

*San Luis National Wildlife Refuge Complex  
Draft Comprehensive Conservation Plan and Environmental Assessment*

# **Appendices**

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## Appendix A: List of Preparers

\*Note: During the CCP process numerous changes and transitions in personnel and team composition occurred.

### **CCP Core Team:**

San Luis NWR Complex Staff  
USFWS Region 8 Office, Natural Resources Division Staff  
USFWS Region 8 Office, Planning Staff  
Former Staff of the San Luis NWR Complex

### **CCP Expanded Team:**

San Luis NWR Complex Staff  
FWS Region 8 Office, Regional Fire Planning Staff

### **CCP Contributors:**

USFWS Region 8 Office, Division of Refuge Law Enforcement Staff  
Former staff of the San Luis NWR Complex

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## Appendix B: References and Glossary of Terms

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## Glossary

**Abiotic Factors.** The non-living parts of an ecosystem, such as light, temperature, water, oxygen, and other nutrients or gases.

**Accumulation.** The build-up of a chemical in an organism due to repeated exposure (Henry and Hickey 1991).

**Acorn.** Fruit of an oak.

**Acre-feet (AF).** An acre-foot of water is the amount of water required to cover 1 acre of land to a depth of 1 foot; it is the equivalent of 325,851 gallons.

**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.

**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 Fan.** Accumulation of sediment where a stream moves from a steep gradient to a flatter gradient and suddenly loses transporting power.

**Alluvium.** Clay, sand, or other sediment that is gradually deposited by moving water (see also alluvial-fan).

**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).

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

**Appropriated Water.** Surface water in an irrigation district that has been assigned or allocated to owners of water rights.

**Appurtenant Land.** The land base to which water rights legally pertain or belong.

**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.

**Aquifer.** An underground layer of porous rock, sand, or gravel containing large amounts of water.

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

**ATV.** All Terrain Vehicle ( either 3 or 4-wheeled vehicles).

**Backward Linkages.** The impacts associated with the purchase of inputs needed to produce a good whose output will change as a direct consequence of the water rights acquisition program.

**Bank.** The rising ground bordering a body of water or forming the edge of a cut or hollow.

**Basin.** A depressed area with little or no surface water; an area where water flows in, but where surface water does not flow out.

**Bench Land.** Eligible land with a water duty of 4.5 AF/acre/year.

**Berries.** Pulpy fruit of relatively small size.

**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 Control.** The use of organisms or viruses to control weeds or other pests.

**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.

**Biosphere.** Synonym: ecosphere. Literally, the "living circle." The portion of our planet (or any other, should life be discovered elsewhere) that contains and supports life. On Earth, this layer is roughly 7 to 8 miles high and, at the deepest depths of the oceans, about 7 miles (a little more than 38,000 feet) deep. All life exists within this thin veneer circling the globe. The biosphere is subdivided into three main sections: lithosphere (the solid part of the planet's surface), hydrosphere (the water on and under the planet's surface), and atmosphere (the mass of air surrounding the planet).

- Biome.** A broad category of habitat; a type of ecosystem. Often characterized by a particular type of climax vegetation. May also be characterized by crucial abiotic factors, such as rainfall or temperature (both of which greatly influence what kind of climax vegetation will be present) values.
- Biota.** The plant and animal life of a region.
- Biotic Factors.** All the living organisms -- fungi, protists, vertebrate, invertebrate, plants, etc. -- and their impacts on other living things within an ecosystem.
- Bogs.** Low-lying and inadequately drained areas rich in plant residues.
- Bottom Land.** Eligible land with a water duty of 3.5 AF/acre/year.
- Canal Losses.** Seepage, evaporation, and operational spills from main-line canals and regulatory reservoirs.
- Carbon Banking.** The storage of atmospheric carbon in living tissues. Carbon is the most fundamental element of organic chemistry, so it is a major component of all living organisms. The largest "banks" are primary growth forests, especially tropical forests. The value of carbon banking is the removal of carbon from the atmosphere, where it contributes to the greenhouse effect.
- Carcinogenic.** Any substance that produces or causes cancer.
- Carnivore.** An animal that kills and eats other animals.
- Categorical Exclusion (CE, CX, CATEX, CATX).** A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).
- CFR.** Code of Federal Regulations.
- 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.

**Concern.** See Issue.

**Cones.** Ovule-bearing mass of scales or bracts of gymnosperm trees.

**Coordination Area.** A wildlife management area made available to a State, by "(A) cooperative agreement between the United States Fish and Wildlife Service and the State fish and game agency pursuant to Section 4 of the Fish and Wildlife Coordination Act (16 U.S.C. 664); or (B) by long-term leases or agreements pursuant to the Bankhead-Jones Farm Tenant Act (50 Stat. 525; 7 U.S.C. 1010 et seq.)." States manage Coordination Areas, but they are part of the Refuge System. We do not require CCPs for Coordination Areas.

**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).

**Delivery.** The amount of irrigation water delivered to a water-users head gate during the irrigation season.

**Demand.** The amount of water that a water-right holder calls for or requests in any one irrigation season. Under Nevada State law demand should not exceed entitlement.

**Deposits.** Material that is laid down through the actions of wind, water, ice, or other natural process.

**Designated Wilderness Area.** An area designated by the United States Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).

**Detritus.** An accumulation of decomposing plant and animal remains.

**Dissolved-Solids.** Particles that are dissolved and suspended in water. See also total dissolved solids.

**Diversion.** A structure in a river or canal that diverts water from the river or canal to another water course.

**Downzoning.** The act of reclassifying a land use of a particular area or property to a lower development-intensity land use classification; such as from moderate density residential to agriculture.

**Drain.** A canal that collects and transports excess water from irrigated farmland.

**Drainwater.** See irrigation drainwater.

**Easement.** A privilege or right that is held by one person or other entity in land owned by another.

**Ecological Integrity.** The integration of biological integrity, natural biological diversity, and environmental health; the replication of natural conditions.

**Ecology.** The branch of biology that studies the interactions of organisms within an environment, either with other organisms (biotic factors) or with the non-living components (abiotic factors) of that ecosystem.

**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.

**Ecosystem Approach.** Protecting or restoring the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.

**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).

**Efficiency.** With reference to an irrigation water delivery system, the proportion of the amount of water delivered for irrigation use compared to the total amount of water released to meet that delivery (i.e., amount of delivery divided by amount of release).

**Effluent.** Waste material discharged into the environment from a wastewater treatment facility.

**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.

**Entitlement.** The annual maximum amount of water which can be delivered to a parcel of land, a product of eligible acres and water duty (expressed in acre-feet).

**Environment.** The sum total of all biological, chemical, and physical factors to which organisms are exposed; the surroundings of a plant or animal.

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

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

**Environmental Impact Statement (EIS).** A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

**Ephemeral.** Pertains to streams, lakes and wetlands that exist temporarily each year.

**Ethnography.** The branch of anthropology that deals descriptively with specific cultures, especially those of non-literate peoples.

**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).

**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.

**Fallow.** Allowing land that normally is used for crop production to lie idle.

**Farm Profits.** Sales minus fixed and variable costs.

**Fauna.** All the plant species of a determined area.

**Federal Trust Resources.** A trust is something managed by one entity for another who holds the ownership. The Service holds in trust many natural resources for the people of the United States of America as a result of Federal Acts and treaties. Example are species listed under the Endangered Species Act, migratory Birds protected by the Migratory Bird Treaty Act and other international treaties, and native plant or wildlife species found on the Refuge System.

**Ferns.** Spore-forming vascular plants with leaf-like fronds.

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

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

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

**Forbs.** Herbaceous dicotyledonous plants.

**Forward Linkages.** Impacts that are associated with the use of goods whose production will change as a direct consequence of the water rights acquisition program. For instance, if additional cost to an alfalfa producer is incurred due to water rights acquisitions, this cost will be passed on to dairy producers by forward linkages.

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

**Friable Soil.** Easily crumbled or pulverized soil.

**Fruit.** Pulpy fruit reproductive body of a seed plant.

**Fungi.** Sapropttic spore-forming, nonvascular plants such as mushrooms, molds, etc.

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

**Goal.** 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.

**Graminoids.** Grasses and grass-like plants.

**Gravelly Soil.** Soil dominated by gravel size grains 2 to 75 mm (.08 to 3.0) in diameter).

**Greenhouse Effect.** Warming of the surface and lower atmosphere of a planet caused by conversion of solar radiation into heat. The process of gases trapping heat from the sun in the Earth's atmosphere is called the greenhouse effect.

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

**Habitat Restoration.** Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy forestlands, rangelands, and aquatic systems.

**Head gate.** The control works or gate at the entrance to a canal or conduit system.

**Head gate entitlement.** The amount of water/AF/year to which a particular water right is entitled.

**Humus.** The nutrient-rich, dark dirt found in areas with lots of decaying organic material suspended in the soil. Commonly referred to as "topsoil." Humus is generally rich in saprobes and saprophytes (things that get their nutrients by decomposing dead organic materials, thereby speeding the nutrient cycles and making the soil richer).

**Hydrologic Regime.** The local pattern and magnitude of water flow influenced by season.

**Hydrology.** The science dealing with the properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere. The distribution and cycling of water in an area.

**Hydrothermal.** Relating to hot water-especially to the formation of minerals by hot solutions rising from a cooling magma. Underwater volcanoes can form hydrothermal chimneys.

**Impoundment.** A body of water created by collection and confinement within a series of levees or dikes thus creating separate management units although not always independent of one another.

**Impact.** See effect.

**Informed Consent.** The grudging willingness of opponents to "to go along" with a course of action that they actually oppose (Bleiker).

**Indigenous.** Native to the area.

**Industry Outputs.** The estimated value of commodities produced in any given year.

**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.

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

**Irrigated Acreage.** The amount of land that is irrigated.

**Irrigation Delivery.** Refers to the delivery of water for irrigation purposes.

**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.

**Lacustrine.** Of or pertaining to lakes. More specifically, this term refers to permanent, seasonal, and intermittent lakes and reservoirs that typically have depths exceeding 6 feet and are larger than 20 acres, and that have less than 30 percent of their area covered by emergent wetlands vegetation.

**Landowner.** A person or entity indicated as the owner of property on the various ownership maps maintained by the Office of the County Assessor.

**Lease.** A legal contract by which water rights are acquired for a specified period of time for a specified rent or compensation.

**Levee.** An embankment along the river to prevent water from overbank flooding.

**Lichens.** Algal-fungal symbiotic associations on solid surfaces.

**Linear Regression.** A mathematical technique used to determine the functional relationship between two variables; the resulting model can be used to predict the values of one variable when values of the other variable are given.

**Lithic.** A scatter of rocks less than 254 mm (10 in) in diameter on the ground.

**Management Alternative.** See Alternative.

**Management Concern.** See Issue.

**Management Opportunity.** See Issue.

**Marsh.** A periodically wet or continually flooded area where the water is shallow enough to allow the growth of emergent vegetation such as sedges, rushes, and cattails.

**Marsh Habitat.** Habitat that is characterized by shallow water and emergent vegetation. Unless otherwise specified, this term does not apply to similar habitat found in rivers, drains, or canals.

**Migration.** The seasonal movement from one area to another and back.

**Migratory Bird.** A bird that seasonally moves between geographic areas. In reference to birds in the Great Basin, a bird that breeds in Great Basin and subsequently moves south of the Great Basin for the winter months. Birds that migrate south of Mexico for the winter are considered neotropical migrants.

**Mission Statement.** Succinct statement of the unit's purpose and reason for being (Region 7 Planning Staff).

**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.

**Mobilization.** Transport or movement of an element or other substance into the water column.

**Model.** A mathematical formula that expresses the actions and interactions of the elements of a system in such a manner that the system may be evaluated under any given set of conditions.

**Moist-Soil.** A process where water is drawn down intentionally or naturally to produce mudflats (i.e., moist soil) that are required for germination of many desirable plants.

**Moss.** Bryophytic plants.

**Mud Flat.** Expanses of mud contiguous to a water body often covered and exposed by tides.

**Multiplier.** A number by which another number is multiplied. Used in economic analysis to show linkages.

**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 AReport of Lands Under Control of the U.S. Fish and Wildlife Service.@

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

**National Wildlife Refuge System Mission (mission).** "The mission of the System is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

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

**NEPA.** National Environmental Policy Act of 1969.

**Nectar.** The sweet fluids secreted by flowers.

**Nest Box.** A box constructed to provide secondary cavity nesters a nesting site.

**Nest Platform.** An elevated platform constructed as a large bird nesting site.

**Nest Island.** An island constructed for bird nesting.

**Niche.** An organism's "place," or role, in an ecosystem. This involves many components of the organism's life: where it lives (habitat), what it eats, by whom it is eaten, when it migrates or breeds, etc. All of these factors combine to determine the role of the organism in its ecosystem.

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

**Non-Priority Public Uses.** Any use other than a compatible wildlife-dependent recreational use.

**Non-Structural Alternative:** A hydraulically based flood control design alternative versus an engineered solution for control of flood waters.

**Notice of Intent (NOI).** A notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the *Federal Register*.

**Nuts.** Hard-shelled, dry fruit.

**NWR.** National Wildlife Refuge.

**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.

**Operation and Maintenance (O&M) Costs.** Charges paid by water users for delivery of water in the Newlands Project that are paid to the Newlands Project operator for reasonable and customary operation and maintenance of the delivery system.

**Opportunities.** Potential solutions to issues.

**Organic Soil.** Soil which contains greater than 20 percent of organic matter by weight.

**Overbank Flooding.** River flows that exceed the boundaries of the existing river channel and flood the adjacent riparian areas and bottomlands.

- Palustrine.** Of or pertaining to marshes or marsh habitat. More specifically, for this document, this term refers to permanently, seasonally, and intermittently flooded areas that typically have depths less than six feet and that have more than 30 percent of their area covered by emergent wetland vegetation.
- Passerine Bird.** A songbird or other perching bird that is in the order Passeriformes. Blackbirds, crows, warblers, sparrows, and wrens for example.
- Perennial.** In reference to a body of water, one that contains water year-to-year and that rarely goes dry.
- Pasture Land.** Eligible land with a water duty of 1.5 AF/acre/year.
- Peak Flow.** The maximum discharge of a stream during a specified period of time.
- Permeability.** The property or capacity of porous rock, sediment, or soil to transmit water.
- Phenology.** Life cycle of a particular species.
- Phreatophytes.** Plants whose roots penetrate to the water table.
- Physiographic.** Physical geography of a particular region of the U.S.
- PILT.** Payment-in-Lieu-of-Taxes.
- Planning Area.** The area upon which the planning effort will focus. A planning area may include lands outside existing planning unit boundaries currently studied for inclusion in the Refuge System and/or partnership planning efforts. It also may include watersheds or ecosystems outside of our jurisdiction that affect the planning unit. At a minimum, the planning area includes all lands within the authorized boundary of the refuge.
- Planning Team.** A team or group of persons working together to prepare a document. Planning teams are interdisciplinary in membership and function. Teams generally consist of a Planning Team Leader, Refuge Manager and staff biologists, a state natural resource agency representative, and other appropriate program specialists (e.g., social scientist, ecologist, recreation specialist). We also will ask other Federal and Tribal natural resource agencies to provide team members, as appropriate. The planning team prepares the CCP and appropriate NEPA documentation.
- Planning Team Leader.** The Planning Team Leader typically is a professional planner or natural resource specialist knowledgeable of the requirements of NEPA and who has planning experience. The Planning Team Leader manages the refuge planning process and ensures compliance with applicable regulatory and policy requirements.
- Planning Unit.** A single refuge, an ecologically or administratively related refuge complex, or distinct unit of a refuge. The planning unit also may include lands currently outside refuge boundaries.

**Plant Community.** An assemblage of plant species of a particular composition. The term can also be used in reference to a group of one or more populations of plants in a particular area at a particular point in time; the plant community of an area can change over time due to disturbance (e.g., fire) and succession.

**Playa.** A shallow basin where water collects and is evaporated.

**Pollutant.** Any introduced gas, liquid, or solid that makes a resource unfit for a specific purpose.

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

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

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

**Prescribed Natural Fires.** A fire ignited by natural process (usually lightning) and allowed to burn within specified parameters of fuels, weather, and topography to achieve specified resource management objectives.

**Primary Wetland Habitat.** Habitat provided by shallow or deep water (up to 6-feet deep), with or without emergent and aquatic vegetation. Primary wetland habitat only exists when and where a primary wetland or portion of a primary wetland is flooded with water (visible surface water). Consequently, the size and shape of "primary wetland habitat" will fluctuate from season-to-season and year-to-year while the size and shape of the "primary wetland" within which primary wetland habitat occurs will remain constant from season to season and from year to year. Primary wetlands only provide habitat for waterfowl, shorebirds, muskrats, aquatic insects, and other wetland-dependent wildlife when they contain surface water (i.e., when they provide wetland habitat).

**Prime Farmland.** Farmland in an area or region that is considered to be the most ideal farmland based on several criteria; usually soil types and land productivity of the land are two of the most important criteria.

**Prime Water.** Any water delivered via a canal to a head gate.

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

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

**Public.** Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

**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 Involvement Plan.** Broad long-term guidance for involving the public in the comprehensive planning process.

**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.

**Purveyor.** A private land owner or association that controls water rights for the ability to use the water.

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

**Recommended Wilderness.** Areas studied and found suitable for wilderness designation by both the Director and Secretary, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).

**Record of Decision (ROD).** A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

**Recreation Day.** A standard unit of use consisting of a visit by one individual to a recreation area for recreation purposes during any reasonable portion or all of a 24-hour period.

**Refuge.** Short of National Wildlife Refuge.

**Refuge Goal.** See goal.

**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.

- Refuge Purposes.** 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, a refuge unit, or refuge subunit (Draft Service Manual 602 FW 1.5).
- Refuge Revenue Sharing Program or RRSP.** Proves payments to counties in lieu of taxes using revenues derived from the sale of products from refuges.
- Refuge Use.** Any activity on a refuge, except administrative or law enforcement activity carried out by or under the direction of an authorized Service employee.
- Remediation.** The act or process of correcting a problem.
- Reservoir.** An artificially created lake in which water is collected and stored for future use.
- Reservoir Storage.** The volume of water held in a reservoir at any particular time.
- Return Flow.** See irrigation return flow.
- Riparian Area.** The land adjacent to rivers, streams, and irrigation canals and drain ditches where vegetation is influenced by higher amounts of water than the surrounding lands. For the purpose of this EIS, riparian areas do not include the land surrounding lakes and basin marshes.
- Riverine.** Living or situated on the banks of a river; related to, formed by, or resembling a river.
- RMIS.** Refuge Management Information System database
- Roots.** The underground parts of plants.
- Sales.** Gross cash receipts.
- Saline Soil.** Soils which are saline or alkaline, supporting vegetation which is salt tolerant (e.g., pickleweed, salt grass, shadscale, iodine bush).
- Salinity.** An expression of the amount of dissolved solids in water.
- Sand Dune.** A hill or ridge of sand piled up by the wind.
- Sandy Soil.** Soil dominated by sand grain .05 to 2 mm (.002 to .08 in) in diameter.
- Sap.** The fluid part of a plant.
- Secretary.** Short of the Secretary of the Interior.
- Sediment.** Any material, carried in suspension by water, which ultimately settles to the bottom of water courses. Sediments may also settle on stream banks or flood plains during high water flow.
- Seeds.** The ovules of plants.

**Service. Or USFWS.** Short for U.S. Fish and Wildlife Service.

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

**Shrubs.** Woody plants of smaller stature than trees when fully grown.

**Soil Erosion.** The wearing away of the land's surface by water, wind, ice, or other physical process.

**Sound Professional Judgement.** 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.

**Spatial Distribution.** The pattern of frequency of a specific habitat type over a larger area.

**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.** A group of species that inhabit a specific habitat type in its healthy state. To enhance species composition is to ensure that all or as many species as possible inhabit the appropriate habitat by improving the quality of that habitat.

**Spill.** With reference to a reservoir operations, water that is released, either inadvertently or through precautionary releases, in excess of that required to compensate for delivery system losses and to meet irrigation demand.

**Spillway.** The overflow channel of a dam.

**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).

**Submergent Vegetation.** Plants that grow completely submerged except when flowering.

**Sub-surface Drainage.** Irrigation water that percolated into the soil and subsequently flows under the surface of irrigated farmland into drains.

**Surface Water.** A body of water that has its upper surface exposed to the atmosphere.

**System or Refuge System.** National Wildlife Refuge System.

**Talus.** A slope formed by an accumulation of rock debris, often at the base of a cliff.

**Targeting.** A technique for acquiring or protecting water-rights whereby specific areas could be targeted, based on soil type classification or other relevant variables.



**Terminus.** In reference to a stream or river, its end point; where it flows into a lake or other basin.

**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.

**Tiering.** The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).

**Total Dissolved-Solids (TDS).** The total concentration of solids (or salts) dissolved in water; specific conductance is a surrogate measure of dissolved solids. More specifically, total dissolved-solids is an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, etc. of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

**Trace Elements.** Metallic elements (with atomic number >21) generally occurring in trace amounts in water, including iron, manganese, copper, chromium, arsenic, mercury, and vanadium.

**Transfer Rate.** The use-rate for a water right that is transferred from an owner to a buyer during a transaction.

**Transient Species.** Animals that migrate through a locality without breeding or overwintering.

**Trust Species.** Species for which the U.S. Fish and Wildlife Service has primary responsibility, including, most federally listed threatened and endangered species, anadromous fishes once they enter inland U.S. waterways, migratory birds, and certain marine mammals.

**Turbidity.** Cloudiness of a water body caused by suspended silt, mud, pollutants, or algae.

**Understory.** Shrubs and herbaceous plants that typically grow beneath larger trees in a woodland.

**Unit Objective.** See objective.

**Unconsolidated.** A geological term that describes soil that is not compacted.

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

**Use-rate.** The amount of water/AF/year to which a particular water right is entitled.

**USFWS or Service.** Short for U.S. Fish and Wildlife Service.

**U.S. Fish and Wildlife Service Mission.** Our mission is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

**Vegetation Community.** See plant community.

**Vegetation Type or Habitat Type.** A land classification system based upon the concept of distinct plant associations.

**Vernal Pool.** Seasonally flooded depressions found on ancient soils with an impermeable layer such as a hardpan, claypan, or volcanic basalt. The impermeable layer allows the pools to retain water much longer than the surrounding uplands; nonetheless, the pools are shallow enough to dry up each season. Vernal pools often fill and empty several times during the rainy season. Only plants and animals that are adapted to this cycle of wetting and drying can survive in vernal pools over time.

**Vertebrate.** An animal having a segmented backbone or vertebral column; includes mammals, birds, fish, amphibians, and reptiles.

**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.

**VOW.** Valley oak woodland habitat

**Water Duty.** The maximum rate at which water can legally be delivered to a farm head gate to satisfy a water right, usually expressed in AF/acre/year.

**Water Year.** That period of time between October 1 of one calendar year and September 30 of the next calendar year. Traditionally, hydrologic data (i.e., stream flows, precipitation, etc.) was summarized or totaled for this period of time.

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

**Water-righted Acreage.** The land base for which there are water rights.

**Water Rights.** A grant, permit, decree, appropriation, or claim to the use of water for beneficial purposes, and subject to other rights of earlier date of use, called priority, or prior appropriation.

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

**Wetland.** Land that is transitional between upland (terrestrial) and aquatic systems (greater than about 6-feet deep) where the water table is usually at or near the surface or the land is covered by shallow water... wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (plants that require wet conditions); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin and others, 1979).

**Wetland Habitat.** Habitat provided by shallow or deep water (but less than 6-feet deep), with or without emergent and aquatic vegetation in wetlands. Wetland habitat only exists when and where a wetland or portion of a wetland is covered with water (visible surface water). Consequently, the size and shape of "wetland habitat" will fluctuate from season-to-season and year-to-year while the size and shape of the "wetland" within which wetland habitat occurs will remain constant from season to season and from year to year. Wetlands only provide habitat for waterfowl, shorebirds, muskrats, aquatic insects, and other wetland-dependent wildlife when they contain surface water (i.e., when they provide wetland habitat).

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

**Wilderness Study Areas.** Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

**Wilderness.** See designated wilderness.

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

**Wildland fire.** Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3)

**Wildlife.** All non-domesticated animal life; included are vertebrates and invertebrates.

**Wildlife Corridor.** A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival of reproduction of its migrants.

**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.

**Zoning.** The act of dividing a city or county into zones, and assigning particular, allowable land uses for each of the defined zones; also used in reference to the end product of such a process.

**Zooplankton.** Small animals free-floating in the oceans and lakes of the world. Unable to control their movements through the oceans, they are at the mercy of the currents and tides. They feed on smaller zooplankton or on phytoplankton. Examples of zooplankton would include true plankton (animals that will remain planktonic all their lives) such as jellyfish, ctenophores, chaetognaths, and -- the most important of all plankton -- the shrimp-like krill of the south oceans. Zooplankton also includes transient plankton (organisms that will not remain planktonic for their whole lifecycle) such as baby crabs and lobsters, newly hatched fish, coral larvae, etc.

# Draft Compatibility Determination

## Title

Compatibility Determination for Commercial Photography at Merced National Wildlife Refuge

## Refuge Use Category

Wildlife Observation and Photography

## Refuge Use Type(s)

Photography, video, filming or audio recording (commercial)

Wildlife Observation (commercial)

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS), otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment.

**What is the use?**

Commercial photography is a commercial activity conducted by an individual or organization involving photography, videography, filming or other recording of sight or sound. This includes the creation of educational, entertainment or commercial enterprises as well as advertising audio-visuals for the purpose of paid product or services, publicity and commercially oriented photo contests. Wildlife photography is one of the six priority wildlife-dependent public uses of the NWRS and are to be encouraged when compatible with the purposes of the Refuge.

**Is the use a priority public use?**

Yes.

**Where would the use be conducted?**

Commercial recording may take place by foot, from blinds or using vehicles. Landing or taking-off of drones (unmanned aerial systems or UAS) on Refuge lands could be approved on a case-by-case basis depending on specific circumstances of the request and through the special use permit (SUP) process. Areas used for obtaining recordings, modes of access and equipment used would be approved on a case-by-case basis under an SUP with terms and conditions. Recording activities and access on Refuge lands may be restricted (e.g., seasonal, location) to avoid impacts to sensitive wildlife or resources where disturbance could be detrimental.

**When would the use be conducted?**

Commercial recording could be permitted seven days a week from dawn to dusk but would need to be closely coordinated with the Refuge if occurring during sensitive periods (e.g., breeding season of a listed species). Proposed activities will be evaluated to ensure they do not cause excessive disturbance to wildlife, habitats and sensitive resources or interfere with Refuge operations, and they may be denied.

**How would the use be conducted?**

Commercial photography is conducted in accordance with Department of Interior regulations. The regulation governing commercial filming and still photography is found at 43 CFR, part 5, subpart A. The Service manages audio recording as governed within 50 CFR, part 21.71. That rule implemented the requirements of P.L. 106-206 (16 U.S.C. 460l-6d), which directed the Secretaries of Interior and Agriculture to require permits and develop a consistent fee structure for commercial filming and some photography on Federal lands. The final rule, which modifies regulations at 36 CFR, part 5, defines commercial filming and still photography and explains which activities require a permit. In accordance with P.L. 106-206, the rule states that all commercial filming and certain photography activities require a permit. The rule also discusses the more limited circumstances when a permit is required for news-gathering activities. It states conditions under which a filming or photography permit may be denied: if the activity would cause resource damage; unreasonably disrupt public use; pose health or safety risks; or violate the Wilderness Act (16 U.S.C. 1131-1136) or other applicable laws or regulations. Commercial still photography only requires a permit in certain cases, per 43 CFR 5.2(b):

"Still photography does not require a permit unless:

- 1) It uses a model, set, or prop as defined in § 5.12; or
- 2) The agency determines a permit is necessary because:
  - (i) It takes place at a location where or when members of the public are not allowed; or
  - (ii) The agency would incur costs for providing on-site management and oversight to protect agency resources or minimize visitor use conflicts."

A permit for audio recording would be required under the same conditions as still photography.

Commercial recording requests must be submitted to the Refuge manager at least two weeks in advance of the requested visit via an application for a Commercial SUP. The application includes interpretive purpose of the recording, description of the three proposed activities, dates and times, number of personnel and equipment used. The U.S. Fish and Wildlife Service (Service) will evaluate the SUP application using the following criteria:

- 1) How does the interpretive message of the recording align with the mission of the Service and the NWRS?
- 2) How does the interpretive message of the recording align with the Refuge's goals and objectives?
- 3) Will the recording request conflict with any management programs?
- 4) Will the recording be intrusive in any way or cause undue disturbance to Refuge resources?
- 5) Depending upon the scale of the request, does the Refuge have available resources to manage the proposed SUP?

In some instances, arrangements can be made to allow commercial photographers into closed portions of the Refuge Complex in exchange for the Service receiving images taken by the photographer for use in public outreach products and displays.

### **Why is this use being proposed or reevaluated?**

Commercial photography is being reevaluated as a Refuge use in conjunction with the San Luis National Wildlife Refuge (NWR) Complex Comprehensive Conservation Plan and Environmental Assessment. Commercial photography is also found to be compatible on San Luis NWR in a separate Compatibility Determination.

### **Availability of Resources**

Adequate funding and staff exist to manage commercial photography conducted by private individuals or groups at the Merced NWR. Costs are primarily administration, monitoring and facilities. Administrative staff costs associated with this use consists of Refuge Complex staff time to review applications for SUPs, evaluate impacts and ensure that photographers are in compliance. Annual monetary costs expended by the Refuge Complex to administer this use averages \$5,000. Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.” Only the impacts to vegetation and wildlife resources are discussed below; all other resources will not be more than negligibly impacted by the action and have been dismissed from further analyses.

### **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities, such as wildlife observation/photography, may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively impact wildlife, producing stressful conditions even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon...” 16 U.S.C. Sec 664 (Fish and Wildlife Coordination Act).

However, the Refuge System Administration Act states that the Refuge System “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.” Commercial photography on the Merced NWR will provide such wildlife-dependent recreation, increasing the public’s knowledge and understanding of wildlife and streamside habitats and increasing their sense of ownership of and support for conservation of those lands.

### **Short-term impacts**

Commercial recording activities could cause temporary disturbance to wildlife. Adherence by the permittee to the terms and conditions of the SUP will lessen or eliminate disturbance. If disturbance occurs, it is expected to be localized and of short duration. Wildlife disturbed generally have abundant cover or escape routes and disturbance is likely to have impacts (fright and flight) of short duration. Once considered "non-consumptive," wildlife observation and photography are now seen as possible threats to wildlife by altering wildlife behavior, reproduction, distribution and habitat (Purdy et al. 1987; Knight and Cole 1995).

### **Long-term impacts**

Purdy et al. (1987) and Pomerantz et al. (1988) described six categories of impacts to wildlife resulting from visitor activities: 1) direct mortality; 2) indirect mortality; 3) lowered productivity; 4) reduced use of Refuge; 5) reduced use of preferred habitat on the Refuge and 6) aberrant behavior/stress. Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Many studies have shown that birds can be



impacted from human activities on trails when they are disturbed and flushed from feeding, resting or nesting areas.

Flushing, especially repetitive flushing, can strongly affect habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy and be deterred from using desirable habitat, affect resting or feeding patterns, and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989). Nest predation for songbirds (Miller, Knight and Miller 1998) and raptors (Glinski 1976) tend to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994). Depending on the species (especially migrants vs. residents), some birds may habituate to some types of recreation disturbance, and either are not disturbed or will immediately return after the initial disturbance (Hockin et al. 1992; Burger, Gochfeld and Niles 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). We do not expect indirect impacts or alterations to wildlife habitat, such as availability of food, shelter and living space (Cole and Landres 1995), from commercial recording because it is short-term in nature.

As noted above, the proposed use does not include unrestricted access to sensitive areas or allow activities outside of appropriate times of the year when the use may disturb wildlife and their habitat. Service staff or a partner approved by the Refuge may actively supervise each permittee or allow permittees to shadow Service staff or the Refuge partner during conservation activities taking place on the Refuge, as the Service determines necessary to minimize disturbance. By restricting commercial recording in this way, permittees are not likely to disturb Federally endangered wildlife or interfere with Refuge management activities.

Of the wildlife observation techniques, wildlife photographers tend to have the largest disturbance impacts (Klein 1993, Morton 1995, Dobb 1998). While wildlife observers frequently stop to view species, wildlife photographers are more likely to approach wildlife (Klein 1993). Even slow approach by wildlife photographers tends to have behavioral consequences to wildlife species (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers, with low-power lenses, to get much closer to their subjects than other activities would require (Morton 1995) and wander off trails. This usually results in increased disturbance to wildlife and habitat, including trampling of plants.

However, because commercial photographers have high-power lenses and video equipment, they are likely to have fewer disturbance effects to wildlife and habitat than the average photographer. Some localized impacts to vegetation may occur from trampling by foot, vehicle or portable blind use for recording purposes. Humans and equipment can also be vectors for invasive plants by moving seeds or other propagules from one area to another. Refuge staff will monitor and evaluate the effects of these potential impacts to discern if adverse effects to wildlife or habitats result from the uses.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

1. Recording activities and access on Refuge lands are subjective to time and location restrictions, if needed, to protect sensitive habitat or wildlife. Such restrictions will be determined by the Refuge Manager or equivalent.
2. All visitors must comply with NWRS-related regulations, including Prohibited Acts listed in 50 C.F.R § 27 and Public Entry Regulations in 50 C.F.R. § 26.
3. Permittee(s), designated representatives and associates shall comply with terms and conditions within the SUP as provided by the Refuge Manager. The SUP will provide terms and conditions to eliminate or reduce impacts to Refuge resources. News gathering organizations are exempt from formal permits and bonding requirements.
4. Permittee(s) will contact the Refuge Manager and/or the Manager's designee prior to commencement of work, preferably 2 weeks in advance to identify conflicts and sensitive areas/wildlife.
5. If a drone (UAS) is approved to land or take off from the Refuge, then the permittee shall follow all FAA regulations (Small UAS Rule; Part 107) and remain in visual and operational control of the aircraft at all times. In addition, the permittee use of a drone must not take, disturb, harass or chase wildlife as defined within the Endangered Species, Migratory Bird Treaty and Airborne Hunting Acts and the Code of Federal Regulations. Any use of drones on the Refuge must be in accordance with the Department of Interior policy.
6. The Refuge Manager or designee may supervise permittee activities and can suspend, modify or terminate any recording should unacceptable, unforeseen or unexpected impacts or issues arise.
7. The Refuge may terminate the special use permit for non-compliance with listed conditions or if the Refuge Manager determines the use of the permit is no longer in the best interest of the Refuge.

## **Justification**

The National Wildlife Refuge System Improvement Act of 1997 identifies interpretation, environmental education and wildlife photography as priority public uses for national wildlife refuges, along with hunting, fishing and wildlife observation. As expressed, priority uses of the Refuge System, these uses take precedence over other potential public uses in Refuge planning and management. The Service strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the NWRS.

Currently, the Refuge's visitor use is an estimated average of 57,000 visits to the Refuge annually. Allowing select commercial recording activities will enhance the public's understanding of the Service mission and the Refuge and its biological resources.

Assessing the potential impacts determined that commercial recording within Merced National Wildlife Refuge as described herein will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In the Service's opinion, allowing commercial recording with associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge.

## **Signature of Determination**

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Refuge Manager Signature and Date

## **Signature of Concurrence**

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Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2038

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# **Draft Compatibility Determination**

## **Title**

Compatibility Determination for Cooperative Farming, Grazing and Haying at Merced National Wildlife Refuge

## **Refuge Use Category**

Agriculture, Aquaculture and Silviculture

## **Refuge Use Type(s)**

Farming (cooperative)

Grazing

Haying or ensilage

## **Refuge**

Merced National Wildlife Refuge

## **Refuge Purpose(s) and Establishing and Acquisition Authority(ies)**

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## **National Wildlife Refuge System Mission**

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## **Description of Use**

### **Is this an existing use?**

Yes. This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment.

### **What is the use?**

Cooperative farming is the practice of agriculture, especially mechanically disturbing the soil and artificially introducing seeds or other plant parts periodically to produce stands of plants, for use primarily as food by wildlife, domestic animals or humans. This includes water delivery, irrigation and drainage. Grazing is the feeding on vegetation by domestic livestock. This includes trailing and watering of livestock. Haying or ensilage is defined as the cutting or mowing of vegetation for fodder.

Merced NWR (Refuge) has utilized grain crops since its inception in 1951, as well as irrigated pasture since 1969. Farming is used on the Refuge to produce cereal grain and green browse for use as forage supplies for arctic-nesting geese, sandhill cranes and other wildlife in the winter and early spring, and to produce nesting and foraging substrate for tricolored blackbirds and other wildlife in the spring and summer.

This cooperative farming and grazing programs were initiated under authority of the Lea Act to provide an abundant forage supply to attract migratory birds to the Refuge and reduce crop depredation on nearby private agricultural lands. As cropping patterns changed, the Refuge farming and grazing programs were continued to provide and enhance winter forage supplies on which arctic nesting geese and sandhill cranes were dependent. In more recent years, the Refuge farming program has also provided nesting and foraging habitat for tricolored blackbirds as part of a state-wide conservation effort to restore that species.

The Cooperative Farming Program directly improves and enhances foraging conditions that provide such a high level of migratory bird use. In addition to providing food for waterbirds, cooperative farming is a valuable management tool for providing long-term, cost-effective habitat improvements and depredation relief to lease lands and private farm fields.

### **Is the use a priority public use?**

No.

### **Where would the use be conducted?**

Cooperative farming occurs on the approximately 750 acres of agricultural lands (corn, winter wheat and irrigated pasture) on the Merced NWR. Only land that was leveled and used for row crop agriculture or irrigated pasture prior to U.S. Fish and Wildlife Service (USFWS) ownership is included in the Refuge farming program. Currently, the farming program encompasses approximately 750 acres (four row crop fields and eight irrigated pasture units). The acreage and types of crops grown is consistent with the Refuge management goals, objectives, and strategies detailed in the draft Comprehensive Conservation Plan for the San Luis NWR Complex. Only land that had been leveled and converted to

agricultural use prior to USFWS ownership would be considered for inclusion in the Refuge farming program.

Grazing is conducted on all Refuge subunits (Merced, Mariposa, North Merced, Snobird, Arena Plains) and on the following habitat types: irrigated pasture, natural upland and altered floodplains and fallowed farm fields.

### **When would the use be conducted?**

During the late spring, summer, and early fall, the pastures are irrigated with surface delivered water on a bi-monthly rotation. The pastures are allowed to grow to a tall stature during the spring to provide waterfowl nesting and tricolored blackbird foraging habitat and then hayed back to a short stature in late May/early June. From the time of haying to December, the pastures are grazed using cattle to maintain their health and short stature.

The winter wheat is planted in the fall (aerial or ground broadcast application) and left to sprout by winter rains or irrigated by the Cooperator as needed. After tricolored blackbird nesting is complete, the fields are left fallow until late summer or fall, at which time they are burned and mowed and/or disked by Refuge staff. The latter provides foraging habitat for sandhill cranes in the early fall. If sufficient wheat grain remains, the field is left to re-seed itself in the second fall following the initial seeding, or otherwise broadcast seeded.

Grazing regimes and timeline vary; more details on timing can be found under “How would the use be conducted?” below.

### **How would the use be conducted?**

The Refuge farming and grazing programs are implemented through multi-year Cooperative Agricultural Agreements (CAAs) with local farming and grazing operators. Each agreement is publicly advertised on a 5-year basis. Annual farming and grazing activities are based on annual farming/grazing plans developed by Refuge staff. These plans provide specific stocking rates, duration of stocking and subunit specific management goals.

#### **Cooperative Farming Program**

The ongoing farming program focuses on production of corn, winter wheat and the cutting of grass hay in irrigated pastures. Much of the on-the-ground farming work is done by the CAA Cooperator rather than Refuge staff. The Cooperator is responsible for all costs of growing crops of corn and winter wheat as an in-lieu service in exchange for 1) the value of livestock grazing rights on native uplands and irrigated pasture and 2) the cutting of hay on irrigated pasture.

The Cooperator plants the corn in fields designated in the annual plans and grows it to maturity. The entire crop belongs to the USFWS and is mowed by Refuge staff throughout the winter to provide grain forage for migratory birds.

Winter wheat is grown in other designated fields during fall to produce green browse for geese in the fall and winter, nesting substrate for tricolored blackbirds in the spring, and residual grain for sandhill cranes



in the fall. The winter wheat is planted in the fall (aerial or ground broadcast application) and left to sprout by winter rains or irrigated by the Cooperator as needed. Cranes feed on the sprouting grains and geese browse on the meristems of the winter wheat plants. Grazing impacts by geese and cranes through the winter, plus a lack of herbicide application, generally result in a mixed stand of wheat and weeds by spring. On a scheduled basis, individual winter wheat fields are disked down and prepared for corn planting, and other fields are left to grow and provide a nesting substrate for tricolored blackbirds. After nesting is completed, the fields are left fallow until late summer or fall, at which time they are burned and mowed and/or disked by Refuge staff. The latter provides foraging habitat for sandhill cranes in the early fall. If sufficient wheat grain remains, the field is left to re-seed itself in the second fall following the initial seeding, or otherwise broadcast seeded.

Irrigated pasture is maintained on the Merced unit of the Refuge and managed in a short-crop condition for much of the year by cattle grazing. During the late spring, summer and early fall, the pastures are irrigated with surface delivered water on a bi-monthly rotation. The pastures are allowed to grow to a tall stature during the spring to provide waterfowl nesting and tricolored blackbird foraging habitat. and then hayed back to a short stature in late May/early June. From the time of haying to December, the pastures are grazed using cattle to maintain their health and short stature. Periodically, these pastures need to undergo reconditioning to maintain optimal forage quality for wildlife, which may entail the addition of fertilizers, reseeding and/or invasive plant control.

Crops are rotated in a systematic fashion with individual fields generally being in winter wheat for 2 years and then switched to corn for 2 years. Depending on rotations, the amount of land planted to corn and wheat both range from approximately 140 to 200 acres. The farming Cooperator also harvests a single cutting of grass/clover hay from the irrigated pastures each year; this is a common agricultural practice to eradicate newly established weeds prior to turning in cattle to graze that maintains pasture quality and reduces the need for herbicide application. Haying in the irrigated pastures is generally not allowed until June 1 of each year due to the importance of tall vegetation as foraging habitat for tricolored blackbirds. In addition to the regular cycle of haying and grazing, the irrigated pastures are periodically disked under and planted to corn, sorghum sudan or other small cereal grain for one year and then re-seeded as part of pasture rehabilitation (following a flood or 10- to 15-year rotation). This farming program, consisting of corn/wheat production and haying of irrigated pastures, allows Refuge staff to manage habitats and provide wildlife forage supplies in a manner that is consistent with the Refuge System mission and the purposes for which the Merced NWR was established.

Farming cooperators are chosen according to the process described in the USFWS Refuge Manual, 620 FW 2, and farming privileges are awarded when a producer enters into a Cooperative Agricultural Agreement with the Refuge. Part 29.2 of Title 50, Code of Federal Regulations, entitled "Cooperative Land Management," states that: "Cooperative agreements with persons for crop cultivation, haying, grazing, or the harvest of vegetative products, including plant life, growing with or without cultivation on wildlife Refuge areas may be executed on a share-in-kind basis when such agreements are in aid of or benefit to the wildlife management of the area."

The custom farming rates, labor and hay value equivalents reflect standard practices and fair-market rental rates characteristic of Merced County, with adjustments made for restrictions imposed by the

USFWS. Such restrictions include not allowing use of insecticides, limiting use of herbicides to an approved list of products, timing of plantings and delaying haying of pastures until June 1.

### Grazing Program

The ongoing Refuge grazing program utilizes cattle as habitat management tools to produce habitat conditions that meet seasonal and year-round needs of different wildlife species, maintain and enhance natural plant communities and control non-native invasive weeds. This grazing on Refuge lands is conducted in a manner that is consistent with the Refuge System mission and the purposes for which the Merced NWR were established.

All livestock used in the proposed grazing program are owned and managed by local agricultural producers. Grazing privileges are awarded by the Refuge when a producer enters into a CAA with the Refuge. Part 29.2 of Title 50, Code of Federal Regulations, entitled "Cooperative Land Management," states that: "Cooperative agreements with persons for crop cultivation, haying, grazing, or the harvest of vegetative products, including plant life, growing with or without cultivation on wildlife Refuge areas may be executed on a share-in-kind basis when such agreements are in aid of or benefit to the wildlife management of the area."

Grazing cooperators are chosen according to the process described in the USFWS Refuge Manual, 620 FW 2.

Grazing regimes vary by habitat type, site specific objectives and Refuge Unit.

### *Irrigated Pastures*

Irrigated pastures are present only on the Merced Unit and are generally grazed on a rotational basis from June 1 to December 15 each year. The irrigated pastures are leveled farm fields (leveled prior to acquisition) that have been planted with a mix of domestic grasses and forbs and are maintained by regular irrigations and vegetation management. Summer grazing is done to maintain the health of the grass/forb stand and control encroachment by weeds. Late summer/fall grazing levels are managed with the objective of having the pastures in a short-cropped condition when sandhill cranes arrive in mid-October. Cattle are removed by December 15 to make all the forage supplies available to the later arriving geese, and to reduce soil compaction by cattle hooves when the soil is soft and wet. Prescribed stocking rates range from 0.6 to 1.3 animal units/acre/month for 6.5 months.

### *Natural Uplands*

The Merced, Arena Plains and Snobird Units all contain natural uplands, which consist of lands that have retained their native topography but are vegetated with a mix of native and non-native grasses and forbs. The grazing period for natural uplands at the Merced and Snobird Units is generally December 1–June 15. This seasonal grazing maintains annual grasses in a short-cropped status during their growing season (cool season plants), controls invasive weeds and provides year-round short-statured grassland habitat. Not grazing during the summer and early fall encourages growth of native grasses, such as alkali sacaton (*Sporobolus airoides*) and creeping wildrye (*Leymus triticoides*), and native forbs (warm season plants). The period of grazing may be extended to July 15 to control annual and non-native plant growth during years with above-average precipitation and reduced (along with stocking levels) as necessary during years of below-average precipitation. The natural uplands at the Arena Plains Unit are grazed on

a year-round basis, with cattle being rotated among the different pastures through the year and stocked at a lower level than occurs on the Merced and Snobird Units. Arena Plains is different from the other units in that it is primarily made up of sandy soil types. Year-round grazing not only maintains the uplands as short-statured grassland and controls invasive weeds but does a better job in reducing thatch accumulation and preventing stabilization of remnant sand dunes. This enhances unique resources, such as Blainville horned lizards (*Phrynosoma blainvillii*), showy wildflower populations and sand dune plant communities. Prescribed stocking rates for natural uplands on the different units range from 0.15 to 0.20 animal units/acre/month.

#### ***Altered Floodplains and Fallow Farm Fields***

The periods of grazing are more variable in altered floodplains (bypass floodways) and fallowed crop fields. Altered floodplains consist of the lands between flood control levees. These lands, except for the creek channels, can function as dry uplands during some years but are subject to extended periods of inundation during flood events. The floodplain sites generally have more moist soil conditions, which promote vegetation growth throughout much of the year. Grazing within the floodways can occur throughout the year depending on site-specific objectives, but in years of extended flood events may not begin until July or August. This grazing reduces dense vegetation growth and promotes germination and establishment of unique floodplain-associated plants, such as the state threatened delta button celery (*Eryngium racemosum*), and provides short grassland foraging habitat in the fall for sandhill cranes. Fallowed farm fields consist of lands that were leveled for crop production prior to USFWS acquisition. Under USFWS ownership, they have been allowed to grow in a mix of native and non-native grasses and forbs to serve as nesting cover and foraging habitat. They are restored to native grasses and forbs as funding becomes available. Grazing in the fallowed crop fields is generally scheduled for July through September, which allows the sites to be available as tall dense nesting cover for ground nesting birds during the nesting season and short foraging habitat for sandhill cranes and other birds in the fall and winter. Prescribed stocking rates range from 0.2 to 1.3 animal units/acre/month depending on habitat objectives and site productivity.

#### **Why is this use being proposed or reevaluated?**

Cooperative farming and grazing programs are being reevaluated as Refuge uses in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment. Cooperative farming and haying are not found compatible on San Luis NWR, but a separate Compatibility Determination for grazing exists on the San Luis NWR.

#### **Availability of Resources**

The farming and grazing programs are administered by Refuge staff, whose tasks include preparing CAAs and annual farming/grazing plans, providing coordination for farming Cooperators and conducting compliance monitoring. Field site preparation (mowing and/or disking) prior to planting corn or winter wheat is done by the farming Cooperator or Refuge staff.

The water supply for field and pasture irrigation is provided through the Refuge allotment of delivered water (Merced Irrigation District), which is adequate for both wetland management and farming

operations. Facilities installed primarily for non-agricultural purposes, such as wells, lift pumps and pipelines, are constructed or maintained at Refuge expense. Facilities installed primarily for agricultural purposes, such as irrigation valves and fences, are installed by the farming Cooperator for the Refuge as an in-lieu service for the value of grazing Refuge lands as detailed in the annual farming/grazing plans. Current Refuge staffing levels are sufficient to administer the grazing and farming programs at Merced NWR.

The farming Cooperator is responsible for all other costs of producing crops (seed, fertilizer, planting, irrigation labor, herbicide application) as an in-lieu service for the value of grazing Refuge lands as detailed in the Cooperative Land Management Agreement and annual farming/grazing plans.

The grazing Cooperator is responsible for installing and/or maintaining all range improvements (watering facilities, cross-fencing, etc.) associated with grazing activities. The costs of these are either at the Cooperator's expense or credited by the Refuge against the value of grazing. Facilities installed primarily for Refuge purposes are constructed or maintained at Refuge expense.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible; in such cases, the resource is considered an "affected resource."

## **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Although not a wildlife-dependent activity, the Refuge cooperative farming program is not expected to negatively impact the purposes of Merced NWR. Rather, farming to benefit wildlife at the Merced NWR as indicated in this determination is compatible with the purposes for which the Refuge was established. The use will function to attract waterbirds and other migratory birds, which will in turn benefit the Refuge purposes of "...management and control of migratory waterfowl and other wildlife..." (16 U.S.C. Sec 695, Lea Act); "...as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. Sec 715d, Migratory Bird Conservation Act); and "...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).

Additionally, the Refuge System Administration Act states that the Refuge System "...was created to conserve fish, wildlife and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation." Therefore, this use will not materially interfere with or detract from the Merced NWR purposes, nor the Refuge System purpose and mission. Current research supports grazing as an appropriate, beneficial and effective land management tool, particularly in vernal pool complexes, such as those found across San Luis NWR (Michaels, Tate and Eviner 2021).

## **Short-term impacts**

### Water

Ninety percent of the pesticides approved for Refuge use have the active ingredient of glyphosate. Glyphosate rapidly and strongly adheres to soil and degrades, especially in areas with high organic content; thus, little is transferred by rain or irrigation water and has minute leaching potential from applied areas (Sauve and Parker 2005). All these herbicides are applied in accordance with the label, are commonly used for invasive species control in upland areas away from water resources and are not persistent in the environment. For this reason, application of pesticide is only expected to have minor adverse effects on water and soils.

### Soils

In addition to the impacts on soils described above, vehicle access and heavy equipment usage may result in compaction of soils and increase the potential for small releases of oils, grease and other petroleum products to soils. Because the cooperative farming program only overlaps with existing agricultural areas, impacts would be localized and only result in minor adverse effects to soils.

### Vegetation/Habitat

The potential misapplication or incorrect use of pesticides could adversely impact adjacent native plant communities and wildlife. However, implementation of practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance would limit impacts to be only minor, temporary and localized. This includes application based upon non-exceedance of threshold values as described in Chemical Profiles.

Improper fence placement and rotation of livestock within grazed areas can result in sensitive areas, such as wetlands and riparian corridors, being grazed and/or trampled excessively. Grazing can also help to maintain native forb and grass communities associated with uplands, vernal pools and floodplains by reducing annual plant biomass and thatch accumulation. Grazing activities help to control non-native invasive weeds, such as yellow star thistle, milk thistle, poison hemlock (*Conium maculatum*), prickly lettuce, five hook bassia (*Bassia hyssopifolia*) and black mustard (*Brassica nigra*), through direct consumption, trampling and reducing the seed bank. Mechanical methods, such as grazing, can reduce (1) the amount of chemical herbicide necessary to control non-native invasive weeds and (2) the amount of carbon emissions associated with tractor/equipment operation during wetland unit rehabilitation by reducing biomass within the units to be treated.

### Wildlife

Noise and physical disturbance caused by agricultural activities (such as mowing, haying, etc.) could adversely impact ground-nesting birds and other wildlife by destroying nests, hens and/or young and flushing species from their habitat in the short term. Grazing and agricultural activities can also improve the winter forage supply (e.g., short annual grass meristems and forbs) for arctic-nesting geese such as Ross's geese, white-fronted geese and cackling geese; wigeon; sandhill cranes; and other migratory birds.

Providing short grassland habitat makes macro-invertebrates, seeds and plant tubers available for winter foraging by sandhill cranes and other migratory birds. Maintaining short grassland habitat can also help

meet the year-round foraging, denning and nesting needs of wildlife species, such as coast horned lizards, burrowing owls, long-billed curlews, kangaroo rats, San Joaquin kit fox and badgers.

### **Long-term impacts**

The production of agricultural crops inherently forgoes the opportunity to restore that acreage back to native plant communities and thus increase natural diversity within the National Wildlife Refuge System. However, the benefits to wildlife and special status species, such as lesser sandhillcranes (*Grus canadensis canadensis*), arctic-nesting geese such as the Ross's goose (*Anser rossii*) and the lesser snow goose (*Chen caerulescens caerulescens*) and tricolored blackbird (*Agelaius tricolor*), outweigh this opportunity loss by providing foraging and nesting habitat.

By growing important winter foraging habitat, Refuge croplands provide habitat for lesser sandhill cranes, arctic-nesting geese and the lesser snow goose. Specifically, crops like winter wheat and corn provide a high-carbohydrate maintenance diet for arctic-nesting geese, sandhill cranes and other wildlife in the winter and early spring; regrowth provides a high-protein diet critical to building a nutrient reserve necessary to sustain migration.

Tricolored blackbirds have been greatly impacted by the loss of habitat and fragmentation associated with the conversion of grassland to agriculture (Allen 2000). For this reason, Refuge croplands provide critical foraging habitat for the state-listed tricolored blackbird. Specifically, farming is used on the Refuge to produce nesting and foraging substrate for tricolored blackbirds and other wildlife in the spring and summer. Mature wheat stands also provide nesting habitat for colonial tricolored blackbirds. This provision of suitable nesting habitat would continue to reduce the number of colonies subject to complete nesting loss when occupied adjacent private agricultural crops are cut for silage.

Providing high-quality foraging habitat on Refuge croplands will also reduce depredation of proximate private properties, thus reducing conflicts between the Refuge and private landowners. The establishing purpose of the Refuge supports the continued use of agriculture to “attract wintering waterfowl from neighboring farmland where their foraging activities were causing crop damage.”

## **5) Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft Comprehensive Conservation Plan and Environmental Assessment for the San Luis National Wildlife Refuge Complex.

### **Determination**

#### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

1. Use of genetically modified organisms, such as Round-Up ready corn, is prohibited on Refuge lands per USFWS policy.
2. Only herbicides from a pre-approved USFWS list can be utilized on the Refuge. The use and application of all herbicides will adhere to all label instructions and requirements, as well as any BMPs identified in the Service's Pesticide Use Proposal System.
3. The cutting of grass hay in irrigated pastures must be delayed until June 1 of each year to protect nesting birds.
4. Refuge staff will develop multi-year Cooperative Agricultural Agreements and annual Farming/Grazing Plans, which provide direct benefits to migratory birds and other Trust responsibilities. These documents will provide the necessary information and assistance from the Refuge to determine the types of crops, acreages planted and how farming is implemented on the Refuge.
5. The Cooperator will operate under the terms and conditions of a Cooperative Agricultural Agreement, Special Use Permit and a Refuge Farming/Grazing Plan.
6. Only lands that had been leveled and converted to agricultural uses prior to USFWS ownership will be included in the Refuge Farming Program.
7. Refuge staff will regularly monitor Cooperator compliance and maintain complete files on all farming activities.
8. Refuge staff will set the value of grazing to reflect current fair market values, monitor Cooperator compliance and maintain complete files on all grazing activities.
9. All Refuge Complex rules and regulations must be followed unless otherwise excepted, in writing, by the project leader.

## **Justification**

The Merced NWR was established for the management and control of migratory waterfowl and other wildlife, for use as an inviolate sanctuary and to conserve fish or wildlife listed as endangered species or threatened species or plants. Farming to benefit wildlife at the Merced NWR as indicated in this determination is compatible with the purposes for which the Refuge was established. The Cooperative Farming and Grazing Programs will also directly support Refuge goals, objectives, management plans and activities. The programs will improve and enhance foraging conditions that provide a high level of migratory bird use. Although not a wildlife-dependent activity, the Refuge cooperative farming and grazing programs will not significantly impact public safety or current recreational use of Merced NWR; rather it will function to attract waterbirds that will enhance the wildlife dependent recreational experiences of the visiting public. These uses will not materially interfere with or detract from the Refuge System purpose and mission, nor the purposes for which the Refuge was established.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2033

## Literature Cited/References

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# Draft Compatibility Determination

## Title

Compatibility Determination for Environmental Education and Interpretation at Merced NWR

## Refuge Use Category

Environmental Education and Interpretation

## Refuge Use Type(s)

Environmental education (not conducted by NWRS staff or authorized agents)

Environmental education (NWRS staff and authorized agents)

Environmental education (general)

Interpretation (NWRS staff and authorized agents)

Interpretation (not conducted by NWRS staff or authorized agents)

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## **Description of Use**

### **Is this an existing use?**

Yes. This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan and Environmental Assessment.

### **What is the use?**

The National Wildlife Refuge System Improvement Act of 1997 identifies environmental education and interpretation as priority wildlife-dependent public uses for Refuges. As two of the six priority public uses of the Refuge System, environmental education and interpretation are to be encouraged when compatible with the purposes of the Refuge. Environmental education and interpretation uses are considered jointly in this compatibility determination. Many elements of environmental education and interpretation are similar to the wildlife observation and photography programs at the Complex. These uses are identified and discussed in more detail in the Final Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the San Luis NWR Complex.

Environmental education comprises teacher- or leader-conducted activities that are intended to actively involve students or others in hands-on activities. These activities are designed to promote discovery and fact-finding, develop problem-solving skills and lead to personal involvement and action. The Service focuses on kindergarten through 12th-grade students.

Interpretation involves participants of all ages who learn about the complex issues confronting fish and wildlife resource management as they voluntarily engage in stimulating and enjoyable activities. First-hand experience with the environment is emphasized, although presentations, audiovisual media and exhibits are often necessary components of the interpretive program.

The guiding principles of the Refuge System's environmental education programs (605 FW 6 of the Service Manual) are to:

- Teach awareness, understanding and appreciation of our natural and cultural resources and conservation history.
- Allow program participants to demonstrate learning through Refuge-specific stewardship tasks and projects that they can carry over into their everyday lives.
- Establish partnerships to support environmental education both on- and off-site.
- Support local, state and national educational standards through environmental education on Refuges.
- Assist Refuge staff, volunteers and other partners in obtaining the knowledge, skills and abilities to support environmental education.
- Provide appropriate materials, equipment, facilities and study locations to support environmental education.
- Give Refuges a way to serve as role models in the community for environmental stewardship.
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.

The guiding principles of the Refuge System's interpretive programs (605 FW 7 of the Service Manual) are to:

- Promote visitor understanding of, and increase appreciation for, America's natural and cultural resources and conservation history by providing safe, informative, enjoyable and accessible interpretive opportunities, products and facilities.
- Develop a sense of stewardship leading to actions and attitudes that reflect interest and respect for wildlife resources, cultural resources and the environment.
- Provide quality interpretive experiences that help people understand and appreciate the individual Refuge and its role in the Refuge System.
- Provide opportunities for quality recreational and interpretive experiences consistent with criteria describing quality found in 605 FW 1.6.
- Assist Refuge staff, volunteers and community support groups in attaining knowledge, skills and abilities in support of interpretation.
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

**Is the use a priority public use?**

Yes.

**Where would the use be conducted?**

Environmental education and interpretation activities on Merced NWR occur on the 5-mile auto tour route featuring interpretive panels as well as two interpretive information kiosks: one at the main entrance and another at the sportsmen entrance. Four nature trails are on the Refuge. Bitter Marsh trail can be accessed from the auto tour route and is open year-round to pedestrians only; no biking or horseback riding is allowed. Environmental education and interpretation would also be conducted in the Arena Plains Unit once every spring in the form of a guided tour.

**When would the use be conducted?**

Merced NWR is open year-round from sunrise to sunset. The visitor center, which is located on San Luis NWR but contains information for Merced NWR as well, is open daily from 8:00 a.m. to 4:30 p.m., except on Federal holidays.

**How would the use be conducted?**

The environmental education program offers several ways for visiting school groups to experience the Complex and its habitat and wildlife. At the visitor center, classes are welcomed by visitor services staff and have access to activities in the exhibit hall, environmental education room and outdoor grounds, including the amphitheater and wetland nature trail. Classes may also travel by bus around the tule elk and waterfowl auto tour routes. Depending on the teacher's specific interests, field trips might also be conducted on the Merced NWR auto tour route and nature trails. The environmental education program

specifically targets elementary school grade levels, primarily 3rd through 5th grades, but will accommodate visits for any age group, preschool through adult.

Although the visitor center is located on the San Luis NWR, it can provide information about Merced NWR, and education specialists can also schedule tours and education programs on Merced NWR along nature trails and/or the auto tour route.

All groups seeking a staff-facilitated visit to the Refuge for environmental education are required to make reservations in advance. The reservation system ensures that the facility is not over-crowded, and that sufficient staff are available to facilitate the visit.

Conditions created by the soils and hydrology at the Arena Plains Unit result in expansive displays of spring wildflowers in most years. Refuge staff annually provide a guided tour of the unit in spring to provide the public an educational opportunity to view the wildflowers and learn about the unique natural history of the area. Due to the sensitive nature of habitat at the Arena Plains Unit, including a number of threatened and endangered species, the guided public tour is limited to a single day with 40–50 participants. The approximately 3-hour tour is made accessible by driving on established roads through the unit to three locations. From these three locations, tour participants are then able to explore wildflower meadows on foot. At least 2–3 Refuge staff are present to lead each tour and ensure limited disturbance to sensitive species.

### Interpretation

Visitors to the Merced NWR can engage in wildlife interpretation through both interactive and passive methods. Interactive methods of interpretation include guided tours, walks, presentations and special events. Refuge Complex staff regularly facilitate guided tours of the Refuge Units for a variety of groups throughout the year. Refuge Complex-related information is provided at annual local festivals or during special events, such as the State Fair, National Wildlife Refuge Week, special tour days on the Complex (such as Crane Day and the annual Arena Plains Wildflower and Vernal Pool tour) and numerous volunteer workdays. Refuge Complex staff are regularly invited to be guest speakers at community service groups (e.g., Rotary, Soroptimist) meetings, NGO chapter (e.g., Audubon) meetings and conferences and symposia.

Passive methods of wildlife interpretation on the Refuge include interpretive information kiosks, a 5-mile auto tour route, and four nature trails.

### **Why is this use being proposed or reevaluated?**

Environmental education and interpretation are being reevaluated as Refuge uses in conjunction with the San Luis National Wildlife Refuge Complex CCP and EA. Environmental education and interpretation are also found to be compatible on Merced NWR in a separate Compatibility Determination.

### **Availability of Resources**

Adequate funding and staff exist to manage the environmental education and interpretation programs at the Refuge. Costs are primarily administration and facilities. The Refuge has two permanent full-time

Visitor Services staff members: an outdoor recreation planner and a park ranger. Annual monetary costs expended by the Refuge Complex to administer this use averages \$55,000 (this includes both San Luis and Merced NWRs). Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.” Only the impacts to vegetation, wildlife and visitor use are discussed below; all other resources will not be more than negligibly impacted by the action and have been dismissed from further analyses.

## **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities like environmental education and interpretation may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively impact wildlife, producing stressful conditions even if unintentional. These disturbances from public use may negatively impact some of the Refuge’s purposes, including “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec 715d (Migratory Bird Conservation Act) and “...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act).

However, the Refuge System Administration Act states that the Refuge System “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.” Environmental education and interpretation activities on Merced NWR will increase the public’s knowledge and understanding of wildlife and streamside habitats and increase their sense of ownership of and support for conservation of those lands.

## **Short-term impacts**

### Wildlife

Disturbance of wildlife is the primary concern regarding these uses. Disturbance to wildlife, such as the flushing of feeding, resting or nesting birds, is inherent to these activities. Some temporary disturbance to wildlife results from human activities on trails and auto tour routes; however, the disturbance is generally localized and will not adversely impact overall populations. Increased facilities and visitation would cause some displacement of habitat and increase some disturbance to wildlife, although this is expected to be minor given the size of the Refuges and that most environmental education and interpretation activities occur within the visitor center.

Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications or death (Smith and Hunt 1995). Many studies have shown that birds can be impacted from human activities on trails when they are disturbed and flushed from feeding, resting or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy or be deterred from using desirable habitat, affect resting or feeding patterns, increase exposure to predation, or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

Hérons and shorebirds were observed to be the most easily disturbed (when compared to gulls, terns and ducks) by human activity and flushed to distant areas away from people (Burger 1981). A reduced number of shorebirds were found near people who were walking or jogging, and about 50 percent of flushed birds flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance (e.g., running, flushing) increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller, Knight and Miller 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994).

Depending on the species (especially migrants vs. residents), some birds may habituate to some types of recreation disturbance and either are not disturbed or will immediately return after the initial disturbance (Hockin et al. 1992; Burger and Niles 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbance to foraging and loafing birds based on experimental flushing distances for 16 species of waders and shorebirds. They recommended 100 meters as an adequate buffer against pedestrian traffic; however, they suggest this distance may be reduced if physical barriers (e.g., vegetation screening) are provided, noise levels are reduced and traffic is directed tangentially rather than directly toward birds. Screening may not effectively buffer noise impacts; thus, visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998). Seasonally restricting or prohibiting recreation activity may be necessary during spring and fall migration to alleviate disturbance to migratory birds (Burger 1981, 1986; Boyle and Samson 1985; Klein, Humphrey and Percival 1995; Hill et al. 1997).

### Soils and vegetation

Visitors participating in environmental education and interpretation activities could directly impact the plants and soils on the Refuge. Knight and Gutzwiller (1995) found that the main effect on vegetation and soil is human trampling caused by walking on- and off-trail. Excessive travel by foot can crush, bruise, shear off and uproot vegetation (Cole and Landres 1995). Vegetation in trampled areas may be reduced in height, stem length, leaf area, flower and seed production and carbohydrate reserves (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration and nutrient availability (Kuss 1986). This can, in turn, affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and increasing fluctuation in soil moisture content (Knight and Gutzwiller 1995). Hammitt and Cole (1998) note that soil compaction limits the ability of plants to revegetate affected areas.

Visitors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and, when necessary, treatment. Staff will work to educate the visiting public to reduce introductions and to monitor and control invasive species.

Visitor use on the Refuge would only occur on designated roads and trails. Public use trails and wildlife observation areas are designed and maintained to minimize impacts on soil and vegetation. Therefore, we anticipate additional impacts to soils and vegetation would be negligible and localized. Off-trail access for these uses would be limited to areas that have already been incorporated into specific programs.

## **Long-term impacts**

### Visitor use

Environmental education and interpretation can inform the public of not only the opportunities available on Merced NWR, but in conservation at large. These uses can also make visitors aware of the potential impacts from their actions, such as trampling vegetation and flushing birds. Environmental education and interpretation activities generally support the Refuge Complex purposes and negative impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about Refuge resources. While these uses (especially environmental education) primarily target school-age children, they are not limited to this group. These uses can educate Refuge visitors about endangered and threatened species management, wildlife management, and ecological principles and communities. A secondary benefit of public uses is that they instill a sense of ownership and stewardship in visitors, which can reduce vandalism, littering and poaching. It also strengthens the Service's visibility in the local community.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

### **Stipulations Necessary to Ensure Compatibility**

1. Participants in the Refuge environmental education and interpretation programs are restricted to established trails, auto tour route and other sites normally open to the public, unless being escorted and under the supervision of Refuge staff.
2. All groups wanting a Refuge-led environmental education visit are required to make reservations in advance to ensure that the Refuge has staff and resources available to conduct the program. Currently, educational groups are not charged a fee or required to have a special use permit.
3. Trail etiquette, including ways to reduce wildlife disturbance, is discussed with teachers during orientation meetings and with students upon arrival during their welcome session. On the Refuge, the teacher(s) is responsible for ensuring that students follow required trail etiquette.
4. Refuge staff maintain records of public visitation and activities on the Refuge. The data are analyzed and used to make future program modifications if necessary to ensure compatibility of environmental education programs.
5. Educational groups are required to have a sufficient number of adults to supervise their groups—a minimum of 1 adult per 12 students.

## **Justification**

The National Wildlife Refuge System Improvement Act of 1997 identifies interpretation and environmental education as two of the priority public uses for National Wildlife Refuges. As expressed, priority uses of the Refuge System take precedence over other potential public uses in Refuge planning and management. The Service strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the NWRS.

Currently, the Refuge receives an estimated average of 57,000 visits annually. Allowing environmental education and interpretation activities on the Refuge will enhance the public's understanding of the Refuge and its biological resources.

After assessing the potential impacts, environmental education and interpretation within the Merced National Wildlife Refuge as described herein were determined to not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In the Service's opinion, allowing these uses, with associated stipulations, will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge.



## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Hunting at Merced National Wildlife Refuge

## Refuge

Merced National Wildlife Refuge

## Refuge Use Category

Hunting

## Refuge Use Type(s)

Hunting (other migratory birds), Hunting (waterfowl), Hunting (upland game)

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System (NWRS) Mission

The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is it a priority Public Use?

Yes

### What is the Use?

The use is hunting ducks, geese, coot and moorhen on approximately 2,210 acres of Merced Refuge. In addition, the Service proposes to open these 2,210 acres to snipe hunting on the Merced and Lonetree Units of the Refuge. The Environmental Assessment for Expanded Pheasant and Snipe Hunting Opportunities at San Luis and Merced National Wildlife Refuges (2020) and the San Luis National Wildlife Refuge Waterfowl, Other Migratory Bird, and Upland Game Hunt Plan provide additional

details of the use and are incorporated by reference. Hunting big game is prohibited. All other wildlife, including coyotes and crows, are protected.

### **Where would the use be conducted?**

Goose, duck, coot and common moorhens will continue to be permitted on approximately 2,210 acres on the Merced and Lonetree Units of the Refuge. In addition, the Service will open these 2,210 acres to snipe hunting, shown in Figure 1 of the Environmental Assessment.

### **When would the use be conducted?**

During fall and winter, hunting of migratory birds, such as geese, ducks, coots, moorhens and snipe, is permitted on Wednesdays and Saturdays during the regular state season.

### **How would the use be conducted?**

The Refuge System Administration Act, as amended by the NWRS Improvement Act and the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4) governs the administration and public use of rRefuges, including hunting. We allow hunting waterfowl, other migratory bird and upland game on designated areas of the Refuge in accordance with State regulations (<https://wildlife.ca.gov/hunting>), Station-Specific Hunting Regulations (50 CFR § 32.47) and Public Access and Recreation Regulations (50 CFR § 26.34) that pertain to hunting on the Refuge as of the date of the Refuge Hunt Plan. Bag limits are as designated and required by the State. The Refuge promotes ethical hunting and provides access for the opportunity to participate in fair chase small game and migratory bird hunting, consistent with State and Federal hunting regulations.

### **Why would the use be conducted?**

Hunting is identified in the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-ee) as a priority use for Refuges when it is compatible with the Refuge purposes and mission of the Refuge System. Migratory bird hunting provides the public with a recreational opportunity to experience wildlife on Refuge lands. Migratory bird hunting is consistent with the mission of the NWRS and natural resources and visitor services goals for the Refuge.

## **Resources**

Existing Management Capability Existing Funds: The U.S. Fish and Wildlife Service (Service) currently has adequate budget and staff to support the annual costs associated with operation of this hunting program. Annual costs are estimated at \$50,000.

## **Impacts**

### **Short-term impacts**

The primary species taken by hunters at the Refuge include Ross's goose, mallard, northern pintail, American green-winged teal, cinnamon teal, American coot and Wilson's snipe. The impacts addressed here are discussed in detail in the Environmental Assessment for Expanded Pheasant and Snipe Hunting

## Opportunities at San Luis and Merced National Wildlife Refuges (2020) and the San Luis National Wildlife Refuge Waterfowl, Other Migratory Bird, and Upland Game Hunt Plan.

Hunting would have direct, lethal effects on individual waterfowl and other target game animals. The number of birds killed would depend on the number of hunters, days of effort and hunter success rates. Hunting would result in injuries to animals that were hit, but not killed. Common effects include mortality, wounding and disturbance (DeLong 2002). Regular disturbance, including loud noises and human movements, can alter food habits, result in weight loss and cause waterfowl to relocate from feeding areas (Madsen 1995; Wolder 1993). Various studies have documented that hunting can alter the distribution, behavior and population structure of wildlife species (Owens 1977; Raveling 1979; White-Robinson 1982; Thomas 1983; Bartelt 1987; Madsen 1995; Cole and Knight 1990). Researchers have identified an inverse relationship between the number of birds utilizing an area and hunting intensity (DeLong 2002). Target species, such as the northern pintail, may preferentially select non-hunt areas during the hunting season (Heitmeyer and Raveling 1988). Following the close of the hunting season, ducks generally increased their use of the hunt area; however, use was lower than before the hunting season began. Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns and boats powered by outboard motors. This disturbance, especially when repeated over a period of time, compels waterfowl to change food habits, feed only at night, lose weight or desert feeding areas (Madsen 1995; Wolder 1993). Hunting can also stress non-target species, such as sandhill cranes, by flushing them from foraging areas and shifting foraging locations (Stone 2009).

These impacts can be reduced by the presence of adjacent sanctuary areas where hunting does not occur, and birds can feed and rest relatively undisturbed. Sanctuaries have been identified as the most common solution to disturbance problems caused from hunting (Havera et al. 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995; Paulus 1984). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl. Numbers of dabbling ducks and geese increased 4- to 20-fold within the sanctuary (Madsen 1995). Thus, sanctuary and non-hunt areas are very important for minimizing disturbance to waterfowl populations to ensure their continued use of the Refuges. As such, the Service provides 60 percent of the Refuges' land base as disturbance-free sanctuary areas at the Complex.

Intermittent hunting can be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). It is common for Refuges to manage hunt programs with non-hunt days. For example, at a nearby Refuge (Sacramento National Wildlife Refuge), 3 to 16 percent of pintails were located on hunted units during non-hunt days but were almost entirely absent in those same units on hunt days (Wolder 1993). In addition, northern pintails (*Anas acuta*), American wigeon (*Anas Americana*) and northern shovelers (*Anas clypeata*) decreased time spent feeding on days when hunting occurred on public shooting areas, as compared to non-hunt days (Heitmeyer and Raveling 1988). The intermittent waterfowl hunting program of 2 hunt days per week at Merced Refuge results in lower waterfowl densities on hunt areas during non-hunt days than non-hunt areas. However, intermittent hunting may not always greatly reduce hunting impacts.

The California Department of Fish and Wildlife (CDFW) is California's lead agency for management of fish, wildlife and native plants (collectively called *wildlife*). CDFW has trustee responsibility for the conservation and management of wildlife for the benefit and enjoyment of the public. Resident game species are protected on Refuges by both Federal and State laws and regulations to ensure that harvest rates do not negatively impact populations. The potential impacts of hunting on resident game birds are discussed and evaluated in the California Environmental Quality Act process. This process results in periodically updated and publicly reviewed documents. Based on the findings of these documents, the State ensures that game animal hunting in California does not adversely impact its wildlife populations to an unacceptable level (CDFW 2015, 2004).

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

### **Long-term impacts**

By its very nature, hunting has very few positive effects on the target species while the activity is occurring. However, hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving their habitat, which has ultimately contributed to the Refuge System mission. Furthermore, despite the potential impacts of hunting, a goal of the Refuges is to provide visitors of all ages an opportunity to enjoy wildlife-dependent recreation. Of key concern is to offer a safe and quality program and ensure adverse impacts remain at an acceptable level.

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

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

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

These indirect impacts are not significant on the Refuges because they can be reduced by the availability of adjacent sanctuary areas where hunting does not occur, and both hunted and non-hunted wildlife can

feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et al. 1992).

Adverse effects would be minimized by extensive program management. Regulations, including specified hunting seasons, non-hunt days, maximum daily hunter capacities and bag limits are implemented to minimize the level of disturbance to both game and non-game species and ensure harvest rates do not negatively impact long-term game species. Although mortality of individual animals is expected, the hunting program would not have adverse impacts at the population level. Further, the Complex would provide approximately 2,304 acres of sanctuary zones to provide waterfowl species with disturbance-free habitat. Although hunting results in numerous adverse impacts to both game and non-game species, hunting provides a long-term benefit by increasing public appreciation for and stewardship of wildlife resources and enhancing visitor understanding of the importance of habitat conservation.

Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi and Atlantic). NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, *Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds* (USFWS 2013) and its adjustments in 2015 (USFWS 2015). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate EA and FONSI.

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

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

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada and is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program and Parts Collection Surveys (also known as *Wing Surveys* or *Wingbees*). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations



(appropriate levels of harvest) that compose the framework offered to the states that year. CDFW then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package. Their selections can be more restrictive but cannot be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each state increases or decreases each year in accordance with the annual status of waterfowl populations.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the Use Compatible?**

Yes.

## **Stipulations**

1. Migratory Game Bird Hunting. We allow hunting on designated areas of the Refuge in accordance with State regulations subject to the following conditions:
  - a. Only approved nontoxic shot may be in possession while in the field (State regulations, Sec. 32.2(k)).
  - b. Upland Game Hunting. We allow hunting of snipe pheasant on designated areas of the Refuge in accordance with State regulations subject to the following: hunting is allowed only on designated days; hunting is by shotgun only with approved nontoxic shot.
2. Non-hunting and hunting acres are physically separated.
3. Vehicle traffic is allowed only on designated roads and parking areas.
4. Mobility-impaired hunters should consult the Refuge Manager for allowed conveyances.
5. No more than 25 shells may be in possession while in the field.
6. Building or maintaining fires is prohibited.
7. Vehicle parking is allowed only in designated parking areas.
8. Dogs are required to be kept on a leash, except for hunting dogs engaged in authorized hunting activities and under the immediate control of a licensed hunter.
9. Consumption or possession of an open container of alcohol while hunting is prohibited.
10. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the disturbance of archaeological or historical sites and the removal of artifacts are prohibited. The excavation, disturbance, collection or purchase of historical, ethnological or archaeological specimens or artifacts or mementos from the Refuge is prohibited.

## Justification

Hunting is a wildlife-dependent recreational use included in the National Wildlife Refuge System Improvement Act. Providing hunting opportunities contributes to achieving one of the Refuge’s goals. By facilitating this use on the Refuge, we will increase the visitors’ knowledge and appreciation of fish and wildlife, which may lead to increased public stewardship of wildlife and their habitats on the Refuge.

Increased public stewardship will support and complement the Service’s actions in achieving the Refuge’s purposes and the mission of the National Wildlife Refuge System.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Natural Resource Collection at Merced National Wildlife Refuge

## Refuge Use Category

Natural Resource Collection

## Refuge Use Type(s)

Plant Gathering (non-commercial)

Animal Product Gathering (non-commercial)

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes. This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

Plant and animal product collection may occur on Merced NWR **only** with the approval of a special use permit (SUP). This activity must occur under the stipulations of a valid SUP and approval from the Refuge Manager or equivalent Refuge personnel.

**Is the use a priority public use?**

No.

**Where would the use be conducted?**

This use will occur on Merced NWR, only in locations that are pre-approved in a corresponding SUP.

**When would the use be conducted?**

This use will occur only during times and seasons that are pre-approved in a corresponding SUP.

**How would the use be conducted?**

Plant collection of non-sensitive plant species and/or animal products may be routinely removed or collected if the activities do not adversely affect wildlife species, habitat or Refuge property, as permitted in an approved SUP. The SUP will outline the specific location(s) and time(s) by which collection may occur. Individuals can submit a General Special Use Permit application (FWS Form 3-1383-G2020) or a Research Special Use Permit Form (3-1383-R) to the Refuge Manager for approval. This Compatibility Determination (CD) only covers noncommercial natural resource gathering.

**Why is this use being proposed or reevaluated?**

Plant or animal product collection may be authorized for the purposes of environmental education or habitat restoration under the Partner's for Wildlife program. The National Wildlife Refuge System Improvement Act of 1997 supports environmental education as one of six wildlife-dependent public uses. Plant collection can serve in meeting this objective by educating the public in the function and ecological role of plants through direct learning or as an educational display. Additionally, the San Luis NWR Complex maintains a Partner's for Wildlife program, which assists private landowners, companies and other organizations in habitat management and conservation. The collection and removal of certain native plants from the Refuges onto participating partners' land for habitat restoration activities is an appropriate and beneficial purpose.

**Availability of Resources**

Adequate funding and staff exist to manage plant and animal product collection activities at Merced NWR. Administrative staff costs associated with this use consists of Refuge Complex staff time to review proposals, process SUPs, evaluate impacts, oversee collection activities and ensure that the plant collection activities comply. Annual monetary costs expended by the Refuge Complex to administer this use averages \$2,000 per request. Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.” Only the impacts to soils, vegetation and wildlife are discussed below; all other resources will not be more than negligibly impacted by the action and have been dismissed from further analyses.

### **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by natural resource collection may result in changes to wildlife physiology, behavior, reproduction and species composition and diversity. Public use activities and mere human presence can negatively impact wildlife, producing stressful conditions even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act); “...for the management and control of migratory waterfowl and other wildlife...” (Lea Act); and “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ...” (Endangered Species Act of 1973).

#### Wildlife

Disturbance to wildlife, such as the flushing of feeding, resting or nesting birds, may occur during natural resource collection activities. Some temporary disturbance to wildlife due to human activities occurs; however, the disturbance is generally localized and will not adversely impact overall populations. Increased disturbance would cause some displacement of habitat and increase some disturbance to wildlife, although this is expected to be minor given the size of the Refuges and by avoiding or minimizing intrusion into critical wildlife habitat.

Individual animals may be disturbed by human contact to varying degrees. Human activities on the Refuge can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications or death (Smith and Hunt 1995). Many studies have shown that birds can be impacted by human activities when they are disturbed and flushed from feeding, resting or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy, be deterred from using desirable habitat, affect resting or feeding patterns and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

Hérons and shorebirds were observed to be the most easily disturbed (when compared to gulls, terns and ducks) by human activity and flushed to distant areas away from people (Burger 1981). A reduced number of shorebirds were found near people who were walking or jogging, and about 50 percent of flushed birds flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance (e.g., running, flushing) increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller, Knight and Miller 1998), raptors

(Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994).

Depending on the species (especially migrants vs. residents), some birds may habituate to some types of disturbance and either are not disturbed or will immediately return after the initial disturbance (Hockin et al. 1992; Burger, Gochfeld and Niles 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbance to foraging and loafing birds based on experimental flushing distances for 16 species of waders and shorebirds. They recommended 100 meters as an adequate buffer against pedestrian traffic; however, they suggest this distance may be reduced if physical barriers (e.g., vegetation screening) are provided, noise levels are reduced and traffic is directed tangentially rather than directly toward birds. Screening may not effectively buffer noise impacts; thus, visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998).

### Soils and vegetation

Those collecting plant and/or animal product materials could directly impact the plants and soils on the Refuge by trampling. Knight and Gutzwiller (1995) found that the main effect on vegetation and soil is human trampling caused by walking on- and off-trail. Excessive travel by foot can crush, bruise, shear off and uproot vegetation (Cole and Landres 1995). Vegetation in trampled areas may be reduced in height, stem length, leaf area, flower and seed production and carbohydrate reserves (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration and nutrient availability (Kuss 1986). This can in turn affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and increasing fluctuation in soil moisture content (Knight and Gutzwiller 1995).

Collectors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and, when necessary, treatment.

Collection activities directly remove plant material from the Refuge, but the SUP and stipulations of this CD will ensure that the removal will not affect plant population levels.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for



the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

### **Stipulations Necessary to Ensure Compatibility**

The following stipulations are required to ensure compatibility of this activity: 1) a Special Use permit application is required for any plant or animal product collection activity; 2) the application is reviewed by San Luis NWR Complex staff as to its potential value and impacts to the Refuge Complex's natural resources; 3) a Special Use Permit is issued to approved plant collection activities and 4) restrictions regarding the specific specimens collected are listed in the Special Use Permit. Failure to comply with the provisions of the Special Use Permit will result in revocation of permit privileges. Specifically, all plant collection activities on the Refuge Complex will require the following:

1. The principal authority must submit an SUP application for approval to the Complex.
2. All work will be coordinated with the project leader or designated staff member.
3. Collections will adhere to the requirements indicated in the SUP.
4. Complex staff will be present during times of natural resource collections to assess potential impacts, to ensure SUPs are adhered to and to determine if approved activities and SUPs should be terminated because of adverse impacts.
5. All Refuge Complex rules and regulations must be followed unless otherwise exempted, in writing, by the project leader.

## **Justification**

As proposed, plant and animal product gathering would allow the small number of interested individuals access to this use at a level the Refuge can accommodate. The goals of the National Wildlife Refuge System (NWRS) include providing an understanding and appreciation of fish and wildlife ecology, wildlife habitat and the human role in the environment. The Service strives to provide priority public uses when compatible with the purpose and goals of the Refuge and the mission of the NWRS. The National Wildlife Refuge System Improvement Act of 1997 identifies environmental education and interpretation as priority public uses for National Wildlife Refuges, along with hunting, fishing, wildlife observation and photography. This use, while not wildlife-dependent, is a traditional use that contributes to environmental education and awareness. This activity could be used in environmental education programs to enhance others' understanding of the Refuge and its natural resources.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2033

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# Draft Compatibility Determination

## Title

Compatibility Determination for Mosquito Management at Merced National Wildlife Refuge.

## Refuge Use Category

Pest and Predator Management

## Refuge Use Type(s)

Mosquito Management

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

The Merced National Wildlife Refuge was established in 1951. The first parcel (Merced Unit) was acquired under the Lea Act to protect the surrounding agricultural lands from waterfowl depredation. Additional units and parcels were acquired under the Migratory Bird Conservation Act and the Endangered Species Act.

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

No

**What is the use?**

Activities undertaken to monitor and control mosquitoes, including pesticide use and vegetation and water management.

**Is the use a priority public use?**

No

**Where would the use be conducted?**

All application of pesticides/biological agents must be coordinated and approved by the Refuge Manger to avoid conflicts with nesting birds, public use, management activities, etc. Mosquito larvae will be widespread and abundant as documented by sampling for permission to be granted for the Districts to larvicide any portion of the Refuge. Prior to all larvicide applications, the Districts will provide a map and sampling results to the Refuge Manager and obtain verbal approval. Spraying of any kind will not be conducted on vernal pools or other such water basins resulting from rainwater accumulations in upland sites.

**When would the use be conducted?**

Larvae control would only be conducted when breeding is widespread, as documented by sampling efforts, by specific request by Districts supported by public health data, or by the Refuge Manager in areas directly adjacent to high use public areas, specifically parking areas and observation decks. Mosquito adulticides would only be allowed in cases of a declared health emergency, following a specific request to the Refuge and written concurrence from appropriate Service or Department bureaus. A human-health emergency is defined by the presence of human disease virus-positive mosquitoes, virus-positive birds and/or human disease at or by the Refuge.

**How would the use be conducted?**

Application of mosquito control measures is to be conducted in accordance with approved Pesticide Use Proposals and labels. Mosquito control will be authorized on an annual basis by a special use permit (SUP). SUP condition will stipulate that all mosquito control work will be carried out under the guidance of pre-approved Pesticide Use Proposals. Only Bti and Altosid may be applied on the Refuge as a larvicide, and only Pyrocyde or Pyrenone be used as an adulticide.

The Districts will provide the Refuge with interim and final reports regarding mosquito sampling on the Refuge. At the end of the permitting period, the Districts will provide the Refuge Manager with a list of all pesticides/biological agents used, and the quantities of each that were applied.

**Why is this use being proposed or reevaluated?**

Mosquitoes are a natural component of most wetland ecosystems, but they may also present a threat to human and wildlife health as vectors of disease. When necessary to protect the health and safety of the public or a wildlife population, the Service seeks to manage mosquitoes on Refuge lands using the least intrusive means possible. The Service encourages Refuge Managers to cooperate closely with local public health and mosquito control agencies. Local agencies routinely conduct mosquito monitoring on

Refuge lands in the Central Valley. At Merced National Wildlife Refuge, the Merced County Mosquito Abatement District proposes to continue the monitoring and controlling of mosquitoes at the Refuge to address nuisance and human health concerns of neighboring communities.

