Appendices

Appendix A: Glossary of Terms

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 Unite 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. Saprophytic 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.

Gravely 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 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 *Report of Lands Under Control of the U.S. Fish and Wildlife Service.*

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

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 "hard" 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 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 then 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 beet 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 nondomesticated 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.

Appendix B: Environmental Assessment

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Chapter 1. Purpose and Need for Action

Introduction

This draft environmental assessment (EA) has been prepared to assist the U.S. Fish and Wildlife Service (Service) in evaluating the alternatives and environmental effects of implementing a Comprehensive Conservation Plan (CCP) for San Joaquin River National Wildlife Refuge (Refuge). This assessment is being used by the Service to solicit public involvement in the refuge planning process and to determine whether implementing the CCP would have a significant effect on the quality of the human environment. This EA is part of the Service's decision-making process in accordance with the National Environmental Policy Act (NEPA).

Proposed Action

The Service proposes to implement alternative D (biodiversity alternative) as described in this EA. This alternative is described in more detail in the accompanying CCP.

Purpose of and Need for a Comprehensive Conservation Plan and EA
A plan is needed to guide Refuge management. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Act), requires that every refuge have a CCP in place within 15 years of the Acts' enactment. The NEPA requires that an EA or Environmental Impact Statement (EIS) be prepared to accompany the CCP to evaluate the effects of different alternatives which meet the goals of the Refuge and identifies the Service's preferred alternative for implementing the CCP.

This EA will be used to analyze and evaluate the environmental effects of implementing a proposed alternative management framework for the Refuge.

Project Area

The Refuge is 9 miles west of Modesto, in Stanislaus and San Joaquin Counties, California. The 12,887 acres within the approved Refuge boundary are within the historic floodplain of the confluences of the San Joaquin, Stanislaus, and Tuolumne Rivers (Figure 1). The Refuge includes wetland, upland, and riparian habitat types.

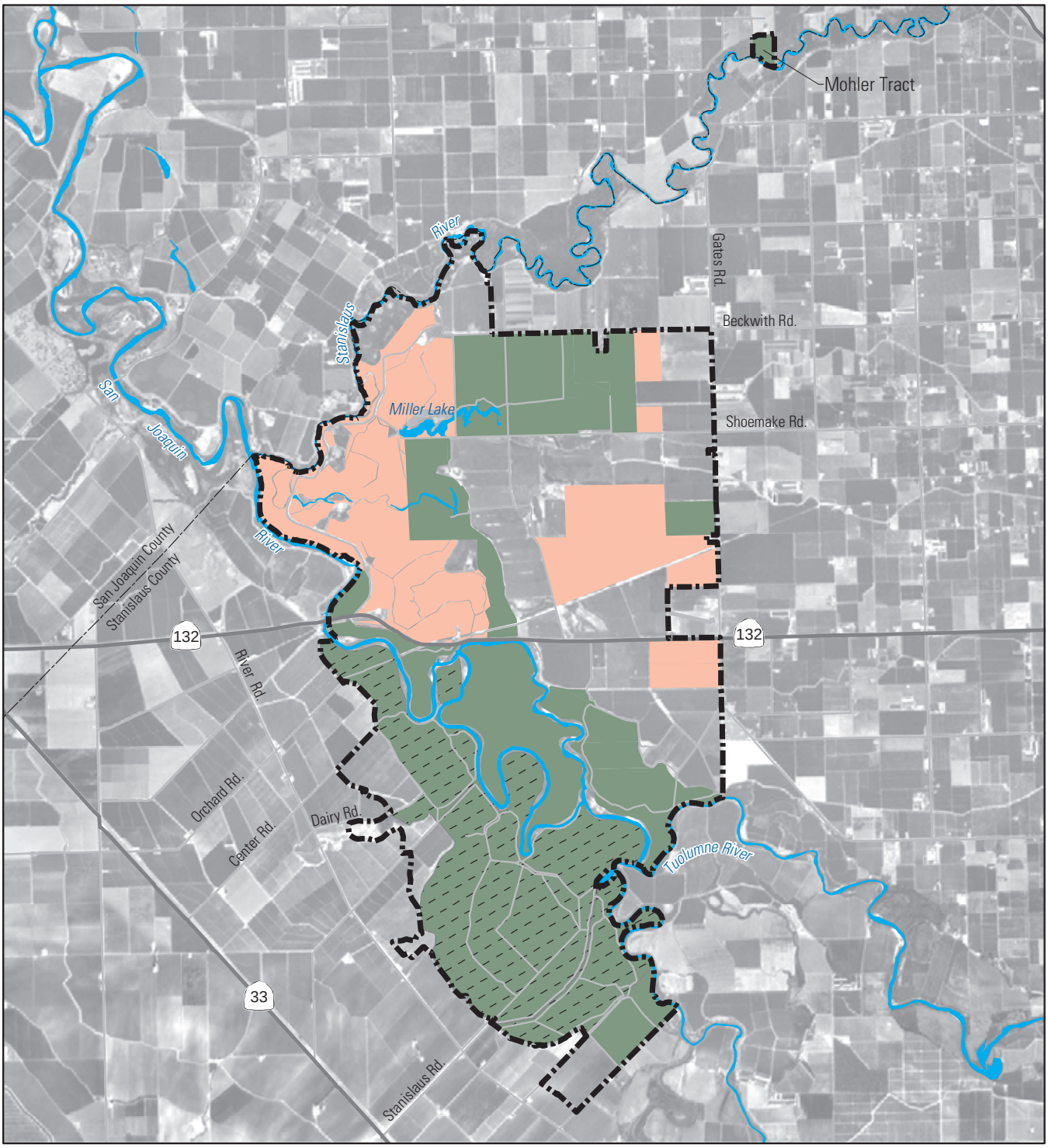
Decisions to Be Made

Based on the analysis documented in this draft EA, the California/Nevada Operations Manager must determine the type and extent of management and public access on the Refuge and whether the selected alternative would have a significant impact upon the quality of the human environment.

Issue Identification

Issues, concerns, and opportunities were identified through early planning discussions and through the public scoping process, which began with the mailing of the first planning update in March 1999. The planning team held a public open house on March 17, 1999 and a second open house on April 18, 2000. The first meeting was held to gather the public's issues and concerns about the refuge. The core planning team presented preliminary alternatives at the second meeting. In addition, Service staff held quarterly Community Forums to meet with the public and discuss concerns in further detail. Other comments were received orally from meetings and in writing. The issues, concerns, and opportunities are a compilation of information received by the Service throughout the planning process. These issues can be found in Chapter 2 of the CCP. Public scoping and involvement helped direct and provided important elements in the synthesis of the goals, objectives, and strategies found in the CCP for the proposed action and in this document for all other Alternatives.

Figure 1: Land Status



The core planning team helped to further define the issues. This core team consists of Service employees from the San Luis National Wildlife Refuge Complex, field offices, and the California/Nevada Refuge Planning Office.

The issues can be summarized by the following categories:

- Recreation and Public Use
- Refuge Staffing