## **Availability of Resources**

Adequate funding and staff exist to manage this activity. Monitoring and control will be conducted by the District and not require the direct involvement of Refuge staff, with the exception of oversight by the Refuge Manager. Monitoring of treatments would include observations of sprayed areas before and after treatment and coordination of permitting, documentation and record-keeping.

## **Anticipated Impacts of the Use**

### **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

This activity has three principal potential impacts on Service lands, waters or interests: disturbance to wildlife caused by the application of Bti/Altosid, impacts on wildlife by the periodic elimination of mosquito larvae from the Refuge, and the impacts of Bti/Altosid on nontarget organisms. All three potential impacts are somewhat minimized by only allowing treatment of habitats when mosquito breeding has been documented as widespread by District or Refuge staff and by requiring approval for treatment by the Refuge Manager. Therefore, instead of being treated weekly, whether needed or not, Refuge lands will only be treated when sampling has documented a need. Disturbance from the ground or by aircraft usually is of short duration for the unit being treated.

The impacts of monitoring will be confined to pathways to shorelines where dip net samples will be taken. Small areas of vegetation may be crushed in transit to pools of water, but the vegetation will likely spring back after it has been bent under foot. Relatively little of this impact will occur, as dipping is done at most once a week. Placing and checking of CO<sub>2</sub> traps might also create a transient impact from footsteps on the vegetation going to and from the traps. Again, this is done at most once a week. No disturbance of habitat associated with the single light trap will occur due to it being located in the maintenance yard at headquarters.

### Toxicity and Effects to Non-target Organisms

The dominant impact of mosquito control will relate to the toxicity and effects of the treatments on non-target organisms. Both Bti and Altosid treatments are more target-specific and less persistent in the environment than most chemical insecticides and thus impacts the Refuge biota to a lesser degree than other chemical treatments available (Fleming et al. 1985; Fortin and Leclair 1987; Lee and Scott 1989; Marten, Che and Bordes 1993; Mittal, Adak and Sharma 1991; Parsons and Surgeoner 1991; Purcell 1981). The possible effects of each compound will be discussed individually.

#### *Bacillus thuringiensis var. israelensis (Bti)*

Bti has practically no acute or chronic toxicity to mammals, birds, fish or vascular plants (U.S. EPA 1998). Extensive acute toxicity studies indicated that Bti is virtually innocuous to mammals (Siegel and Shadduck 1992). These studies exposed a variety of mammalian species to Bti at moderate to high doses, and no pathological symptoms, disease or mortality were observed. Laboratory acute toxicity

studies indicated that the active ingredient of Bti-formulated products is not acutely toxic to fish, amphibians or crustaceans (Brown et al. 2002; Brown et al. 2000; Garcia, Des Rochers and Tozel 1980; Lee and Scott 1989; Wipfli, Merritt and Taylor 1994). However, other ingredients in formulated Bti products are potentially toxic. The acute toxicity response of fish exposed to the formulated Bti product Teknar® HPD was attributed to xylene (Fortin, Lapointe and Charpentier 1986; Wipfli, Merritt and Taylor 1994). Field studies indicated no acute toxicity to several fish species exposed to Bti (Merritt et al. 1989; Jackson, Horowitz and Sweeny 2002); no detectable adverse effects to breeding red-winged blackbirds using and nesting in Bti-treated areas (Niemi et al. 1999; Hanowski et al. 1997); and no detectable adverse effects to tadpole shrimp 48 hours post-Bti treatment (Dritz et al. 2001).

In addition to mosquitoes (family *Culicidae*), Bti affects some other members of the suborder Nematocera within the order Diptera. Also affected are members of the family *Simuliidae* (black flies) and some chironomids midge larvae (Boisvert and Boisvert 2000; Garcia, Des Rochers and Tozel 1980). The most observed Bti effects to non-target organisms were to larvae of some chironomids in laboratory settings when exposed to relatively high doses (Boisvert and Boisvert 2000; Lacey and Mulla 1990; Miura, Rakahashi and Mulligan 1980). In field studies, effects to target and susceptible nontarget invertebrates have been variable and difficult to interpret. Field study results are apparently dependent on the number, frequency, rate and aerial extent of Bti applications; the Bti formulation used; the sample type (e.g., benthic, water column or drift); the sampling interval (e.g., from 48 hours to one or more years after treatment); the habitat type (e.g., lentic or lotic); the biotic (e.g., aquatic communities) and abiotic factors (e.g., suspended organic matter or other suspended substrates, temperature, water depth); the mode of feeding (e.g., filter feeder, predator, scraper or gatherer); the larval development stage and larval density (Ali 1981; Boisvert and Boisvert 2000; Lacey and Mulla 1990). Bti activity against target and susceptible nontarget invertebrates is also related to Bti persistence and environmental fate, which are in turn affected by the factors associated with field study results (Dupont and Boisvert 1986; Mulla 1992). Simulated field studies resulted in the suppression of two unicellular algae species, *Closterium* sp. and *Chlorella* sp., resulting in secondary effects to turbidity and dissolved oxygen of aquatic habitats, with potential trophic effects (Su and Mulla 1999). For these reasons, Bti effects to target and susceptible nontarget organisms and potential indirect trophic impacts in the field are difficult to predict.

### *Methoprene.*

Methoprene has moderate acute fish toxicity, slight acute avian toxicity and practically no acute mammalian toxicity (EPA 2000; USFWS 1984). In mallard ducks, dietary concentrations of 30 parts per million (ppm) caused some reproductive impairment (EPA 1991). This figure exceeds the estimated environmental concentration by a factor of 10 (Figure 1). Methoprene residues have been observed to bioconcentrate in fish and crayfish by factors of 457 and 75, respectively (EPA 1991). Up to 95 percent of the residue in fish was excreted within 14 days (EPA 1991). Risk quotients for birds, fish and mammals are below EPA levels of concern for endangered species indicating negligible risk to those taxa resulting from direct exposure using maximum labeled rates for mosquito control (Urban and Cook 1986). In field studies no detectable adverse effects to breeding red-winged blackbirds using and nesting in areas treated with methoprene were observed (Niemi et al. 1999).

Methoprene affects terrestrial and aquatic invertebrates and is used to control fleas and sciarid flies in mushroom houses; cigarette beetles and tobacco moths in stored tobacco; Pharaoh's ants; leaf miners in



glasshouses; and midges (Tomlin 1994). Methoprene may also be fed to livestock in a premix food supplement for control of homily (WHO, undated). Methoprene is highly toxic to aquatic invertebrates with a 48-hour EC50 of 0.89 ppm for *Daphnia magna* (EPA 1991). Laboratory studies show that methoprene is acutely toxic to chironomids, cladocerans and some decapods (Horst and Walker 1999; Celestial and McKenney 1994; McKenney and Celestial 1996; Chu, Wong and Chiu 1997). In field studies, significant declines of aquatic invertebrate, mollusk and crustacean populations have been directly correlated to methoprene treatments for mosquito control (Breaud et al. 1977; Miura and Takahashi 1973; Niemi et al. 1999; Hershey et al., 1998).

Methoprene has a ten-day half-life in soil, a photolysis half-life of ten hours, and a solubility in water of 2 ppm (Zoecon 2000). Degradation in aqueous systems is caused by microbial activity and photolysis (EPA 1991). Degradation rates are roughly equal in freshwater and saltwater systems and are positively correlated to temperature (EPA 1991).

### ***Adulticides***

Adulticides have not been used at the Refuge in the last 10 years. There are only two general classes of adulticides, organophosphates and pyrethroids. The pyrethroids include both natural products called pyrethrins and synthetic molecules that mimic the natural pyrethrins, such as permethrin, resmethrin and sumithrin.

In general, pyrethroids have lower toxicity to terrestrial vertebrates than organophosphates. Although not toxic to birds and mammals, pyrethroids are very toxic to fish and aquatic invertebrates (Anderson 1989; Siegfried 1993; Millam, Farris and Wilhide 2000). The actual toxicity of pyrethroids in aquatic habitats, however, is less than may be anticipated because of the propensity of these pesticides to adsorb organic particles in water (Hill et al. 1994). The Districts use only natural pyrethrins on Refuge lands.

All adulticides are very highly toxic to aquatic invertebrates in concentrations > 1 ppb (Millam, Farris and Wilhide 2000). Because most adulticides can be applied over or near water when used for mosquito control, there are risks to aquatic invertebrates from direct deposition and runoff of the pesticides. However, very few field studies have been conducted that have examined the impacts to aquatic organisms from mosquito control adulticides. The limited number of studies on adulticide impacts all involve examining short-term effects, usually from a single application of a pesticide. Therefore, it is difficult to extrapolate the results of short-term experiments into predictions of long-term impacts, including if the short-term studies detected impacts. In addition, mosquito control is most often conducted at a landscape level. Statistically significant studies of impacts at larger temporal and spatial scales are non-existent and would be a challenge both scientifically and economically.

### **Short-term impacts**

Anticipated impacts on wildlife from mosquito monitoring and control by the Districts is expected to be minimal. In an extensive literature review on the effects of Bti on mammals, Siegel and Shadduck (1992) found the bacterium to be innocuous. These studies exposed a variety of mammalian species to Bti at moderate to high doses and observed no pathological symptoms, disease or mortality. Continued use of the bacterium Bti at moderate rates is likely to have a negligible effect on mammalian species residing on the Refuge.

Areas most likely to be treated with larvicides include irrigated pasture and seasonal wetland basins recently filled-both of which are unlikely to contain fish. Aquatic habitats which have a fish community are unlikely to be significant sources of mosquitos on the Refuge. Toxicity of any of these pesticides to fish populations is not likely to be an issue, since fish rarely occur in mosquito production areas at the Refuge.

While treatment on the ground may seem ideal because the impact area is small and can be accomplished from existing roads and levees, aerial treatment is preferred as the impacts to the ground are non-existent and the amount of coverage is larger, less time consuming, and effective over a large area. Low flying aircraft will undoubtedly cause disturbances to wildlife. However, the number of treatment days per year is low, and if the applicator (pilot or ground) follows the stipulations previously outlined and within the SUP, mosquito abatement practices should not materially interfere with or detract from the Refuge purpose or the mission of the National Wildlife Refuge System. If additional biological monitoring of this activity documents substantial negative impacts to migratory birds or other wildlife, this determination, would be reanalyzed on the basis of new evidence.

### **Long-term impacts**

The Refuge was established in part to provide habitat for migratory birds, particularly waterfowl including geese, swans, ducks and coots. These species occur on the Refuge during August, September and October, when newly flooded wetlands are being treated to control mosquitoes, so there is a potential impact on them. Geese and swans likely will not be impacted much, as they are year-round herbivores. Geese feed mainly on grasses and agricultural lands, while swans feed mainly on roots, tubers, stems and leaves of submerged and emergent aquatic vegetation. While applications of Bti and Altosid would be likely to occur over areas of vegetation that may be used by geese and swans, birds are not found to be negatively affected by using foods exposed to Bti or methoprene (Niemi et al. 1999). In contrast, ducks are known to be opportunistic feeders on both plants and invertebrates, using the most readily available food sources. Invertebrates, plants and seeds compose most of their diet, varying with the season and the geographic location.

A study in California's Sacramento Valley has shown that plant foods are dominant in fall diets of northern pintails, while invertebrate use increases in February and March (Miller 1987). Seeds of swamp timothy are the most important duck food in the summer-dry habitats of the San Joaquin Valley (Miller 1987). Therefore, any food chain impacts resulting from larvicide and adulticide treatment will have limited impacts on the mainly seed diet of newly arriving ducks. Their diet shifts to invertebrates after mosquito treatments are expected to be reduced in frequency, thereby allowing the invertebrate populations to recover. Studies have shown that aquatic invertebrates are a dominant food of non-breeding waterfowl during the summer molt and the fall and winter periods (Heitmeyer and Raveling 1988). Invertebrates are also critical for egg production during the spring (Swanson, Krapu and Serie 1979) and duckling growth during the summer rearing period (Krapu and Swanson 1975).

Mosquitoes and chironomids make an important contribution to invertebrate food resources throughout the year. Other significant food resource contributors of the invertebrate community are Coleoptera, Odonata and Trichoptera. However, during fall flood-up and peak mosquito populations, ducks tend to feed on seed and other plant material. Waterfowl generally tend to feed on seeds when they reach their

wintering areas, perhaps to regain energy lost during long flights (Heitmeyer and Raveling 1988; Miller 1987). Therefore, any food chain impacts resulting from larvicide and adulticide treatment will have limited impacts to the mainly seed diet of newly arriving ducks. Their diets shift to invertebrates after treatments are expected to be reduced in frequency thereby allowing invertebrate populations to recover.

Shorebirds feed on a wide variety of invertebrates all year—feeding that intensifies at the onset of spring migration. Documentation of indirect food-chain effects have not come to light. Hanowski et al. (1997) studied 19 different bird species after collecting data on wetlands 2 years before treatment and 3 years after treatment of both Bti and methoprene applications and found no negative effects. Niemi et al. (1999) found the same results from the same study site of a 3-year study on zooplankton or breeding birds. Primarily two California State Species of Concern forage and nest on the Refuge: tricolored blackbirds and white-faced ibis. Both species are associated with wetland habitats. Although resident endangered species are limited to upland habitat on the Refuge, these sensitive species prefer wetland habitat or habitat bordering wetlands. While Hanowski et al. (1997) found no direct evidence to indicate Bti or methoprene negatively impacted the reproduction, growth or foraging of blackbirds, to minimize impacts to these species during their breeding season, no applications will occur where tricolored blackbirds or white-faced ibis are nesting.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes

### **Stipulations Necessary to Ensure Compatibility**

The following stipulations are required to ensure compatibility:

1. Monitoring of the use must be sufficient to evaluate compliance with stated conditions and swift action must be taken to correct or respond to any serious deviations.
2. The Refuge Manager has final approval for any adulticide treatments on the Refuge.

## **Justification**

For many years, the San Luis National Wildlife Complex has worked cooperatively with the Turlock and Eastside Mosquito Vector Control Districts. Mosquito management, as outlined in this Compatibility Determination, would not conflict with the national policy to maintain the biological

diversity, integrity and environmental health of the Refuge. Based on available science and best professional judgment, the Service has determined that the mosquito management at Merced National Wildlife Refuge, in accordance with the stipulations provided here, would not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose of the Refuge.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2033

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### Figure(s)

Figure 1. Relative Toxicity of Larvicide to Fish.  
The smaller the index, the less likely the risk of toxicity.

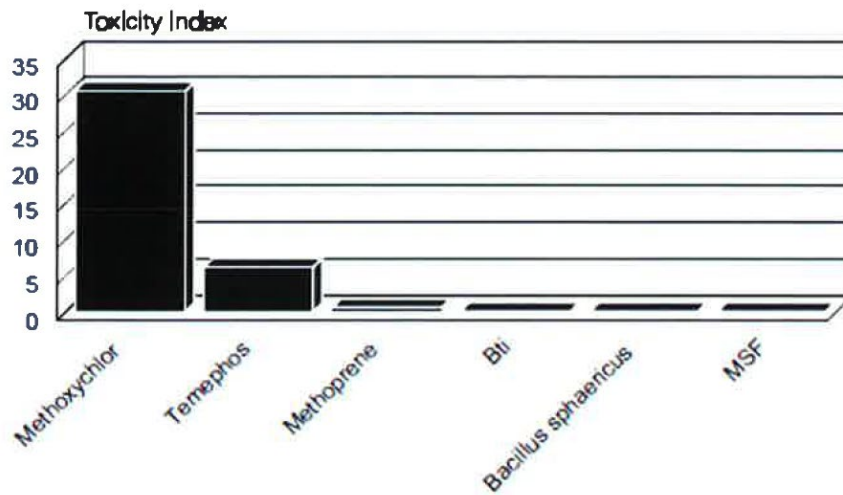


Figure 2. Relative Toxicity of Adulticides to Fish.  
The smaller the index, the less likely the risk of toxicity.

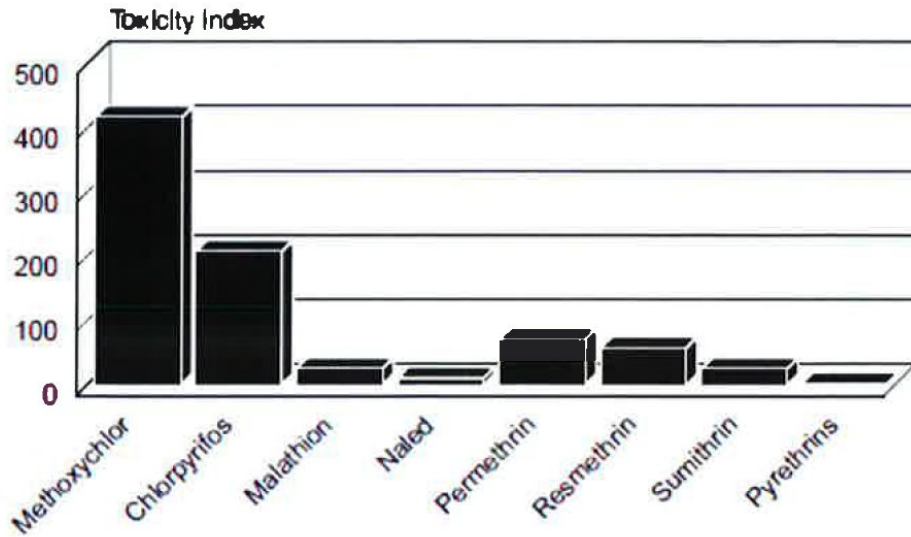
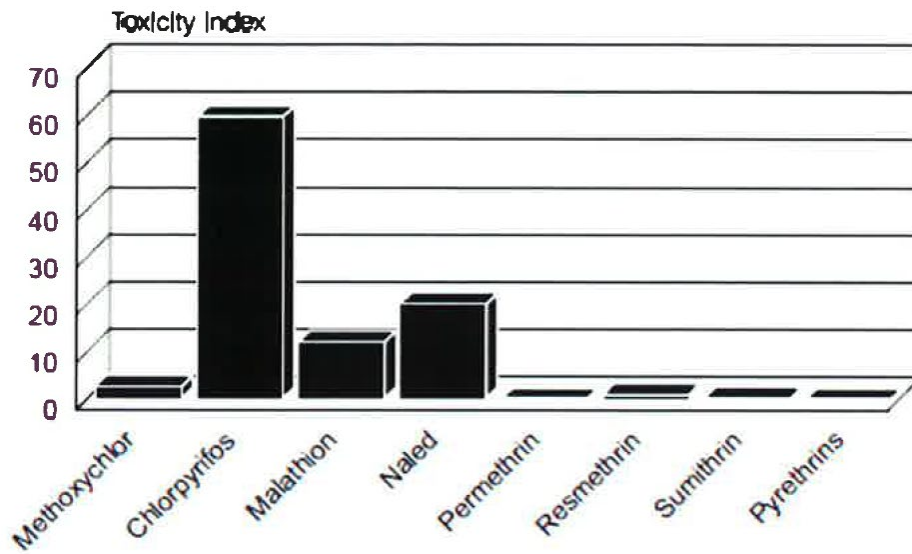


Figure 3. Relative Toxicity of Adulticides to Birds.  
The smaller the index, the less likely the risk of toxicity.



Figures 1, 2 and 3 from: Paul and Sinnott 2000

# Draft Compatibility Determination

## Title

Compatibility Determination for Wildlife Observation and Photography at Merced National Wildlife Refuge

## Refuge Use Category

Wildlife Observation and Photography

## Refuge Use Type(s)

Photography

Photography, video, filming or audio recording (news and educational)

Wildlife Observation

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## **Description of Use**

### **Is this an existing use?**

Yes. This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

### **What is the use?**

The National Wildlife Refuge System Improvement Act of 1997 identifies wildlife observation and photography as well as hunting, fishing, interpretation and environmental education as priority wildlife-dependent public uses for Refuges. As two of the six priority public uses of the Refuge System, these uses are to be encouraged when compatible with the purposes of the Refuges. Wildlife observation and photography are considered simultaneously in this Compatibility Determination (CD). Many elements of the wildlife observation and photography programs are similar to opportunities provided in the environmental education and interpretation programs. These uses are described in the Final CCP and Visitor Services Plan.

The guiding principles of the Refuge System's wildlife observation and wildlife photography programs (Service Manual 605 FW 4 and 5) are to:

- Provide safe, enjoyable and accessible wildlife viewing opportunities and facilities.
- Promote visitor understanding of, and increase visitor appreciation for, America's natural resources.
- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in Service Manual 605 FW 1.6.
- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.

### **Is the use a priority public use?**

Yes.

### **Where would the use be conducted?**

Wildlife observation and photography can be conducted on all portions of the Refuge that are open to the general public. Wildlife observation and photography at Merced NWR take place on one auto tour route and four nature trails. The auto tour route is 5 miles and travels around the Refuge's wetland, upland and agricultural units. Four nature trails are at Merced NWR, two of which are accessible from the main entrance parking area: the Meadowlark and Kestrel Trails.

The Meadowlark Trail is 1.5 miles and travels through the native grassland meadows, riparian corridors, and seasonal wetlands found on the Refuge. This habitat mixture attracts a diversity of bird species that vary with each season. The 0.5-mile Kestrel Trail is used by many different songbirds that are particularly vocal in the spring. The 1-mile Bittern Marsh Trail meanders around a semipermanent

wetland, and wildlife observation highlights include Great Horned Owls and coyotes. The 1.5-mile Cottonwood Trail is located on the north side of the Refuge and travels through cottonwood trees to an elevated observation deck that provides views of cranes and geese during the winter.

### **When would the use be conducted?**

The San Luis National Wildlife Refuge Complex Visitor Center is generally open daily from 8:00 a.m. to 4:30 p.m., with hours possibly varying seasonally to meet the needs of visitors. The Visitor Center is closed on Federal holidays. All other outdoor areas of Merced NWR are open to the public from one-half hour before sunrise to one-half hour after sunset.

### **How would the use be conducted?**

Non-commercial photography and wildlife observation do not require a special use permit (SUP) if the following conditions are met:

- Only handheld recording equipment (e.g., camera, camcorder, smartphone, etc.) or hand-carried tripods are used.
- Artificial lights or audio equipment, which would cause disturbance, are prohibited.
- Access is limited to areas of the Refuge open to the general public.
- No other special considerations are needed (e.g., access to the Refuges after normal public visitation hours, setting up temporary photography blinds, etc.) (16 USC 460I-6d, Refuge Manual 8 RM 16).

Opportunities for wildlife observation and photography can be found on auto routes and nature trails, with highlights including opportunities to view large flocks of ducks, geese, cranes and other waterbirds, as well as riparian woodland species. Visitors must remain in vehicles along the auto tour route due to the proximity of the road to wildlife; however, staying inside the vehicle and using it as a viewing blind can be advantageous. Pull-outs with interpretive panels along the tour route describe wildlife ecology and management on the Refuge. The auto tour route has two elevated observation platforms with permanently mounted spotting scopes. Merced NWR has one permanent photo blind available on a first-come, first-served basis.

### **Why is this use being proposed or reevaluated?**

Noncommercial photography and wildlife observation are wildlife-dependent uses that are considered priority public uses of the National Wildlife Refuge System. Providing opportunities for wildlife observation and photography would contribute toward fulfilling provisions of the National Wildlife Refuge System Administration Act, as amended in 1997, and one of the goals of the San Luis NWR Complex CCP (Goal 4, Objective 4.1 of the CCP). Wildlife observation and photography provide an excellent forum for allowing public access and increasing understanding of Refuge Complex resources.

## **Availability of Resources**

Adequate funding and staff exist or are attainable in order to provide the public with wildlife observation and photography opportunities at Merced NWR. Annual maintenance costs will involve visitor center maintenance, nature trail and parking area maintenance, entrance road maintenance, auto tour route maintenance, cleaning and maintenance of comfort stations, periodic maintenance of wooden structures (i.e., benches, platforms and blinds) and repair/replacement of signs and gates. The Service is able to properly develop, operate and maintain wildlife observation and photography in a way that will not materially interfere with or detract from fulfillment of the Refuge purposes nor the Refuge System mission.

## **Anticipated Impacts of the Use**

The impacts of the proposed use to Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.” Only the impacts to vegetation, wildlife and visitor use are discussed below; all other resources will not be more than negligibly impacted by the action and have been dismissed from further analyses.

### **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities such as wildlife observation and photography may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively impact wildlife, producing stressful conditions even if unintentional. These disturbances from public use may negatively impact some of the Refuge’s purposes, including “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec 715d (Migratory Bird Conservation Act) and “...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act).

However, the Refuge System Administration Act states that the Refuge System “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.” Wildlife observation and photography (noncommercial) on Merced NWR will provide such wildlife-dependent recreation, increasing the public’s knowledge and understanding of wildlife and streamside habitats and increasing their sense of ownership of and support for conservation of those lands.

## Short-term impacts

### Wildlife

Disturbance of wildlife is the primary concern regarding these uses. Disturbance to wildlife, such as the flushing of feeding, resting or nesting birds, is inherent to these activities. Some temporary disturbance to wildlife due to human activities on trails (e.g., hiking, bird watching) occurs; however, the disturbance is generally localized and will not adversely impact overall populations. Increased facilities and visitation would cause some displacement of habitat and increase disturbance to wildlife, although this is expected to be minor given the size of the Refuges and by avoiding or minimizing intrusion into critical wildlife habitat.

Purdy et al. (1987) and Pomerantz et al. (1988) described six categories of impacts to wildlife as a result of visitor activities such as wildlife observation and photography:

1. Direct mortality: immediate, on-site death of an animal.
2. Indirect mortality: eventual, premature death of an animal caused by an event or agent that predisposed the animal to death.
3. Lowered productivity: reduced fecundity rate, nesting success, or reduced survival rate of young before dispersal from nest or birth site.
4. Reduced use of Refuge: wildlife not using the Refuge as frequently or in the manner they normally would in the absence of visitor activities.
5. Reduced use of preferred habitat on the Refuge: wildlife use is relegated to less suitable habitat on the Refuge due to visitor activity.
6. Aberrant behavior/stress: wildlife demonstrating unusual behavior or signs of stress likely to result in reduced reproductive or survival rates.

Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications or death (Smith and Hunt 1995). Many studies have shown that birds can be impacted from human activities on trails when they are disturbed and flushed from feeding, resting or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy or be deterred from using desirable habitat, affect resting or feeding patterns, and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

Hérons and shorebirds were observed to be the most easily disturbed (when compared to gulls, terns and ducks) by human activity and flushed to distant areas away from people (Burger 1981). A reduced number of shorebirds were found near people who were walking or jogging, and about 50 percent of flushed birds flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance (e.g., running, flushing) increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller, Knight and Miller 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine

species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994).

Depending on the species (especially migrants vs. residents), some birds may habituate to some types of recreation disturbance and either are not disturbed or will immediately return after the initial disturbance (Hockin et al. 1992; Burger, Gochfeld and Niles 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbance to foraging and loafing birds based on experimental flushing distances for 16 species of waders and shorebirds. They recommended 100 meters as an adequate buffer against pedestrian traffic; however, they suggest this distance may be reduced if physical barriers (e.g., vegetation screening) are provided, noise levels are reduced and traffic is directed tangentially rather than directly toward birds. Screening may not effectively buffer noise impacts, thus visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998). Seasonally restricting or prohibiting recreation activity may be necessary during spring and fall migration to alleviate disturbance to migratory birds (Burger 1981, 1986; Boyle and Samson 1985; Klein, Humphrey and Percival 1995; Hill et al. 1997).

Of the wildlife observation techniques, wildlife photographers tend to have the largest disturbance impacts (Klein 1993, Morton 1995, Dobb 1998). While wildlife observers frequently stop to view species, wildlife photographers are more likely to approach wildlife (Klein 1993). Even slow approach by wildlife photographers tends to have behavioral consequences to wildlife species (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers, with low-power lenses, to get much closer to their subjects than other activities would require (Morton 1995), including wandering off trails. This usually results in increased disturbance to wildlife and habitat, including trampling of plants. Klein (1993) recommended that Refuges provide observation and photography blinds to reduce disturbance of waterbirds when approached by visitors.

### Soils and vegetation

Visitors participating in wildlife observation and photography activities could directly impact the plants and soils on the Refuge. Knight and Gutzwiller (1995) found that the main effect on vegetation and soil is human trampling caused by walking on- and off-trail. Excessive travel by foot can crush, bruise, shear off and uproot vegetation (Cole and Landres 1995). Vegetation in trampled areas may be reduced in height, stem length, leaf area, flower and seed production and carbohydrate reserves (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration and nutrient availability (Kuss 1986). This can in turn affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and increasing fluctuation in soil moisture content (Knight and Gutzwiller 1995).



Visitors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and, when necessary, treatment. Staff will work to educate the visiting public to reduce introductions and will work to monitor and control invasive species.

Visitor use would primarily occur on designated roads and trails and inside the Visitor Center. Public use trails and wildlife observation areas are designed and maintained to minimize impacts on soil and vegetation. Therefore, we anticipate additional impacts to soils and vegetation would be negligible and localized. Off-trail access for these uses would be limited to areas that have already been incorporated into specific programs.

Additionally, maintenance activities required for boardwalks/trails and parking lots will have minor impacts on soils and vegetation around the trails. This could include an increased potential for erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), alteration of vegetative structure and composition and sediment loading (Cole and Marion 1988). However, these activities will concentrate the foot traffic of visitors, allowing the vegetation surrounding them to remain undisturbed.

## **Long-term impacts**

### Visitor use

Wildlife observation and photography are not only wildlife-dependent recreation activities, but also a means of making visitors aware of the potential impacts from their actions, such as trampling vegetation and flushing birds. These uses generally support the Refuge purposes and negative impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by the opportunities provided to visitors. A secondary benefit of public uses is that they instill a sense of ownership and stewardship in visitors, which can reduce vandalism, littering and poaching. It also strengthens the Service's visibility in the local community.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

### **Stipulations Necessary to Ensure Compatibility**

- Adequate areas are designated as wildlife sanctuary with no or limited public use activities to provide high-quality habitat for feeding, resting and nesting.
- Regulations and wildlife-friendly behavior (e.g., requirements to stay on designated trails and keep dogs on leash, etc.) are described in brochures and posted at kiosks and trailheads.
- Refuge visitors are required to remain in vehicles while on the auto tour routes except at designated parking areas.
- Refuge law enforcement staff routinely monitor the auto tour route and walking trails for Refuge regulation compliance.
- Access to the Refuges is allowed from one-half hour before sunrise to one-half hour after sunset.
- Visitors must obtain an SUP if the request includes access to closed areas of the Refuges or other special considerations (e.g., access to the Refuges after normal public visitation hours, setting up temporary photography blinds, etc.) (16 USC 460I-6d, Refuge Manual 8 RM 16). Specific conditions may apply depending upon the requested activity and will be addressed through the SUP.

## **Justification**

These wildlife-dependent uses are priority public uses of the National Wildlife Refuge System. Providing opportunities for wildlife observation and photography would contribute toward fulfilling provisions of the National Wildlife Refuge System Administration Act, as amended in 1997, and one of the goals of the San Luis NWR Complex (Goal 4, Objective 4.1 of the CCP). Wildlife observation and photography provide an excellent forum for allowing public access and increasing understanding of Refuge Complex resources. The stipulations outlined above will minimize potential impacts relative to wildlife/human interactions. Based upon impacts described in the Final Comprehensive Conservation Plan and Environmental Assessment, it is determined that wildlife observation and photography within Merced NWR as described herein, will not materially interfere with or detract from the purposes for which the Refuges were established or the mission of the Refuge System. Implementing wildlife observation and photography programs and associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuges.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Research at Merced National Wildlife Refuge

## Refuge Use Category

Research and Surveys

## Refuge Use Type(s)

Research  
Surveys

## Refuge

Merced National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes. This use is being reevaluated in conjunction with the San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

For the purposes of this compatibility determination (CD), research is considered to be planned, organized and systematic investigation of a scientific nature conducted by non-USFWS personnel or authorized agent. Similarly, surveys are defined in this CD as scientific inventory or monitoring conducted by non-USFWS personnel or authorized agent. This CD does not address research related to cultural resources.

**Is the use a priority public use?**

No.

**Where would the use be conducted?**

On Service-owned lands with the approved acquisition boundary for Merced NWR. Specific areas on the Refuge must be approved in the special use permit (SUP) (see “How would the use be conducted?” for more details).

**When would the use be conducted?**

The Refuge Manager receives periodic requests to conduct natural resources research and surveys on the Refuge. These proposals are reviewed and approved by the Refuge Manager when it is determined that a proposed research activity would provide benefits to Refuge fish, wildlife, plant populations and/or their habitats, or expand our understanding of natural ecosystem processes and/or functions occurring on the Refuge. In so doing, the research would support Refuge purposes and the mission of the National Wildlife Refuge System. Specific start and end dates for a particular research proposal would consider time of year (e.g., avoiding the nesting season) and any restrictions related to time of day necessary to minimize disturbance to habitat and species or to avoid conflicts with ongoing Refuge operations.

**How would the use be conducted?**

Research investigations are designed to address these provisions by answering specific management questions. These include, but are not limited to, evaluation of vegetation and wildlife response to habitat management techniques, wildlife and plant population monitoring, documentation of seasonal wildlife movements and habitat use, wildlife disease investigations and development of invasive species management techniques. Pertinent results from research investigations are incorporated into management plans and actions at the Complex and help strengthen the decision-making process. The proposed research program is discussed as part of the Proposed Action in the Draft CCP and associated EA.

Research would be conducted in accordance with the procedures, conditions and case-specific stipulations included in an approved Refuge SUP using USFWS Form 3-1383-R. The SUP process requires applicants to submit the details of the research proposal for review and approval, including:

- Objectives of the study;
- Justification for the study;
- Detailed study methodology and schedule;

- Research personnel required and their qualifications and experience;
- Status of necessary permits (i.e., scientific collecting permits, endangered species permit);
- Costs to Refuge and Refuge staff time requested, if any; and
- Anticipated end products (i.e., reports, publications).

Once a proposal is submitted, the Refuge Manager or other Complex staff would review the details of the proposal and, if acceptable, would prepare an SUP authorization and Special Conditions that include a complete project description, conditions and project-specific stipulations to be followed during implementation of the proposal. Stipulations would be developed after considering the following factors:

- Will information gained from the research or survey provide insight into current or future Refuge management?
- Is there a potential for short- and/or long-term disturbance, injury and/or mortality to any listed species and/or other Refuge wildlife and/or habitats? If so, are there measures that can be implemented to avoid or minimize such impacts?
- Could the proposal conflict with other ongoing research, monitoring or management programs? If so, are there measures that can be implemented to avoid such conflicts?
- Could the research or survey be implemented elsewhere, or does the Refuge provide the only option for carrying out the specified research?
- Is the proposal designed to minimize disturbance by taking into consideration location, timing and scope of the study, as well as the number of participants, study methods and number of study sites?

Proposals for open-ended research projects would not be considered. If a proposal is approved, an SUP will be prepared that specifies rules of conduct, all permitted procedures, case-specific stipulations and data-reporting requirements. Projects would be reviewed annually to assess whether they:

- Continue to meet the specified criteria or require additional stipulations,
- Continue to operate as originally proposed and
- Can provide data to confirm that the objectives of the study are being accomplished.

### **Why is this use being proposed or reevaluated?**

The National Wildlife Refuge System Administration Act directs the Service to "...ensure that the biological integrity, diversity, and environmental health of the System are maintained ..." and to "...monitor the status and trends of fish, wildlife, and plants in each refuge..." Monitoring and research are integral parts of National Wildlife Refuge management. Plans and actions based on research and monitoring provide an informed approach that analyzes the effects of management actions on Refuge resources.

Research proposals also allow for independent examination of natural processes occurring on the Refuge, as well as for focused research on issues important to Refuge management, such as vegetation and wildlife response to habitat management, wildlife and plant population monitoring, documentation of seasonal wildlife movements and habitat use, wildlife disease investigations and development of



invasive species management techniques. Pertinent results from research investigations can inform management recommendations in step-down plans, comprehensive conservation plan updates and compatibility determinations. They can also inform the development and updating of monitoring protocols in habitat and species management plans.

## **Availability of Resources**

Adequate funding and staff exist to manage scientific studies concerning natural resources conducted by private individuals or groups at the Merced NWR. Administrative staff costs associated with this use consist of Refuge Complex staff time to review research proposals, collected data, SUPs and research summaries; evaluate impacts; and ensure that researchers are in compliance. Annual monetary costs expended by the Refuge Complex to administer this use averages \$5,000. Refuge Complex operational funds are currently available through the Service budget process to administer this program. Most of the research conducted on the Refuge Complex in the past has been funded from outside sources and this trend is expected to continue.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.”

### **Potential impacts of a proposed use on the Refuge's purpose(s) and the Refuge System mission**

Refuge purposes at San Luis NWR include “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act); “...for the management and control of migratory waterfowl and other wildlife...” (Lea Act); and “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ...” (Endangered Species Act of 1973). As such, monitoring, surveys and research are integral parts of adaptive management on National Wildlife Refuges. Research and survey uses are considered compatible with Refuge purposes and the Refuge System mission. Adverse impacts on wildlife and habitat as described in the following sections will be clearly outlined in the SUP approval process and mitigated whenever possible.

### **Short-term impacts**

Some direct and indirect effects would occur through disturbance, which is expected with some research activities, especially where researchers are entering wildlife habitat. Researcher disturbance could include altering wildlife behavior, going off designated trails, collecting soil and plant samples or trapping and handling wildlife. Most of these effects would be short-term because only the minimum of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates) are required for identification

and/or experimentation. Statistical analysis will be encouraged and captured, and marked wildlife will be released.

Research activities could also have impacts on vegetation, soil and/or water. However, most of these effects would be short-term because only the minimum of samples required for identification and/or experimentation and statistical analysis would be permitted. Off-trail walking by researchers could have similar effects as hikers who may alter habitats by trampling vegetation, compacting soil and increasing the potential of erosion (Liddle 1975; Hendee, Stankey and Lucas 1990). Soil compaction makes root penetration more difficult, making it difficult for seedlings to become established (Cole and Landres 1995). In moderate cases of soil compaction, plant cover and biomass are decreased. In highly compacted soils, plant species abundance and diversity are reduced in the long-term, as only the most resistant species survive (Liddle 1975). Impacts from vegetation trampling can lower species richness, decrease ground cover and plant species density, increase weedy annuals and induce changes in species composition (Grabherr 1983).

According to Knight and Cole (1991), there are three categories of wildlife responses to human disturbance: 1) avoidance; 2) habituation and 3) attraction. The magnitude of the avoidance response may depend on a number of factors, including the type, distance, movement pattern, speed and duration of the disturbance; the time of day, time of year and weather; and the animal's access to food and cover, energy demands and reproductive status (Knight and Cole 1991; Gabrielson and Smith 1995). Individual animals may be disturbed by human contact to varying degrees. Many studies have shown that birds can be impacted from human activities when they are disturbed and flushed from feeding, resting or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy and be deterred from using desirable habitat, affect resting or feeding patterns and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds are observed to be more sensitive than resident species to disturbance (Klein 1989). Nest predation for songbirds (Miller, Knight and Miller 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people.

In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994). Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife would respond to disturbance is predictability. Gabrielson and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path. Wildlife may also be attracted to human presence. For example, wildlife may be converted to "beggars" lured by handouts (Knight and Temple 1995), and scavengers may be attracted to road kills (Rosen and Lowe 1994).

### **Long-term impacts**

Use of the Refuge to conduct research will benefit Refuge fish, wildlife, plant populations and their habitats. Monitoring and research investigations are an important component of adaptive management.

Research investigations would be used, in part, to evaluate habitat restoration projects and ecosystem health. Specific restoration and habitat management questions could be addressed in most research investigations to improve habitat and benefit wildlife populations.

Standardized monitoring would be used to ensure data compatibility for comparisons from across the landscape so that natural resource bottleneck areas could be identified for habitat enhancement and restoration. Expected long-term and cumulative effects include a growing body of science-based data and knowledge, as new and continued monitoring and new research complements and expands upon previous investigations and a science-based body of data and information on Refuge management best practices. Not only are natural resources inventory, monitoring and research provisions of the Refuge Improvement Act, they also are necessary tools for maintaining biological integrity and diversity and environmental health, which are other key provisions of the act.

Long-term effects would be eliminated or reduced because the Service's evaluation of research proposals would ensure that only proposals with adequate safeguards to mitigate impacts would be accepted. Potential impacts associated with research activities would be minimized because sufficient restrictions would be included as part of the study design and research activities would be monitored by Refuge staff. Refuge staff would ensure that research projects contribute to the enhancement, protection, preservation and management of native Refuge wildlife populations, and their habitats would help the Refuge fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System and the need to maintain ecological integrity. Additionally, the SUP would include conditions to further ensure that impacts to wildlife and habitats are avoided and minimized.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis National Wildlife Refuge Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

Research proposals are required for any investigation and are reviewed by Complex staff to assess potential value and impacts to the Refuge Complex's natural resources. All investigations require that a one-year special use permit (SUP) is issued to approved research projects; restrictions regarding the specific research project are listed in the SUP; and an annual/final report is produced. Failure to comply

with the provisions of the SUP results in revocation of permit privileges. Specifically, all scientific studies on the Refuge Complex will require the following:

1. The principal investigator must submit a study proposal to the Complex for approval.
2. All work will be coordinated with the project leader or designated staff and researcher.
3. Research will adhere to current approved protocols for data collection as indicated in the study proposal and SUP.
4. Proposed research methods that would or have the potential to adversely affect Refuge Complex resources will require the researcher to develop mitigation measures to minimize potential impacts; mitigation measures will be listed as a condition in the SUP.
5. Complex staff will be free to accompany researchers at any time to assess potential impacts; ensure SUPs are adhered to; and determine if approved research proposals and SUPs should be terminated because of adverse impacts.
6. All Refuge Complex rules and regulations must be followed unless otherwise excepted, in writing, by the project leader.
7. The researcher will be responsible for acquiring all necessary permits, both from the State of California or the Service, if applicable, and demonstrating that these permits are up to date prior to the beginning of research approval.

## **Justification**

Based on the impacts described above and in the Comprehensive Conservation Plan and Environmental Assessment, it is determined that research and surveys within the Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. Refuge monitoring and research will directly benefit and support Refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitat will improve through the application of knowledge gained from monitoring and research. Biological integrity, diversity and environmental health would benefit from scientific research on natural resources conducted at the Refuge. The wildlife-dependent, priority public uses (wildlife viewing and photography, environmental education and interpretation, fishing and hunting) would also benefit as a result of increased biodiversity and wildlife and native plant populations from improved restoration and management plans and activities associated with monitoring and research investigations which address specific restoration and management questions.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2035

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# Draft Compatibility Determination

## Title

Compatibility Determination for Commercial Photography at San Luis National Wildlife Refuge

## Refuge Use Category

Wildlife Observation and Photography

## Refuge Use Types

Photography, video, filming, or audio recording (commercial)

Photography, video, filming, or audio recording (news and educational)

Wildlife Observation (commercial)

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

Commercial photography is an activity conducted by an individual or organization involving photography, videography, filming, or other recording of sight or sound for commercial purposes. This includes the creation of educational, entertainment, or commercial enterprises, as well as advertising audio-visuals for the purpose of paid product or services, publicity and commercially oriented photo contests. Wildlife photography is one of the six priority wildlife dependent public uses of the NWRS and is to be encouraged when compatible with the purposes of the Refuge.

**Is the use a priority public use?**

Yes.

**Where would the use be conducted?**

Commercial recording may take place by foot, from blinds or from vehicles. Landing or taking-off of drones (hereafter, unmanned aerial systems, or UAS) on Refuge lands could be approved on a case-by-case basis depending on specific circumstances of the request and through the Special Use Permit (SUP) process. Areas used for obtaining recordings, modes of access and equipment used would be approved on a case-by-case basis under a SUP with terms and conditions. Recording activities and access on Refuge lands may be restricted by season, location, etc., to avoid effecting sensitive wildlife or resources where disturbance could be detrimental.

**When would the use be conducted?**

Commercial recording could be permitted seven days a week from dawn to dusk, but it would need to be closely coordinated with the Refuge if occurring during sensitive periods such as the breeding season of a listed species. Proposed activities will be evaluated to ensure they do not cause excessive disturbance to wildlife, habitats and sensitive resources, or interfere with refuge operations. All requests are subject to denial.

**How would the use be conducted?**

Commercial photography is conducted in accordance with Department of Interior regulations. The regulation governing commercial filming and still photography is found at 43 CFR Part 5 Subpart A. The Service manages audio recording as governed within 50 C.F.R. Part 21.71. That rule implemented the requirements of Pub. L. No. 106-206 (16 U.S.C. 4601-6d), directing the Secretaries of Interior and Agriculture to require permits and to develop a consistent fee structure for commercial filming and some photography on federal lands. The final rule, which modifies regulations at 36 C.F.R. Part 5, defines commercial filming and still photography and explains which activities require a permit. In accordance with Pub. L. No. 106- 206, the rule states that all commercial filming and certain photography activities require a permit. The rule also discusses the more limited circumstances when a permit is required for news-gathering activities. It states the conditions in which a filming or photography permit may be



denied, such as if the activity would cause resource damage, unreasonably disrupt public use, pose health or safety risks, or violate the Wilderness Act (16 U.S.C. 1131–1136) or other applicable laws or regulations. Commercial still photography only requires a permit in certain cases, per 43 CFR 5.2(b):

“Still photography does not require a permit unless:

- 1) It uses a model, set, or prop as defined in §5.12; or
- 2) The agency determines a permit is necessary because:
  - (i) It takes place at a location where or when members of the public are not allowed; or
  - (ii) The agency would incur costs for providing on-site management and oversight to protect agency resources or minimize visitor use conflicts.”

A permit for audio recording would be required under the same conditions as still photography. Commercial recording requests must be submitted to the Refuge manager at least two weeks in advance of the requested visit through a Commercial SUP application. The application includes interpretive purpose of the recording, description of the three proposed activities, dates and times, number of personnel and equipment used. The U.S. Fish and Wildlife Service (hereafter, Service) will evaluate the SUP application using the following criteria:

- 1) Will the recording request conflict with any management programs?
- 2) Will the recording be intrusive in any way or cause undue disturbance to Refuge resources?
- 3) Depending upon the scale of the request, does the Refuge have the available resources to manage the proposed SUP?

In some instances, arrangements can be made to allow commercial photographers into closed portions of the Refuge Complex in exchange for the Service receiving images taken by the photographer for use in public outreach products and displays.

### **Why is this use being proposed or reevaluated?**

Commercial photography is being re-evaluated as a Refuge use in conjunction with the San Luis NWR Complex CCP and EA. Commercial photography on Merced National Wildlife Refuge (hereafter Merced NWR) was also found to be compatible in a separate Compatibility Determination (CD).

### **Availability of Resources**

Adequate funding and staff exist to manage commercial photography conducted by private individuals or groups at the San Luis NWR. Costs are primarily associated with administration, monitoring and facilities. Administrative staff costs associated with this use consist of Refuge Complex staff time reviewing applications for SUPs, evaluating effects and ensuring photographer compliance. Annual monetary costs expended by the Refuge Complex to administer this use average \$5,000. Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use of refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analysis of the environmental consequences to a resource only when the resource is considered to be an “affected resource” due to the potential effects to that resource being more than negligible. Only the impacts to vegetation and wildlife resources are discussed in the content to follow; all other resources not being more than negligibly impacted by the action have been dismissed from further analyses.

### **Potential impacts of a proposed use on the Refuge’s purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities like wildlife observation and photography may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively affect wildlife, producing stressful conditions, even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act).

However, the Refuge System Administration Act states that the Refuge System, “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.” Commercial photography on the San Luis NWR will provide such wildlife-dependent recreation, increasing public knowledge and understanding of wildlife and streamside habitats, and increasing their sense of stewardship and support for conservation of those lands.

### **Short-term impacts**

Commercial recording activities could cause temporary wildlife disturbance. Adherence by the permittee to the terms and conditions of the SUP lessens or eliminates disturbances. If disturbance occurs, it is expected to be localized and of short duration. Wildlife generally have abundant cover or escape routes, and disturbances (fright and flight) are likely to have short-term effects . Once considered “nonconsumptive,” wildlife observation and wildlife photography are now recognized as having the potential to negatively affect wildlife by altering wildlife behavior, reproduction, distribution and habitat (Purdy, et al. 1987, Knight and Cole 1995).

### **Long-term impacts**

Purdy, et al. (1987) and Pomerantz, et al. (1988) describe six categories of wildlife effects due to visitor activities, including—

- 1) direct mortality

- 2) indirect mortality
- 3) lowered productivity
- 4) reduced use of Refuge
- 5) reduced use of preferred habitat on the Refuge
- 6) aberrant behavior/stress

Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance causing physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Many studies show that birds can be affected by human activities on trails when they are disturbed and flushed from feeding, resting, or nesting areas.

Flushing, especially repetitive flushing, can significantly affect habitat use patterns of many bird species. Flushing birds from an area can cause birds to expend more energy, avoid using desirable habitat or abandon sites with repeated disturbance, effect resting or feeding patterns and increase exposure to predation. (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989). Nest predation for songbirds (Miller et al. 1998) and raptors (Glinski 1976) increases in areas more frequently visited by people. In addition, , primary song occurrence and consistency for many passerine species can be affected by a single visitor (Gutzwiller et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994). Depending on the species, especially migratory v. resident, some birds may habituate to some types of recreational disturbance, either by being undisturbed or returning immediately after the initial disturbance (Hockin, et al. 1992; Burger, et al. 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). We do not expect Indirect impacts, Alterations due to indirect impacts to wildlife habitats such as food, shelter and living space availability are not anticipated from commercial recording because it is short-term in nature (Cole and Landres 1995).

As noted previously, the proposed use does not include unrestricted access to sensitive areas nor does it allow activities when the use may disturb wildlife and their habitat. Service staff, or a partner approved by the Refuge, may actively supervise or allow permittees to shadow Service staff or the Refuge partner during conservation activities taking place on the Refuge because the Service staff determine actions necessary to minimize disturbance. By restricting commercial recording in this way, permittees are unlikely to disturb federally endangered wildlife or interfere with refuge management activities.

Wildlife photographers tend to have the largest disturbance impacts of all the wildlife observation techniques (Klein 1993; Morton 1995; Dobb 1998). While wildlife observers frequently stop to view species, wildlife photographers are more likely to approach wildlife (Klein 1993). Even slow approaches by wildlife photographers tend to have behavioral consequences for wildlife species (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers with low-power lenses to get much closer to their subjects than other activities would

require (Morton 1995), including wandering off trails. This usually results in increased disturbance to wildlife and habitat, including trampling of plants.

However, because commercial photographers have high power lenses and video equipment, they are likely to have fewer disturbance effects on wildlife and habitat than the average photographer. There may be some localized effects to vegetation from trampling by foot, vehicle, or portable blind use for recording purposes. Humans and equipment can also be vectors for invasive plants by moving seeds or other propagules from one area to another. Refuge staff will monitor and evaluate the effects of these potential effects to discern if adverse effects to wildlife or habitats result from the uses.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

1. Recording activities and access on Refuge lands are subjective to time and location restrictions, if needed, to protect sensitive habitat or wildlife. Such restrictions will be determined by the Refuge Manager or equivalent.
2. All visitors must comply with NWRS-related regulations, including Prohibited Acts listed in 50 C.F.R § 27 and Public Entry Regulations in 50 C.F.R. § 26.
3. Permittee(s), designated representatives and associates shall comply with terms and conditions within the SUP as provided by the Refuge Manager. The SUP will provide terms and conditions to eliminate or reduce impacts to Refuge resources. News gathering organizations are exempt from formal permits and bonding requirements.
4. Permittee(s) will contact the Refuge Manager or their designee prior to commencement of work, at least 2 weeks in advance to allow the identification of conflicts and sensitive areas and wildlife.
5. If a drone (UAS) is approved to land or take off from the Refuge, then the permittee shall follow all FAA regulations (Small UAS Rule Part 107) and remain in visual and operational control of the aircraft at all times. In addition, the permitted use of a drone must not take, disturb, harass, or chase wildlife as defined within the Endangered Species, Migratory Bird Treaty and Airborne

Hunting Acts and the Code of Federal Regulations. Any use of drones on the refuge must be in accordance with Department of Interior Policy.

6. The Refuge Manager or designee may supervise permittee activities and can suspend, modify, or terminate any recording should unacceptable, unforeseen, or unexpected impacts or issues arise.
7. The Refuge may terminate the Special Use Permit (SUP) for noncompliance with listed conditions or if the Refuge Manager determines the use of the permit is no longer in the best interest of the Refuge.

## **Justification**

The National Wildlife Refuge System Improvement Act of 1997 identifies interpretation, environmental education and wildlife photography as priority public uses for national wildlife refuges, along with hunting, fishing and wildlife observation. As expressed, priority Refuge System uses take precedence over other potential public uses in Refuge planning and management. The Service strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the NWRS.

Currently, the Refuge’s estimated average visitor use is 110,000 visits to the Refuge annually. Allowing selected commercial recording activities will enhance the public understanding of the Service mission and the biological resources of the Refuge.

After assessing potential effects, commercial recording within the San Luis NWR as described herein was determined to not materially interfere with nor detract from the purposes for which the Refuge was established, nor the mission of the Refuge System. In the Service’s opinion, allowing commercial recording with associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge.

## **Signature of Determination**

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Refuge Manager Signature and Date

## **Signature of Concurrence**

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Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Environmental Education and Interpretation at San Luis National Wildlife Refuge

## Refuge Use Category

Environmental Education and Interpretation

## Refuge Use Types

Environmental education (not conducted by NWRS staff or authorized agents)  
Environmental education (NWRS staff and authorized agents)  
Environmental education (general)  
Interpretation (NWRS staff and authorized agents)  
Interpretation (not conducted by NWRS staff or authorized agents)

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes. This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

### What is the use?

The National Wildlife Refuge System Improvement Act of 1997 identifies environmental education and interpretation, along with hunting, fishing, interpretation, and environmental education, as priority wildlife-dependent public uses for Refuges. As two of the six priority public uses of the Refuge System, environmental education and interpretation are to be encouraged when compatible with the purposes of the Refuge. Environmental education and interpretation use are considered jointly in this compatibility determination. Many elements of environmental education and interpretation are similar to the wildlife observation and photography programs at the Complex. These uses are identified and discussed in more detail in the Final CCP and EA for the San Luis NWR Complex.

Environmental education is comprised of teacher- or leader-conducted activities that are intended to actively involve students or others in hands-on activities. These activities are designed to promote discovery, fact-finding and problem-solving skill development, leading to personal involvement and action. The Service focuses on kindergarten through twelfth grade students.

Interpretation involves participants of all ages learning about the complex issues confronting fish and wildlife resource management by voluntarily engaging in stimulating and enjoyable activities. First-hand experience with the environment is emphasized, although presentations, audiovisual media and exhibits are often necessary components of the interpretive program.

The guiding principles of the Refuge System's environmental education programs (605 FW 6 of the Service Manual) are to—

- A. "Teach awareness, understanding and appreciation of our natural and cultural resources and conservation history.
- B. Allow program participants to demonstrate learning through refuge-specific stewardship tasks and projects that they can carry over into their everyday lives.
- C. Establish partnerships to support environmental education both on- and off-site.
- D. Support local, State, and national educational standards through environmental education on refuges.
- E. Assist refuge staff, volunteers, and other partners in obtaining the knowledge, skills, and abilities to support environmental education.
- F. Provide appropriate materials, equipment, facilities, and study locations to support environmental education.
- G. Give refuges a way to serve as role models in the community for environmental stewardship.
- H. Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities."

The guiding principles of the Refuge System’s interpretive programs (605 FW 7 of the Service Manual) are to:

- A. “Promote visitor understanding of, and increase appreciation for, America’s natural and cultural resources and conservation history by providing safe, informative, enjoyable, and accessible interpretive opportunities, products, and facilities;
- B. Develop a sense of stewardship leading to actions and attitudes that reflect interest and respect for wildlife resources, cultural resources, and the environment;
- C. Provide quality interpretive experiences that help people understand and appreciate the individual refuge and its role in the Refuge System;
- D. Provide opportunities for quality recreational and interpretive experiences consistent with criteria describing quality found in 605 FW 1.6;
- E. Assist refuge staff, volunteers, and community support groups in attaining knowledge, skills, and abilities in support of interpretation; and
- F. Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.”

**Is the use a priority public use?**

Yes.

**Where would the use be conducted?**

Most environmental education and interpretation activities occur at the Visitor Center at San Luis NWR, but there are also passive interpretation opportunities throughout the Refuge. Passive methods include stationary interpretive kiosks, interpretive panels and Refuge-specific brochures, posters and displays. The Refuge also offers information on the Refuge website. Specifically, there are five interpretive information kiosks on the Refuge, located at the San Luis Unit, Freitas Unit, West Bear Creek Unit (two kiosks) and Kesterson Unit. The Refuge also hosts a waterfowl auto tour route and elk auto tour route, the latter of which has an elk observation platform with interpretive panels.

**When would the use be conducted?**

The San Luis NWR, including the auto tour routes and nature trails, is open daily from one-half hour before sunrise (dawn) to one-half hour after sunset (dusk). The Visitor Center is generally open daily from 8:00 a.m. to 4:30 p.m., with hours varying seasonally to meet the needs of visitors. The Visitor Center is closed on Federal holidays.

**How would the use be conducted?**

Environmental Education

The environmental education program offers several ways for visiting school groups to experience the Complex and its habitat and wildlife. At the Visitor Center, classes are welcomed by visitor services staff and have access to activities in the exhibit hall, environmental education room, and outdoor grounds, including the amphitheater and wetland nature trail. Classes may also travel by bus around the

tule elk and waterfowl auto tour routes. The environmental education program specifically targets elementary school grade levels, primarily 3rd through 5th grades, but accommodates visits for any age group preschool through adult.

All groups seeking a staff-facilitated visit to the Refuge for environmental education are required to make reservations in advance. The reservation system ensures that the facility is not over-crowded and that sufficient staff are available to facilitate the visit.

### Interpretation

The focal point for interpretation on the Complex is the Visitor Center at San Luis NWR. The Visitor Center features an interpretive lobby and exhibit hall filled with more than 22 interactive educational exhibits that narrate the general mission, themes and conservation stories of the Complex. The Visitor Center also serves as a launching point for visitors to explore the Complex.

Visitors to the San Luis NWR can engage in wildlife interpretation through both interactive and passive methods. Interactive methods of interpretation include guided tours, walks, presentations and special events. Refuge Complex staff regularly facilitate guided tours of the refuge units for a variety of groups throughout the year. Refuge Complex-related information is provided at annual local festivals or during special events, such as the State Fair; National Wildlife Refuge Week; special tour days on the Complex, such as Crane Day and the annual Arena Plains Wildflower and Vernal Pool tour; and numerous volunteer workdays. Refuge Complex staff are regularly invited to be guest speakers at community service group meetings such as the Rotary Club and Soroptimist and NGO chapter meetings such as Audubon and conferences and symposia. Passive methods of wildlife interpretation on the Refuge include interpretive information kiosks, an observation platform with interpretive panels, and two auto tour routes.

### **Why is this use being proposed or reevaluated?**

Environmental education and interpretation are being re-evaluated as Refuge uses in conjunction with the San Luis NWR Complex CCP and EA. Environmental education and interpretation are also found to be compatible with Merced National Wildlife Refuge (Merced NWR) in a separate Compatibility Determination (CD).

### **Availability of Resources**

Adequate funding and staff exist to manage the environmental education and interpretation programs at the Refuge. Costs primarily relate to administration and facilities. The Refuge has two permanent full-time Visitor Services staff members: an outdoor recreation planner and a park ranger. Annual monetary costs expended by the Refuge Complex to administer this use averages \$55,000 (this includes both San Luis and Merced NWRs). Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use of Refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analysis of the environmental consequences to a resource only when the resource is considered to be an “affected resource” due to the potential effects to that resource being more than negligible. Only the impacts to vegetation, wildlife and visitor use are discussed in the content to follow; all other resources not being more than negligibly impacted by the action have been dismissed from further analyses.

### **Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities like environmental education and interpretation may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively affect wildlife, producing stressful conditions, even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act).

However, the Refuge System Administration Act states that the Refuge System, “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.” Environmental education on the San Luis NWR will provide such wildlife-dependent recreation, increasing public knowledge and understanding of wildlife and streamside habitats and increasing their sense of stewardship and support for conservation of those lands.

### **Short-term impacts**

#### Wildlife

The primary concern regarding these uses is wildlife disturbance . Wildlife disturbances, such as the flushing of feeding, resting, or nesting birds, are inherent to these activities. Some temporary disturbance to wildlife due to human activities on trails and auto tour routes occurs; however, the disturbance is generally localized and not adversely effecting overall populations. Increased facilities and visitation would cause some habitat displacement and increase some wildlife disturbances, although this effect is expected to be minor given the size of the Refuges and location of most environmental education and interpretation activities occurring within the Visitor Center.

Purdy, et al. (1987) and Pomerantz, et al. (1988) describe six categories of impacts to wildlife as a result of visitor activities like wildlife observation and photography, including—

- 1) Direct mortality: The immediate, on-site death of an animal.

- 2) Indirect mortality: The eventual, premature death of an animal caused by an event or agent that predisposed the animal to death.
- 3) Lowered productivity: The reduced fecundity rate, nesting success, or reduced survival rate of young before dispersal from nest or birth site.
- 4) Reduced use of refuge: Wildlife not using the refuge as frequently or in the manner they normally would in the absence of visitor activity.
- 5) Reduced use of preferred habitat on the refuge: Wildlife use is relegated to less suitable habitat on the refuge due to visitor activity.
- 6) Aberrant behavior or stress: Wildlife demonstrating unusual behavior or signs of stress, likely resulting in reduced reproductive or survival rates.

Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance causing physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Many studies show that birds can be affected by human activities on trails when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can significantly affect the habitat use patterns of many bird species. Flushing birds from an area can cause birds to expend more energy, avoid using desirable habitat or abandon sites with repeated disturbance, affect resting or feeding patterns and increase predation exposure (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

Hérons and shorebirds were observed to be the most easily disturbed by human activity and were flushed to distant areas away from people when compared to gulls, terns and ducks (Burger 1981). A reduced number of shorebirds were found near walking or jogging people, and approximately 50 percent of flushed birds flew elsewhere (Burger 1981). The foraging time of sanderlings decreased and avoidance behaviors, such as running and flushing, increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976), and waterfowl (Boyle and Samson 1985) increases in areas more frequently visited by people. In addition, , primary song occurrence and consistency for many passerine species can be affected by a single visitor (Gutzwiller et al. 1994). Birds appeared to be reluctant to establish nesting territories in areas where primary song was affected by disturbance (Reijnen and Foppen 1994).

Depending on the species, especially migratory vs. resident, some birds may habituate to some types of recreational disturbance, either by being undisturbed or returning immediately after the initial disturbance (Hockin, et al. 1992; Burger, et al. 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbances to foraging and loafing birds, based on experimental flushing distances for 16 species of waders and shorebirds. They recommended 100 meters as an adequate buffer against pedestrian traffic; however, they suggest this distance may be reduced if physical barriers, such as vegetation screening, are provided, noise levels are reduced, and traffic patterns are directed tangentially rather than directly toward birds. Screening may not effectively buffer noise impacts, thus visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998). Seasonally restricting or prohibiting recreational activities may be

necessary during spring and fall migration to alleviate disturbances to migratory birds (Burger 1981, 1986; Boyle and Samson 1985; Klein, et al. 1995; Hill, et al. 1997).

### Soils and vegetation

Visitors participating in environmental education and interpretation activities could directly affect Refuge plants and soils. Knight and Gutzwiller (1995) found that human trampling caused by walking on- and off-trail is the main effect on vegetation and soil. Excessive foot travel can crush, bruise, shear and uproot vegetation (Cole and Landres 1995). Vegetation may be reduced in height, stem length, leaf area, flower and seed production, and carbohydrate reserves in trampled areas (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration and nutrient availability (Kuss 1986). In turn, this can affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and increasing fluctuation in soil moisture content (Knight and Gutzwiller 1995). Hammitt and Cole (1998) note that soil compaction limits the ability of plants to revegetate affected areas.

Visitors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary. Staff will work to educate the visiting public about how to reduce introductions and will work to monitor and control invasive species.

Visitor use would primarily occur on designated roads, trails, and within the Visitor Center. Public use trails and wildlife observation areas are designed and maintained to minimize soil and vegetation effects. Additional soil and vegetation effects would be negligible and localized. Off-trail access for these uses would be limited to areas that have already been incorporated into specific programs.

### **Long-term impacts**

#### Visitor use

Environmental education and interpretation can not only inform the public of the opportunities available in the San Luis NWR, but in conservation at large. These uses can also make visitors aware of the potential effects of their actions, such as trampling vegetation and flushing birds. Environmental education and interpretation activities generally support the Refuge purposes, and negative effects can largely be minimized (Goff et al. 1988). Minor resource effects attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about Refuge resources. While these uses primarily target school age children, especially environmental education, they are not limited to this age group. These uses can educate Refuge visitors about endangered and threatened species management, wildlife management, and ecological principles and communities. A secondary benefit of public use is instilling a sense of ownership and stewardship in visitors, which can

reduce vandalism, littering and poaching. It also strengthens the Service's visibility in the local community.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

1. Participants in the Refuge environmental education and interpretation programs are restricted to established trails, auto tour routes, visitor center, and other sites normally open to the public, unless escorted and under Refuge staff supervision .
2. All groups wanting a Refuge-led environmental education visit are required to make reservations in advance to ensure that the Refuge has staff and resources available to conduct the program. Currently, educational groups are not charged a fee or required to have a Special Use Permit (SUP).
3. Trail etiquette, including ways to reduce wildlife disturbance, is discussed with teachers during orientation meetings and with students during their welcome session upon arrival. On the Refuge, the teachers are responsible for ensuring that students follow required trail etiquette.
4. Refuge staff maintain records of public visitation and activities on the Refuge. The data are analyzed and used to make future program modifications as necessary to ensure compatibility of environmental education programs.
5. Educational groups are required to have a sufficient number of adults to supervise their groups—a minimum of 1 adult per 12 students.

## **Justification**

The National Wildlife Refuge System Improvement Act of 1997 identifies interpretation and environmental education as two of the priority public uses for National Wildlife Refuges. As expressed, priority Refuge System uses take precedence over other potential public uses in Refuge planning and management. The Service strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the NWRS.



Currently, the Refuge's estimated average visitor use is 110,000 visits to the refuge annually. Allowing environmental education and interpretation activities on the Refuge will enhance the public understanding of the Refuge and its biological resources.

After assessing potential effects, environmental education and interpretation within the San Luis NWR as described herein was determined to not materially interfere with or detract from the purposes for which the Refuge was established, nor the mission of the Refuge System. In the Service's opinion, allowing these uses with their associated stipulations, will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge.

### **Signature of Determination**

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Refuge Manager Signature and Date

### **Signature of Concurrence**

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Assistant Regional Director Signature and Date

### **Mandatory Reevaluation Date**

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Fishing at San Luis National Wildlife Refuge

## Refuge Use Category

Fishing

## Refuge Use Type

Non-commercial fishing

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

“The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

Non-commercial fishing has been allowed at San Luis National Wildlife Refuge (hereafter, San Luis NWR) since its establishment in 1967. This use is being re-evaluated in conjunction with the San Luis NWR Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

### **What is the use?**

Non-commercial fishing includes the harvesting of fish, shellfish, or other aquatic organisms, including bait collection for personal use, for recreational purposes or personal consumption. The San Luis NWR features fishing access along Salt Slough.

Currently, fishing at the San Luis NWR is limited to a specific section of Salt Slough, which is a natural freshwater tributary to the San Joaquin River. The most commonly fished species include channel catfish (*Ictalurus punctatus*), bullheads (*Ameiurus spp*), largemouth bass (*Micropterus salmoides*), sunfish, (*Lepomis spp.*), and common carp (*Cyprinus carpio*).

Take methods, seasons, bag limits and allowable species are subject to California Department of Fish and Wildlife (CDFW) fishing regulations, which can be found on their website. Fishing is permitted in accordance with State and Federal regulations to ensure non-interference with fish and wildlife conservation and their habitats.

### **Is the use a priority public use?**

Yes.

### **Where would the use be conducted?**

Fishing at San Luis NWR is limited to a portion of the Salt Slough, a natural freshwater tributary of the San Joaquin River. There are nine designated fishing areas with angler parking lots. Fishing opportunities along the Salt Slough follow the Salt Slough Fishing Access Road and parts of the Tule Elk auto tour route, which runs parallel to Highway No. 165.

Salt Slough is an unmanaged permanent wetland bordered by riparian habitat. San Luis NWR manages approximately 8,800 acres of wetland habitat and 240 acres of riparian habitat. Permanent wetlands on the Refuge are characterized by open water areas with a perimeter of emergent vegetation, such as roundstem bulrush (*Scirpus acutus*) and cattail (*Typha latifolia*). Riparian areas of the Refuge are dominated by mature black willow (*Salix gooddingii*) but also include scattered Fremont cottonwoods (*Populus fremontii*), buttonwillow (*Cephalanthus occidentalis*), small groves of valley oak (*Quercus lobata*), and dense stands of sandbar willow (*Salix exigua*). Specifically, Salt Slough has similar vegetation but lacks any mature valley oak.

Numerous species of waterfowl, songbirds and wading and diving birds make use of the wetland, riparian and upland habitats found on San Luis NWR. Additionally, San Joaquin River and its tributaries overlapping with the Refuge provide a small measure of habitat and connectivity to aquatic habitats for a range of federally listed fish, including fall-run Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss*) and Sacramento splittail (*Pogonichthys macrolepidotus*). Other native fish on the Refuge include Pacific lamprey (*Lamptera tridentata*), river lamprey (*Lamptera ayresii*), hitch (*Lavinia exilicauda*), Sacramento blackfish (*Orthodon microlepidotus*), Sacramento sucker (*Catostomus occidentalis*), tule perch (*Hysterocarpus traskii*) and prickly sculpin (*Cottus asper*).

### **When would the use be conducted?**

Fishing is open on the Refuge seven days a week during daylight hours.

### **How would the use be conducted?**

On average, there are 4,000 fishing visits to the Refuge annually. This number has remained consistent since 2011 to present. Anglers have access to a total of nine parking lots with graveled pads and barricades to confine and limit effects on the riparian corridor vegetation. There are signs specifying parking regulations and other information. There is also an Americans with Disabilities Act-(ADA) accessible concrete fishing pier along Salt Slough. No public boat launch facilities for fishing are provided on the Refuge.

### **Why is this use being proposed or reevaluated?**

Non-commercial fishing has been allowed at San Luis NWR since its establishment in 1967. This use is being re-evaluated in conjunction with the San Luis NWR Complex CCP and EA. Fishing is not found to be compatible with the other two refuges of the San Luis NWR Complex.

### **Availability of Resources**

The analysis of cost for administering and managing each use will only include the incremental increase beyond general operational costs shown as being directly caused by the proposed use.

The fishing program is administered by Refuge Management and Visitor Services staff who ensure that the fishing program meets public use objectives and minimizes adverse impacts to Refuge resources. Refuge law enforcement officers regularly patrol the public fishing area to ensure that refuge regulations compliance. Current Refuge staffing levels are sufficient to administer the fishing program at San Luis NWR in an adequate and efficient manner.

### **Anticipated Impacts of the Use**

The effects and impacts of the proposed use of Refuge resources, whether adverse or beneficial, are those that are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This Compatibility Determination (CD) includes the written analyses of the environmental consequences to a resource only when resource is considered to be an “affected resource” due to the potential effects to that resource being more than negligible. Air quality, water quality, cultural resources, threatened and endangered species and socioeconomic resources not being more than negligibly impacted by the action have been dismissed from further analyses.

### **Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities like fishing may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively affect wildlife, producing stressful conditions, even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as

an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act).

However, Service policy states that, “[fishing] programs promote understanding and appreciation of natural resources and their management on all lands and waters of the Refuge System” (USFWS 2006). The Refuge System Administration Act states that the Refuge System “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation.”

Non-commercial fishing on San Luis NWR will provide such wildlife-dependent recreation, increasing public knowledge and understanding of wildlife and streamside habitats and increasing their sense of stewardship and support for conservation of those lands.

### **Short-term impacts**

Fishing, when practiced as a solitary and stationary activity, tends to be less disturbing to non-target wildlife than hunting or motorized boating (Tuite, et al. 1983). Fishing may cause disturbance to birds and other wildlife by influencing the bird community composition and distribution, abundance and productivity of waterbirds (Bell and Austin 1985; Bordignon 1985; Bouffard 1982; Cooke 1987; Edwards and Bell 1985; and Tydeman 1977). Anglers often fish in shallow, sheltered bays and creeks that birds prefer, affecting distribution and abundance of waterfowl, grebes and coots (Cooke, 1987). In Britain, anglers displaced waterfowl from their preferred feeding and roosting areas and caused widgeon, green-winged teal, pochard and mallard to prematurely depart from a reservoir (Jahn and Hunt 1964). On fishing days, anglers influenced the numbers, behavior and diurnal distribution of avian scavengers present at sites in Washington when compared to non-fishing days (Knight et al. 1991).

Fishing would have direct, lethal effects on individual fish, the target game species. The number of mortalities depends on the angling pressure based on the number of anglers, the number of days of effort, the catch success rate, etc. The number of individual fish taken per angler would be reduced to the extent that anglers engage in catch-and-release practices, but some percentage of mortality would remain. Species-specific regulation enforcement of by the California Department of Fish and Wildlife (CDFW) would avoid long-term adverse effects on native fish populations. Discarded lead weights, hooks, monofilament line and miscellaneous trash can harm and even lead to wildlife mortality.

### **Long-term impacts**

Parking and vehicle use can adversely affect riparian habitat by damaging or destroying sensitive vegetation, causing streambank erosion, and compacting soils. Recreational fishing can also reduce terrestrial wildlife habitat quality by repeated vegetation trampling at boat launches and fishing sites and through soil compaction caused by off-road vehicles and trailers. Human disturbance caused by recreational fishing can also lead to increased vandalism and litter, both of which can directly harm

wildlife and degrade the visual appearance of the Refuge. Broken or abandoned monofilament line or other trash can cause direct wildlife mortality through entanglement or ingestion. The use of lead sinkers and other lead terminal gear can result in lead being deposited in the environment and being ingested by migratory birds.

Regular maintenance and service of fishing program facilities, such as parking lots, access barriers, trash cans, and signage can minimize these adverse effects on wildlife and habitat. Similarly, providing informational brochures about the environmental hazards of lead fishing tackle and providing non-lead alternatives; monitoring and assessing by Refuge staff of effects on riparian vegetation and any wildlife response to fishing activities; and regularly patrolling by Refuge law enforcement officers can significantly reduce potential adverse impacts.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

The following stipulations were found necessary to ensure compatibility of this use:

1. Monitoring by Refuge staff to assess impacts to riparian vegetation and any wildlife response to fishing activities.
2. Regular patrol presence by Refuge law enforcement officers.
3. Maintaining vehicle barriers to prevent unnecessary damage to vegetation and sensitive habitats.
4. Providing information to the public regarding Refuge-specific rules and regulations through signage at fishing areas and refuge brochures made available at the Visitor Center.
5. Regular maintenance and availability of trash receptacles in fishing parking lots.

## **Justification**

Service policy states that, “Fishing programs promote understanding and appreciation of natural resources and their management on all lands and waters of the Refuge System” (USFWS 2006). The Refuge System Administration Act states that the Refuge System “...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing



Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing..., on System lands and to better appreciate the value of and need for fish and wildlife conservation.” This Act goes on to state that the Refuge System is to provide increased, compatible opportunities “...for parents and their children to safely engage in traditional outdoor activities, such as fishing...”

Service policy and Federal law require that wildlife-dependent public uses, including fishing, be given special consideration in refuge planning and management and opportunities to allow these uses to be considered in each refuge CCP (U.S. Fish and Wildlife Service [USFWS] 2000 and National Wildlife Refuge System [NWRS] Administration Act). When determined compatible on a refuge-specific basis, a wildlife-dependent use becomes a priority public use for that refuge and is to be facilitated and strongly encouraged.

By facilitating this use on the Refuge, the Service strives to increase visitors knowledge and appreciation of fish and wildlife, which may lead to increased public stewardship of wildlife and their habitats on the Refuge. Increased public stewardship will support and complement the Service’s actions in achieving the Refuge’s purpose and the mission of the National Wildlife Refuge System. As described, this program is determined to be compatible and will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge.

### **Signature of Determination**

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### **Signature of Concurrence**

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### **Mandatory Reevaluation Date**

2038

## Literature Cited/References

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# Draft Compatibility Determination

## Title

Compatibility Determination for Grazing at San Luis National Wildlife Refuge

## Refuge Use Category

Agriculture, Aquaculture, and Silviculture

## Refuge Use Type

Grazing

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

“The mission of the National Wildlife Refuge System, otherwise known as Refuge System, is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

### **What is the use?**

Domestic livestock feed on vegetation by grazing, including during the trailing and watering of livestock. The grazing program was initiated to provide an abundant forage supply to attract migratory birds to the Refuge and reduce crop depredation on nearby private agricultural lands.

The ongoing Refuge grazing program uses both sheep and cattle as habitat management tools to produce habitat conditions that meet the seasonal and year-round needs of different wildlife species, maintain and enhance natural plant communities, and control non-native invasive weeds. Grazing on Refuge lands is conducted in a manner consistent with the Refuge System mission and the purposes for which the San Luis NWR was established. Specific grazing objectives at San Luis NWR include:

- 1) Providing grass and forb forage supplies and short grassland foraging habitat in irrigated pasture (Merced National Wildlife Refuge [hereafter, Merced NWR] only) and natural uplands for arctic nesting geese (Ross' geese [*Chen rossii*], snow geese [*Chen caerulescens*], greater white-fronted geese [*Anser albifrons*], and cackling geese [*Branta hutchinsii*]), sandhill cranes (*Grus canadensis*), long-billed curlews (*Numenius americanus*) and white-faced ibis (*Plegadis chihi*) during winter and early spring.
- 2) Providing foraging, denning and nesting habitat for species that are characteristic of Central Valley grasslands, requiring habitat characterized by short vegetation heights, including San Joaquin kit fox (*Vulpes macrotis mutica*), Heerman's kangaroo rat (*Dipodomys heermanni*), American badger (*Taxidea taxus*), California ground squirrel (*Spermophilus beecheyi*) and burrowing owl (*Athene cunicularia*).
- 3) Maintaining and enhancing the health and integrity of native plant and vernal pool communities in natural uplands and floodplains by decreasing the amount of accumulated thatch (dead plant material) and competitive influence of exotic grasses and forbs.
- 4) Reducing and controlling the abundance and proliferation of non-native invasive weeds such as yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), milk thistle (*Silybum marianum*) and perennial pepperweed (*Lepidium latifolium*).

### **Is the use a priority public use?**

No.

### **Where would the use be conducted?**

Grazing occurs on most subunits of the Refuge to some extent (San Luis, North and South Freitas, Kesterson, West Bear Creek) and in the following habitat types: natural uplands, altered floodplains, managed wetlands and irrigated pasture. More details follow in the "How this use is conducted" section.

### **When would the use be conducted?**

Grazing at San Luis NWR is used to—

- 1) provide winter foraging habitat for arctic nesting geese, sandhill cranes and other migrating birds.
- 2) maintain year around habitat for San Joaquin kit fox, burrowing owls, kangaroo rats and other wildlife species dependent on short-statured vegetation.
- 3) 3) promote natural plant communities.

The goals for grazing include creating short-statured grassland vegetation to provide both winter forage and year-round habitat, reducing thatch to allow the maintenance of native plant communities and controlling non-native invasive plants.

The grazing period for natural uplands generally occurs between December 1 and June 15. Depending on the amount of winter and spring precipitation, grazing in dry years occurs between December and April; in a normal year, grazing continues through June 15. Grazing within the altered floodplains occurs throughout the year, depending on site specific objectives. In years of extended flood events, grazing may not begin until July or August, following receding floodwaters and of post-flood vegetation germination. Grazing using sheep in managed wetlands typically occurs from April to July to control cocklebur and perennial pepperweed in wetland edge habitats. In some wet years, a very reduced stocking rate of cattle is kept on the certain landscape areas from late June through November to specifically control late emerging invasive plants such as Russian thistle and yellow star thistle.

#### **How would the use be conducted?**

Grazing regimes vary by habitat type, site specific objectives, and Refuge Unit.

#### **Natural Uplands**

All Units of San Luis NWR contain natural uplands. These consist of lands in which the natural topography has not been altered through leveling. A large percentage of those lands are floodplains of the San Joaquin River and its tributaries and are subject to varying levels of inundation during flood events. Other areas are slightly more elevated and include alkaline benches, vernal pool complexes and sand dunes. These areas are vegetated with a mix of native and non-native grasses and forbs. The grazing period for these natural uplands is generally occurs between December 1 and June 15. Seasonal grazing maintains annual grasses in a short-cropped status during their growing season (cool season plants), controls invasive weeds, and provides year-round short-statured grassland habitat. Not grazing during the summer and early fall encourages growth of native grasses, such as alkali sacaton (*Sporobolus airoides*) and creeping wild rye (*Leymus triticoides*), and forbs (warm season plants). The period of grazing may be extended to July 15 to control annual and non-native plant growth during years with above-average precipitation and reduced, along with stocking levels, during years of below-average precipitation, as necessary. Prescribed stocking rates for natural uplands on the different units range from 0.15 to 0.20 animal units per acre per month.

### Altered Floodplains

The periods of grazing are more variable in altered floodplain lands, where the floodway lands between flood control levees. Much of the natural topography was disturbed or altered during the original levee construction. The areas closest to the watercourses have moister soil conditions that promote vegetation growth throughout most of the year. Grazing within the floodways could occur throughout the year, depending on site-specific objectives, but in years of extended flood events, may not begin until July or August. This grazing reduces dense vegetation growth and promotes germination and establishment of unique floodplain-associated plants, such as the state-threatened delta button celery, providing short grassland foraging habitat in the fall and winter for geese and sandhill cranes. Prescribed stocking rates are similar to the native upland areas at 0.20 animal units per acre per month.

### Managed Wetlands

Grazing is not typically allowed in managed wetlands. However, it is periodically used as a tightly controlled management tool to reduce biomass in wetland units scheduled to be rehabilitated by disking or burning to set back plant succession. Cattle or sheep are brought into a drawn-down unit for the purpose of consuming and trampling specific pest plants such as Bermuda grass and emergent vegetation such as cattails (*Typha spp.*) and bulrush (*Scirpus spp.*). This reduces the amount of disking needed to incorporate the vegetation into the soil, thus reducing fuel and labor costs and the carbon imprint.

### **Why is this use being proposed or reevaluated?**

Grazing is being re-evaluated for Refuge use in conjunction with the San Luis NWR Complex CCP and EA. Grazing is found compatible on Merced NWR and is covered in a separate Compatibility Determination (CD). The use is in accordance with Fish and Wildlife Service Manual 620 FW 2.

### **Availability of Resources**

The grazing program is administered by Refuge management and biological staff who cooperatively identify the desired objectives of the grazing program. cooperative agricultural agreements are issued via a Special Use Permit (SUP) on a 5-year basis. Annual Refuge grazing plans are written by biological staff, approved by management staff and provided to the cooperator. The plans detail stocking rates, stocking duration and specific management goals for each grazed subunit across the refuge. Biological and management staff ensure coordination with cooperators and compliance monitoring at the Refuge.

The grazing cooperator is responsible for installing and maintaining all range improvements, such as watering facilities, cross-fencing, etc., associated with grazing activities. These costs of these are either at the cooperator's expense or credited by the Refuge against the value of grazing. Facilities installed primarily for refuge purposes are constructed or maintained at the Refuge's expense. Current Refuge staffing levels are sufficient to administer the grazing program at San Luis NWR in an adequate and efficient manner.

## Anticipated Impacts of the Use

The effects and impacts of the proposed use of Refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analysis of the environmental consequences on a resource only when the resource is considered to be an “affected resource” due to the potential effects to that resource being more than negligible.

### Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission

Although the Refuge grazing program is not a wildlife dependent activity, it is not expected to negatively affect the purpose of San Luis NWR. Rather, grazing to benefit wildlife at the San Luis NWR as indicated in this determination is compatible with the purposes for which the Refuge was established. The use will attract waterbirds and other migratory birds, in turn, benefitting the Refuge purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act). Current research supports grazing as an appropriate, beneficial and effective land management tool, particularly in vernal pool complexes such as those found across San Luis NWR (Michaels 2021).

### Short-term impacts

Improper fence placement and rotation of livestock within grazed areas could result in sensitive areas, such as wetlands and riparian corridors, being grazed or trampled excessively. Grazing maintains native forb and grass communities associated with uplands, vernal pools and floodplains by reducing annual plant biomass and thatch accumulation. Grazing activities help to control non-native invasive weeds such as yellow star-thistle, milk thistle, poison hemlock (*Conium maculatum*), prickly lettuce, five hook bassia (*Bassia hyssopifolia*), and black mustard (*Brassica nigra*) through direct consumption, trampling and seed bank reduction. Non-mechanical methods, such as grazing, could reduce the amount of chemical herbicide necessary to control non-native invasive weeds and the amount of carbon emissions associated with equipment operation during wetland unit rehabilitation by reducing biomass within the treated units.

Grazing and agricultural activities could also improve the winter forage supply, such as short annual grass meristems and forbs, for arctic nesting geese; such Ross’s geese, greater white-fronted geese and cackling geese; wigeon; sandhill cranes and other migratory birds. Providing short grassland habitat makes macro-invertebrates, seeds and plant tubers available for winter foraging by sandhill cranes and other migratory birds. Maintaining short grassland habitat could also help meet the year-round foraging, denning and nesting needs of wildlife species, such as coast horned lizards, burrowing owls, long-billed curlews, kangaroo rats, San Joaquin kit fox and badgers.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

1. Refuge staff will develop multi-year cooperative agricultural agreements and annual grazing plans which provide direct benefits to migratory birds and other trust responsibilities. These documents will provide the necessary information and assistance from the Refuge to determine use periods and stocking rates.
2. The cooperator will operate under the terms and conditions of the cooperative agricultural agreement, Special Use Permit (SUP) and Refuge grazing plan.
3. Refuge staff will set the value of grazing to reflect current fair market values.
4. Refuge staff will monitor cooperator compliance and maintain complete files on all grazing activities.

## **Justification**

The San Luis NWR was established for use as an inviolate sanctuary, or for any other management purpose, for migratory birds and for the conservation, maintenance and management of wildlife resources thereof, and habitat thereon. Livestock grazing for habitat management purposes at the San Luis NWR as indicated in this determination is compatible with the purposes for which the Refuge was established. Grazing by sheep and cattle, as administered through cooperative land management agreements and Refuge grazing plans, is the most effective way to improve and maintain habitat conditions for many species of wildlife and to enhance desirable vegetation communities at San Luis NWR. Without the grazing services provided through cooperative land management agreements, the Refuge would have to conduct habitat management activities, such as increased mowing, herbicide spraying and prescribed burning, to achieve similar results; current staffing and budget levels preclude the Refuge from accomplishing a fraction of these tasks or obtaining a portion of the results that could be accomplished through an effectively administered grazing program.



## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2035

## Literature Cited/References

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# Draft Compatibility Determination

## Title

Compatibility Determination for Hunting at San Luis National Wildlife Refuge

## Refuge:

San Luis National Wildlife Refuge

## Refuge Use Category

Hunting

## Refuge Use Type(s)

Waterfowl, Other migratory birds, Upland game

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## NWRS Mission

The mission of the National Wildlife Refuge System (NWRS) “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is the use a priority public use?

Yes

### What is the use?

In addition to hunting ducks, geese, coot and moorhen on approximately 12,771 acres of San Luis Refuge, The U.S. Fish and Wildlife Service (Service) proposes to open an additional 671 acres for pheasant hunting on the newly delineated Upland Freitas Hunt Unit. The Environmental Assessment for Expanded Pheasant and Snipe Hunting Opportunities at San Luis and Merced National Wildlife Refuges (2020) and the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Waterfowl, Other Migratory Bird, and Upland Game Hunt Plan provide additional details of the use and are incorporated

by reference. Big game hunting is prohibited. All other wildlife, including coyotes and crows, are protected.

### **Where would the use be conducted?**

Goose, duck, coot, moorhen and snipe will continue to be permitted on approximately 12,771 acres on the San Luis, Blue Goose, Kesterson, West Bear Creek, East Bear Creek and North Freitas units of the Refuge. In addition, the Service will open an additional 671 acres to pheasant hunting on the newly delineated Upland Freitas Hunt Unit.

### **When would the use be conducted?**

During fall and winter, hunting migratory birds, such as geese, ducks, coots, moorhens and snipe, is permitted on Wednesdays, Saturdays and Sundays during the regular State season.

### **How would the use be conducted?**

The Refuge System Administration Act, as amended by the NWRS Improvement Act and the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4) govern the administration and public use of refuges, including hunting. The Service allows waterfowl, other migratory bird and upland game hunting on designated areas of the Refuge in accordance with State regulations (<https://wildlife.ca.gov/hunting>) station-specific hunting regulations (50 CFR § 32.47), and Public Access and Recreation Regulations (50 CFR § 26.34) pertaining to hunting on the refuge as of the date of the Refuge Hunt Plan. The State designates and requires bag limits. The Refuge promotes ethical hunting and provides access opportunities consistent with State and Federal hunting regulations for fair-chase small game and migratory bird hunting.

### **Why would the use be conducted?**

Hunting is identified in the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-ee) as a priority use for refuges when it is compatible with the Refuge purposes and mission of the refuge system. Migratory bird and upland game hunting provide the public with recreational opportunities to experience wildlife on Refuge lands. Migratory bird and upland game hunting are consistent with the mission of the NWRS and natural resources and visitor services goals for the Refuge.

## **Availability of Resources**

### **Existing\_Management\_Capability\_Existing\_Funds**

The Service currently has adequate budget and staff to support the annual costs associated with operation of this hunting program. Annual costs are estimated at \$150,000.

## **Anticipated Impacts of the Use**

The primary species taken by hunters at the Refuge include Canada goose, mallard, northern pintail, American green-winged teal, cinnamon teal, redhead, American coot and Wilson's snipe. Upland game hunters take ring-necked pheasants. The impacts addressed here are discussed in detail in the Environmental Assessment for Expanded Pheasant and Snipe Hunting Opportunities at San Luis and

Merced National Wildlife Refuges (2020) and the San Luis NWR Waterfowl, Other Migratory Bird, and Upland Game Hunt Plan.

Hunting would have direct, lethal effects on individual waterfowl and other target game animals. The number of birds killed would depend on the number of hunters, days of effort and hunter success rates. Hunting would result in injuries to animals that were hit, but not killed. Common effects include mortality, wounding and disturbance (De Long 2002). Regular disturbance, including loud noises and human movements, can alter food habits, result in weight loss and cause waterfowl to relocate from feeding areas (Madsen 1995; Wolder 1993). Various studies document that hunting can alter the distribution, behavior and population structure of wildlife species (Owens 1977; Raveling 1979; White-Robinson 1982; Thomas 1983; Bartelt 1987; Madsen 1985; Cole and Knight 1990). Researchers identified an inverse relationship between the number of birds utilizing an area and hunting intensity (DeLong 2002). Target species, such as the northern pintail, may preferentially select non-hunt areas during the hunting season (Heitmeyer and Raveling 1988). Following the close of the hunting season, ducks generally increased their use of the hunt area; however, use was lower than before the hunting season began. Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns and boats powered by outboard motors. This disturbance, especially when repeated over a period of time, compels waterfowl to change food habits, feed only at night, lose weight or desert feeding areas (Madsen 1995; Wolder 1993). Hunting also stresses non target species, such as sandhill cranes, by flushing them from foraging areas and shifting foraging locations (Stone 2009).

These effects can be reduced by the presence of adjacent sanctuary areas where hunting does not occur and birds can feed and rest relatively undisturbed. Sanctuaries have been identified as the most common solution to disturbance problems caused from hunting (Havera, et al. 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995; Paulus 1984). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl. The number of dabbling ducks and geese increased 4 to 20 times within the sanctuary (Madsen 1995). Thus, sanctuary and non-hunt areas are very important for minimizing disturbances to waterfowl populations, ensuring their continued Refuge use. As such, the Service provides 60 percent of the Refuge land base as disturbance-free sanctuary areas at the Complex.

Intermittent hunting can be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). It is common for refuges to manage hunt programs with non-hunt days. For example, at nearby Sacramento National Wildlife Refuge, 3 to 16 percent of pintails were located on hunted units during non-hunt days but were almost entirely absent in those same units on hunt days (Wolder 1993). In addition, northern pintails (*Anas acuta*), American wigeon (*Mareca americana*) and northern shovelers (*Anas clypeata*) decreased their time spent feeding on hunting days in public shooting areas, as compared to non-hunt days (Heitmeyer and Raveling 1988). The intermittent waterfowl hunting program of three hunt days per week at San Luis Refuge resulted in lower waterfowl densities in hunt areas during non-hunt days than in non-hunt areas. However, intermittent hunting may not always greatly reduce hunting impacts.

The California Department of Fish and Wildlife (CDFW) is California's lead agency for management of fish, wildlife and native plants, collectively referred to as wildlife. CDFW has trustee responsibilities to conserve and manage wildlife for the benefit and enjoyment of the public. Both Federal and State laws and regulations protect resident game species on refuges, ensuring harvest rates do not negatively impact populations. The potential effects of hunting on resident upland game birds are discussed and evaluated in the California Environmental Quality Act process. This process results in periodically updated and publicly reviewed documents. Based on the findings of these documents, the State ensures that game animal hunting in California does not adversely impact its wildlife populations to an unacceptable level (CDFW 2004; 2015).

Wildlife populations on the refuges can sustain hunting and support other wildlife-dependent priority uses. To manage the populations to support hunting, the refuges adopt harvest regulations set by the State within Federal framework guidelines. The regulatory procedures governing harvests are described in the section "Harvest Management—Regulatory Procedures."

By its very nature, hunting has very few positive effects on the target species while the activity is occurring. However, hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving their habitat, ultimately contributing to the Refuge System mission. Furthermore, despite the potential effects of hunting, a goal of the Refuges is to provide visitors of all ages an opportunity to enjoy wildlife-dependent recreation. Offering a safe, quality program and ensuring adverse effects remain at an acceptable level is of key concern.

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

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

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

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

Adverse effects could be minimized by extensive program management. Regulations, including specified hunting seasons, non-hunt days, maximum daily hunter capacities and bag limits implemented to minimize the level of disturbance to both game and non-game species ensures harvest rates do not negatively affect long-term game species. Although individual animal mortality is expected, the hunting program would not have adverse impacts on the population level. Further, the Complex could provide approximately 15,383 acres of sanctuary zones to provide waterfowl species with disturbance-free habitat. Although hunting results in numerous adverse effects to both game and non-game species, hunting provides a long-term benefit by increasing public appreciation and stewardship of wildlife resources and enhances visitor understanding of the importance of habitat conservation.

Waterfowl populations throughout the United States are managed through an administrative process known as flyways, including Pacific, Central, Mississippi and Atlantic. National Environmental Policy Act (NEPA) considerations by the Service for hunted migratory game bird species are addressed by the programmatic document “Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds” (USFWS 2013) and its 2015 adjustments (USFWS 2015). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment (EA) and Finding of No Significant Impact (FONSI).

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

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

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, conducted throughout portions of the United States and Canada, that is used to establish an annual Waterfowl Population Status Report. In addition, the number of waterfowl hunters and resulting harvest are monitored closely through both the Harvest Information Program and Parts Collection Surveys, also known as Wing Surveys or Wingbees. Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under Adaptive Harvest Management (AHM), a number of decision-making protocols render the choice, or package, of pre-determined regulations for the appropriate levels of harvest, and include the framework offered to the states that year. The California Department of Fish and Wildlife then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package; their selections can be more restrictive but cannot be more liberal than AHM allowances. Thus, the level of hunting opportunity

afforded to each State increases or decreases each year according to the annual waterfowl population status..

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes

### **Stipulations Necessary to Ensure Compatibility**

1. Migratory Game Bird Hunting. The Service allows hunting on designated areas of the refuge in accordance with State regulations subject to the following conditions:
  - a. Only motorless boats or boats with electric motors are allowed in designated areas of the Refuge during the migratory waterfowl hunting season. Motorboats are allowed at the North and South Freitas units during the waterfowl hunting season. Inboard water thrust or jet and air boats are prohibited.
  - b. Only approved nontoxic shot may be in possession while in the field (State regulations, Sec. 32.2(k)).
2. Upland Game Hunting. The Service allows pheasant hunting on designated areas of the Refuge in accordance with State regulations, subject to the following: hunting is allowed only on designated days and hunting is by shotgun only with approved nontoxic shot.
3. Non-hunting and hunting acres are physically separated.
4. Vehicle traffic is allowed only on designated roads and parking areas.
5. Mobility-impaired hunters should consult the Refuge manager for allowed conveyances.
6. No more than 25 shells may be in possession while in the field.
7. Building or maintaining fires is prohibited.
8. Vehicles parking is allowed only in designated parking areas.
9. Dogs are required to be kept on a leash, except for hunting dogs engaged in authorized hunting activities and under the immediate control of a licensed hunter.
10. Consumption or possession of an open container of alcohol while hunting is prohibited.
11. In accordance with the Archaeological Resources Protection Act (16 U.S.C. 470aa), the disturbance of archaeological or historical sites, and the removal of artifacts are prohibited. The excavation, disturbance, collection, or purchase of historical, ethnological, or archaeological specimens or artifacts, or mementos from the Refuge is prohibited.

## **Justification**

Hunting is a wildlife-dependent recreational use included in the National Wildlife Refuge System Improvement Act. Providing hunting opportunities contributes to achieving one of the Refuge's goals. By facilitating this use on the Refuge, hunting will increase visitors knowledge and appreciation of fish and wildlife, which may lead to increased public stewardship of wildlife and their habitats on the Refuge.

Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

## **Signature of Determination**

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Refuge Manager Signature and Date

## **Signature of Concurrence**

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Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2038



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# Draft Compatibility Determination

## Title

Compatibility Determination for Natural Resource Collection at San Luis National Wildlife Refuge

## Refuge Use Category

Natural Resource Collection

## Refuge Use Types

Plant Gathering (noncommercial)

Animal Product Gathering (noncommercial)

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

Plant and animal product collection may occur on San Luis NWR only with the approval of a Special Use Permit (SUP). This activity must occur under the stipulations of a valid SUP and approval from the Refuge manager or equivalent Refuge personnel.

**Is the use a priority public use?**

No.

**Where would the use be conducted?**

This use will occur only in locations that are pre-approved in a corresponding SUP on San Luis NWR.

**When would the use be conducted?**

This use will occur only during times and seasons that are pre-approved in a corresponding SUP.

**How would the use be conducted?**

Non-sensitive plant species or animal products may be routinely removed or collected if the activities do not adversely affect wildlife species, habitat, or Refuge property, as permitted in an approved SUP. The SUP will outline the specific location(s) and time(s) by which collection may occur. Individuals can submit a General SUP application (FWS Form 3-1383-G2020) or a Research SUP Form (3-1383-R) to the Refuge manager for approval. This Compatibility Determination (CD) only covers noncommercial natural resource gathering.

**Why is this use being proposed or reevaluated?**

Plant or animal product collection may be authorized for the purposes of environmental education or habitat restoration under the Partner's for Wildlife program. The National Wildlife Refuge System Improvement Act of 1997 supports environmental education as one of six wildlife-dependent public uses. Plant collection can meet this objective by educating the public in the function and ecological role of plants through direct learning or educational displays. Additionally, the San Luis NWR maintains a Partner's for Wildlife program that assists private landowners, companies and other organizations in habitat management and conservation. The collection and removal of certain native plants from the refuges onto participating partner' land for habitat restoration activities is an appropriate and beneficial purpose.

**Availability of Resources**

Adequate funding and staff exist to manage plant and animal product collection activities at San Luis NWR. Administrative staff costs associated with this use consist of Refuge Complex staff time to review proposals, process SUPs, evaluate impacts, oversee collection activities and ensure plant collection

activities compliance. Annual monetary costs expended by the Refuge Complex to administer this use average \$2,000 per request. Refuge Complex operational funds are currently available through the Service budget process to administer this program.

## **Anticipated Impacts of the Use**

The effects and impacts of the proposed use of refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences to a resource only when the resource is considered to be an “affected resource” due to the potential effects on that resource being more than negligible. Only the impacts to soils, vegetation and wildlife are discussed in the content to follow; all other resources not being more than negligibly impacted by the action have been dismissed from further analyses.

### **Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by natural resource collection may result in changes to wildlife physiology, behavior, reproduction, species composition and diversity. Public use activities and mere human presence can negatively affect wildlife, producing stressful conditions, even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act).

#### Wildlife

Disturbance to wildlife, such as the flushing of feeding, resting or nesting birds, may occur during natural resource collection activities. There is some temporary disturbance to wildlife due to human activities; however, the disturbance is generally localized and will not adversely impact overall populations. Increased disturbance could cause some displacement of habitat and increase some wildlife disturbance, although by avoiding or minimizing intrusion into critical wildlife habitat, this is expected to be minor, given the size of the refuges.

Individual animals may be disturbed by human contact to varying degrees. Human activities on the Refuge can result in direct effects on wildlife through harassment, a form of disturbance causing physiological effects, behavioral modifications or death (Smith and Hunt 1995). Many studies show that birds can be affected by human activities when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can significantly affect habitat use patterns of many bird species. Flushing birds from an area can cause birds to expend more energy, avoid using desirable habitat or abandon sites with repeated disturbance, effect resting or feeding patterns, and increase exposure to predation (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

When compared to gulls, terns and ducks, herons and shorebirds were observed to be the most easily disturbed by human activity and flushed to distant areas away from people (Burger 1981). A reduced

number of shorebirds were found near walkers or joggers, and about 50 percent of flushed birds flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance behaviors, such as running and, flushing, increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller, et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) increases in areas more frequently visited by people. Primary song occurrence and consistency for many passerine species can be affected by a single visitor (Gutzwiller, et al. 1994). In areas where primary song was affected by disturbance, birds appeared to be reluctant to establish nesting territories (Reijnen and Foppen 1994).

Depending on the species, especially migratory v. resident, some birds may habituate to some types of disturbance, by being undisturbed or returning immediately after the initial disturbance (Hockin, et al. 1992; Burger, et al. 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbance to foraging and loafing birds based on experimental flushing distances for 16 species of waders and shorebirds. They recommend 100 meters as an adequate buffer against pedestrian traffic; however, they suggest that this distance could be reduced if physical barriers, such as vegetation screening, are provided, noise levels are reduced and traffic is directed away from the birds. Screening may not effectively buffer noise impacts, thus visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998).

### Soils and vegetation

Those collecting plant or animal product materials could directly impact the plants and soils on the refuge by trampling. Knight and Gutzwiller (1995) found that the main effect on vegetation and soil is human trampling caused by walking on- and off-trail. Excessive travel by foot can crush, bruise, shear, and uproot vegetation (Cole and Landres 1995). Vegetation in trampled areas may be reduced in height, stem length, leaf area, carbohydrate reserves and flower and seed production (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration and nutrient availability (Kuss 1986). In turn, this can affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and fluctuating soil moisture content (Knight and Gutzwiller 1995). Hammitt and Cole (1998) note that soil compaction limits the ability of plants to revegetate affected areas.

Collectors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary.

Collection activities directly remove plant material from the Refuge, but the SUP and stipulations ensure that the removal will not affect population levels.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

The following stipulations are required to ensure compatibility of this activity:

- 1) A Special Use Permit (SUP) application is required for any plant or animal product collection activity.
- 2) The application is reviewed by San Luis NWR staff for the potential value and impact to the Refuge Complex's natural resources.
- 3) A SUP is issued for approved plant collection activities.
- 4) The Special Use Permit lists specific specimen collection restrictions.

Failure to comply with the provisions of the SUP results in the revocation of permit privileges. Specifically, all plant collection activities on the Refuge Complex will require the following—

- 1) The principal authority must submit a SUP application for approval to the Complex.
- 2) All work must be coordinated with the project leader, or designated staff member.
- 3) Collections must adhere to the requirements indicated in the special use permit.
- 4) Complex staff must be present during times of natural resource collections to assess potential impacts; to ensure SUP adherence; and to determine if approved the activities and SUP need terminating because of adverse impacts.
- 5) All Refuge Complex rules and regulations must be followed unless otherwise exempted in writing by the project leader.

## **Justification**

As proposed, plant and animal product gathering allows the currently small number of interested individuals access to this use at a level that the Refuge can accommodate. The goals of the National Wildlife Refuge System (NWR System) include providing an understanding and appreciation of fish and



wildlife ecology, wildlife habitat and human environmental roles. The Service strives to provide priority public uses when compatible with the purpose and goals of the Refuge and the mission of the NWR System. The National Wildlife Refuge System Improvement Act of 1997 identifies environmental education and interpretation as priority public uses for National Wildlife Refuges, along with hunting, fishing, wildlife observation and photography. This use, while not wildlife dependent, is a traditional use that contributes to environmental education and awareness. This activity could be used in environmental education programs to enhance visitor understanding of the Refuge and its natural resources.

## **Signature of Determination**

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Refuge Manager Signature and Date

## **Signature of Concurrence**

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Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2033

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# Draft Compatibility Determination

## Title

Compatibility Determination for Mosquito Management at San Luis National Wildlife Refuge.

## Refuge Use Category

Pest and Predator Management

## Refuge Use Type

Mosquito Management

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

The San Luis National Wildlife Refuge (hereafter, San Luis NWR) was established in 1967 to provide habitat for migratory birds under the Migratory Bird Conservation Act. Additional units and parcels were added through the Migratory Bird Conservation Act and the Fish and Wildlife Act.

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

“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 and servitude.” 16 U.S.C. Sec. 742f(b)(1) (Fish and Wildlife Act of 1956).

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

No

**What is the use?**

Mosquito management includes activities undertaken to monitor and control mosquitoes, including pesticide use and vegetation and water management.

**Is the use a priority public use?**

No

**Where would the use be conducted?**

All application of pesticides or biological agents must be coordinated and approved by the Refuge manager to avoid conflicts with nesting birds, public use, management activities, etc. Mosquito larvae must be widespread and abundant, as documented by sampling, for Districts to be granted permission to larvicide any portion of the Refuge. Prior to all larvicide applications, the Districts will provide a map and sampling results to the Refuge manager and obtain verbal approval. No spraying of any kind will be conducted on vernal pools or other such water basins resulting from rainwater accumulations in upland sites.

**When would the use be conducted?**

Larvae control would only be conducted when breeding is widespread, as documented by sampling efforts; when supported by public health data and specifically requested by Districts; or when requested by the Refuge manager for areas directly adjacent to high use public areas, such as the Visitor Center, parking areas and observation decks. Mosquito adulticides would only be allowed on the Refuge in cases of a declared health emergency, following a specific request and written concurrence from appropriate Service or Department bureaus. A human health emergency is defined by the presence of human disease virus-positive mosquitoes, virus-positive birds or human disease on or near the Refuge.

**How would the use be conducted?**

Application of Mosquito control measure applications are to be conducted in accordance with approved Pesticide Use Proposals and labels. Mosquito control will be authorized annually by a Special Use Permit (SUP). SUP conditions stipulate that all mosquito control work will be carried out under the guidance of pre-approved Pesticide Use Proposals. Only *Bacillus thuringiensis israelensis* (Bti) and Altosid® may be applied on the Refuge as a larvicide, and only Pyrocide® or Pyrenone® be used as an adulticide.

The Districts will provide the Refuge with interim and final reports regarding mosquito sampling on the Refuge. At the end of the permitting period, the Districts will provide the Refuge Manager with a list of all pesticides or biological agents and the quantities used.

**Why is this use being proposed or reevaluated?**

Mosquitoes are a natural component of most wetland ecosystems, but they may also present a threat to human and wildlife health as disease vectors. When necessary to protect the health and safety of the public or a wildlife population, the Service seeks to manage mosquitoes on refuge lands using the least intrusive means possible. The Service encourages refuge managers to cooperate closely with local

public health and mosquito-control agencies. Local agencies routinely conduct mosquito monitoring on refuge lands in the Central Valley. The Merced County Mosquito Abatement District proposes continuing monitoring and controlling mosquitoes at the San Luis NWR to address nuisance and human health concerns of neighboring communities.

## **Availability of Resources**

Adequate funding and staff exist to manage this activity. Monitoring and control will be conducted by the District and not require the direct involvement of Refuge staff, with the exception of Refuge manager oversight. Treatment Monitoring would include observations of sprayed areas before and after treatment and the coordination of permitting, documentation and records-keeping.

## **Anticipated Impacts of the Use**

### **Potential impacts of a proposed use on the refuge's purpose(s) and the Refuge System mission**

This activity has three principal potential impacts on Service lands, waters, or interests, including wildlife disturbance caused by Bti/Altosid application, wildlife impacts from the periodic mosquito larvae elimination from the Refuge, and the Bti/Altosid impacts on nontarget organisms. All three potential effects are somewhat minimized by only allowing habitat treatment when District or Refuge staff document widespread mosquito breeding and require treatment approval from the Refuge manager. Therefore, Refuge lands will only be treated when there is a documented need based on sampling, instead of being treated weekly. Disturbance from the ground or by aircraft usually is of short duration for the treated unit.

The impacts of monitoring will be confined to pathways to shorelines where dip net samples can be taken. In transit to pools of water, small vegetation areas may be crushed, but the vegetation will likely spring back after it being bent underfoot. This type of impact will be rare, as dipping is done once a week at most. Placing and monitoring CO<sub>2</sub> traps may also create a transient impact on the vegetation from footsteps going to and from the traps, once a week at most. No associated habitat disturbance is expected with the single light trap, due to its headquarters maintenance yard location.

### **Toxicity and Effects to Non-target Organisms**

The dominant effect of mosquito control relates to treatment toxicity and effects on non-target organisms. Both Bti and Altosid treatments are more target-specific and less persistent in the environment than most chemical insecticides, thus affecting the Refuge biota lesser than other available chemical treatments (Fleming, et al. 1985; Fortin, et al. 1987; Lee and Scott 1989; Marten, et al. 1993; Mittal, et al. 1991; Parsons and Surgeoner 1991; Purcell 1981). The possible effects of each compound will be discussed individually in the following sections.

#### **Bacillus thuringiensis var. israelensis (Bti)**

Bti has practically no acute or chronic toxicity to mammals, birds, fish, or vascular plants (U.S. EPA 1998). Extensive acute toxicity studies indicate that Bti is virtually innocuous to mammals (Siegel and Shadduck 1992). These studies exposed a variety of mammalian species to Bti at moderate to high doses and no pathological symptoms, disease, or mortality were observed. Laboratory acute toxicity studies

indicate that the active ingredient of Bti-formulated products is not acutely toxic to fish, amphibians, or crustaceans (Brown, et al. 2002; Brown, et al. 2000; Garcia, et al. 1980; Lee and Scott 1989; Wipfli et al. 1994). However, other ingredients in Bti-formulated products are potentially toxic. The acute toxicity response of fish exposed to the Bti-formulated product Teknar® HPD was attributed to xylene (Fortin, et al. 1986, Wipfli, et al. 1994). Field studies indicate no acute toxicity to several fish species exposed to Bti (Merritt, et al. 1989; Jackson, et al. 2002); no detectable adverse effects to breeding red-winged blackbirds using and nesting in Bti-treated areas (Niemi, et al. 1999; Hanowski 1997); and no detectable adverse effects to tadpole shrimp 48 hours post-Bti treatment (Dritz, et al. 2001).

In addition to mosquitoes (family Culicidae), Bti affects some other members of the suborder Nematocera within the order Diptera. Members of the family Simuliidae (black flies) and some chironomids midge larvae are also affected by Bti (Boisvert and Boisvert 2000; Garcia et al. 1980). The most observed nontarget organism Bti effects were in the larvae of some chironomids when exposed to relatively high doses in laboratory settings (Boisvert and Boisvert 2000; Lacey and Mulla 1990; Miura, et al. 1980). In field studies, target and susceptible nontarget invertebrate effects have been variable and difficult to interpret. Field study results are dependent on the number, frequency, rate and aerial extent of Bti applications; the Bti formulation used; the sample type, such as benthic, water column, or drift); the sampling interval, such as 48 hours or more than one year after treatment; the habitat type, such as lentic or lotic); the biotic, such as aquatic communities, and abiotic factors, such as suspended organic matter or other suspended substrates, temperature and water depth; the mode of feeding, such as filter feeder, predator, scraper, or gatherer; and the larval development stage and density (Ali 1981; Boisvert and Boisvert 2000; Lacey and Mulla 1990). Bti activity against target and susceptible nontarget invertebrates is also related to Bti persistence and environmental fate, which are affected by the factors associated with field study results (Dupont and Boisvert 1986; Mulla 1992). Simulated field studies showed that in the suppression of two unicellular algae species, Closterium and Chiarella, secondary effects to turbidity and dissolved oxygen of aquatic habitats resulted with potentially trophic effects (Su and Mulla 1999). For these reasons, the Bti effects to target and susceptible nontarget organisms and potential indirect trophic impacts in the field are difficult to predict.

#### Methoprene.

Methoprene has moderate acute fish toxicity, slight acute avian toxicity, and practically no acute mammalian toxicity (U.S. EPA 2000; U.S. Fish and Wildlife Service 1984). In mallard ducks, dietary concentrations of 30 parts per million (ppm) caused some reproductive impairment (U.S. EPA 1991). This figure exceeds the estimated environmental concentration by a factor of 10 (Table 1). Methoprene residues have been observed to bioconcentrate in fish and crayfish by factors of 457 and 75, respectively (U.S. EPA 1991). Up to 95 percent of the residue in fish was excreted within 14 days (U.S. EPA 1991). Risk quotients for birds, fish and mammals are below EPA levels of concern for endangered species, indicating negligible risk from direct exposure using maximum labeled rates for mosquito control to those taxa (Urban et al. 1986). No detectable adverse effects to breeding red-winged blackbirds using and nesting in areas treated with methoprene were observed in field studies (Niemi et al. 1999).

Methoprene effects terrestrial and aquatic invertebrates and is used to control fleas, sciarid flies in mushroom houses; cigarette beetles and tobacco moths in stored tobacco; pharaoh ants; leaf miners in glasshouses; and midges (Tomlin 1994). Methoprene is highly toxic to aquatic invertebrates with a 48-

hour EC<sub>50</sub> of 0.89 ppm for *Daphnia magna* (U.S. EPA, 1991). Laboratory studies show that Methoprene is acutely toxic to chironomids, cladocerans, and some decapods (Horst and Walker 1999; Celestial and McKenney 1994; McKenney and Celestial 1996; Chu, et al. 1997). In field studies, significant aquatic invertebrate, mollusk and crustacean population declines have been directly correlated to Methoprene treatments for mosquito control (Breaud, et al. 1977, Miura and Takahashi 1973, Niemi, et al. 1999, and Hershey, et al., 1998).

Methoprene has a ten-day half-life in soil, a photolysis half-life of ten hours, and a water solubility of 2 ppm (Zoecon® 2000). Degradation in aqueous systems is caused by microbial activity and photolysis (U.S. EPA 1991). Degradation rates are roughly equal in freshwater and saltwater systems and are positively correlated to temperature (U.S. EPA 1991).

### Adulticides

Adulticides have not been used at the Refuge in the past 10 years. There are only two general classes of adulticides, organophosphates and pyrethroids. Pyrethroids include natural products called pyrethrins and synthetic molecules that mimic natural pyrethrins, such as permethrin, resmethrin and sumithrin.

In general, pyrethroids have lower toxicity to terrestrial vertebrates than organophosphates. Although not toxic to birds and mammals, pyrethroids are very toxic to fish and aquatic invertebrates (Anderson 1989; Siegfried 1993, Milam, et al. 2000). The actual toxicity of pyrethroids in aquatic habitats, however, is less than anticipated because of the propensity of these pesticides to adsorb organic particles in water (Hill, et al. 1994). The Districts use only natural pyrethrins on Refuge lands.

All adulticides are very highly toxic to aquatic invertebrates in concentrations >1 ppb (Milam, et al. 2000). Because most adulticides can be applied over or near water when used for mosquito control, there are risks to aquatic invertebrates from direct deposition and pesticide run-off. However, very few field studies have been conducted that have examined the impacts on aquatic organisms from mosquito control adulticides. The limited number of studies on adulticide impacts all involve examining short-term effects, usually from a single pesticide application. Therefore, it is difficult to extrapolate the results of short-term experiments into long-term impact predictions, including if the short-term studies detected impacts. In addition, mosquito control is most often conducted at a landscape level. Statistically significant studies of impacts at larger temporal and spatial scales are nonexistent and would be a challenge both scientifically and economically.

### **Short-term impacts**

Minimal anticipated wildlife effects from mosquito monitoring and control by the Districts is expected. In an extensive literature review on the effects of Bti on mammals, Siegel and Shadduck (1992) found the bacterium to be innocuous. These studies exposed a variety of mammalian species to Bti at moderate to high doses and observed no pathological symptoms, disease, nor mortality. Continued use of the bacterium Bti at moderate rates is likely to have a negligible effect on mammalian species residing on the Refuge.

Areas most likely to be treated with larvicides include irrigated pasture and recently filled seasonal wetland basins —both of which are unlikely to contain fish. Aquatic habitats containing fish



communities are unlikely to be significant sources of mosquitos on the Refuge. Toxicity of any of these pesticides to fish populations is unlikely to be an issue, because fish rarely occur in mosquito-producing Refuge areas.

While treatment on the ground may seem ideal because the impact area is small and can be accomplished from existing roads and levees, aerial treatment is preferred, because the impacts to the ground are non-existent and the amount of coverage is larger, less time-consuming, and effective over a large area. Low flying aircraft will undoubtedly cause disturbances to wildlife. However, the number of treatment days per year is few, and if the pilot or ground applicator follows the stipulations previously outlined in the SUP, mosquito abatement practices should not materially interfere with nor detract from the purpose or mission of the National Wildlife Refuge System. If additional biological monitoring of this activity documents substantial negative effects on migratory birds or other wildlife, this determination would be reanalyzed on the basis of new evidence.

### **Long-term impacts**

The Refuge was established, in part, to provide migratory birds habitat, in particular waterfowl, including geese, swans, ducks and coots. These species occur on the Refuge during August, September and October, when newly flooded wetlands are being treated to control mosquitoes, creating a potential for impact. Geese and swans are less likely to be affected as they are year-round herbivores. Geese feed mainly on grasses and agricultural lands, while swans feed mainly on roots, tubers, stems and leaves of submerged and emergent aquatic vegetation. While applications of Bti and Altosid would likely occur over areas of vegetation that may be used by geese and swans, it has been found that birds are not negatively affected by foods exposed to Bti or methoprene (Niemi et al. 1999). In contrast, ducks are known to be opportunistic feeders on both plants and invertebrates, using the most readily available food sources. Invertebrates, plants and seeds compose most of their diet, varying with the season and the geographic location.

A study in Sacramento Valley, California shows that the diet of northern pintails primarily consists of plant foods in the fall and more invertebrates in February and March (Miller 1987). The most important duck food in the summer-dry habitats of the San Joaquin Valley include swamp timothy seeds (Miller 1987). Therefore, larvicide and adulticide treatments have limited effects on the mainly seed diet of newly arriving ducks. Their diet shifts to invertebrates after the expected mosquito treatment frequency reduces, and allows the invertebrate populations to recover. Studies show that aquatic invertebrates are a dominant food of nonbreeding waterfowl during the summer molt, fall and winter periods (Heitmeyer and Raveling 1988). Invertebrates are also critical for egg production during the spring (Swanson, et al. 1979), and duckling growth during the summer rearing period (Krapu and Swanson 1975).

Mosquitoes and chironomids make an important contribution to invertebrate food resources throughout the year. Other significant invertebrate food resource contributors are Coleoptera, Odonata, and Trichoptera. However, during fall flood-up and peak mosquito populations, ducks tend to feed on seeds and other plant material. Waterfowl generally tend to feed on seeds after reaching their wintering areas, perhaps regaining energy lost during long flights (Heitmeyer and Raveling 1988; Miller 1987).

Shorebirds feed on a wide variety of invertebrates all year, intensifying at the spring migration onset. Documentation of indirect food-chain effects has not come to light. Hanowski, et al. (1997) studied 19 different bird species after collecting data on wetlands 2 years before treatment and 3 years after treatment of both Bti and methoprene applications and found no negative effects. Niemi, et al. (1999) found the same results from the same study site of a 3-year study on zooplankton and breeding birds. There are two primary California State Species of Concern that forage and nest on the Refuge: tricolored blackbirds and white-faced ibises; both species are associated with wetland habitats. While resident endangered species are limited to upland habitat on the Refuge, these sensitive species prefer wetland habitat or habitat bordering wetlands. Although Hanowski, et al. (1997) found no direct evidence indicating that Bti or methoprene negatively impacted the reproduction, growth, or foraging of blackbirds, no applications will occur in tricolored blackbird or white-faced ibis nesting areas to minimize effects on these species during their breeding season..

## **Public Review and Comment**

The public was provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this Compatibility Determination (CD) will be solicited in conjunction with the distribution of the Draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for the San Luis NWR Complex. It will be made available electronically on the refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes

### **Stipulations Necessary to Ensure Compatibility**

The following stipulations are required to ensure compatibility:

- The use must be sufficiently monitored to evaluate compliance with stated conditions, with swift action taken to correct or respond to any serious deviations.
- The Refuge manager gives the final approval for any adulticide treatments on the Refuge.

## **Justification**

The San Luis National Wildlife Complex has worked cooperatively with the Turlock and Eastside Mosquito Vector Control Districts for many years. Mosquito management, as outlined in this CD, would not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuge. Based on the available science and best professional judgements, the Service has determined that the mosquito management at San Luis NWR, in accordance with the stipulations provided here, would not materially interfere with, nor detract from, the fulfillment of the National Wildlife Refuge System mission or the purpose of the Refuge.

## Signature of Determination

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Refuge Manager Signature and Date

## Signature of Concurrence

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Assistant Regional Director Signature and Date

## Mandatory Reevaluation Date

2033

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## Figures

Figure 1. Relative toxicity of larvicide to fish.  
The smaller the index, the less likely the risk of toxicity.

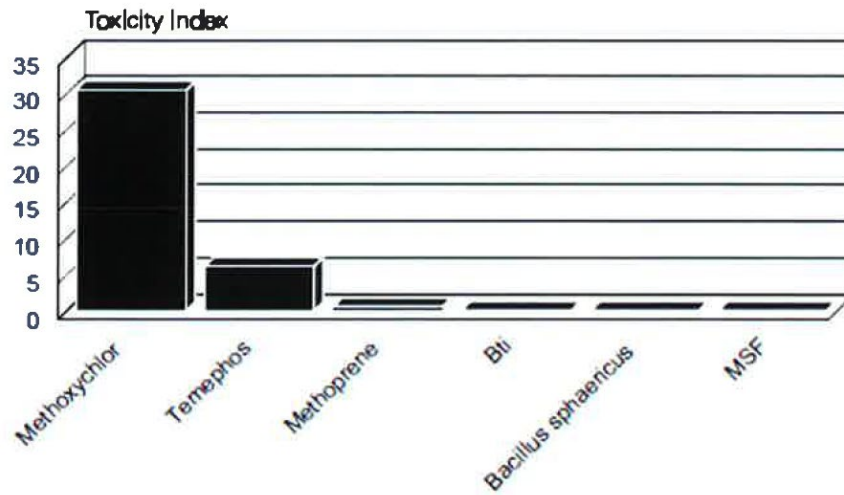


Figure 2. Relative toxicity of adulticides to fish.  
The smaller the index, the less likely the risk of toxicity.

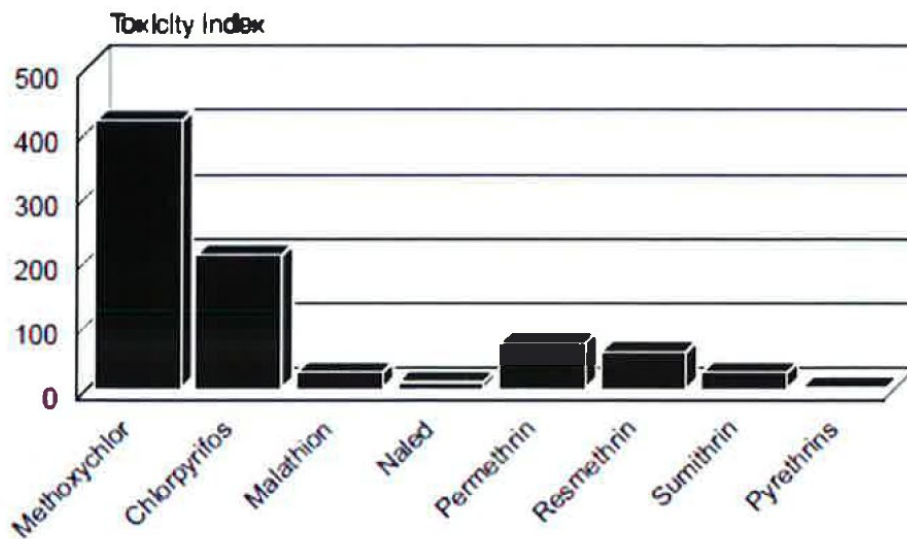
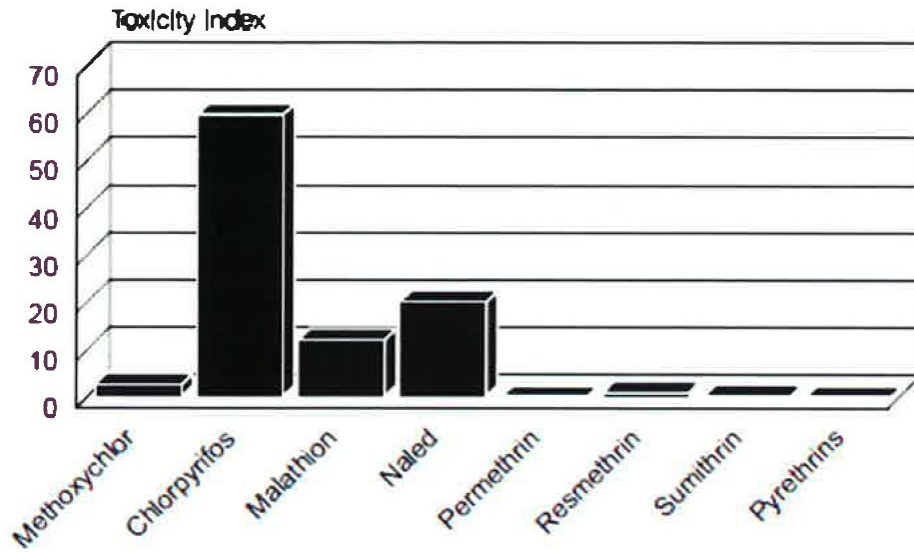




Figure 3. Relative toxicity of adulticides to birds.  
The smaller the index, the less likely the risk of toxicity.



Figures 1, 2 and 3 from Paul and Sinnott 2000.

# Draft Compatibility Determination

## Title

Compatibility Determination for Noncommercial Wildlife Observation and Photography at San Luis National Wildlife Refuge

## Refuge Use Category

Wildlife Observation and Photography

## Refuge Use Types

Photography  
Wildlife Observation

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWS) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

The National Wildlife Refuge System Improvement Act of 1997 identifies wildlife observation and photography, along with hunting, fishing, interpretation, and environmental education, as priority wildlife-dependent public uses for refuges. As two of the six priority public uses of the Refuge System, these uses are to be encouraged when compatible with the purposes of the refuges. Wildlife observation and photography are considered simultaneously in this Compatibility Determination (CD). Many elements of the wildlife observation and photography programs are also similar to opportunities provided in the environmental education and interpretation programs. These uses are described in the Final CCP and Visitor Services Plan.

The guiding principles of the Refuge System’s wildlife observation and wildlife photography programs (Service Manual 605 FW 4 and 5) are to—

- A. “Provide safe, enjoyable, and accessible wildlife viewing opportunities and facilities.
- B. Promote visitor understanding of, and increase visitor appreciation for, America’s natural resources.
- C. Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in Service Manual 605 FW 1.6.
- D. Minimize conflicts with visitors participating in other compatible wildlife-dependent recreation activities.”

**Is the use a priority public use?**

Yes.

**Where would the use be conducted?**

Wildlife observation and photography can be conducted on all portions of the Refuge that are open to the general public. Wildlife observation and photography at the San Luis NWR occurs at the Visitor Center and along three auto tour routes and eight nature trails. Visitors at the San Luis NWR may traverse the auto tour routes only by vehicle.

The Visitor Center grounds feature wildlife observation opportunities. Two nature trails are accessible directly from the Visitor Center parking lot; these two trails include the 0.8-mile Wetland Trail, which travels around a seasonal wetland and features an elevated boardwalk, and the 0.5-mile Upland Trail, which travels through a dense patch of Atriplex shrubs. The waterfowl auto tour route is an 8.5-mile all-weather road that travels through seasonal and permanent wetlands, native uplands and riparian areas.

The waterfowl tour route features three associated nature trails, each with parking areas. First, the 1-mile Sousa Marsh trail is a loop that meanders through a dense riparian area and leads visitors to a large observation platform overlooking the Sousa Marsh, one of the largest marshes on the Refuge. The Sousa

Marsh is an important component of the nonhunt sanctuary, often hosting large concentrations of waterfowl available for viewing. There is a permanently-mounted spotting scope on the platform.

Second, the Winton Marsh Trail is a one-half-mile loop that meanders around a permanent wetland and features an observation deck. Third, the Chester Marsh Trail is a 1-mile loop trail, open seasonally from February through August. The Chester Marsh Trail features an overlook on the San Joaquin River of the historic, once-bustling community of Chester, which included a major ferry crossing, post office, hotel and general store in the late-1800s. Today, only the remnants of the ferry crossing remain and can be seen from the trail.

The elk auto tour route is 5 miles long and travels the 780-acre tule elk enclosure perimeter. The enclosure holds a resident herd of tule elk that are visible most of the time from the auto tour route. Pull-outs with interpretive panels narrate the successful recovery of the tule elk from near-extinction. In addition to the elk, wildlife viewing highlights along the tour route include other wetland, upland and riparian-associated species. The auto tour route has an elevated observation platform with a permanently mounted spotting scope to enhance wildlife viewing.

The West Bear Creek Unit auto tour route is 2.5 miles and provides opportunities for up-close viewing of waterfowl and other waterbirds. There is direct access to the auto tour route from State Highway 165, a heavily trafficked commuter road. Wildlife observation highlights along the auto tour route include large flocks of waterfowl, shorebirds and raptors. Mule deer are sometimes spotted from the auto tour route and associated nature trails. The West Bear Creek Unit has two nature trails that are accessible from the auto tour route.

### **When would the use be conducted?**

The Visitor Center is generally open from 8:00 a.m. to 4:30 p.m. daily, with hours varying seasonally to meet the needs of visitors. The Visitor Center is closed on federal holidays. All other outdoor Refuge areas open to the public are open one-half hour before sunrise until one-half hour after sunset.

### **How would the use be conducted?**

Noncommercial photography and wildlife observation do not require a Special Use Permit (SUP), as long as following conditions are met:

- Only handheld recording equipment, such as a camera, camcorder, smartphone, etc., or hand-carried tripods are used.
- Artificial lights or audio equipment that would cause disturbance are not used.
- Access is limited to areas of the refuge open to the general public.
- No other special considerations are needed, such as access to the Refuges after normal public visitation hours, setting up temporary photography blinds, etc. (16 USC 460I-6d, Refuge Manual 8 RM 16)

Auto routes and nature trails provide wildlife observation and photography opportunities, including featured highlights to view large flocks of ducks, geese, cranes and other waterbirds and riparian woodland species. Visitors can use their car as a “photography blind” while driving along an auto tour

route. Walking is not permitted along auto tour routes but is allowed in parking lots and along nature trails. Pull-outs along the tour route feature interpretive panels describing encountered wildlife and habitat features. There are also two elevated observation platforms on the auto tour route; one is located at the Sousa Marsh and the other at the Winton Marsh.

### **Why is this use being proposed or reevaluated?**

Noncommercial photography and wildlife observation are wildlife-dependent uses that are considered priority public uses of the National Wildlife Refuge System. Providing opportunities for wildlife observation and photography would contribute toward fulfilling the National Wildlife Refuge System Administration Act provisions, as amended in 1997, and one of the San Luis NWR Complex CCP goals (Goal 4, Objective 4.1). Wildlife observation and photography provide an excellent forum for allowing public access and increasing understanding of Refuge Complex resources.

### **Availability of Resources**

Adequate funding and staff are available or are attainable to provide the public with wildlife observation and photography opportunities at San Luis NWR. Annual maintenance costs will involve visitor center maintenance, nature trail and parking area maintenance, entrance road maintenance, auto tour route maintenance, cleaning and maintenance of comfort stations, periodic maintenance of wooden structures, such as benches, platforms and interpretive or informative kiosks, and repair and replacement of signs and gates. The Service can properly develop, operate and maintain wildlife observation and photography in a way that will not materially interfere with nor detract from fulfillment of the Refuge purposes nor the System mission.

### **Anticipated Impacts of the Use**

The effects and impacts of the proposed use of refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analysis of the environmental consequences to a resource only when the resource is considered to be an “affected resource” due to the potential effects to that resource being more than negligible. Only the impacts to vegetation, wildlife, and visitor use are discussed in the content to follow; all other resources not being more than negligibly impacted by the action have been dismissed from further analyses.

### **Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission**

Disturbances to wildlife caused by public use activities like wildlife observation and photography may result in changes to wildlife physiology, behavior, reproduction, population levels and species composition and diversity. Public use activities and mere human presence can negatively affect wildlife, producing stressful conditions, even if unintentional. These disturbances from public use may negatively impact the Refuge’s purpose “... as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. Sec. 715d (Migratory Bird Conservation Act) and “...for the conservation,

maintenance, and management of wildlife, resources thereof, and its habitat thereon, ..." 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act).

However, the Refuge System Administration Act states that the Refuge System, "...was created to conserve fish, wildlife, and plants and their habitats and this conservation mission has been facilitated by providing Americans with opportunities to participate in compatible wildlife-dependent recreation, including fishing...on System lands and to better appreciate the value of and need for fish and wildlife conservation." Wildlife observation and photography (non-commercial) on the San Luis NWR will provide such wildlife-dependent recreation, increasing public knowledge and understanding of wildlife and streamside habitats and increasing their sense of stewardship and support for conservation of those lands.

### **Short-term impacts**

#### Wildlife

The primary concern regarding these uses is the Disturbance of Wildlife. Wildlife disturbance, such as the flushing of feeding, resting, or nesting birds, is inherent to these activities. Some temporary disturbance to wildlife due to human activities, such as hiking and bird watching, occurs on trails; however, the disturbance is generally localized and not adversely affecting overall populations. Increased facilities and visitation would cause some habitat displacement and increase some wildlife disturbances, although this effect is expected to be minor given the size of the refuges and by avoiding or minimizing intrusion into critical wildlife habitat.

Purdy et al. (1987) and Pomerantz et al. (1988) described six categories of impacts to wildlife as a result of visitor activities like wildlife observation and photography:

1. Direct mortality: The immediate, on-site death of an animal.
2. Indirect mortality: The eventual, premature death of an animal caused by an event or agent that predisposed the animal to death.
3. Lowered productivity: The reduced fecundity rate, nesting success, or reduced survival rate of young before dispersal from nest or birth site.
4. Reduced use of refuge: Wildlife not using the refuge as frequently or in the manner they normally would in the absence of visitor activity.
5. Reduced use of preferred habitat on the refuge: Wildlife use is relegated to less suitable habitat on the refuge due to visitor activity.
6. Aberrant behavior or stress: Wildlife demonstrating unusual behavior or signs of stress, likely resulting in reduced reproductive or survival rates.

Individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance causing physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Many studies show that birds can be affected by human activities on trails when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can significantly affect the habitat use patterns of many bird species. Flushing birds from an area can cause birds to expend more energy, avoid using

desirable habitat or abandon sites with repeated disturbance, affect resting or feeding patterns and increase predation exposure (Smith and Hunt 1995). Migratory birds were observed to be more sensitive than resident species to disturbance (Klein 1989).

Hérons and shorebirds were observed to be the most easily disturbed by human activity and were flushed to distant areas away from people when compared to gulls, terns and ducks (Burger 1981). A reduced number of shorebirds were found near walking or jogging people, and approximately 50 percent of flushed birds flew elsewhere (Burger 1981). The foraging time of sanderlings decreased and avoidance behaviors, such as running and flushing, increased as the number of humans within 100 meters increased (Burger and Gochfeld 1991). Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976), and waterfowl (Boyle and Samson 1985) increases in areas more frequently visited by people. In addition, , primary song occurrence and consistency for many passerine species can be affected by a single visitor (Gutzwiller et al. 1994). Birds appeared to be reluctant to establish nesting territories in areas where primary song was affected by disturbance (Reijnen and Foppen 1994).

Depending on the species, especially migratory v. resident, some birds may habituate to some types of recreational disturbance, and either by being undisturbed or returning immediately after the initial disturbance (Hockin, et al. 1992; Burger, et al. 1995; Knight and Temple 1995; Madsen 1995; Fox and Madsen 1997). Rodgers and Smith (1997) calculated buffer distances that minimize disturbances to foraging and loafing birds, based on experimental flushing distances for 16 species of waders and shorebirds. They recommended 100 meters as an adequate buffer against pedestrian traffic; however, they suggest this distance may be reduced if physical barriers, such as vegetation screening, are provided, noise levels are reduced, and traffic patterns are directed tangentially rather than directly toward birds. Screening may not effectively buffer noise impacts, thus visitors should be educated on the effects of noise and noise restrictions should be enforced (Burger 1981, 1986; Klein 1993; Bowles 1995; Burger and Gochfeld 1998). Seasonally restricting or prohibiting recreational activities may be necessary during spring and fall migration to alleviate disturbances to migratory birds (Burger 1981, 1986; Boyle and Samson 1985; Klein, et al. 1995; Hill, et al. 1997).

Wildlife photographers tend to have the largest disturbance impacts of the wildlife observation techniques (Klein 1993; Morton 1995; Dobb 1998). While wildlife observers frequently stop to view species, wildlife photographers are more likely to approach wildlife (Klein 1993). Even slow approaches by wildlife photographers tend to have behavioral consequences for wildlife species (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers with low-power lenses to get much closer to their subjects than other activities would require (Morton 1995), including wandering off trails. This usually results in increased disturbance to wildlife and habitat, including trampling of plants. Klein (1993) recommends that refuges provide observation and photography blinds to reduce waterbird disturbance when visitors approach.

### Soils and vegetation

Visitors participating in wildlife observation and photography activities could directly affect Refuge plants and soils. Knight and Gutzwiller (1995) found that human trampling caused by walking on- and

off-trail is the main effect on vegetation and soil. Excessive travel by foot can crush, bruise, shear and uproot vegetation (Cole and Landres 1995). Vegetation may be reduced in height, stem length, leaf area, flower and seed production, and carbohydrate reserves in trampled areas (Liddle 1975, as cited in Cole and Landres 1995). Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986).

Foot travel may also result in compacted soils and diminished soil porosity, aeration, and nutrient availability (Kuss 1986). In turn, this can affect plant growth and survival. Pedestrians may also affect soils by decreasing organic surface material, compacting mineral soil, reducing infiltration, increasing soil erosion and increasing fluctuation in soil moisture content (Knight and Gutzwiller 1995). Hammitt and Cole (1998) note that soil compaction limits the ability of plants to revegetate affected areas.

Visitors can be vectors for invasive plants when seeds or other parts of the plant are moved from one area to another. Once established, invasive species can outcompete native plants, thereby altering habitats and indirectly affecting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary. Staff will work to educate the visiting public about how to reduce introductions and will work to monitor and control invasive species.

Visitor use would primarily occur on designated roads, trails and within the Visitor Center. Public use trails and wildlife observation areas are designed and maintained to minimize soil and vegetation effects. Additional effects to soils and vegetation would be negligible and localized. Off-trail access for these uses would be limited to areas that have already been incorporated into specific programs.

Additionally, maintenance activities required for boardwalks, trails and parking lots will have minor impacts on soils and vegetation around the trails. Potential effects could include increased erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), vegetative structure and composition alteration and sediment loading (Cole and Marion 1988); however, these activities will concentrate the foot traffic of visitors, allowing the vegetation surrounding them to remain undisturbed.

## **Long-term impacts**

### Visitor use

Wildlife observation and photography are not only wildlife-dependent recreation activities but a means of making visitors aware of the potential impacts from their actions, such as trampling vegetation and flushing birds. These uses generally support the Refuge purposes, and negative impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by the opportunities provided to visitors. A secondary benefit of public use is instilling a sense of ownership and stewardship in visitors, which can reduce vandalism, littering and poaching. It also strengthens the Service's visibility in the local community.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for



the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

### **Stipulations Necessary to Ensure Compatibility**

- Adequate areas are designated as wildlife sanctuaries with limited or no public use activities, providing high quality habitat for feeding, resting and nesting.
- Regulations and wildlife friendly behavior, such as staying on designated trails, keeping dogs leashed, etc., are described in brochures and posted at kiosks and trailheads.
- Refuge visitors are required to remain in vehicles while on the auto tour routes, except in designated parking areas.
- Refuge law enforcement staff routinely monitor the auto tour route and walking trails for Refuge regulation compliance.
- Access to the Refuges is allowed from one-half hour before sunrise to one-half hour after sunset.
- Visitors must obtain an SUP if the request includes access to closed areas of the Refuges or other special considerations, such as access to the Refuges after normal public visitation hours, setting up temporary photography blinds, etc. (16 USC 460I-6d, Refuge Manual 8 RM 16). Specific conditions may apply depending on the requested activity and will be addressed in the SUP.

## **Justification**

Providing opportunities for wildlife observation and photography would contribute toward fulfilling provisions of the National Wildlife Refuge System Administration Act, as amended in 1997, and one of the goals of the San Luis NWR and Merced National Wildlife Refuge (Merced NWR) (Goal 4, Objective 4.1 of the CCP). These wildlife-dependent uses are priority public uses of the National Wildlife Refuge System. Wildlife observation and photography provide excellent forums for allowing public access and increasing understanding of Refuge Complex resources. The stipulations outlined in this document will minimize potential impacts relative to wildlife and human interactions. Based on effects described in the Final CCP and EA, wildlife observation and photography within the San Luis NWR, as described herein, was determined to not materially interfere with nor detract from the purposes for which the Refuges were established, nor the mission of the Refuge System. Implementing wildlife observation and photography programs and associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity and environmental health of the Refuges.

## **Signature of Determination**

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Refuge Manager Signature and Date

## **Signature of Concurrence**

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Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2038

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# Draft Compatibility Determination

## Title

Compatibility Determination for Research at San Luis National Wildlife Refuge

## Refuge Use Category

Research and Surveys

## Refuge Use Types

Research  
Surveys

## Refuge

San Luis National Wildlife Refuge

## Refuge Purpose(s) and Establishing and Acquisition Authority(ies)

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec. 664 (Fish and Wildlife Coordination Act)

## National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System, otherwise known as Refuge System, “is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (Pub. L. No. 105-57; 111 Stat. 1252).

## Description of Use

### Is this an existing use?

Yes.

This use is being re-evaluated in conjunction with the San Luis National Wildlife Refuge (hereafter, San Luis NWR) Complex Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA).

**What is the use?**

For the purposes of this Compatibility Determination (CD), research is considered to be the planning, organizing and systematic investigating of a scientific nature conducted by non-FWS personnel or authorized agents. Similarly, surveys are defined in this CD as scientific inventory or monitoring conducted by non-FWS personnel or authorized agents. This CD does not address research related to cultural resources.

**Is the use a priority public use?**

No.

**Where would the use be conducted?**

Research and survey would be conducted on Service-owned lands with the approved acquisition boundary for San Luis NWR. Specific areas on the Refuge must be approved in the Special Use Permit (SUP). For more information, see “How would the use be conducted?”.

**When would the use be conducted?**

The Refuge manager periodically receives requests to conduct natural resources research and surveys on the refuge. These proposals are reviewed and approved by the Refuge manager when that a proposed research activity is determined to provide benefits to Refuge fish, wildlife, plant populations, or habitats, or expand our understanding of natural ecosystem processes and functions occurring on the refuge. In doing so, the research would support refuge purposes and the mission of the National Wildlife Refuge System. Specific beginning and end dates for a particular research proposal would consider time of year, for example, avoiding the nesting season, and any time of day restrictions necessary to minimize habitat and species disturbance or to avoid ongoing Refuge operations conflicts.

**How would the use be conducted?**

Research investigations are designed to address these provisions by answering specific management questions. These investigations include, but are not limited to, evaluating vegetation and wildlife responses to habitat management techniques, monitoring wildlife and plant populations, documenting seasonal wildlife movements and habitat use, investigating wildlife diseases, and developing invasive species management techniques. Pertinent results from research investigations are incorporated into management plans and actions at the Complex and help strengthen the decision-making process. The proposed research program is discussed as part of the Proposed Action in the Draft CCP and associated EA.

Research would be conducted in accordance with the procedures, conditions and case-specific stipulations included in an approved refuge Special Use Permit (SUP) using FWS Form 3-1383-R. The

SUP process requires applicants to submit the details of the research proposal for review and approval, including:

- Objectives of the study
- Justification for the study
- Detailed study methodology and schedule
- Research personnel requirements and their qualifications and experience
- Status of necessary permits, such as scientific collecting permits or endangered species permits
- Any requested refuge and refuge staff time costs
- Anticipated end products, such as reports or publications

Once a proposal is submitted, the Refuge manager or other Complex staff would review the details of the proposal and, if acceptable, would prepare a SUP that includes a complete project description, conditions, and project-specific stipulations to be followed during implementation of the proposal. Stipulations would be developed after considering the following factors:

- Will information gained from the research or survey provide insight into current or future refuge management?
- Is there a potential for short- or long-term disturbance, injury, or mortality to any listed species or other refuge wildlife or habitats? If so, what measures can be implemented to avoid or minimize such impacts?
- Does proposal conflict with other ongoing research, monitoring, or management programs? If so, what measures can be implemented to avoid such conflicts?
- Could the research or survey be implemented elsewhere, or does the refuge provide the only option for carrying out the specified research?
- Does the proposal consider the location, timing, study scope, number of participants, study methods and number of study sites to minimize disturbance?

Proposals for open-ended research projects would not be considered., An SUP would be prepared, specifying conduct rules, all permitted procedures, case-specific stipulations and data reporting requirements, if a proposal is approved. Projects would be reviewed annually to assess whether they—

- Continue to meet the specified criteria or require additional stipulations,
- Continue to operate as originally proposed, and
- Can provide data confirming that the objectives of the study are being accomplished.

### **Why is this use being proposed or reevaluated?**

The National Wildlife Refuge System Administration Act directs the Service to “...ensure that the biological integrity, diversity, and environmental health of the System are maintained ...” and to “...monitor the status and trends of fish, wildlife, and plants in each refuge...” Monitoring and research are an integral part of National Wildlife Refuge management. Plans and actions based on researching and monitoring provide an informed approach to analyzing the effects of management actions on Refuge resources.

Research proposals allow for independent examination of the natural processes occurring on the Refuge and focused research on issues important to Refuge management, such as documenting vegetation and wildlife responses to habitat management, monitoring wildlife and plant populations, documenting of seasonal wildlife movements and habitat use, investigating wildlife diseases and developing invasive species management techniques. Pertinent results from research investigations can inform management recommendations in step-down plans, comprehensive conservation plan updates, and Compatibility Determinations (CDs). They can also inform the development and updating of monitoring protocols in habitat and species management plans.

### **Availability of Resources**

Adequate funding and staff exist to manage scientific studies concerning natural resources conducted by private individuals or groups at the San Luis NWR. Administrative staff costs associated with this use consist of Refuge Complex staff time to review research proposals, collected data, Special Use Permits (SUPs) and research summaries and to evaluate impacts and ensure researcher compliance. Annual monetary costs expended by the Refuge Complex to administer this use average \$5,000.00. Refuge Complex operational funds are currently available to administer this program through the Service budget process. Most of the research conducted on the Refuge Complex in the past was funded by outside sources; this trend is expected to continue.

### **Anticipated Impacts of the Use**

The effects and impacts of the proposed use to refuge resources, whether adverse or beneficial, are reasonably foreseeable and have a reasonably close causal relationship to the proposed use. This CD includes the written analyses of the environmental consequences to a resource only when the resource is considered to be an “affected resource” due to the potential effects on that resource being more than negligible.

### **Potential impacts of a proposed use on the refuge’s purpose(s) and the Refuge System mission**

Refuge purposes at San Luis NWR include “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act) and “...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” (Fish and Wildlife Coordination Act). As such, monitoring, surveys and research are an integral part of adaptive management and monitoring on National Wildlife Refuges. Research and survey uses are considered compatible with Refuge purposes and the Refuge system mission. Adverse impacts on wildlife and habitat as described in the following section will be outlined clearly in the SUP approval process and mitigated whenever possible.

### **Short-term impacts**

Some direct and indirect effects could occur through disturbance, which is expected with some research activities, especially where researchers enter wildlife habitat. Researcher disturbance could include altering wildlife behavior, going off designated trails, collecting soil and plant samples, or trapping and



handling wildlife. Most of these would be short-term effects because only minimum samples of water, soil, vegetative litter, plants, macro-invertebrates, etc., are required for identification or experimentation would be permitted. Statistical analysis will be encouraged. Captured and marked wildlife will be released.

Off trail walking by researchers could have similar effects as hiking in general, which alters habitats by trampling vegetation, compacting soil and increasing the erosion potential (Liddle 1975; Hendee et al. 1990). Soil compaction makes root penetration more difficult, making it difficult for seedlings to become established (Cole and Landres 1995). In moderate cases of soil compaction, plant cover and biomass decrease. In highly compacted soils, plant species abundance and diversity reduce in the long-term because only the most resistant species survive (Liddle 1975). Effects from vegetation trampling can lower species richness, decrease ground cover and plant species density, increase weedy annuals and induce species composition changes (Grabherr 1983).

According to Knight and Cole (1991), there are three categories of wildlife responses to human disturbance: avoidance, habituation, and attraction. The avoidance response magnitude may depend on a number of factors, including type, distance, movement pattern, speed, disturbance duration, time of day, time of year, weather animal access to food and cover, energy demands and reproductive status (Knight and Cole 1991; Gabrielson and Smith 1995). Individual animals may be disturbed by human contact to varying degrees. Many studies show that birds can be impacted from human activities when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can significantly affect habitat use patterns of many bird species. Flushing birds from an area can cause birds to expend more energy, avoid using desirable habitat or abandon sites with repeated disturbance, affect resting or feeding patterns, and increase predation exposure (Smith and Hunt 1995). Migratory birds are observed to be more sensitive than resident species to disturbance (Klein 1989). Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1976) and waterfowl (Boyle and Samson 1985) increases in areas more frequently visited by people. In addition, primary song occurrence and consistency for many passerine species can be affected by a single visitor (Gutzwiller et al. 1994). Birds appeared to be reluctant to establish nesting territories in areas where primary song was affected by disturbance (Reijnen and Foppen 1994). Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences (Alcock 1993). Predictability is a key factor for predicting how wildlife would respond to disturbance. Gabrielson and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path. Wildlife may also be attracted to human presence; for example, wildlife may be converted to “beggars” lured by handouts (Knight and Temple 1995) and scavengers attracted to road kills (Rosen and Lowe 1994).

### **Long-term impacts**

Use of the Refuge to conduct research will benefit Refuge fish, wildlife, plant populations, and habitats. Monitoring and research investigations are an important component of adaptive management. In part, research investigations would be used to evaluate habitat restoration projects and ecosystem health.

Specific restoration and habitat management questions could be addressed in most research investigations, improving habitats and benefitting wildlife populations.

Standardized monitoring could be used to ensure data compatibility with cross-landscape comparisons, identifying natural resource bottleneck areas for habitat enhancement and restoration (Elzinga, et al. 1998; Ralph, et al. 1993). As new and continued monitoring and new research compliments and expands upon previous investigations, the expected long-term and cumulative effects include growing a body of science-based data and knowledge and expanding a science-based body of data and information to draw upon to implement the best Refuge management practices possible. Not only are natural resource inventory, monitoring and research provisions of the Refuge Improvement Act, but they are necessary tools to maintaining key provisions of the act: biological integrity and diversity, and environmental health.

The Service's evaluation of research proposals would ensure that only proposals with adequate safeguards mitigating impacts would be accepted to eliminate or reduce long-term effects. Sufficient restrictions would be included as part of the study design and researcher activities would be monitored by Refuge staff, minimizing potential impacts associated with research activities. Refuge staff would ensure research projects contribute to the enhancement, protection, preservation and management of native Refuge wildlife populations and their habitats, thereby helping the Refuge fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System and the need to maintain ecological integrity. Additionally, the Special Use Permit (SUP) would include conditions to further ensure that impacts to wildlife and habitats are avoided and minimized.

## **Public Review and Comment**

The public will be provided the opportunity to review and comment on current and potential Refuge programs as part of the Comprehensive Conservation Planning process. Additional public review and comments on this CD will be solicited in conjunction with the distribution of the Draft CCP and EA for the San Luis NWR Complex. It will be made available electronically on the Refuge website (<https://www.fws.gov/refuge/san-luis>). Concerns expressed during the public comment period will be addressed in the final version.

## **Determination**

### **Is the use compatible?**

Yes.

## **Stipulations Necessary to Ensure Compatibility**

Research proposals are required for any investigation; proposals are reviewed by Complex staff for the potential value and impact to the Refuge Complex's natural resources. A one-year Special Use Permit (SUP) is issued to approved research projects; restrictions regarding the specific research project are listed in the SUP, and annual or final reports are required for all investigations. Failure to comply with

the provisions of the SUP results in the revocation of permit privileges. Specifically, all scientific studies on the Refuge Complex will require the following:

1. The principal investigator must submit a study proposal for approval to the Complex.
2. All work must be coordinated with the project leader or designated staff and the researcher.
3. Research must adhere to current approved protocols for data collection as indicated in the study proposal and Special Use Permit (SUP).
4. Proposed research methods adversely affecting or having the potential to adversely affect Refuge Complex resources require the researcher to develop mitigation measures to minimize potential impacts; mitigation measures must be listed as a condition in the SUP.
5. Complex staff must be free to accompany researchers at any time to assess potential impacts; to ensure SUP adherence; and to determine if the approved research proposals and SUP need terminating because of adverse impacts.
6. All Refuge Complex rules and regulations must be followed unless otherwise excepted in writing by the project leader.
7. The researcher will be responsible for acquiring all necessary permits, both from the State of California or the Service, as applicable, and demonstrating that these permits are current before the starting of the research approval.

## **Justification**

Based on effects described in this document in the CCP and EA, research and surveys within the Refuge, as described herein, was determined to not materially interfere with nor detract from the purposes for which the Refuge was established nor the mission of the Refuge System. Refuge monitoring and research will directly benefit and support Refuge goals, objectives, management plans and activities. Fish, wildlife, plants and habitats will improve by applying knowledge gained from monitoring and research. Biological integrity, diversity and environmental health could benefit from scientific research conducted on natural resources at the Refuge. The wildlife-dependent priority public uses, including wildlife viewing and photography, environmental education and interpretation and fishing and hunting, could also benefit from improved restoration and management plans and activities associated with monitoring and researching investigations that address specific restoration and management questions and increase biodiversity and wildlife and native plant populations.

## **Signature of Determination**

---

Refuge Manager Signature and Date

## **Signature of Concurrence**

---

Assistant Regional Director Signature and Date

## **Mandatory Reevaluation Date**

2033

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**Appendix D –  
Draft Environmental Assessment for  
San Luis National Wildlife Refuge  
Complex Comprehensive Conservation  
Plan**

*Merced National Wildlife Refuge  
San Luis National Wildlife Refuge  
Grasslands Wildlife Management Area*

Prepared By:

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**July 2023**

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# **Draft Environmental Assessment for San Luis National Wildlife Refuge Complex Comprehensive Conservation Plan**

*Merced National Wildlife Refuge, San Luis National Wildlife Refuge, Grasslands Wildlife Management Area*

## **Chapter 1. Purpose and Need for Action**

### **Introduction**

This Environmental Assessment (EA) has been prepared by the U. S. Fish and Wildlife Service (Service) pursuant to the National Environmental Policy Act (NEPA; 42 United States Code 4321 et seq.) to evaluate the effects associated with implementing the management actions addressed in the draft Comprehensive Conservation Plan (CCP) for the San Luis National Wildlife Refuge Complex (the Complex). The EA, which analyzes the management proposals within the draft CCP, as well as two alternative management approaches, was prepared to determine if significant environmental impacts would occur as a result of implementing one or more of the various management actions. The draft CCP addresses future management of the Merced National Wildlife Refuge (NWR), San Luis NWR and Grasslands Wildlife Management Area (WMA), all part of the Complex.

This EA complies with NEPA as implemented by the Council on Environmental Quality Regulations (Title 40 Code of Federal Regulations [CFR] §§1500–1508 [40 CFR §§1500-1508], as revised per a final rule published in the Federal Register [87 FR 23453] on April 20, 2022, and effective on May 20, 2022) and Department of the Interior (43 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment, and states in 40 CFR §1501.5 that “An agency shall prepare an environmental assessment for a proposed action that is not likely to have significant effects or when the significance of the effects is unknown . . .”

The Service will use this EA to solicit public comment on the analysis provided in the EA, to determine whether implementation of the CCP would have a significant effect on the quality of the human environment, and to facilitate continued public involvement in the refuge planning process. The EA will be published conjointly with the Complex CCP in the Federal Register. A link will be posted that directs users to its electronic location on the refuge website.

## **Proposed Action**

The Service has proposed to implement a CCP for the Merced NWR, San Luis NWR and Grasslands WMA that best achieves the purposes for which the refuges were established, helps fulfill the mission of the National Wildlife Refuge System (NWRS), is consistent with sound fish and wildlife management and ensures that the biological integrity, diversity and environmental health of the refuge system are maintained.

The Service examined a range of management alternatives. Specific details regarding the preferred alternative and the other alternatives that were evaluated are provided in Chapter 2. Of these, Alternative C represents the Service’s proposed action for the Merced NWR, San Luis NWR and Grasslands WMA. However, 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.

## **Background**

National wildlife refuges are guided by the mission and goals of the NWRS, the purposes of an individual refuge, refuge-specific enabling legislation, Service policy, laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act (NWRSA) of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act).

The Merced NWR was established pursuant to the Lea Act “...for the management and control of migratory waterfowl and other wildlife...” (16 U.S.C. Sec 695). Other purposes include “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (16 U.S.C. Sec 715d; Migratory Bird Conservation Act); and “...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).

The Grasslands WMA was established pursuant to the Migratory Bird Conservation Act “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (16 U.S.C. Sec 715d; Migratory Bird Conservation Act). Other purposes include “...for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ...” (16 USC Sec 3901(b), 100 Stat. 3583; Emergency Wetlands Resources Act of 1986) and “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ...” (16 USC Sec 1534; Endangered Species Act of 1973).

The San Luis NWR was established pursuant to the Migratory Bird Conservation Act “...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (16 U.S.C. Sec 715d; Migratory Bird Conservation Act). Other purposes include the Fish and Wildlife Coordination Act, which “...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for

the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon ...” (16 USC Sec 664; Fish and Wildlife Coordination Act).

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

## **Purpose and Need**

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 each refuge was established, the mandates of the NWRs and the refuges’ goals and objectives. The purpose of the Complex CCP is to describe the desired future conditions of the Merced NWR, San Luis NWR and Grasslands WMA 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 the legislative obligations of the Service. The National Wildlife Refuge System Administration Act of 1966, as amended by Refuge Improvement Act, requires the Service to prepare a CCP for every refuge or related complex of refuges and to manage the refuge(s) consistent with the CCP. The NEPA requires that an environmental assessment or environmental impact statement be prepared to accompany the CCP to evaluate the effects of different alternatives that meet the goals of the refuges and identify the Service’s proposed action for implementing the CCP.



*Merced NWR wetland. Photo: Rick Lewis*

## **Previous NEPA Analysis for the San Luis NWR Complex**

### **Anticipated Direct and Indirect Impacts of Hunting and Fishing on Wildlife Species**

For additional information about impacts of hunting, hunting harvest management and regulatory procedures, see Environmental Assessment for Expanded Pheasant and Snipe Hunting Opportunities at San Luis and Merced National Wildlife Refuges (USFWS 2020).

As outlined in Section 2 of the Environmental Assessment, there are no proposed substantive changes to hunting access, species available for hunting, or bag limits under any of the Alternatives. Therefore, similar levels of hunting would occur under each Alternative commensurate with existing baseline conditions. Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning and regulations will be designated to minimize any negative impacts to wildlife populations and other public visitors using the refuges.

The Service would also continue to provide public fishing opportunities within Salt Slough of the San Luis unit. Fishing in the Complex is subject to California Department of Fish and Wildlife (CDFW) fishing regulations (e.g., gear, species and bag-limit restrictions). Enforcement of species-specific regulations would avoid long-term adverse impacts to native fish populations. Unrestricted parking and off-road vehicle use to access preferred fishing holes have the potential to adversely impact riparian habitat and disturb wildlife. Discarded lead weights, hooks, monofilament line and miscellaneous trash can harm and kill wildlife. The refuge only allows the use of pole and line or

rod and reel to take fish, and anglers must attend their equipment at all times to mitigate this risk of injury to wildlife. Regular maintenance of fishing-related facilities, allowing fishing only during normal refuge visitation hours in designated areas, strategically located vehicle barriers and regular law enforcement patrols would minimize potential adverse impacts to refuge wildlife as a result of implementing a fish program. Recreational fishing opportunities may also increase public stewardship of the resources and provide a source of volunteers to assist in wildlife conservation efforts within the Complex.

## **Project Area**

The three refuge units—Merced NWR, San Luis NWR and Grasslands WMA—are all located in the central portion of Merced County, California (Figures 1-1 and 1-2). The three units are bounded by the major transportation routes of Highway 99 to the east and Interstate 5 to the west. The Complex is six miles west of the city of Merced, and the city of Los Banos separates the West and South units of the Grasslands WMA. The Complex is located in the northern portion of the San Joaquin Valley, which is enclosed by the foothills of the Sierra Nevada Mountains to the east and the Coast Range to the west.

The Merced NWR is 10,262 acres in size and consists of four main units: Merced unit, Lone Tree unit, Snobird unit and Arena Plains unit. The San Luis NWR is 26,878 acres in size and consists of six contiguous units: San Luis unit, West Bear Creek unit, East Bear Creek unit, Blue Goose unit, Freitas unit (sometimes split into Freitas North and South) and Kesterson unit. The San Luis NWR is located to the west of the Merced NWR, although its East Bear Creek unit borders the Snobird unit of the Merced NWR.

The Grasslands WMA consists of 75,225 acres of perpetual conservation easements on private lands and is the largest, concentrated easement program for wildlife in the State of California. The Grasslands WMA consists of three broad units: West, South, and East. The West and East units surround most of the San Luis NWR and the East unit surrounds most of the Merced NWR. The South unit of the Grasslands WMA, situated southeast of Los Banos, is isolated from the rest of the Grasslands WMA and San Luis and Merced NWRs (see Figure 1-2 for geographical context).

Figure 1- 1. Map of the San Luis NWR, Merced NWR and Grasslands WMA

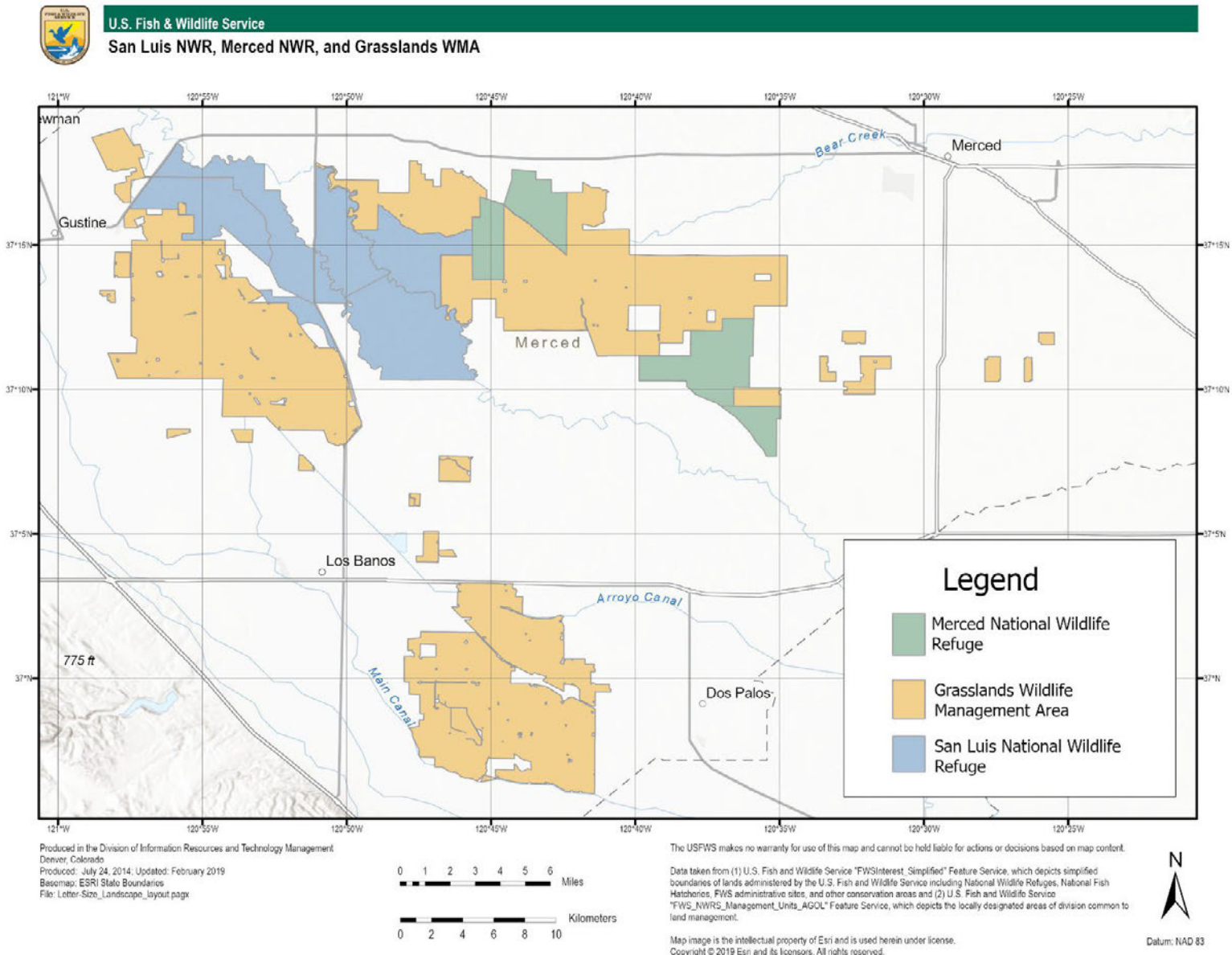
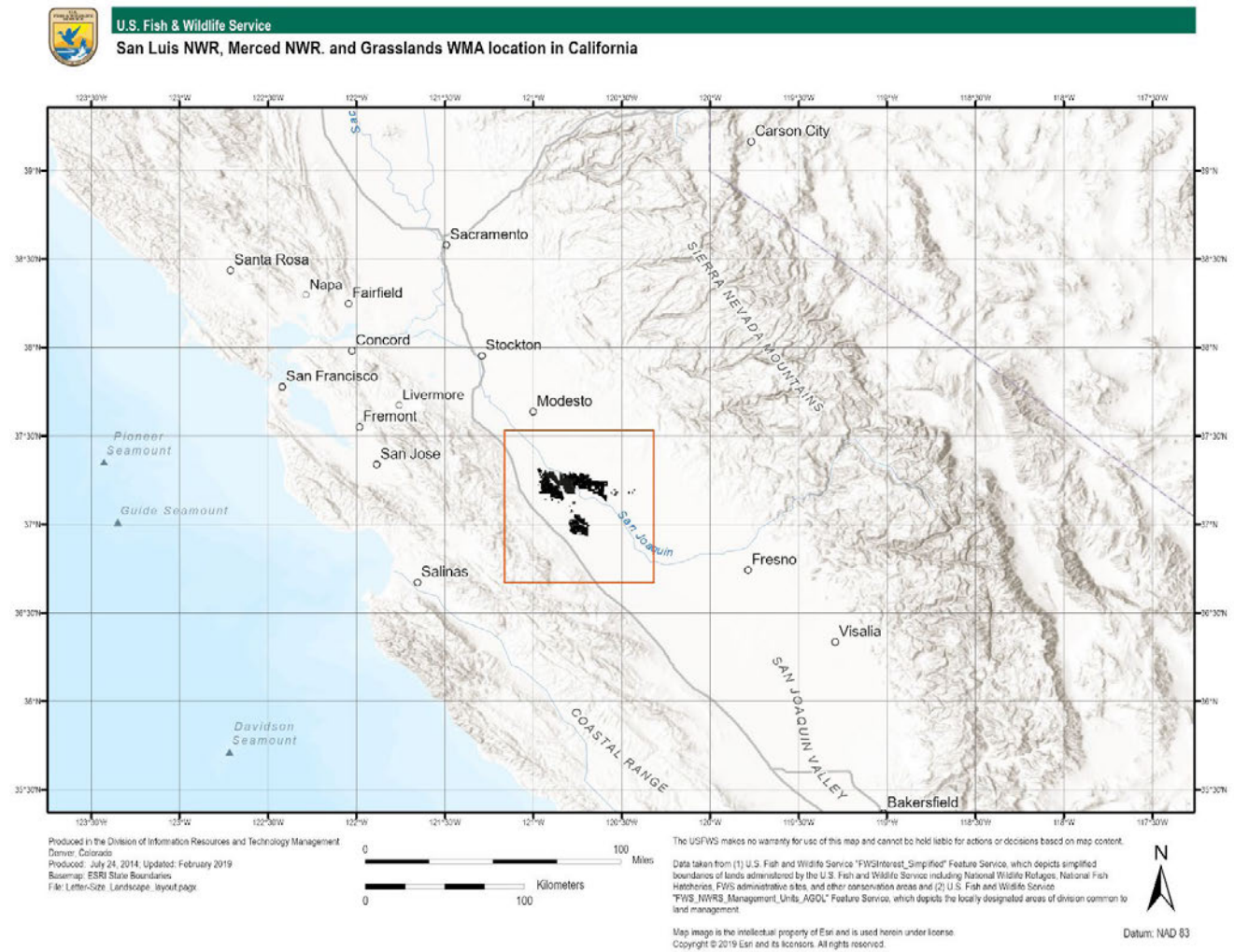




Figure 1- 2. Location of the San Luis NWR Complex within California’s Central Valley



## Refuge Vision Statement

*The San Luis NWR, Merced NWR and Grasslands WMA together make up the heart of California’s largest contiguous freshwater wetlands, providing vital habitat for waterfowl and other migratory birds as well as assemblages of resident wildlife. Together, these lands are managed as a vital link in a chain of wetlands along the Pacific Flyway, providing refuge for millions of migratory birds; it is a unique area of incredible beauty and biodiversity offering permanent and seasonal wetlands, riparian corridors and native grasslands. These areas will be preserved for their ecological importance and for the wildlife that depend upon them, from native chinook salmon making the arduous journey to historic spawning grounds, to majestic tule elk bugling amid the grasslands, to sandhill cranes emitting their clarion call, and to flocks of waterfowl large enough to darken the sky. Here, visitors reconnect to the rich wildlife heritage of the San Joaquin Valley—participating in a variety of wildlife-dependent recreational activities and uses. Complex staff are committed to protecting and preserving wildlife and their habitats in the face of ongoing challenges from climate*

*change, urban expansion, and continued habitat degradation. As such, the Complex will contribute to the mission of the National Wildlife Refuge System.*

## **Refuge Goals**

This section contains the primary goals that will define the management direction of the refuges for the next 15 years. Goals are broad statements of the desired future conditions for refuge resources. In addition, as part of the CCP, refuges are expected to develop objectives and strategies that together, will help achieve the goals.

Five broad goals were developed for the natural resource and public use alternatives selected for the management of the San Luis NWR Complex. They are consistent with the Complex purposes, ecoregion goals, NWRs goals, Refuge Improvement Act, Service policy and international treaties. These goals, objectives and strategies are as follows:

### **Goal 1: Migratory Birds and Biological Diversity**

Conserve, protect, manage, restore and enhance natural habitats and associated plant and wildlife species of the Northern San Joaquin Valley on Complex lands, with an emphasis on supporting an abundance and natural diversity of migratory birds including waterfowl, shorebirds, waterbirds, raptors, songbirds and other wildlife. (Merced and San Luis NWRs).

### **Goal 2: Threatened and Endangered Species**

Contribute to the recovery of threatened/endangered species as well as the protection and management of populations of endemic Central Valley wildlife and special status wildlife, plants and habitats. (Merced and San Luis NWRs).

### **Goal 3: Visitor Services and Public Use**

Provide the public with opportunities for compatible, wildlife-dependent recreation and other uses to enhance understanding, appreciation and enjoyment of natural resources on the Complex. (Merced and San Luis NWRs).

### **Goal 4: Wildlife Conservation Easement Management**

Manage the Service's easement program on private lands for the benefit of wildlife and explore the potential for additional wildlife easement from willing sellers within the approved easement acquisition boundary. (Grasslands WMA).

### **Goal 5: Ecological Processes, Ecosystem Management and Partnerships**

Maintain and/or restore natural ecological processes to promote healthy, functioning ecosystems for wildlife on Complex lands by developing strong partnerships with Partners, research institutions, and other local, state and Federal agencies. Coordinate the natural resource management of the Complex's natural resources within the larger context of the Central Valley/San Francisco Ecoregion and Pacific Flyway. (Merced and San Luis NWRs).

## Habitat Protection and Land Acquisition Process

If the proposed action is approved, various means could be used for habitat protection through the purchase of fee title, conservation easement, no-cost transfer, memorandum of understanding (MOU), donation, or exchange within the acquisition boundary of Grasslands WMA. It is the established policy of the Service to acquire land or interests in land only from landowners that are willing sellers. The authorities for the acquisition of the proposed expansion area are the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), as amended; the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715-715d-715r), as amended; and the Refuge Recreation Act of 1969 (16 U.S.C. 460k-460k-4), as amended. Acquisition funding could be made through the Land and Water Conservation Fund Act of 1965, the Migratory Bird Conservation Fund, or other sources to acquire lands and/or waters, or interests therein, for fish and wildlife conservation purposes.

### Fee Title Acquisition and Refuge Revenue Sharing

**Fee Title Acquisition.** Service policy is to acquire lands or interest in lands only from willing participants. Landowners within the project boundary who do not wish to sell their property or any other interest in their property are under no obligation to enter into negotiations or to sell to the Service.

Due to the size of the acquisition boundary of the Complex and value of the agricultural land, it is expected that acquisition may take many decades to acquire just a portion of the lands proposed. We anticipate fee title acquirement would total approximately 20 percent of the total land base of the 37,905-acre acquisition goal within the available acquisition boundary area of Grasslands WMA. It is also anticipated that some lands may never be acquired by the Service.

The basic considerations in acquiring lands are: (1) biological significance of the land; (2) existing and anticipated threats to fish and wildlife resources; and (3) landowner willingness to sell or otherwise make property available for inclusion into the project. The purchase of refuge lands is dependent upon the availability of funds.

Fee title acquisition normally conveys all ownership rights, including water rights, to the Federal government. Fee title interest is normally acquired when (1) the land's fish and wildlife resources require permanent protection, (2) the land is needed for visitor use development, (3) a pending land use could adversely impact the area's resources, or (4) it is the most practical and economical way to assemble small tracts into a manageable unit.

**Revenue Sharing.** Under provisions of the Revenue Sharing Act (Public law 95-469), the Service would annually reimburse San Joaquin, Stanislaus, and Merced Counties to help offset tax revenue lost as a result of fee title acquisitions of private property. This law states that the Secretary of the Interior shall pay to each county in which the area acquired in fee title is situated, the greater of the following amounts:

1. An amount equal to the product of 75 cents multiplied by the total acreage of that portion of the fee area that is located within such county.
2. An amount equal to three-fourths of one percent of the fair market value, as determined by the Secretary, for that portion of the fee area that is located within

such county.

3. An amount equal to 25 percent of the net receipts collected by the Secretary in connection with the operation and management of such fee area during such fiscal year. However, if a fee area is located in two or more counties, the amount for each county shall be proportionate to the acreage in that county.

Given market values for national wildlife refuge lands in California, the second formula (i.e., 0.75 percent of the fair market value of acquired lands) is usually used to determine Federal revenue sharing payments. Federal regulations specify that the fair market value of fee title refuge lands is to be reappraised every five years. However, payments to counties have been less than the full amount authorized by the Revenue Sharing Act because Congressional appropriations typically fall short of the maximum authorized amount.

Congress may appropriate, through the budget process, supplemental funds to compensate local governments for any shortfall in revenue sharing payments. Payments under this act would be made only on lands that the Service acquires in fee. On lands where the Service acquires only partial interest through easement, all taxes would remain the responsibility of the individual landowner.

## **Easement Acquisition**

The option to place conservation easements on private land is an important private property right that comes with land ownership in the United States. Private property owners have a number of private rights that go along with the ownership of property. With a conservation easement, the landowner sells some of those rights. In a conservation easement, the owner of the property, also known as the Grantor of the easement, retains all rights of ownership not specifically prohibited or limited by the easement. These include the rights to exclude public access and to sell the property. The easement holder, or Grantee, only has rights specifically included in the easement. The objectives and conditions of our conservation easements will recognize lands for their importance to wildlife habitat, and any other qualities that recommend them for wildlife conservation. Activities that are normally restricted under the terms of a conservation easement include:

- Destruction of native habitats,
- Subdividing for the purposes of development,
- Alteration of the area's natural topography (unless for restoration),
- Erecting, constructing, or placing structures or buildings.

In the acquisition of a conservation easement, the Service would acquire the minimum rights needed to preserve and protect habitat. The easement interests acquired would be considered components of the Refuge System and would be subject to those laws and regulations that are applicable to the easement interest acquired. We anticipate easements would total approximately 80 percent of the total land base of the 37,905-acre acquisition goal within the acquisition boundary area of Grasslands WMA. The Service would seek to acquire easements in areas where the acquisition would meet Refuge objectives and be acceptable to the landowner. The landowner would remain responsible for all property taxes.

## **Chapter 2. Alternatives, Including the Proposed Action**

### **Introduction**

This chapter describes three alternatives for managing the three complex units (San Luis and Merced NWRs and Grasslands WMA): Alternative A (No Action), Alternative B (Wetland and Waterbird Focus Alternative) and Alternative C (Proposed Action). These alternatives are described in the following text. Under Alternative A, the No Action Alternative, the Service would continue managing the three units as it currently does. Alternatives B and C are “action alternatives” that would involve a change in the current management of the three units. The Service’s proposed action is Alternative C.

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

During the public scoping period, alternative actions for managing the refuge were suggested. Some of these suggestions were consistent with refuge purposes and the mission of the NWRS 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. Other actions were found to be infeasible. The actions that were removed from further consideration are as follows.

#### **High-Speed Rail Corridor**

There is a proposal for a high-speed rail corridor that would bisect the San Luis NWR Complex. The Complex will continue to provide decisionmakers with information regarding the effects of the proposed high-speed rail on wildlife and their habitat. The proposed high-speed rail corridor will not be addressed in this CCP/EA.

#### **Boundary Expansion**

Proposed expansion of existing refuge boundaries or establishment of new refuges will not be addressed in this CCP/EA.

### **Current Management of San Luis and Merced NWRs and Grasslands WMA**

For a detailed description of the current management practices on the three units, please see Chapter 3, Section 3.8 of the Complex CCP.

## **Description of Alternatives**

### **Alternative A (No Action)**

Under Alternative A, the Service would continue to manage the San Luis and Merced NWRs and Grasslands WMA as they have been managed in the recent past. Existing staffing and funding levels would remain approximately the same. In addition to the actions described in the *Features Common to all Alternatives* section, Alternative A would ensure robust management of Complex wetlands, grasslands and croplands with a focus on autumn through spring use. The Service would continue to coordinate habitat and wildlife management activities at the Complex with other land management agencies and entities.

#### ***Wetland, Waterfowl and Waterbird Management***

Under Alternative A, the Service would continue to manage over 5,500 acres in more than 110 units as seasonal wetlands for migratory birds with an emphasis on waterfowl and shorebirds. Moist soil units would be managed with an 8-year disturbance cycle to produce desirable wetland plants. In addition, the Service would manage approximately 1,000 acres of permanent, semi-permanent and reverse cycle wetlands to support waterbirds year-round and serve as breeding and brood-rearing sites. In addition, over 3,000 acres of unmanaged wetlands and additional aquatic habitat would be protected from artificial disturbances to benefit wildlife. Under this alternative, the Service would continue to manage 750 acres of croplands (corn, winter wheat and irrigated pasture) at the Merced NWR for cranes, geese and other wildlife.

The Service would continue to provide 60 percent of the refuges' land base as disturbance-free sanctuary areas for migratory waterfowl. In addition, the Service would implement the wildlife disease management plan. All colonial nesting waterbird breeding sites would be protected from disturbance. Suitable islands and peninsulas in wetland units would be maintained for waterbirds and 20 percent of the wetlands' shorelines would be maintained in an open condition. In addition, the Service would continue to aid in the recovery and protection of wetland-dependent threatened and endangered species including the giant garter snake.

#### ***Water Resource Management***

Under the No Action Alternative, the Service would continue to use the 74,415 acre-feet of water through the Central Valley Project Improvement Act (CVPIA) for the benefit of migratory birds. Water use would continue to be monitored. In addition, the Service would continue efforts to increase water conservation and efficiencies to optimize existing water use. The refuge water suppliers would also monitor the quality of delivered water supplies, pass through water, and spill water. Water quality issues would be identified, and the Service would seek to address any issues by employing best management practices (BMPs) with the assistance of partners and other agencies. The Service would also work with other agencies and groups, including water districts, to improve water quality and quantity in the ecoregion.

### **Grassland Management**

Under Alternative A, the Service would continue to manage over 24,000 acres of grassland habitats using grazing, prescribed burning, mowing, seeding, planting and chemical control to provide both short and long structured grasslands to provide nesting habitat and winter foraging habitat for migratory birds and other wildlife. The Service would also focus on maintaining and restoring native grasses and forbs. Vernal pool habitats would be managed with grazing and fire as needed to maintain/restore vernal pool vegetative communities to benefit wildlife.

In addition, the Service would continue to aid in the recovery and protection of grassland-dependent threatened and endangered species, including the San Joaquin kit fox (*Vulpes macrotis*), Fresno kangaroo rat (*Dipodomys nitratoides exilis*) and blunt-nosed leopard lizard (*Gambelia sila*), as well as vernal pool-dependent threatened and endangered species, including several vernal pool invertebrates, California tiger salamander (*Ambystoma californiense*), hairy Orcutt grass (*Orcuttia pilosa*), Hoover's sandmat (*Euphorbia hooveri*) and Colusa grass (*Neostapfia colusana*).

### **Riparian Woodland Management**

Under the No Action Alternative, the Service would continue to maintain 300 acres of existing riparian woodland habitats for wildlife. In addition, the Service would continue to aid in the recovery and protection of riparian woodland-dependent threatened and endangered species including the least Bell's vireo (*Vireo bellii pusillus*), yellow-billed cuckoo (*Coccyzus americanus*), riparian/San Joaquin valley woodrat (*Neotoma fuscipes*), riparian brush rabbit (*Sylvilagus bachmani riparius*) and valley elderberry longhorn beetle (*Desmocerus californicus*).

This includes conducting riparian brush rabbit habitat surveys and mapping to determine the viability of reintroducing the species to the San Luis NWR. Reintroduction of this species would entail a small pilot study of vaccinated and radio collared rabbits hard released onto San Luis NWR and monitored for survival success. The translocation would reduce the risk of severe flooding to RBR by creating a population in flood-secure riparian habitats. The translocation would also help mitigate the threat of RHDV2 by creating redundant populations and vaccinating translocated animals. Based on the results of the pilot study, additional releases of rabbits to San Luis NWR would continue until the population is considered self-viable, as determined by post-release population monitoring efforts. The Complex and associated partners would conduct all recovery efforts in accordance with the guidelines and recommendations in the Recovery Plan, Species Status Assessment and Five-Year Status Review (Species Status Assessment, USFWS, 2020; Five-Year Status Review of Riparian Brush Rabbits, CDFW, 2020) See Riparian brush rabbit draft translocation plan for additional details about riparian brush rabbit release and monitoring on San Luis NWR (USFWS, 2022).

### **Land Acquisition**

Under Alternative A, the Service would continue to pursue fee-title acquisition of high-priority habitat from willing sellers within the approved acquisition boundaries for the San Luis and Merced NWRs. The land acquisition program would be coordinated with other agencies and partners to enhance connectivity between natural lands and increase habitat patch size. In addition, the Service would seek to acquire up to 37,905 acres of wildlife conservation easements within the

Grasslands WMA from willing sellers within the approved acquisition boundary. Easement acquisition would be prioritized by parcel characteristics including the presence of wetlands, native uplands and trust wildlife resource values.

### ***Other Wildlife Management***

Under the No Action Alternative, the Service would continue to monitor tule elk abundance and work with the State to manage population numbers per the agreement. In addition, the Service would continue the cooperative program with the State to support the black-tailed deer (*Odocoileus hemionus*) population at the Complex. In addition, the Service would continue to protect and enhance populations of State-listed, rare and other special status species on the Complex, including greater sandhill crane (*Grus canadensis*), Swainson's hawk (*Buteo swainsoni*), bank swallow (*Riparia riparia*), willow flycatcher (*Empidonax traillii*), bald eagle (*Haliaeetus leucocephalus*), delta button celery (*Eryngium racemosum*) and tricolored blackbird (*Agelaius tricolor*). The Service would also continue to protect and enhance populations of San Joaquin Valley endemic species, including coastal horned lizard (*Phrynosoma coronatum*), Hermann's kangaroo rat (*Dipodomys heermanni*) and yellow-billed magpie (*Pica nuttalli*).

### ***Fisheries Management***

Under Alternative A, the Service would continue to protect waterways from artificial disturbance and maintain riparian vegetation along all waterways. All permanent waterways would continue to be maintained. In addition, the Service would work with partners to inventory and monitor fish communities on the Complex. Under this alternative, the Service would also aid in the recovery and protection of threatened and endangered fish, including Chinook salmon and steelhead trout. The Service would also continue to support the salmonid restoration efforts for the San Joaquin River and the removal of non-native fish.

### ***Fire Management***

Under the No Action Alternative, the Service would continue to implement annual prescribed burns on 3,000 to 7,500 acres of grassland, wetland and vernal pool habitat to control invasive species, promote native species, enhance nutrient cycling and reduce hazardous fuel levels. Approximately 10 mechanical fuels treatment projects would complement prescribed burns and reduce fuel hazards on an additional approximately 840 acres each year and would include pile burning. Prescribed burns would be conducted in accordance with both the Department of the Interior and Service Fire Management Policy (621 FW 1-3 of the Service Manual) and the Interagency Standards for Fire & Aviation Operations. Use of prescribed burns for habitat management and hazardous fuel reduction would be consistent with both the approved habitat and fire management plans for the Complex. All prescribed burns would be conducted in compliance with the Clean Air Act and associated permitting requirements.

The Complex would maintain a 10-member fire management crew (7 permanent and 3 seasonal firefighters). In addition to the fire funded personnel, the Complex would maintain a contingent of at least 15 collateral firefighters consisting of Complex staff. Further, the Complex would maintain firefighting equipment consisting of two type 3 engines, two type 6 engines and one 1500-gallon water tender; a stand-alone fire station; and a bunk house.



The Service would work with partner agencies to coordinate wildfire suppression efforts on wildlands within the San Joaquin Valley and surrounding foothills region. Doing so would require maintaining a suppression response capability appropriate to meet expected wildland fire complexity. The Service would monitor the dispatch office, located at the Sierra National Forest headquarters, and neighboring cooperating agencies, such as the California Department of Forestry and Fire Protection, for information regarding wildfire activity (or potential activity) that could impact the refuges' wildlife and habitat resources. At a minimum, the Complex would maintain one staffed wildland fire engine for suppression of local wildfires during all times of the year.

### ***Invasive Plant Species Management***

In accordance with 517 Departmental Manual (DM) 1 and 7 Refuge Manual 14, an integrated pest management (IPM) approach would be utilized to eradicate, control or contain pest and invasive species (herein collectively referred to as *pests*) where practicable on the refuges. 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 were needed on the refuges, 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 U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders or permits issued by the EPA may be applied on lands and waters under refuge jurisdiction.

Environmental harm by pest species refers 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 can greatly 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 firefighting costs.

Throughout the life of the CCP, proposed pesticide uses on the refuges would be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects would be documented under Chemical Profiles, to be included in the IPM Plan. Pesticide uses with appropriate and practical 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) to protect human health and safety (e.g., mosquito- borne disease).

Service-approved herbicides would continue to be used for controlling invasive plants. Plants targeted for treatment include: common cocklebur, water primrose, water-hyacinth, alligator weed, Parrotfeather, black mustard, shortpod mustard, common mallow, Johnson grass, smallflower tamarisk, downy brome, cheatgrass, scarlet wisteria, red sesbania, barb goatgrass, Brazilian Egeria, purple loosestrife, fennel, Eurasian watermilfoil, hydrilla, stinkwort, French broom, pampasgrass, spotted knapweed, jubatagrass, Scotch broom, medusahead, Himalayan blackberry, Saharan mustard, black walnut, puncture vine, virgata, English ivy, Hoary Cress, kochia, charlock, tower mustard, seaside barley, glasswort, Canada thistle, milk thistle, poison hemlock, Russian olive, Russian thistle, cheese weed, prickly lettuce, sow thistle, yellow star thistle, perennial pepperweed, salt cedar, tree of heaven, five hook bassia, giant reed, common reed and tree tobacco. An average of 2,500 acres would be treated each year. Herbicides expected to be used on the refuges include: glyphosate (both terrestrial and aquatic formulations), triclopyr triethylamine, aminopyralid, chlorsulfuron, clopyralid, dicamba, nicosulfuron, rimsulfuron and tembotrione/halosulfuron methyl. When chemicals are used, the Service would follow standard BMPs, including adherence to all U.S. EPA and California EPA warning labels and application requirements, as well as the Service's Pesticide Use Proposal process regulations.

### ***Invasive Nutria Management***

Under Alternative A, invasive nutria would be monitored on the Complex via camera trapping and removed via live trapping and dispatchment in conjunction with CDFW. Captured nutria would be dispatched using 0.22 caliber pellet pistols. The carcasses would be labelled using plastic flagging with cell number, trap ID, date, refuge location, and trapper initials. All dispatched nutria on the complex would be necropsied by USFWS staff following CDFW protocol. All data would be entered into the State's online database and the information could be downloaded by request from the CDFW GIS Coordinator for refuge records.

To examine distribution, Complex staff would use remote cameras and live trapping to document nutria locations at each of the refuge units. Camera locations were not selected and trapping was not performed systematically or randomly across the Complex, but instead in targeted areas where nutria were observed or where staff thought they would likely occur based on the presence of

permanent or semi-permanent water. Heat maps using both camera and trapping data would be developed to examine their occurrence at each refuge.

The Complex would use primarily single-door tomahawk live traps and would use some double-door traps. CDFW also uses suitcase, conibear and multi-catch traps. Traps would be set out in wetlands with evidence of nutria presence such as scat, tracks or areas where camera traps have documented them.

The Complex would also use camera traps, which would be set out in wetlands across all refuge units. Camera platforms would be made by folding, weaving and piling emergent vegetation into a stable mound/platform. The wooden platform would be anchored to the wetland basin with bamboo poles. The platform would then be covered with a layer of soft decaying vegetation to imitate a natural aquatic mammal platform and baited heavily with fresh-cut tules/cattails and sweet potatoes. Occasionally, floating wooden platforms would be used in areas where there is not enough emergent vegetation to create a natural feeding platform.

### ***Mosquito-Borne Disease Management***

Under Alternative A, the Service would continue to work with local and state mosquito control agencies in accordance with USFWS policy to address refuge mosquito-borne disease issues. The Complex is situated within one mosquito control agency (Merced Mosquito Abatement District). This district would continue to conduct mosquito monitoring programs (both larvae and adults), as well as disease monitoring programs (i.e., encephalitis, malaria and West Nile Fever) at the Grasslands. The district also conducts larviciding and adulticiding programs in Merced County; however, both the San Luis NWR and Merced NWR are considered too distant from population centers and the district has not requested approval for any control program on refuge lands.

### ***Easement Management***

Under Alternative A, the Service would continue to monitor all easement lands annually for easement compliance and maintain easement databases. The Service would also provide technical assistance to private landowners on easement and natural resource issues. In addition, the Service would continue to work with willing landowners to implement Partners for Fish and Wildlife and other programs to restore and enhance habitat on easement lands. The Complex fire program would continue to support local fire resources in suppressing wildfires on easement lands. Complex law enforcement would also support the CDFW to protect public safety and enforce natural resource laws on easement lands.

### ***Inventory, Monitoring, and Research***

Under the No Action Alternative, the Service would continue to conduct the following monitoring on the refuges in coordination with other agencies and partners: waterbird use of seasonal wetlands; vegetation of seasonal wetlands; the tule elk population; sandhill cranes; non-passerine use of grasslands; goose use of croplands; colonial waterbird nesting; tricolored blackbird nesting; water monitoring; annual one-hour fuel production; weather; invasive plant occurrence on the Lonetree unit and tule elk enclosure; and habitat management activities. Other monitoring would be conducted on an as-needed basis. Under this Alternative, the Service would also continue to

assess potential trends and impacts to Complex natural resources from climate change. In addition, the Service would partner with and encourage university, agency and independent investigators to use the Complex for natural resource research projects. Finally, the Service would monitor and track the six priority wildlife-dependent public uses occurring on refuge lands.

### ***Cultural Resource Management***

Under Alternative A, the Service would continue to manage and conserve cultural resources at the San Luis and Merced NWRs and Grasslands WMA 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), as well as consultation and coordination with Indian Tribal Governments pursuant to Executive Order 13175 (November 6, 2000), 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.

### ***Visitor Services***

Under this alternative, the Service would continue to provide opportunities for wildlife observation and nature photography on four auto-tour routes, eight nature trails and six observation decks. In addition, opportunities for nature interpretation would be maintained, including seven information kiosks, interpretive signs along auto-tour routes and nature trails, and the exhibit hall and visitor center. Refuge staff would provide periodic nature interpretive programs to the public. The Service would also develop and provide environmental education programs from the visitor center facility with an emphasis on San Joaquin Valley wildlife and habitats, the Complex and the NWRS. Public outreach efforts would continue to focus on the Complex refuges, natural resources in the ecoregion and the NWRS. In addition to hosting special events at the Complex, refuge staff would participate in off-Complex events.

The Service would also continue to provide waterfowl hunting opportunities for hunters by offering free roam, exclusive free roam, hunt blinds, goose pits, boat hunting and blinds that are more accessible for those with mobility impairments. The hunting program would continue to be cooperatively administered with CDFW. The Service would manage the refuge land, habitat and facilities; CDFW would administer the reservation system while also selecting and processing the refuge hunters.

In addition, the Service would continue to provide fishing opportunities to the public at six designated fishing sites (including a disabled site) at Salt Slough on the San Luis NWR. While the Service would manage access and public use infrastructure for fishing, sport fish populations would not be actively managed.

Under Alternative A, the Service would continue to utilize the region's law enforcement program, which consists of one patrol captain and four full-time Federal wildlife officers assigned to the Central California Patrol Zone. The patrol zone comprises a geographical area including the Stone Lakes NWR, Tulare Basin WMA, San Luis NWR Complex, San Francisco Bay NWR Complex, Hopper Mountain NWR Complex and Kern NWR Complex. These officers would be responsible

for any law enforcement and public safety issues on San Luis NWR (six units), Merced NWR (four units), the San Joaquin River NWR and Grasslands WMA (three units). In addition to the Federal wildlife officers assigned to the region, the patrol captain (who directly supervises the Federal wildlife officers) would potentially provide enforcement support on the Complex, especially during periods of high use or low staffing levels. The Complex's law enforcement officers would work closely and coordinate their activities with other local, state and Federal law enforcement and public resource officials. When needed, they would assist them on details outside the refuge units' boundaries. Law enforcement relies heavily on other agencies at times due to limited law enforcement staff and the segmented-scattered positioning of individual refuge units in the Complex.

## **Alternative B (Wetland and Waterbird Focus)**

### ***Wetland, Waterfowl and Waterbird Management***

Alternative B would include all the elements of Alternative A (no action), except the Service would manage moist soil units with a more frequent and intensive 6-year disturbance cycle rather than an 8-year cycle. In addition, the Service would restore 600 acres of additional seasonal wetland basins in the Snobird and East Bear Creek units.

### ***Water Resource Management***

Water resource management would be the same under Alternative B as Alternative A, with one exception: under Alternative B, the Service would seek acquisition of 10,000 acre-feet of additional water and/or operating funds for water for the Snobird unit and Arena Plains units and 18,000 acre-feet of additional water for the Merced unit, San Luis unit and West Bear Creek units.

### ***Grassland Management***

Alternative B would include all the elements of Alternative A (no action), except the Service would reconfigure tall grassland management units to maximize nesting habitats around suitable waterfowl brood wetland units and short grassland management units for geese, cranes and curlews by increasing grazing intensity and decreasing prescribed fire return intervals. In addition, the Service would inventory all vernal pool habitats, including flora, by conducting standardized vernal pool habitat site assessments (i.e., standardized species surveys) as outlined in Action 3.2.2 of the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. The Service would also investigate methods for remediating contamination by poultry manure at the Arena Plains unit of Merced NWR, as outlined in the Recovery Plan for those species (USFWS 2005).

### ***Riparian Woodland Management***

Under Alternative B, riparian woodland management would be the same as under Alternative A, except the Service would restore 100 acres of additional riparian woodland habitats along suitable waterways by planting native understory and overstory vegetation along riparian corridors, removing invasive plant species and enhancing floodplain connectivity.

### ***Land Acquisition***

Land acquisition would be the same as under Alternative A, except the Service would prioritize parcels with wetland habitats for fee and easement acquisition in the Grasslands Ecological Area.

### ***Other Wildlife Management***

Management of other wildlife species (e.g., ungulates, special status species) would be the same under Alternative B as Alternative A, except management efforts would focus on wetland-dependent species. Under Alternative B, more resources would be dedicated to species such as mink, muskrat, beaver and permanent wetland-dependent species than under Alternative A, and water management allocations would focus on providing a higher percentage of permanent and semi-permanent water during Level 2 water supply years, rather than primarily supporting seasonal moist soil water management goals. Alternative B would result in a lower available supply of water in winter months for seasonal wetland-dependent species.

### ***Fisheries Management***

Fisheries management under Alternative B would be the same as under Alternative A.

### ***Fire Management***

Fire management would be the same under Alternative B as Alternative A, except that fuel projects would focus on wetland habitats.

### ***Invasive Plant Species Management***

Invasive species management would be the same under Alternative B as Alternative A, except that control efforts would focus on wetland habitats. The invasive treatment focus would shift to within basin unwanted vegetation control—primarily perennial pepperweed and poison hemlock. Under this alternative, upland invasive management of species such as yellow star thistle, stinkwort and Russian thistle would receive lower prioritization.

### ***Invasive Nutria Management***

Nutria management would be the same under Alternative B as Alternative A.

### ***Mosquito-Borne Disease Management***

Mosquito-borne disease management under Alternative B would be the same as under Alternative A.

### ***Easement Management***

Easement management under Alternative B would be the same as under Alternative A, with a few exceptions. Under Alternative B, technical assistance and habitat restoration/enhancement programs for landowners would prioritize wetland projects. In addition, a second private lands biologist would be added to expand this programs capacity.

***Inventory, Monitoring and Research***

Inventory, monitoring and research under Alternative B would be the same as under Alternative A, except program would focus on water, wetlands and wetland-dependent wildlife. In addition, the Service would map habitat within the Grasslands WMA.

***Cultural Resource Management***

Cultural resources under Alternative B would be the same as under Alternative A.

***Visitor Services***

Visitor Services under Alternative B would be the same as Alternative A.

**Alternative C (Proposed Action)**

***Wetland, Waterfowl and Waterbird Management***

Alternative C would include all the elements of Alternative A (no action), except the Service would restore 600 acres of additional seasonal wetland basins in the Snobird and East Bear Creek units. Improvements to the East Bear Creek and Snobird units would include removing, replacing or enhancing interior infrastructure such as roads, levees and water control structures; repairing water supply infrastructure such as wells and lifts on the Snobird unit, and modernizing and adding a fish screen to the East Bear Creek Pumping Plant; enhancing floodplain connectivity; removing obsolete infrastructure; and installing a solar array to supplement power to wells. In addition, the Service would inventory and categorize aquatic habitats on the Complex.

***Water Quantity and Quality Management***

Water quantity and quality management would be the same under Alternative C as Alternative B.

***Grassland Management***

Grassland management under Alternative C would be the same as under Alternative B.

***Riparian Woodland Management***

Riparian woodland management under Alternative C would be the same as Alternative B.

***Land Acquisition***

Land acquisition under Alternative C would be the same as Alternative A, except with a prioritization weighted for increased habitat connectivity between existing conserved lands to benefit wildlife species rather than equal consideration of all willing sellers regardless of connectivity to adjacent lands already in conservation protection, easement or fee title. Additionally, up to 7,580 acres of the remaining 37,905 acre easement acquisition objective within the Grasslands WMA would be shifted to fee-title acquisition, prioritizing willing seller acquisition of properties with wetlands within 1 mile of existing Service-owned fee-title lands, or properties with vernal pools anywhere within the acquisition boundary.

### ***Other Wildlife Management***

Management of other wildlife species (e.g., ungulates, special status species) would be the same under Alternative C as Alternative A, except the Service would also examine the potential for expanding the range of tule elk and other native ungulates at the Complex. In addition, the Service would actively manage to maintain and/or restore habitat for selected special status species (i.e., tricolored blackbird, coastal horned lizard, Hermann’s kangaroo rat, yellow-billed magpie and tule elk), including young robust emergent stands and stands of coarse forbs, iodine bush-dominated grasslands, old dune/sandy soil sites, thatch-free grasslands and tussock-dominated grasslands.

### ***Fisheries Management***

Fisheries management under Alternative C would be the same as under Alternative B.

### ***Fire Management***

Fire management would be the same under Alternative C as Alternative A.

### ***Invasive Plant Species Management***

Invasive species management under Alternative C would be the same as Alternative A, except the Service would develop a baseline monitoring program for invasive plant species and a rapid assessment and control program for new invasive species.

### ***Invasive Nutria Management***

Nutria management would be the same under Alternative C as Alternative A.

### ***Mosquito-Borne Disease Management***

Mosquito-borne disease management under Alternative C would be the same as under Alternative A.

### ***Easement Management***

Easement management under Alternative C would be the same as under Alternative A, with a few exceptions. Under Alternative C, the Service would promote landowner workshops on wetland management, waterfowl management, water conservation and grassland management. In addition, a second private lands biologist would be added to expand this programs capacity.

### ***Inventory, Monitoring, and Research***

Inventory, monitoring and research under Alternative C would be the same as under Alternative A, except for the following new inventories and monitoring:

- Research and/or monitor migratory bird use of the variety of upland habitats at the Complex.
- Detailed vegetation, including grasslands.
- Vernal pools and associated vegetative communities.
- Permanent breeding bird survey routes.



- Black-tailed deer abundance.
- Permanent grassland monitoring plots.
- Periodic monitoring of small mammals, mid-sized mammals and other wildlife.

### ***Cultural Resource Management***

Cultural resource management under Alternative C would be the same as under Alternative A.

### ***Visitor Services***

In addition to the visitor opportunities offered under Alternative A, the Service would develop the following facilities, opportunities and media under Alternative C:

- Construct an approximately one-half-mile Riparian Woodland nature trail at the visitor center. This trail would depart from the same trailhead as the existing wetland nature trail to meander along the north side of Mallard Slough and incorporate at least one foot bridge to cross to the south side of the slough and connect with the wetland trail.
- Add additional boardwalk section of approximately 400 feet to the wetland nature trail at the San Luis NWR.
- Add a children's nature exploration area near the picnic pavilion outside the visitor center. This would entail adding touch-friendly panels that are oriented for young children educational levels, interactive natural elements such as play-friendly logs and nature-themed displays.
- Hold wildlife identification and nature photography workshops at the Visitor Center.
- Add a water level observation blind to a seasonal wetland at the San Luis NWR.
- Add more easily accessible observation/photo blinds at the San Luis and Merced NWRs.
- Implement a program of weekend guided nature walks.
- Develop an evening lecture program at the visitor center.
- Develop a cadre of volunteers or docents to assist with nature interpretation programs and other activities.
- Develop a waterfowl identification brochure and a waterfowl hunting brochure.
- Develop teacher resource packets and guides.
- Partner with local colleges and universities to provide students environmental education opportunities.

Under Alternative C, the Service would also significantly increase the number of events and utilize different media types for public outreach.

## **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 C is the proposed action for the refuge because it best meets the following criteria:

- Achieves the mission of the National Wildlife Refuge System.
- Achieves the purposes of the refuge(s).
- 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.
- Is consistent with the scientific principles of sound fish and wildlife management and endangered species recovery.

The preferred alternative was identified based on the analysis presented in this Draft EA, and could be modified following the completion of the public comment period in response to comments received from other agencies, Tribal Governments, non-governmental organizations and/or individuals. As a result, the action ultimately described for implementation in the final CCP may or may not be the preferred alternative presented in the Draft EA.

The three alternatives for managing the San Luis and Merced NWRs and Grasslands WMA are summarized in Table 2-1.

**Table 2- 1. Draft CCP Alternatives - San Luis and Merced NWRs and Grasslands WMA**

**Goal 1 (Biological Diversity)—Conserve, protect, manage, restore and enhance natural habitats and associated plant and wildlife species of the Northern San Joaquin Valley on Complex lands, with an emphasis on supporting an abundance and natural diversity of migratory birds, including waterfowl, shorebirds, waterbirds, raptors, songbirds and other wildlife. (Merced and San Luis NWRs)**

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Wetland Management</b>	<ul style="list-style-type: none"> <li>• Manage over 5,500 acres in 110+ units as seasonal wetlands for migratory birds with an emphasis on waterfowl and shorebirds.</li> <li>• Manage as moist soil units with an 8-year disturbance cycle to produce desirable wetland plants.</li> <li>• Manage approximately 1,000 acres of permanent, semi-permanent and reverse cycle wetlands to support waterbirds year round and serve as breeding and broodrearing sites.</li> <li>• Protect 3,000+ acres of unmanaged wetlands from artificial disturbances to benefit wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alt A, and:</li> <li>• Restore 600 acres of additional seasonal wetland basins in the Snobird and East Bear Creek units.</li> <li>• Manage moist soil units with a 6-year disturbance cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alt A, and:</li> <li>• Restore 600 acres of additional seasonal wetland basins in the Snobird and East Bear Creek units, which would involve enhancing floodplain connectivity by removing, replacing or enhancing interior infrastructures such as roads, levees and water control structures.</li> </ul>
<b>Water Quantity &amp; Quality Management</b>	<ul style="list-style-type: none"> <li>• Maintain and use the 74,415 acre-feet of water through CVPIA for the benefit of migratory birds.</li> <li>• Monitor water use.</li> <li>• Improve water conservation and efficiencies to optimize existing water use.</li> <li>• Monitor water quality of delivered water supplies, pass through water and spill water.</li> <li>• Identify water quality issues and seek to address by employing BMPs and with the assistance of partners and other agencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Seek acquisition of 10,000 acre-feet of additional water and/or operating funds for water for the Snobird and Arena Plains units and 18,000 acre-feet of additional water for the Merced, San Luis and West Bear Creek units.</li> <li>• Water management allocations would focus on providing a higher percentage of permanent and semi-permanent water during Level 2 water supply years, rather than primarily supporting seasonal moist soil water management goals.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>

<b>Resource</b>	<b>Alternative A Current Program (No action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Grassland Management</b>	<ul style="list-style-type: none"> <li>• Manage over 24,000 acres of grassland habitats using grazing, prescribed burning, mowing, seeding, planting and chemical control to provide both short (10,000+ acres) and long (10,000+ acres) structured grasslands to provide nesting habitat and winter foraging habitat for migratory birds and other wildlife.</li> <li>• Focus on the maintenance and restoration of native grasses and forbs.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Reconfigure tall grassland management units to maximize nesting habitats around suitable waterfowl brood wetland units and short grassland management units for geese, cranes and curlews.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>
<b>Cropland Management</b>	<ul style="list-style-type: none"> <li>• Manage 750 acres of croplands (corn, winter wheat and irrigated pasture) at the Merced NWR for cranes, geese and other wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Riparian Woodland Management</b>	<ul style="list-style-type: none"> <li>• Maintain existing 300 acres of riparian woodland habitats for wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Restore 100 acres of additional riparian woodland habitats along suitable waterways.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>
<b>Vernal Pool Management</b>	<ul style="list-style-type: none"> <li>• Manage vernal pool habitats through grazing and fire as needed to maintain/restore vernal pool vegetative communities to benefit wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Inventory all vernal pool habitats including flora.</li> <li>• Restore the vernal pool habitats on the 1,700-acre Snobird unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>
<b>Aquatic Habitat Management</b>	<ul style="list-style-type: none"> <li>• Protect and manage aquatic habitats for fish and wildlife to eliminate or minimize artificial disturbances to these areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Inventory and categorize these habitats on the Complex.</li> </ul>

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Land Acquisition</b>	<ul style="list-style-type: none"> <li>Review the approved acquisition boundaries for the San Luis and Merced NWRs and modify as needed and pursue fee-title acquisition from willingsellers.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Prioritize parcels with wetland habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except focus acquisitions to increase connectivity of wildlands to benefit wildlife, and:</li> <li>Shift 20 percent of easement acquisition acres to fee-title acres within the Grasslands WMA acquisition boundary to prioritize parcels with wetland and vernal pool habitat</li> </ul>
<b>Migratory Bird Management</b>	<ul style="list-style-type: none"> <li>Identify key trust species for management emphasis.</li> <li>Ensure robust use of the Complex by managing wetlands, grasslands and croplands with a focus on autumn through spring use.</li> <li>Provide 60 percent of the refuges' land base as disturbance-free sanctuary areas at the Complex.</li> <li>Implement the wildlife disease management plan.</li> <li>Protect all colonial nesting waterbird breeding sites from disturbance.</li> <li>Maintain suitable island and peninsulas in wetland units for waterbirds and maintain 20 percent of the wetlands' shorelines in an open condition.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Research and/or monitor migratory bird use of variety of habitats at the Complex to assist in directing management activities.</li> </ul>
<b>Ungulate Management</b>	<ul style="list-style-type: none"> <li>Monitor tule elk abundance and work with the State to control numbers per agreement.</li> <li>Continue the cooperative program with the State to manage black-tailed deer within the Complex.</li> <li>Implement the Complex's Chronic Wasting Disease Plan if CWD is detected.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Monitor black-tailed deer abundance.</li> <li>Examine the potential for expanding the range of tule elk and other ungulates at the Complex.</li> </ul>

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Other Wildlife Management</b>	<ul style="list-style-type: none"> <li>• Monitor and manage to maintain all resident native wildlife (as well as migratory species other than birds) at the Complex for all habitat types. Provide disturbance-free areas at the Complex for these species.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Fisheries Management</b>	<ul style="list-style-type: none"> <li>• Identify key trust fish species for management emphasis.</li> <li>• Protect waterways from artificial disturbance and maintain riparian vegetation along all waterways.</li> <li>• Maintain water in all permanent waterways.</li> <li>• Work with partners to inventory and monitor fish communities on the Complex.</li> <li>• Support the salmon restoration efforts for the San Joaquin River and the removal of non-native fish.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Restore riparian vegetation where needed.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>
<b>Fire Management</b>	<ul style="list-style-type: none"> <li>• Suppress all wildfires.</li> <li>• Maintain two heavy and two light engines.</li> <li>• Focus fuel projects on a 5- to 10-year cycle, or more frequently if needed for invasive plant control or other resource reasons.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, except:</li> <li>• Focus fuel projects on wetland habitats.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Invasive Species Management</b>	<ul style="list-style-type: none"> <li>• Eliminate or minimize invasive species from the Complex.</li> <li>• Reduce populations of perennial pepperweed, giant reed, smallflower tamarisk, alligator weed, yellowstar thistle, water hyacinth, salt cedar and other nuisance species.</li> <li>• Reduce the abundance of non-native annual grass species from Complex grasslands.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, except:</li> <li>• Emphasize invasive species impacting wetland habitats, primarily perennial pepperweed and poison hemlock. Under this alternative, upland invasive management of species such as yellow star thistle, stinkwort and Russian thistle would receive lower prioritization.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Develop a baseline monitoring program of invasive plant species and a rapid assessment and control program for new invasive species.</li> </ul>
<b>Mosquito Management</b>	<ul style="list-style-type: none"> <li>• Work with local and state mosquito control agencies as allowed by FWS policy to address refuge mosquito issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>

<b>Resource</b>	<b>Alternative A Current Program (No action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Monitoring &amp; Inventory</b>	<ul style="list-style-type: none"> <li>• Develop and maintain the species catalog for the Complex.</li> <li>• Maintain existing geographic information systems (GIS) layers, including boundaries, management units, grassland management units, fireperimeters, wetlands and water infrastructure.</li> <li>• Maintain and update monitoring of waterbird use of seasonal wetlands, vegetation of seasonal wetlands, the tule elk population, sandhill cranes, non-passerine use of grasslands, goose use of croplands, colonial waterbird nesting, tricolored blackbird nesting, water monitoring, annual one hour fuel production, weather, invasive plant occurrence on the Lonetree unit and tuleelk enclosure, habitat management activities and other monitoring required on as-needed basis.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Obtain more detailed GIS layers, particularly for vegetation in a useful management format (baseline layer).</li> <li>• For grassland habitats, explore appropriate habitat/vegetation classification schemes for and develop GIS layer.</li> <li>• Inventory and develop GIS layer for all vernal pools and associated vegetative communities.</li> <li>• Develop permanent breeding bird survey routes, black-tailed deer monitoring and permanent grassland monitoring plots.</li> <li>• Conduct periodic monitoring of small mammals, mid-sized mammals and other wildlife.</li> </ul>
<b>Cultural Resources</b>	<ul style="list-style-type: none"> <li>• Comply with cultural resource mandates and inventory and protect known cultural resources.</li> <li>• Coordinate with Tribes on cultural resource issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Facilities &amp; Equipment</b>	<ul style="list-style-type: none"> <li>• Track, maintain and protect all real property, equipment and infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Repair water supply infrastructure, such as wells and lifts on Snobird unit, and modernize and add a fish screen to the East Bear Creek Pumping Plant. Remove obsolete infrastructure and install a solar array to supplement power to wells.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B.</li> </ul>

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Law Enforcement</b>	<ul style="list-style-type: none"> <li>• Utilize the region’s law enforcement program.</li> <li>• Staff one patrol captain and four full-time Federal wildlife officers assigned to the Central California Patrol Zone.</li> <li>• Coordinate activities with other local, state and Federal law enforcement and public resource officials.</li> <li>• Conduct year-round refuge patrols for resource and visitor protection.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Staff one additional full-time officer.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>• Implement Complex Safety Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>



**Goal 2 (Threatened and Endangered Species)—Contribute to the recovery of threatened and endangered species as well as the protection and management of populations of endemic Central Valley wildlife and special status/rare species of wildlife, plants and habitats. (Merced and San Luis NWRs)**

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Grassland-Dependent Threatened &amp; Endangered Species</b>	<ul style="list-style-type: none"> <li>• Aid in the recovery and protection of grassland-dependent threatened and endangered species, including the San Joaquin kit fox, Fresno kangaroo rat, short-nosed kangaroo rat and blunt-nosed leopard lizard.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Riparian Woodland/Wetland-Dependent Threatened &amp; Endangered Species</b>	<ul style="list-style-type: none"> <li>• Aid in the recovery and protection of riparian woodland/wetland-dependent threatened and endangered species, including the giant garter snake, least Bell’s vireo, yellow billed cuckoo, willow flycatcher, riparian brush rabbit and valley elderberry longhorn beetle.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Establish and maintain a translocated population of riparian brush rabbit on San Luis NWR.</li> </ul>
<b>Vernal Pool-Dependent Threatened &amp; Endangered Species</b>	<ul style="list-style-type: none"> <li>• Aid in the recovery and protection of vernal pool-dependent threatened and endangered species, including several vernal pool invertebrates, California tiger salamander, hairy Orcutt grass and Colusa grass.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Aquatic Habitat-Dependent Threatened &amp; Endangered Species</b>	<ul style="list-style-type: none"> <li>• Aid in the recovery and protection of threatened and endangered fish, including Chinook salmon and steelhead trout.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>State of California Listed Species</b>	<ul style="list-style-type: none"> <li>• Protect and enhance populations of state-listed species at the Complex, including greater sandhill crane, Swainson’s hawk, tricolored blackbird, bald eagle, bank swallow and delta button celery.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, with a focus on wetland-dependent species.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Special and/or Rare Central Valley Endemic Species</b>	<ul style="list-style-type: none"> <li>• Aid in the protection and increase of special and or rare Central Valley endemic species, including coastal horned lizard, Heermann’s kangaroo rat, yellow-billed magpie and tule elk.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Actively maintain and/or restore habitat for these species, including young robust emergent stands and stands of coarse forbs, iodine bush dominated grasslands, old dune/sandy soil sites, thatch-free grasslands and tussock-dominated grasslands.</li> </ul>

**Goal 3 (Ecological Processes, Ecosystem Management and Partnerships)—Maintain and/or restore natural ecological processes to promote healthy, functioning ecosystems for wildlife on Complex lands. Coordinate the natural resource management of the Complex’s natural resources within the larger context of the Central Valley/San Francisco Ecoregion and Pacific Flyway. (Merced and San Luis NWRs)**

<b>Resource</b>	<b>Alternative A Current Program (No action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Inventory &amp; Monitoring</b>	<ul style="list-style-type: none"> <li>Coordinate and participate in landscape inventory and monitoring programs for wildlife and habitat with other agencies and partners.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Prioritize wetlands and wetland-dependent wildlife first.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Water Issues</b>	<ul style="list-style-type: none"> <li>Work with other agencies and groups, including water districts, to improve water quality and quantity in the ecoregion.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Seek additional water resources for Complex units without adequate water for natural resource management.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative B.</li> </ul>
<b>Connectivity &amp; Habitat Protection</b>	<ul style="list-style-type: none"> <li>Coordinate and participate with other agencies and partners to enhance connectivity among wildlands and increase habitat parcel size.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Focus efforts on wetlands and wetland-dependent wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Landscape Management &amp; Restoration Efforts</b>	<ul style="list-style-type: none"> <li>Coordinate habitat and wildlife management activities at the Complex with other land management agencies and entities.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Focus efforts on wetlands and wetland-dependent wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Climate Change</b>	<ul style="list-style-type: none"> <li>Assess potential trends and impacts to Complex natural resources from climate change.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Prioritize trends and impacts to water and wetland resources.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>

<b>Resource</b>	<b>Alternative A Current Program (No action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Ecological Processes</b>	<ul style="list-style-type: none"> <li>Identify key ecological processes (trophic patterns, nutrient cycling, hydrology, fire, keystone species effects, fragmentation and isolation, biological movement, local extirpation, natural landscape size, colonization potential for native and non-native species, etc.) and their current status and potential for protection and/or restoration.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Focus on wetland and aquatic systems.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Contaminants</b>	<ul style="list-style-type: none"> <li>Document and identify contaminant issues within the Complex.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Focus on water and wetland issues.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Revisit past contaminant issues for updates and trends.</li> </ul>
<b>Land Acquisition</b>	<ul style="list-style-type: none"> <li>Work with partners and other agencies within the ecoregion to acquire important wildlands or their protection from willing sellers for the benefit of wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Focus on wetland habitats.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Fire Management</b>	<ul style="list-style-type: none"> <li>Assist with the coordination of wildfire suppression efforts on wildlands within the San Joaquin Valley and surrounding foothills region.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Law Enforcement</b>	<ul style="list-style-type: none"> <li>Partner with and coordinate natural resource law enforcement within the San Joaquin Valley.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Research</b>	<ul style="list-style-type: none"> <li>Partner and encourage university, agency and independent investigators to use the Complex for natural resource research projects.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Develop a list of research priorities for the Complex and seek partners/funding to implement projects.</li> </ul>
<b>Adaptive &amp; Science-Based Management</b>	<ul style="list-style-type: none"> <li>Conduct Complex operations using adaptive management and based on the best available science.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Improve the Complex’s abilities to access and share natural resource science and access to its own natural resource databases and planning documents.</li> </ul>

**Goal 4 (Public Use)—Provide the public with opportunities for compatible, wildlife-dependent recreation and other uses to enhance understanding, appreciation and enjoyment of natural resources on Complex lands. (Merced and San Luis NWRs)**

Resource	Alternative A Current Program (No Action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Wildlife Observation &amp; Photography</b>	<ul style="list-style-type: none"> <li>• Provide public opportunity for wildlife observation and nature photography by providing four auto-tour routes, eight nature trails, and six observation decks.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Construct an approximately one-half-mile riparian woodland nature trail near the visitor center.</li> <li>• Add additional 400-foot boardwalk section to wetland nature trail at the San Luis NWR.</li> <li>• Hold wildlife identification and nature photography workshops at the visitor center.</li> <li>• Add more easily accessible photo/observation blinds at both San Luis and Merced NWRs.</li> </ul>
<b>Nature Interpretation</b>	<ul style="list-style-type: none"> <li>• Provide the public opportunities for nature interpretation by maintaining seven information kiosks, interpretive signs along auto-tour routes and nature trails, exhibit hall and visitor center.</li> <li>• Provide staffed periodic nature interpretive programs to the public.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Implement a program of weekend guided nature walks.</li> <li>• Develop a children’s nature exploration area outside the visitor center.</li> <li>• Develop an evening lecture program at the visitor center.</li> <li>• Develop a cadre of volunteers to assist with nature interpretation programs and other activities.</li> <li>• Develop different media types for public nature interpretation.</li> </ul>

<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Hunting</b>	<ul style="list-style-type: none"> <li>• Provide a diversity of waterfowl hunting opportunities for sportsmen by offering free roam, exclusive free roam, hunt blinds, goose pits, boat hunting and blinds for sportsmen with mobility impairments.</li> <li>• Coordinate the hunt program with the State.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Fishing</b>	<ul style="list-style-type: none"> <li>• Provide fishing opportunities to the public by providing six designated fishing sites (including a site for anglers with mobility impairments) at Salt Slough on the San Luis NWR.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Improve accessibility of complex observation decks and fishing piers.</li> </ul>
<b>Environmental Education</b>	<ul style="list-style-type: none"> <li>• Develop and provide environmental education programs from the visitor center facility with an emphasis on San Joaquin Valley wildlife and habitats, the Complex and the National Wildlife Refuge System.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Develop teacher resource packets and guides.</li> <li>• Partner with local colleges and universities to provide students to conduct environmental education programs.</li> </ul>
<b>Outreach</b>	<ul style="list-style-type: none"> <li>• Provide outreach to the public concerning the Complex, natural resources in the ecoregion and the National Wildlife Refuge System by hosting special events at the Complex and participating in off-Complex events.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, but:</li> <li>• Significantly increase the number of events and employ different media types for public outreach.</li> </ul>
<b>Public Safety</b>	<ul style="list-style-type: none"> <li>• Ensure safe conditions at all visitor facilities at the Complex and adequate law enforcement is available.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Monitor Public Use</b>	<ul style="list-style-type: none"> <li>• Monitor and track visitor use of refuge lands, including the six priority public uses.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>

**Goal 5 (Wildlife Conservation Easement Management)—Manage the U.S. Fish and Wildlife Service’s easement program (Grasslands Wildlife Management Area) on private lands for the benefit of wildlife and explore the potential for additional wildlife easements from willing sellers within the approved easement acquisition boundary. (Grasslands WMA)**

<b>Resource</b>	<b>Alternative A Current Program (No action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity Focus (Proposed Action)</b>
<b>Easement Management</b>	<ul style="list-style-type: none"> <li>• Monitor all easement lands annually for easement compliance and maintain easement databases.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>
<b>Easement Inventory</b>	<ul style="list-style-type: none"> <li>• Maintain easement inventories in a GIS format.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Develop a GIS habitat layer for easements.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative B, and:</li> <li>• Develop a GIS layer of trust resources for easements.</li> </ul>
<b>Easement Land Acquisition Priorities</b>	<ul style="list-style-type: none"> <li>• Prioritize potential easement acquisitions from willing private landowners by wetlands, native uplands and trust wildlife resource values.</li> </ul>	<ul style="list-style-type: none"> <li>• Prioritize potential easement acquisitions from willing private landowners by wetlands and trust wildlife resource values.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, but:</li> <li>• Prioritize acquisitions by connectivity of land parcels to benefit wildlife.</li> </ul>
<b>Easement Land Acquisitions</b>	<ul style="list-style-type: none"> <li>• Acquire wildlife conservation easements in current approved acquisition boundary of the remaining 37,905 acquisition acres from willing private landowners.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Seek additional funding and funding sources for easement acquisitions.</li> <li>• Shift 20 percent (7,580 acres) of easement acquisition acres to fee-title authority.</li> </ul>
<b>Technical Assistance to Easement Owners</b>	<ul style="list-style-type: none"> <li>• Provide technical assistance to private landowners on easement issues and natural resource issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, except:</li> <li>• Prioritize wetland projects and issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative A, and:</li> <li>• Promote landowner workshops on wetland management, waterfowl management, water conservation and grassland management.</li> </ul>

Resource	Alternative A Current Program (No action)	Alternative B Wetland & Waterbird Focus	Alternative C Biodiversity Focus (Proposed Action)
<b>Habitat Projects—Partners for Fish Wildlife Program</b>	<ul style="list-style-type: none"> <li>Implement Partners for Fish and Wildlife habitat restoration and enhancement projects on easement lands.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, except:</li> <li>Prioritize wetland projects and issues.</li> <li>Increase the number of projects by adding a second private lands biologist.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Increase the number of projects by adding a second private lands biologist.</li> </ul>
<b>Habitat Projects—Other Programs</b>	<ul style="list-style-type: none"> <li>Implement through other programs, when feasible, habitat restoration and enhancement projects on easement lands.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Prioritize wetland projects and issues.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A, and:</li> <li>Seek additional funding sources for habitat projects on easement lands.</li> </ul>
<b>Fire Management</b>	<ul style="list-style-type: none"> <li>Complex fire program resources support local fire resources in suppressing wildfires on easement lands.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>
<b>Law Enforcement</b>	<ul style="list-style-type: none"> <li>Complex law enforcement program resources support California Department of Fish and Game in public safety and enforcing natural resource laws on easement lands.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative A.</li> </ul>



## **Chapter 3. Affected Environment**

A detailed description of the affected environment (physical, biological, and social and economic environments) is provided in Chapter 3 of the CCP.



## **Chapter 4. Environmental Consequences**

Chapter 4 provides an analysis and evaluation of the direct, indirect and cumulative effects of implementing each of the alternatives described in Chapter 2. Avoidable and unavoidable adverse impacts, along with all proposed mitigation measures, are presented for each aspect of the environment, including the physical, biological and social environment. The current conditions of the resources are fully described in Chapter 3 of the CCP.

The environmental consequences analysis describes the effects of three alternatives, as defined in Chapter 2: Alternative A (No Action), Alternative B (Wetland and Waterbird Focus) and Alternative C (Proposed Action). Alternative A assumes the continuation of current management conditions 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 resource, 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 Complex relative to current management regimes (i.e., no action, Alternative A).

Cumulative effects for each alternative are presented at the end of the section, along with a discussion of environmental justice concerns. 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, supporting planning studies and educational and outreach activities. Generally, these types of activities do not result in any direct physical impacts; therefore, they are not analyzed in this chapter.

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 (EIS) by decisionmakers. Furthermore, this analysis aids decisionmakers in identifying mitigation measures for avoiding, minimizing, rectifying or reducing impacts over time, or compensating for adverse effects identified through the NEPA process. The Service also applies management practices as an integral part of the proposed action in order to avoid or minimize certain effects that would have otherwise occurred. For example, as part of site-specific permits and regulatory requirements, the Service applies site-specific management practices 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 stipulations included under Compatibility Determinations in Appendix C of the CCP). Furthermore, the Service will develop project-specific permit conditions outlined in Special Use Permits or other agreements to further reduce adverse effects from wildlife-dependent recreational use of the Complex. The potential benefits associated with these management practices, to include the stipulations developed as part of Compatibility Determinations, are already incorporated into the characterization of environmental effects

presented for each alternative as appropriate. See Appendix C of the CCP for a description of the stipulations to be implemented by the Service as part of the proposed action.

For determining direct, indirect and cumulative impacts, the Service defers to the Council on Environmental Quality regulations in 40 CFR 1501.3. Significance determinations 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 Complex and those areas immediately surrounding these refuges (typically the areas within Merced County). *Intensity* in this context refers to consideration of the severity of the effect, 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.

## **Summary of Effects**

Table 4-1 presents a summary of the effects to resources at the Complex from implementing the three alternatives. Resource specific effects are described in Sections 4.1.1 through 4.1.12.

**Table 4- 1. Summary of Environmental Effects for Each Alternative.**

<b>Physical Environment</b>			
<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity &amp; Visitor Services Focus (Proposed Action)</b>
<b>Geology and Soils</b>	Minor short-term adverse effects on soils and no adverse effects on geologic resources. Habitat and fire management practices would temporarily expose soils to erosion. Long-term net beneficial effects to soils would occur from habitat management efforts.	Minor short-term adverse impact from vegetation clearing for habitat management and restoration projects as compared to Alternative A. Long-term net beneficial effects to soils would occur from habitat management efforts as compared to Alternative A.	Similar to Alternative B. Minor long-term impact of less than two acres from vegetation clearing and soil displacement for construction of additional 400-foot boardwalk section to the wetland trail, the construction of the approximately one-half-mile riparian trail and the construction of the children’s nature play area adjacent to the picnic pavilion.
<b>Air Quality</b>	Minor adverse impact due to particulate emissions from prescribed fire and pile burning. In addition, vehicle emissions would continue from management efforts, volunteer activities and public visitation.	Minor beneficial impact from reduced prescribed fire emissions as compared to Alternative A.	Minor adverse impact from increased emissions from construction actions and slight increases in vehicle emissions from increased public visitation as compared to Alternative A. Prescribed fire emissions would be the same as Alternative A. Overall, impacts would be more adverse than Alternative B due to increased restoration, management and visitation.
<b>Noise</b>	Minor negative impact from vehicle and equipment access through local areas.	Negligible impacts would occur as compared to Alternative A.	Similar to Alternative B. Average noise levels from increased visitation would be imperceptible.
<b>Water</b>	Long-term moderate negative impact to water supply and hydrology from quantity and quality deficiencies.	Moderate positive impact on water supply and hydrology from acquisition of additional water and operating funds as compared to Alternative A.	Similar to Alternative B.

**Biological Environment**

<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity &amp; Visitor Services Focus (Proposed Action)</b>
<b>Vegetation</b>	Overall, long-term minor positive impact on native vegetation as a result of intensive habitat management regime and ongoing adaptive management. Long-term minor benefit from prescribed burns and mechanical fuel treatments to reduce the risk of more severe wildfires. Localized management including herbicide application would result in localized, short-term adverse effects to vegetation. Minor negative impacts on vegetation due to nutria trapping and monitoring would be offset by the overall net positive effect to vegetation from nutria eradication.	Long-term moderate positive impacts on wetland vegetation as compared to Alternative A from pursuing additional water supplies; habitat restoration; more frequent moist soil disturbance regime; additional staff; and focusing management and research regimes on wetland objectives. Some species in certain areas may experience minor negative short-term or localized impacts from habitat manipulation, herbicide application and trampling. Potential minor long-term adverse impacts on some species from diverting limited management resources away from upland and riparian habitats.	Long-term moderate positive impacts as compared to Alternative A from pursuing additional water supplies; habitat restoration; invasive species rapid assessment and control program; nutria eradication, additional staff; additional easement acquisition funding; inventory and monitoring; and collaborative research partnerships. Some species and areas may experience short-term, localized adverse impacts from the construction of visitor amenities and habitat manipulation, herbicide application and trampling. Long-term minor adverse impacts from increased visitation. Overall, net impact on vegetation biodiversity would be slightly more positive as compared to Alternative B.

<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity &amp; Visitor Services Focus (Proposed Action)</b>
<b>Wildlife Resources</b>	Moderate long-term positive impact to wildlife diversity and populations as a result of the adaptive nature of intensive habitat management (e.g., disking, grazing, chemical treatments, mowing fuels management, invasive species control). Minor short-term negative impacts on non-target wildlife due to nutria trapping efforts. Benefits provided by intensive management outweigh potential minor short-term adverse impacts.	Moderate long-term positive impacts to wildlife diversity and populations as compared to Alternative A. Long-term moderate positive impact to wetland wildlife diversity and populations from additional water supplies; more frequent seasonal wetland disturbance regime; additional habitat restoration; additional staff; and an increased focus of management and research on wetland habitat objectives. Moderate positive impact on nesting waterfowl from reconfiguring tall grassland units adjacent to wetland management units. Short-term minor adverse impact on some species from increased frequency of disturbance, herbicide applications, fuels management, nutria trapping and human activity associated with wetland habitats. Long-term minor adverse impact to habitat quality for upland species in specific areas from reduction in fuels management and invasive species control. Moderate long-term impact to seasonal wetland-dependent species in winter months.	Moderate long-term positive impacts to wildlife diversity and populations as compared to Alternative A. Overall, impacts are more positive than Alternative B. Long-term positive impact to wildlife diversity and populations from additional water supplies; habitat restoration; invasive species rapid assessment and control program; additional staff; riparian brush rabbit translocation; additional landowner workshops; reconfiguration of tall grassland units adjacent to wetland units; expanded public education and outreach; enhanced monitoring and research partnerships; and pursuing additional land acquisitions. Potential short-term minor adverse impact from construction of additional visitor amenities and human activity associated with restoration, herbicide applications, fuels management and nutria trapping. Potential long-term minor adverse impact from increased wildlife-dependent recreation opportunities.

<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity &amp; Visitor Services Focus (Proposed Action)</b>
<b>Special Status Species (SSS)</b>	Minor positive impacts to SSS from intensive habitat management regime to eradicate invasive species, enhance native habitat diversity and reduce risk of severe wildfire.	Moderate long-term positive impact to vernal pool obligate SSS within Snobird unit from the restoration of natural vernal pool complex hydrology as compared to Alternative A. Moderate positive impact on riparian nesting avian SSS from the restoration of an additional 33 percent of existing riparian wetlands. Potential indirect minor benefits to wetland-dependent SSS from prioritization of management, inventory and research capabilities on wetland related objectives. Potential for minor short-term localized adverse impact to SSS from restoration activities, although management practices would reduce this potential.	Moderate long-term positive impacts to SSS as compared to Alternative A. Overall, impacts to SSS are more positive than Alternative B. Moderate long-term positive impacts to Central Valley endemic species from expanded management regime to promote/maintain suitable habitats. Moderate long-term positive impacts to both vernal pool obligate SSS and riparian nesting avian SSS as a result of habitat restoration. Moderate benefits to SSS recovery from improved adaptive management capabilities; invasive species rapid assessment and control program; expanded research partnerships; and improved data collection. Potential for minor short-term localized adverse impacts to SSS from restoration activities and expanded research, visitor and volunteer programs, although management practices, would reduce this potential.



**Socioeconomic Environment**

<b>Resource</b>	<b>Alternative A Current Program (No Action)</b>	<b>Alternative B Wetland &amp; Waterbird Focus</b>	<b>Alternative C Biodiversity &amp; Visitor Services Focus (Proposed Action)</b>
<b>Socioeconomics</b>	Minor positive impact. Staff and expenditure levels would remain the same, and the Complex would operate at current levels.	Minor positive impact to the local economy as compared to Alternative A from increased recreational opportunities of the Complex and visitors, increased expenditures and staffing changes.	Minor positive impact as compared to Alternative A from increased recreational opportunities, added facilities, staffing and expenditures. Minor positive impact as compared to Alternative A and B from increased acquisition flexibility and payments associated with acquiring lands as either fee title or easement in Grasslands WMA. Overall, impacts are more positive than Alternative B.
<b>Public Use</b>	No change in public access and outreach programs. The Complex would continue to provide positive wildlife-dependent recreational opportunities for the public through informative outreach, wildlife photography and observation, and permitted hunting and fishing programs.	Negligible indirect impact from enhancing habitat quality as compared to Alternative A.	Moderate positive impact as compared to Alternative A from increased visitor access, expanded outreach, volunteer opportunities, visitor amenities and habitat quality. Overall, impacts to the public are more positive than Alternative B.
<b>Cultural Resources</b>	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 would be minimized through cultural resources reviews and surveys, as required.	Minor negative impact to yet unidentified sites as compared to Alternative A due to human activity and management resulting in potential for disturbance of unknown cultural resources. Any future impacts would be minimized through cultural resources reviews and surveys, as required.	Minor negative impact from soil disturbance and increased public access (expanded wildlife observation opportunities, tour groups/ volunteers) as compared to Alternative A resulting in potential for disturbance of unknown cultural resources. Impacts would be minimized through cultural resources reviews and surveys, as required.
<b>Environmental Justice</b>	No impact.	Same as Alternative A—no impact.	Same as Alternative A—no impact.

## Physical Environment

### Geology and Soils

#### *Common to All Alternatives*

Under all alternatives, the Complex's use of pesticides would have a minor adverse impact on soils. The Complex itself utilizes Service-approved pesticides and treats approximately 2,350 acres annually. Herbicide usage is expected to remain similar in the future under each of the Alternatives. Ninety percent of the pesticides have the active ingredient glyphosate.

Glyphosate rapidly and strongly adheres to soil and degrades, especially in areas with high organic content; thus, little is transferred by rain or irrigation water, and it would have minute leaching potential from applied areas (Sauve and Parker 2005). One estimate showed less than 2 percent of the applied chemical was lost to runoff (USFWS 1984). The herbicide could move when attached to soil particles in erosion runoff. The Complex would employ management practices such as maintaining unsprayed buffer areas in accordance with label recommendations near aquatic habitats and other sensitive areas. In soils, glyphosate readily decomposes through microbial degradation, and is relatively non-persistent in soils with a half-life of fewer than 60 days (Cornell University 2012). Glyphosate is practically nontoxic to soil invertebrates (earthworm [*Eisenia foetida*] LC50 > 110,000 mg/kg dry soil) and is broken down naturally by microorganisms (Tu et al. 2001; Monsanto 2008). It also dissipates rapidly from natural water bodies through adsorption to organic substances and inorganic clays, microbial degradation and dilution. Due to glyphosate's aforementioned characteristics, application would only have short-term minor adverse effect on soils.

Small quantities of five other registered herbicides—triclopyr triethylamine, aminopyralid, chlorsulfuron, clopyralid and 2,4-D dimethylamine (DMA)—would be selectively applied to treat another 1,450 acres of the Complex. All of these herbicides are applied in accordance with the label, are commonly used for invasive species control and are not persistent in the environment. Under most environmental conditions, the field half-life for these herbicides range from 0.2 days to 26 days (USFS 2004a,b; 2006; 2007; 2011a,b). These herbicides would be applied in upland areas and/or dry habitat for seasonal wetlands and with sufficient buffer from riparian and aquatic habitat, thereby reducing the potential for soil erosion transport. Furthermore, the Service will spray only when special permits (e.g., National Pollutant Discharge Elimination System [NDPES] permits) are not required. All chemical treatments would be reviewed and approved through the Service's Pesticide Use Proposal system to identify target species, application rates, timing, method, and implementation measures and to minimize potential adverse impacts to native species and sensitive habitats. Given these characteristics and management controls, the application of herbicides is considered to have only a minor adverse effect on soils in the short term.

#### *Alternative A—No Action*

Continuation of current Complex management practices would have overall short-term minor adverse effects and long-term positive effects on soils. There would be no adverse effects on

geologic resources. The Complex would continue to manage over 5,500 acres in 110+ units as seasonal wetlands, over 24,000 acres of grassland habitats, 750 acres of croplands, 200 acres of riparian woodland habitat and moist soil units. Maintenance activities can involve vegetation clearing, mowing and disking, which would continue across the Complex for habitat management, maintaining firebreaks, invasive species removal and road/trail maintenance. Such maintenance actions would result in temporary and localized exposure of erodible soils to water and wind erosion. In addition, vehicular access for maintenance, monitoring 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. Similarly, public use may also result in soil compaction and oil release from private vehicles, as wildlife viewing, fishing, hunting, photography and environmental education are all popular activities at the Complex. For instance, parking or driving vehicles outside of designated areas can damage or destroy sensitive riparian vegetation and cause stream bank erosion and compact soil. However, public use and access are only permitted in designated areas; therefore, effects would be localized in these areas. These negative impacts would also be minimized as the Complex is monitored by staff and law enforcement officers. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy and management practices (e.g., installation of silt fences to reduce runoff) would reduce potential adverse effects to soils. Overall, these activities would result in minor adverse effects to soils.

Prudent utilization of prescribed fire would have a long-term positive effect on soil. The Complex would focus on the prevention of wildfires and conduct fuel projects on a 5- to 10-year cycle or more frequently, if needed. If wildfires were to occur sporadically or frequently, this may create a long-term negative effect as soil particles become water-repellant, causing rainwater to run off and create erosion. On the other hand, prescribed fires may be beneficial because soil can become more nutrient-rich after a fire due to the high mineral content of the ash and charcoal and from the warm, moist conditions that increase microbial activity. As plants mature, an increasing proportion of nutrients are reserved in the vegetation and are unavailable until plants die and decompose. Low-intensity fires speed up this recycling process, returning nutrients back to the soil. Under many conditions, prescribed fires may increase nitrogen fixation in the soil and thus compensate for nitrogen loss to the atmosphere that results from burning the litter layer.

Prescribed fires would not cause changes in the structure of mineral soil because the elevated temperatures are of brief duration. Fires can reduce the numbers of soil organisms, but invertebrates have been found to recover quickly following lower intensity burns. Overall, through prescribed fire management, the Complex can influence and enhance soil quality and minimize the negative effects of unintentional, higher-intensity wildfires.

### ***Alternative B—Wetland and Waterbird Focus***

Under Alternative B, there would be overall short-term minor adverse effects and long-term positive effects on soils. There would be no adverse effects on geologic resources. Under Alternative B, more intensive habitat restoration and management would be implemented, as compared to Alternative A, which would result in additional minor adverse impacts to soils. Restoration, reconfiguration and maintenance efforts from equipment and vehicular access would

result in temporary and localized exposure of erodible soils to water and wind erosion, localized compaction of soils, and potential for small releases of oils grease and petroleum products. In the long-term, however, these efforts produce an overall net positive effect as soil processes within the areas that would be restored. These soil processes are particularly important as soil organic matter, cation exchange capacity, and other properties are directly linked to healthy habitats and wetland functions. For example, under Alternative B, the Complex would manage moist soil units with a 6-year disturbance cycle as opposed to the 8-year disturbance cycle in Alternative A. This would result in about a 30 percent increase in the frequency of soils being disturbed, which would accelerate release of nutrients to the soils and enhance wetlands restoration efforts. On the other hand, the increase in disturbance would result in short-term minor adverse effects by increasing the potential for soil erosion and loss.

The Complex's use of prescribed fire would have a positive effect on soil quality in the long term; however, focusing fuel projects on wetlands would result in fewer benefits to the entire Complex as compared to Alternative A. Wetland habitats have a higher rate of soil moisture than chaparral and other types of upland habitat (USFS, 1997). Prescribed fire in wetland habitats would generally burn with lower intensity; thus, results of fire are less effective. However, prescribed fire on moist soils would still be beneficial because soil can become more nutrient-rich due to high mineral content of ash and charcoal. Prescribed burning can facilitate recycling of nutrients, increased microbial activity, and decomposition. Properly timed fires would result in little change in the soil moisture conditions (Kansas State University 2000) and soil invertebrates quickly recover. Through prescribed fire management, the Complex can influence soil characteristics quality while avoiding the negative effects of unintentional wildfires.

### ***Alternative C—Preferred Alternative***

Alternative C would have overall short-term minor adverse effects and long-term positive effects on soils similar to those discussed for Alternative B due to habitat management activities.

Overall, restoration, reconfiguration and maintenance efforts from equipment and vehicular access would result in temporary and localized exposure of erodible soils to water and wind erosion, localized compaction of soils, and potential for small releases of oils grease and petroleum products from equipment and private vehicles. There would be no adverse effects on geologic resources. There would be additional minor short-term adverse effects on soils due to implementing minor construction projects under Alternative C (e.g., one-half-mile riparian woodland nature trail, children's exploration area, additional 400-foot boardwalk section of the wetland nature trail at the San Luis NWR, additional observation blinds), which would result in ground-disturbing activities covering less than two acres. Additional public use amenities may also increase public visitation, which may also result in additional soil compaction and disturbance relative to Alternatives A and B. Furthermore, Alternative C would employ the same fire management approach as Alternative A, resulting in similar minor beneficial and adverse effects described for Alternative A. Overall, there would be minor short-term localized adverse impacts to soil from implementing Alternative C relative to Alternative A due to habitat management and minor construction projects, but long-term net beneficial effects.

## **Air Quality**

The Complex is located in Merced County, California, which is within the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAPCD is in non-attainment status for Federal ozone (8 hour) and particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) (SJVAPCD 2018).

### ***Alternative A—No Action***

Minor adverse impacts to air quality would continue under Alternative A. The Complex would continue to manage wetlands, croplands, riparian woodlands and grassland habitats, which would include the use of heavy equipment, prescribed fire and pile burning across 2,000 to 4,000 acres of habitat each year, and soil disturbing activities (disking, mowing and seeding). In addition, the Complex employs maintenance activities that disturb and expose soil, such as grading (road maintenance), vegetation clearing and other activities, which can also generate particulate emissions, especially during windy conditions. Equipment and vehicle usage for habitat management, maintenance and public use would result in air emissions in the form of gas and particulate matter emissions (PM<sub>2.5</sub>), ozone precursors (reactive organic gasses [ROG] and nitrogen oxides [NO<sub>x</sub>]) and carbon emissions, as well as release of toxic air pollutants and acidic compounds from the combustion of fossil fuels. In addition, road abrasion dust would result in increased particulate emissions. Particulate emissions within the Complex would vary based on numerous factors, including number and type of equipment, hours used, fuel type, elevation and ambient temperature at which the equipment is operated. Overall, emissions associated with vehicle trips (annual visitors to the refuges, including hunters, and Service and other support personnel) and equipment usage would be minor given the level of activity at the Complex relative to current emissions within the SJVAPCD associated with regional traffic, equipment usage and the various major point sources that operate in the region.

The Complex would employ prescribed fire and pile burning to allow continuation of a vital ecological process to improve habitat for native wildlife and reduce hazardous fuel loadings. 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. Prescribed fire and pile burning activities would be conducted in accordance with the SJVAPCD burn permits and in consideration of predetermined prescription levels, wind direction and distance from receptors to minimize effects. All prescribed fires would comply with applicable Federal, state and local laws and regulations, such as the State of California Air Quality Regulations for burning (CCR Title 17) (USFS, 2012).

### ***Alternative B—Wetland and Waterbird Focus***

Implementing Alternatives B would result in minor adverse effects to air quality. Alternative B would execute a more robust restoration program, which includes 600 acres of additional seasonal wetland basins, 100 acres of additional riparian woodland habitats and an increased number of projects related to restoration and enhancement on easement lands. These restoration activities would use additional heavy equipment and would generate additional particulate matter as well as air emissions in the form of gas and particulate matter, ozone precursors, nitrogen oxides and carbon emissions. With prescribed fire management, the Complex would focus fuel projects on wetland

habitats with fewer acres burned each year (minimum of 1,000 acres versus 2,000 acres under Alternative A). Overall, focusing habitat management in wetlands areas will reduce the use of prescribed fire, which would result in a minor reduction in air emissions relative to Alternative A.

### ***Alternative C—Preferred Alternative***

Alternative C would result in minor adverse effects to air quality. Additional management activities described for Alternative B would result in a similar minor increase in emission levels under Alternative C. In addition, the Complex proposes to construct a nature trail, use photo blinds and develop additional programs for visitors. If the projects are successful, the number of visitors may increase, thus generating increased emissions from vehicles (PM10, ROG, NOx and carbon emissions). These minor construction activities would also increase equipment usage and associated air emissions. An overall net effect from increased public use, construction and more intense restoration efforts would produce a minor adverse impact to air quality relative to current management activities under Alternative A. Furthermore, emissions under Alternative C would be slightly higher than Alternative B, given that management activities would not be focused on just wetland habitat and the additional visitor vehicle trips that may be generated from Alternative C.

## **Noise**

### ***Alternative A—No Action***

Minor adverse noise impacts to receptors residing along access roads to the Complex would occur from continued management and visitor activities under Alternative A. The general public in the vicinity of the Complex would experience negligible changes in noise due to activities associated with resource management actions at the Complex and public use such as auto tours and hunting. The two adjacent towns located northwest of the Complex, Gustine and Newman, would experience minor, varying noise levels from traffic. These noise effects are similar to levels experienced by residents from other traffic along these access roads. Sensitive receptors (i.e., schools, churches, clinics, assisted living facilities) and residences located along major access routes to the Complex would not experience any substantial differences in traffic related noise levels.

### ***Alternative B—Wetland and Waterbird Focus***

Under Alternative B, there would be a negligible increase in traffic-related noise from increased management activities for receptors residing along access roads to the Complex. The receptors may experience negligible changes in traffic-related noise during periods of increased management activity within the Complex. In any event, these changes would be negligible given the limited volume of traffic associated with Complex activity.

### ***Alternative C—Preferred Alternative***

Increased management and visitor activities under Alternative C would result in increases in local traffic, which would result in negligible increases in noise levels during certain periods for a short duration for receptors residing near access roads to the Complex. In any event, these changes would be negligible given the limited volume of traffic associated with Complex activity and visitor access. Furthermore, the average increase in the day-night sound level associated with increased traffic would be far below 3 dB (i.e., change in sound intensity if traffic levels doubled)

relative to Alternative A. This change in average daily noise intensity may be imperceptible (because sound is measured on a logarithmic scale) (EPA 1973; 1974).

Furthermore, EPA indicates that increased sound levels less than 5 dB are generally not considered significant (EPA 1973; 1974).

## **Water Availability and Water Quality**

### ***Common to All Alternatives***

Under all Alternatives, the Complex and the entire Central Valley have been experiencing drought conditions that limit the availability of water resources for managing wetlands on the Complex. This exacerbates long-term historical deficits in available acre-feet of water for maintaining high-quality wetlands habitat on the Complex. Continued increases in demand for water resources at the regional level and the effects of climate change will continue to limit available water resources at the Complex into the future. For all alternatives, the Complex would continue to implement their existing drought contingency plan (see Appendix V of the CCP) to mitigate the adverse effects of drought. The plan includes (but is not limited to) prioritizing available water allotments across the Complex both spatially and temporally to support waterfowl populations; developing alternative sources of water (e.g., increased groundwater pumping); enhancing water conservation; and reducing public access.

Under all Alternatives, the Complex's use of pesticides would have a minor adverse impact on water quality. The Complex itself utilizes service-approved pesticides and treats approximately 2,350 acres annually. Herbicide usage is expected to remain similar in the future under each of the Alternatives. Ninety percent of the pesticides have the active ingredient glyphosate.

Lead poisoning has been a chronic and significant cause of migratory bird (primarily waterfowl) mortality associated with hunting in some areas of North America. Birds ingest spent lead shotgun pellets in sediments of waterways and wetlands. The pellets are ground in their gizzards, converted to soluble form and absorbed into tissues, which can have lethal effects. Secondary poisoning of predatory birds can also occur when they feed on birds carrying lead pellets embedded in body tissues (DOI 1988). The Service has mandated the use of nontoxic shot for all waterfowl hunting since 1991 (50 CFR 20.21). In addition, the use of nontoxic shot is required for hunting mourning dove, pheasants, coots, moorhens and snipe on the refuges.

### ***Alternative A—No Action***

Continuation of the current Complex management practices would have long-term moderate adverse impacts on hydrology and quantities. Under Alternative A, there would be no change in the amount of water supplied to the Complex. The Complex estimates that additional quantities of high-quality water are required to achieve optimal management of existing wetland acreage. San Luis NWR's ideal quantity to achieve optimal management would be 65,380 acre-feet of delivered water, but the NWR only receives 50,380 acre-feet of delivered water per year, or 77 percent per annum. Merced receives 16,000 of 35,000 acre-feet of delivered water, or 45.7 percent. Finally, the Grassland Resource Conservation District, which is within the Grassland Ecological Area (GEA),

currently receives approximately 180,000 acre-feet of delivered water per annum but (similar to the San Luis and Merced NWRs) would ideally receive greater supplies of delivered water to achieve optimal management. Without strategies to augment water supplies, it may be expected that the Complex would continue to experience water shortages. Under Alternative A, conservation efforts of water quantity and quality would continue through the San Luis NWR habitat management plan, the Central Valley Project Improvement Act (CVPIA) and the assistance of partners, water districts and other agencies. Under Alternative A, the Complex would continue to operate with serious water deficits and would experience long-term moderate adverse impacts on hydrology.

The Complex would continue to operate with low-quality water supply. Water quality concerns include salinity, selenium, boron, mercury and agricultural pesticides and nutrients. The Complex's wetlands and aquatic habitats are dependent on delivered water from the Henry Miller Reclamation District (Merced County 2009). The Complex prefers the use of delivered water over well and riparian water to meet wetland habitat management needs. Delivered water is surface water supplied from the northern part of the state and does not deplete local groundwater and surface water supplies. As such, delivered water generally optimizes water quality and does not deplete groundwater and naturally occurring surface water supplies as does the use of wells and riparian water rights. The availability of delivered water quality and quantity varies significantly at different areas and times of the year. The variation in water quality is due to the delivered water mixed with lower-quality water from the Salt Slough unit (laden with higher levels of soluble salts), which produces varying water quality. The water quality also varies due to changes in the natural hydrology of the San Joaquin Valley's past and current land use practices of urbanization, severe loss of wetlands and modern agricultural practices. Under Alternative A, the Complex would continue to have low-quality water because high-quality delivered water is mixed with low-quality water from the Salt Slough unit.

#### ***Alternative B—Wetland and Waterbird Focus***

Under Alternative B, the Complex would experience an overall net positive effect on water resources as compared to Alternative A. In addition to maintenance of the 74,415 acre-feet of water, under Alternative B the Complex proposes to seek acquisition of an additional 10,000 acre-feet of water for Complex units without adequate water supply for natural resource management. In addition, the Complex would seek additional operational funds for water supply for the Snobird and Arena Plains units, and 18,000 acre-feet of additional water supply for the Merced, San Luis and West Bear Creek units. The Complex's acquisition of additional water would help alleviate the current water deficit.

Furthermore, Alternative B aims to improve long-term hydrology through habitat and wetland restoration. This alternative proposes to restore 100 acres of additional riparian woodland habitats along suitable waterways and 600 additional acres of seasonal wetland basins. In the short term, vehicle access and heavy equipment usage for the restoration would temporarily expose soils resulting in increases in soil erosion, runoff and localized increases in turbidity levels. This may also increase the potential for small releases of oils, grease, and other petroleum products into the waterways. Thus, in the short term, such efforts may result in short-term adverse effects on water quality. However, in the long term, wetland restoration would improve surface and ground water



quality by collecting and filtering sediment, nutrients, pesticides and bacteria in runoff. As such, these restoration efforts would result in long-term positive impacts to water resources.

### ***Alternative C—Preferred Alternative***

Similar short-term minor adverse and long-term positive effects to water quality and hydrology previously described for Alternative B would occur from implementing Alternative C. Additional construction activities under Alternative C would increase the potential for erosion and turbidity concerns, but impacts would be minimal and temporary given implementation of management practices (e.g., installation of silt fences to reduce runoff) and given the small size of the construction footprint (collectively less than two acres).

## **Biological Resources**

### **Vegetation**

#### ***Common to All Alternatives***

Imported, well and riparian water would be utilized to manage a diversity of wetland habitats, including seasonal, permanent, semi-permanent and reverse cycle wetlands (i.e., wetlands that are flooded during the spring and summer and dry during the fall and winter), providing both short- and long-term positive impacts to native wetland-dependent vegetation. Although the acreage of seasonal wetlands varies between alternatives, all alternatives would involve management of approximately 1,000 acres of permanent, semi-permanent and reverse cycle wetlands. Disking, mowing, prescribed burns and chemical treatments would be utilized periodically to promote early successional vegetation stages that favor establishment of pioneer species (e.g., swamp timothy [*Crypsis schoenoides*]) over undesirable plant species (e.g., Bermuda grass [*Cynodon dactylon*]). More than 10,000 acres of both short and tall structured grasslands and associated vernal pools would be managed through grazing, prescribed burns, mowing, seeding/planting and herbicide treatments to control invasive species and provide a positive impact to establishment and growth of native grassland vegetation (e.g., alkali sacaton [*Sporobolus airoides*], wildrye [*Leymus triticoides*] and saltgrass [*Distichlis spicata*]). Although riparian habitats would be less intensively managed, native vegetation would receive a minor long-term benefit from restoration plantings, herbicide treatments, wildfire suppression and the exclusion of grazing.

Annual herbicide treatments, as part of an integrated pest management approach, would provide short- and long-term positive impacts to native vegetation by controlling invasive and undesirable plant growth that can lead to competitive exclusion of native species. Treatments would be applied predominately in grasslands (e.g., yellow starthistle [*Centaurea solstitialis*] and milk thistle [*Silybum marianum*]) and to a lesser extent in both riparian (e.g., common cocklebur [*Xanthium strumarium*] and poison hemlock [*Conium maculatum*]) and wetlands habitats (e.g., California bulrush [*Schoenoplectus californicus*] and common cattail [*Typha latifolia*]).

Approximately 900 acres of the complex would continue to be treated with 466 gallons of herbicides containing the active ingredient glyphosate, accounting for approximately 95 percent of

total herbicides applied annually. Modeling and risk assessment studies have shown that indirect exposure (e.g., spray drift) to glyphosate 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, 2011). As previously discussed, small quantities of five other registered herbicides—triclopyr triethylamine, aminopyralid, chlorsulfuron, clopyralids and 2,4-D (DMA)—would be selectively applied to treat another 1,450 acres of the Complex. All of these herbicides are applied in accordance with the label, are commonly used for invasive species control and are not persistent in the environment. Under most environmental conditions, the field half-life (or soil half-life, if unavailable) for these herbicides range from 0.2 to 26 days (USFS 2004 a,b; 2006; 2007; 2011a,b). These herbicides would be applied in upland areas and/or dry habitat for seasonal wetlands and with sufficient buffer from riparian and aquatic habitat. Furthermore, the Service will spray only when special permits (e.g., NDPES permits) are not required. All chemical treatments would be reviewed and approved through the Service’s Pesticide Use Proposal to identify target species, application rates, timing, method and implementation measures and to minimize potential adverse impacts to native species and sensitive habitats.

Impacts to the refuges’ vegetation by hikers and hunters are expected to be minimal and insignificant. Visitors involved in non-consumptive activities are encouraged to utilize established trails and hardened areas, which would not impact vegetation. Hunting is conducted by foot by individuals or small groups, often accompanied by a hunting dog. This direct impact of foot travel by hunters on the habitat is often different from that of other wildlife-dependent recreation users because hunters tend to travel in dispersed patterns over wide areas, minimizing the chances of negatively impacting sites. As such, impacts to vegetation from hunting programs are expected to be minimal and insignificant.

Nutria monitoring efforts would cause minor to negligible temporary impacts to local wetland vegetation (e.g., cattails, tules, water fern). Impacts include folding and/or cutting vegetation to create vegetated platforms to attract nutria to cameras/traps, and trampling of upland vegetation to access wetlands in frequently visited trapping areas. Overall, due to the intense impacts nutria have on native plants in riparian areas, a net positive impact to local wetland vegetation from nutria eradication is expected.

### ***Alternative A—No Action***

Overall, there would be a minor positive impact to native plant and vegetation communities from continuation of current management activities under Alternative A, given the intensive land management regime at the Complex. Ongoing efforts to control and eradicate invasive species—including yellow starthistle, perennial pepperweed (*Lepidium latifolium*), giant reed (*Arundo donax*) and water hyacinth (*Eichhornia crassipes*)—within the Complex would result in a long-term positive impact to native grassland, wetland and riparian vegetation by reducing competition with and displacement of native species (D’Antonio et al. 2002; DiTomaso, Kyser and Hastings 1999; Bossard, Randall and Hoshovsky 2000). A combination of prescribed grazing, controlled burns, mowing, native seeding/planting, mechanical treatments and herbicide application within approximately 24,500 acres of uplands grassland habitats would reduce the competitive influence of invasive weeds and both maintain and promote native grass (e.g., alkali sacaton and creeping

wildrye [*Leymus triticoides*]) growth and establishment. Ongoing manipulation of water delivery, control and discharge within 6,648 acres of seasonal wetland management units would emulate natural wetland function to the maximum extent practical and promote germination and growth of native vegetation communities (Lane and Jenson 1999). Seasonal wetlands would be managed on an 8-year disturbance cycle designed to reduce establishment of undesirable perennial wetland species (e.g., cocklebur [*Exanthium spp.*], Bermuda grass and aster [*Aster spp.*]) and to promote desirable early successional wetland species, including swamp timothy and smartweed (*Polygonum spp.*), characterized by high seed production (Reid et al., 1989; Lane and Jenson 1999; Mensik and Reid 1995). Ongoing management measures would include a combination of seasonal mowing, annual prescribed burns, periodic disking and herbicide applications. Seasonal grazing and prescribed burns within vernal pool complexes should continue to provide long-term benefits to stimulating growth of endemic vernal pool obligate species (e.g., downingia (*Downingia spp.*) and goldfields (*Lastenia spp.*) (Witham et al. 1998; Marty 2005). Potential adverse impacts to native vegetation as a result of overgrazing (e.g., trampling and consumption) would be avoided by carefully timing grazing regimes to avoid sensitive growth stages and adhering to maximum prescribed stocking rates contained within an annual grazing plan.

Annual prescribed burns would be conducted on 3,000 to 7,500 acres of grassland, wetland and vernal pool habitats to control invasive species, promote native species, enhance nutrient cycling and reduce hazardous fuel levels. Approximately 10 annual mechanical fuels treatment projects would complement the prescribed burns and reduce fuel hazards on an additional approximately 840 acres, including pile burning. Prescribed fire and mechanical treatments would 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—to include stand replacement of the dominant vegetation species, reduction in aboveground vegetation biomass and reduction in vegetation biodiversity (USDA 2000). Public visitation, wildlife-dependent recreation (e.g., nature photography and wildlife observation) and environmental education programs are expected to result in minor localized adverse impacts to native vegetation (e.g., trampling and soil compaction) because the majority of visitor services are confined to established trails, roads and pullouts. Short-term negative impacts to vegetation as a result of ongoing hunting opportunities within the Complex are also expected to be minor due to the dispersed patterns of use, seasonal nature of the activity and a 3 days-per-week schedule within the hunting season.

### ***Alternative B—Wetland and Waterbird Focus***

Implementing Alternative B would have a long-term moderate positive impact on native vegetation communities—with a particular emphasis on wetland habitats and associated vegetation. Restoration of an additional 600 acres of seasonal wetlands in the Snobird and East Bear Creek units would increase the total acreage of managed seasonal wetlands by 9 percent across the Complex, improving the overall quantity and diversity of wetland vegetation. Short-term adverse impacts to native vegetation (e.g., soil disturbance and untargeted species removal) during restoration would be minimized by adhering to management practices and revegetating all disturbed sites. Pursuing acquisition of an additional 10,000 acre-feet of water for the Snobird and East Bear Creek units, an additional 18,000 acre-feet of water for the Merced, San Luis and West

Bear Units, and potential additional supplies for other inadequately supplied management units may facilitate additional acreage of wetland restoration and improve water management within existing wetland management units. Additional water supplies would allow wetland habitats to be managed closer to optimal conditions to stimulate native vegetation growth over undesirable plant species and may provide a buffer from reduced Level 2 and suspended Level 4 water deliveries from the CVPIA during low-water years. Hydraulic manipulation, in concert with successional stage management, is an important determinant of species diversity, density and seed production (Lane and Jensen 1999; Smith, Rollins and Shinn 1994).

Desirable moist-soil vegetation species, including swamp timothy, smartweed and watergrass, can be propagated on most seasonal wetlands through a combination of effective water management and soil disturbance (Smith, Rollins and Shinn 1994). Additional water supplies would allow refuge managers to optimize the timing and duration of wetland flooding, irrigation and drawdown to promote native/desirable species, control invasive/undesirable species and enhance wetland habitat diversity.

A transition to a 6-year disturbance cycle management regime for moist soil wetland units would stimulate growth and establishment of pioneer/earlier successional species (e.g., swamp timothy, smartweed and watergrass), enhance wetland productivity, improve nutrient cycling and reduce encroachment by emergent cattail/bulrush stands and other undesirable perennial species (e.g., Bermuda grass and aster). Vegetation composition and productivity are closely related to successional stage, and later stages are characterized by undesirable perennial species and low reduced productivity (Lane and Jensen 1999; Strader and Stinson 2005; Smith, Rollins and Shinn 1994). The complex would manage the successional stage of a total of 7,248 acres of seasonal wetlands using a combination of water manipulation, burning and mechanical disturbance (e.g., disking). Periodic disking reduces competition and creates conditions favorable for pioneer wetland species by removing dense stands of undesirable perennial species. A more frequent disturbance regime would complement ongoing native planting/seeding and an increased emphasis on invasive species removal (mechanical and chemical treatments) within wetland habitats would provide a long-term positive benefit to native/desirable plant species. Potential adverse impacts to native species as a result of increased wetland treatments would be minimized by reviewing all chemical treatments through the Service's Pesticide Use Proposal and ensuring all herbicides are applied in accordance with manufacturer's label instructions.

Focusing a larger degree of existing fuels management projects and prescribed burns on wetland habitats would provide a long-term positive benefit to open pool areas of wetlands and early successional native plant species. Mechanical fuels removal and prescribed burns would reduce thick and overgrown undesirable vegetation, favor establishment of early successional species with high seed productivity, improve nutrient cycling and reduce the long-term threat of catastrophic wildfire. Increasing fuels management within wetland habitats could have an indirect adverse impact on native vegetation communities by diverting limited resources (e.g., labor and finances) away from fuels management in grassland and riparian habitats. Less frequent fuels management could increase the threat of more severe wildfires and increase competitive exclusion of native species by invasive species.

The restoration of an additional 100 acres of riparian woodland habitats along suitable waterways would increase native riparian woodland habitat on the Complex by 33 percent. Re-establishment of black willow (*Salix goodingii*), Fremont's cottonwoods (*Populus fremontii*), valley oak (*Quercus lobata*), buttonwillow (*Cephalanthus occidentalis* var. *californicus*), coyote bush (*Baccharis pilularis*), quail brush (*Atriplex lentiformis*), California rose (*Rosa californica*) and other native plants would have a moderate long-term positive impact on biodiversity and habitat complexity, as well as enhance the linkage and exchange of energy and matter between upland terrestrial habitats and aquatic ecosystems (RHJV 2004). Restoration would involve riparian plantings in suitable areas and parallel herbicide treatments to remove exotic species.

Active restoration would target degraded riparian habitats primarily within the San Luis NWR, but also to a lesser degree within the Merced NWR. Many of the suitable areas within the Merced NWR are located between levees or in designated floodways subject to woody vegetation removal by levee districts. Although riparian restoration activities could have short-term minor adverse effects on riparian habitats (e.g., bank destabilization, vegetation trampling, herbicide treatments), these impacts would be minimized by implementing appropriate management practices. Applying herbicides in accordance with label instructions during calm weather periods with low drift potential, along with sufficient buffers, would minimize the adverse effects to non-target species outside the designated application area.

In addition to ongoing vernal pool management (e.g., grazing, prescribed burns, herbicide treatments [only during dry seasons]), implementation of Alternative B would restore vernal pool habitats on the recently acquired 1,700-acre Snobird unit within the Merced NWR. Restoration of natural vernal pool complex hydrology combined with seasonal grazing and prescribed burns would reduce the abundance of non-native annual grass and promote rare and endemic vernal pool obligate and other native grassland plant species (Witham et al. 1998; Marty 2005).

Restoration may benefit downingia (*Downingia* sp.), goldfields (*Lastenia* sp.) and Colusa grass (*Neostapfia colusana*), as well as other native species inhabiting vernal pools and associated grasslands. Potential adverse effects of grazing on grasslands include trampling sensitive species, trampling of vegetation creating gaps for invasive species, overgrazing, habitat fragmentation and soil disturbance (CalPIF 2000; Beedy and Hamilton 1997; Holland and Keil 1995; Taylor and Davilla 1986; USFWS 1998). These adverse effects would be avoided and minimized by adhering to an annual prescribed grazing plan and implementing monitoring and adaptive management measures. Potential adverse impacts of potential herbicide treatments would be minimized by adhering to conditions approved in the appropriate Service Pesticide Use Proposals and only spraying during dry conditions with ample buffer distances from water and riparian areas.

Prioritizing resources for wetland management and wetland land acquisition would have a positive impact on wetland quality, diversity, and habitat connectivity. Focusing ongoing local and regional partnerships with outside agencies for land management and restoration, ecological research and habitat protection efforts on wetlands and wetland-dependent species would improve information sharing and long-term adaptive management of wetland habitats. Potential short-term adverse impacts from additional research in wetland habitats (e.g., vegetation trampling, soil disturbance)

would be minimized by adherence to conditions outlined in appropriate Special Use Permits. Securing an additional biologist to support the Partners for Fish and Wildlife Program and developing a geographic information system (GIS) habitat database for easements would support additional technical assistance, habitat restoration and enhancement projects on easement lands beyond the current levels. Due to limited human and financial resources, an increased emphasis on wetland habitats would likely divert resources away from management of grassland and riparian resources and may have a long-term minor adverse impact on native grassland and riparian communities. An additional law enforcement officer would increase Complex surveillance, reduce rules violations and minimize the potential adverse impacts on vegetation as a result of public visitation.

Although certain management measures may have localized, short-term minor adverse impacts on certain plant communities and non-target species (e.g., clearing, disking, herbicide treatment), the long-term benefits in habitat productivity and biodiversity would result in net benefits to native vegetation. Overall, the net effect on vegetation from all management activities under Alternative B would result in moderate positive impacts to native plant species and vegetative communities.

### ***Alternative C—Preferred Alternative***

Alternative C would have a moderate long-term positive impact on native plant species and vegetation communities—although benefits would be more equally distributed between wetlands, grasslands and riparian habitats relative to Alternative B. Implementation would secure and restore identical amounts of additional water supplies, wetlands, riparian woodlands and vernal pool habitats to Alternative B, conveying similar long-term positive benefits to native vegetation communities. A total of 7,248 acres of seasonal wetland units would continue to be managed on the existing 8-year disturbance cycle and may experience higher levels of competitive exclusion of native species and lower seed productivity during years 7 and 8 relative to Alternative B (Lane and Jensen 1999; Smith, Rollins and Shinn 1994).

Development of a baseline monitoring and rapid assessment and control program for new invasive species to control non-native, invasive species and noxious weeds would provide a long-term positive impact to habitat quality and native biodiversity. The monitoring program would facilitate early identification and control of invasive species in order to minimize negative impacts associated with the colonization of additional invasive species. A baseline monitoring program would provide enhanced resolution of data with regards to short- and long-term trends in invasive species distribution and abundance. Improved data would enhance refuge managers' ability to evaluate and adapt invasive species management techniques to maximize long-term benefits to native vegetation communities and improve the resilience to future non-native invasions. Development of more detailed GIS data vegetation communities and permanent grassland monitoring plots would enhance the resolution of refuge land management and improve long-term adaptive management to maximize the benefit to native vegetation.

Implementation of Alternative C may improve the long-term ecological integrity of the Complex on a landscape scale within the larger Pacific Flyway. The Complex would seek additional funding for easement acquisitions within the Grasslands WMA and prioritize future acquisitions from

willing sellers based on wildlife habitat connectivity. Additional easements may reduce edge effects associated with future urbanization and habitat fragmentation within the region.

Promoting landowner workshops on wetland, waterfowl and grassland management would benefit native vegetation communities by improving natural resource stewardship on private land. Alternative C would also add an additional biologist for the Partners for Fish and Wildlife Program and seek additional funding to increase the total number of habitat restoration and enhancement projects on easement lands. Long-term benefits to habitat quality and diversity would be more distributed between wetlands, grasslands and riparian habitats as compared to Alternative B, which emphasizes wetland-oriented enhancement projects. Increased funding and partnerships with academic, external agency and independent investigators to execute Complex-defined research priorities and improve data-sharing technology with the external scientific community would improve manager understanding of existing data gaps and could enhance long-term adaptive management to promote native species distribution and abundance.

Construction of a series of visitor amenities, including a one-half-mile riparian woodland nature trail near the visitor center, a 400-foot-mile extension to the existing wetland nature trail boardwalk, a children's nature exploration area and several observation and photo blinds would have minor localized adverse impacts to native vegetation communities. Adverse impacts may include vegetation removal, reduction in seed emergence (Cole and Landres 1995) and alteration of vegetation structure and composition. Potential impacts would be minimized by careful site selection, the relatively small footprint of the proposed projects, implementation of site-specific management practices, and replanting/seeding of all temporarily disturbed areas. A parallel increase in public outreach and environmental education, nature interpretation and volunteer programs could result in a moderate increase to overall refuge visitation. Long-term adverse impacts from increased visitation (e.g., vegetation trampling and removal) are expected to be minor as the majority of visitors are expected to remain on maintained roads and trails. The construction of additional trails and boardwalks should concentrate visitor traffic and preserve adjacent undisturbed habitat.

Additional observation and photography blinds may further reduce the frequency of off-trail wandering and minimize potential adverse impacts to native vegetation as a result of wildlife observation and photography. Increased environmental education and outreach programs may also improve overall visitor awareness and increase resource stewardship.

Overall, the net effect of all management activities in Alternative C would result in moderate positive impacts to native plant species and vegetation communities relative to Alternative A. In general, Alternative C would improve invasive species management, increase habitat restoration and enhancement and may increase the acreage and habitat connectivity of the Grasslands WMA. Although similar in magnitude to the impacts of Alternative B, Alternative C provides a more equal distribution of the positive impacts among wetlands, grasslands and riparian habitats.

The Complex's livestock program utilizes prescribed grazing by sheep and cattle to reduce the growth of annual grasses, create open sand areas for kangaroo rats and horned lizards and prevent

the spread of invasive weeds such as yellow starthistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), little mallow (*Malva parviflora*) and black mustard (*Brassica* spp.). Sheep- and cattle-grazing have been used throughout grassland ecosystems to influence competition in favor of native species; however, research to measure the effectiveness of grazing has provided mixed results. The mixed results provided by existing research underscore the need for research that is specific to the Complex uplands and considers current ratios of native to non-native species, historical use of grazing on these grasslands and current and future climates.



*Prescribed Burn. Photo: USFWS*

There is little information on the effects of grazing for many grassland species, including passerine birds, small mammals and insects. Although meeting the needs of certain species, the effects of grazing on other wildlife species may cause ecological disturbances through fragmentation of habitat, injury or mortality, with the degree of effect dependent upon the species involved. The co-evolution of grasslands and deer over millions of years was made possible by the migratory habits of the deer and the intercalary meristems of grasses that facilitate their re-growth. Grazing directly affects grassland plants through defoliation, trampling and nutrient redistribution. Reduction of the leaf area through defoliation causes herbivorous insects to act as competitors for grassland plants as food. Trampling can create soil compaction, with greater compaction in heavily grazed areas. Nutrient redistribution may increase or decrease net primary productivity of certain plant species, resulting in changes in the structure of the plant community, which, in turn, impacts the herbivores that feed on those plants. The 2006 grassland bird survey at the Complex found that, in grazed areas, in addition to vegetation species composition being sub-optimal, vegetation structure was inadequate to support breeding sites and provide cover and foraging opportunities.



Prescribed burns on the refuges are used for weed control and to enhance nutrient recycling, improve forage, reduce fuels, open up bare ground for the benefit of specific species (such as horned lizards) and meet the needs of plants that require heat for seed scarification for germination. Fire plays an integral role in the conservation and management of grassland ecosystems.

California's grassland vegetation has evolved through a fire regime that consists of an interactive relationship between fire and plant species that tolerate fire and/or need fire to complete their life cycles. The use of prescribed burning to reduce thatch, control exotic species and restore native species in Complex grasslands is complicated by the increased severity of fires within this grassland ecosystem dominated by non-native annual grasses. Plant species composition is affected by the intensity, timing, frequency and season of burn, all factors that need to be considered when using prescribed burns as a management technique. As is the case with grazing, studies of the use of prescribed fire to reduce non-native vegetation to remove competition with perennial grasses have provided mixed results. A meta-analysis of 19 studies, conducted by D'Antonio et al. (2002), indicated that burn frequency and the use of grazing with burning positively affected the results of prescribed burning.

Animals may be affected directly through injury or death, or indirectly by changes to their habitat or food supply. Effects on birds vary by species and site with some birds, such as horned lark (*Eremophila alpestris*) and burrowing owls (*Athene cunicularia*), preferring shorter grasses. Early spring burning may impact nesting waterfowl, such as mallards and cinnamon teal. Effects on mammals are also variable; small mammals, such as deer mice and voles, escape to their burrows and return to seek out new growth. Although plant biomass is reduced by fire, large herbivores may be attracted to the increased nutritional quality of forage following burning. Arthropods also experience direct and indirect effects as well as long-term and short-term effects to the abundance, distribution and diversity of species.

## **Wildlife Resources**

### ***Common to all Alternatives***

Approximately 750 acres of agricultural lands (e.g., corn, winter wheat and irrigated pasture) on the Merced NWR would continue to provide important winter foraging habitat for lesser sandhill cranes (*Grus canadensis canadensis*) and arctic-nesting geese, including Ross' goose (*Anser rossii*) and the lesser snow goose (*Chen caerulescens caerulescens*). Croplands provide high-quality foraging habitat that allows migratory birds to accumulate the necessary fat and nutrients to sustain migration. Low-intensity management of 200 acres of riparian habitats (e.g., restoration plantings, herbicide treatments, wildfire suppression and the grazing exclusion) would continue to benefit a large diversity of neotropical migrants, including blue grosbeak (*Guiraca caerulea*) and black-headed grosbeak (*Pheucticus melanocephalus*) (RHJV 2004), as well as mammals such as the American mink (*Mustela vison*) (Sullivan 1996) and the northern river otter (*Lutra canadensis*) (Tesky 1993a). Riparian habitat management would also provide a long-term positive impact to permanent aquatic habitats, including the San Joaquin River and its tributaries/sloughs and permanent wetlands. These habitats support a diverse array of native (e.g., Sacramento splittail [*Pogonichthys macrolepidotus*], tule perch [*Hysterocarpus traski*] and prickley sculpin [*Cottus*

*asper*]) and exotic (e.g., black bass [*Micropterus salmoides*], blue gill [*Lepomis macrochirus*], and striped bass [*Morone saxatilis*]) fish species.

Management of a captive herd of tule elk (*Cervus elaphus nannoides*) within a 760-acre enclosure on the San Luis NWR and participation in the reintroduction of Columbian black-tailed deer (*Odocoileus hemionus*) within the Grasslands WMA are expected to continue to support regional native ungulate recovery and provide tule elk translocation opportunities to other native habitats. Historically, large numbers of these native ungulates were a major component of the Central Valley ecosystem (McCullough 1969; Bakker 1965). The reintroduction of tule elk and black-tailed deer provide a long-term positive impact to the Complex through the restoration of natural ecological processes—some of which are artificially replicated through seasonal livestock grazing—that contribute to habitat diversity and nutrient cycling and restore a prey base for keystone predators. Potential adverse impacts on native habitats (e.g., overgrazing and soil disturbance) as a result of overpopulation would be minimized by population monitoring and relocation as necessary.

Nutria trapping operations would have minor adverse impacts on non-target species captured incidentally. Non-target species captured in live traps—such as muskrat, raccoon, mink, American river otter, American beaver and waterfowl—are released when traps are checked in the morning. An analysis of nutria trapping operations on the refuge complex from 2019–2020 found that 26 percent of the total captures were non-target species, and of those captures 1.6 percent resulted in mortality (USFWS 2020). In areas where non-target species are frequently captured in traps, refuge staff can make efforts to decrease captures of non-target species by switching baits or moving trap locations within the wetland. Additionally, traps are checked at least once every 24 hours, and are not set during inclement weather, such as heavy wind, rain or extreme high or low temperatures, to reduce mortalities of non-target species.

Water management activities to maintain and enhance wetland habitats that benefit wetland-dependent fish, wildlife, and plant species could result in minor adverse effects to aquatic species occupying irrigation canals and drains through operation and maintenance of water management infrastructure throughout the Complex. Operation of lift pumps (to delivery water to wetlands from irrigation canals and other surface waters) could result in impingement and entrainment of aquatic organisms in those waters. For example, spring-run chinook salmon (Central Valley experimental population) could occur in proximity to the lift station in the Eastside Bypass (of the San Joaquin River) at East Bear Creek (San Luis NWR). In such circumstances, lift stations will be operated and modified with fish screens to minimize adverse effects to aquatic fish and wildlife species including native salmonids.

### ***Alternative A—No Action***

Overall, there would be a moderate long-term positive benefit to wildlife resources from continuation of the management activities under Alternative A, given the extensive habitat management that occurs at the Complex. Active management of over 7,500 acres of seasonal, permanent, semi-permanent and reverse cycle wetlands is expected to continue to benefit migratory birds by providing critical winter foraging habitat for migratory waterfowl (e.g., northern pintail and green winged-teal within the Pacific Flyway); stopover foraging grounds for migratory

shorebirds (e.g., western sandpipers [*Calidris mauri*], black-necked stilts [*Himantopus mexicanus*]); and nesting, brooding and foraging habitat for year-round and summer residents (e.g., mallard and cinnamon teal). A combination of seasonal flooding and drawdown, mowing, periodic disking and prescribed burns are expected to benefit wetland habitat value for a wide range of migratory birds and other seed-eating wildlife by reversing plant succession; increasing seed production; and improving invertebrate habitat (Smith, Rollins and Shinn 1994; Tesky 1993b). Potential adverse impacts to some wildlife species (e.g., disturbance, displacement, habitat destruction and mortality) would be expected to be predominately temporary in nature and would be minimized by adjusting the timing of management activities to the phenology of key species and rotating treatments to maintain a diversity of habitats. Although management of wetlands would be conducted primarily for migratory birds, the diversity of wetlands is expected to benefit a variety of wildlife species.

Ongoing grassland management measures (e.g., prescribed burns, prescriptive grazing, herbicide treatments, native planting/seeding) would continue to provide a mosaic of tall (10,000+ acres) and short-structured (10,000+ acres) grassland habitats, which would provide benefits to a range of 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). For example, short-structured grasslands support the savannah sparrow (*Passerculus sandwichensis*) and long-billed curlew (*Numenius americanus*) (USDA 1999), and long structured grassland support the northern harrier (*Circus cyaneus*) and gadwall (*Anas strepera*) (USDA 1999; Tesky 1993b). Short-structured grassland also provide foraging, denning and nesting habitat for coast horned lizards (*Phrynosoma coronatum frontale*), kangaroo rats (*Dipodomys* sp.) and badgers (*Taxidea taxus*). Although overgrazing by livestock can adversely impact many wildlife species (CalPIF 2000; USFWS 1998), including native ungulates (USDA 2011a), prescribed grazing would be targeted and managed through an adaptive management process to minimize and prevent overgrazing, with a focus on improving long-term habitat quality (Barry 2003; Griggs 2000; McNaughton 1985; Muir and Moseley 1994; Marty 2005; Thomsen et al. 1993). Prescribed burns could also have adverse impacts on preferred nesting habitat and reduce reproductive success rates for gadwall and mallards that utilize the Complex for breeding (Snyder 1993; Tesky 1993b). Potential adverse impacts of prescribed burns would be minimized by avoiding sensitive habitats. 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 wildfires (e.g., stand-replacement fires) can eliminate important habitat for many species of birds and small mammals, expose wildlife to predators and seriously reduce browsing opportunities for ungulates for many years (CalPIF 2004; USDA 2000).

Selective herbicide application as part of an integrated pest management program would result in long-term positive impacts to wildlife by reducing invasive and undesirable species and improving overall habitat quality of wetlands, grasslands and riparian habitats. Herbicides containing the active ingredient glyphosate (e.g., Buccaneer, Rodeo and Roundup Original) account for 95 percent of the total treatments and applications rates range from 0.3 to approximately 3 lbs. a.e. per acre (1.5 lb. a.e. per acre on average). Worst case exposure estimates identify potential adverse impacts to non-target aquatic organisms, particularly amphibians, at application rates greater than 1 lb. a.e. per acre. Although risks to mammals cannot be ruled out based on upper bound estimates of

exposure at application rates in excess of 2.5 lbs. a.e. per acre, central estimates of exposure demonstrate no risk (USFS 2011a). As previously discussed, small quantities of five other registered herbicides—triclopyr triethylamine, aminopyralid, chlorsulfuron, clopyralid and 2,4-D (DMA)—would be selectively applied to treat another 1,450 acres of the Complex. All of these herbicides are applied in accordance with the label, are commonly used for invasive species control and are not persistent in the environment. Under most environmental conditions, the field half-life (or soil half-life, if unavailable) for these herbicides range from 0.2 to 26 days (USFS 2004a,b; 2006; 2007; 2011a,b). These herbicides would be applied in upland areas and/or dry habitat for seasonal wetlands and with sufficient buffer from riparian and aquatic habitat. Furthermore, the Service will spray only when special permits (e.g., NDPEs permits) are not required. All treatments would be conducted by trained applicators in accordance with both the manufacturer's recommendations and an approved Pesticide Use Proposal to identify target species, application rates, timing and method to avoid and minimize exposure to wildlife receptors. Overall, the improvements to habitat quality as a result of herbicide treatments are anticipated to provide a net benefit to wildlife populations.

Providing 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, Knight and Miller 1998; Morton 1995; Morton, Fowler and Kirkpatrick 1989; Purdy et al. 1987; and Smith and Hunt 1995). These effects would be minor, short-term and localized given the expected level of visitation and nature of access (e.g., access restricted to trails and designated areas, avoidance of sensitive areas to minimize impacts to wildlife). The service would also maintain a network of wildlife sanctuary areas within no or severely limited public use to maintain high quality wildlife habitat free of visitor disturbance.

Although many habitat management measures would result in short-term minor adverse impacts and localized disturbances as a result of human activity, these measures would provide a net long-term moderate positive impact on many species of wildlife that utilize grassland, riparian, wetland and riparian woodland habitat, including many species of migratory birds (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000). Opportunistic acquisition of additional easements from willing landowners to expand within the Grasslands WMA would continue to benefit wildlife by expanding protected habitat. The Service would leverage external partnerships with wildlife and land management agencies, research universities and private entities to monitor long-term effects of ongoing management measures and apply an adaptive management approach 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.

### ***Alternative B—Wetland and Waterbird Focus***

Implementing Alternative B would have a long-term moderate positive impact on wetland-dependent wildlife resources, but may have minor adverse impacts on upland wildlife species relative to Alternative A. Pursuing an additional 10,000 acre-feet of water for the Snobird and

Arena Plains units and 18,000 acre-feet for the Merced, San Luis and West Bear Creek units could facilitate optimization of water management for a diversity of wildlife species within existing seasonal, permanent, semi-permanent and reverse cycle wetlands units, as well as support additional seasonal wetland habitat restoration. The manipulation of timing and depth of flooding and rate of drawdown are critical determinants of a wetlands value to specific wildlife species (Fredrickson and Taylor 1982). Additional water supplies would allow active management of currently underutilized wetlands basins in both the Snobird and Arena Plains units, and augment existing water supplies in other units, allowing a greater refinement of flooding and drawdown to maximize the long-term positive benefit to waterfowl, shorebirds and wading/diving birds, as well as other wetland-dependent wildlife.

The restoration of 600 acres of seasonal wetland basins in the Snobird and East Bear Creek units represents a 9-percent increase in moist soil units and would increase foraging habitat for migratory waterfowl in the Central Valley region of the Pacific Flyway. The restored wetlands would increase energy-rich food supplies of aquatic invertebrates, seeds, tubers and browse for waterfowl, shorebirds and other waterbirds (Strader and Stinson 2005) and enhance overall wetland habitat and cover. Additional moist soil wetland units would also benefit invertebrates, reptiles and amphibians, which are important prey species not only for waterfowl, but also raptors and other upland wildlife (Fredrickson and Taylor 1982).

Transitioning to a 6-year moist soil unit disturbance regime would benefit waterfowl, shorebird and other waterbirds by maximizing seed production, reducing dense tall emergent vegetation, promoting native vegetation and enhancing habitat diversity (Lane and Jensen 1999; Strader and Stinson 2005). Although seasonal wetlands may experience a short-term reduction in seed production during the year of disking (Frederickson and Taylor 1982), managing a mosaic of successional stages on a rotational schedule would minimize potential adverse impacts to wildlife. Solitary species, such as the sora rail (*Porzana carolina*), that require dense emergent stands of cattails may experience temporary adverse impacts from loss of habitat and more frequent disturbance. Increased emphasis on invasive species management in wetland habitats would improve the quality and diversity of native habitat for wetland-dependent wildlife.

Although short-term adverse impacts (e.g., disturbance and displacement) to wildlife species as a result of increased frequency of mechanical treatments (e.g., mowing, disking and burning) are possible, a more frequent disturbance regime is expected to provide a net benefit to wildlife species by increasing habitat quality.

Reconfiguration of tall grassland units to maximize nesting habitat around suitable waterfowl brood wetland units may provide a long-term positive impact on breeding success of upland nesting waterfowl, such as mallards, cinnamon teal and northern pintail. Nest success and duckling survival have been positively related to the extent of perennial grassland cover (Reynolds et al. 2001; Phillips et al. 2003) and the distance between the nest and first brooding wetland (Rotella and Ratti 1992). Tall grasslands would increase cover for ducklings, conceal nests from predators and reduce predator foraging efficiency. Reconfiguration of short grassland management units may benefit lesser sandhill cranes and Ross' goose by improving foraging efficiency and reducing

susceptibility to predation. Negative impacts associated with the grassland reconfigurations would be minor and short-term in nature as the long-term ratio of tall-to-short structured grasslands would remain unchanged.

Restoration of an additional 100 acres of riparian woodland habitat along suitable waterways would provide a long-term benefit to a large diversity of bird species, including the blue grosbeak, belted kingfisher (*Ceryle alcyon*) and Swainson's thrush (*Catharus ustulatus*), as well as mammal species, such as the American mink and northern river otter. Restoration would increase riparian woodland habitat by 33 percent, improve riparian habitat connectivity, enhance local and wildlife habitat corridors and may prevent additional decline in regional riparian-dependent wildlife populations. As a result of their importance to in-stream habitat quality (e.g., hydrology and sediment dynamics, nutrient cycling, and food web dynamics), the restoration of riparian habitat may also provide a long-term indirect benefit to the long-term recovery of native aquatic species (Moyle 2002).

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 and adjusting the timing of management activities. Although certain management measures may have localized, short-term minor adverse impacts on wildlife from habitat disturbance and human activities, the long-term benefits in habitat productivity, wildlife population growth and increased biodiversity would result in net long-term, positive effects to wildlife resources. The Service would apply an adaptive management approach 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 4.17.

A second biologist to support the Partners for Fish and Wildlife program would expand the number of habitat enhancement and technical assistance projects available to private landowners in the Grasslands WMA. These projects—along with Complex-wide ongoing wildlife inventory and monitoring, fuels management, invasive species eradication, habitat enhancement projects, research and land acquisition programs—would be focused more specifically on wetland habitats relative to Alternative A. More intense wetland management is expected to provide a long-term benefit to wetland-dependent wildlife. Improved data collection on wetland species population trends and habitat use would allow Complex managers to adapt and refine wetland management activities to optimize the benefits for native wildlife species. Targeting collaborative landscape-scale management initiatives and additional easement acquisitions on wetland habitats would further enhance the benefits to wetland-dependent wildlife. An additional full-time law enforcement officer would also improve refuge patrols, encourage visitor adherence to refuge regulations and minimize wildlife poaching and harassment.

Redirecting limited resources to support more intensive wetland management may impart indirect adverse impacts to wildlife inhabiting upland and riparian habitats. The extent of potential short- and long-term impacts would depend on the magnitude of resources (e.g., labor and finances) diverted away from grassland and riparian habitat management. Increases in both fuels management and invasive species control within wetland units would likely lead to parallel

decreases in grassland and riparian management regimes. Reduction of existing fuels and invasive species management would result in a decline in overall habitat quality and may increase susceptibility to catastrophic wildfire, which could result in habitat destruction and direct wildlife mortality (USFWS 1998).

Overall, the net effects on wildlife resources from all management activities under Alternative B would result in a net benefit to wildlife resources in the long term relative to Alternative A—particularly wetland-dependent species. Focusing limited resources on wetlands management could divert important resources away from critical grasslands management programs, reduce the efficacy of adaptive management for grassland habitats and have a long-term minor adverse impact on grassland-dependent wildlife species.

### ***Alternative C—Preferred Alternative***

Implementation of Alternative C would have a long-term, moderate positive impact on wildlife resources. Benefits would be more equally distributed between wetland, riparian and grassland-dependent wildlife as compared to Alternative B. Under Alternative C, wildlife would experience similar benefits from the acquisition of additional water supplies, restoration of seasonal wetlands and riparian habitats and reconfiguration of grassland units as described in Alternative B. Alternative C would continue to manage moist wetland units on the existing 8-year disturbance cycle as described for No Action, Alternative A. This approach would be less beneficial than the more intensive 6-year management cycle proposed for Alternative B. Spatial and temporal variation in disturbance cycles among wetlands would continue to ensure a mosaic of wetland habitats and successional species for the benefit of wetland-dependent wildlife and waterfowl. Enhanced monitoring and inventory of wildlife species will improve long-term adaptive management to maximize benefits to wildlife species.

A baseline monitoring program for invasive species and the development of a rapid assessment and control program to control non-native, invasive species and noxious weeds in grassland, riparian and wetland habitats would provide a long-term positive impact to wildlife. Early identification, control and eradication of invasive species would minimize adverse impacts to wildlife associated with the colonization of new invasive species and subsequent declines in habitat quality. A baseline monitoring program would improve the resolution of data with regards to short- and long-term trends in invasive species distribution and abundance, and enhance refuge managers' ability to evaluate and adapt invasive species management techniques to maximize long-term benefits to native wildlife.

Expanded nature interpretation, wildlife observation, education and outreach, and volunteer opportunities would increase visitation and result in minor adverse impacts to wildlife species. Construction of a one-mile riparian woodland nature trail near the visitor center, a one-third-mile extension to the existing wetland nature boardwalk at the San Luis NWR, construction of a children's nature exploration area outside the visitor center and additional observation blinds would result in the direct loss of less than two acres of riparian and wetland habitat and increase the total acreage of habitat subject to potential visitor disturbance. Wildlife disturbance from construction would be minimized by site selection (e.g., avoid sensitive wildlife areas) and seasonal restrictions

to avoid wildlife nesting or breeding seasons. Increased levels of wildlife photography, observation and volunteer activities could alter wildlife behavior (e.g., modify singing in birds, repeated flushing), increase energy expenditures, reduce reproductive success, alter distributions, reduce habitat quality, increase exposure to predation 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, Knight and Miller 1998; Morton 1995; Morton, Fowler and Kirkpatrick 1989; Purdy et al. 1987; Smith and Hunt 1995). Potential adverse impacts are expected to be minor, short-term and localized provided the low level of visitation and access restrictions (e.g., foot traffic restricted to developed trails, sanctuary zones).

Additional trail construction may concentrate visitor use and minimize wildlife disturbance by reducing the frequency of off-trail wandering. Construction of additional observation and photography blinds would reduce the visitor disturbance of waterfowl by providing protected observation opportunities. Construction of a children's nature exploration area adjacent to the visitor center would provide an area to concentrate creative play for children visiting the refuge and may minimize disturbance elsewhere. Furthermore, expanded educational programs would enhance visitor awareness of potential adverse impacts to wildlife associated with certain activities, increase overall public appreciation of refuge resources and contribute to improved stewardship ethic among visitors. Klein (1993) demonstrated that staff and/or volunteer contact with visitors reduced the likelihood of visitor disturbance to bird species. Increased volunteers may also provide additional labor to assist the Service in meeting habitat and wildlife management objectives.

Alternative C would improve wildlife monitoring and inventory, GIS data resolution for wildlife habitats and funding for research and habitat enhancement projects. Additional resources would be more equitably distributed among wetland, riparian and grassland habitats, resulting in increased benefits to riparian and grassland wildlife species relative to Alternative B. An additional biologist to support the Partners for Fish and Wildlife program would increase the annual number of restoration and enhancement projects executed on easement lands within the Grasslands WMA. In contrast to Alternative B, wetland enhancement and restoration projects would not be prioritized over grasslands and riparian projects, resulting in more benefits to grassland and riparian wildlife species. Additional wildlife research, inventories, habitat characterizations, species surveys and GIS capabilities would improve understanding of wildlife population trends in response to management regimes and improve adaptive management to optimize long-term benefits to wildlife. For example, expanded research and monitoring of migratory bird use of upland habitats could assist in refining the existing grassland management regime to maximize the benefit to migratory birds. Increased informational sharing and access natural resource databases, both internally and externally, would facilitate the incorporation of the best available science into the ongoing adaptive management process. All research would require a special use permit that outlines mitigation measures necessary to minimize potential short-term adverse impacts (e.g., wildlife disturbance).

Pursuing additional funding for and prioritizing land and easement acquisitions programs based on habitat connectivity, as opposed to willing sellers (Alternative A) or wetland habitats (Alternative B), would provide a long-term positive impact on wildlife by enhancing movement corridors,



reducing future habitat fragmentation and associated edge effects and improving the ecological function of the Complex on a landscape-scale within the region. Additional landowner workshops on wetland, waterfowl and grassland management could also improve private land stewardship and provide a long-term benefit to wildlife.

Overall, Alternative C would provide a moderate positive benefit to wildlife in upland, wetland and riparian habitats relative to Alternative A. Although some actions could have temporary minor adverse impacts on certain species, implementation is expected to provide an overall net benefit to wildlife. Increased inventorying, monitoring, and research capabilities would improve long-term adaptive management capabilities to maximize long-term benefits to wildlife.

Although many benefits are similar in magnitude to Alternative B, they are more evenly distributed between habitat types.

### Special Status Species

The Complex provides habitat for a variety of special status species, many of which are endemic to the Central Valley and dependent on regionally scarce natural habitats. As a result, the Complex is positioned to play a vital role in species conservation and recovery in the region. As discussed in the special status species section of the CCP, 17 Federally listed threatened and endangered species have the potential to occur on the Complex. Eleven species, including the giant garter snake (*Thamnophis gigas*), California tiger salamander (*Ambystoma californiense*), conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), Colusa grass (*Neostapfia colusana*) and least Bell's vireo (*Vireo bellii pusillus*), are known to occur on the Complex. There are historical records of Hoover's sandmat occurring on the Complex, although no recent surveys have been conducted. Although suitable spawning habitat does not exist, Chinook salmon-winter run (*Oncorhynchus tshawytscha*) and Central Valley steelhead trout (*Oncorhynchus mykiss*) occasionally occur within sloughs on the Complex. San Joaquin kit fox was last confirmed on the Complex in 2000. Although potential habitat exists for Fresno kangaroo rat (*Dipodomys nitratoides exillis*), giant kangaroo rat (*Dipodomys ingens*), blunt-nosed leopard lizard (*Gambelia sila*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and hairy orcutt grass, their presence has not been documented. Yellow-billed cuckoo (*Coccyzus americanus*) and western snowy plover (*Charadrius nivosus nivosus*) have been observed as rare migrants/transients, but are not local nesters.

California-listed threatened and endangered species known to occur on the Complex include the greater sandhill crane, bald eagle, tricolored blackbird, Swainson's hawk and delta button celery. Yellow-billed cuckoo (*Coccyzus americanus*), willow flycatcher and bank swallow have been observed as rare migrants/transients, but are not local nesters.

The Complex supports numerous other special status species, including Federal and state candidate species, species of special concern, species of conservation concern, and California Partners in Flight focal species. The tricolored blackbird is a state-listed species that utilizes farm fields, irrigated pasture and other upland habitats on the Merced NWR for colonial nesting. The western

burrowing owl (*Athene cunicularia*) is a Federal bird of conservation concern and state-listed species of special concern known to nest on refuge grasslands. The Complex also supports state candidate species such as Crotch's bumblebee (*Bombus crotchii*) and mountain lion (*Puma concolor*), and Federal candidate species such as the monarch butterfly (*Danaus plexippus*).

### ***Common to All Alternatives***

The farming program would continue to provide a benefit to the conservation and recovery of the state-listed tricolored blackbird and the greater sandhill crane. Cooperative Agricultural Agreements with local farming operators provide for the management of approximately 716 acres of row crops and irrigated pasture. A combination of winter wheat and corn provides a high-carbohydrate maintenance diet for wintering greater sandhill cranes. Regrowth provides a high-protein diet critical to building a nutrient reserve necessary to sustain migration.

Management of a network of on-refuge mature wheat stands also provides nesting habitat for colonial tricolored blackbirds. The provision of suitable nesting habitat would continue to reduce the number of colonies subject to complete nesting loss when occupied adjacent private agricultural crops are cut for silage. Irrigated pasture provides a supply of clover tubers and macroinvertebrates for the greater sandhill crane. Although farming precludes natural habitat restoration, all farmland predates USFWS land ownership and is expected to provide a net benefit to special status species.

To avoid, minimize and/or reduce adverse impacts to special status species, the following management practices would be employed in all alternatives 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 would be 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 Endangered Species Act Section 7 consultation when specific projects are undertaken that may affect listed species.

### ***Alternative A—No Action***

Current management activities would provide a long-term benefit to special status species recovery on the Complex, as well as enhance suitable habitat for species with the potential to occur on the Complex. A management regime of seasonal grazing, prescribed fire, mowing and herbicide treatments would provide long-term benefits to a variety of special status species by reducing non-native grassland vegetation and maintaining a mosaic of short- and tall-structured grasslands. More than 10,000 acres of tall-structured grassland would continue to provide foraging habitat for the northern harrier and tricolored blackbird. Seasonal grazing and annual prescribed burns would reduce dense thatch buildup in grassland habitats and may support long-term re-establishment of the San Joaquin kit fox, Fresno kangaroo rat and blunt-nosed lizard, which favor short, sparse structured grasslands (Cypher, Phillips and Kelly 2007; USFWS 1998). Western burrowing owls may benefit from improved nesting and foraging habitat, as well as potential increase in prey diversity and density (Howard 1996). Short-structured grasslands and interspersed croplands would also provide winter

foraging habitat for the greater sandhill crane. Although livestock grazing may have adverse impacts by collapsing burrows utilized by these species and destroying shrub cover important to some prey species (USFWS 1998), these impacts would be minimized by adhering to specified time periods, durations, and levels of intensity as outlined in a grazing management plan. Periodic prescribed fires would also reduce fuel loads and reduce the threat of severe wildfires that may eliminate habitat that could be utilized by other special status species (USDA 2000; USFWS 1998).

Managed grazing, prescribed burns and site protection measures would provide a long-term benefit to the recovery and conservation of vernal pool endemic species (e.g., Colusa grass, California tiger salamander, conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp and vernal pool tadpole shrimp) by controlling non-native grasses and preserving the hydrological integrity of vernal pool complexes (USFWS 2005; Pollack and Kan 1998). Invasive species compete for nutrients, light and water and can result in the competitive exclusion of native vegetation communities (USFWS 2005). Proper grazing regimes may reduce competition from invasive annual grasses, increase native plant cover, enhance aquatic invertebrate diversity and promote longer pool inundation periods. Longer inundation periods would specifically benefit species with longer reproductive cycles, such as the California tiger salamander. Site protection measures designed to prevent soil disturbance would prevent hydrological alterations from altering the timing, frequency and duration of inundation and disrupting the life cycle of vernal pool obligate species (USFWS 2005). Short-term adverse impacts to endemic vernal pool species (e.g., trampling, consumption and nutrient input) (USFWS 1998) would be minimized by adhering to a prescribed annual grazing plan.

Potential adverse impacts would be short-term and localized in nature, and the benefits of management activities would provide a net-benefit to vernal pool endemic species.

Livestock exclusion fencing, fire suppression, invasive weed removal and native plantings/seeding would continue to benefit riparian-dependent special status species by enhancing structural habitat diversity and quality, preventing additional habitat disturbance and supporting natural re-establishment of previously degraded riparian habitat. Coordinating riparian habitat protection and enhancement with ongoing grassland management regimes on a landscape level should also provide a long-term benefit to special status riparian woodland nesting birds (e.g., Swainson's hawk and least Bell's vireo) that require adjacent uplands foraging habitats (RHJV 2004). Short-term localized adverse impacts (e.g., disturbance, vegetation trampling and soil disturbance) as a result of human activity would be minimized by implementing seasonal restrictions during critical lifecycle periods, and the long-term benefits to special status species as a result of restoration activities are expected to provide net beneficial effects to species recovery.

Management of 1,000 acres of permanent, semi-permanent and reverse-cycle wetlands (i.e., wetlands that are flooded during the spring and summer and dry during the fall and winter) would continue to provide suitable habitat for the giant garter snake. The provision of suitable wetland habitat within close proximity to known populations improves regional habitat connectivity, may facilitate colonization of additional habitat and provides a long-term benefit to species recovery. Potential adverse impacts from periodic dredging and silt removal activities within water delivery

and drainage canals would be avoided and minimized by conducting maintenance during the active season (May 1–Oct 1) and adhering to Service standard avoidance and minimization measures during construction activities for the protection of giant garter snake habitat.

Inventory and monitoring of special status species and their habitats would provide insight into species specific responses to various management activities, and permit refuge managers to adapt and refine management regimes to maximize the long-term benefits to special status species.

Ongoing land management coordination and research partnerships, such as the Tricolored Colored Blackbird Working Group, are expected to provide a long-term benefit to special status species by improving the overall understanding of species-specific life-cycle requirements and facilitating the incorporation of the best available science into the adaptive management process.

Management and trapping of invasive nutria could potentially impact non-target species such as raccoon, skunk, muskrat and beaver, but trapping of non-target species will be minimized by following protocol that dictates setting traps overwater to minimize potential of terrestrial mammal bycatch. Use of live traps only minimizes harm to non-target aquatic mammals, such as beaver and muskrat, which can be easily released unharmed. No special status species have been trapped incidentally during nutria removal operations from 2018–2022. In addition, traps are checked at least once every 24 hours and are not set during inclement weather, such as heavy wind, rain or extreme high or low temperatures, to reduce mortalities of non-target species.

#### ***Alternative B—Wetland and Waterbird Focus***

Implementation of Alternative B would result in short- and long-term moderate benefits to special status species relative to Alternative A. Although Alternative B would result in many similar benefits to special status species from ongoing habitat management regimes, prioritizing wetland research and management would disproportionately benefit wetland-dependent species. Vernal pool restoration in the Snobird unit and expanded inventory and monitoring of vernal pool flora would provide a moderate long-term benefit to the recovery of a variety of endemic special status species. Restoring altered pool hydrology would minimize erosion, siltation and contaminant loading, and promote natural inundation cycles that benefit vernal pool obligate species, including the California tiger salamander, Colusa grass, delta button celery and four listed species of fairy shrimp (USFWS 2005). Following restoration, vernal pool endemic species would continue to benefit from seasonal grazing and prescribed burns designed to replicate natural disturbance cycles and prevent competitive exclusion by invasive species (e.g., perennial pepperweed). Restored vernal pool complexes may also support natural recolonization and provide future opportunities for re-introduction of special status species, including Colusa grass and hairy Orcutt grass. Conducting a complete inventory of vernal pool flora would improve refuge managers' understanding of the distribution of special status species and enhance the resolution of ongoing adaptive management. Adverse impacts to special status species inhabiting vernal pools (e.g., trampling and soil disturbance) as a result of restoration activities are expected to be localized and short-term in nature. Overall, long-term improvements in habitat quality are expected to provide a net positive impact to special status species recovery efforts.

Restoration of an additional 100 acres of riparian woodlands would provide a moderate long-term benefit to riparian-dependent special status species recovery by reducing existing habitat fragmentation, improving habitat connectivity and enhancing existing dispersal corridors. A 25-percent expansion in riparian woodland habitat would increase the long-term availability of suitable nesting habitat for Swainson's hawk (RHJV 2004); may support re-establishment of least Bell's vireo, yellow-billed cuckoos and valley elderberry longhorn beetle; and could complement external efforts to restore chinook salmon and steelhead trout to the San Joaquin watershed (Moyle 2002). Least Bell's vireo populations have responded favorably to riparian habitat restoration, achieving nest success rates similar to natural habitats (RHJV 2004).

Prioritizing restoration near existing high-quality habitat would reduce negative edge effects and may benefit reproductive success of riparian nesting special status species by reducing nest predation and parasitism (RHJV 2004). Incorporating elderberry shrub into native plantings as part of the restoration process would increase suitable habitat for and may support the long-term recovery of the valley elderberry longhorn beetle. Expansion of riparian habitat may provide an opportunity to establish an experimental population of the riparian brush rabbit as part of the recovery program. Increased human activity as a result of habitat restoration has the potential to impart short-term, localized adverse impacts to special status species (e.g., disturbance, vegetation trampling and soil disturbance). Potential adverse impacts would be minimized and/or avoided by implementing site-specific management practices, and the long-term benefits of riparian woodland habitat expansion are expected to provide a net benefit to special status species recovery.

Implementation of Alternative B would increase management emphasis on wetland habitats relative to Alternative A. Prioritizing invasive species control, fuels management, future land acquisitions, inventory and monitoring, research, external agency collaboration and habitat restoration and enhancement within wetland habitats may provide long-term benefits to wetland-dependent special status species such as the giant garter snake and tricolored blackbird. Increased Partners for Fish and Wildlife program annual restoration project capacity, facilitated by an additional full-time biologist, may also provide a long-term benefit to wetland-dependent special status species recovery. Although some degree of resources would likely be diverted away from invasive species and fuels management in grasslands and riparian habitats, ongoing management of existing habitat occupied by special status species would remain a management priority. As such, any potential adverse impacts on special status species as a result of a potential decline in habitat quality and increased risk of wildfire species are expected to be minimal.

In general, increased habitat restoration and inventory and monitoring will provide a positive impact to special status species relative to Alternative A. Prioritizing future habitat management and research for wetlands habitat will primarily benefit the long-term recovery of wetland-dependent species. Although potential short-term minor adverse impacts are possible, implementation of Alternative B is expected to provide a net positive impact on special status species recovery relative to Alternative A.

### ***Alternative C—Preferred Alternative***

Implementation of Alternative C would have a long-term, moderate positive impact on special status species relative to Alternative A. Similar positive benefits to special status species as previously described in Alternative B would be achieved by restoring vernal pool and riparian habitats. Targeting additional active management (e.g., prescribed grazing, controlled burns, chemical treatments and mowing) to maintain and/or restore young robust emergent stands of wetland vegetation, stands of coarse forbs, iodine bush dominated grasslands, old dune/sandy soil sites, thatch free grasslands and tussock-dominated grasslands would improve habitat suitability for and provide a long-term benefit to the recovery of numerous species endemic to the Central Valley, including tricolored blackbird, riparian brush rabbit, coastal horned lizard, Heermann’s kangaroo rat and yellow-billed magpie.

Implementing a baseline monitoring and rapid assessment and control program to control non-native, invasive species and noxious weeds in grassland, riparian and wetland habitats, would provide a long-term positive benefit to special status species. Early identification, control and eradication of invasive species would minimize potential habitat degradation and competitive exclusion of native endemic species, especially within vernal pool habitats (e.g., Colusa grass, delta button celery and hairy Orcutt grass). Early identification and control would also reduce future declines in habitat quality and diversity associated with invasive species colonization.

Improved data resolution on short- and long-term trends in invasive species distribution and abundance would enhance refuge managers’ ability to evaluate and adapt invasive species management techniques to maximize long-term benefits to native special status species and their habitats.

Long-term species recovery hinges on the species-specific understanding of the life history, distribution, genetics, habitat requirements and threats to survival. Expanded efforts to develop partnerships and secure funding for priority research projects may fill remaining ecological data gaps and improve long-term management of special status species. Securing funding for high-priority research on the distribution and ecological requirements for the Fresno kangaroo rat, riparian brush rabbit, long-billed curlew, giant garter snakes, vernal pool flora and fauna and migratory bird use of upland habitats would improve understanding of species-specific life history requirements and allow managers to refine habitat management regimes to benefit long-term species recovery. Expanded monitoring and inventory (e.g., vernal pool inventories, permanent breeding bird surveys routes, grassland monitoring plots and periodic monitoring of small and mid-sized mammals); improved vernal pool and grassland habitat/vegetation classification and GIS data; and enhanced internal and external data-sharing capabilities would improve managers’ understanding of special status species habitat use and populations trends, as well as facilitate the incorporation of the best available science into adaptive management. Management (e.g., inventory and monitoring, fuels projects and invasive species control) and research resources (e.g., climate change, ecological processes and contaminants) would be more equitably distributed between wetland, riparian and grassland habitats relative to Alternative B, and may provide long-term benefits to the recovery of a wider variety of special status species.

Prioritizing future land and easement acquisitions programs based on habitat connectivity, as opposed to willing sellers, may provide long-term benefits to special status species recovery by enhancing movement corridors, facilitating recolonization, improving gene flow, reducing habitat fragmentation and associated edge effects and improving the ecological function of the Complex on a landscape-scale within the region. Additional landowner workshops on wetland management and grassland management may increase habitat quality and diversity for special status species (e.g., giant garter snake and vernal pool species) within the Grassland WMA. Additional staff resources to support Partners for Fish and Wildlife program habitat enhancement and restoration projects may also benefit special status species recovery within the Grassland WMA. Potential positive impacts would be more equitably distributed between grasslands, riparian and wetland habitats and provide benefits to a larger range of special status species relative to Alternative B.

Expanded wildlife-dependent recreation, educational programs and volunteer opportunities could result in localized, short-term adverse impacts (e.g., disturbance, displacement, habitat degradation) to special status species. Potential adverse impacts to special status species as a result of trail, boardwalk and observation blind construction would be avoided through site selection and adhering to management practices (e.g., closing trails and areas, establishing protective buffer and signage). Implementing sensitive area closures, expanded educational programs and additional interpretative signage would minimize potential adverse impacts from increased visitation. Furthermore, additional trails and observation blinds/platforms may concentrate foot traffic on established facilities and minimize impacts to sensitive species as a result of off-trail wondering. Training and education programs would minimize any localized, short-term disturbances as a result of increased volunteer and educational programs.

Implementation of Alternative C may also increase general public awareness and stewardship of natural resources and reduce adverse impacts to special status species as a result of wildlife-dependent recreation.

In general, actions to be implemented under Alternative C (e.g., additional special status species-specific habitat management, increased habitat restoration, expanded inventory and monitoring, and a rapid assessment and control program for invasive species) would provide a moderate positive impact to special status species recovery relative to Alternative A. Although Alternative C would increase wildlife-dependent recreation, impacts to special status species are expected to be negligible; the Service would actively manage access to sensitive habitat with special status species to include closing areas and providing sufficient buffer habitat to mitigate adverse effects associated with recreational use of the Complex. Many of the short- and long-term benefits to special status species would be similar in nature, but more equitably distributed among wetland, riparian and grassland-dependent species as compared to Alternative B.

## **Socioeconomic Environment**

### **Economic Environment**

#### ***Common to All Alternatives***

##### Effects of Hunting on the Economy

In 2021, approximately 1.4 million people participated in waterfowl hunting throughout the United States (Raftovich et. al 2022). The majority of waterfowl hunters typically live in the Mississippi Flyway, followed by the Atlantic Flyway, the Central Flyway and then the Pacific Flyway. In 2021, approximately 52,300 people participated in waterfowl hunting in California (Raftovich et. al 2022). Waterfowl hunters spent \$495 million on trip expenses and \$440 million on equipment expenditures in 2001. These expenditures created 21,415 jobs and \$725.2 million in employment income. In 2001, over \$129.5 million in state tax revenue and \$201.8 million in Federal tax revenue was generated. Waterfowl hunters spent \$86.5 million on trip expenses and equipment expenditures.

These expenditures created 1,303 jobs and \$44.9 million in employment income. In 2001, approximately \$8.4 million in state tax revenue and \$12.5 million in Federal tax revenue was generated in California. From 2001 to 2010, the number of duck and goose hunters in California increased at an annual rate of 4.7 percent and 6.3 percent, respectively (CDFW 2014).

Statewide, California hunters spent an estimated 1,033,989 days and \$27,100,000 in local economies in pursuit of resident game birds alone during the 2002 hunting season (USFWS and U.S. Census Bureau 1993). In 2010, the CDFW estimates that 175,505 hunters bought upland game bird hunting licenses. If the hunting of resident game birds were to cease, the CDFW would expect to lose about \$9.7 million in revenues (\$45.93 license + \$9.46 upland game bird stamp x 175,505). A revenue loss of this magnitude would effectively halt all resident game bird management activities of the CDFW.

Hunting on the refuges (all Alternatives) has the potential to result in positive economic impacts on the local communities. Because some of the communities in the project area are small, there would be some economic benefits near the hunt areas since hunters from outside the local area visit the region and purchase goods and services from local merchants. This additional spending is likely to generate additional retail sales, income and possibly short-term employment in businesses such as motels, restaurants and retail stores. All of the Alternatives would generate the same economic benefits from hunting because the hunting program is the same for each Alternative.

#### ***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 expenditure levels at the Complex. Also, there would be no appreciable changes in recreational activities and visitation to the Complex. Regular maintenance of buildings and services at the Complex, as well as continued purchase of water rights (approximately \$2.6 million annually), will



continue to provide minor beneficial impacts to the local and regional economy. Refuge recreation activities (such as wildlife watching, hunting, and fishing) would be expected to have a minor effect on the local area demographics and economy, given the size of the entire regional economy.

A 2019 report by the Service, “Banking on Nature: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation” studied the economic benefits that are derived from recreational visits at 80 national wildlife refuges, including the San Luis NWR (Carver and Caudill 2019). The report analyzed money spent on food, lodging, and transportation when calculating the total economic activity tied to recreational use of the Refuge. In 2017, San Luis NWR had 104,720 visits for a variety of recreation activities, including hiking, wildlife viewing, hunting, and fishing. Merced NWR had 41,845 visits. The vast majority were for non-consumptive recreations, and residents accounted for a large percent of these visits (Carver and Caudill 2019). The report estimated that San Luis NWR and Merced NWR together generated \$7.6 million in total economic activity output related to refuge recreation with associated employment of 59 jobs, \$2.2 million in employment income (Carver and Caudill 2019). The Refuge generated \$3.09 of recreation-related benefits for every \$1 of budget expenditure during 2011, as estimated in the 2013 study (Carver and Caudill 2013). The economic impact from Refuge visitor expenditures could be considered substantial to those working in the hospitality and recreation industry in the local area.

#### ***Alternative B – Wetland and Waterbird Focus***

Alternative B would result in a minor positive impact to the local economy relative to Alternative A. With the initial capital outlay to implement this alternative, the Complex would experience some increased employment and spending in the local area for materials, construction, and services. The expected sales volume and income resulting from the added employment and expenditures would be slightly less than expected under Alternative C (i.e., less than \$8 million per year in sales overall, and less than a net increase of \$1.4 million per year and 0.3 percent change in historical economic activity in Merced County, see Section 4.1.8.4 below), but slightly more than Alternative A. Payment for water rights under this alternative (approximately \$3.2 million annually) would also benefit the regional economy, similar to what is seen in Alternative C. Under Alternative B, the Complex will examine the potential for an additional waterfowl hunt program, which if adopted could further increase wildlife-dependent recreation opportunities and associated economic activity in the local area, slightly above economic impacts estimated above for Alternative A. Overall, the economic impacts of implementing Alternative B would be well within the norms of historic variation in economic activity for Merced County.

#### ***Alternative C – Preferred Alternative***

Alternative C would result in a minor positive impact to the local economy relative to Alternative A. Due to the amount of expenditures and jobs created under this alternative, it would be more beneficial than Alternatives A and B. Under this alternative, the Complex would experience some increased employment and spending in the local area for materials, construction, and services. Payment for water rights under this alternative would also benefit the regional economy. Under this alternative, lands acquired through fee title purchases would be managed by the Service and would

be removed from county tax rolls. Reductions in county taxes would be partially replaced by Refuge Revenue Sharing payments.

The report *Banking on Nature 2017: The Economic Contributions of National Wildlife Refuge Recreational Visitation to Local Communities*<sup>1</sup> (Caudill and Carver 2019) detailed the findings from 80 NWRs, including the San Luis NWR and Merced NWR. The study considered money spent for food, lodging, transportation and other expenses when it calculated the economic activity related to refuge recreational use. The study found that, for San Luis NWR, visitor recreation expenditures for 2017 were \$3.9 million, with non-residents accounting for \$2.7 million or 68 percent of the total. Expenditures on non-consumptive activities (such as wildlife observation and photography, interpretation, hiking and auto tours) accounted for 82 percent of spending. Spending in the local area generates and supports economic activity. The contribution of recreational spending in the local communities surrounding the refuge was associated with about 46 jobs, \$1.7 million in employment income, \$469,000 in total tax revenue and \$5.9 million in economic output (Caudill and Carver 2019).

For Merced NWR, the *Banking on Nature Study* found that visitor recreation expenditures for 2017 were \$1.1 million, with non-residents accounting for \$728,000 or 67 percent of the total. Expenditures on non-consumptive activities accounted for 96 percent of spending. The contribution of recreational spending in local communities was associated with about 13 jobs, \$472,000 in employment income, \$129,000 in total tax revenue, and \$1.6 million in economic output (Caudill and Carver 2019). The increased recreation opportunities within the Complex will increase economic activity in the local area.

## **Public Use**

### ***Common to All Alternatives***

Hunting and fishing opportunities would be similar under all three alternatives. As previously discussed, these programs would continue to be available for all members of the public. The Complex provides waterfowl hunting opportunities for hunters by offering free roam, exclusive free roam, hunt blinds, goose pits, boat hunting and blinds for persons with disabilities.

Hunting at the San Luis NWR is coordinated with the State. Hunting is not allowed on refuge trails. Minor impacts to refuge roads in the hunt areas will occur from hunter use. The hunting parking areas will also receive normal wear and tear from hunters. These impacts are expected to be relatively minor. Fishing opportunities are available through six designated fishing sites, one of which is designed to be accessible for persons with a disability, at Salt Slough on the San Luis NWR. Most importantly, the Complex would continue to ensure safe conditions at all facilities and adequate law enforcement is available.

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<sup>1</sup> Available online at

[https://www.fws.gov/sites/default/files/documents/USFWS\\_Banking\\_on\\_Nature\\_2017.pdf#:~:text=The%202017%20Banking%20on%20Nature%3A%20The%20Economic%20Contribution,engine%20adding%20over%2041%2C000%20jobs%20to%20local%20communities.](https://www.fws.gov/sites/default/files/documents/USFWS_Banking_on_Nature_2017.pdf#:~:text=The%202017%20Banking%20on%20Nature%3A%20The%20Economic%20Contribution,engine%20adding%20over%2041%2C000%20jobs%20to%20local%20communities.)

The Complex would continue to be open to wildlife-dependent recreation (hunting, wildlife observation, photography, environmental education, and interpretation) under all alternatives. Furthermore, areas of exclusive use for non-hunting wildlife-dependent recreation uses would be provided under each alternative.

Hunting affects other wildlife-dependent recreation opportunities in a variety of ways. Many non-hunters plan their vacations or visits to avoid being in hunting areas during the hunting seasons. Most tend to seek out areas that offer amenities such as trails, parking areas and information kiosks. These facilities provide bird watchers, photographers and students an opportunity to experience the Complex for a safe, informally guided visit. In contrast, hunters plan their visits to correspond with the hunting seasons. They seek out the habitats that support the game species they are hunting. Most of the hunting occurs in fall and early winter. Although the timing of wildlife observation, photography, environmental education and interpretation activities overlap with hunting activities, they occur in geographically distinct areas on the Complex.

Conflicts between hunting and other public uses would be minimized by implementing the following management practices:

- Physically separate non-hunting and hunting acres to spatially divide the activities.
- Waterfowl hunting limited to Wednesdays, Saturdays, and Sundays during the established seasons.
- Boundary and hunting area signs maintained to clearly define the designated hunting areas.
- Allow vehicle traffic only on designated roads and parking areas.
- Parking areas signed and gated to allow only pedestrian hunter access to hunting areas.
- The hunting program managed in strict accordance with all applicable Federal laws (Code of Federal Regulations, Title 50 subchapter C) and to the extent practicable, consistent with applicable State laws.
- Field checks by refuge law enforcement officers planned and coordinated with staff and other agencies to maintain compliance with regulations and assess species and number harvested.
- Provide information about the refuge hunting program through signs, kiosks, brochures, and the Complex's website.
- No camping or tents allowed on the Complex. The exception is overnight parking at check stations is allowed for hunters that plan to hunt within the refuge the following morning.
- Outreach plan serves as a means for managing social conflicts.

By implementing these management practices there will be minimal conflicts between hunters and the other wildlife-dependent recreational uses. The uses are not occurring on the same area at the same time. Therefore, continuation of the hunting program at the Complex would have minimal effects on other wildlife-dependent recreation opportunities.

***Alternative A—No Action***

Continuation of the current public use activities would have long-term moderate positive effects to the public by providing a wide range of non-consumptive wildlife-dependent recreational opportunities. Under Alternative A, public use and visitation would remain largely unchanged. Both San Luis NWR and Merced NWR would continue to provide non-consumptive wildlife-dependent recreational opportunities to the public, including wildlife viewing, photography and environmental education. These activities would foster a connection between visitors and natural resources. The San Luis NWR provides four auto-tour routes, eight nature trails and six observation decks for wildlife observation and nature photography. Nature interpretation is available through seven information kiosks, interpretive signs along auto-tour routes and nature trails and an exhibit hall in the visitor center. The San Luis NWR visitor center facility would also continue to develop and provide environmental education programs with an emphasis on the San Joaquin Valley wildlife and habitats and the NWRS. The San Luis NWR also provides outreach to the public regarding the natural resources in the ecoregion and the refuge system by hosting special events and participating in off-Complex events.

From 2017-2019, the San Luis NWR had an average of 96,032 annual visitors. Of these visits, 84 percent of visitors' primary reason for visiting was for the auto tours. Similarly, Merced NWR had an average of 49,877 visitors, 86 percent of visitor's primary reason for visiting was for the auto tours (USFWS Visitor Services Plan 2023). Photography visits were the second reason for visiting the Complex. Visitation trends have shown that annual visitors have been increasing overall in the latter part of the decade. Under Alternative A, the Complex would continue to be a beneficial asset to the public by providing various wildlife-dependent recreational activities to the public.

***Alternative B—Wetland and Waterbird Focus***

Alternative B would have a negligible effect on public use and visitation. Under Alternative B, enhancement of wetland habitat may indirectly attract additional visitors to the Complex due to enhanced wildlife-dependent recreational opportunities (waterfowl observation). In any event, these efforts would not be expected to appreciably change annual public visitation. Overall, the Complex would continue to be a beneficial asset to the public by providing various wildlife-dependent recreational activities.

***Alternative C—Proposed Action***

Alternative C would result in long-term moderate positive benefits to public use from offering increased non-consumptive, wildlife-dependent recreational opportunities relative to Alternative A. Under Alternative C, non-consumptive activities are expanded to meet the objective of providing more opportunities for compatible, wildlife-dependent recreation and to enhance understanding and appreciation of natural resources on Complex lands. To increase visitors, the Complex proposes to promote itself through different types of media and by increasing the number of public outreach events. Various types of media would ensure that a wide range of audiences would be aware of all the Complex's available activities. Teachers and students, specifically, would also benefit from the Complex, as the Complex proposes to actively seek out partnerships with local colleges and universities to provide students the ability to conduct environmental education programs and

research. The Complex would promote and conduct environmental education (e.g., teacher resource packets and guides) that is aligned with the current Federal, state and local curriculum standards and provides interdisciplinary opportunities linking the natural world with all subject areas. Partnerships with colleges and universities would moderately increase as compared to Alternative A, where partnerships are developed only if the schools approach the Complex.

To increase public understanding and appreciation of the natural resources available, Alternative C would implement an evening lecture series at the visitor center, weekend guided nature walks, and identification and nature photography workshops. The Complex would also develop different types of informational material, specifically nature interpretation, waterfowl identification and waterfowl hunting brochures for hunters and wildlife observers alike. To assist with nature interpretation programs and activities, the Complex would proactively seek a cadre of volunteers and foster an exchange program of nature interpretation programs among Region 8 NWRs. Through different activities, the Complex would positively impact the public by attracting various types of visitors, from hunters to students.

Alternative C would produce a moderate positive impact for the public by creating several major physical additions for public use. The Complex would add an approximately one-half-mile long riparian woodland nature trail near the visitor center; a children’s nature exploration area outside the visitor center; and an approximately 400-foot mile boardwalk section to the wetland nature trail at the San Luis NWR. Other physical improvements accessible to the public include a water level observation blind to a seasonal wetland at the San Luis NWR, and photo blinds at both San Luis and Merced NWRs. These changes would bolster the number of wildlife observers, photographers and general public visitors alike.

All improvements would result in increased public use and in the long-term moderate positive benefits to visitors under Alternative C. In general, Alternative C would provide more benefits to visitors through increased educational opportunities, public outreach and recreational access, as compared to Alternatives A and B. Another major difference would be the Complex’s proposal for proactive member outreach. Although the number of visitors is expected to increase, it is difficult to forecast how many additional visitors would come to the Complex by implementing these programs.

## **Environmental Justice**

### ***Common to All Alternatives***

All Federal agencies are required to achieve environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies and activities on both low-income and minority populations. Environmental justice is the “fair treatment and meaningful involvement of all people regardless of race, color, sex, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (EPA 2022).”

The mission of the Service is working with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. The 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 United States fish and wildlife resources, as well as equal access to information that would enable them to participate meaningfully in activities and policy shaping.

The Complex is located in the San Joaquin Valley of Central California. In 2020, 21.9 percent of the population was living below the poverty level in Merced County, compared to California’s 12.3 percent (U.S. Census Bureau 2020). The county also has a slightly large percentage of certain minority groups. For example, the Hispanic or Latino population is 62.5 percent, as compared to 40.2 percent at the state level. The Complex’s management actions would benefit all members of the community, from access to recreational activities to improved health benefits from the natural environment.

Due to the nature of the action and the analysis previously discussed, the Service has concluded that none of the alternatives, including the proposed action, result in disproportionately high and adverse human health or environmental effects to any of the communities around the Complex. The Service has concluded that no minority and low-income populations or communities would be disproportionately affected by any of the alternatives. Benefits to nearby communities would be proximity to the Complex for wildlife dependent recreational uses and conserved lands. Therefore, there are no environmental justice concerns associated with implementing any of the alternatives.

## **Cultural Resources**

### **Cultural Resources**

Requirements for Federal agencies to identify, evaluate and protect cultural resources are outlined in several Federal regulations, including the National Historic Preservation Act (NHPA), the Antiquities Act of 1906, the Archaeological Resources Protection Act of 1979 and the Native American Graves Protection and Repatriation Act of 1990. The requirement for consultation with Tribal Governments is addressed in the presidential “Memorandum on Government-to-Government Relations with Native American Tribal Governments” (April 29, 1994), EO 13175 (2000) Consultation with Indian Tribal Governments, and USFWS Native American Policy (510 FW1). Tribal coordination and consultation continues as implementation of the CCP proceeds. The USFWS policy provides a framework for government-to-government relationships, which furthers the United States’ and the Department of the Interior’s trust responsibility to Federally recognized Tribes to protect, conserve and use Tribal reserved, treaty guaranteed or statutorily identified resources.

The NHPA (16 U.S.C. 470 *et seq.*) establishes the nation’s policy for historic preservation and sets in place a program for the preservation of historic properties by requiring Federal agencies to consider effects to significant cultural resources (e.g., historic properties) prior to undertakings. The NHPA established the National Register of Historic Places (NRHP) and the President’s

Advisory Council on Historic Preservation, and provided that states may establish State Historic Preservation Offices to carry out some of the functions of the NHPA. Most significantly, the NHPA established that Federal agencies be responsible for managing cultural resources. Section 106 of the NHPA directs that Federal agencies take into account the effect of an undertaking on any district, site, building, structure or object that is included in or eligible for inclusion in the NRHP. Further, it defines the steps necessary to identify historic properties, including consultation with Federally recognized Native American Tribes to identify resources with important cultural values; determine whether they may be adversely affected by a proposed undertaking; and outline the process for eliminating, reducing or mitigating adverse effects.

EO 13175 firmly establishes the policy for regular and meaningful consultation with Tribes, directing each agency to develop a consultation process. Executive Memorandum, Government-to-Government Relationship with Tribal Governments (September 2004), recognizes the unique legal and political relationship of Tribes, and reaffirms that each executive department and agency fully respect the rights of self-government and self-determination in their working relationships with Federally recognized Tribal Governments.

### ***Alternative A—No Action***

Under Federal regulations, a project has an effect on a historic property when the undertaking could alter the characteristics of the property that may qualify the property for inclusion in the National Register of Historic Places (NRHP), including alteration of location, setting or use. An undertaking may be considered to have an adverse effect on a historic property when the effect may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association. Adverse effects on historic properties include, but are not limited to:

- Cause physical destruction of or damage to all or part of a historic or prehistoric site.
- Alter a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines.
- Remove the property from its historic location.
- Change the character of the property's use or any physical features within the property's setting that contribute to its historic significance.
- Introduce visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
- Neglect a property, which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an affiliated Native American Tribe or Native Hawaiian organization.

Alternative A may result in minor adverse effects to cultural resources. Outside of normal maintenance and project actions, habitat 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 adverse effects. All ground disturbing projects outside of normal maintenance and management practices are cleared with USFWS Cultural Resources in advance through a Section 106 evaluation. The Service would continue to manage and conserve cultural resources at the Complex and comply with Section 106 of the National Historic Preservation Act (NHPA), including consultation with the State Historic Preservation Officer (SHPO) and pertinent Tribes, in order to eliminate or minimize adverse effects. A formal cultural resources survey was conducted at the San Luis NWR and Merced NWR by Haversat and Breschini in 1985. The 1985 survey resulted in finding 38 archaeological sites at the San Luis NWR and one site at the Merced NWR. Most of these sites were categorized as “base camps” occupied by several families on a year-round or seasonal basis (Haversat and Breschini 1985). One of the sites identified at the San Luis NWR was a historic ferry crossing used in the late 1800s. For over 150 years, agriculture has been a major activity in Merced County, which has caused some challenges when assessing the area for archaeological activity; the soils in many areas have been disturbed and manipulated by plowing or the grade altered entirely, which may have destroyed historical evidence.

All sites NRHP 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 the Complex receive protection under Federal laws mandating the management of cultural resources, including, but not limited to the Archaeological Resources Protection Act, Archaeological and Historical Preservation Act, Native American Graves Protection and Repatriation Act and NHPA. If any cultural resources are discovered on the Complex, the Service would take all necessary steps to comply with Section 106 of the NHPA and other applicable regulations, in consultation with the SHPO and affected Tribal Governments. The Service is not proposing any project, activity or program that would result in changes in the character of, or would potentially adversely affect, any known historic cultural resource or archaeological site.

Impacts to cultural resources from hunting activities on the refuges, if any, will be minimal. No significant effects to cultural resources are anticipated as a result of continuing the current hunting program within the project area.

#### ***Alternative B—Wetland and Waterbird Focus***

Similar minor adverse effects to cultural resources previously described for Alternative A would occur from implementing Alternative B. Alternative B may increase adverse effects to cultural resources because of increased habitat management efforts that will result in additional soil disturbing activities. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. When ground-disturbing activities are proposed, the Service would follow the same process of compliance with Section 106 of the NHPA and other applicable regulations along with the initiation of Tribal consultation, as described in Section 4.4.1 above.



### ***Alternative C—Preferred Alternative***

Similar minor adverse effects to cultural resources previously described for Alternatives A and B would occur from implementing Alternative C. Alternative C may increase adverse effects to cultural resources due to an increase in human activity and visitation to the Complex. The adverse effects would be slightly greater under Alternative C, relative to Alternatives A and B, due to the additional ground-disturbing activities being proposed. 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 other applicable regulations and conduct Tribal consultation when ground-disturbing activities are proposed.

## **Cumulative Effects**

In this section, 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 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 C), or combinations of management measures being considered for other alternatives (i.e., Alternatives A or B), 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 (which is the projected time frame for implementing the CCP) for the Complex and throughout the study area (i.e., the Complex and surrounding areas in Merced County).

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 below.

- **Regional Growth**—From 2010 to 2020, Merced County saw an increase in population of 10 percent, from 255,793 to 281,202 (U.S. Census Bureau 2020). The California Department of Finance estimates Merced County will have about 620,000 people by the year 2040 (CDF 2010).
- **Renewable Energy**—In Merced County, various active renewable energy projects occur, with a majority planned or currently active in agricultural zones (CEC 2006). For instance, the Cenergy Solar Project recently submitted a notice of preparation for a 30-acre, fixed panel, solar photovoltaic power generation facility (CA OPR 2012). This site is classified as Prime Farmland and may provide foraging habitat for the Swainson’s hawk. Another project, the Quinto Solar PV Project, is a 110-megawatt solar PV energy generation facility on a 1,012-acre site on the county’s Agricultural Preserve.

- **Agricultural Practices**—Agriculture is the foundation of Merced’s economy. As an economic driver and a factor in the socioeconomic structure of the San Joaquin Valley, agriculture would continue to play a decisive role in the future of the region. According to the County’s General Plan, Merced County intends to continue to expand its agriculture industry through diversification to food processing and packing, as further described below (Merced County 2012a).
- **Industries**—Over the past 20 years, the county’s economy has expanded from exclusively farm crop production to include food processing and manufacturing (U.S. Census Bureau and Merced County 2012). Manufacturing is an important stage of value-added production, and its continued and expanded role in the processing of agricultural products is regarded as an important source of future economic growth. In addition to manufacturing, the county’s goal is to further diversify the economy and attract new industries (Merced County 2012a). The county has already begun this transition. Over the past two decades, lower land and labor costs in the valley compared to those of other regions have attracted numerous businesses to the region. Although the county’s majority of major employers are related to the agriculture industry (i.e., food processors and packers), the county also has non-agriculture major employers such as the Werner Company (ladders), Malibu Boats (competition boats) and NCI Building Systems (building material) (Merced County 2012b).
- **Infrastructure/Development Projects**—According to the 2030 Merced County General Plan, the county plans to invest in infrastructure to infill areas with the greatest potential for economic growth, particularly along existing infrastructure, such as Interstate 5, State Route 99 and University of California, Merced (Merced County 2012a). In addition, the county also intends to encourage telecommunication infrastructure capabilities throughout the county (Merced County 2012a). One large-scale project proposed to be built within the next two decades is the California High-Speed Rail; the project proposes to serve major cities between Sacramento and Los Angeles (DOT 2012). The California High-Speed Train (HST) Project EIR/EIS concluded that, across the state, HST would induce the highest incremental population growth in Merced and Madera County. The economic analysis found that the largest employment shifts by sector would occur in the Central Valley, and it concluded that the rail could be a strong influence in additional employment and business opportunities and attract higher-wage jobs (DOT 2012).
- **Wildfire**—Wildfire risks and intensity have the potential to increase in the coming decades due to climate change and expanded development. Over the next 75 years, a combination of warmer winters, reduced snowpack, earlier snowmelts and hotter, drier summers would lead to more wildfires in forested parts of the state (DWR 2012). Current population growth, easy access to recreation, nature scenery and lower property costs have resulted in development expansion into traditionally nonurban areas, which increases the potential for wildfire risks due to fire suppression activities.
- **Hydrology**—Hydrology has been adversely impacted by flood control and water storage measures and may be adversely impacted in the coming decades by global and regional

climatic events (i.e., increased erosion, increased frequency of extreme weather events). In addition, increased water competition and degradation from expansion of development would impact hydrology. Agricultural irrigation represents the dominant water use in the county. Excluding agriculture water usages, urban water use is expected to increase 50 to 70 percent (40,000–60,000) in eastern and northern Merced County in the next 20 years (Merced County 2009). Water quality and natural movement and distribution would be adversely impacted by infrastructure.

- Hunting—Other past, present and reasonably foreseeable hunts and anticipated impacts associated with hunting in the region are outlined.

**Past.** The San Luis and Merced NWRs and Grasslands WMA were established in 1967, 1951 and 1979, respectively. Waterfowl hunting has been a constant at the San Luis NWR and Merced NWR, and in the early years of each refuge, a high priority was placed on this public use. Each refuge, beginning with the Merced NWR in 1951 and the San Luis NWR in 1968, managed public waterfowl hunting programs from the beginning of their establishment. The early programs at each refuge were rudimentary and became more refined in the following decades. The first two decades of the Merced NWR hunt program featured a free-roam style shoot. In the mid-1970s, due to a trend of poor hunter success, the hunt program was re-evaluated and several changes were made to improve the quality. The daily hunter capacity was reduced and fixed blind sites were established. Hunting days per week at the Merced NWR were also reduced to Wednesdays and Saturdays, each with only half-day hunts. As with the Merced NWR, hunt areas and boundaries at the San Luis NWR changed over the years to improve hunting opportunities and facilitate other public uses. In the late 1980s, the hunt area shifted to the western side of the refuge. This change allowed the waterfowl auto tour route, part of which was previously in the hunt area, to remain open for wildlife observers on waterfowl hunt days.

Hunting has also traditionally occurred in the region on private lands, state-owned conservation properties and Federally owned public lands. California has a long history of hunters investing significant resources into the betterment of many of the State's habitats. The interest generated by these programs has resulted in the formation of numerous local sportsmen's organizations dedicated to the protection and improvement of wildlife habitat. Moreover, several organizations—including Ducks Unlimited, California Waterfowl Association, National Wild Turkey Federation, Quail Unlimited, Pheasants Forever, Safari Club International, Safari Club International Foundation and California Deer Association—invest resources to benefit many types of wildlife.

**Present.** In California, 38 refuges provide 471,526 acres of habitat for wildlife. Hunting, fishing, wildlife observation, photography, environmental education and interpretation are enjoyed by millions of visitors annually. They are also wild places where people can find solace and reconnect with nature.

In California, 14 refuges are closed to the public. Eighteen refuges, including the San Luis NWR, Merced NWR and Grasslands WMA, allow waterfowl hunting. Nine of these refuges, including San Luis NWR and Grasslands WMA, also allow upland game bird hunting. Hunting on the Complex will have an extremely minor impact on wildlife species on refuges within California. California hunters benefit from being able to hunt these species on the refuges; however, it is not a cumulatively significant impact.

Approximately 9,000 annual hunter visits occur on the San Luis and Merced NWRs. The number of hunters is not expected to increase significantly in the future. In addition, hunting is monitored, regulated and designed to ensure that harvest does not reduce populations to unsustainable levels. Hunters must report waterfowl and pheasant harvest at each of the refuge's check stations. Although hunting directly impacts individual animals, the amount of harvest is not expected to have a measurable effect on the refuges' wildlife population levels. Field checks by refuge law enforcement officers will be planned, conducted and coordinated with staff and other agencies to maintain compliance with regulations and assess species populations and numbers harvested.

The Complex, inclusive of the acquisition boundary of the Grasslands WMA, is 262,474 acres, which includes 99,764 acres of remnant riparian and wetland vegetation and 162,710 acres of upland areas consisting of croplands and grasslands. This diversity of vegetation presently provides game animals with high-quality breeding habitat, which provides abundant and diverse food items, such as seeds and legumes; shelter from weather-related elements; roosting habitat; water; and high-quality winter habitat, which provides similar food, escape, shelter, roosting and water needs.

Wildlife populations are currently hunted on both private and public lands in Merced County. Hunting is a highly regulated activity. It generally takes place at specific times and seasons (dawn, fall and winter), when the game animal is less vulnerable (e.g., non-breeding season), and in areas where other wildlife-dependent activities (e.g., bird-watching, environmental education and interpretation) do not occur, thus reducing the magnitude of disturbance to refuge wildlife in those areas. The Complex currently places a visitor capacity only on the waterfowl hunting program. Free-roam areas, assigned zone/pond and spaced blinds all have maximum capacities to ensure that hunters have a safe and quality experience, and to minimize the impact and disturbance to the Complex and wildlife. Managed and regulated hunting will not reduce species populations to levels where other wildlife-dependent uses will be affected.

***Reasonably Foreseeable Future.*** As previously discussed, although hunting directly impacts individual animals, the amount of harvest is not expected to have a measurable effect on the Complex wildlife population levels. In addition, hunting is monitored, regulated and designed to ensure that harvest does not reduce populations to unsustainable levels. Moreover, the amount of hunting on the Complex is not expected to increase significantly in the future. Even if hunting effort were to slightly increase in California and at the refuges in the long term, adaptive management harvest processes would continue to

set and adjust hunting regulations to maintain stable waterfowl and upland game bird populations in the region.

**Physical Environment.** Additional cumulative minor adverse impacts on air quality, noise and water resources would occur from implementing the proposed actions, when added to impacts associated with increased development and water competition in the region. Localized positive benefits to hydrology from implementing the proposed action may exacerbate adverse cumulative effects at the regional scale due to water competition associated with urban development and expansion of infrastructure, as well as climatic events. No additional cumulative effects are expected to affect geological resources and soils of the region from implementing the proposed action.

**Biological Environment.** The implementation of Alternatives A, B or C would provide positive benefits to vegetation, wildlife and special status species. The ecological benefits of additional wetland restoration (under Alternatives B and C) are substantial. Additional wetlands offer wildlife protection from predators and other vital habitat factors for many of the nation's fish and wildlife species, including endangered and threatened species. Wetlands act as filters to regulate pollutants and intercept storm runoff and release floodwater gradually into downstream systems. All alternatives would have some long-term benefits by preserving and enhancing native wildlife species and habitats within the area. However, these alternatives would not reverse or halt the regional trend of development and the associated reduction in biological diversity.

With respect to hunting, each national wildlife refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting. Season dates and bag limits for national wildlife refuges open to hunting are never longer or higher than the State regulations. Season dates and bag limits may be more restrictive than the State allows.

The harvest management procedures that are in place at a national and state level consider the status of waterfowl and upland game bird populations prior to determining the appropriate level of harvest permitted that year.

Based on the analysis presented earlier in this chapter, the Service has concluded that there will be no significant cumulative impacts of hunting on wildlife populations, either hunted or non-hunted species, on the Complex. Although mortality will occur to some wildlife under the hunt program, the analysis presented previously in this appendix supports the conclusion that there would be no adverse population level impacts to hunted or non-hunted wildlife species, even when added to other hunt programs regionally or nationally. The Service has also concluded that continuation of the hunting program will not cumulatively impact the environment or programs of the Complex. This determination was based upon a careful analysis of potential environmental impacts of hunting on the Complex together with other projects and/or actions. Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning and regulations will be designated to minimize any negative impacts to wildlife populations using the Complex.

**Socioeconomic Environment.** Cumulative minor beneficial effects may occur to socioeconomics because development growth, combined with increases in Complex expenditures and activities, would induce additional economic growth for the region.

The report *Banking on Nature 2017: The Economic Contributions of National Wildlife Refuge Recreational Visitation to Local Communities* (Caudill and Carver 2019) detailed the findings from 80 NWRs, including the San Luis NWR and Merced NWR. The study considered money spent for food, lodging, transportation and other expenses when it calculated the economic activity related to refuge recreational use. The study found that, for San Luis NWR, visitor recreation expenditures for 2017 were \$3.9 million, with non-residents accounting for \$2.7 million, or 68 percent, of the total. Expenditures on non-consumptive activities (such as wildlife observation and photography, interpretation, hiking and auto tours) accounted for 82 percent of spending. Spending in the local area generates and supports economic activity. The contribution of recreational spending in the local communities surrounding the refuge was associated with about 46 jobs, \$1.7 million in employment income, \$469,000 in total tax revenue and \$5.9 million in economic output (Caudill and Carver 2019).

For Merced NWR, the *Banking on Nature Study* found that visitor recreation expenditures for 2017 were \$1.1 million, with non-residents accounting for \$728,000, or 67 percent, of the total. Expenditures on non-consumptive activities accounted for 96 percent of spending. The contribution of recreational spending in local communities was associated with about 13 jobs, \$472,000 in employment income, \$129,000 in total tax revenue and \$1.6 million in economic output (Caudill and Carver 2019).

The Complex would continue to have a long-term positive impact on the surrounding economies through expenditures, local employment and other wildlife-related activities.

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## **Chapter 5. Consultation and Coordination**

### **List of Sources, Agencies and Persons Consulted**

#### **Preparers:**

Natural Resources Division, Pacific Southwest Region (Region 8) staff, San Luis National Wildlife Refuge Complex staff, U.S. Fish and Wildlife Service

#### **State Coordination:**

Write if any state coordination

#### **Tribal Consultation:**

The Service is coordinating with the following Tribes that have cultural ties to the general area where the proposed action would occur: Central Sierra Miwok, Ione Band of Miwok and Southern Sierra Miwok.

#### **Public Outreach**

In July 2008, the first Planning Update (newsletter), introducing the refuges and the CCP process, was mailed to over 200 members of the public, elected officials, organizations, media and agency representatives. The Notice of Intent for the CCP/EA was published on September 8, 2008. During the fall of 2008, public scoping meetings were conducted, news releases were circulated, website information was posted and informational mailings (Planning Update #2 and an issues workbook) were sent to interested parties to gather input and comments. The public had opportunities to attend two public scoping meetings in Los Banos (on September 24, 2008) and one meeting in Merced (on September 25, 2008). Approximately 32 people attended the three meetings. Verbal comments were recorded during scoping meetings and additional comments were received in response to the issues workbook provided by the planning team. The scoping period ended on October 23, 2008. Over 100 comments were received, including written comments by mail or e-mail and verbal comments provided during personal conversations with refuge and planning staff during the scoping meetings.

In 2023, state partners and tribes will be notified in advance of draft availabilities for their advanced review before the general public. A public meeting for receiving public comments and feedback about the drafts will be scheduled for late July or August, 2023. The general public will have 45 days to submit their comments. All substantial comments will then be compiled and addressed.

The draft Environmental Assessment will also be available for public and agency review during the summer of 2023, likely in the July to September timeframe, for 45 days. Substantive comments received on the draft document will be addressed appropriately. This draft EA will be available on



the San Luis National Wildlife Refuge Complex website. The public will also be notified through postings on Facebook and Twitter and through local media outlets (including newspapers).

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## **Chapter 6. Determination**

### **Signatures**

**Submitted By:**

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**Project Leader Signature:**

**Date:**

**Concurrence:**

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**Refuge Supervisor Signature:**

**Date:**

**Approved:**

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**Regional Chief, National Wildlife Refuge System Signature:**

**Date:**

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## **Subappendix D-2. BMPs on Service-Owned Lands**

Best management practices (BMPs) are designed to reduce adverse impacts to wildlife and plants and their habitats on Service-owned (USFWS) lands. BMPs shall be executed on Service-owned lands by all project coordinators.

1. Follow all terms, conditions and stipulations in regulatory permits and other official project authorizations to eliminate or reduce impacts to endangered, threatened or sensitive species or their critical habitats.
2. Complete restoration activities at individual project sites in a timely manner to reduce disturbance and/or displacement of wildlife species in the immediate project area.
3. Use existing roadways or travel paths for access to project sites.
4. 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.
5. 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.
6. 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 clean up any small-scale accidental hazardous spills. 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.
7. 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. 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 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.

8. 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.
9. 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, such as hay bales and silt fences, shall be employed until the risk of aquatic contamination has ended.
10. Monitoring is required during project implementation and for at least 1 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.
11. Special status plants and habitats will be well marked and communicated to equipment operators to avoid direct and indirect adverse effects.
12. All construction personnel will be briefed on the status of the special status species and employ avoidance measures.
13. To protect special status species when threatened by proposed activities, USFWS will conduct the following activities: a) trails, roads and/or areas will be closed to ensure that human access does not disturb special status species using an adaptive management process; b) 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 c) USFWS will comply with all terms and conditions resulting from section 7, Endangered Species Act consultation.
14. 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.
15. Sedimentation and erosion controls shall be implemented, when and where appropriate, during wetland restoration or creation activities to maintain the water quality of adjacent water sources.
16. 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.

17. 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.
18. Snags shall be retained on project sites for cavity-dependent wildlife species whenever possible.
19. Seedlings, cuttings and other plant propagules for restoration shall be sourced from local ecotypes.
20. When necessary for invasive plant removal or habitat restoration, trees shall be felled away from streams, riparian zones and wetlands whenever possible.
21. 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.
22. Reduce the need for mosquito pesticides by strategically controlling the speed, timing and depth of flooded wetlands. a) Use delayed or phased fall flooding and early fall flood-up planning. Depending on flood date, the timing of habitat unit flooding can reduce the need or amount of additional mosquito management treatments. b) Use rapid fall flooding and rapid irrigation. As a rule, the faster water can be applied during fall flooding and spring/summer irrigation, the fewer generations of mosquitoes will be hatched, which can reduce the need or amount of additional mosquito management treatments. c) Maintain stable water levels, circulate water, use deep initial flooding and subsurface irrigate. If possible, wetlands can be flooded to deeper water depths (24 inches) during the fall and allowed to recede during the cooler winter months (instead of warmer months), which can reduce the need or amount of additional mosquito management treatments. d) To reduce the need or amount of additional mosquito management treatments, when possible, managers will shorten the duration of irrigation to 4 to 10 days to reduce the likelihood of hatching floodwater mosquitoes and eliminate the possibility of creating habitat for standing water mosquitoes. Following wetland irrigations, water will be drawn down into waterways containing mosquito predators that can consume any mosquito larvae that may have hatched. e) Naturally occurring predators, such as fish, dragonflies, aquatic macroinvertebrates and certain birds and bats, can contribute to the reduction of mosquitoes and, assumedly the need for chemical treatments to reduce mosquitoes. It is critical to the success of biological mosquito control to limit the use, when possible, of broad-spectrum insecticides that not only kill mosquitoes, but also eliminate their natural predators. f) Maintain permanent or semi-permanent water where mosquito predators can develop and be maintained. Discourage use of broad spectrum pesticides. g) All chemical applications will occur when wind speeds are at or below eight (8) mph.

23. Mosquito control will follow an ordered succession, using non-chemical treatments first (e.g., water control strategies, mosquito fish) and resorting to chemical treatments only when necessary.
24. Weed control will also follow an ordered succession, using mechanical methods, burning or grazing before resorting to chemical treatments whenever possible.
25. No aquatic vegetation will be targeted with chemical herbicides in flooded conditions, and there will be no direct application of chemicals into riverine environments.
26. Mosquito adulticides applications will not be made within 100 feet of wetlands, lakes or streams, which may contain listed fish unless winds or inversions favor pesticide drift away from the water.
27. Potential impacts of research activities on refuge resources will be minimized because sufficient restrictions and safeguards, including the following stipulations (BMPs), will be included in the Special Use Permit and research activities will be monitored by the refuge manager and biologist. The refuge manager and biologist would ensure that proposed monitoring and research investigations would contribute to the enhancement, protection, conservation and management of native refuge wildlife populations and their habitats. The following BMPs are included as stipulations in Compatibility Determinations for approval of research. a) If proposed research methods are evaluated and determined to have potential adverse impacts on refuge wildlife or habitat, then the refuge would determine the utility and need of such research for conservation and management of refuge wildlife and habitat. If the need was demonstrated by the research permittee and accepted by the refuge, then measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) would be developed and included as part of the study design and on the Special Use Permit (SUP). SUPs will contain specific terms and conditions that the researcher(s) must follow relative to activity, location, duration, seasonality, etc. to ensure continued compatibility. b) All refuge rules and regulations must be followed unless otherwise accepted in writing by refuge management. c) Extremely sensitive wildlife habitat areas will be avoided unless sufficient protection from research activities (i.e., disturbance, collection, capture and handling) is implemented to limit the area and/or wildlife potentially impacted by the proposed research, as approved by the refuge manager. Where appropriate, some areas may be temporarily/seasonally closed so that research would be permitted when impacts to wildlife and habitat are no longer a concern. d) Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise. e) Refuge staff will monitor researcher activities for potential impacts to the refuge resources and for compliance with conditions on the SUP. The refuge manager may determine that previously approved research and SUPs be terminated due to observed impacts. The refuge manager will also have the ability to cancel a SUP if the researcher is out of compliance with the conditions of the SUP.

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## Appendix E: Species List

### Bird Species

<b>Scientific Name</b>	<b>Common Names</b>
<i>Accipiter cooperii</i>	Cooper's Hawk
<i>Accipiter striatus</i>	Sharp-shinned Hawk
<i>Aquila chrysaetos</i>	Golden Eagle
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Buteo lagopus</i>	Rough-legged Hawk
<i>Buteo lineatus</i>	Red-shouldered Hawk
<i>Buteo regalis</i>	Ferruginous Hawk
<i>Buteo swainsoni</i>	Swainson's Hawk
<i>Circus cyaneus</i>	Northern Harrier
<i>Elanus caeruleus</i>	Black-shouldered Kite
<i>Haliaeetus leucocephalus</i>	Bald Eagle
<i>Cathartes aura</i>	Turkey Vulture
<i>Pandion haliaetus</i>	Osprey
<i>Aix galericulata</i>	Mandarin Duck
<i>Aix sponsa</i>	Wood Duck
<i>Anas acuta</i>	Northern Pintail
<i>Anas americana</i>	American Wigeon
<i>Anas clypeata</i>	Northern Shoveler
<i>Anas crecca</i>	Green-winged Teal
<i>Anas cyanoptera</i>	Cinnamon Teal
<i>Anas discors</i>	Blue-winged Teal
<i>Anas penelope</i>	Eurasian Wigeon
<i>Anas platyrhynchos</i>	Mallard
<i>Anas strepera</i>	Gadwall
<i>Anser albifrons</i>	Greater White-fronted Goose
<i>Aythya affinis</i>	Lesser Scaup
<i>Aythya americana</i>	Redhead
<i>Aythya collaris</i>	Ring-necked Duck
<i>Aythya marila</i>	Greater Scaup
<i>Aythya valisineria</i>	Canvasback
<i>Branta bernicla</i>	Brant
<i>Branta canadensis moffitti</i>	Western Canada Goose
<i>Branta canadensis parvipes</i>	Lesser Canada Goose
<i>Branta hutchinsii leucopareia</i>	Aleutian Cackling Goose
<i>Branta hutchinsii minima</i>	Cackling Goose
<i>Branta hutchinsii taverneri</i>	Taverner's Cackling Goose
<i>Branta ruficollis</i>	Red-breasted Goose
<i>Bucephala albeola</i>	Bufflehead
<i>Bucephala clangula</i>	Common Goldeneye

<b>Scientific Name</b>	<b>Common Names</b>
<i>Chen caerulescens</i>	Snow Goose
<i>Chen rossii</i>	Ross' Goose
<i>Cygnus buccinator</i>	Trumpeter Swan
<i>Cygnus columbianus</i>	Tundra Swan
<i>Dendrocygna bicolor</i>	Fulvous Whistling Duck
<i>Lophodytes cucullatus</i>	Hooded Merganser
<i>Melanitta perspicillata</i>	Surf Scoter
<i>Mergus merganser</i>	Common Merganser
<i>Oxyura jamaicensis</i>	Ruddy Duck
<i>Aeronautes saxatalis</i>	White-throated Swift
<i>Chaetura vauxi</i>	Vaux's Swift
<i>Archilochus alexandri</i>	Black-chinned Hummingbird
<i>Calypte anna</i>	Anna's Hummingbird
<i>Selasphorus rufus</i>	Rufous Hummingbird
<i>Stellula calliope</i>	Calliope Hummingbird
<i>Chordeiles acutipennis</i>	Lesser Nighthawk
<i>Charadrius montanus</i>	Mountain Plover
<i>Charadrius nivosus nivosus</i>	Western Snowy Plover
<i>Charadrius semipalmatus</i>	Semipalmated Plover
<i>Charadrius vociferus</i>	Killdeer
<i>Pluvialis dominica</i>	American Golden Plover
<i>Pluvialis squatarola</i>	Black-bellied Plover
<i>Chlidonias niger</i>	Black Tern
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull
<i>Hydroprogne caspia</i>	Caspian Tern
<i>Larus californicus</i>	California Gull
<i>Larus canus</i>	Mew Gull
<i>Larus delawarensis</i>	Ring-billed Gull
<i>Larus glaucescens</i>	Glaucous-winged Gull
<i>Larus smithsonianus</i>	Herring Gull
<i>Sterna forsteri</i>	Forster's Tern
<i>Himantopus mexicanus</i>	Black-necked Stilt
<i>Recurvirostra americana</i>	American Avocet
<i>Actitis macularius</i>	Spotted Sandpiper
<i>Arenaria interpres</i>	Ruddy Turnstone
<i>Calidris alba</i>	Sanderling
<i>Calidris alpina</i>	Dunlin
<i>Calidris bairdii</i>	Baird's Sandpiper
<i>Calidris canutus</i>	Red Knot
<i>Calidris himantopus</i>	Stilt Sandpiper
<i>Calidris mauri</i>	Western Sandpiper
<i>Calidris melanotos</i>	Pectoral Sandpiper
<i>Calidris minutilla</i>	Least Sandpiper
<i>Calidris pusilla</i>	Semipalmated Sandpiper

<b>Scientific Name</b>	<b>Common Names</b>
<i>Gallinago delicata</i>	Common Snipe
<i>Limnodromus griseus</i>	Short-billed Dowitcher
<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher
<i>Limosa fedoa</i>	Marbled Godwit
<i>Limosa haemastica</i>	Hudsonian Godwit
<i>Numenius americanus</i>	Long-billed Curlew
<i>Numenius phaeopus</i>	Whimbrel
<i>Phalaropus lobatus</i>	Red-necked Phalarope
<i>Phalaropus tricolor</i>	Wilson's Phalarope
<i>Tringa flavipes</i>	Lesser Yellowlegs
<i>Tringa melanoleuca</i>	Greater Yellowlegs
<i>Tringa semipalmata</i>	Willet
<i>Tringa solitaria</i>	Solitary Sandpiper
<i>Mycteria americana</i>	Wood Stork
<i>Columba livia</i>	Rock Dove
<i>Patagioenas fasciata</i>	Band-tailed Pigeon
<i>Streptopelia decaocto</i>	Eurasian Collared Dove
<i>Zenaida macroura</i>	Mourning Dove
<i>Megaceryle alcyon</i>	Belted Kingfisher
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo
<i>Geococcyx californianus</i>	Greater Roadrunner
<i>Falco columbarius</i>	Merlin
<i>Falco mexicanus</i>	Prairie Falcon
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Falco sparverius</i>	American Kestrel
<i>Callipepla californica</i>	California Quail
<i>Meleagris gallopavo</i>	Turkey
<i>Phasianus colchicus</i>	Ring-necked Pheasant
<i>Gavia immer</i>	Common Loon
<i>Grus canadensis</i>	Sandhill Crane
<i>Fulica americana</i>	American Coot
<i>Gallinula chloropus</i>	Common Moorhen
<i>Porzana carolina</i>	Sora
<i>Rallus limicola</i>	Virginia Rail
<i>Psaltriparus minimus</i>	Bushtit
<i>Eremophila alpestris</i>	Horned Lark
<i>Bombycilla cedrorum</i>	Cedar Waxwing
<i>Bombycilla garrulus</i>	Bohemian Waxwing
<i>Passerina amoena</i>	Lazuli Bunting
<i>Passerina caerulea</i>	Blue Grosbeak
<i>Pheucticus melanocephalus</i>	Black-headed Grosbeak
<i>Piranga ludoviciana</i>	Western Tanager
<i>Certhia americana</i>	Brown Creeper
<i>Aphelocoma californica</i>	Western Scrub Jay

Scientific Name	Common Names
<i>Corvus brachyrhynchos</i>	American Crow
<i>Corvus corax</i>	Common Raven
<i>Pica nuttalli</i>	Yellow-billed Magpie
<i>Ammodramus savannarum</i>	Grasshopper Sparrow
<i>Artemisiospiza belli</i>	Sage Sparrow
<i>Calamospiza melanocorys</i>	Lark Bunting, Lark Sparrow
<i>Chondestes grammacus</i>	Lark Sparrow
<i>Junco hyemalis</i>	Dark-eyed Junco
<i>Melospiza georgiana</i>	Swamp Sparrow
<i>Melospiza lincolnii</i>	Lincoln's Sparrow
<i>Melospiza melodia</i>	Song Sparrow
<i>Melozone crissalis</i>	California Towhee
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Passerella iliaca</i>	Fox Sparrow
<i>Pipilo erythrophthalmus</i>	Rufous-sided Towhee
<i>Pipilo maculatus</i>	Spotted Towhee
<i>Pooecetes gramineus</i>	Vesper Sparrow
<i>Spizella passerina</i>	Chipping Sparrow
<i>Zonotrichia albicollis</i>	White-throated Sparrow
<i>Zonotrichia atricapilla</i>	Golden-crowned Sparrow
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow
<i>Haemorhous mexicanus</i>	House Finch
<i>Haemorhous purpureus</i>	Purple Finch
<i>Spinus lawrencei</i>	Lawrence's Goldfinch
<i>Spinus pinus</i>	Pine Siskin
<i>Spinus psaltria</i>	Lesser Goldfinch
<i>Spinus tristis</i>	American Goldfinch
<i>Hirundo rustica</i>	Barn Swallow
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow
<i>Progne subis</i>	Purple Martin
<i>Riparia riparia</i>	Bank Swallow
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow
<i>Tachycineta bicolor</i>	Tree Swallow
<i>Tachycineta thalassina</i>	Violet-green Swallow
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
<i>Agelaius tricolor</i>	Tricolored Blackbird
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird
<i>Icterus bullockii</i>	Bullock's Oriole
<i>Icterus cucullatus</i>	Hooded Oriole
<i>Icterus galbula</i>	Northern Oriole
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Quiscalus mexicanus</i>	Great-tailed Grackle
<i>Sturnella neglecta</i>	Western Meadowlark
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird

<b>Scientific Name</b>	<b>Common Names</b>
<i>Lanius excubitor</i>	Northern Shrike
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Mimus polyglottos</i>	Northern Mockingbird
<i>Toxostoma redivivum</i>	California Thrasher
<i>Anthus rubescens</i>	American Pipit
<i>Baeolophus inornatus</i>	Oak Titmouse
<i>Cardellina pusilla</i>	Wilson's Warbler
<i>Geothlypis tolmiei</i>	Macgillivray's Warbler
<i>Geothlypis trichas</i>	Common Yellowthroat
<i>Icteria virens</i>	Yellow-breasted Chat
<i>Leiothlypis celata</i>	Orange-crowned Warbler
<i>Leiothlypis ruficapilla</i>	Nashville Warbler
<i>Mniotilta varia</i>	Black-and-white Warbler
<i>Setophaga coronata</i>	Yellow-rumped Warbler
<i>Setophaga nigrescens</i>	Black-throated Gray Warbler
<i>Setophaga occidentalis</i>	Hermit Warbler
<i>Setophaga petechia</i>	Yellow Warbler
<i>Setophaga ruticilla</i>	American Redstart
<i>Setophaga townsendi</i>	Townsend's Warbler
<i>Passer domesticus</i>	House Sparrow
<i>Phainopepla nitens</i>	Phainopepla
<i>Regulus calendula</i>	Ruby-crowned Kinglet
<i>Regulus satrapa</i>	Golden-crowned Kinglet
<i>Sitta canadensis</i>	Red-breasted Nuthatch
<i>Sitta carolinensis</i>	White-breasted Nuthatch
<i>Sturnus vulgaris</i>	European Starling
<i>Chamaea fasciata</i>	Wrentit
<i>Cistothorus palustris</i>	Marsh Wren
<i>Salpinctes obsoletus</i>	Rock Wren
<i>Thryomanes bewickii</i>	Bewick's Wren
<i>Troglodytes aedon</i>	House Wren
<i>Troglodytes pacificus</i>	Winter Wren
<i>Catharus guttatus</i>	Hermit Thrush
<i>Catharus ustulatus</i>	Swainson's Thrush
<i>Ixoreus naevius</i>	Varied Thrush
<i>Sialia currucoides</i>	Mountain Bluebird
<i>Sialia mexicana</i>	Western Bluebird
<i>Turdus migratorius</i>	American Robin
<i>Contopus pertinax</i>	Olive-sided Flycatcher
<i>Contopus sordidulus</i>	Western Wood-pewee
<i>Empidonax difficilis</i>	Pacific-slope Flycatcher
<i>Empidonax oberholseri</i>	Dusky Flycatcher
<i>Empidonax traillii</i>	Willow Flycatcher
<i>Empidonax wrightii</i>	Gray Flycatcher

Scientific Name	Common Names
<i>Myiarchus cinerascens</i>	Ash-throated Flycatcher
<i>Pyrocephalus rubinus</i>	Vermilion Flycatcher
<i>Sayornis nigricans</i>	Black Phoebe
<i>Sayornis saya</i>	Say's Phoebe
<i>Tyrannus verticalis</i>	Western Kingbird
<i>Tyrannus vociferans</i>	Cassin's Kingbird
<i>Vireo bellii pusillus</i>	least Bell's vireo
<i>Vireo cassinii</i>	Cassin's Vireo
<i>Vireo gilvus</i>	Warbling Vireo
<i>Ardea alba</i>	Great Egret
<i>Ardea herodias</i>	Great Blue Heron
<i>Botaurus lentiginosus</i>	American Bittern
<i>Bubulcus ibis</i>	Cattle Egret
<i>Butorides virescens</i>	Green Heron
<i>Egretta thula</i>	Snowy Egret
<i>Ixobrychus exilis</i>	Least Bittern
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron
<i>Pelecanus erythrorhynchos</i>	American White Pelican
<i>Pelecanus occidentalis</i>	Brown Pelican
<i>Plegadis chihi</i>	White-faced Ibis
<i>Colaptes auratus</i>	Northern Flicker
<i>Melanerpes formicivorus</i>	Acorn Woodpecker
<i>Melanerpes lewis</i>	Lewis' Woodpecker
<i>Picoides nuttallii</i>	Nuttall's Woodpecker
<i>Picoides pubescens</i>	Downy Woodpecker
<i>Aechmophorus clarkii</i>	Clark's Grebe
<i>Aechmophorus occidentalis</i>	Western Grebe
<i>Podiceps auritus</i>	Horned Grebe
<i>Podiceps nigricollis</i>	Eared Grebe
<i>Podilymbus podiceps</i>	Pied-billed Grebe
<i>Aegolius acadicus</i>	Saw-whet Owl
<i>Asio flammeus</i>	Short-eared Owl
<i>Asio otus</i>	Long-eared Owl
<i>Athene cunicularia</i>	Burrowing Owl
<i>Bubo virginianus</i>	Great Horned Owl
<i>Megascops kennicottii</i>	Western Screech Owl
<i>Otus flammeolus</i>	Flammulated Owl
<i>Strix occidentalis</i>	Spotted Owl
<i>Tyto alba</i>	Barn Owl
<i>Phalacrocorax auritus</i>	Double-crested Cormorant

## Mammal List

<b>Scientific Name</b>	<b>Common Names</b>
<i>Bos taurus</i>	aurochs, Aurochs, domestic cattle (feral), domesticated cattle
<i>Capra hircus</i>	domestic goat, Goat, goat (feral)
<i>Ovis aries</i>	domestic sheep, mouflon, Red Sheep, sheep (feral)
<i>Cervus elaphus nannodes</i>	Tule Elk
<i>Odocoileus hemionus</i>	Black-tailed Deer
<i>Sus scrofa</i>	Domestic Pig, Domestic Pig (feral)
<i>Canis latrans</i>	Coyote
<i>Canis lupus familiaris</i>	Domestic Dog
<i>Urocyon cinereoargenteus</i>	Gray Fox
<i>Vulpes macrotis</i>	San Joaquin Valley Kit Fox
<i>Vulpes vulpes</i>	Red Fox
<i>Felis catus</i>	Domestic Cat
<i>Lynx rufus</i>	Bobcat
<i>Puma concolor</i>	Mountain Lion
<i>Mephitis mephitis</i>	Striped Skunk
<i>Spilogale gracilis</i>	Western Spotted Skunk
<i>Lontra canadensis</i>	common otter, North American River Otter, northern river otter, river otter
<i>Lontra canadensis sonora</i>	Southwestern River Otter
<i>Mustela frenata</i>	Long-tailed Weasel
<i>Neovison vison</i>	Mink
<i>Taxidea taxus</i>	Badger
<i>Procyon lotor</i>	Raccoon
<i>Eumops perotis</i>	Greater Bonneted Bat, Western Bonneted Bat, Western Mastiff-Bat
<i>Eumops perotis californicus</i>	California Mastiff Bat
<i>Tadarida brasiliensis</i>	Brazilian Free-tailed Bat
<i>Antrozous pallidus</i>	Pallid Bat
<i>Corynorhinus townsendii townsendii</i>	Townsend's Big-eared Bat
<i>Eptesicus fuscus</i>	Big Brown Bat
<i>Euderma maculatum</i>	Spotted Bat
<i>Lasionycteris noctivagans</i>	silver-haired bat, Silver-haired Bat
<i>Lasiurus blossevillii</i>	Red Bat, western red bat, Western Red Bat
<i>Lasiurus cinereus</i>	Hoary Bat
<i>Myotis californicus</i>	California Myotis
<i>Myotis ciliolabrum</i>	Small-footed Myotis
<i>Myotis evotis</i>	Long-eared Myotis
<i>Myotis lucifugus</i>	little brown bat, little brown myotis, Little Brown Myotis
<i>Myotis occultus</i>	Arizona Myotis
<i>Myotis thysanodes</i>	Fringed Myotis
<i>Myotis volans</i>	Long-legged Myotis

<b>Scientific Name</b>	<b>Common Names</b>
<i>Myotis yumanensis</i>	Yuma Myotis
<i>Parastrellus hesperus</i>	Western Pipistrelle
<i>Didelphis virginiana</i>	Virginia Opossum
<i>Lepus californicus</i>	Black-tailed Hare
<i>Sylvilagus audubonii</i>	Desert Cottontail
<i>Castor canadensis</i>	Beaver
<i>Microtus californicus</i>	California Vole
<i>Neotoma fuscipes</i>	San Joaquin Valley Wood Rat
<i>Ondatra zibethicus</i>	Muskrat
<i>Onychomys torridus</i>	Southern Grasshopper Mouse
<i>Peromyscus maniculatus</i>	Deer Mouse
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse
<i>Thomomys bottae</i>	Southwestern Pocket Gopher
<i>Dipodomys heermanni</i>	Heermann's Kangaroo Rat
<i>Dipodomys ingens</i>	Giant Kangaroo Rat
<i>Dipodomys nitratooides exilis</i>	Fresno Kangaroo Rat
<i>Perognathus inornatus inornatus</i>	San Joaquin Pocket Mouse
<i>Perognathus longimembris longimembris</i>	Little Pocket Mouse
<i>Mus musculus</i>	House Mouse
<i>Rattus norvegicus</i>	Norway Rat
<i>Rattus rattus</i>	Black Rat
<i>Myocastor coypus</i>	Coypu, nutria
<i>Ammospermophilus nelsoni</i>	San Joaquin Antelope Squirrel
<i>Otospermophilus beecheyi</i>	California Ground Squirrel
<i>Sorex ornatus</i>	Ornate Shrew
<i>Scapanus latimanus</i>	Broad-footed Mole

### Reptile and Amphibian List

<b>Scientific Name</b>	<b>Common Names</b>
<i>Elgaria multicarinata multicarinata</i>	California Alligator Lizard
<i>Anniella pulchra</i>	California Legless Lizard
<i>Arizona occidentalis</i>	California Glossy Snake
<i>Coluber mormon</i>	Western Yellow-bellied Racer
<i>Lampropeltis getula californiae</i>	California Kingsnake
<i>Masticophis flagellum ruddocki</i>	San Joaquin Whipsnake
<i>Pituophis catenifer catenifer</i>	Pacific Gopher Snake
<i>Pituophis melanoleucus</i>	Gopher Snake
<i>Thamnophis couchii</i>	Giant Garter Snake
<i>Thamnophis elegans</i>	Western Terrestrial Garter Snake
<i>Thamnophis gigas</i>	Giant Garter Snake
<i>Thamnophis sirtalis</i>	Common Garter Snake
<i>Gambelia sila</i>	Blunt-nosed Leopard Lizard
<i>Sceloporus occidentalis</i>	Western Fence Lizard



<b>Scientific Name</b>	<b>Common Names</b>
<i>Uta stansburiana elegans</i>	California Side-blotched Lizard
<i>Phrynosoma coronatum</i>	Blainville Horned Lizard, California/Coast Horned Lizard
<i>Eumeces gilberti</i>	Gilbert's Skink
<i>Cnemidophorus tigris mundus</i>	California Whiptail
<i>Crotalus oreganus</i>	Western Rattlesnake
<i>Actinemys marmorata</i>	Western Pond Turtle
<i>Trachemys scripta</i>	Slider
<i>Anaxyrus boreas</i>	Western Toad
<i>Pseudacris regilla</i>	Pacific Tree Frog
<i>Lithobates catesbeianus</i>	Bullfrog
<i>Lithobates pipiens</i>	Leopard Frog
<i>Rana draytonii</i>	California Red-legged Frog
<i>Spea hammondi</i>	Western Spadefoot Toad
<i>Ambystoma californiense</i>	California tiger salamander
<i>Batrachoseps attenuatus</i>	California Slender Salamander

## Fish List

<b>Scientific Name</b>	<b>Common Names</b>
<i>Acipenser transmontanus</i>	White Sturgeon
<i>Menidia beryllina</i>	Inland Silverside
<i>Alosa sapidissima</i>	American Shad
<i>Dorosoma petenense</i>	Threadfin Shad
<i>Catostomus occidentalis</i>	Sacramento Sucker
<i>Carassius auratus</i>	Goldfish
<i>Cyprinella lutrensis</i>	Red Shiner
<i>Cyprinus carpio</i>	Common Carp
<i>Lavinia exilicauda</i>	Hitch
<i>Notemigonus crysoleucas</i>	Golden Shiner
<i>Orthodon microlepidotus</i>	Sacramento Blackfish
<i>Pimephales promelas</i>	Fathead Minnow
<i>Pogonichthys macrolepidotus</i>	Sacramento Splittail
<i>Ptychocheilus grandis</i>	Sacramento Pikeminnow
<i>Gambusia affinis</i>	Western Mosquitofish
<i>Archoplites interruptus</i>	Sacramento Perch
<i>Lepomis cyanellus</i>	Green Sunfish
<i>Lepomis gulosus</i>	Warmouth
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis microlophus</i>	Redear Sunfish
<i>Micropterus dolomieu</i>	Smallmouth Bass
<i>Micropterus salmoides</i>	Largemouth Bass
<i>Pomoxis annularis</i>	White Crappie
<i>Pomoxis nigromaculatus</i>	Black Crappie

<b>Scientific Name</b>	<b>Common Names</b>
<i>Hysterocarpus traskii</i>	Tule Perch
<i>Morone saxatilis</i>	Striped Bass
<i>Percina macrolepida</i>	Bigscale Logperch
<i>Entosphenus tridentatus</i>	Pacific Lamprey
<i>Oncorhynchus mykiss</i>	Rainbow Trout
<i>Oncorhynchus tshawytscha</i>	Chinook salmon
<i>Cottus asper</i>	Prickly Sculpin
<i>Ameiurus catus</i>	White Catfish
<i>Ameiurus melas</i>	Black Bullhead
<i>Ameiurus nebulosus</i>	Brown Bullhead
<i>Ictalurus punctatus</i>	Channel Catfish

### Crustacean List

<b>Scientific Name</b>	<b>Common Names</b>
<i>Branchinecta conservatio</i>	conservancy fairy shrimp
<i>Branchinecta lindahli</i>	versatile fairy shrimp
<i>Branchinecta longiantenna</i>	longhorn fairy shrimp
<i>Branchinecta lynchi</i>	vernal pool fairy shrimp
<i>Procambarus clarkii</i>	Red Swamp Crayfish
<i>Lepidurus packardii</i>	vernal pool tadpole shrimp

## **Appendix F: Wilderness Inventory Review**

### **Introduction**

A National Wilderness Preservation System composed of federally owned areas designated by Congress as “wilderness areas” has been created as a result of the passage of the Wilderness Act of 1964 (16 USC 1131-1136, 78 Stat. 890). The purpose of this act is “to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” Areas designated as wilderness are to be administered “for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.” No Federal lands are to be designated as “wilderness areas” except as provided for in the act.

Consistent with the intent of the Wilderness Act, wilderness reviews are a required element of CCPs and are conducted in accordance with the refuge planning process outlined in Section 602 FW 1 and 3 of the Service Manual, including public involvement and NEPA compliance. The three phases of the wilderness review are: 1) inventory; 2) study; and 3) recommendation.

If, through the inventory process, a determination is made that a refuge or area on a refuge meets the criteria for wilderness, the area, referred to as a wilderness study area (WSA), is further evaluated as part of the study phase. In the study phase, all values (e.g., ecological, recreational, cultural, economic, symbolic), resources (e.g., wildlife, water, vegetation, minerals, soils), public uses, and refuge management activities within the area are analyzed. This analysis also includes an evaluation of whether the WSA can be effectively managed to preserve its wilderness character. These elements are analyzed through the refuge planning process to determine the most appropriate management direction for the WSA.

The recommendation phase consists of forwarding or reporting recommendations for wilderness designation from the Director through the Secretary of the Interior and the President to Congress in a wilderness study report.

If the inventory does not identify any areas that meet the WSA criteria, these findings are documented in the administrative record for the CCP, fulfilling the planning requirement for a wilderness review. We inventoried the lands and waters within the San Luis and Merced NWRs and found no areas that meet the eligibility criteria for a WSA as defined by the Wilderness Act. This appendix summarizes the wilderness inventory for the San Luis and Merced NWRs.

### **Inventory Criteria**

The wilderness inventory is a broad look at the planning area to identify wilderness study areas (WSAs). WSAs are roadless areas that meet the minimum criteria for wilderness identified in Section 2(c) of the Wilderness Act.

"A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions, and which: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an

unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value."

A WSA must be a roadless area or island, meet the size criteria, appear natural, and provide outstanding opportunities for solitude or primitive recreation. The process for identification of roadless areas and islands in the San Luis and Merced NWRs and application of the wilderness criteria are described in the following sections.

### *Identification of Roadless Areas and Roadless Islands*

Identification of roadless areas and roadless islands required gathering and evaluating land status maps, land use and road inventory data, and aerial photographs for the San Luis and Merced NWRs. "Roadless" refers to the absence of improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use.

### *Evaluation of the Size Criteria*

Roadless areas or roadless islands meet the size criteria if any one of the following standards applies:

- An area with over 5,000 contiguous acres. State and private lands are not included in making this acreage determination.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the U.S. Forest Service, National Park Service, or Bureau of Land Management.

### *Evaluation of the Naturalness Criteria*

In addition to being roadless, a WSA must meet the naturalness criteria. Section 2(c) defines wilderness as an area that "... generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable." The area must appear natural to the average visitor rather than "pristine." The presence of historic landscape conditions is not required. An area may include some human impacts, provided they are substantially unnoticeable in the unit as a whole. Significant human-caused hazards, such as the presence of unexploded ordnance from military activity, and the physical impacts of refuge management facilities and activities are also considered in evaluation of the naturalness criteria. An area may not be considered unnatural in appearance solely on the basis of the "sights and sounds" of human impacts and activities outside the boundary of the unit.

### *Evaluation of Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation*

In addition to meeting the size and naturalness criteria, a WSA must provide outstanding opportunities for solitude or primitive recreation. The area does not have to possess outstanding opportunities for both solitude and primitive and unconfined recreation, and it does not need to have outstanding opportunities on every acre. Further, an area does not have to be open to public use and access to qualify under these criteria; Congress has designated a number of wilderness areas in the Refuge System that are closed to public access to protect resource values.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. These primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

These two "opportunity elements" are not well defined by the Wilderness Act but, in most cases, can be expected to occur together. However, an outstanding opportunity for solitude may be present in an area offering only limited primitive recreation potential. Conversely, an area may be so attractive for recreation use that experiencing solitude is not an option.

### *Evaluation of Supplemental Values*

Supplemental values are defined by the Wilderness Act as "...ecological, geological, or other features of scientific, educational, scenic, or historic value." These values are not required for wilderness, but their presence should be documented.

## Inventory Findings

As documented here, the lands and waters within the San Luis and Merced NWRs do not meet the criteria for a WSA.

### *Roadless Areas and Roadless Islands*

The Merced and San Luis NWRs comprise 10,262 acres and 26,878 acres respectively in non-contiguous acres in fee title. Many paved and unpaved roads extend through the Refuges, including roads and state highways. Others are used only by the Refuge. The lands within these Refuges do not meet the criteria for roadless areas.

### *Size criteria*

The San Luis and Merced NWRs include roads and state highways, farm and dairy structures, and levees and water conveyance structures. Some Refuge lands are still in agricultural production along with adjacent properties. Within both Refuges' boundaries are various levee and utility easements including a major California water pipeline. Therefore, these areas do not contain undisturbed land of sufficient size to meet the wilderness size criteria. No islands are within these Refuges.

### *Naturalness Criteria*

Both these Refuges' landscapes have significant evidence of past and current human agricultural use and activities. Some Refuge lands are still in agricultural production along with adjacent properties.

### *Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation*

San Luis and Merced NWRs are bounded by the major transportation routes of Highway 99 to the east and Interstate 5 to the west. The Refuges are located in the northern portion of the San Joaquin Valley, which is enclosed by the foothills of the Sierra Nevada Mountains to the east and the Coast Range to the west. Large metropolitan centers within two hours driving distance to the Refuges include San Francisco, San Jose, Fresno, Oakland, Modesto and Sacramento. Although the Refuge can provide opportunities for escape from the urban environment, the sights and sounds of urbanization are often apparent within the Refuge boundaries.

### *Supplemental Values*

The San Luis and Merced NWRs do provide supplemental wilderness values, defined as “...ecological, geological, or other features of scientific, educational, scenic, or historic value.” Specifically, the Merced and San Luis NWRs provide wetland habitat in the Central Valley, an area in which 94% of historic wetlands have been lost (USGS 2021).

### *Conclusions*

The lands and waters included within the San Luis and Merced NWRs do not meet the minimum criteria for wilderness as identified in Section 2(c) of the Wilderness Act. No further analysis related to wilderness issues is therefore required.

# Visitor Services Plan for San Luis National Wildlife Refuge and Merced National Wildlife Refuge



*Figure 1. Bronze tule elk statue outside the San Luis NWR Complex visitor center. Courtesy Brad R. Lewis*

U.S. Fish and Wildlife Service  
Pacific Southwest Region  
2023



Visitor Services Plan  
for  
San Luis National Wildlife Refuge  
and  
Merced National Wildlife Refuge

\_\_\_\_\_  
Project Leader / Refuge Manager

\_\_\_\_\_  
Date

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Refuge Supervisor

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Date

\_\_\_\_\_  
Chief, Division of Visitor Services

\_\_\_\_\_  
Date

\_\_\_\_\_  
Regional Chief, National Wildlife Refuge System

\_\_\_\_\_  
Date

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# Summary

The U.S. Fish and Wildlife Service (Service) manages the San Luis National Wildlife Refuge Complex (Complex) located in the San Joaquin Valley of California—approximately 25 miles southwest of Merced, 70 miles east of San Jose and 65 miles northwest of Fresno. Three National Wildlife Refuges (San Luis NWR, Merced NWR and San Joaquin River NWR) and one Wildlife Management Area (Grasslands WMA) are included in the Complex. The Complex contains critically important habitats for a great diversity of wildlife, particularly migratory birds of the Pacific Flyway. A variety of wetland, upland and riparian habitats on the refuges support these and many other species. The Complex has a longstanding and diverse public use program including a waterfowl hunting program, auto tour routes with wayside exhibits, nature trails, a fishing program and a visitor center.

The purpose of this Visitor Services Plan is to establish priorities and identify improvements, which will guide the Complex's visitor services program over the next 15 years.

# I. Background Information

## A. REFUGE PURPOSE

National Wildlife Refuge System (NWRS) lands have been acquired under a variety of legislative acts and administrative orders. The transfer and acquisition authorities used to obtain the lands usually have one or more purposes for which land can be transferred or acquired. The purpose(s) for which these lands were acquired are important for determining and planning their management, such as for this Comprehensive Conservation Plan (CCP). The transfer and acquisition authorities used to obtain the lands comprising the Merced National Wildlife Refuge (NWR) and San Luis NWR are listed below.

*Merced NWR—The purposes for acquiring lands for this refuge include:*

“...for the management and control of migratory waterfowl and other wildlife...” 16 U.S.C. Sec 695 (Lea Act)

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

“...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)

*San Luis NWR—The purposes for acquiring lands for this refuge include:*

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

“...shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. Sec 664 (Fish and Wildlife Coordination Act)

## B. VISITOR SERVICES PROGRAM PURPOSE AND SCOPE OF PLAN

The purpose of the visitor services program at San Luis NWR and Merced NWR is to foster understanding and instill appreciation and support of the fish, wildlife and plants and their conservation by providing the public with safe, high-quality, appropriate and compatible wildlife-dependent recreational and educational programs and activities. In 1997, Congress passed the National Wildlife Refuge Improvement Act (Improvement Act), which clearly states that wildlife comes first on national wildlife refuges. The Improvement Act also identified six priority wildlife-dependent public use activities and programs that are compatible with the mission of the NWRS. These uses include hunting, fishing, wildlife observation, photography, environmental education and interpretation.

This Visitor Services Plan (VSP) was prepared based on these guidelines. With the adoption and implementation of the CCP and this step-down plan, all visitor service activities and programs on the

Complex would be in conformance with national guidelines and would ensure that all visitor activities are compatible with the refuges' overarching wildlife mission and purposes.

The purpose of the VSP is to establish priorities and identify improvements, which will guide the refuges' visitor services program during the next 15 years. Visitor services goals, objectives and strategies have been identified within Chapter V of the CCP for San Luis NWR and Merced NWR. This VSP addresses compatible wildlife-dependent recreational uses on these refuges, including hunting, fishing, wildlife observation, photography, environmental education and interpretation (Appendix G of the CCP), as well as volunteer programs.

## C. HISTORY OF THE REFUGE VISITOR SERVICES PROGRAM



*Figure 2. Photographers at Merced NWR. Courtesy Gary R. Zahm*

As the San Luis and Merced refuges have expanded in scope and size since their establishment, so have the public use programs. Although the types of activities offered to the public have remained constant over the years (hunting, fishing, wildlife observation, environmental education, photography and interpretation), public use infrastructure and participation in activities have changed considerably.

Waterfowl hunting has been a constant at the San Luis and Merced refuges and was a dominant public use (by program

management focus and public participation) during the early years of each refuge. Both refuges, beginning with the Merced in 1951 and the San Luis in 1968, managed public waterfowl hunting programs during their first several years of establishment. The early hunting programs were rudimentary and became more regulated and structured in the following decades. The first two decades of the Merced NWR hunt program featured a free-roam-style shoot. In the 1980s, due to a trend of poor hunter success, the hunt program at Merced was reevaluated and major changes were made to improve the quality: the daily hunter capacity was reduced, and fixed blind sites were established. Later, hunting days per week at Merced were reduced to Wednesdays and Saturdays only, with half-day hunts (shooting time ending at noon). As with the Merced NWR, hunt areas and boundaries at the San Luis NWR changed over the years to improve hunting opportunities and facilitate other public uses, which were increasing in popularity. In 1980, the hunt area was consolidated on the western side of the refuge. This change allowed the waterfowl auto tour route, part of which was previously in the hunt area, to remain open for wildlife observation on waterfowl hunt days. Today, hunting remains a priority public use, and several additional hunting units have been incorporated into the programs at the San Luis and Merced NWRs in recent decades.

Although an early emphasis was placed on hunting, other public use activities—such as wildlife observation, photography and picnicking—also occurred but usually were not allowed on hunt days. Fishing has never been allowed at the Merced NWR; however, fishing received significant use in the

early years at San Luis NWR, second in participation only to hunting. For many years, fishing at San Luis NWR was only allowed seasonally during the non-hunting period but began being open year-round during the early 1980s. By the mid-1970s, the public was becoming more widely aware of both refuges and visitation was increasing, especially following the introduction of a tule elk herd at the San Luis NWR in the early 1970s. Auto tour routes for wildlife observation had previously been closed during waterfowl hunt seasons but were opened year-round in 1980. Wildlife observation was becoming more prevalent and, by 1985, most refuge visits were for non-consumptive uses, such as wildlife observation and nature photography. During the 1990s, major public use infrastructure for wildlife observation was established, including interpretive panels along the auto tour routes, elevated wildlife observation platforms and interpretive kiosks.



*Figure 3. Birdwatcher at Merced NWR. Courtesy Gary R. Zahm*

From the establishment of San Luis and Merced NWRs until the early 2000s, visitor services programs were conducted by a diverse assortment of staff primarily as collateral duties. In addition to managing the hunting, fishing and wildlife observation programs, depending on availability, staff would provide tours and school field trips, deliver public presentations and hold volunteer events. When public use, especially wildlife observation, began to increase during the 1980s through 1990s, refuge managers mentioned in annual narratives the need for public use personnel to organize and conduct the visitor services program. In 2005, the Complex hired its first outdoor recreation planner to manage the visitor services program. In 2014, a park ranger was added to the Complex's organizational chart to assist with conducting visitor services activities.

### ***Notable Visitor Services Dates and Events at San Luis NWR and Merced NWR***

1951: Merced NWR—Refuge manager attended meetings with nonprofits, state agencies, sportspeople associations, duck club owners and water agencies for outreach regarding establishment of the refuge, wildlife management practices/issues, limited water supply and hunting.

1952: Merced NWR—Public use activities included hunting, picnicking, swimming, sightseeing and wildlife observation.

1965: Merced NWR—An information booth was constructed near the refuge office.

1966: Kesterson Unit (formerly Kesterson NWR)—Public use program received 20,000 visitors participating in hunting, fishing, tours, photography and picnicking.

1968: San Luis and Merced NWRs were consolidated under one refuge manager.

1968: Merced NWR—Official NWRS refuge entrance sign was erected on Sandy Mush Road.

1968: San Luis NWR—Signs were posted identifying public fishing areas, hunt areas and closed zones. Three official NWRS refuge entrance/recognition signs were installed.

1968: San Luis NWR—Agreement between USFWS and San Joaquin Levee District approved allowing refuge to use levee road as a public auto tour route (to begin use in 1970).

1970: Kesterson Unit (formerly Kesterson NWR)—Official NWRS refuge entrance/recognition signs were installed on CA-140, and state and county road shoulder signs were installed on CA-140 and at the intersection of CA-140 and CA-165 (formerly J-14).

1973: San Luis NWR—Waterfowl tour route opened to the public. Tour route is closed seasonally during waterfowl hunt season.

1974: San Luis NWR—Tule elk enclosure construction was completed in November. In December, 18 elk were introduced.

1976: San Luis NWR—Refuge became more widely known and public use increased. Refuge staff provided tours for elementary school groups, college classes and environmental groups, as well as off-refuge talks and presentations.

1980: San Luis NWR—Refuge conducted for the first time a one-day orientation for waterfowl hunters, attended by 90 people. Hunt program was consolidated to a contiguous area west of Dickenson Ferry Road.

1980: San Luis NWR—For the first time, a waterfowl auto tour route was opened to the public during the waterfowl hunt season, made possible by consolidating the hunt zone to an area west of Dickenson Ferry Road.

1981: Merced NWR—A rough auto tour route of 5 and 1/3 miles was created, encircling the eastern half of the refuge with public vehicles and foot traffic restricted to this route.

1981: San Luis NWR—Public interest in the elk herd resulted in steady increases in wildlife observation visits.



1982: Merced NWR—A photo blind was installed along the auto tour route.

1985: San Luis NWR—Non-consumptive public uses (wildlife observation, photography, interpretation, education) surpassed hunting and fishing.

1991: Merced NWR—A wildlife observation platform, an interpretive kiosk and four vehicle turnouts along the tour route were constructed.

1993: San Luis NWR—Extensive work was done on auto tour routes. A new visitor information kiosk with two interpretive panels was constructed. Four new vehicle turnouts were constructed along the waterfowl tour route. Six new interpretive panels were installed along auto tour routes.

2005: San Luis NWR Complex—Outdoor recreation planner (GS-0023-11) was added to the organization chart and hired as first dedicated visitor services employee for the Complex.

2005: San Luis NWR—Vault toilet was constructed at West Bear Creek Unit at trailhead for Woody Pond and Raccoon Marsh trails.

2006: San Luis NWR Complex—The Complex hosted its first Youth Conservation Corps crew in several decades. The Complex continued to host a crew each consecutive summer through 2019.

2006: Merced NWR—Waterfowl hunt program at Lonetree Unit was established.

2007: San Luis NWR Complex—Redesigned and printed the Complex bird list brochure.

2008: Merced NWR—Hunter information kiosk was installed in hunter parking lot.

2009: San Luis NWR Complex—It was announced in February that the Complex would receive a new visitor center funded by the American Recovery and Reinvestment Act, to be built on San Luis NWR.

2009: San Luis NWR—Waterfowl hunt program at East Bear Creek Unit was established.

2009: Merced NWR—Cottonwood trail observation platform was constructed.

2010: San Luis NWR—Turn lanes were installed on CA-165 at the West Bear Creek Unit entrance to improve safe access by the public. This was a Federal Highway Administration project.

2011: San Luis NWR—Waterfowl auto tour route was realigned to eliminate portion that included the San Joaquin River levee.

2011: San Luis NWR Complex—Redesigned and printed the Complex general brochure.

2011: San Luis NWR Complex—Visitor center on San Luis NWR was completed and opened to the public in October. The facility was the first LEED Platinum building for USFWS.

2011: San Luis NWR—Wetland and Upland trails were completed.

2013: San Luis NWR—Turn lanes were installed on CA-165 at the Wolfsen Road intersection, South Freitas Boat Launch and Blue Goose Fire Cache to improve safe access. This was a Federal Highway Administration project.

2014: San Luis NWR Complex—Park ranger (GS-0025-09) was added to organization chart to assist with operation of the visitor services program.

2015: San Luis NWR Complex—Developed and printed Complex auto tour route and nature trail brochure.

2016: Merced NWR—Constructed second vault toilet near Bittern Marsh trailhead.

2016: San Luis NWR—Developed and printed tule elk natural history brochure, funded by outreach grant from Rocky Mountain Elk Foundation.

2017: Merced NWR—Three new waterfowl hunt blind locations (7A, 7B, 9A) were added on the West Marsh side to compensate for the blinds on the Mariposa Creek side that have chronic issues with slow flood-up.

2018: San Luis NWR—Floating moveable waterfowl hunt blind was installed at Kesterson Unit for use by hunters with disabilities.

2018: Merced NWR—Cottonwood trail information kiosk was constructed.

2019: San Luis NWR—Wolfsen Road was rehabilitated and repaved, and the refuge entrance road—including the visitor and staff parking lots—was paved under a Federal Highway Administration project.

2019: San Luis NWR—Kesterson hunter check station was replaced.

2019: San Luis NWR and Merced NWR—Picnic shade structures were constructed near the main entrances at both refuges.

2020: San Luis NWR—Sousa Marsh observation deck was rebuilt.

2020: San Luis NWR—Visitor center and headquarters office were closed to the public in March due to the COVID-19 pandemic and were later reopened to the public in May 2022.

2020: Merced NWR—Cottonwood trail was completed and opened to the public for first time, and Bittern Marsh trail was rehabilitated under a Federal Highway Administration project.

2021: San Luis NWR Complex—Designed and printed Complex mammal brochure.

2022: San Luis NWR—Added a sandhill crane diorama and interactive bird identification exhibit inside the exhibit hall.

2022: San Luis NWR—Developed and installed four new interpretive panels and structures along Waterfowl auto tour route and replaced the structures for two existing panels.

2022: Merced NWR—Developed and installed eight new interpretive panels and structures along tour route to replace old panels/structures.

## **D. VISITOR SERVICES APPROPRIATE USES AND SPECIAL PROVISIONS**

### ***San Luis NWR***

The following visitor services public uses have been determined, through the Finding of Appropriateness process, to be appropriate uses at the San Luis NWR: hunting, fishing, environmental education and interpretation, and non-commercial and commercial wildlife observation and photography.

Through Findings of Appropriateness, the following refuge uses have been determined to be Not Appropriate and are not allowed at the San Luis NWR: bicycling, horseback riding, camping and dog training.

Refuge-specific rules: The San Luis NWR, including the auto tour routes, nature trails and fishing area, is open daily from one half-hour before sunrise (dawn) to one half-hour after sunset (dusk). The visitor center is generally open daily from 8:00 a.m. to 4:30 p.m., with hours possibly varying seasonally depending on staffing. The visitor center is closed on Federal holidays. Visitors at the San Luis NWR are not allowed to travel auto tour routes on foot or bicycle and must be in a motorized vehicle properly registered to legally be on public roads to use the auto tour routes. They may step out of their vehicle momentarily – for example, to set up and look through a spotting scope – but are generally required to remain in their vehicle while on the auto tour route. Visitors may have dogs on the nature trails, but dogs must be on leashes and under control at all times. No other pets are allowed outside the vehicle. The Chester Marsh nature trail and Kesterson Unit are open seasonally from mid-February to mid-September to avoid conflicts with the waterfowl hunting program. The West Bear Creek Unit may have a restricted open season that coincides with periods when wetlands along the auto tour route are flooded (usually fall through early spring). Closing the West Bear Creek Unit during dry periods is an effort to curb vandalism, graffiti, and trash dumps that occur primarily during dry summer months when wildlife observation opportunities on the unit are low.

### ***Merced NWR***

The following visitor services public uses have been determined through Findings of Appropriateness to be appropriate uses at the Merced NWR: hunting, environmental education and interpretation, and non-commercial and commercial wildlife observation and photography.

Through Appropriate Refuge Uses findings, the following uses have been determined to be Not Appropriate and are not allowed at the Merced NWR: fishing, bicycling, horseback riding, camping, and dog training.

Refuge-specific rules: The Merced NWR, including the auto tour route and nature trails, is open daily from one half-hour before sunrise (dawn) to one half-hour after sunset (dusk). Visitors at the Merced NWR are not allowed to travel the auto tour route on foot and must be in a motorized vehicle properly registered to be on public roads legally. They may step out of their vehicle momentarily—for example, to set up and look through a spotting scope—but are generally required to remain in their vehicle while on the auto tour route. Visitors may have dogs on the nature trails, but dogs must be on leashes and under control at all times. No other pets are allowed outside the vehicle. Dogs are not allowed outside the vehicle on the auto tour route. The Cottonwood trail is closed seasonally during summer months to curb vandalism, graffiti and trash dumps that are likely to occur more frequently due to proximity to heavily traveled Sandy Mush Road.



*Figure 4. Sandhill cranes on the auto tour route at Merced NWR. Courtesy Rick Lewis*

## **E. THEMES, MESSAGES AND TOPICS**

Central themes and topics of the San Luis NWR and Merced NWR visitor services program focus primarily on the wildlife and habitat resources found on the Complex. Most of the visitor services infrastructure, programs and exhibits are intended to educate visitors about wetlands, native uplands, riparian woodlands and vernal pool habitats and associated wildlife. The wildlife component of the visitor services program focuses on migratory birds, specifically waterfowl and other waterbirds, and endangered species. Other main topics of the program include tule elk, habitat restoration and native pollinators.

## F. VISITOR FACILITIES

### *San Luis NWR*



*Figure 5. San Luis NWR Complex visitor center. USFWS*

The visitor center, completed in fall 2011, is the primary welcome and orientation point of the Complex. The visitor center includes an interpretive lobby and exhibit hall with over 20 interactive and educational exhibits about wildlife and habitats. The exhibits are designed to be experienced by visitors in a self-guided manner. In 2022, a sandhill crane diorama and an interactive Bird ID exhibit were added to the exhibit hall, funded with a donation from the estate of a visitor. A highlight of the lobby is a wildlife viewing area looking out into the elk enclosure, where visitors might observe the tule elk herd as well as birds and other wildlife. A multipurpose room is used to conduct environmental education visits for schools, as well as meetings. Outside conservation-based partners and agencies may use the multipurpose room for meetings. Outside the visitor center is an amphitheater used for school visits and as a gathering point for programs and tours. The visitor center grounds serve as a launching point for the refuge. Immediately accessible from the visitor center are two nature trails and two auto tour routes.

The San Luis NWR has three auto tour routes: a Waterfowl auto tour route of 8.5 miles, a tule elk auto tour route of 5 miles and a West Bear Creek auto tour route of 2.5 miles. The Waterfowl tour route guides visitors through seasonal wetlands, providing the opportunity to see large concentrations of waterfowl, shorebirds and other waterbirds. Interpretive panels along the Waterfowl tour route

describe the wildlife and habitats encountered and previous restoration activities. Interpretive panels along the tule elk route tell the story of this unique subspecies, endemic to California, that nearly went extinct in the late 1800s. The elk are visible throughout the year. The West Bear Creek auto tour route winds through and around a rich mosaic of riparian woodlands, seasonal wetlands and native grasslands, providing visitors the chance to see scores of waterfowl and other wildlife. The West Bear Creek Unit tour route and trails had historically been open year-round, but beginning in 2022, underwent a seasonal closure during summer months in an attempt to curb vandalism and other illegal behavior that was occurring predominantly during the dry summer season.

Nature trails at the San Luis NWR include two trails that launch from the visitor center—the Upland trail (0.5 mile) and the Wetland/Riparian trail (1 mile). Situated along the auto tour routes are the Chester Marsh trail (1 mile), the Sousa Marsh trail (1 mile) and the Winton Marsh trail (0.5 mile). The Chester Marsh trail is open seasonally from February 15 through September 15 and allows visitors to walk to a historical ferry crossing on the San Joaquin River. The Sousa Marsh trail includes an elevated observation platform overlooking one of the largest wetlands on the refuge, which provides spectacular waterbird viewing fall through spring. The Winton Marsh trail meanders around a permanent wetland and includes an elevated observation platform. At the West Bear Creek Unit, the Raccoon Marsh (1.3 miles) and Woody Pond (1.75 miles) trails provide opportunities to see waterfowl and other waterbirds in fall through spring, as well as native songbirds and mammals, such as black-tailed deer.

The Kesterson Unit is unique in the Complex in that it offers “free-roam” nature hiking throughout the unit. However, Kesterson has no auto tour route, and the unit is only open to the general public from February 15 through September 15, when the waterfowl hunting season is closed.

The San Luis NWR has two permanent, waterless, vault-style restrooms. One is located near the visitor center on the San Luis Unit, and the other is located at the West Bear Creek Unit at the trailhead parking area for the Raccoon Marsh and Woody Pond nature trails.

The refuge has three elevated wildlife observation platforms: one each along the Sousa Marsh nature trail, Winton Marsh nature trail and tule elk auto tour route. The Sousa observation platform underwent a partial rebuild in 2020. The tule elk platform is scheduled to undergo a partial rebuild in 2023. Additionally, the visitor center Wetland nature trail has an elevated boardwalk constructed in 2011. The fishing area on the refuge has a fishing pier overlooking Salt Slough that is designed to be accessible to persons with disabilities.

The refuge features a picnic shade structure adjacent to the visitor center at the Wetland trailhead.

The visitor infrastructure for the waterfowl hunt program includes approximately 30 blinds on the San Luis Unit, 9 blinds on the Blue Goose Unit, 34 blinds on the Kesterson Unit and numerous hunter parking lots.



*Figure 6. Picnic shade structure at San Luis NWR. USFWS*

### ***Merced NWR***

The Merced NWR has a 5-mile auto tour route that travels around seasonal wetlands and uplands, providing views of thousands of Ross' geese and lesser Sandhill cranes during the fall and winter along with a diverse concentration of dabbling ducks and shorebirds. Pull-outs with interpretive panels describe wildlife natural history and refuge management.

The Merced NWR has four nature trails: Meadowlark (1.5 miles), Bittern Marsh (1 mile), Kestrel (0.5 mile) and Cottonwood (1.5 miles). The Bittern Marsh trail is a tree-lined loop around a semipermanent wetland that provides a chance to see and hear marsh birds and the occasional great-horned owl. The Kestrel trail is a short grassland loop that is home to many different songbirds; various raptor species are also visible in the nearby cottonwood trees. The Cottonwood trail on the north side of the refuge meanders through a dense stand of trees and terminates at an elevated observation platform, providing views of geese and cranes during fall through early spring. Refuge staff had been working to develop the Cottonwood trail since 2010, but finally received Federal Highway Administration

funding in 2019 for construction and completion of the trail in 2020. The Cottonwood trail is closed seasonally during summer months to curb vandalism, graffiti and trash dumps that are likely to occur more frequently due to proximity to heavily traveled Sandy Mush Road.

The refuge has two permanent, waterless, vault-style restrooms along the auto tour route. One is located near the main refuge entrance near the beginning of the tour route, and the other is at the midway point along the tour route near the Bittern Marsh trailhead.

Three elevated wildlife observation decks are on the refuge—one each at the main entrance, at Pintail Marsh and along the Cottonwood nature trail.

The visitor infrastructure for the waterfowl hunt program includes 19 blinds on the Merced Unit and three hunter parking lots.

### ***Print Media***

The Complex has a general brochure and brochures for auto tour routes and nature trails, tule elk natural history and types of birds and mammals.



## G. VISITOR SERVICES MAPS



Figure 7. Visitor services map of San Luis NWR.

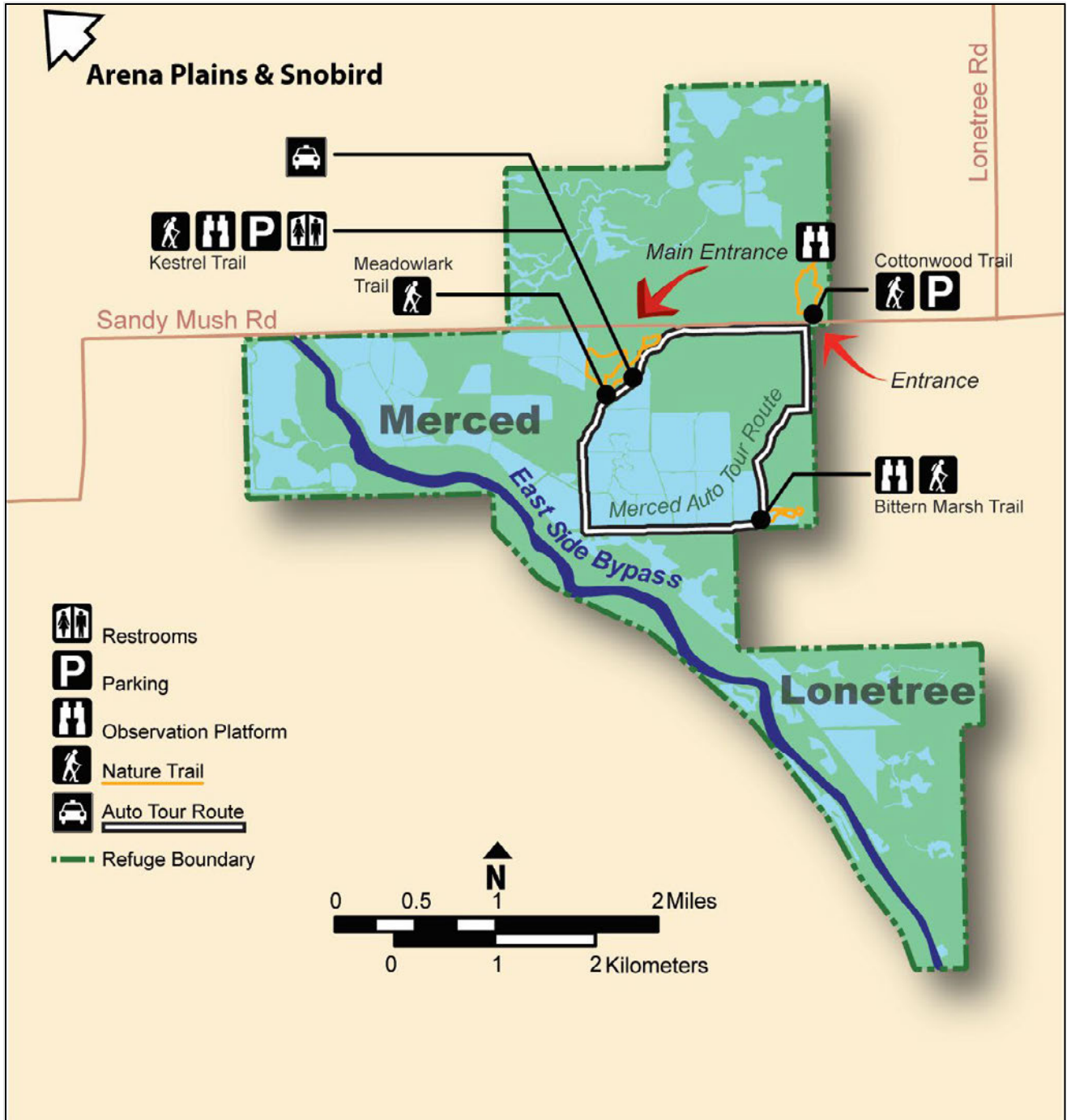


Figure 8. Visitor services map of Merced NWR.

## H. REFUGE VISITATION TRENDS AND IDENTIFYING AUDIENCES

**Table 1a. Annual Visitation at the San Luis NWR**

<b>San Luis NWR</b>	<b>FY19</b>	<b>FY20</b>	<b>FY21</b>	<b>Three-Year Average</b>
<b>Annual Visitors</b>	<b>86,000</b>	<b>93,285</b>	<b>108,810</b>	<b>96,032</b>
Visitor Center/Contact Station Visits	15,500	7,900*	300*	7,900
Onsite Special Event Visits	450	450	375*	425
Hunting Visits	8,418	8,935	9,395	8,916
Fishing Visits	3,900	4,000	4,000	3,967
Wildlife Observation Visits—Auto Tour Routes	72,500	77,500	91,450	80,483
Wildlife Observation Visits—Nature Trails	5,500	6,200	7,315	6,338
Environmental Education Visits	1,350	450*	400*	733
Interpretation Visits	900	665*	500*	688
Photography Visits	15,730	16,870	19,883	17,494
Boat Launch Visits	650	650	650	650

\*Visitor center was closed to the public and staff were not conducting tours or events due to COVID-19 pandemic March 2020–April 2022.

**Table 1b. Annual Visitation at the Merced NWR**

<b>Merced NWR</b>	<b>FY19</b>	<b>FY20</b>	<b>FY21</b>	<b>Three-Year Average</b>
<b>Annual Visitors</b>	<b>43,000</b>	<b>48,950</b>	<b>57,682</b>	<b>49,877</b>
Visitor Center/Contact Station Visits	0	0	0	0
Onsite Special Event Visits	250	240*	120*	203
Hunting Visits	930	970	1,042	981
Fishing Visits	0	0	0	0
Wildlife Observation Visits—Auto Tour Route	36,500	42,000	49,560	42,687
Wildlife Observation Visits—Nature Trails	5,500	6,000	7,080	6,193
Environmental Education Visits	250	200*	175*	208
Interpretation Visits	425	240*	200	288
Photography Visits	8,400	9,790	11,325	9,838
Boat Launch Visits	0	0	0	0

\*Visitor center was closed to the public and staff were not conducting tours or events due to COVID-19 pandemic March 2020–April 2022.

In 2012, San Luis NWR participated in a national visitor survey in conjunction with the U.S. Geological Survey to identify visitation trends on the refuge. The survey assessed where visitors reside (local vs. nonlocal), frequency of visits, activities that visitors take part in during their refuge

visits and overall satisfaction with visitor experience. The survey found that 52 percent of visitors lived in the local area (within 50 miles of the refuge), whereas 48 percent were nonlocal (farther than 50 miles from the refuge). For both local and nonlocal visitors, most—88 and 55 percent, respectively—indicated that visiting the refuge was the primary purpose of their trip. Nonlocal visitors traveled an average of 300 miles to reach the refuge; 92 percent of all visitors traveling to San Luis NWR were from California. Of the visitors surveyed, 72 percent participated in wildlife observation, 67 percent in auto tour routes, 61 percent in birdwatching and 22 percent in migratory bird hunting.

The San Luis NWR is scheduled to conduct the visitor survey again in 2022–23.

## I. VISITOR CAPACITY

The visitor services program has the challenging role of balancing the needs and interests of visitors with the mission of protecting and managing refuge resources. In addition to effects on the resources, visitor use and density may also impact the quality of the refuge visitation experience. The Complex does not regulate the number of visits or place quotas for visitor use of auto tour routes, trails or self-guided visitation inside the visitor center. Visitation use and density of tour routes and trails at San Luis NWR generally are not at levels that cause negative issues for other visitors or wildlife. Visitation at the Merced NWR tour route can be very high seasonally from October through April, resulting in heavy vehicle traffic along the tour route and many visitors not adhering to refuge rules regarding remaining inside vehicles while using the tour route. Visitors out of vehicles and walking on the tour route and closed roads are a recurring problem at Merced NWR during the peak visitation period.

The Complex currently places a defined capacity on the waterfowl hunting program. Free-roam areas, assigned zone/pond and spaced blinds all have maximum capacities to ensure that hunters have a safe and quality experience, and to minimize the impact and disturbance to the resource and wildlife.



*Figure 9. Auto tour route traffic at Merced NWR. Courtesy Gary R. Zahm*

## II. Implementation Strategies

This section uses the format of the 14 visitor services standards in correlation with the relevant CCP goals and objectives. Visitor services-related objectives may be found within other CCP goals (i.e., Fish and Wildlife Populations, Habitat Management, Resource Protection and Refuge Administration). This process will identify existing CCP strategies and develop additional strategies that will form the basis of the Visitor Services Plan (VSP). Table 2 lists all CCP goals and objectives that are relevant to visitor services.

**Table 2. CCP Goals and Objectives Summary**

<b>GOAL 4 – Visitor Services and Public Use</b>	<i>Objective 4.1 - Wildlife Observation/Interpretation/Photography</i>
	<i>Objective 4.2 – Hunting Program</i>
	<i>Objective 4.3 – Fishing</i>
	<i>Objective 4.4 – Environmental Education</i>
	<i>Objective 4.5 – Interpretation</i>
	<i>Objective 4.6 – Visitor Center Operation</i>
	<i>Objective 4.7 – Volunteer Program</i>
	<i>Objective 4.8 – Friends Group</i>
	<i>Objective 4.9 – Public Outreach</i>
	<i>Objective 4.10 – Monitoring (Visitor Services)</i>
	<i>Objective 4.11 – Research (Visitor Services)</i>

## **STANDARD 1: DEVELOP A VISITOR SERVICES PLAN**

### ***Policy (605 FW 1.14 A)***

Refuge managers will develop a VSP that addresses all compatible wildlife-dependent recreational uses on their refuge complex.

#### ***Current Program Discussion:***

The San Luis NWR and Merced NWR did not have a VSP prior to this one.

#### ***Significant Program Changes:***

The drafting, approval and implementation of this VSP.

#### ***Monitor and Evaluate:***

Refuge managers and visitor services staff will monitor the performance of the Visitor Services Program under this VSP and update and improve the program as necessary.

## **STANDARD 2: WELCOME AND ORIENT VISITORS**

### ***Policy (605 FW 1.14 B)***

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



Figure 10. Visitor Center entrance sign. USFWS

**Current Program Discussion:**

The visitor center on the San Luis NWR is the primary welcome and orientation point for visitors. The visitor center is generally open daily from 8:00 a.m. to 4:30 p.m., except on Federal holidays—these hours may fluctuate depending on staffing levels. The facility includes a staffed visitor information desk as well as an interpretive lobby and exhibit hall with information about the Complex. USFWS and Complex-specific brochures, including the San Luis NWR Complex general brochure, are available at the visitor center.

The San Luis and Merced NWRs have information kiosks near the main entrances that contain maps, brochures and interpretive panels to welcome and orient visitors. All information about public use portions of the refuges (auto tour routes, nature trails, fishing areas) is contained at the kiosks. Information about prohibited activities is also clearly posted at these locations. Additionally, most nature trailheads at the San Luis and Merced NWRs contain a kiosk with information about the trails. USFWS and Complex-specific brochures, including the San Luis NWR Complex general brochure, are available at most information kiosks.

The Complex maintains websites for each of the refuges, which are updated regularly to inform the public about news, current events and closures. The websites contain downloadable brochures, maps and driving directions.

The Complex established a Facebook page in 2018 that contains timely posts about the refuge units and wildlife, as well as announcements and information pertinent to the public. The Facebook page is generally updated 3–4 times or more per week. Most posts involve a timely wildlife or habitat photograph taken by one of several photographers who graciously share their images with the Complex, along with natural history information about the photo's subject. As of 2022, the Facebook page has over 2,200 followers.

### ***Objectives and Strategies:***

#### ***CCP OBJECTIVE 4.6: VISITOR CENTER OPERATION***

The San Luis NWR Complex Visitor Center serves as a welcoming and launching point for visitors to learn about the wildlife and habitats of the Complex before embarking outdoors on the refuges. The visitor center is a contact point for visitors to interact with staff and have questions and concerns addressed.

#### **Objective 4.6 Rationale:**

Visitor centers serve an important function in welcoming and orienting visitors on a refuge. The information contained in exhibits conveys key messages about the Complex and provides background information to complement the visit.

#### **Objective 4.6 Visitor Center Operation Strategies:**

- 4.6.1 Provide adequate staffing for the visitor center to be open 7 days a week from 8:00 a.m. to 4:30 p.m., except on Federal holidays.
- 4.6.2 Maintain interpretive exhibits in the visitor center lobby and exhibit hall and periodically update or add new exhibits.
- 4.6.3 Maintain the visitor center building and exterior grounds to be a safe and inviting place for staff and the public.
- 4.6.4 Conduct environmental education field trips for school groups using the visitor center.
- 4.6.5 Maintain the Wetland Nature trail and Upland Nature trail adjacent to the visitor center.
- 4.6.6 Maintain the public parking lot and staff parking lot.
- 4.6.7 Maintain adequate indoor and outdoor directional signage.
- 4.6.8 Allow natural resource-based agencies and organizations to hold meetings in the multipurpose and conference rooms.
- 4.6.9 Maintain the visitor center to be current with Federal facility accessibility standards for people with disabilities.
- 4.6.10 Hold wildlife identification and nature photography workshops at the visitor center.
- 4.6.11 Develop a natural resource-themed guest lecture program at the visitor center.

### ***Significant Program Changes:***

The following proposed additions to the program would aid in welcoming and orienting visitors:

- Develop a “Common Birds of the San Luis NWR Complex” brochure.
- Develop a brochure for the Complex waterfowl hunt program.
- Develop a Common Native Plants of the San Luis NWR Complex” brochure.
- Develop a “Waterfowl of the San Joaquin Valley” Identification brochure.



**Monitor and Evaluate:**

Staff will continue to update welcome signage, directional signage and information in websites and brochures to ensure that orientation information is presented in a clear and concise manner that is easy for visitors to access and understand. Common, recurring questions by visitors are a gauge regarding areas in need of better communication by the refuge complex.

**STANDARD 3: HUNTING**

***Policy (605 FW 2)***

Hunting is an appropriate use of wildlife resources of the NWRS when compatible. Hunting programs will be of the highest quality, conducted in a safe and cost-effective manner, and to the extent practicable, carried out in accordance with state regulations.

Hunting is an important wildlife management tool that the Service recognizes as a healthy, traditional outdoor pastime deeply rooted in America’s heritage. Hunting can instill a unique understanding and appreciation of wildlife, their behavior and their habitat needs.

As practiced on refuges, hunting does not pose a threat to wildlife populations and, in some instances, is necessary for sound wildlife management. Hunting programs can promote understanding and appreciation of natural resources and their management on lands and waters in the refuge system.

***Current Program Discussion:***

Units of the San Luis and Merced NWRs are open to waterfowl hunting during California’s season for the Balance of the State Zone. The dates fluctuate slightly each year, but the season generally begins in mid-October and ends in late January or early February. All San Luis and Merced refuge hunt units are open for ducks, geese, coots and common gallinules (moorhen). Certain areas of our refuges are also open for ring-necked pheasant and snipe hunting.



*Figure 11. Kesterson floating moveable hunt blind accessible for persons with disabilities. USFWS*

The refuge hunt programs are operated through a cooperative agreement between the Service and California Department of Fish and Wildlife (CDFW) that defines the roles and responsibilities of each agency. The Service maintains hunt units, habitat, infrastructure and facilities; CDFW administers reservations, lotteries, fee collection and permitting systems, and processes hunters through state-operated hunter check stations.

The San Luis and Merced NWRs are included in California's Balance of the State zone. Although all days within the season are open to hunting on private lands, hunting on state and Federal public lands that carry CDFW's Type A designation (like the refuges) only occurs on Wednesdays, Saturdays and Sundays, with few exceptions.

Each hunter needs to obtain the following items in advance of their visit and present them at the hunter check station when checking in:

- Current California hunting license or junior hunting license if the hunter is under 18 years of age.
- California Duck Stamp validation. Required for any person hunting waterfowl, excluding juniors hunting under the authority of a junior hunting license.
- Federal Duck Stamp. Hunters under the age of 16 are exempt from the Federal Duck Stamp requirement. Juniors 16 and older and all adult hunters must have a Federal Duck Stamp.
- Harvest Information Program validation.
- Type A pass for hunting at a California state-operated hunt area. These passes can be a Type A one-day, two-day or season pass. They are sold at license agents, such as sporting goods stores, as well as online on the CDFW website. Passes are not sold at check stations.
- If hunting pheasant or snipe, hunters will also need an Upland Game Bird validation.

### *RESERVATIONS*

Reservations are not required, but having a reservation will guarantee getting a hunting spot during the busiest periods of the season. Reservation applications are available for a fee through the CDFW online reservation system.

Hunters can apply for reservations for specific hunt areas (for example, San Luis, Kesterson, Bear Creek, North Freitas, South Freitas, Merced). The reservation does not guarantee a specific blind number or pond; rather, the reservation determines the order that hunters check in first thing in the morning to select their hunt assignments. Reservation holders are called to the check station in numerical order to select their hunt assignments.

Check stations start calling reservation holders either 2 or 2.5 hours before shoot time, depending on the hunt unit. The check station attendant will call reservation holders in order of their reservation number. At that time, reservation holders will present their hunt credentials (hunting license, stamps, pre-purchased daily pass) and select their hunt assignment—for example, a particular blind or zone.

**Table 3. Daily Reservations Issued for Each Hunt Unit**

<b>Refuge Hunt Unit</b>	<b>Daily Reservations Issued at Full Capacity</b> (May fluctuate depending on flood-up conditions)
San Luis/Blue Goose	55
Kesterson	32
Kesterson Accessible Blinds	2
Bear Creek (includes East and West)	14
North Freitas	15
South Freitas	15
Merced/Lonetree	17
Merced Accessible Blind	1
<b>TOTAL</b>	<b>151</b>

After all reservation holders are called and checked in, the check station will fill remaining hunt slots with individuals on the lottery list, followed by individuals on the first-come, first-served list (referred to as the “sweat line”).

There are usually vacant hunt slots remaining after all the reservation holders check in (with the possible exception of the Freitas units). The next group called by the check station to select their hunt assignment includes the lottery participants. After lottery participants check through, remaining hunt slots are issued to the first-come, first-served list.

Hunters without reservations can sign up for the lottery draw the evening before the shoot day between 6 p.m. and 9 p.m. Shortly after 9 p.m., the check station will run the computerized random lottery and post the results. Hunters that arrive after the 9 p.m. deadline to sign up for the lottery can get on the first-come, first-served list for a chance at any hunt assignments remaining after lottery participants check through. Hunters may only sign up for one lottery per day—for example, a hunter may not sign up for the San Luis lottery and Kesterson lottery for the same day. This rule is generally set by the refuge’s CDFW partners who operate the refuge check stations in order to be consistent with all state and Federal hunt areas in the vicinity, although the rule might be revisited by refuge and state partners and adjusted between years based on traffic levels at check stations.

One of the appealing characteristics of hunting at the San Luis and Merced NWRs is the diversity of hunting formats provided. The different hunt units provide opportunities to hunt from assigned blinds, free-roam areas, exclusive zones, assigned ponds and boat access-only areas. The following is a brief description of each hunt unit.

#### *SAN LUIS NWR HUNT PROGRAM*

The San Luis NWR hunt program comprises six units: San Luis, Blue Goose, Kesterson, West Bear Creek, East Bear Creek and Freitas.

San Luis Unit: Legal species include ducks, geese, coots, common gallinules, snipe and ring-necked pheasant. The capacity is 90 hunters but may fluctuate depending on habitat conditions. Hunt days are Wednesdays, Saturdays and Sundays during the state season. The San Luis Unit consists of free

roam within a large contiguous area consisting of seasonal mixed marshes and a river zone. Visitors have three parking lots from which to choose, and each parking lot has a hunter capacity. Vehicles must be parked in the assigned parking lot, but hunters can move by foot anywhere within the free-roam hunt boundary. Pit blinds are in the free-roam area as depicted on the hunt map; however, these blinds are not assigned and not necessarily maintained annually. Hunters are not required to hunt from these blinds. Hunters check in at the Salt Slough check station. A reservation for the San Luis Unit also applies to the Blue Goose Unit. Up to six people can enter the San Luis Unit on a reservation, but only two of the six may be adult hunters.

#### Site-Specific Hunting Regulations for San Luis Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. Vehicles may stop only at designated, assigned parking areas. The dropping of passengers or equipment or stopping between designated parking areas is prohibited.
3. All permits must be completed and returned to the check stations immediately upon completion of your hunt before using any tour routes or leaving the refuge vicinity.
4. Construction of permanent blinds is prohibited. You may use only portable blinds, temporary blinds constructed of natural materials or existing concrete barrel blinds. The cutting/breaking of woody vegetation is prohibited.
5. You must remove all portable blinds, decoys and other personal equipment from the refuge following each day's hunt.
6. The use of motorized boats is prohibited.
7. Use or possession of alcoholic beverages while in the field is prohibited.
8. Fires are prohibited.
9. Fishing is prohibited except where posted.
10. A maximum speed limit of 25 mph is strictly enforced.
11. Hunters must possess valid hunting licenses, stamps and area permits while in the field.

Blue Goose Unit: Legal species include ducks, geese, coots and common gallinules. The capacity is 26 hunters, established by the combined capacity of the unit's blinds. Hunt days are Wednesdays, Saturdays and Sundays during the state season. The Blue Goose Unit consists of nine assigned blinds (eight three-person and one two-person) in seasonal mixed marshes. Hunters may only hunt from their assigned blind. The Blue Goose Unit does not have its own reservation system. A reservation for the San Luis Unit also applies to the Blue Goose Unit. Upon check-in, a hunter with a San Luis reservation can choose between the San Luis or Blue Goose Units. A reservation grants entry for up to the capacity of the blind (two or three people). Hunters check in at the Salt Slough check station.

#### Site-Specific Hunting Regulations for Blue Goose Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. Vehicles may stop only at designated, assigned parking areas. The dropping of passengers or equipment or stopping between designated parking areas is prohibited.
3. All permits must be completed and returned to the drop box or check station immediately upon completion of your hunt before using any tour routes or leaving the refuge vicinity.
4. You may not transport loaded firearms while walking or bicycling between parking areas and spaced blind units.
5. Use or possession of alcoholic beverages while in the field is prohibited.

6. Hunters are restricted to their assigned blind, except for retrieving downed birds, placing decoys or traveling to and from the parking area. You may not shoot from outside the blind.
7. Taking snipe, doves, quail and pheasant is prohibited.
8. Hunters must possess valid hunting licenses, stamps and area permits while in the field.
9. Fires are prohibited.

Kesterson Unit: Legal species include ducks, geese, coots and common gallinules. The capacity is 86 hunters, established by the combined capacity of the unit's blinds. Hunt days are Wednesdays, Saturdays and Sundays during the State season. The Kesterson Unit consists of 34 assigned blinds (16 three-person, 16 two-person and 2 three-person disabled accessible) in seasonal mixed marshes. Hunters may only hunt from their assigned blind. Hunters check in at the Kesterson check station. Hunters may apply for a Kesterson reservation in the statewide system. A reservation grants entry for up to the capacity of the blind (two or three people). A special pheasant hunt is offered in the spaced blind portion of the Kesterson Unit only on the first Monday of pheasant season (the special pheasant hunt is first-come, first-served, with check-in starting at 6:00 a.m.).

Site-Specific Hunting Regulations for Kesterson Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. Vehicles may stop only at designated, assigned parking areas. The dropping of passengers or equipment or stopping between designated parking areas is prohibited.
3. All permits must be completed and returned to the drop box or check station immediately upon completion of your hunt before using any tour routes or leaving the refuge vicinity.
4. You may not transport loaded firearms while walking or bicycling between parking areas and spaced blind units.
5. Use or possession of alcoholic beverages while in the field is prohibited.
6. Hunters are restricted to their assigned blind, except for retrieving downed birds, placing decoys or traveling to and from the parking area. You may not shoot from outside the blind.
7. Taking snipe, doves, quail and pheasant is prohibited.
8. Hunters must possess valid hunting licenses, stamps and area permits while in the field.
9. Fires are prohibited.

West Bear Creek Unit: Legal species include ducks, geese, coots and common gallinules. The capacity is 36 hunters but may fluctuate depending on habitat conditions. Hunt days are Wednesdays, Saturdays and Sundays during the state season, beginning on the third Saturday in November. The West Bear Creek Unit consists of six assigned ponds (five mixed marsh wetlands and one river zone) with capacities of four to six hunters each. Hunters may only hunt from their assigned pond/zone. Hunters check in at the Salt Slough check station. The West Bear Creek Unit traditionally opens the third Saturday in November due to the San Luis NWR water delivery schedule and the unit's positioning at the end of the C Canal. Hunters may apply for a Bear Creek reservation, which allows access to the West or East Bear Creek units. Up to six people can enter the West Bear Creek Unit on a reservation, but only two of the six hunters may be adults.

Site-Specific Hunting Regulations for West Bear Creek Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. Vehicles may stop only at designated, assigned parking areas. The dropping of passengers or equipment or stopping between designated parking areas is prohibited.
3. All permits must be completed and returned to the check station or drop box immediately upon completion of your hunt and before using any tour routes or leaving the refuge vicinity.

4. Construction of permanent blinds is prohibited. You may use only portable blinds and temporary blinds constructed of natural materials. We prohibit the cutting/breaking of woody vegetation.
5. You must remove all portable blinds, decoys and other personal equipment from the refuge following each day's hunt.
6. The use of motorized boats is prohibited.
7. Use or possession of alcoholic beverages while in the field is prohibited.
8. Fires are prohibited.
9. A maximum speed limit of 25 mph is strictly enforced.
10. Hunters must possess valid hunting licenses, stamps and area permits while in the field.

East Bear Creek Unit: The East Bear Creek Unit consists of two exclusive zones (one party of three hunters per zone). The hunt zones are large and encompass a mosaic of flooded swales, uplands and trees. Hunters may only hunt from within their assigned zone. Legal species include ducks, geese, coots and common gallinules. Hunters check in at the Salt Slough check station. The East Bear Creek Unit traditionally opens on the third Saturday in November. Hunters may apply for a Bear Creek reservation, which allows access to the West or East Bear Creek Units. Up to three people can enter the East Bear Creek Unit on a reservation. The end of shoot time on the East Bear Creek unit is 12 p.m.

Site-Specific Hunting Regulations for East Bear Creek Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. Vehicles may stop only at designated, assigned parking areas. The dropping of passengers or equipment or stopping between designated parking areas is prohibited.
3. All permits must be completed and returned to the check station or drop box immediately upon completion of your hunt and before using any tour routes or leaving the refuge vicinity.
4. Construction of permanent blinds is prohibited. You may use only portable blinds and temporary blinds constructed of natural materials. Cutting/breaking woody vegetation is prohibited.
5. You must remove all portable blinds, decoys and other personal equipment from the refuge following each day's hunt.
6. The use of motorized boats is prohibited.
7. Use or possession of alcoholic beverages while in the field is prohibited.
8. Fires are prohibited.
9. A maximum speed limit of 25 mph is strictly enforced.
10. Hunters must possess valid hunting licenses, stamps and area permits while in the field.

Freitas Unit: The Freitas hunt area consists of the San Joaquin River and Salt Slough riparian corridors, and the hunt area is divided into north and south access/launch points. Hunters must use a boat to access the Freitas hunt area; however, once inside the hunt boundary, they may hunt from land or boat. Many hunters shore their boats and set out across land within the hunt area to hunt from natural cover or in pothole ponds that fill when the waterways flood. A special zone within the Freitas Unit is open to pheasant hunting during the ring-necked pheasant season.

North Freitas is a boat-access hunt unit on the San Joaquin River. Hunters access the unit by launching their boat in the San Joaquin River at Great Valley Grasslands State Park Fremont Ford boat launch facility on CA-140. Access to this hunt unit is via boat only, with a maximum speed of 5 mph. Inboard water thrust and air-thrust boats are prohibited (for example, jet skis, air boats and inboard jet boats are not allowed). All California and U.S. Coast Guard boating regulations apply. The

hunt unit begins approximately 2 miles upstream of the boat launch. The habitat is riverine, dense riparian woodland and flooded timber. Once inside the hunt unit, hunters may leave their boat and hunt anywhere within the sign-posted hunt boundary. Legal species include ducks, geese, coots and common gallinules. North Freitas hunters check in at the Kesterson check station. Hunters with a North Freitas reservation may check in to obtain their hunt permit anytime between 6 p.m. the evening prior and 3 a.m. but may not enter the boat launch parking lot until 2 a.m. (the parking lot and hunt area are closed between 8 p.m. and 2 a.m.—no access allowed during this time). Hunters that do not have a reservation can check in after 3 a.m. Hunters are required to possess a Type A hunt pass and obtain an area permit at the check station on Wednesdays, Saturdays and Sundays. On these days, the daily capacity is 15 boats with no more than four hunters per boat. On Mondays, Tuesdays, Thursdays and Fridays, no check-in or permit is required, and there is no capacity regarding the number of boats.

During pheasant season, Freitas boat-in waterfowl hunters may not enter the adjacent Upland Pheasant Zone on Wednesdays, Saturdays or Sundays without first changing hunt assignments and obtaining a pheasant zone permit at the check station. When hunting the pheasant zone on Wednesdays, Saturdays or Sundays (during pheasant season), only pheasants may be hunted. On Mondays, Tuesdays, Thursdays and Fridays during waterfowl season, Freitas boat-in waterfowl hunters may enter the zone to hunt waterfowl, coots and common gallinules. Before and after pheasant season, Freitas boat-in waterfowl hunters may enter the zone 7 days/week during waterfowl season; however, a Freitas hunt permit and Type A pass are required on Wednesdays, Saturdays and Sundays.

The South Freitas Unit is a boat-access hunt unit on Salt Slough. Hunters access the unit using the San Luis NWR's Salt Slough boat launch on CA-165. Access to this hunt unit is via boat only, with a maximum speed of 5 mph. Inboard water thrust and air-thrust boats are prohibited (for example, jet skis, air boats and inboard jet boats are not allowed). All California and U.S. Coast Guard boating regulations apply. Once inside the hunt unit, hunters may leave their boat and hunt anywhere within the sign-posted hunt boundary. Legal species include ducks, geese, coots and common gallinules. South Freitas hunters check in at the Salt Slough check station. Hunters with a South Freitas reservation may check in to obtain their hunt permit anytime between 6 p.m. the evening prior and 3 a.m. but may not enter the boat launch parking lot until 2 a.m. (the parking lot and hunt area are closed between 8 p.m. and 2 a.m.—no access allowed during this time). Hunters that do not have a reservation can check in after 3 a.m. Hunters are required to possess a Type A hunt pass and obtain an area permit at the check station on Wednesdays, Saturdays and Sundays. The daily capacity of the boat launch is 15 boats with no more than four hunters per boat on these days, although all 15 boats generally do not hunt in the South Freitas zone; a subset of boats that launch at South Freitas usually travel downstream under the CA-165 bridge to hunt in the North Freitas zone and this activity is allowed. On Mondays, Tuesdays, Thursdays and Fridays, no check-in or permit is required, and there is no capacity regarding the number of boats.

The Freitas Unit also features a walk-in upland pheasant zone accessed by its own parking lot on CA-140. The upland pheasant zone is managed separately from the Freitas boat-access waterfowl hunt zone. The upland pheasant zone is only open on Wednesdays, Saturdays and Sundays during the pheasant season and requires hunters to possess a Type A hunt pass and obtain an area permit from the Kesterson check station. Hunters may not move back and forth between the upland pheasant zone and the boat access waterfowl zone without changing their hunt assignment at the check station. Legal species in the upland pheasant zone are limited to only pheasants. The hunter capacity of the zone is 10 hunters. A Kesterson reservation or lottery draw may be used to access the pheasant zone.

### Site-Specific Hunting Regulations for Freitas Unit:

1. Permits obtained from the check station are required on Wednesdays, Saturdays and Sundays. During the remainder of the week, the Freitas Unit is open on a first-come, first-served basis, with no daily fee, hunter quota or check-in required.
2. South Freitas boat launch permits are issued at the Salt Slough check station on Wednesdays, Saturdays and Sundays. North Freitas boat launch permits are issued at the Kesterson Check Station. Hunters are required to launch their boat and park at the boat launch indicated on their permit; however, travel via boat to hunt in either portion (north or south) of the Freitas hunt zone is allowed.
3. During pheasant season, Freitas boat-in waterfowl hunters may not enter the Upland Pheasant Zone on Wednesdays, Saturdays and Sundays without first changing their hunt assignment and obtaining a pheasant zone permit at the Kesterson check station. When hunting the pheasant zone on Wednesdays, Saturdays or Sundays (during pheasant season), only pheasants may be hunted. On Mondays, Tuesdays, Thursdays and Fridays during waterfowl season, Freitas boat-in waterfowl hunters may enter the zone to hunt waterfowl, coots and moorhens. Before and after pheasant season, Freitas boat-in waterfowl hunters may enter the zone 7 days/week during waterfowl season; however, a Freitas hunt permit and Type A pass are required on Wednesdays, Saturdays and Sundays. Consult state hunting regulations for specific season dates.
4. Construction of permanent blinds is prohibited. Only portable blinds and temporary blinds constructed of natural materials are permitted. Cutting/breaking woody vegetation is prohibited. Hunters must remove all blinds, equipment and belongings from the refuge by the end of each daily hunt visit.
5. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the boat launch.
6. Permits must be completed and returned to the check station or drop box at the end of each hunt (Wednesdays, Saturdays and Sundays).
7. You may not transport loaded firearms while traveling in a boat under power.
8. Access to the Freitas Unit is via boat only. The unit, including the parking lot, is closed between the hours of 8 p.m. and 2 a.m.
9. Boats are limited to a maximum speed of 5 mph. Inboard water thrust and air-thrust boats are prohibited (for example, jet skis, air boats and inboard jet boats are prohibited).
10. Vehicles parked in the boat launch parking lots must not block the ramp or other vehicles. Hunters using the South Freitas boat launch must display a parking pass obtained at the check station on Wednesdays, Saturdays and Sundays.
11. All Federal and state regulations, season dates, bag limits, boat safety and equipment rules and shoot times apply to this area.
12. Use or possession of alcoholic beverages while in the field is prohibited.
13. Fishing on the Freitas Unit is prohibited.
14. The Freitas hunt boundary is sign-posted on the ground. To further assist hunters in locating the hunt areas, below are the latitude-longitude coordinates, which can be entered into GPS units or smartphone mapping applications: North Freitas boat launch hunt zone northern boundary: 37.297754, -120.912793. North Freitas boat launch hunt zone southern boundary: 37.250924, -120.858378. South Freitas boat launch hunt zone northern boundary: 37.242853, -120.844052. South Freitas boat launch hunt zone southern boundary: 37.219017, -120.834293.

### Site-Specific Hunting Regulations for the Pheasant Hunt Zone in the Freitas Unit:

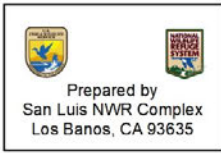
1. Hunters must possess a valid hunting license, stamps and area permit while in the field.



2. You may possess not more than 25 Federally-approved nontoxic shotgun shells once you have left the parking lot.
3. Vehicles must be parked in the Pheasant Unit parking lot. Access to the hunt unit is by foot only.
4. Only pheasants may be hunted in the Freitas Upland Pheasant Unit under a pheasant unit permit.
5. All permits must be completed and returned to the check station immediately upon completion of your hunt.
6. Use or possession of alcoholic beverages while in the field is prohibited.
7. This unit is open only on Wednesdays, Saturdays and Sundays during California's normal pheasant hunting season. All hunters must check in at the Kesterson check station to obtain an area-specific permit and then return the permit to the check station upon completion of the hunt and before departing the area.
8. Hunters may not move back and forth between the Freitas Upland Pheasant Unit and the Freitas boat-in waterfowl zone without changing their hunt assignment at the check station.
9. Hunters may enter the field after obtaining a permit from the check station, but no shooting is allowed until start of official 8:00 a.m. shoot time.



*Figure 12. Young Freitas waterfowl hunter with dog. Courtesy Shawn Milar*



## San Luis National Wildlife Refuge Management Units

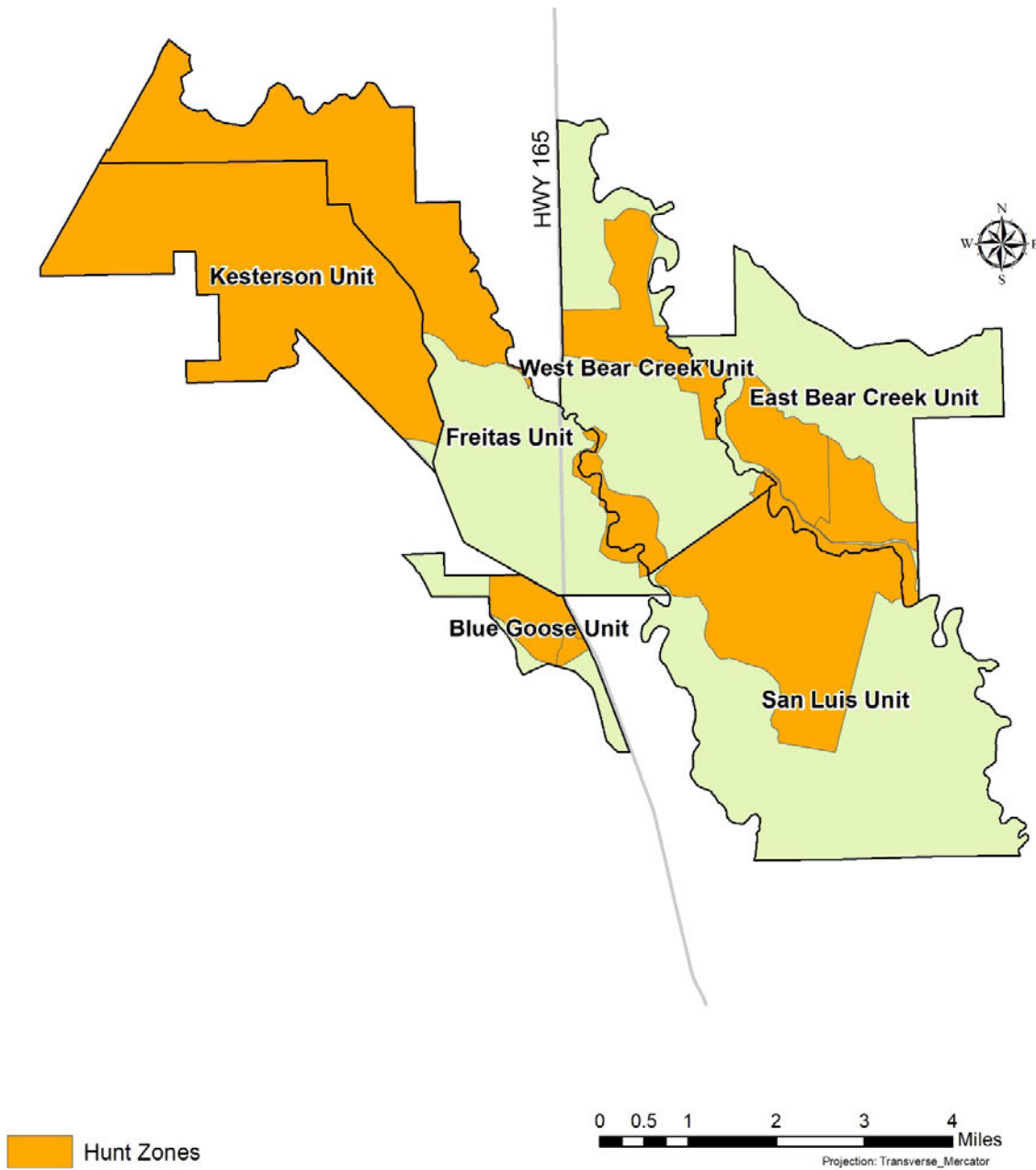


Figure 13. Map of the San Luis NWR Hunt Program waterfowl hunt zones.

# SAN LUIS UNIT HUNT MAP SAN LUIS NATIONAL WILDLIFE REFUGE

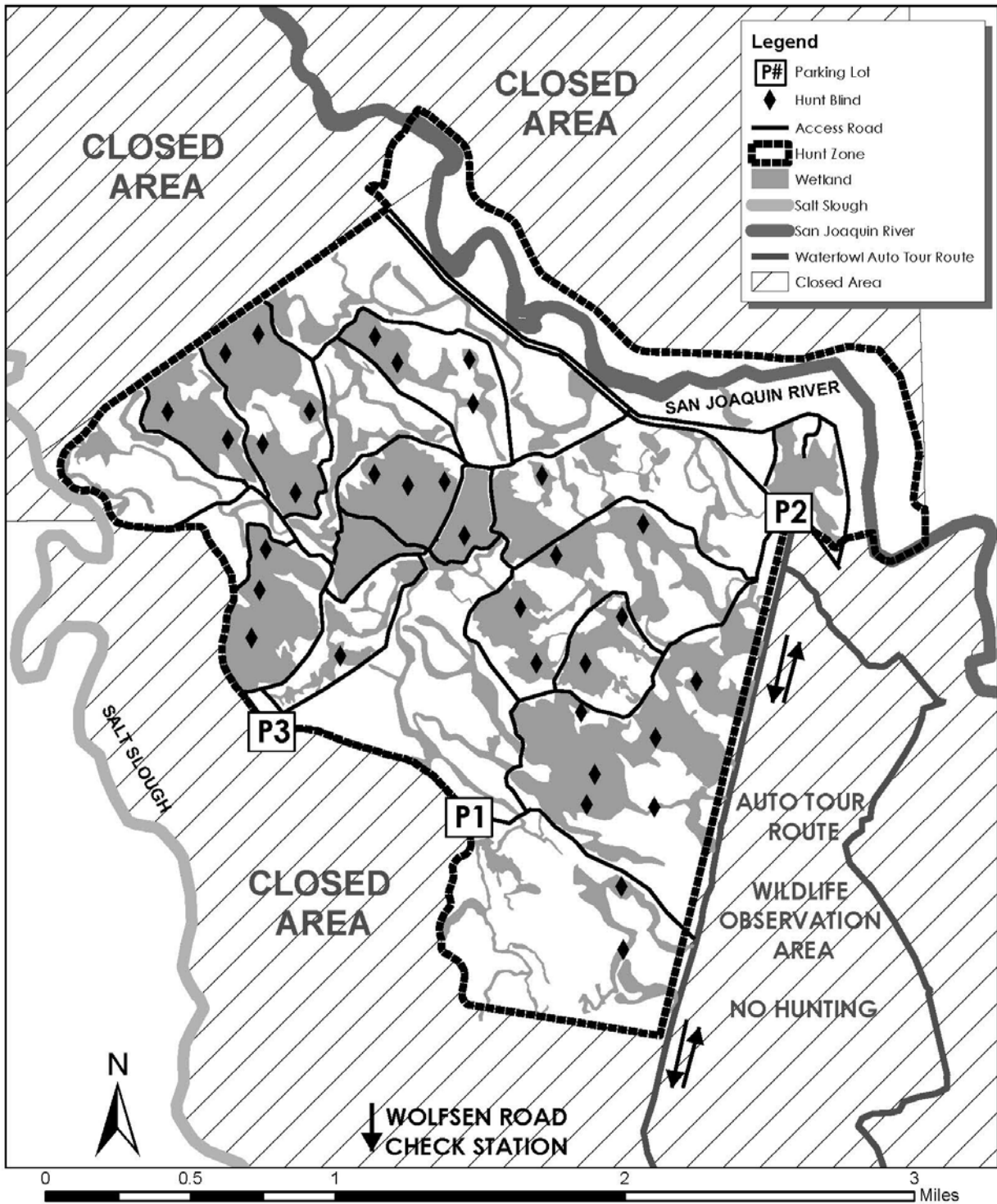


Figure 14. Front side of San Luis Unit hunt map handout.

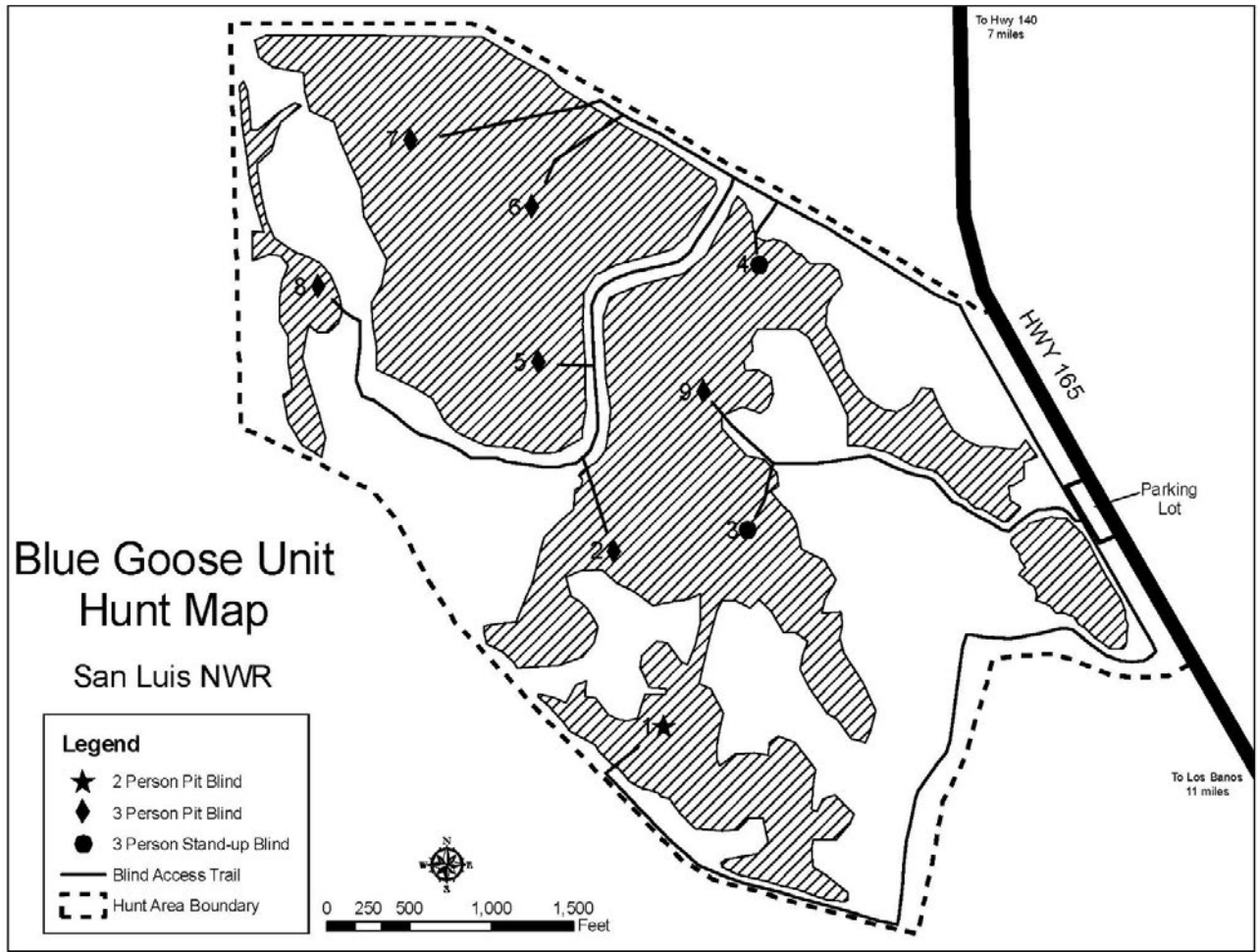


Figure 15. Front side of Blue Goose Unit hunt map handout.

**KESTERSON UNIT HUNTING MAP  
SAN LUIS NATIONAL WILDLIFE REFUGE**

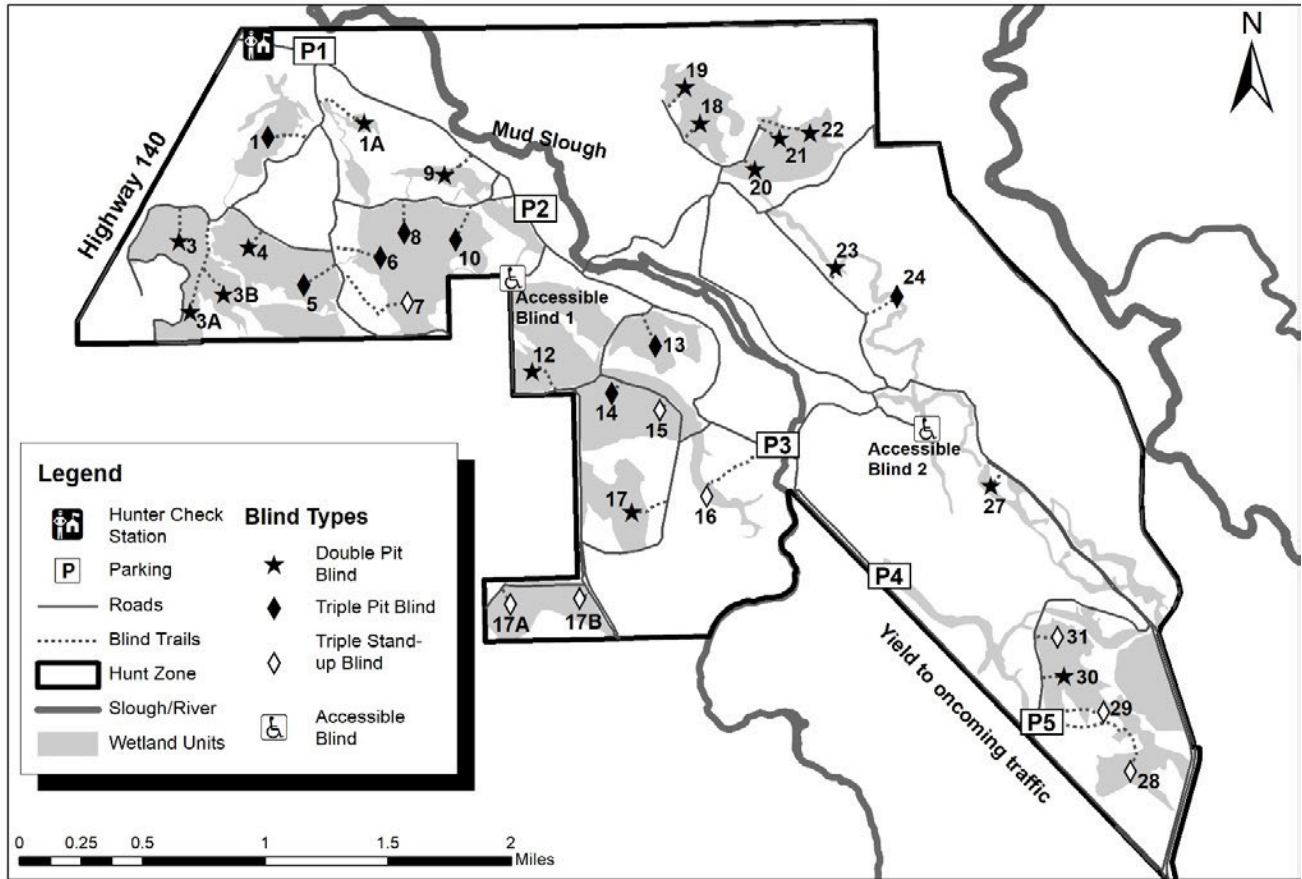


Figure 16. Front side of Kesterson Unit hunt map handout.

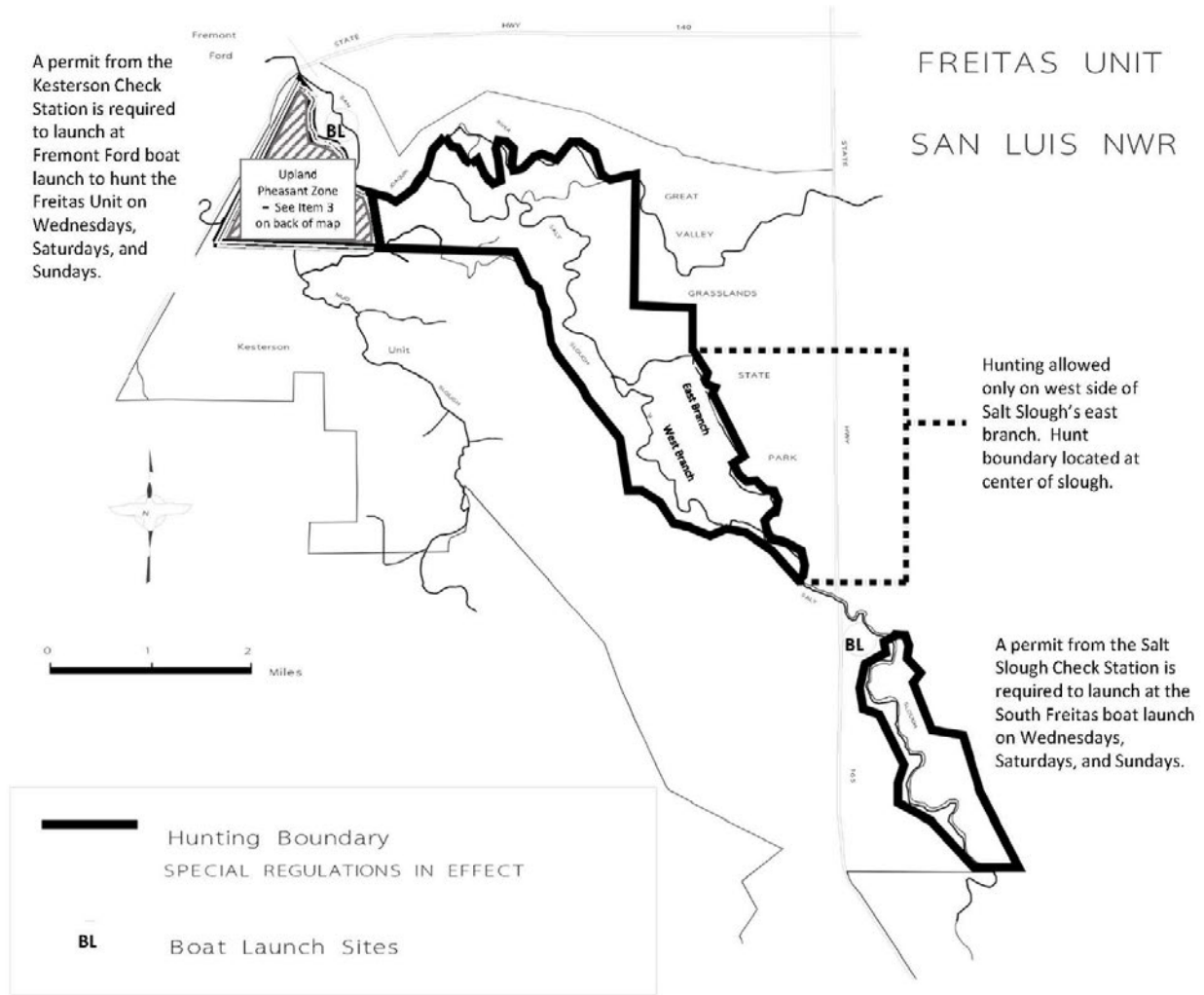


Figure 17. Front side of Freitas Unit hunt map handout.

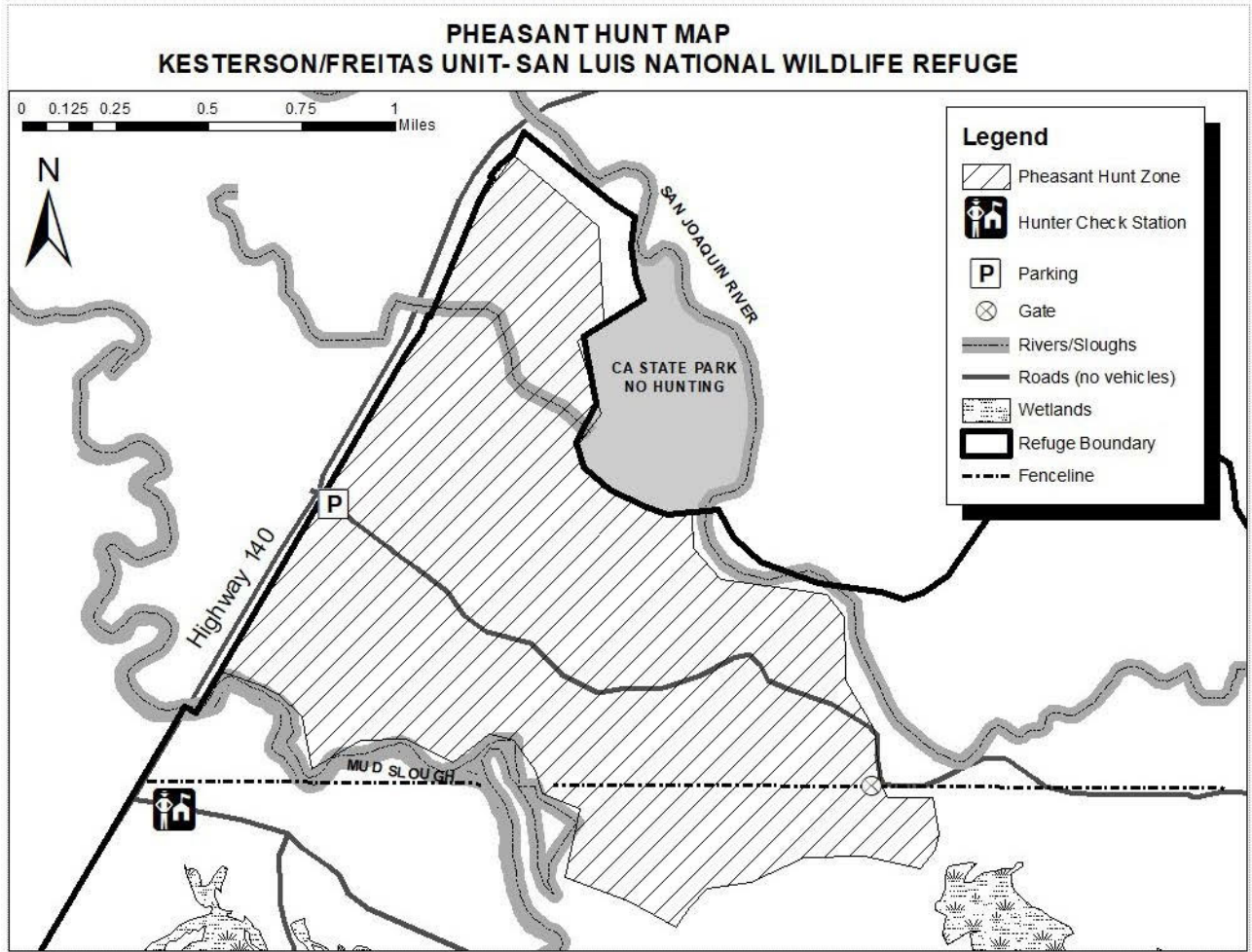


Figure 18. Front side of Freitas Pheasant Zone hunt map handout.

# WEST BEAR CREEK UNIT HUNT MAP SAN LUIS NATIONAL WILDLIFE REFUGE

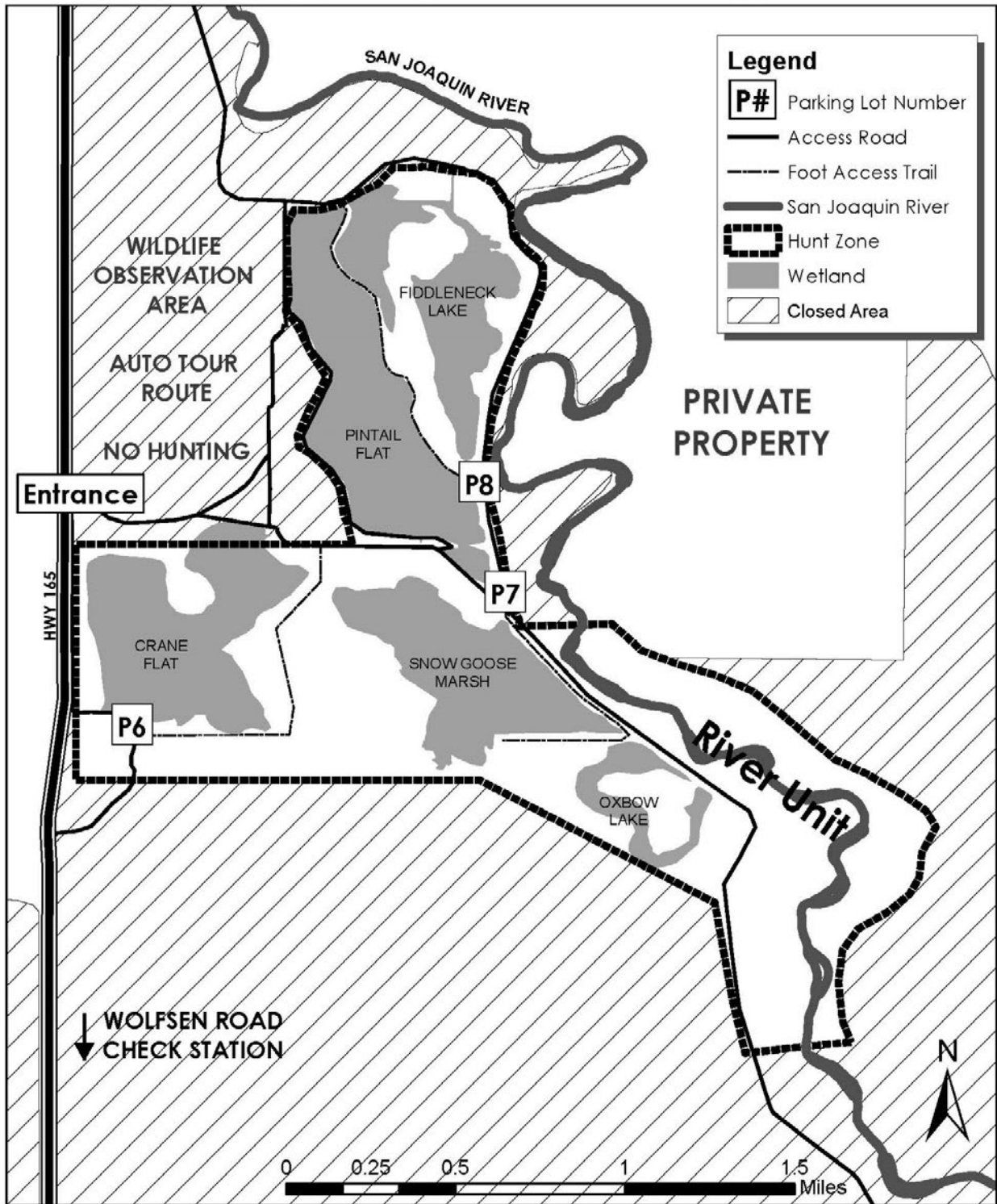


Figure 19. Front side of West Bear Creek Unit hunt map handout.



# EAST BEAR CREEK UNIT HUNTING MAP SAN LUIS NATIONAL WILDLIFE REFUGE

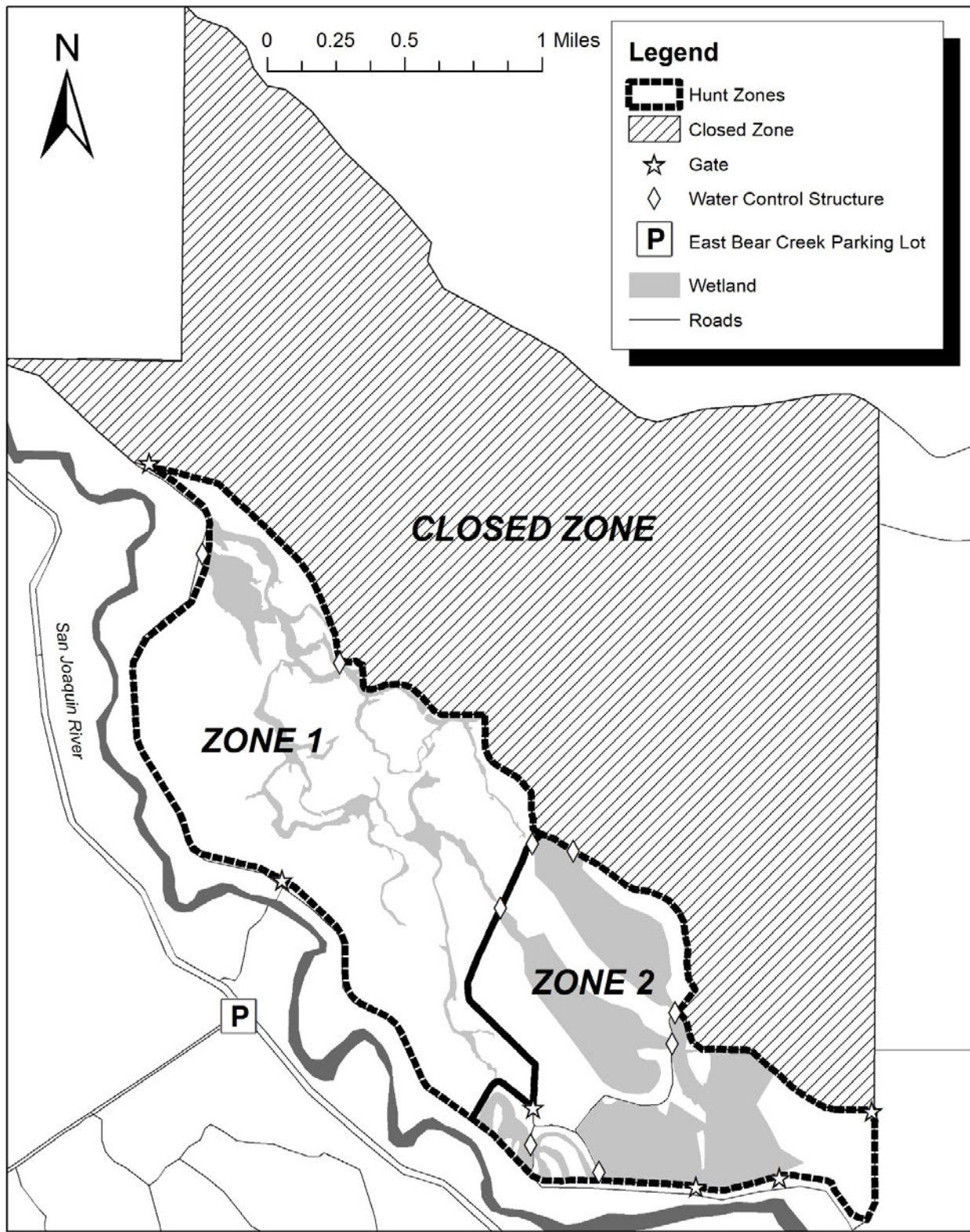


Figure 20. Front side of East Bear Creek Unit hunt map handout.

## *MERCED NWR HUNT PROGRAM*

The Merced NWR hunt program consists of the Merced Unit (West Marsh and Mariposa Creek sub-units) and Lonetree Unit. Several special restrictions occur at Merced NWR to increase the quality of the hunt program. These restrictions reduce hunting pressure on the refuge during the hunt day and allow waterfowl to better recover from disturbance before the next hunt day. Special restrictions include only hunting two days per week on Wednesdays and Saturdays, rather than three. The shooting day at the Merced NWR is reduced in length, with 12 p.m. marking the end of shoot time rather than sunset, and no refills of hunt assignments are issued as hunters leave for the day.

Merced Unit: The West Marsh and Mariposa Creek hunt units of Merced NWR consist of 19 assigned blinds (17 two-person, 1 three-person and 1 three-person disabled accessible) in seasonal mixed marshes and two dry field goose pits. In 2017, three new blind locations (7A, 7B, 9A) were added on the West Marsh side to compensate for the blinds on the Mariposa Creek side that have chronic issues with slow flood-up. The goose pits traditionally open on the third Saturday in November. Hunters may only hunt from their assigned blind. Hunters check in at the Merced check station on Sandy Mush Road. Legal species include ducks, geese, coots, common gallinules and snipe. Hunters may apply for a Merced NWR reservation in the statewide system, which applies to the Merced or Lonetree units. A reservation grants entry at the Merced Unit for up to the capacity of the blind (two or three people) or for a party of up to three people if going to a zone at the Lonetree Unit. The Merced NWR has the following special regulations: Shoot days are Wednesdays and Saturdays only, and shoot time ends at 12 p.m.

### Site-Specific Hunting Regulations for Merced NWR:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells once you have left the parking lot.
2. You must unload firearms while transporting them between parking areas and blind sites.
3. Hunters are restricted to their assigned blind, except for retrieving downed birds, placing decoys or traveling to and from the parking area. You may not shoot from outside the blind.
4. Taking doves, quail and pheasant is prohibited.
5. Use or possession of alcoholic beverages while in the field is prohibited.
6. Shooting hours are from one-half hour before sunrise to 12 p.m.
7. Hunters must possess valid hunting licenses, stamps and area permits while in the field.
8. Fires are prohibited.
9. Permits must be completed and returned to the check station upon completion of your hunt.
10. Hunters must park in assigned parking lots.

Lonetree Unit: The Lonetree Unit consists of five exclusive zones (one party of three hunters per zone). The Lonetree Unit traditionally opens on the third Saturday in November. The hunt zones encompass a mosaic of habitats, including uplands, mixed marshes, swales and the Mariposa Creek bypass channel. Hunters may only hunt within their assigned zone. Hunters check in at the Merced check station on Sandy Mush Road. Legal species include ducks, geese, coots, common gallinules and snipe. Hunters may apply for a Merced NWR reservation in the statewide system, which applies to the Merced or Lonetree units. A party of up to three people can enter the Lonetree Unit on a Merced reservation. The Merced NWR has the following special regulations: Shoot days are Wednesdays and Saturdays only, and shoot time ends at 12 p.m.

### Site-Specific Hunting Regulations for Lonetree Unit:

1. You may possess not more than 25 Federally approved nontoxic shotgun shells after leaving the parking lot.
2. Shooting hours are from one-half hour before sunrise to 12 p.m.

3. Vehicles may stop only at the designated, assigned parking area. The dropping of passengers or equipment or stopping between the designated parking area is prohibited.
4. All permits must be completed and returned to the check station immediately upon completion of your hunt before using any tour routes or leaving the refuge vicinity.
5. Construction of permanent blinds is prohibited. You may use only portable blinds and temporary blinds constructed of natural materials. Cutting/breaking woody vegetation is prohibited.
6. You must remove all portable blinds, decoys and other personal equipment from the refuge following each day's hunt.
7. The use of motorized boats is prohibited.
8. Use or possession of alcoholic beverages while in the field is prohibited.
9. Fires are prohibited.
10. Fishing is prohibited.
11. A maximum speed limit of 25 mph is strictly enforced.
12. Hunters must possess valid hunting licenses, stamps and area permits while in the field.

Prepared by:  
San Luis NWR Complex  
Los Banos, CA 93635



# Merced National Wildlife Refuge Management Units

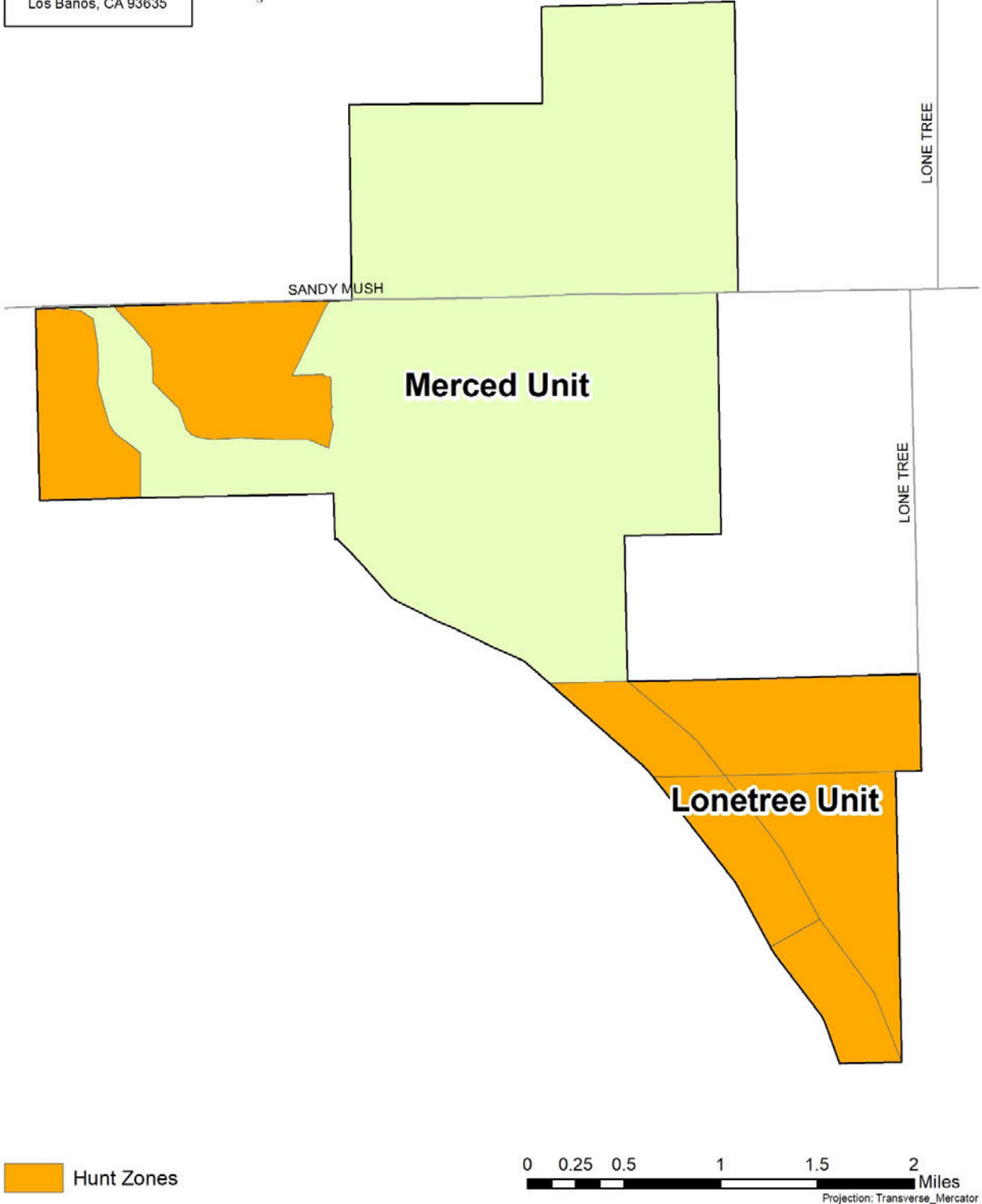


Figure 21. Map of Merced NWR hunt units.

# MERCED NATIONAL WILDLIFE REFUGE HUNT MAP

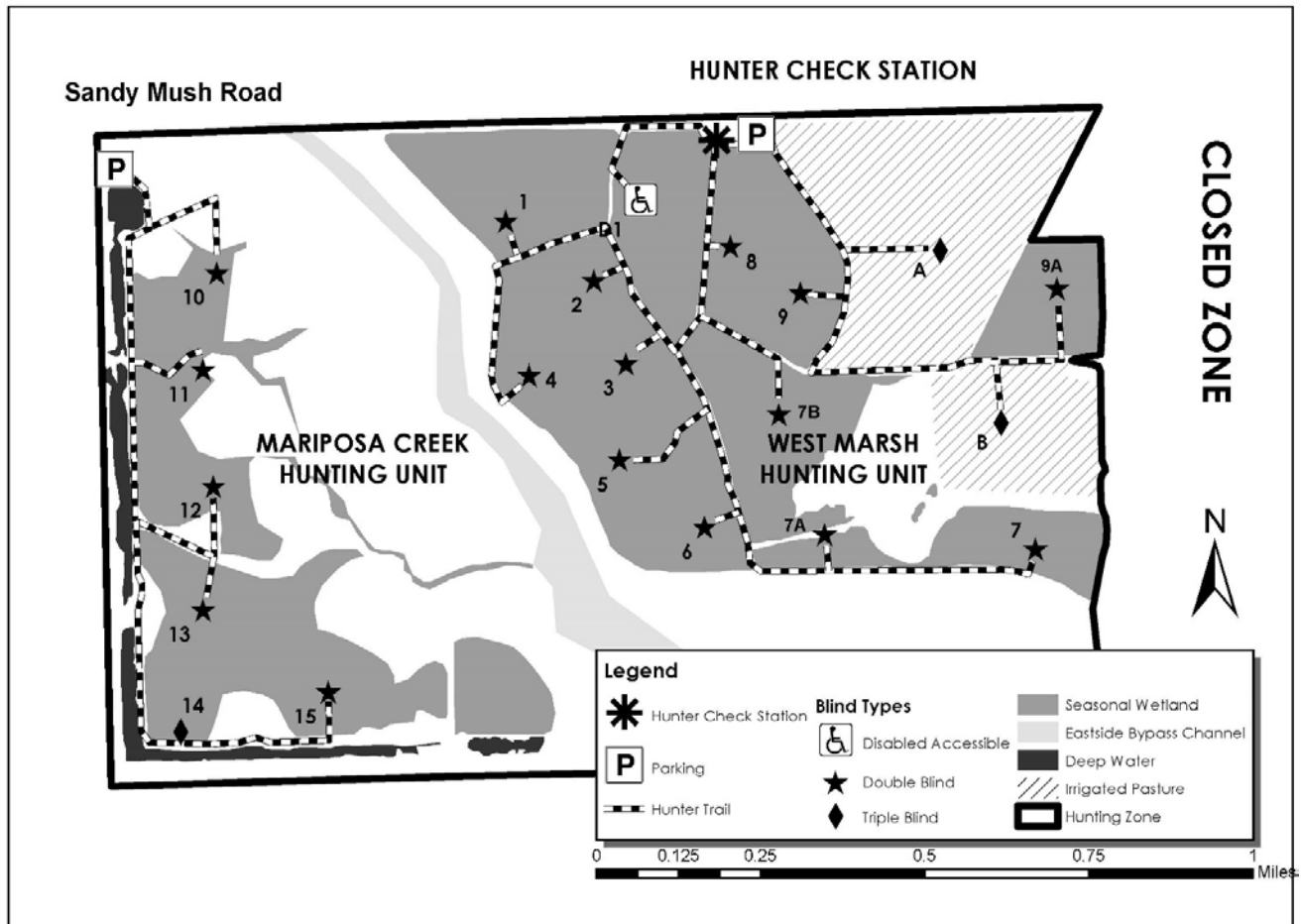


Figure 22. Front side of Merced NWR hunt map handout.

# LONE TREE UNIT HUNT MAP MERCED NATIONAL WILDLIFE REFUGE

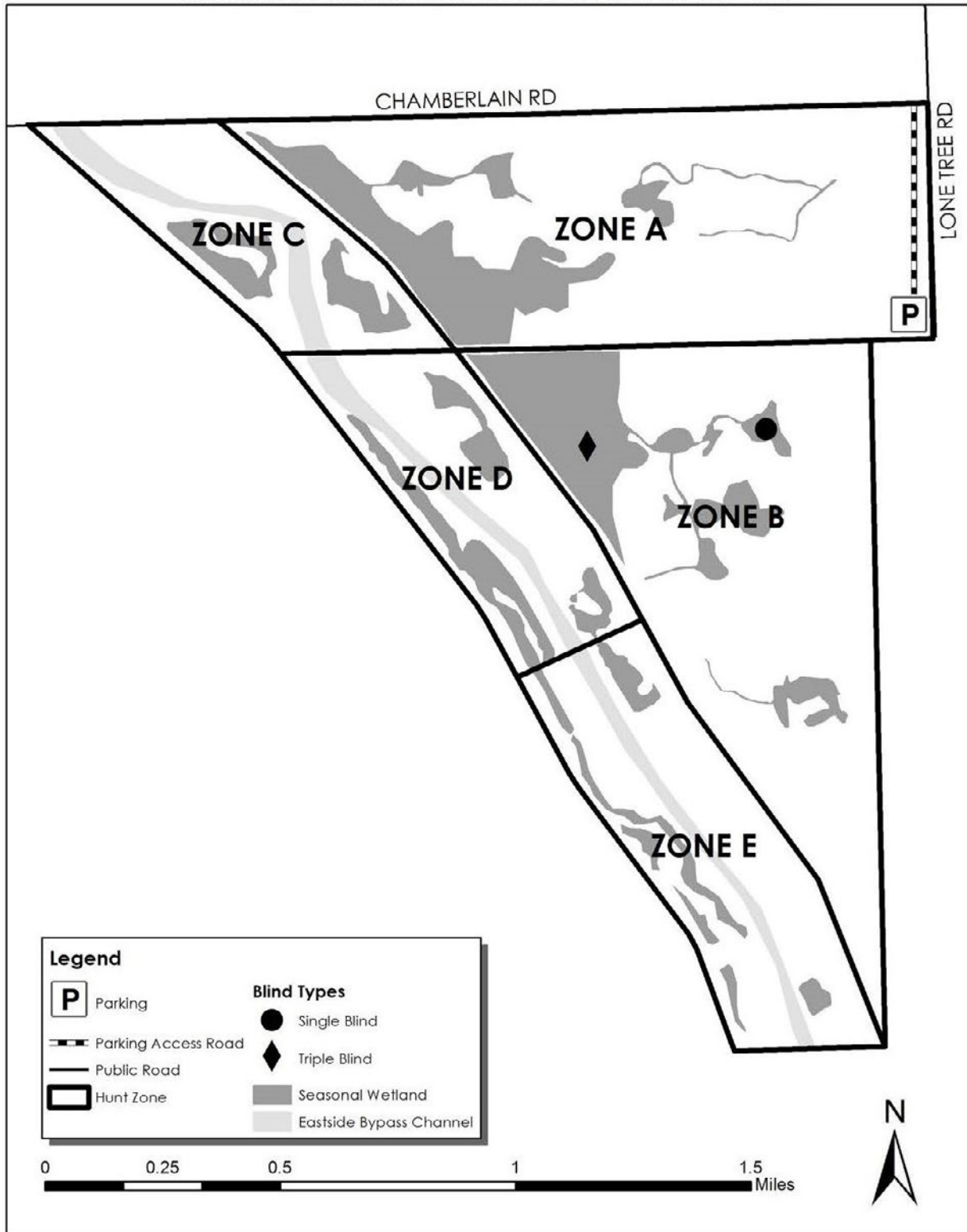


Figure 23. Front of Lonetree Unit hunt map handout.

## **Objectives and Strategies:**

### **CCP OBJECTIVE 4.2: HUNTING**

The Complex will provide the public with a high-quality and diverse hunting program, including opportunities for hunting of waterfowl and other waterbirds.

#### **Objective 4.2 Rationale:**

Hunting is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. As a result, the refuges propose to continue to allow hunting of waterfowl, coots, common moorhens, pheasant and snipe. The hunting program will be conducted in a safe and cost-effective manner, consistent with state regulations, to provide safe hunting opportunities while minimizing conflicts with other priority wildlife-dependent recreational uses. Other visitor uses occur in different areas of the refuges, thereby minimizing potential conflicts with hunters. The Complex hunting program complies with the Code of Federal Regulations Title 50, 32.1 and is managed in accordance with Service Manual 605 FW 2, Hunting.

#### **Objective 4.2 Hunting Program Strategies:**

- 4.2.1.** Implement the hunting program portion of the Complex's visitor services plan to provide the public with high-quality and diverse waterfowl hunting opportunities. The waterfowl hunt program will include opportunities for hunting from fixed blinds, goose pits, hunting from boats, free roam and exclusive zone free-roam types.
- 4.2.2.** Manage a waterfowl hunt program with opportunities for at least 90 sportspeople per hunt day at the San Luis Unit of the San Luis NWR.
- 4.2.3.** Manage a waterfowl hunt program consisting of nine assigned blinds at the Blue Goose Unit of the San Luis NWR.
- 4.2.4.** Manage a waterfowl hunt program consisting of 34 assigned blinds at the Kesterson Unit of the San Luis NWR.
- 4.2.5.** Manage a waterfowl hunt program consisting of six assigned ponds/units at the West Bear Creek Unit of the San Luis NWR.
- 4.2.6.** Manage a boat access waterfowl hunt program 7 days/week at the Freitas Unit of the San Luis NWR, with opportunities for at least 120 hunters on Wednesdays, Saturdays and Sundays.
- 4.2.7.** Manage a waterfowl hunt program consisting of two zones for up to six sportspeople per hunt day at the East Bear Creek Unit of the San Luis NWR. Consider expanding or realigning the number of zones.
- 4.2.8.** Manage a waterfowl hunt program consisting of 19 assigned blinds at the Merced NWR.
- 4.2.9.** Manage a waterfowl hunt program consisting of five zones at the Lonetree Unit of the Merced NWR.
- 4.2.10.** Manage a pheasant hunting program at the San Luis and Freitas units of the San Luis NWR.
- 4.2.11.** Manage a special Monday pheasant hunt at the Kesterson Unit of the San Luis NWR.
- 4.2.12.** Coordinate hunt program operations with CDFW, including annual pre- and post-hunt season meetings; update hunt program changes in CDFW regulations; and 50 CFR as necessary.
- 4.2.13.** Provide hunt program information and maps at hunter check stations, interpretive kiosks and visitor centers and on refuge websites.
- 4.2.14.** Provide and update hunting information on the Complex's individual refuge websites.

- 4.2.15. Operate special youth and veteran waterfowl hunts on Merced and San Luis refuges in conjunction with CDFW.
- 4.2.16. Maintain records and statistics on hunter visits and bird harvest.
- 4.2.17. Work cooperatively with CDFW wardens and Federal wildlife officers to enforce hunting laws and refuge-specific regulations to provide all visitors with a safe and quality experience.
- 4.2.18. Maintain Service-owned hunter check stations and kiosks to effectively and safely process hunters and provide hunter-related information.
- 4.2.19. Consider methods and opportunities to improve hunter success and waterbird use on the Blue Goose Unit, such as reducing hunting pressure by shortening the hunt day or reducing the number of hunt days per week to two.

***Significant Program Changes:***

The following proposed changes/additions would improve the Complex waterfowl hunting program:

- To improve the diversity of opportunities, explore installing waterfowl hunt blinds on Merced NWR's Lonetree Unit and San Luis NWR's East Bear Creek Unit.
- Explore realigning or adding additional hunt zones on the East Bear Creek Unit.
- Replace most of the aging hunt blinds at Kesterson and San Luis Units.

Consider methods and opportunities to improve hunter success and waterbird use on the Blue Goose Unit, such as reducing hunting pressure by shortening the hunt day or reducing the number of hunt days per week to two.

***Monitor and Evaluate:***

The Complex maintains a database of hunt unit results and hunt blind/zone results that is updated each season. The performance of each hunt area and blind/zone, as well as use and subscription by sportspeople, are tracked. In addition, the Service meets with CDFW before and after each hunt season to coordinate regarding operation of the program. CDFW hosts an annual pre-season public meeting that the Service attends to provide updates about refuge hunt programs.

**STANDARD 4: FISHING**  
***Policy (605 FW 3)***

Fishing is an appropriate use of the National Wildlife Refuge System when compatible. Fishing programs will be of the highest quality, conducted in a safe and cost-effective manner, and to the extent practicable, carried out in accordance with State regulations.





Figure 24. Fishing parking lot along Salt Slough at San Luis NWR. USFWS

### **Current Program Discussion:**

The San Luis NWR features fishing access along Salt Slough, a natural freshwater tributary of the San Joaquin River. A section of Salt Slough, accessed via the Elk auto tour route, is open to fishing by rod and reel from the bank daily year-round. Refuge visitation hours are 1/2-hour before sunrise to 1/2-hour after sunset (dawn to dusk). Common species include channel catfish, bullhead catfish, striped bass and black bass. No boats are allowed. Visitors must adhere to all California fishing regulations. All anglers 16 years old and older must have a current California fishing license while fishing on the refuge. The fishing area features a concrete fishing pier overlooking Salt Slough from which anglers can fish. The pier is designed to be accessible to persons with disabilities. Fishing visitation is estimated based on staff observations (Table H, Refuge Visitation Trends and Identifying Audiences). The refuge manages public access and infrastructure for fishing opportunities, but the refuge does not conduct active management of sport fish populations.

There is no fishing allowed at the Merced NWR. Water management on the refuge within the public use area consists primarily of seasonal wetlands and is not conducive to operating a fishing program.

**Objectives and Strategies:**

**CCP OBJECTIVE 4.3: FISHING**

The Complex will implement a quality fishing program for visitors at the San Luis Unit of the San Luis NWR by providing and maintaining fishing access locations along Salt Slough.

*Objective 4.3 Rationale:* Fishing is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. The San Luis NWR will continue to allow fishing in the Salt Slough channel. The fishing program will be conducted in a safe and cost-effective manner, consistent with state regulations, to provide fishing opportunities while minimizing conflicts with other priority wildlife-dependent recreational uses. Other visitor uses that could conflict with fishing occur in different areas of the refuge, thereby minimizing potential conflicts with anglers. The refuge fishing program complies with the Code of Federal Regulations Title 50, 32.1 and is managed in accordance with Service Manual 605 FW 2, Hunting (for fishing).

Objective 4.3 Fishing Strategies:

- 4.3.1. Allow public fishing opportunities in accordance with State regulations at the San Luis Unit of the San Luis NWR.
- 4.3.2. Maintain and enhance the fishing access facilities, including designated fishing access parking lots along Salt Slough on the San Luis Unit of the San Luis NWR.
- 4.3.3. Maintain a fishing pier accessible to persons with disabilities at the San Luis Unit of the San Luis NWR.
- 4.3.4. Maintain auto tour routes and other public access roads that travel to fishing areas.
- 4.3.5. Conduct law enforcement patrols to ensure conformance with fishing regulations.
- 4.3.6. Post a summary of refuge fishing rules and regulations prominently at the fishing area.
- 4.3.7. Create and distribute a fact sheet to the public about the refuge fishing program.

**Significant Program Changes:**

None.

**Monitor and Evaluate:**

Monitor fishing program participation via staff observation and tule elk tour route traffic for changes in trends and levels of visitation. Record common questions and suggestions from visitors regarding the fishing program and changes or improvements.

**STANDARD 5: WILDLIFE OBSERVATION AND WILDLIFE PHOTOGRAPHY**

**Policy (605 FW 4 and 604 FW 5)**

Wildlife observation and wildlife photography are appropriate wildlife-dependent recreational uses of Refuge System lands when compatible. Visitors of all ages and abilities will have an opportunity to observe and photograph key wildlife and habitat resources of the Complex. Viewing and photographing wildlife in natural or managed environments will foster a connection between visitors and natural resources.



Figure 25. Visitors observing wildlife on Merced NWR. Courtesy Gary R. Zahm

### **Current Program Discussion:**

#### **SAN LUIS NWR WILDLIFE OBSERVATION AND PHOTOGRAPHY**

Wildlife observation and photography on the San Luis NWR primarily take place from the visitor center, three auto tour routes and eight nature trails.

#### **Auto Tour Routes:**

##### ***Waterfowl Auto Tour Route***

Length: 8.5 miles

Season: Open year-round

Access: Visitor center/main refuge entrance

Road Surface: All-weather compacted gravel

The waterfowl auto tour route meanders through the heart of the San Luis NWR upland and wetland habitats. Thousands of wintering ducks use these wetlands during fall, winter and spring. Large flocks of geese and sandhill cranes often can be seen during the winter season, and tundra swans are usually visible in one or more of the wetlands during the winter. Mammals, such as black-tailed deer and coyotes, are abundant on the refuge and seeing one is always a possibility. The variety of raptor species increases in the winter, when peregrine falcons, bald eagles and occasionally even golden eagles hunt the Valley's plentiful rodent populations. Spring, summer and fall are bountiful times

when dozens of songbird species either migrate through the riparian woodlands or move in for the summer breeding season.

From the waterfowl auto tour route, visitors can access three nature trails—the Chester Marsh nature trail, the Sousa Marsh nature trail and the Winton Marsh nature trail. Each trail has a trailhead parking lot for vehicles.

### *Tule Elk Auto Tour Route*

Length: 5 miles

Season: Open year-round

Access: Visitor center/main refuge entrance

Road Surface: All-weather compacted gravel

The tule elk auto tour route guides visitors around the nearly 800-acre enclosure that is home to a resident herd of an endemic sub-species of North American elk known as tule elk. Tule is another name for bulrush—a large wetland plant. Tule elk nearly became extinct in the late 1800s, when they declined to as few as 20 to 40 animals because of market hunting, habitat loss and competition from introduced livestock. The refuge herd was established to help tule elk recover from the brink of extinction. Today, well over 4,000 tule elk in 22 herds live throughout California. Several interpretive panels located along the tour route provide information about the elk and other species of wildlife that depend on this upland habitat to survive. A wildlife viewing platform with a spotting scope located on the tour route provides an elevated view into the elk's native grassland habitat. Interpretive panels mounted on the platform provide information about the habitat and other species that share the elk's upland home. In addition to elk, birds abound along the route throughout the upland/grasslands and the riparian corridor adjacent to Salt Slough, a tributary of the San Joaquin River.

### *West Bear Creek Auto Tour Route*

Length: 2.25 miles

Season: Closed seasonally when wetlands are dry (late spring–early fall). Open when wetlands along the tour route are flooded.

Access: West Bear Creek Unit entrance on Hwy 165

Road Surface: All-weather compacted gravel

The West Bear Creek auto tour route leads around and through the various wetlands of the San Luis NWR's West Bear Creek Unit. Winter and spring are the busiest times for wildlife, as scores of ducks can be found in the ponds and tundra swans occasionally make an appearance; surprises, such as Eurasian wigeon and horned grebes, can also be seen. Secretive marsh birds, such as the Virginia rail and sora, can often be heard but are rarely seen. Receding water levels in the spring draw hundreds to thousands of shorebirds of many different species, and senescent tule and cattail stands frequently host breeding colonies of yellow-headed blackbirds. Raptors can be seen soaring above the wetlands and uplands as they hunt for unwary ground squirrels and American coots. Black-tailed deer and river otter may make surprise appearances along the tour route. Other mammals, such as coyote, black-tailed jackrabbit, desert cottontail rabbit, California ground squirrel and raccoon, are always present but not always seen. The riparian corridor east of the auto tour route provides habitat for woodpeckers, raptors, owls and many species of songbirds and neotropical migrant birds, especially during the fall and spring migrations. The Woody Pond and Raccoon Marsh Nature trails are accessible from the West Bear Creek auto tour route.

### Nature Trails:

The refuge features eight nature trails encompassing over 10 miles. Nature trails are open to foot traffic only. Visitors must stay on trails, except at special areas where leaving the trail is allowed and indicated by signage. Dogs are allowed on nature trails but must be on leashes and under control at all times.

#### *Wetland Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 0.8 mile

Location of Trail: Starts from visitor center grounds

Surface: Compacted gravel, boardwalk

Difficulty: Light to moderate

Information: The Wetland nature trail begins at the visitor center, then leads visitors around a semipermanent marsh that provides year-round habitat for a variety of waterfowl and riparian species. The trail features a boardwalk that leads visitors over the wetland for close-up encounters in this cattail/tule marsh. Visitors will hear the buzzy calls of marsh wren in the summer and see their basket-like nests hanging out of the reach of tules. Benches along the trail provide places to stop and reflect on the sights and sounds of the wetland, which is surrounded by riparian woodland and shallow water habitats, as well as upland grasslands. Visitors will see a variety of wildlife species throughout the year.

#### *Upland Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 0.5 mile

Location of Trail: Starts from visitor center grounds

Surface: Compacted gravel

Difficulty: Light

Information: The Upland trail begins at the visitor center, then winds through native grasses and shrubs that provide foraging and nesting opportunities and shelter for a variety of upland species. Birds, such as spotted towhee, California towhee and California quail, forage for seeds and hide beneath the native quail brush. Desert cottontail rabbits feed on grasses and take cover, hiding from coyotes and birds of prey in the shrubs. Western fence lizards scamper along the ground hunting for insects, and gopher snakes make their way through the brush hunting for rodents. Visitors may find the reptiles coming out early in the day to warm themselves on the sand as the morning sun moves higher in the sky.

#### *Chester Marsh Trail*

Open Season: Open February 15 to September 15. Walking only. Not open to biking or horseback riding.

Length: 1 mile

Location of Trail: Accessed from Waterfowl auto tour route

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: The Chester Marsh nature trail is accessed from the Waterfowl auto tour route and is open to visitors from February 15 to September 15. It is closed during the waterfowl hunting season. At the parking lot/trailhead, visitors can pick up an interpretive annotated pamphlet containing

information keyed to numbered stops along the trail. The trail leads visitors around the Chester Marsh and alongside riparian woodland and grassland habitats adjacent to the San Joaquin River. About halfway around the trail, visitors may choose a 0.25-mile spur that leads them to the San Joaquin River and the remains of a wood and iron truss bridge built in 1884. Travelers on the Merced-Los Banos stage route crossed the river on that bridge to the now-extinct town of Chester.

### *Sousa Marsh Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 1 mile

Location of Trail: Accessed from the waterfowl auto tour route

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: The Sousa Marsh trail is accessed from the waterfowl auto tour route and leads visitors through a riparian woodland to the Sousa Marsh—one of the largest marshes on the San Luis NWR. Once at the marsh, visitors can enjoy a snack or lunch at a picnic table or view the marsh and its wildlife from an elevated observation platform that also provides a spotting scope. Sousa Marsh is a seasonal wetland that supports its largest diversity of waterfowl and other birds during the fall, winter and spring. Visitors can see large numbers of various duck species and other waterfowl, such as tundra swans. Raptors, such as red-tailed hawks and white-tailed kites, can be seen coursing back and forth across the marsh, watching for an unwary American coot to become a meal. The riparian woodland provides habitat for many migrating songbirds during the fall and spring. Summer resident bird species, such as blue grosbeak and black-headed grosbeak, nest and raise their young in the native trees and shrubs of the woodland, as do year-round residents, including the American robin and northern mockingbird.

### *Winton Marsh Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 0.5 mile

Location of Trail: Accessed from the Waterfowl auto tour route

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: This trail is accessed from the waterfowl auto tour route. The Winton Marsh is a permanent wetland established in honor of J. Martin Winton, a lifelong advocate of wildlife conservation who promoted successful Federal wildlife habitat legislation. Winton Marsh's dense emergent wetland vegetation of cattails and bulrush provides cover and forage for secretive wetland species, such as American bitterns, Virginia rail and sora. In the winter, seasonal raptors, such as peregrine falcon, are sometimes spotted perched on the tops of trees along the canal adjacent to a portion of the trail, where they wait patiently and scan the surrounding grasslands for prey. About one-third of the way along the trail, visitors can peer into the marsh from an elevated observation deck.

### *Woody Pond Trail*

Open Season: Open seasonally when West Bear Creek Unit auto tour route is open when wetlands along the tour route are flooded (late fall to early spring).

Length: 1.75 miles

Location of Trail: West Bear Creek Unit along auto tour route

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: The trailhead, accessed from the West Bear Creek auto tour route, features a visitor kiosk and interpretive panels that introduce visitors to the habitats and wildlife of the West Bear Creek Unit. The Woody Pond nature trail leads around a densely wooded seasonal wetland adjacent to the San Joaquin River. The trail makes a loop around the pond, with a portion traveling atop the San Joaquin River levee between the river and the pond. The riparian woodland is teeming with bird life during all seasons of the year. As many as 50 species of birds have been seen in just one walk around the trail. If one is lucky, they might even be treated to views of the re-introduced black-tailed deer that use the riparian woods for cover as they move from one foraging area to another. Raptors, songbirds, waterfowl, shorebirds, owls—it is possible to see them all from the Woody Pond trail depending on the season.

### *Raccoon Marsh Trail*

Open Season: Open seasonally when West Bear Creek Unit auto tour route is open when wetlands along the tour route are flooded (late fall to early spring).

Length: 1.3 miles

Location of Trail: West Bear Creek Unit along auto tour route

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: The trailhead, shared with the Woody Pond trail, is accessed from the West Bear Creek auto tour route. Raccoon Marsh is a seasonal wetland providing habitat for waterfowl and other wetland species from fall through spring. Mudflats exposed by receding water attract migrating shorebirds in early spring. Long-billed dowitchers, least sandpipers, black-necked stilts and American avocets are common, but you never know what shorebird surprise might be in store. Habitat like this might host western sandpipers, solitary sandpipers or short-billed dowitchers. The willows and other shrubs along portions of the trail provide habitat for California quail and towhees, as well as many songbirds and various woodpeckers. Raccoon Marsh in the winter and spring is home to numerous waterfowl species.

### *Kesterson Unit*

Open Season: Open February 15 to September 15. Walking only. Not open to biking or horseback riding.

Length: Entire Kesterson Unit is open to foot traffic

Location of Trail: Kesterson Unit, accessed from main parking lot off CA-140

Surface: Compacted gravel, dirt, cross-country uplands

Information: Kesterson is a unit of the San Luis NWR that is open to the general public on a seasonal basis. Each year, the unit opens February 15 and closes September 15. Public access during this period is limited to foot traffic only. The parking lot is located on Highway 140. Kesterson is a unique area containing seasonal wetlands, arid upland grasslands, iodine bush scrub and vernal pools. Kesterson is also unique in that walking trails are outlined by refuge roads, but once inside, visitors are free to roam wherever they choose. Spring is a great time to check the wetland basins for shorebirds. Spring also welcomes the neotropical migrant grassland species that return to the valley to nest, such as western kingbirds and blue grosbeaks. When the winter rains and spring temperatures have been just right, the vernal pools support arrays of beautiful and vibrant uniquely adapted wildflowers. The invertebrate-rich saline waters of the pools support scores of waterfowl and wading birds. Raptors can usually be seen soaring overhead as they scan the uplands for their rodent prey. The habitat is also home to black-tailed deer, coyote, jackrabbits, kangaroo rats, fox and numerous reptiles.

## *MERCED NWR WILDLIFE OBSERVATION AND PHOTOGRAPHY*

The Merced NWR has one auto tour route and four nature trails. The auto tour route is 5 miles and travels around the refuge's wetland, upland and cropland management units. Visitors must remain in vehicles along the auto tour route due to the proximity of the road to wildlife; however, staying inside the vehicle and using it as a viewing blind can be advantageous. Pull-outs with interpretive panels along the tour route describe wildlife ecology and management on the refuge. The auto tour route has two elevated observation platforms with permanently mounted spotting scopes.

### *Merced NWR Auto Tour Route*

Length: 5 miles

Season: Open year-round

Access: Main entrance off Sandy Mush Road

Road Surface: All-weather compacted gravel

The Merced auto tour route is a 5-mile loop surrounding seasonal wetlands before heading across native uplands, refuge farm fields and irrigated pastures. Visitors can access two elevated wildlife observation platforms along the tour route. One at the entrance parking lot provides a permanently mounted spotting scope and a series of interpretive panels. The entrance parking lot also provides an information kiosk to orient visitors and access to a vault restroom facility.

The second observation deck is at the southeast corner of the route along with a picnic table. It also has a spotting scope. Visitors can leave their vehicles in the parking lot provided there and proceed to the observation deck or Bittern Marsh nature trail.

The Merced NWR provides seasonal spectacles of tens of thousands of snow and Ross's geese in the winter and upwards of 20,000 lesser sandhill cranes roosting in the ponds or feeding in uplands. Visitors during the winter are also almost guaranteed to see large numbers of various waterfowl species, such as northern pintail, green-winged teal and northern shoveler, among others, as well as a number of shorebirds, such as black-necked stilt, American avocet and white-faced ibis.

In the spring, the ponds in the southeast corner reliably host large numbers of black-bellied plover and dunlin. Keep your eyes peeled for surprises like a migrating snowy plover or stilt sandpiper. In the spring and early summer, large flocks of tri-colored blackbird frequently nest and forage on the refuge. The wide-open landscape surrounding the auto tour route often encourages the presence of a variety of raptors. Bald eagles are often spotted in the winter and burrowing owls in the grasslands.

The Merced NWR features four trails for wildlife observation and photography. Nature trails are open to foot traffic only. Dogs are allowed on nature trails but must be on leashes and under control at all times.

### *Bittern Marsh Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 1 mile

Location of Trail: Starts from auto tour route

Surface: Compacted gravel

Difficulty: Light to moderate

Information: The Bittern Marsh trail, accessed from the Merced auto tour route, offers visitors a choice of two loops—an inside loop and an outside loop—as well as a short spur leading to an area with a picnic table surrounded by native cottonwood trees. Depending on the season, the trees may be



home to dozens of songbird species, including house finch, warbling vireo and American goldfinch in the summer and yellow-rumped warbler, bushtit and ruby-crowned kinglet in the winter. During spring and fall migration seasons, all kinds of neotropical migrant songbirds move through, taking a short pause in their amazing long-distance migrations to rest in the shelter of trees and glean protein-rich insects from the leaves and branches. Bittern Marsh and surrounding trees are a veritable beehive of activity no matter the season. Some secretive marsh species, such as American bittern, Virginia rail and sora, are often more easily heard than seen, but visitors can scan the water and the treetops for all kinds of waterfowl, shorebirds and other species that are at home near the water, such as great egret, great blue heron and red-winged and yellow-headed blackbirds.

### *Meadowlark Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 1 mile

Location of trail: Starts from auto tour route near the main entrance

Surface: Compacted gravel, dirt

Difficulty: Light to moderate

Information: Accessed from the main entrance parking lot, the Meadowlark trail could also be called the “Songbird trail.” The first section travels along the bank of Deadman Slough through a dense riparian woodland of native cottonwoods, black willows and Oregon ash. Depending on the season, visitors may spot flycatchers, warblers, grosbeaks and other songbirds, as well as raptors, such as red-tailed, Swainson’s and red-shouldered hawks. Great-horned and barn owls frequent these trees as well, with large nests near the treetops. Check closely—it may be home to a nesting great-horned owl and her owlets. Be alert because you may spot a bald eagle as well! The trail leaves Deadman Slough, making a loop through the wetlands and upland grasslands. Along the way, visitors may take a short spur that leads into the woods. Check the trees closely for woodpeckers and other surprises, especially during spring and fall migration seasons. The main trail loop offers views of grassland species, such as western kingbirds, loggerhead shrikes and western meadowlarks, as well as wetland species of waterfowl, such as northern pintail, northern shoveler and cinnamon teal in the fall and winter. Visitors may also see wading birds, such as white-faced ibis, long-billed dowitchers and black-necked stilts. When in vast open habitats like this, always watch the skies for soaring raptors or flocks of waterfowl flying overhead.

### *Cottonwood Trail*

Open Season: Open September–May. Walking only. Not open to biking or horseback riding.

Length: 1.5 miles

Location of Trail: Trailhead parking on north side of Sandy Mush Road, 1 mile east of main refuge entrance

Surface: Compacted gravel

Difficulty: Light to moderate

Information: Accessed from the trailhead on the north side of Sandy Mush Road, one mile east of the main entrance, the Cottonwood trail leads to an elevated observation deck that provides visitors with outstanding opportunities to view thousands of snow and Ross’s geese in one of their favorite upland foraging spots on the refuge. Other species make use of this habitat too, including greater white-fronted geese and sandhill cranes, which favor the same foraging habitats. Aleutian cackling geese may also make an appearance. Along the walk to the observation deck, visitors pass through a grove of native Fremont cottonwood trees that provide nesting and foraging habitat for all manner of songbirds in winter, as well as neotropical migrants in the spring and fall. The trees provide a place

for red-tailed, Swainson's and red-shouldered hawks and great horned owls to build nests in the spring and roosting sites for raptors in the winter.

### *Kestrel Trail*

Open Season: Open year-round. Walking only. Not open to biking or horseback riding.

Length: 0.5 mile

Location of trail: Starts from auto tour route near the main entrance

Surface: Compacted gravel, dirt

Difficulty: Light

Information: The Kestrel trail, located near the main entrance, takes a short walk alongside Deadman Slough through native quail brush habitat. Egrets and great blue herons are often seen hunting for crayfish in the slough. Early and late in the day, visitors may see a black-crowned night heron hunting and spot a coyote or black-tailed jackrabbit moving through as well. The quail brush provides cover and food for myriad songbirds in the winter—white-crowned and golden-crowned sparrows and yellow-rumped warblers. In the summer, visitors can watch for northern mockingbirds, American robins and western meadowlarks. The native trees on the west are full of songbirds in the spring—watch and listen for all manner of surprises as the neotropical migrants move through during March, April and May. In the summer, the tall cottonwoods might be sheltering nests of red-shouldered hawks and red-tailed or Swainson's hawks. Recently, these trees provided a summer home for the endangered least Bell's vireo. Watch also for spotted towhees, black-headed grosbeaks and woodpeckers—Nuttall's, downy and northern flicker. The litter of dead leaves and vegetation beneath the trees provide foraging habitat for wintering birds, such as the hermit thrush. In the winter, the sky can be full of geese and sandhill cranes as they move back and forth over the refuge.

### **Objectives and Strategies:**

#### **CCP OBJECTIVE 4.1: WILDLIFE OBSERVATION AND PHOTOGRAPHY**

The Complex will provide high quality and a variety of opportunities for wildlife observation, interpretation and wildlife photography on its lands to visitors.

*Objective 4.1 Rationale:* Wildlife observation is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. As a result, the refuges encourage first-hand opportunities to observe wildlife in their habitats. This activity will be managed to ensure that people have opportunities to observe wildlife in ways that minimize wildlife disturbance and damage to refuge habitats. Wildlife viewing will be managed to foster a connection between visitors and natural resources. The wildlife observation program will be managed in accordance with Service Manual 605 FW 4, Wildlife Observation.

Wildlife photography is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. As a result, the refuges encourage first-hand opportunities to observe and photograph wildlife in their habitats. This activity will be managed to ensure that people have opportunities to photograph wildlife in ways that minimize wildlife disturbance and damage to the refuges' habitats. Wildlife photography will be managed to foster a connection between visitors and natural resources. The wildlife photography program will be managed in accordance with Service Manual 605 FW 5, Wildlife Photography.

#### **Objective 4.1 Wildlife Observation and Photography Strategies:**

- 4.1.1.** Maintain and enhance the waterfowl auto tour route on the San Luis NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.

- 4.1.2. Maintain and enhance two observation platforms on the San Luis NWR waterfowl auto tour route: one at Sousa Marsh and one at Winton Marsh.
- 4.1.3. Maintain and enhance the Wetland trail, Upland trail, Chester Marsh trail, Sousa Marsh trail, Winton Marsh trail and visitor center grounds footpaths on the San Luis NWR.
- 4.1.4. Maintain and enhance the tule elk auto tour route on the San Luis NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.
- 4.1.5. Maintain and enhance the tule elk observation platform along the elk auto tour route.
- 4.1.6. Maintain and enhance the waterfowl auto tour route on the Merced NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.
- 4.1.7. Maintain and enhance three observation platforms on the Merced NWR: one each at the entrance, on Pintail Marsh and on the Cottonwood trail.
- 4.1.8. Maintain and enhance four nature trails on the Merced NWR: Bittern Marsh trail, Meadowlark trail, the Kestrel trail and the Cottonwood trail.
- 4.1.9. Maintain and enhance the auto tour route at the West Bear Creek Unit of the San Luis NWR, including multiple interpretive panels and information kiosks.
- 4.1.10. Maintain and enhance two nature trails at the West Bear Creek Unit of the San Luis NWR.
- 4.1.11. Provide and maintain waterless vault toilet public restroom facilities at the San Luis, Merced and West Bear Creek Units of the San Luis NWR Complex.
- 4.1.12. Maintain the Complex's website with timely and relevant information for the public.
- 4.1.13. Maintain and provide public access to a wildlife photography blind at the Merced NWR and evaluate opportunities for increasing the number of photography blinds along tour routes and trails at San Luis NWR and Merced NWR.
- 4.1.14. Construct riparian nature trail at the San Luis NWR.
- 4.1.15. Construct boardwalk at Merced NWR Cinnamon Slough wetland.
- 4.1.16. Enhance Wetland nature trail at the San Luis NWR by extending existing boardwalk and adding an observation platform.
- 4.1.17. Maintain "viewing windows" in emergent wetland vegetation along auto tour routes by strategically mowing or cutting bulrush and cattails so that visitors have opportunities to view and photograph waterbirds using the wetlands.

***Significant Program Changes:***

Enhancements will be made to the Visitor Center Wetland Nature Trail on the San Luis NWR. Wildlife identification and nature photography workshops will be held at the visitor center. We will coordinate with CDFW conservation education program to provide hunter education and safety class at the visitor center. We also will consider developing more photography blinds at optimal locations along the auto tour routes and nature trails.

***Monitor and Evaluate:***

Vehicle counters placed strategically on auto tour routes assist in monitoring trends in wildlife observation and photography visits. Staff keep a log to track visitation trends in the visitor center. The Complex collaborated with the U.S. Geological Survey (USGS) to administer a visitor survey at the

San Luis NWR in 2012 to obtain information about visitor characteristics, and will work with USFWS Human Dimensions to conduct a similar survey in 2022–23.

## **STANDARD 6: ENVIRONMENTAL EDUCATION**

### ***Policy (605 FW 6)***

Through formal, curriculum-based environmental education tied to national and state curriculum standards, we will advance public awareness, understanding, appreciation and knowledge of key fish, wildlife and plants and their habitats. Refuge visitor services staff will assess the potential to work with schools in providing an appropriate level of environmental education. We may support environmental education through the use of facilities, equipment, educational materials, teacher workshops and study sites that are safe and conducive to learning.



*Figure 26. Environmental education visit at San Luis NWR. USFWS*

### ***Current Program Discussion:***

Efforts to formally develop the environmental education program began in 2011–12 to coincide with the development of the visitor center. An environmental education guide for the Complex was developed, which describes the activities, facilities and resources available for visiting school groups.

The program offers several methods for formal school groups to experience the Complex. At the visitor center, classes are welcomed by visitor services staff who facilitate activities in the exhibit hall, multipurpose room and outdoor grounds, including the amphitheater and wetland nature trail. Classes may also be led by bus around the tule elk and waterfowl auto tour routes. The environmental education program specifically targets elementary school grade levels, primarily third through fifth grades, but upon request and prior arrangement, routinely accommodates visits for any age group, preschool through adult.

All groups seeking a staff-facilitated visit to the refuge for environmental education are required to make reservations in advance. The reservation system ensures that the facility is not overcrowded and sufficient staff can plan to be available to facilitate the visit.

### **Objectives and Strategies:**



*Figure 27. Environmental Ed School Visit on Observation Platform. Photo: USFWS*

#### **CCP OBJECTIVE 4.4: ENVIRONMENTAL EDUCATION**

The Complex will promote and conduct environmental education that is aligned to current Federal, state and local curriculum standards; meets the goals and needs of local school districts; and provides interdisciplinary opportunities that link the natural world with all subject areas.

*Objective 4.4 Rationale:* Environmental education is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. As a result, the refuges encourage environmental education as a process of building knowledge in students. Refuge staff will work with

schools (K–12) to integrate environmental concepts and concerns into structured educational activities. These refuge-led or educator-conducted activities are intended to actively involve students or others in first-hand activities that promote discovery and fact-finding, develop problem-solving skills and lead to personal involvement and action. The environmental education program will be managed in accordance with Service Manual 605 FW 6, Environmental Education.

#### **Objective 4.4 Environmental Education Strategies:**

- 4.4.1.** Consult with local school districts and county offices of education regarding building and conducting an environmental education program that will be valued and utilized by educators and the community.
- 4.4.2.** Design environmental education programming that is inclusive and inviting and makes all visitors feel welcome, including bilingual opportunities in Spanish.
- 4.4.3.** Conduct environmental education field trips for school groups using the visitor center and other facilities at San Luis NWR.
- 4.4.4.** Conduct a Youth Conservation Corps program, when feasible with funding and staffing, to provide students with opportunities to learn by doing as they assist Complex personnel with tasks involved in developing and maintaining the Complex's wildlife and habitat resources.

- 4.4.5. Recruit and employ students through the Service's Pathways program (or other internship programs working with NGOs), thereby promoting education regarding the Service's mission and goals by providing students opportunities to combine academic study with on-the-job work experience.
- 4.4.6. Continue to work with local schools and educators to encourage teachers to use the Complex for environmental education and assist them in implementing in-depth study of local habitats on San Luis NWR using the visitor center and its resources.
- 4.4.7. Develop teacher resource packets and guides about the Complex.
- 4.4.8. Maintain refuge websites to promote current educational opportunities.
- 4.4.9. Establish partnerships with conservation organizations to make educational materials available for use by local educators at the refuges or in their classrooms.
- 4.4.10. Partner with local universities on opportunities for students to volunteer to assist with conducting environmental education programs.

***Significant Program Changes:***

Develop teacher resource packets and guides. Partner with local universities on opportunities for students to volunteer to assist with conducting environmental education programs. Develop additional refuge educational resources in Spanish language format to better connect to residents in the local communities surrounding the refuges. Expand virtual environmental education programming to connect to audiences that are unable to physically visit the refuges. Develop a children's exploration area at San Luis NWR to encourage visitation by families with young children.

***Monitor and Evaluate:***

Monitor the total number of environmental education visits annually for changes in participation. Visitor services staff will obtain feedback directly from educator participants and adjust the program accordingly.



Figure 28. Environmental Ed school visit in Exhibit Hall. Photo: USFWS

## **STANDARD 7: INTERPRETATION**

### ***Policy (605 FW 7)***

We will communicate the most important fish, wildlife, habitat and other natural resource issues to visitors of all ages and abilities through effective interpretation. We will tailor messages and delivery methods to specific audiences and present them in appropriate locations. Through heightened awareness, we will inspire visitors to take positive actions supporting refuge goals and the Refuge System mission.

#### ***Current Program Discussion:***

Interpretation involves participants of all ages who learn about the complex issues confronting fish and wildlife resource management as they voluntarily engage in stimulating and enjoyable activities. First-hand experience with the environment is emphasized, although presentations, audiovisual media and exhibits are often necessary components of the interpretive program. The Service's Children and Nature initiative (USFWS 2008) strives to ensure that America's children have enjoyable and meaningful experiences in the outdoors and develop strong life-long connections with the natural world. The refuges also strive to meet this initiative.

The San Luis and Merced NWRs engage in wildlife interpretation through interactive and passive methods.

The focal point for interpretation on the Complex is the visitor center at the San Luis NWR. The visitor center features an interpretive lobby and exhibit hall filled with over 22 interactive educational exhibits that narrate the general mission, themes and conservation stories of the Complex. The visitor center also serves as a launching point for visitors to explore the refuges.



Figure 29. Students exploring the elk exhibit in the visitor center. USFWS

Interactive methods of interpretation include guided tours, walks, presentations and special events. Complex staff regularly facilitate guided tours of the refuge units for a variety of groups throughout the year. Complex-related information is provided at annual local festivals, volunteer workdays and special events—including the State Fair, National Wildlife Refuge Week and special tour days on the Complex, such as Elk Day, Crane Day and an annual Arena Plains Wildflower and Vernal Pool tour. Complex staff are regularly invited to be guest speakers at community service group (e.g., Rotary, Soroptimist) meetings, NGO chapter (i.e., Audubon) meetings and conferences and symposia.

Passive methods include stationary interpretive kiosks, interpretive panels and refuge-specific brochures, posters and displays. The San Luis NWR has five interpretive information kiosks (San Luis Unit, Freitas Unit, West Bear Creek Unit (2) and Kesterson Unit). The waterfowl auto tour route, elk auto tour route and elk observation platform have interpretive panels. The Merced NWR has two interpretive information kiosks (at main entrance and sportspeople entrance), and the auto tour route



features interpretive panels. Additionally, the San Luis NWR Complex maintains a website featuring information about the San Luis NWR, Merced NWR and Grasslands WMA.

**Objectives and Strategies:**

**CCP OBJECTIVE 4.5: INTERPRETATION:**

The Refuge Complex will provide quality opportunities for wildlife interpretation on its lands.

Objective 4.5 Rationale: Interpretation is identified in the Improvement Act as a priority public use that can be allowed when compatible with other refuge purposes. As a result, the Complex encourages interpretation as both an educational and recreational opportunity aimed at revealing relationships, examining systems and exploring how the natural world and human activities are interconnected. Participants of all ages can voluntarily engage in stimulating and enjoyable activities as they learn about the



*Figure 30. Crane Day Tour Group at Merced. Photo: Jack Sparks*

issues confronting fish and wildlife resource management on the refuges. First-hand experiences with the environment will be emphasized, although presentations, audiovisual media and exhibits will be necessary components of the refuges' interpretive program. The interpretive program will be managed in accordance with Service Manual 605 FW 7, Interpretation.

**Objective 4.5 Interpretation Strategies:**

- 4.5.1.** Maintain and enhance the waterfowl auto tour route on the San Luis NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.
- 4.5.2.** Maintain and enhance two observation platforms on the San Luis NWR waterfowl auto tour route: one at Sousa Marsh and one at Winton Marsh.
- 4.5.3.** Maintain and enhance the Wetland, Upland, Chester Marsh, Sousa Marsh and Winton Marsh trails on the San Luis NWR.
- 4.5.4.** Maintain and enhance the tule elk auto tour route on the San Luis NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.
- 4.5.5.** Maintain and enhance the tule elk observation platform along the elk auto tour route.
- 4.5.6.** Maintain and enhance the waterfowl auto tour route on the Merced NWR, including multiple pull-outs with information kiosks and wayside exhibits along the auto tour route.
- 4.5.7.** Maintain and enhance three observation platforms on the Merced NWR: one at the entrance, one at Pintail Marsh and one on the Cottonwood trail.
- 4.5.8.** Maintain and enhance four nature trails on the Merced NWR: Bittern Marsh, Meadowlark, Kestrel and Cottonwood.
- 4.5.9.** Maintain and enhance the auto tour route at the West Bear Creek Unit of the San Luis NWR, including multiple information kiosks, interpretive panels and wayside exhibits at the West Bear Creek Unit.

- 4.5.10.** Maintain and enhance the Raccoon Marsh and Woody Pond nature trails at the West Bear Creek Unit of the San Luis NWR.
- 4.5.11.** Provide guided walking tours through selected areas of the San Luis and Merced NWRs throughout the year.
- 4.5.12.** Use the visitor center to provide presentations and exhibits about the Complex, wildlife, habitats and NWR System.
- 4.5.13.** Provide staff/docent-led tours on the San Luis and Merced NWRs.
- 4.5.14.** Organize and conduct public events and festivals at the San Luis and Merced NWRs, such as the Tule Elk Day at the San Luis NWR during the elk breeding season and Crane Day at the Merced NWR.
- 4.5.15.** Offer special staff/docent-led public tours of closed portions of the Complex, focusing on unique wildlife and habitats, such as the annual Arena Plains vernal pool and wildflower tour.
- 4.5.16.** Continue to participate in or provide information about annual wildlife events for the public occurring on units of the San Luis NWR complex (e.g., International Migratory Bird Day, National Wildlife Refuge Week).
- 4.5.17.** Participate in fire prevention education and outreach regarding the role of fire and its management uses.
- 4.5.18.** Maintain the Complex's websites with up-to-date and relevant information for the public.
- 4.5.19.** Provide interpretive brochures at kiosks and in the visitor center to inform/educate refuge visitors.
- 4.5.20.** Maintain and upgrade the visitor center displays, videos and activities for the public.
- 4.5.21.** Use students/interns/volunteers to assist with Complex programs (e.g., staffing the visitor center on weekends, providing environmental education activities for school groups, leading refuge tours).
- 4.5.22.** Maintain and provide public access to a wildlife photography blind at the Merced NWR.
- 4.5.23.** Implement a program of weekend guided interpretive walks on the Complex.
- 4.5.24.** Develop a waterfowl of the San Joaquin Valley identification brochure.
- 4.5.25.** Develop an introduction to the San Luis NWR Complex video.
- 4.5.26.** Develop a tule elk natural history video.
- 4.5.27.** Develop a geese and cranes at the Merced NWR video.
- 4.5.28.** Develop an Aleutian cackling goose video.
- 4.5.29.** Develop a riparian brush rabbit video.
- 4.5.30.** Develop evening lecture program of natural resource topics at the visitor center.
- 4.5.31.** Develop a children's exploration area at the San Luis NWR to encourage visitation by families with young children.
- 4.5.32.** The Complex will develop and maintain museum property inventory and a protocol for handling and storing historical artifacts found on the Complex.

**4.5.33.** The Complex will incorporate historical artifacts into interpretive displays where appropriate.

***Significant Program Changes:***

Implement a program of weekend guided nature walks. Develop an evening lecture program at the visitor center. Develop a cadre of volunteers to assist with nature interpretation programs. Develop and offer interpretive programming in Spanish language format to better connect to residents in the local communities surrounding the refuges. Develop a children's exploration area at San Luis NWR to encourage visitation by families with young children.

***Monitor and Evaluate:***

Monitor the total number of interpretation visits annually for changes in participation. The Complex collaborated with the U.S. Geological Survey (USGS) to administer a visitor survey at the San Luis NWR in 2012 to obtain information about visitor characteristics and will work with USFWS Human Dimensions to conduct a similar survey in 2022–23.

**STANDARD 8: MANAGE FOR OTHER RECREATIONAL USE OPPORTUNITIES**

***Policy (605 FW 1 and 603 FW 1)***

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that compatible wildlife-dependent recreational uses are the priority public uses of the National Wildlife Refuge System (hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation) and will receive enhanced consideration over other general public uses. Volunteers, partners, recreation fees and concessions are tools available to assist in managing these uses. We will only permit other uses when we determine that they are legally mandated, provide benefits to the Service, occur due to special circumstances or facilitate one of the priority wildlife-dependent recreational uses.

***Current Program Discussion:***

We may allow other recreational uses that support or enhance one of the wildlife-dependent recreational uses or minimally conflict with any of the them when we determine they are both appropriate and compatible. We will allow uses that are either legally mandated or occur due to special circumstances (605 FW 1).

***Significant Program Changes:***

There are no significant changes planned.

***Monitor and Evaluate:***

Staff will consider comments and requests by visitors regarding requests for recreational uses outside of the six priority wildlife-dependent uses of the NWRS to evaluate whether the requested use is legally mandated, appropriate and compatible; provides a benefit to the Service; occurs due to special circumstances; or facilitates one of the priority wildlife-dependent recreational uses.

## **STANDARD 9: OUTREACH**

### ***Policy (605 FW 1.14I)***

Effective outreach depends on open and continuing communication between Complex staff and the public. This communication involves determining and understanding the issues, identifying audiences, crafting messages, selecting the most effective delivery techniques and evaluating effectiveness. Achieved results will further the mission of the National Wildlife Refuge System and purpose(s) of the refuge. See the *National Outreach Strategy: A Master Plan for Communicating in the U.S. Fish and Wildlife Service*, and *America's National Wildlife Refuge System: 100 on 100 Outreach Campaign*.

#### ***Current Program Discussion:***

The Complex maintains close relationships with the local communities it serves, and the connection between the Complex and communities is mutually beneficial. The 2013 USFWS Banking on Nature study found that visitors to the San Luis NWR alone spent \$5.2 million in the local communities, 64 percent of which was from non-residents bringing new money into the local communities. The study also found that the local economic effect associated with recreation visits to the San Luis NWR was \$8.8 million, including the jobs created in the community as a result of recreation, job income and total tax revenue.

The Complex reaches out to the local communities using a variety of methods. The Complex, along with partners, has presented displays at county fairs and community festivals. Tourist destinations, such as hotels and chamber of commerce offices, keep a supply of San Luis NWR Complex general brochures on display. Notices about upcoming events and special days on the Complex are submitted to local newspapers. Staff routinely provide presentations to community groups, such as local Rotary and Soroptimist chapters.

The Complex has a deep interest in and has been exploring opportunities to better engage members of the local communities, which largely comprise people who speak Spanish as a primary language. As of 2022, the Complex is partnering with the Hispanic Access Foundation to onboard a visitor services intern fluent in Spanish to develop and provide outreach materials and interpretive/education programs targeting that key demographic.

#### ***CCP OBJECTIVE 4.9 PUBLIC OUTREACH:***

The Complex will reach out to surrounding communities using a variety of media and venues to raise awareness and inform residents about the importance of the Complex, its mission and the availability of public use activities.

*Objective 4.9 Rationale:* Public support is vital for Complex operations. In order to give support, the public needs to have a clear understanding of why refuges exist, what refuge management entails and the challenges of refuge management, how the public can use and enjoy the refuge and what wildlife-dependent activities occur in which the public can participate throughout the year.

#### **Objective 4.9 Outreach Strategies:**

- 4.9.1.** Extend public outreach efforts to recruit volunteers from the local cities of Los Banos, Merced and Turlock, as well as smaller communities of Dos Palos, Gustine, Atwater, Livingston, Delhi and Hilmar.

- 4.9.2. Develop and provide presentations in English and Spanish that describe the importance and uniqueness of the Complex to local groups.
- 4.9.3. Conduct an annual (or biennial or triennial) onsite tour for invited local, county, state and Federal representatives to showcase the Complex and its mission and to present its issues, challenges and needs.
- 4.9.4. Develop and distribute Complex-specific educational and information materials in English and Spanish, including printed brochures, posters and clothing.
- 4.9.5. Organize and conduct public events and festivals at the Merced and San Luis NWRs.
- 4.9.6. Develop and maintain interpretive public information kiosks and associated interpretive panels at the San Luis and Merced NWRs.
- 4.9.7. Continue to update and print the San Luis NWR Complex brochures.
- 4.9.8. Develop and print a San Luis and Merced refuges waterfowl hunt program brochure.
- 4.9.9. Maintain tourist orientation signs guiding visitors to the Complex at major intersections and roadways leading to public use units of the Complex.
- 4.9.10. Maintain a supply of Complex general brochures at tourist destinations and major hotels in surrounding communities.
- 4.9.11. Develop Spanish-language versions of refuge brochures.

***Significant Program Changes:***

Develop outreach options that are more inclusive of Spanish-speaking visitors. Consider initiating a Complex Instagram page.

***Monitor and Evaluate:***

The Complex will monitor for changes in visitation trends, which may indicate the success of outreach methods.

**STANDARD 10: VOLUNTEERS AND FRIENDS**

***Policy (605 FW 1.14J)***

Volunteer and Complex support groups fortify refuge staff with their gift of time, skills and energy and are integral to the future of the National Wildlife Refuge System. Complex staff will initiate and nurture relationships with volunteers and Complex support groups and will continually support, monitor and evaluate these groups with the goal of fortifying important refuge activities. The National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998 (P.L. 105-242) strengthens the Refuge System's role in developing effective partnerships with various community groups. Whether through volunteers, Complex support groups or other important partnerships in the community, Complex personnel will seek to make the refuges an integral part of the community, giving rise to a stronger Refuge System.



Figure 31. Volunteer group collecting native tree cuttings to plant at Merced NWR. USFWS

**Current Program Discussion:**

The San Luis and Merced NWRs receive the assistance of volunteers throughout the year on a number of tasks. Common volunteer activities include individuals removing litter and maintaining public use areas, college students assisting with wildlife monitoring projects, birding experts providing guided tours, volunteers monitoring and maintaining the wood duck nest box program and sportspeople maintaining the hunting infrastructure. Additionally, the refuges typically host several habitat restoration workdays each year in which volunteers are invited to assist with planting native species at restoration sites.

**Objectives and Strategies:**

**CCP OBJECTIVE 4.7: VOLUNTEER PROGRAM:**

The San Luis NWR Complex will maintain and increase the number of participants in the Volunteer Program to assist with visitor services, wildlife, maintenance and natural resources projects at the Complex.

*Objective 4.7 Rationale:* The National Wildlife Refuge System Volunteer and Partnership Enhancement Act of 1998 (P.L. 105-242) strengthens the Refuge System’s role in developing

relationships with volunteers. Volunteers possess knowledge, skills and abilities that can enhance the scope of refuge operations and enrich Complex staff with their gift of time, skills and energy. Complex staff will initiate, support and nurture relationships with volunteers so that they may continue to be an integral part of Complex programs and management. The volunteer program will be managed in accordance with the Fish and Wildlife Service Manual, Part 150, Chapters 1–3, “Volunteer Services Program,” and Part 240, Chapter 9, “Occupational Safety and Health, Volunteer and Youth Program.”

Objective 4.7 Volunteer Program Strategies:

- 4.7.1. Develop a cadre of volunteers to assist with conducting the public use program.
- 4.7.2. Recruit interns/volunteers from local universities to assist with natural resource and biological monitoring programs.
- 4.7.3. Host annual sportspeople workdays to perform hunt program maintenance.
- 4.7.4. Recruit youth volunteers and student groups to work on specific natural resource and biological projects at the San Luis and Merced NWRs.
- 4.7.5. Recruit volunteers to assist with maintenance of visitor services facilities, such as trimming nature trails and maintaining interpretive kiosks.

**CCP OBJECTIVE 4.8: FRIENDS GROUP:**

The Complex will explore developing a partnership with a non-profit Friends advocacy group.

Objective 4.8 Rationale: Friends groups can be instrumental in assisting refuges with building support from the public and funding refuge projects.

Objective 4.8 Friends Group Strategies:

- 4.8.1. The Complex will consider partnering with a Friends group.

**Significant Program Changes:**

Recruit and develop a cadre of volunteers to assist with visitor services programming, biological activities and facility maintenance.

**Monitor and Evaluate:**

The volunteer program is evaluated by volunteer participation, work project completion and volunteer satisfaction.

## **STANDARD 11: RECREATION FEE PROGRAM**

***Policy (261 FW 1; 263 FW 1); Federal Lands Recreation Enhancement Act of 2004 (P.L. 108-447); U.S. Fish and Wildlife Service Guidance on the Recreation Fee Program – September 2008***

“The Federal Lands Recreation Enhancement Act of 2004 (FLREA) allows land management agencies, such as the National Wildlife Refuge System, to charge fees for entry and certain amenities (user fees). The charging of entrance and user fees at national wildlife refuges can be a helpful management tool if the program is well-managed and implemented.”

***Current Program Discussion:***

The Complex does not have a Recreation Fee Program.

**STANDARD 12: CONCESSIONS**

***Policy (50 CFR Part 25.61) and Director's Order No.139***

Concession Contracts discuss the Service's current policy for concession management and provide guidance for permitting and administering concession operations on Service lands. We use concessions to assist us in providing wildlife-dependent recreation activities to the visiting public. The concessions are managed through contracts between the Service and private entities, in which private entities are allowed to charge fees to the visiting public for services provided at field stations.

***Current Program Discussion:***

The Complex does not have a Concessions Program.

**STANDARD 13: COMMERCIAL RECREATIONAL USES**

***Policy (50 CFR 29.1; 50 CFR 27.97; 8 RM 16; 603 FW 1; 605 FW 5)***

A commercial recreational use is a use that generates revenue or that results in a commodity that is or can be sold for income or revenue. Before considering compatibility, the use must be determined to contribute to the achievement of the refuge purpose or the mission of the Refuge System, as outlined in Title 50 Code of Federal Regulations, 29.1.

To be allowed on a refuge, a commercial use must go beyond the "not materially interfere with..." requirement and must contribute to the achievement of the refuge purpose or mission of the Refuge System. The contribution must be clearly defined in the justification section of the compatibility determination for any commercial use.

Title 50, Code of Federal Regulations, 27.97, Private Operations, prohibits an unauthorized commercial enterprise on any national wildlife refuge. Thus, commercial tours are required to apply for a special use permit (SUP) from the refuge manager. By establishing a SUP system, the refuge staff is able to set sustainable limits on the number of permits issued.

In determining if a commercial recreational use is compatible, one way to connect it to the mission of the System is to determine if the commercial recreation use will facilitate one of the wildlife-dependent priority public use activities that are "directly related to the mission of the System" (National Wildlife Refuge System Improvement Act of 1997).

***Current Program Discussion:***

The Complex does not have a Commercial Recreational Uses Program.



## **STANDARD 14: WILDERNESS**

***Policy (Wilderness Act of 1964 (U.S. C. 1131-1136) Public Law 88-577, September 3, 1964)***

The Wilderness Act of 1964 directs the Secretary of the Interior, within 10 years, to review every roadless area of 2,024 or more hectares (5,000 or more acres) and every roadless island (regardless of size) within the National Wildlife Refuge System and national parks, and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System by later special Acts of Congress. The Act provides criteria for determining suitability and contains provisions related to activities that can be undertaken on a designated area.

The Wilderness Act establishes additional purposes for the designated wilderness areas within refuges (50 CFR 29.12), which “shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for the future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.” Proposed wilderness areas are managed so as to protect their wilderness values pending action by Congress.

### ***Current Program Discussion:***

The Complex does not have a Wilderness Program.

# III. Implementation Schedule

This table allows the Complex to view all the strategies together as it relates to the project completion time frames, which is the life of the CCP.

**Table 4. Strategies Implementation Schedule**

Strategies Implementation Schedule																			
PROJECTS	TIME FRAME FOR PROJECT COMPLETION																		COMMENTS
	Day	Week	Annual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	
Develop a San Luis NWR Complex hunt program brochure and waterfowl identification brochure								X											Contingent on funding.
Hold wildlife identification and nature photography workshops at the visitor center			X																
Add boardwalk and observation platform at the visitor center Wetland trail on the San Luis NWR													X						Contingent on funding.
Develop environmental education program teacher resource packets and guides						X													
Develop a San Luis NWR Complex auto tour route and nature trail brochure																			
Implement a program of regular weekend guided nature walks			X																Contingent on staffing.
Recruit and develop a cadre of volunteers to assist with upkeep of trails and visitor infrastructure							X												
Create a fact sheet and guide about the refuge fishing program for the public									X										
Develop a tule elk brochure																			Completed.

## Strategies Implementation Schedule

PROJECTS	TIME FRAME FOR PROJECT COMPLETION																			COMMENTS
	Day	Week	Annual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037		
Develop waterfowl of the San Joaquin Valley identification brochure									X											Contingent on funding.
Develop virtual nature trail walk and auto tour route videos				X																
Develop tule elk natural history video																				Completed.
Develop geese and cranes at the Merced NWR video																				Completed.
Develop Aleutian cackling goose video						X														
Develop riparian brush rabbit video						X														
Install remote, web-based video camera of Merced NWR goose and crane feeding areas													X							Contingent on funding.
Construct riparian nature trail at the San Luis NWR													X							Contingent on funding.
Construct boardwalk at Merced NWR Cinnamon Slough wetland																X				Contingent on funding.
Replace Chester Marsh trailhead kiosk at the San Luis NWR							X													Contingent on funding.
Replace Kesterson nature trail kiosk and signage at the San Luis NWR											X									
Replace Bittern Marsh, Meadowlark and Kestrel nature trail signage at the Merced NWR								X												
Update waterfowl auto tour route wayside pull-outs and traffic signage at San Luis NWR				X																Funded and planned for 2022–23.

## Strategies Implementation Schedule

PROJECTS	TIME FRAME FOR PROJECT COMPLETION																			COMMENTS
	Day	Week	Annual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037		
Update tule elk auto tour route wayside pull-outs and traffic signage at San Luis NWR									X											
Develop West Bear Creek Unit auto tour route wayside pull-outs											X									
Update Merced NWR auto tour route wayside pull-outs and traffic signage																				Completed.
Rehabilitate Sousa Marsh observation platform at San Luis NWR																				Completed.
Rehabilitate Winton Marsh observation platform at San Luis NWR						X														
Rehabilitate tule elk observation platform at San Luis NWR				X																
Rehabilitate Merced NWR entrance observation platform						X														
Add sandhill crane exhibit to San Luis NWR exhibit hall																				Completed.
Add endangered species exhibit to visitor center exhibit hall													X							
Add bird sighting kiosk exhibit to visitor center exhibit hall																				Completed.
Add waterfowl and shorebird identification exhibit to visitor center exhibit hall																				Completed.
Add waterfowl/wetland photography blind at San Luis NWR								X												

### Strategies Implementation Schedule

PROJECTS	TIME FRAME FOR PROJECT COMPLETION																			COMMENTS
	Day	Week	Annual	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037		
Rehabilitate 8.5 miles of San Luis NWR waterfowl auto tour route road									X											Contingent on funding.
Rehabilitate 5 miles of San Luis NWR elk auto tour route road										X										Contingent on funding.
Replace hunt blinds at San Luis NWR Kesterson Unit				X																
Replace hunt blinds at San Luis NWR Blue Goose Unit								X												
Replace hunt blinds at Merced NWR Merced Unit								X												
Rehabilitate 2.75 miles of West Bear Creek auto tour route road											X									Contingent on funding.
Rehabilitate 5 miles of Merced auto tour route road									X											Contingent on funding.

# IV. Project Cost

This table is designed to view all the refuge visitor services project costs as it relates to the standards used by the Complex.

**Table 5. Project Cost**

Project Cost Table					
Projects	Targeted Completion Date	Cost	Funding Source (RONS, SAMMS, VFE, Partnership Funds, Etc.)	Date of Cost Estimation	Comments
Develop a San Luis NWR Complex hunt program brochure and waterfowl identification brochure	2027	\$15,000		2022	
Begin holding wildlife identification and nature photography workshops at the visitor center	Annually	Minimal added cost		2022	
Add boardwalk and observation platform at the visitor center Wetland trail on the San Luis NWR	2032	\$275,000		2022	
Develop environmental education program teacher resource packets and guides	2025	\$10,000		2022	
Develop a San Luis NWR Complex auto tour route and nature trail brochure	Completed 2015	\$14,000		2012	
Implement a program of weekend guided nature walks	Annually	Minimal added cost		2022	
Recruit and develop a cadre of volunteers to assist with visitor center and nature interpretation programs	2026	Minimal added cost		2022	
Create and distribute a fact sheet on the Complex fishing program to the public	2028	\$15,000		2022	
Develop tule elk natural history video	Completed 2020.	Minimal added cost		2022	
Develop Aleutian cackling goose video	2025	Minimal added cost		2022	
Update Merced NWR auto tour route wayside pull-outs and traffic signage	Completed 2022.	\$40,000		2012	

**Project Cost Table**

<b>Projects</b>	<b>Targeted Completion Date</b>	<b>Cost</b>	<b>Funding Source (RONS, SAMMS, VFE, Partnership Funds, Etc.)</b>	<b>Date of Cost Estimation</b>	<b>Comments</b>
Construct boardwalk at Merced NWR Cinnamon Slough wetland	2035	\$250,000		2022	
Construct Riparian Nature trail at the San Luis NWR	2032	\$175,000		2022	
Install remote web-based video camera of Merced NWR goose and crane feeding areas	2032	\$40,000		2022	
Develop riparian brush rabbit video	2025	Minimal		2022	
Develop geese and cranes at the Merced NWR video	Completed 2020	Minimal		2012	
Develop waterfowl of the San Joaquin Valley identification brochure	2028	\$15,000		2022	
Develop a tule elk brochure	Completed 2016	\$14,000		2012	
Replace Chester Marsh trailhead kiosk and signage at the San Luis NWR	2026	\$100,000		2022	
Replace Kesterson Nature trail kiosk and signage at the San Luis NWR	2030	\$100,000		2022	
Replace Bittern Marsh, Meadowlark and Kestrel nature trail signage at the Merced NWR	2027	\$10,000		2022	
Update waterfowl auto tour route wayside pull-outs and traffic signage at San Luis NWR	2022–23	\$90,000		2022	
Update tule elk auto tour route wayside pull-outs and traffic signage at San Luis NWR	2028	\$100,000		2022	
Update West Bear Creek Unit auto tour route wayside pull-outs and traffic signage at San Luis NWR	2030	\$100,000		2022	
Rehabilitate Sousa Marsh observation platform at San Luis NWR	Completed 2020	\$200,000		2012	

### Project Cost Table

Projects	Targeted Completion Date	Cost	Funding Source (RONS, SAMMS, VFE, Partnership Funds, Etc.)	Date of Cost Estimation	Comments
Rehabilitate Winton Marsh observation platform at San Luis NWR	2025	\$175,000		2022	
Rehabilitate tule elk observation platform at San Luis NWR	2023	\$250,000		2022	
Rehabilitate Merced NWR entrance observation platform	2025	\$250,000		2022	
Add bird sighting kiosk exhibit to visitor center exhibit hall	Completed 2022	\$20,000		2022	
Add endangered species exhibit to visitor center exhibit hall	2032	\$20,000		2022	
Add waterfowl and shorebird identification exhibit to visitor center exhibit hall	Completed 2022	\$20,000		2022	
Add waterfowl/wetland photography blinds at San Luis NWR	2027	\$60,000		2022	
Rehabilitate 8.5 miles of San Luis NWR waterfowl auto tour route road	2028	\$250,000		2022	
Rehabilitate 5 miles of San Luis NWR elk auto tour route road	2029	\$200,000		2022	
Replace hunt blinds at San Luis NWR Kesterson Unit	2023	\$150,000		2022	
Replace hunt blinds at San Luis NWR Blue Goose Unit	2027	\$80,000		2022	
Replace hunt blinds at Merced NWR Merced Unit	2027	\$125,000		2022	
Rehabilitate 2.75 miles of West Bear Creek auto tour route road	2030	\$175,000		2022	
Rehabilitate 5 miles of Merced auto tour route road	2028	\$200,000		2022	
<b>TOTAL PROJECT COST</b>					



# APPENDICES

## APPENDIX A: LIST OF PREPARERS

The following individuals participated in preparing this Visitor Services Plan:

San Luis NWR Complex Staff

Pacific Southwest Region 8, Regional Office Planning Staff

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# San Luis and Merced National Wildlife Refuges Waterfowl, Other Migratory Birds, and Upland Game Hunting Plan

March 2020

U.S. Fish and Wildlife Service

San Luis National Wildlife Refuge Complex  
7376 S. Wolfsen Road (Do not use for mailing)  
Los Banos, CA 93635

Submitted By:

Project Leader

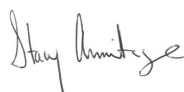
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Concurrence:

Refuge  
Supervisor



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Date

Approved:

Regional Chief,  
National Wildlife  
Refuge System

**PRISCILLA  
WHEELER** Digitally signed by  
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Date: 2020.07.15  
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Date

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# SAN LUIS AND MERCED NATIONAL WILDLIFE REFUGES WATERFOWL, OTHER MIGRATORY BIRDS, AND UPLAND GAME HUNTING PLAN

## 1. Introduction

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual Refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The San Luis and Merced NWRs are part of the San Luis National Wildlife Refuge Complex (Complex) and are located in Merced County in the Northern San Joaquin Valley of California. The Complex is bounded by the major transportation routes of Highway 99 to the east and Interstate 5 to the west. The Grasslands Wildlife Management Area (WMA) composed of USFWS easements on private lands surround these two Refuges.

San Luis NWR is currently 26,878 acres and is the largest contiguous NWR in the Central Valley. The San Joaquin River and several natural tributaries flow through the Refuge, and over half a million ducks and geese use the Refuge for wintering habitat. For that reason, the San Luis National Wildlife Refuge was established in 1967 to provide refuge and breeding habitat for migratory birds and other wildlife. Refuge lands were acquired under the authority of the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715d) and the Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 664).

Similarly, Merced NWR was established in 1951 to provide sanctuary for migratory birds. Refuge lands were acquired under the authority of the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715d), the Endangered Species Act of 1973 (16 U.S.C. 153), and the Lea Act of 1948 (16 U.S.C. 695). The Refuge encompasses over 10,260 acres of freshwater wetlands, native uplands, agricultural fields, vernal pools, and riparian corridors.

The mission of the NWRS, as listed by the National Wildlife Refuge System Administration Act (NWRSA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is:

“... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans”

The NWRSAA mandates the Secretary of the Interior in administering the System to (16 U.S.C. 668dd(a)(4):

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRs;
- Ensure that the biological integrity, diversity, and environmental health of the NWRs are maintained for the benefit of present and future generations of Americans;
- Ensure that the mission of the NWRs described at 16 U.S.C. 668dd(a)(2) and the purposes of each Refuge are carried out;
- Ensure effective coordination, interaction, and cooperation with owners of land adjoining Refuges and the fish and wildlife agency of the States in which the units of the NWRs are located;
- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the NWRs and the purposes of each Refuge;
- Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRs through which the American public can develop an appreciation for fish and wildlife;
- Ensure that opportunities are provided within the NWRs for compatible wildlife-dependent recreational uses; and
- Monitor the status and trends of fish, wildlife, and plants in each Refuge.

Therefore, it is a priority of the Service to provide for wildlife-dependent recreation opportunities, including hunting and fishing, when those opportunities are compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

San Luis and Merced NWRs have long standing waterfowl hunting programs. The various areas offer diverse opportunities for waterfowl hunting, such as free-roam, assigned zone, assigned pond, hunting from blinds, and hunting by boat, and most areas with assigned blinds provide accommodation for ADA accessibility. The hunting program is cooperatively administered with the California Department of Fish and Wildlife (CDFW). The Service manages the Refuge land, habitat, and facilities, the CDFW administers the reservation system and selects and processes the refuge hunters.

## **2. Statement of Objectives**

The objectives are to continue to provide high quality waterfowl and other migratory bird hunting opportunities and expanding upland game hunting opportunities on San Luis and Merced NWRs are to provide

- the public with a high-quality hunting program including opportunities for hunting waterfowl, coot, common moorhen, pheasant, and snipe.
- wildlife-dependent public recreation as mandated by and according to Service law and policy.

The Refuge promotes ethical hunting and provides access for the opportunity to participate in fair chase migratory and upland bird hunting, consistent with State and Federal hunting regulations.

The objectives of migratory bird and upland game hunting on San Luis and Merced NWRs are consistent with the mission of the NWRs; and natural resources and visitor services goals for the San Luis NWR Complex.

### **3. Description of Hunting Program**

#### **A. Areas to be Opened to Hunting**

Waterfowl hunting is permitted on portions of the San Luis NWR and Merced NWR. The CDFW establishes the State seasons within the framework established by the Service. The area is included in California's Balance of the State zone. Although all days within the season are open to hunting on private lands, with a few exceptions hunting on public lands only occurs on Wednesdays, Saturdays, and Sundays. Legal species generally consist of waterfowl, coots, common moorhens, snipe, and pheasants but some refuge units restrict hunting to only ducks, geese, coots, and common moorhens.

#### **Hunting on San Luis National Wildlife Refuge**

The San Luis NWR has a longstanding hunt program. The various hunting areas of San Luis NWR offer diverse opportunities for hunting, such as free-roam, hunting from blinds, exclusive zone, and hunting by boat; and most areas with assigned blinds provide accommodation for Americans with Disabilities Act (ADA) accessibility. The hunting program is cooperatively administered with CDFW; the Service manages the Refuge land, habitat, and facilities, and CDFW administers the reservation system and selects and processes the Refuge hunters.

The hunting program at San Luis NWR currently consists of seven units: San Luis, Blue Goose, Kesterson, West Bear Creek, East Bear Creek, North Freitas, and South Freitas.

More details about hunting regulations on each refuge unit below:

##### *San Luis Unit.*

Legally hunted species include ducks, geese, coots, common moorhens, common snipe, and pheasants. The daily hunter capacity is approximately 90 hunters at a time, but may fluctuate depending on habitat conditions. Hunt days are Wednesdays, Saturdays, and Sundays during the State season. The San Luis unit hunt program is free-roam encompassing 2,784 acres, in which hunters are assigned to one of three parking lots. Each parking lot has a designated hunter capacity. The vehicle must be parked in the assigned lot; however, hunters may walk anywhere within the San Luis unit hunt zone. The assigned parking lot regulates hunter densities as most sportsmen hunt in proximity to their assigned lot. There are 30 hunting blinds within the free-roam area at the San Luis unit. They are available on a first-come/first-served basis and are not

assigned by the check station. Permitted hunters have the option of using a free-roam hunting technique or using one of the blinds. Hunters may apply for a reservation to hunt at the San Luis unit through the State-operated reservation system. A reservation for the San Luis unit will also grant entry to the Blue Goose unit. The Service would expand the hunting of ring-necked pheasants on a 671-acre in a newly delineated Upland Freitas hunt subunit on San Luis NWR (see figure 1).

#### *Blue Goose Unit.*

Legally hunted species include ducks, geese, coots, and common moorhens. The daily hunter capacity is 26 hunters at a time, established by the combined capacity of the unit's blinds. The hunt unit includes 556 acres. Hunt days are Wednesdays, Saturdays, and Sundays during the State season. All hunting at the Blue Goose unit is accomplished from 9 assigned blind sites. Blinds include 3-person stand-up blinds, 3-person pit blinds, and 2-person pit blinds. Hunters select a blind at the check station and must hunt only from that blind unless they select another hunting assignment at the check station.

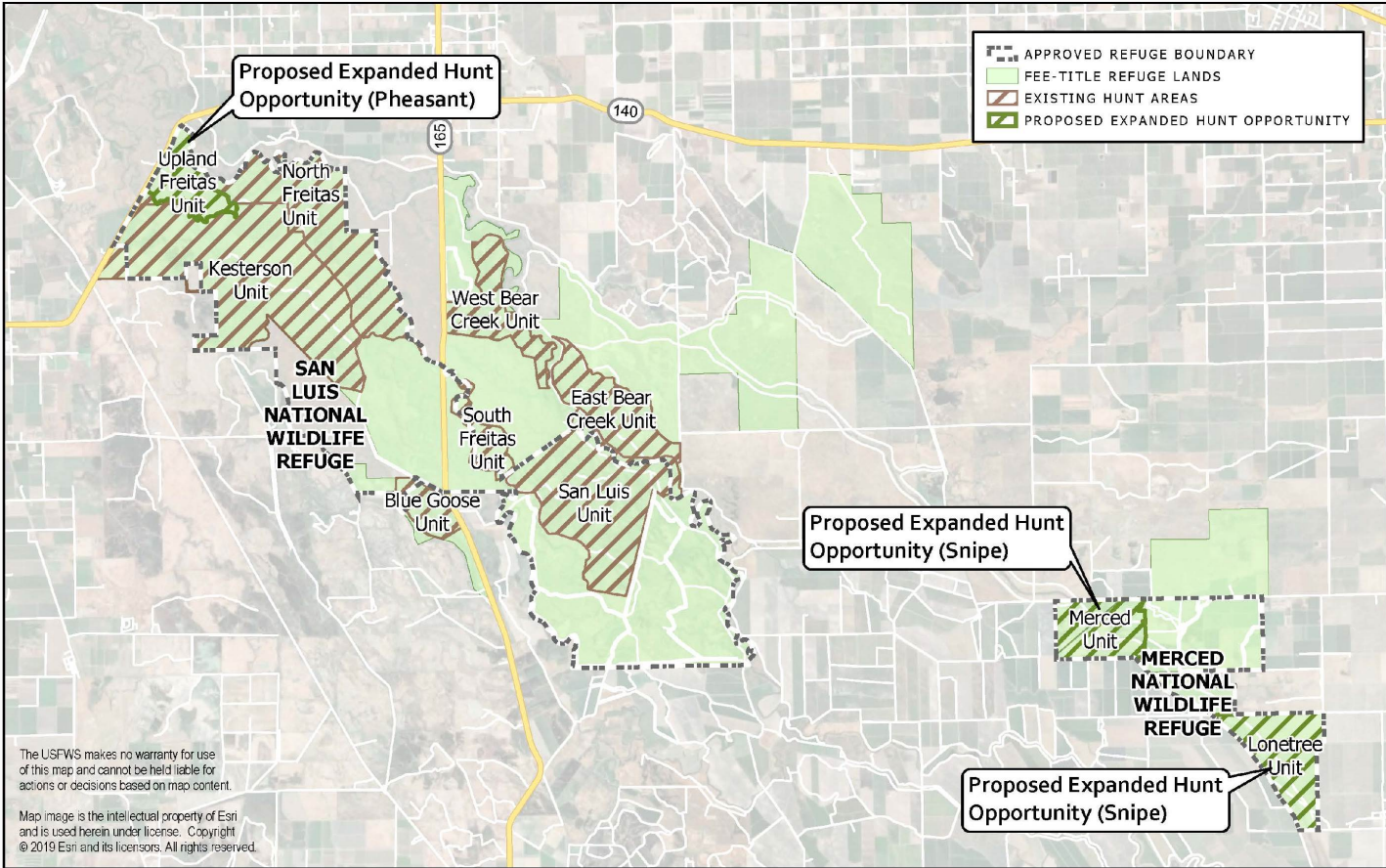
#### *Kesterson Unit.*

Legally hunted species include ducks, geese, coots, and common moorhens. The daily hunter capacity is 86 hunters at a time, established by the combined capacity of the unit's blinds. The hunt unit includes 4,643 acres. Hunt days are Wednesdays, Saturdays, and Sundays during the State season. All hunting at the Kesterson unit is accomplished from 34 assigned blind sites. Blinds include 3-person stand-up blinds, 3-person pit blinds, 2-person pit blinds, and two ADA-accessible 3-person stand-up blinds. Hunters select a blind at the check station and must hunt only from that blind unless they select another hunting assignment at the check station. The Kesterson unit has a special one-day pheasant hunt on the first Monday of pheasant season, but does not allow pheasant hunting on any other day. Hunters may apply through the State-operated reservation system for a reservation to hunt at the Kesterson unit.

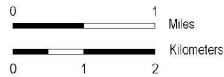
#### *West Bear Creek Unit.*

Legally hunted species include ducks, geese, coots, and common moorhens. The daily hunter capacity is approximately 36 hunters at a time, but may fluctuate depending on habitat conditions. Hunt days are Wednesdays, Saturdays, and Sundays during the State season. The West Bear Creek unit hunt program is assigned pond, in which hunters are assigned one of six assigned ponds encompassing 969 acres, and may free-roam within the assigned pond boundary. Each pond has a hunter capacity of 4-8 hunters depending on the pond. The assigned pond system regulates hunter densities in the hunt unit. Hunters may apply for a reservation to hunt at the West Bear Creek unit through the State-operated reservation system. The reservation is labeled as a "Bear Creek" reservation in the State's system, and a "Bear Creek" reservation holder may select West Bear Creek or East Bear Creek. The West Bear Creek unit typically has a delayed opening and opens to hunting in late-November due to the San Luis NWR water delivery schedule.





Produced in the Division of Natural Resources  
Sacramento, California  
Produced: February 11, 2020  
Basemap: ESRI World Imagery



NAD 83

Figure 1. Hunt Units on San Luis and Merced NWRs

### *North and South Freitas Unit.*

The North Freitas Hunt Unit is 3075 acres, and the South Freitas Hunt Unit is 435 acres. Across these acres, legally hunted species include ducks, geese, coots, and common moorhens. In addition to the above listed species, a portion of the North Freitas Unit is also open to ring-necked pheasant hunting on the opening weekend (Saturday and Sunday). Because the North and South Freitas Hunt Units for waterfowl consists of the San Joaquin River and Salt Slough riparian corridors, it is the only State or Federal hunt area in Merced County that is accessible only by boat. However, once inside the hunt boundary, hunters can hunt from land or boat. Many hunters shore their boat and use a portable blind or the natural cover on the shore. It is the only Service land in Merced County that is open to hunting seven days a week during the State waterfowl hunting season. On Wednesdays, Saturdays, and Sundays hunters must report to the check station and obtain a hunting permit. On Mondays, Tuesdays, Thursdays, and Fridays there is no check-in procedure or daily hunter quota. The North Freitas hunt unit is accessed from a California State Parks boat launch off CA State Route 140, and the South Freitas hunt unit is accessed from a USFWS-owned boat launch on the South Freitas Unit off of CA State Route 165.

### *East Bear Creek Unit.*

Legally hunted species include ducks, geese, coots, and common moorhens. The maximum daily hunter capacity is approximately 6 hunters per day, but may fluctuate depending on habitat conditions. Hunt days are Wednesdays, Saturdays, and Sundays during the State season. The East Bear Creek unit hunt program is assigned exclusive zone, in which hunters are assigned one of potentially two exclusive zones encompassing a total of 1168 acres, and may free-roam within the assigned zone boundary. Each zone has a hunter capacity of three hunters. The assigned zone system regulates hunter densities in the hunt unit. Hunters may apply for a reservation to hunt at the East Bear Creek unit through the State-operated reservation system. The reservation is labeled as a “Bear Creek” reservation in the State’s system, and a “Bear Creek” reservation holder may select West Bear Creek or East Bear Creek. The East Bear Creek unit typically has a delayed opening and opens to hunting in late-November.

### **Hunting on Merced National Wildlife Refuge**

The Merced NWR hunt program consists of the Merced unit and Lonetree unit. Because the Merced NWR is not adjacent to other public lands in the vicinity, several special restrictions occur at the Refuge in an effort to increase the quality of the hunt program, maintain waterfowl numbers in the area, and decrease depredation on neighboring farmland. The restrictions reduce hunting pressure on the Refuge and allow waterfowl to more quickly recover from disturbance before the following hunt day. The special restrictions include only hunting two days per week (Wednesdays and Saturdays) rather than three. The shooting day is reduced in length with noon marking the end of shoot time rather than sunset. Hunters at the Merced NWR are limited to 25 shells for the duration of their hunt day. On other hunt areas, hunters are limited to 25 shells on their person, but may return to their vehicle to obtain more. Hunters may apply for a Merced NWR reservation through the State-operated reservation system. At Merced NWR, reservation applies to the Merced unit and Lonetree unit.

### *Merced Unit*

Legally hunted species include ducks, geese, coots, and common moorhens. The Service is also expanding hunting to include snipe on this unit. The daily hunter capacity is 46 hunters at a time, established by the combined capacity of the unit's blinds. All hunting at the Merced unit is accomplished from 21 assigned blind sites encompassing 969 acres. Blinds include 3-person stand-up blinds, 3-person pit blinds, 2-person pit blinds, and an ADA-accessible 3-person stand-up blind. Hunters select a blind at the check station and must hunt only from that blind unless they select another hunting assignment at the check station.

### *Lonetree Unit*

Legally hunted species include ducks, geese, coots, and common moorhens. The Service is also expanding hunting to include snipe on this unit. The Lonetree unit consists of five zones covering 1,241 acres with one party of three hunters allowed per zone. Hunters may free-roam anywhere within their assigned zone. The assigned zone system regulates hunter densities in the hunt unit.

## **B. Species to be Taken, Hunting periods, Hunting Access**

- **WATERFOWL HUNTING:** On San Luis Refuge, hunting of ducks, geese, and coots is permitted Wednesdays, Saturdays, and Sundays during the State season. \*Note: in the Freitas Unit waterfowl hunting is permitted 7 days a week during the State season; Mondays, Tuesdays, Thursdays and Fridays there is not check-in procedures or hunter quota. On Merced Refuge, hunting of ducks, geese, and coots is permitted on Wednesdays and Saturdays during the State season.
- **OTHER MIGRATORY BIRD HUNTING:** On San Luis Refuge, hunting of migratory birds including common moorhens, and snipe is permitted Wednesdays, Saturdays, and Sundays during the State season. \*Note: in the Freitas Unit, migratory bird hunting is permitted 7 days a week during the State season; Mondays, Tuesdays, Thursdays and Fridays there is not check-in procedures or hunter quota. On Merced Refuge hunting of common moorhen and snipe is permitted Wednesdays and Saturdays during the State season.
- **UPLAND GAME HUNTING:** On San Luis Refuge, pheasant hunting is permitted in designated areas Wednesdays, Saturdays, and Sundays during the State season.

## **C. Consultation and Coordination with the State**

The Refuge reviewed the operations and regulations for neighboring State Wildlife Management Areas and Refuges to find consistency where possible. The Refuge first reached out to the State in early 2019 to discuss this Hunt Plan. We worked with the local wildlife area managers early in the development of the plan. We specifically asked the State if they could include the Refuge in

the State reservation program to ensure consistency and reduce operation costs.

#### **D. Law Enforcement**

Enforcement of Refuge violations normally associated with management of a National Wildlife Refuge is the responsibility of commissioned Federal Wildlife Officers. Other Officers, Special Agents, and State Game Wardens often assist the San Luis NWRC full time Federal Wildlife Officers.

The following methods are used to control and enforce hunting regulations:

- Refuge and hunt area boundaries will be clearly posted;
- The Refuge will provide a brochure that shows the hunt areas;
- San Luis NWRC law enforcement staff will randomly check hunters for compliance with Federal and State Laws.”

Hunter Permit Requirements:

- All hunters are required to possess a valid California hunting license and upland bird validation.
- Migratory waterfowl hunters are required to possess a Federal Migratory Game Bird Hunting Stamp (complete requirements are published at: [eRegulations.com](http://eRegulations.com)).
- Migratory game bird (including ducks, geese, swans, coots, dove, snipe, or moorhens) hunters are required to possess an annual CDFW Harvest Information Program (HIP) validation number (complete requirements are published at: [eRegulations.com](http://eRegulations.com)).

#### **E. Funding and Staffing Requirements**

Annual hunt administration costs, for San Luis NWRC including salary, equipment, law enforcement, brochures, collection of hunt data and analysis of biological information, etc. totals approximately \$150,000. San Luis NWRC funds are used to conduct hunts on San Luis and Merced Refuges. Funding specifically for hunts has not been allocated, although funds are available through the Refuge Complex’s annual budget. Incurred salary and other related operational costs for the administration of the reservation, lottery and check stations are incurred by CDFW. It is anticipated that funding would continue to be sufficient to continue the hunting program at San Luis and Merced Refuges in the future.

### **4. Conduct of the Hunting Program**

#### **A. Hunter Permit Application, Selection, and/or Registration Procedures (if applicable).**

Hunters during the waterfowl season would apply for a reservation, enter the lottery, or enter the first come first serve list to access one of the hunting areas. All of these processes are run by CDFW. Hunters would be required to purchase either an Annual Pass, one day pass, or two day pass for CDFW Type A Areas.

## **B. Refuge-Specific Hunting Regulations**

The Refuge System Administration Act, as amended by the NWRS Improvement Act and the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4) (Recreation Act) govern the administration and public use of refuges. Additionally, Station-Specific Hunting Regulations (50 CFR § 32.47) and Public Access and Recreation Regulations (50 CFR § 26.34) are published annually in the U.S. Federal Register.

We allow waterfowl, other migratory bird and upland game on designated areas of San Luis and Merced NWRs in accordance with State regulations and the Station-specific (Refuge-specific) regulations that pertain to hunting on the refuge as of the date of this plan.

## **C. Relevant State Regulations**

Hunting on the Refuges will be conducted consistent with the regulations of the State available at <http://www.wildlife.ca.gov/hunting>

## **D. Other Refuge-Specific Hunting Regulations**

[Section D. includes rules in the visitors' brochure & hunt brochure that are not in the Hunting and Fishing General Provisions (50 CFR 32), Station-Specific Regs (50 CFR § 32.47), or Public Access and Recreation Regs (50 CFR § 26.34).]: These regulations may be modified as conditions change or if Refuge expansion continues/occurs.

*San Luis National Wildlife Refuge -*

*(1) Migratory game bird hunting. We allow hunting of goose, duck, coot, moorhen, and snipe on designated areas of the Refuge subject to the following conditions:*

*(i) You may not possess more than 25 shot shells while in the field once you have left your assigned parking lot or boat launch.*

*(ii) You must return your permits (state-issued) to the check stations immediately upon completion of your hunt and prior to using any tour routes or leaving the refuge vicinity.*

*(iii) We restrict hunters in the spaced blind area to their assigned blind except when they are*

*placing decoys, traveling to and from the parking area, retrieving downed birds, or pursuing crippled birds.*

*(iv) We restrict hunters in the spaced zone area of the East Bear Creek Unit to their assigned zone except when they are traveling to and from the parking area, retrieving downed birds, or pursuing crippled birds.*

*(v) Access to the Freitas Unit free-roam hunting area is by boat only with a maximum of 5 miles per hour (mph). We prohibit air-thrust and inboard water-thrust boats.*

*(vi) We require State-issued Type A area permits for access on Wednesdays, Saturdays, and Sundays.*

*(vii) We prohibit the use of motorized boats and other flotation devices in the free-roam units with the exception of the Freitas Unit.*

*(viii) We prohibit vehicle trailers of any type or size to be in the refuge hunt areas at any time or to be left unattended at any location on the refuge.*

*(ix) We allow the use of dogs when hunting.*

*(2) Upland game hunting. We allow hunting of pheasant on designated areas of the refuge.*

*(3) [Reserved]*

*(4) Sport fishing. We allow sport fishing on designated areas of the refuge subject to the following conditions:*

*(i) We only allow fishing during normal refuge visitation hours in designated areas as posted.*

*(ii) We only allow the use of pole and line or rod and reel to take fish, and anglers must attend their equipment at all times.*

*(l) Merced National Wildlife Refuge -*

*(1) Migratory game bird hunting. We allow hunting of goose, duck, coot, and moorhen on designated areas of the refuge subject to the following conditions:*

*(i) You may not possess more than 25 shot shells while in the field once you have left your assigned parking lot or boat launch.*

*(ii) Each hunter must remain inside his or her assigned blind, except for when placing decoys, retrieving downed birds, and traveling to and from the parking area. We prohibit shooting from*

*outside the blind.*

*(iii) We restrict hunters in the spaced zone area of the Lonetree Unit to their assigned zone except when they are traveling to and from the parking area, retrieving downed birds, or shooting to retrieve crippled birds.*

*(iv) We allow the use of dogs when hunting.*

*(2) Upland Game hunting. We allow hunting of pheasant and snipe on designated areas of the refuge.*

*(3)-(4) [Reserved]*

## **5. Public Engagement**

### **A. Outreach for Announcing and Publicizing the Hunting Program**

The Complex has a standard list of local media contacts for news releases. The Service will utilize the Complex's website, kiosks, brochures, and flyers to provide current and accurate information regarding the Refuges' hunt program.

### **B. Anticipated Public Reaction to the Hunting Program**

Hunting has been allowed on San Luis and Merced NWR's for more than 40 years and little negative public reaction is expected. Hunting is an important economic and recreational use of California's natural resources.

### **C. How Hunters Will Be Informed of Relevant Rules and Regulations**

General information regarding hunting and other wildlife-dependent public uses can be obtained at San Luis NWRC headquarters at 7376 S. Wolfson Road (Do not use for mailing) Los Banos, CA 93635 or by calling (209) 826-3508. Dates, hunting unit directions, maps, and permit requirements about the hunt will be available on the station website at: [www.fws.gov/refuge/san\\_luis/](http://www.fws.gov/refuge/san_luis/) and at the Refuge Visitor Center.

## **6. Compatibility Determinations**

Hunting and all associated program activities proposed in this plan are compatible with the purposes of the refuges. See the Hunting Compatibility Determinations for San Luis and Merced National Wildlife Refuges.

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## **Appendix I: Federal Laws and Executive Orders Relevant to the San Luis National Wildlife Refuge Complex**

Legal mandates and policies of the U.S. Fish and Wildlife Service (Service) govern the Service's planning and management of the National Wildlife Refuge System (Refuge System). A description of these legal mandates can be found at the "Division of Congressional and Legislative Affairs, USFWS" Web site (<http://www.fws.gov/laws/Lawsdigest.html>). In addition, the Service has developed policies to guide NWRS planning and management, which can be found at the "NWRS Policies Web site" (<http://www.fws.gov/refuges/policiesandbudget/refugepolicies.html>).

### **Laws and Executive Orders Applicable to the San Diego NWR CCP**

All projects and step-down plans described in a CCP will be required to comply with the National Wildlife Refuge System Improvement Act of 1997 and the National Environmental Policy Act (described in Chapter 1 of the CCP), as well as a variety of other Federal regulations, Executive Orders (EOs), and legislative acts. A brief description of the laws and EOs applicable to the San Diego NWR CCP, as well as a statement indicating how each relates to the CCP, is provided in Table 1.

### **Applicable Laws and Executive Orders**

#### **Agency Coordination**

Executive Order No. 12372, Intergovernmental Review of Federal Programs, requires that Federal agencies afford other agencies review of documents associated with Federal programs. The San Diego NWR CCP complies as the availability of the environmental assessment (EA) was advertised in the Federal Register and interested Federal, State, and local agencies and tribes were provided notices.

#### **Effects on the Environment**

The National Environmental Policy Act of 1969 (42 USC 4321 et seq.) (NEPA) requires analysis, public comment, and reporting of environmental impacts for federal actions. The San Diego NWR CCP complies as an EA was prepared jointly with the draft CCP and the public was notified of its availability for review and comment.

#### **Human Rights**

The Architectural Barriers Act of 1968, as amended, (42 U.S.C. §§ 4151 et seq.) requires all new federal buildings and facilities constructed or altered with federal funds since 1968 to be accessible to and usable by individuals with disabilities. It also requires that modifications be made to existing facilities to ensure equal access for employees or visitors. New buildings and other facilities on the Refuge will

comply with these requirements. New trails and outdoor facilities will be laid out and designed per the draft accessibility guidelines for outdoor developed areas.

Executive Order 12898, Environmental Justice, mandates federal agencies to achieve environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Implementing the CCP will not have a disproportionately high and adverse human health or environmental effect on minority or low-income populations. The CCP promotes compatible uses of the land that protect the natural resources and provide accessible opportunities for wildlife-dependent recreational uses.

### **Biological Resources**

Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), as amended, provides for protection of plants, fish, and wildlife that have a designation as threatened or endangered. An Intra-Service Section 7 biological evaluation has been completed in association with the CCP that evaluates the effects of the plan's proposed actions on endangered and threatened species.

Fish and Wildlife Act of 1956 (16 USC 742a-743j, not including 742d-742l), provides the Secretary of the Interior with authority to protect and manage fish and wildlife resources. The Service will continue to comply with this Act under the CCP.

Fish and Wildlife Conservation Act of 1980 (16 USC 661-667e), as amended, requires the Service to monitor non-game bird species, identify species of management concern, and implement conservation measures to preclude the need for listing under ESA. Listed and MSCP-covered species will be monitored per adopted protocols; measures to protect and manage species of concern, along with the conservation of large blocks of native habitat, will assist in conserving trust species.

Fish and Wildlife Coordination Act of 1958 requires equal consideration and coordination of wildlife conservation with other water resource development programs. The CCP

Federal Laws and Executive Orders Relevant to the San Luis NWR Complex acknowledges the need to coordinate Refuge actions with the agencies that maintain reservoirs downstream of the Refuge.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001, instructs federal agencies to conserve migratory birds, in part through the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation Plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents. The Service has incorporated the strategies and recommendations of these bird conservation plans into the CCP. The Service will continue to comply with this Order under the CCP.

Executive Order 13112, Invasive Species, requires federal agencies to use relevant programs and authorities to prevent, control, monitor, and research invasive species and coordinate complementary, cost-efficient, and effective activities concerning invasive species by relying on existing organizations already in place that address invasive species issues. The CCP addresses the need to work with others to

address invasive species issues on the Refuge. In addition, an Integrated Pest Management Plan has been prepared for the Refuge in association with the CCP.

The Bald and Golden Eagle Protection Act of 1940 (16 USC 668 et seq.) provides protection for bald and golden eagles. Measures are addressed in the CCP to protect nesting golden eagles on the Refuge.

Migratory Bird Treaty Act (MBTA) of 1918, as amended, provides protection for bird species that migrate across state and international boundaries. The Service will continue to comply with this Act as it implements the proposals and management plans included within the CCP.

Federal Noxious Weed Act of 1990 requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies. An Integrated Pest Management Plan has been prepared for the Refuge in association with the CCP.

Emergency Wetlands Resources Act of 1986 promotes the conservation of migratory waterfowl and offsets or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitats. The CCP includes strategies to protect, restore, and enhance the wetlands that occur on the Refuge.

### **Cultural Resources**

Antiquities Act of 1906 authorizes the scientific investigation of antiquities on federal land, and also prohibits and provides penalties for unauthorized search for or collection of artifacts or other objects of scientific interest on federal lands. The Act authorizes the President to establish national monuments and cultural areas on federal lands. The Service will continue to comply with this Act under the CCP.

Native American Graves Protection and Repatriation Act of 1990 (PL 101-601; 25 USC 3001 et seq.) (NAGPRA) regulates the treatment of Native American graves, human remains, funeral objects, sacred objects, and other objects of cultural patrimony and requires consultation with Native American Tribes during federal project planning. The San Diego NWR Complex has initiating discussions with the appropriate Native American Tribes to develop an MOU to implement the inadvertent discovery clause of NAGPRA.

Executive Order No. 11593, Protection and Enhancement of the Cultural Environment, requires that if the Service proposes any activities that may affect archaeological or historical sites, the Service shall consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Any cultural resources that are identified will be protected, and steps to avoid any inadvertent impacts to subsurface deposits that have yet to be identified will be taken.

Executive Order 13007, Indian Sacred Sites. 24 May, 1996 Provides for access to, and ceremonial use of, Indian sacred sites on Federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites. Tribes have been contacted regarding the CCP and have been invited to provide information necessary to protect sacred sites and other resources.

Archaeological Resources Protection Act (ARPA) of 1979 (PL 96-95; 93 STAT 722; 16 USC 470aa-47011), as amended, protects materials of archeological interest from unauthorized removal or destruction and requires federal managers to develop plans to locate archaeological resources. Cultural resources that have been identified will be protected, and steps to avoid any inadvertent impacts to subsurface deposits that have yet to be identified will be taken. The Service will continue to comply with this Act under the CCP.

American Indian Religious Freedom Act 1978 (PL 95-341; 92 STAT 469; 42 USC 1996) provides for freedom of Native Americans to believe, express, and exercise their traditional religion, including access to important sites. The Tribes have been contacted regarding the CCP and have been invited to provide information necessary to protect sacred sites and other resources.

National Historic Preservation Act (NHPA) of 1966 (PL 89-665; 50 STAT 915; 16 USC 470 et seq.; 36 CFR 800), as amended, requires federal agencies to consider the effects of any actions or programs on historical properties. The EA prepared to accompany the draft CCP addressed the potential effects of the actions proposed in the CCP and included measures for incorporation into the CCP to ensure that no adverse effects to historical properties will occur.

Archaeological and Historic Preservation Act of 1974 (PL 93-291; 88 STAT 174; 16 USC 469) provides for the preservation of historical buildings, sites, and objects of national significance. Potential historical resources have been identified in the CCP and those of national significance will be preserved. The Service will continue to comply with this Act under the CCP.

Curation of Federally-Owned and Administered Archaeological Collections (36 CFR 79) requires federal agencies to ensure proper care of federally-owned and administered archaeological collections, including ensuring that significant prehistoric and historic artifacts, and associated records, are deposited in an institution with adequate long-term curatorial capabilities that can provide professional, systematic, and accountable curatorial services on a long-term basis. Archaeological resources from the San Diego NWR that may become part of a federally owned and administered archaeological collection would be curated at the San Diego Archaeological Center, which accepts for accession archaeological collections from federal agencies.

### **Tribal Coordination**

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires federal agencies to implement an accountable process to ensure meaningful and timely input by tribal officials as policies are developed that have tribal implications. Tribal governments in San Diego County were consulted prior to publication of the Notice of Intent and have continued to be updated on the progress of the CCP.

### **Paleontological Resources**

Paleontological Resources Preservation Act of 2009 (P.L. 111-11, Title VI, Subtitle D) requires the management and protection of paleontological resources on federal lands using scientific principals and expertise; requires the development of plans for the inventory, monitoring, and scientific and educational use of paleontological resources; addresses the collection and curation of resources;

identifies prohibited acts, and establishes criminal and civil penalties. The potential effects of Refuge actions on paleontological resources have been evaluated and there is a low potential for these resources to be present on the Refuge. The Service will however comply with the provision of this Act as applicable under the CCP.

### **Hazardous Materials**

Oil Pollution Act of 1990 (PL 101-380; 33 USC 2701, et seq.) provides oil pollution policies and protections. The Service will continue to comply with this Act under the CCP.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (PL 96-510; 42 USC 9601, et seq.) provides mechanism for hazardous waste cleanup. The CCP proposes continued coordination with the Contaminants Program of the Carlsbad Fish and Wildlife Office when issues related to contaminants are identified on the Refuge.

### **Water Quality**

The Clean Water Act of 1972, Section 404 (33 USC 1344 et seq.), as amended, establishes a program to regulate the discharge of dredged or fill material into waters of the United States (U.S.), including wetlands and requires a permit from the U.S. Army Corps of Engineers before dredged or fill material may be discharged into waters of the U.S. The CCP requires the implementation of best management practices during ground-disturbing activities to minimize siltation and run-off into adjacent wetlands, as well as during the application of pesticides, all to protect water quality.

Clean Water Act, Section 401, requires that an applicant for a federal license or permit provide a certification that any discharges will comply with the Act, including water quality standard requirements. A Stormwater Pollution Prevention Plan will be prepared in compliance with the regulations of the California State Water Board for projects requiring grading or other significant land disturbance.

### **Land and Water Use**

The National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee), National Wildlife Refuge System Improvement Act of 1997 (PL 105-57) Administration, management, and planning for National Wildlife Refuges, amends the National Wildlife Refuge System Administration Act of 1966, and requires development of CCPs for all refuges outside of Alaska. The Service determined that hunting, wildlife observation, photography, environmental education, interpretation, research, and recreational trails are compatible with the purposes for which the Refuge was established. Implementation of the CCP will therefore satisfy the intent of this Act.

The Refuge Recreation Act of 1962, as amended, provides for recreation use that is compatible with the primary purpose of a refuge. The Service determined that hunting, wildlife observation, photography, environmental education, interpretation, and recreational trails are compatible with the purposes for which the Refuge was established.

Executive Order No. 11990, Protection of Wetlands, provides for the conservation of the natural and beneficial values of wetlands and their associated habitats. The CCP includes strategies to protect, restore, and enhance the wetlands that occur on the Refuge.

Executive Order No. 12996, Management and General Public Use of the National Wildlife Refuge System, directs the Secretary of the Interior to recognize compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education/interpretation as priority general public uses on refuges. The CCP addresses the compatibility of these uses on the San Diego NWR.

Executive Order No. 13690, Establishing a Federal Flood Risk Management Standard Amended EO 11988 (Floodplain Management), addresses the Federal Flood Risk Management Standard, which is intended to reduce the risk and cost of future flood disasters by ensuring that federal investments in and affecting floodplains are constructed to better withstand the impacts of flooding. Structures, such as trail bridges, that have the potential to influence the movement of floodwater will be designed to take into consideration the hydrology of the site, thus the proposed action is consistent with this Executive Order.

Fish and Wildlife Improvement Act of 1978 improves the administration of fish and wildlife programs and amends earlier laws including Refuge Recreation Act, NWRS Administration Act, and Fish and Wildlife Act of 1956. The Act authorizes the Secretary of the Interior to accept gifts or real and personal property on behalf of the U.S. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program. The CCP acknowledges the continued acquisition of lands within the approved Refuge boundary and that some parcels may come into the Refuge as a gift or donation. Volunteers are also an important part of successful Refuge management.

### *Refuge Policies that Guide Refuge Planning and Management*

Statutory authority for Service management and associated habitat management planning on units of the NWRS is derived from the National Wildlife Refuge System Improvement Act. Section 4(a)(3) of the Improvement Act states, “With respect to the National Wildlife Refuge System, it is the policy of the United States that—(A) each refuge shall be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established.”

The Improvement Act provides clear standards for management, use, planning, and growth of the NWRS. Its passage followed the promulgation of Executive Order 12996 (April 1996), “Management of Public Uses on National Wildlife Refuges,” reflecting the importance of conserving natural resource for the benefit of present and future generations of people. The Improvement Act recognizes that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible with the mission of the NWRS and purposes of the Refuge, are legitimate and appropriate public uses of the Refuge System.

The following policies have been developed to help guide the implementation of the Improvement Act and the administration of Refuge lands.

## **Compatibility Policy**

The Improvement Act states, “The Secretary shall not initiate or permit a new use of a Refuge or expand, renew, or extend an existing use of a Refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety.” The Improvement Act also states that “compatible wildlife-dependent recreational uses [hunting, fishing, wildlife observation and photography, or environmental education and interpretation] are the priority general public uses of the System and shall receive priority consideration in Refuge planning and management; and when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate.”

In accordance with the Improvement Act, the Service has adopted a Compatibility Policy (*Fish and Wildlife Service Manual, Part 603 FW 2*) that includes guidelines for determining if a use proposed on a NWR is compatible with the purposes for which the refuge was established. A compatible use is defined in the policy as a proposed or existing wildlife-dependent recreational use or any other use of a NWR that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes for which the Refuge was established. The Policy also includes procedures for documentation and periodic review of existing refuge uses.

When a determination is made as to whether a proposed use is compatible or not, this determination is provided in writing and is referred to as a compatibility determination. An opportunity for public review and comment is required for all compatibility determinations. Compatibility determinations prepared concurrently with a CCP are included in the public review process for the draft CCP and associated NEPA document. The Refuge has completed draft compatibility determinations for hunting, fishing, wildlife observation, photography, interpretation, and environmental education, as well as trail use and research. These compatibility determinations are available for review and comment in Appendix A.

## **Appropriate Use Policy**

Refuges are first and foremost national treasures for the conservation of wildlife. Through careful planning, consistent system-wide application of regulations and policies, diligent monitoring of the impacts of uses on wildlife resources, and preventing or eliminating uses not appropriate to the Refuge System, the conservation mission of the Refuge System can be achieved, while also providing the public with lasting opportunities to enjoy and appreciate the resources protected within the Refuge System. The Appropriate Use Policy (*Fish and Wildlife Service Manual, Part 603 FW 1*) provides a national framework for determining appropriate refuge uses and outlines the procedures refuge managers must follow when deciding if a new or existing use is an appropriate use on the refuge. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a proposed use is not determined to be appropriate, the use will not be allowed, and a compatibility determination will not be prepared.

To be considered appropriate, a proposed or existing use on a refuge must meet at least one of the four conditions described below. All uses determined to be appropriate are also reviewed for compatibility.

- 1) The use is a wildlife-dependent recreational use as identified in the Improvement Act (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in an approved refuge management plan.
- 3) The use involves the take of fish and wildlife under State regulations. (States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. Take of wildlife under such regulations is considered appropriate; however, the refuge manager must determine if the activity is compatible before allowing it on a refuge.)
- 4) The use has been found to be appropriate after considering specific criteria.

For a use to be found appropriate, the Service must have jurisdiction over the use. If the Service does not have jurisdiction over the use or the area where the use would occur, no authority exists to consider the use. In addition, use must comply with all applicable laws and regulations (e.g., Federal, State, tribal, and local). Uses prohibited by law are not appropriate. The use must be consistent with applicable Executive Orders and Department and Service policies. If a use conflicts with an applicable Executive Order or Department or Service policy, the use is not appropriate.

The use must be consistent with public safety. If a use creates an unreasonable level of risk to visitors or refuge staff, or if the use requires refuge staff to take unusual safety precautions to assure the safety of the public or other refuge staff, the use is not appropriate.

The use must be consistent with refuge goals and objectives in an approved management plan or other document. If a use, either itself or in combination with other uses or activities, conflicts with a refuge goal, objective, or management strategy, the use is generally not appropriate.

If the use has been previously considered in a refuge planning process or under this policy and was rejected as not appropriate, it need not be considered further unless circumstances or conditions have changed significantly.

The use cannot divert management efforts or resources away from the proper and reasonable management of a refuge or the implementation of a wildlife-dependent recreational use. A use, other than a wildlife-dependent recreational uses (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that diverts available resources is generally not appropriate.

The use must be manageable in the future within existing resources. If a use would lead to recurring requests for the same or similar activities that will be difficult to manage in the future, then the use is not appropriate. However, if the use can be managed so that impacts to natural and cultural resources are



minimal or inconsequential, or if clearly defined limits can be established, then the use may be further considered.

The use should contribute to the public's understanding and appreciation of the refuge's natural or cultural resources or is beneficial to the refuge's natural or cultural resources. If this is not the case, such a use would generally be considered not appropriate.

The use should be able to be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality, compatible, wildlife-dependent recreation into the future. If this is not the case, such a use would generally be considered not appropriate.

This Policy also states that if, during preparation of the CCP, a previously approved use can no longer be considered appropriate on the refuge, the reasons for this determination must be clearly explained to the public and a description of how the use will be eliminated or modified must also be provided. The documentation for both appropriateness findings and compatibility determinations are provided in Appendix C of the Final CCP.

Although a refuge use may be both appropriate and compatible, the refuge manager retains the authority to not allow the use or to modify the use. For example, on some occasions, two appropriate and compatible uses may be in conflict with each other. In these situations, even though both uses are appropriate and compatible, the refuge manager may need to limit or entirely curtail one of the uses in order to provide the greatest benefit to refuge resources and the public.

### **Biological Integrity, Diversity and Environmental Health Policy**

Section 4(a)(4)(B) of the Improvement Act states, "In administering the System, the Secretary shall . . . ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans . . ." This legislative mandate represents an additional directive to be followed while achieving refuge purposes and the NWRS mission. The Improvement Act requires the consideration and protection of a broad spectrum of fish, wildlife, plant, and habitat resources found on a refuge. To implement this mandate, the Service has issued the Biological Integrity, Diversity and Environmental Health Policy (*Fish and Wildlife Service Manual, Part 601 FW 3*), which provides policy for maintaining and restoring, where appropriate, the biological integrity, diversity, and environmental health of the NWRS. This policy provides a refuge manager with an evaluation process to analyze his/her refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, and in concert with refuge purposes and the NWRS mission, to restore lost or severely degraded resource components. Within section 3[3.7B] of the policy, the relationships among biological integrity, diversity, and environmental health; the NWRS mission; and refuge purposes are explained as follows, "...each refuge will be managed to fulfill refuge purpose(s) as well as to help fulfill the System mission, and we will accomplish these purposes(s) and our mission by ensuring that the biological integrity, diversity, and environmental health of each refuge are maintained and where appropriate, restored."

When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, an understanding of the refuge's role within an ecosystem, and the knowledge of refuge resources, applicable laws, and best available science, including consultation with resource experts both inside and outside of the Service.

The priority public uses of the NWRS are not in conflict with this policy when they have been determined to be compatible. The directives of this policy do not envision or necessitate the exclusion of visitors or the elimination of visitor use structures from refuges; however, maintenance and/or restoration of biological integrity, diversity, and environmental health may require spatial or temporal zoning of visitor use programs and associated infrastructures. General success in maintaining or restoring biological integrity, diversity, and environmental health will produce higher quality opportunities for wildlife-dependent recreational uses.

### **Wilderness Stewardship Policy**

The Wilderness Stewardship Policy, described in Part 610 FW 1 – 5 of the Fish and Wildlife Service Manual, provides an overview and foundation for implementing the National Wildlife Refuge System Administration Act of 1966, as amended, and the Wilderness Act of 1964. In the Wilderness Act, Congress called for the establishment of a National Wilderness Preservation System to secure an “enduring resource of wilderness” for the American public. Wilderness, as defined in Section 2(c) of the Wilderness Act, is an area that “. . . generally appears to have been affected primarily by the forces of nature with the imprint of man's work sustainably unnoticeable . . . has outstanding opportunities for solitude or a primitive and unconfined type of recreation . . . [and] has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition. . . .”

The Wilderness Stewardship Policy provides refuge managers with guidance on conducting wilderness reviews on Refuge System lands to determine if these lands should be recommended for wilderness designation. It also establishes policy for managing wilderness study areas and recommended and proposed wilderness. The Policy also prescribes how refuge managers will preserve the character and qualities of designated wilderness while managing for refuge establishing purpose(s).

Part 610 FW 4 of the Service Manual describes the wilderness review process, a process that must be followed when identifying and recommending for congressional designation Refuge System lands and waters that merit inclusion in the National Wilderness Preservation System. Wilderness reviews are to be conducted as part of a scheduled CCP or CCP revision, but can also be conducted at any time if significant new information becomes available, ecological conditions change (including the restoration of significant acreage to natural conditions so that area now meets the definition of wilderness), or major refuge expansion occurs. The process must include interagency and tribal coordination, public involvement, and NEPA compliance. The wilderness review conducted for the San Diego NWR as part of the CCP process is presented in Appendix L of this document.

## **Appendix I: Federal Laws and Executive Orders Relevant to the San Luis National Wildlife Refuge Complex**

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comply with these requirements. New trails and outdoor facilities will be laid out and designed per the draft accessibility guidelines for outdoor developed areas.

Executive Order 12898, Environmental Justice, mandates federal agencies to achieve environmental justice by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Implementing the CCP will not have a disproportionately high and adverse human health or environmental effect on minority or low-income populations. The CCP promotes compatible uses of the land that protect the natural resources and provide accessible opportunities for wildlife-dependent recreational uses.

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Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), as amended, provides for protection of plants, fish, and wildlife that have a designation as threatened or endangered. An Intra-Service Section 7 biological evaluation has been completed in association with the CCP that evaluates the effects of the plan's proposed actions on endangered and threatened species.

Fish and Wildlife Act of 1956 (16 USC 742a-743j, not including 742d-742l), provides the Secretary of the Interior with authority to protect and manage fish and wildlife resources. The Service will continue to comply with this Act under the CCP.

Fish and Wildlife Conservation Act of 1980 (16 USC 661-667e), as amended, requires the Service to monitor non-game bird species, identify species of management concern, and implement conservation measures to preclude the need for listing under ESA. Listed and MSCP-covered species will be monitored per adopted protocols; measures to protect and manage species of concern, along with the conservation of large blocks of native habitat, will assist in conserving trust species.

Fish and Wildlife Coordination Act of 1958 requires equal consideration and coordination of wildlife conservation with other water resource development programs. The CCP

Federal Laws and Executive Orders Relevant to the San Luis NWR Complex acknowledges the need to coordinate Refuge actions with the agencies that maintain reservoirs downstream of the Refuge.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001, instructs federal agencies to conserve migratory birds, in part through the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation Plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents. The Service has incorporated the strategies and recommendations of these bird conservation plans into the CCP. The Service will continue to comply with this Order under the CCP.

Executive Order 13112, Invasive Species, requires federal agencies to use relevant programs and authorities to prevent, control, monitor, and research invasive species and coordinate complementary, cost-efficient, and effective activities concerning invasive species by relying on existing organizations already in place that address invasive species issues. The CCP addresses the need to work with others to

address invasive species issues on the Refuge. In addition, an Integrated Pest Management Plan has been prepared for the Refuge in association with the CCP.

The Bald and Golden Eagle Protection Act of 1940 (16 USC 668 et seq.) provides protection for bald and golden eagles. Measures are addressed in the CCP to protect nesting golden eagles on the Refuge.

Migratory Bird Treaty Act (MBTA) of 1918, as amended, provides protection for bird species that migrate across state and international boundaries. The Service will continue to comply with this Act as it implements the proposals and management plans included within the CCP.

Federal Noxious Weed Act of 1990 requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies. An Integrated Pest Management Plan has been prepared for the Refuge in association with the CCP.

Emergency Wetlands Resources Act of 1986 promotes the conservation of migratory waterfowl and offsets or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitats. The CCP includes strategies to protect, restore, and enhance the wetlands that occur on the Refuge.

### **Cultural Resources**

Antiquities Act of 1906 authorizes the scientific investigation of antiquities on federal land, and also prohibits and provides penalties for unauthorized search for or collection of artifacts or other objects of scientific interest on federal lands. The Act authorizes the President to establish national monuments and cultural areas on federal lands. The Service will continue to comply with this Act under the CCP.

Native American Graves Protection and Repatriation Act of 1990 (PL 101-601; 25 USC 3001 et seq.) (NAGPRA) regulates the treatment of Native American graves, human remains, funeral objects, sacred objects, and other objects of cultural patrimony and requires consultation with Native American Tribes during federal project planning. The San Diego NWR Complex has initiating discussions with the appropriate Native American Tribes to develop an MOU to implement the inadvertent discovery clause of NAGPRA.

Executive Order No. 11593, Protection and Enhancement of the Cultural Environment, requires that if the Service proposes any activities that may affect archaeological or historical sites, the Service shall consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Any cultural resources that are identified will be protected, and steps to avoid any inadvertent impacts to subsurface deposits that have yet to be identified will be taken.

Executive Order 13007, Indian Sacred Sites. 24 May, 1996 Provides for access to, and ceremonial use of, Indian sacred sites on Federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites. Tribes have been contacted regarding the CCP and have been invited to provide information necessary to protect sacred sites and other resources.

Archaeological Resources Protection Act (ARPA) of 1979 (PL 96-95; 93 STAT 722; 16 USC 470aa-47011), as amended, protects materials of archeological interest from unauthorized removal or destruction and requires federal managers to develop plans to locate archaeological resources. Cultural resources that have been identified will be protected, and steps to avoid any inadvertent impacts to subsurface deposits that have yet to be identified will be taken. The Service will continue to comply with this Act under the CCP.

American Indian Religious Freedom Act 1978 (PL 95-341; 92 STAT 469; 42 USC 1996) provides for freedom of Native Americans to believe, express, and exercise their traditional religion, including access to important sites. The Tribes have been contacted regarding the CCP and have been invited to provide information necessary to protect sacred sites and other resources.

National Historic Preservation Act (NHPA) of 1966 (PL 89-665; 50 STAT 915; 16 USC 470 et seq.; 36 CFR 800), as amended, requires federal agencies to consider the effects of any actions or programs on historical properties. The EA prepared to accompany the draft CCP addressed the potential effects of the actions proposed in the CCP and included measures for incorporation into the CCP to ensure that no adverse effects to historical properties will occur.

Archaeological and Historic Preservation Act of 1974 (PL 93-291; 88 STAT 174; 16 USC 469) provides for the preservation of historical buildings, sites, and objects of national significance. Potential historical resources have been identified in the CCP and those of national significance will be preserved. The Service will continue to comply with this Act under the CCP.

Curation of Federally-Owned and Administered Archaeological Collections (36 CFR 79) requires federal agencies to ensure proper care of federally-owned and administered archaeological collections, including ensuring that significant prehistoric and historic artifacts, and associated records, are deposited in an institution with adequate long-term curatorial capabilities that can provide professional, systematic, and accountable curatorial services on a long-term basis. Archaeological resources from the San Diego NWR that may become part of a federally owned and administered archaeological collection would be curated at the San Diego Archaeological Center, which accepts for accession archaeological collections from federal agencies.

### **Tribal Coordination**

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires federal agencies to implement an accountable process to ensure meaningful and timely input by tribal officials as policies are developed that have tribal implications. Tribal governments in San Diego County were consulted prior to publication of the Notice of Intent and have continued to be updated on the progress of the CCP.

### **Paleontological Resources**

Paleontological Resources Preservation Act of 2009 (P.L. 111-11, Title VI, Subtitle D) requires the management and protection of paleontological resources on federal lands using scientific principals and expertise; requires the development of plans for the inventory, monitoring, and scientific and educational use of paleontological resources; addresses the collection and curation of resources;

identifies prohibited acts, and establishes criminal and civil penalties. The potential effects of Refuge actions on paleontological resources have been evaluated and there is a low potential for these resources to be present on the Refuge. The Service will however comply with the provision of this Act as applicable under the CCP.

### **Hazardous Materials**

Oil Pollution Act of 1990 (PL 101-380; 33 USC 2701, et seq.) provides oil pollution policies and protections. The Service will continue to comply with this Act under the CCP.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (PL 96-510; 42 USC 9601, et seq.) provides mechanism for hazardous waste cleanup. The CCP proposes continued coordination with the Contaminants Program of the Carlsbad Fish and Wildlife Office when issues related to contaminants are identified on the Refuge.

### **Water Quality**

The Clean Water Act of 1972, Section 404 (33 USC 1344 et seq.), as amended, establishes a program to regulate the discharge of dredged or fill material into waters of the United States (U.S.), including wetlands and requires a permit from the U.S. Army Corps of Engineers before dredged or fill material may be discharged into waters of the U.S. The CCP requires the implementation of best management practices during ground-disturbing activities to minimize siltation and run-off into adjacent wetlands, as well as during the application of pesticides, all to protect water quality.

Clean Water Act, Section 401, requires that an applicant for a federal license or permit provide a certification that any discharges will comply with the Act, including water quality standard requirements. A Stormwater Pollution Prevention Plan will be prepared in compliance with the regulations of the California State Water Board for projects requiring grading or other significant land disturbance.

### **Land and Water Use**

The National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee), National Wildlife Refuge System Improvement Act of 1997 (PL 105-57) Administration, management, and planning for National Wildlife Refuges, amends the National Wildlife Refuge System Administration Act of 1966, and requires development of CCPs for all refuges outside of Alaska. The Service determined that hunting, wildlife observation, photography, environmental education, interpretation, research, and recreational trails are compatible with the purposes for which the Refuge was established. Implementation of the CCP will therefore satisfy the intent of this Act.

The Refuge Recreation Act of 1962, as amended, provides for recreation use that is compatible with the primary purpose of a refuge. The Service determined that hunting, wildlife observation, photography, environmental education, interpretation, and recreational trails are compatible with the purposes for which the Refuge was established.

Executive Order No. 11990, Protection of Wetlands, provides for the conservation of the natural and beneficial values of wetlands and their associated habitats. The CCP includes strategies to protect, restore, and enhance the wetlands that occur on the Refuge.

Executive Order No. 12996, Management and General Public Use of the National Wildlife Refuge System, directs the Secretary of the Interior to recognize compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education/interpretation as priority general public uses on refuges. The CCP addresses the compatibility of these uses on the San Diego NWR.

Executive Order No. 13690, Establishing a Federal Flood Risk Management Standard Amended EO 11988 (Floodplain Management), addresses the Federal Flood Risk Management Standard, which is intended to reduce the risk and cost of future flood disasters by ensuring that federal investments in and affecting floodplains are constructed to better withstand the impacts of flooding. Structures, such as trail bridges, that have the potential to influence the movement of floodwater will be designed to take into consideration the hydrology of the site, thus the proposed action is consistent with this Executive Order.

Fish and Wildlife Improvement Act of 1978 improves the administration of fish and wildlife programs and amends earlier laws including Refuge Recreation Act, NWRS Administration Act, and Fish and Wildlife Act of 1956. The Act authorizes the Secretary of the Interior to accept gifts or real and personal property on behalf of the U.S. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program. The CCP acknowledges the continued acquisition of lands within the approved Refuge boundary and that some parcels may come into the Refuge as a gift or donation. Volunteers are also an important part of successful Refuge management.

### *Refuge Policies that Guide Refuge Planning and Management*

Statutory authority for Service management and associated habitat management planning on units of the NWRS is derived from the National Wildlife Refuge System Improvement Act. Section 4(a)(3) of the Improvement Act states, “With respect to the National Wildlife Refuge System, it is the policy of the United States that—(A) each refuge shall be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established.”

The Improvement Act provides clear standards for management, use, planning, and growth of the NWRS. Its passage followed the promulgation of Executive Order 12996 (April 1996), “Management of Public Uses on National Wildlife Refuges,” reflecting the importance of conserving natural resource for the benefit of present and future generations of people. The Improvement Act recognizes that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible with the mission of the NWRS and purposes of the Refuge, are legitimate and appropriate public uses of the Refuge System.

The following policies have been developed to help guide the implementation of the Improvement Act and the administration of Refuge lands.



## **Compatibility Policy**

The Improvement Act states, “The Secretary shall not initiate or permit a new use of a Refuge or expand, renew, or extend an existing use of a Refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety.” The Improvement Act also states that “compatible wildlife-dependent recreational uses [hunting, fishing, wildlife observation and photography, or environmental education and interpretation] are the priority general public uses of the System and shall receive priority consideration in Refuge planning and management; and when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate.”

In accordance with the Improvement Act, the Service has adopted a Compatibility Policy (*Fish and Wildlife Service Manual, Part 603 FW 2*) that includes guidelines for determining if a use proposed on a NWR is compatible with the purposes for which the refuge was established. A compatible use is defined in the policy as a proposed or existing wildlife-dependent recreational use or any other use of a NWR that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes for which the Refuge was established. The Policy also includes procedures for documentation and periodic review of existing refuge uses.

When a determination is made as to whether a proposed use is compatible or not, this determination is provided in writing and is referred to as a compatibility determination. An opportunity for public review and comment is required for all compatibility determinations. Compatibility determinations prepared concurrently with a CCP are included in the public review process for the draft CCP and associated NEPA document. The Refuge has completed draft compatibility determinations for hunting, fishing, wildlife observation, photography, interpretation, and environmental education, as well as trail use and research. These compatibility determinations are available for review and comment in Appendix A.

## **Appropriate Use Policy**

Refuges are first and foremost national treasures for the conservation of wildlife. Through careful planning, consistent system-wide application of regulations and policies, diligent monitoring of the impacts of uses on wildlife resources, and preventing or eliminating uses not appropriate to the Refuge System, the conservation mission of the Refuge System can be achieved, while also providing the public with lasting opportunities to enjoy and appreciate the resources protected within the Refuge System. The Appropriate Use Policy (*Fish and Wildlife Service Manual, Part 603 FW 1*) provides a national framework for determining appropriate refuge uses and outlines the procedures refuge managers must follow when deciding if a new or existing use is an appropriate use on the refuge. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a proposed use is not determined to be appropriate, the use will not be allowed, and a compatibility determination will not be prepared.

To be considered appropriate, a proposed or existing use on a refuge must meet at least one of the four conditions described below. All uses determined to be appropriate are also reviewed for compatibility.

- 1) The use is a wildlife-dependent recreational use as identified in the Improvement Act (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in an approved refuge management plan.
- 3) The use involves the take of fish and wildlife under State regulations. (States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. Take of wildlife under such regulations is considered appropriate; however, the refuge manager must determine if the activity is compatible before allowing it on a refuge.)
- 4) The use has been found to be appropriate after considering specific criteria.

For a use to be found appropriate, the Service must have jurisdiction over the use. If the Service does not have jurisdiction over the use or the area where the use would occur, no authority exists to consider the use. In addition, use must comply with all applicable laws and regulations (e.g., Federal, State, tribal, and local). Uses prohibited by law are not appropriate. The use must be consistent with applicable Executive Orders and Department and Service policies. If a use conflicts with an applicable Executive Order or Department or Service policy, the use is not appropriate.

The use must be consistent with public safety. If a use creates an unreasonable level of risk to visitors or refuge staff, or if the use requires refuge staff to take unusual safety precautions to assure the safety of the public or other refuge staff, the use is not appropriate.

The use must be consistent with refuge goals and objectives in an approved management plan or other document. If a use, either itself or in combination with other uses or activities, conflicts with a refuge goal, objective, or management strategy, the use is generally not appropriate.

If the use has been previously considered in a refuge planning process or under this policy and was rejected as not appropriate, it need not be considered further unless circumstances or conditions have changed significantly.

The use cannot divert management efforts or resources away from the proper and reasonable management of a refuge or the implementation of a wildlife-dependent recreational use. A use, other than a wildlife-dependent recreational uses (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that diverts available resources is generally not appropriate.

The use must be manageable in the future within existing resources. If a use would lead to recurring requests for the same or similar activities that will be difficult to manage in the future, then the use is not appropriate. However, if the use can be managed so that impacts to natural and cultural resources are

minimal or inconsequential, or if clearly defined limits can be established, then the use may be further considered.

The use should contribute to the public's understanding and appreciation of the refuge's natural or cultural resources or is beneficial to the refuge's natural or cultural resources. If this is not the case, such a use would generally be considered not appropriate.

The use should be able to be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality, compatible, wildlife-dependent recreation into the future. If this is not the case, such a use would generally be considered not appropriate.

This Policy also states that if, during preparation of the CCP, a previously approved use can no longer be considered appropriate on the refuge, the reasons for this determination must be clearly explained to the public and a description of how the use will be eliminated or modified must also be provided. The documentation for both appropriateness findings and compatibility determinations are provided in Appendix C of the Final CCP.

Although a refuge use may be both appropriate and compatible, the refuge manager retains the authority to not allow the use or to modify the use. For example, on some occasions, two appropriate and compatible uses may be in conflict with each other. In these situations, even though both uses are appropriate and compatible, the refuge manager may need to limit or entirely curtail one of the uses in order to provide the greatest benefit to refuge resources and the public.

### **Biological Integrity, Diversity and Environmental Health Policy**

Section 4(a)(4)(B) of the Improvement Act states, "In administering the System, the Secretary shall . . . ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans . . ." This legislative mandate represents an additional directive to be followed while achieving refuge purposes and the NWRS mission. The Improvement Act requires the consideration and protection of a broad spectrum of fish, wildlife, plant, and habitat resources found on a refuge. To implement this mandate, the Service has issued the Biological Integrity, Diversity and Environmental Health Policy (*Fish and Wildlife Service Manual, Part 601 FW 3*), which provides policy for maintaining and restoring, where appropriate, the biological integrity, diversity, and environmental health of the NWRS. This policy provides a refuge manager with an evaluation process to analyze his/her refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, and in concert with refuge purposes and the NWRS mission, to restore lost or severely degraded resource components. Within section 3[3.7B] of the policy, the relationships among biological integrity, diversity, and environmental health; the NWRS mission; and refuge purposes are explained as follows, "...each refuge will be managed to fulfill refuge purpose(s) as well as to help fulfill the System mission, and we will accomplish these purposes(s) and our mission by ensuring that the biological integrity, diversity, and environmental health of each refuge are maintained and where appropriate, restored."

When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, an understanding of the refuge's role within an ecosystem, and the knowledge of refuge resources, applicable laws, and best available science, including consultation with resource experts both inside and outside of the Service.

The priority public uses of the NWRS are not in conflict with this policy when they have been determined to be compatible. The directives of this policy do not envision or necessitate the exclusion of visitors or the elimination of visitor use structures from refuges; however, maintenance and/or restoration of biological integrity, diversity, and environmental health may require spatial or temporal zoning of visitor use programs and associated infrastructures. General success in maintaining or restoring biological integrity, diversity, and environmental health will produce higher quality opportunities for wildlife-dependent recreational uses.

### **Wilderness Stewardship Policy**

The Wilderness Stewardship Policy, described in Part 610 FW 1 – 5 of the Fish and Wildlife Service Manual, provides an overview and foundation for implementing the National Wildlife Refuge System Administration Act of 1966, as amended, and the Wilderness Act of 1964. In the Wilderness Act, Congress called for the establishment of a National Wilderness Preservation System to secure an “enduring resource of wilderness” for the American public. Wilderness, as defined in Section 2(c) of the Wilderness Act, is an area that “. . . generally appears to have been affected primarily by the forces of nature with the imprint of man's work sustainably unnoticeable . . . has outstanding opportunities for solitude or a primitive and unconfined type of recreation . . . [and] has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition. . . .”

The Wilderness Stewardship Policy provides refuge managers with guidance on conducting wilderness reviews on Refuge System lands to determine if these lands should be recommended for wilderness designation. It also establishes policy for managing wilderness study areas and recommended and proposed wilderness. The Policy also prescribes how refuge managers will preserve the character and qualities of designated wilderness while managing for refuge establishing purpose(s).

Part 610 FW 4 of the Service Manual describes the wilderness review process, a process that must be followed when identifying and recommending for congressional designation Refuge System lands and waters that merit inclusion in the National Wilderness Preservation System. Wilderness reviews are to be conducted as part of a scheduled CCP or CCP revision, but can also be conducted at any time if significant new information becomes available, ecological conditions change (including the restoration of significant acreage to natural conditions so that area now meets the definition of wilderness), or major refuge expansion occurs. The process must include interagency and tribal coordination, public involvement, and NEPA compliance. The wilderness review conducted for the San Diego NWR as part of the CCP process is presented in Appendix L of this document.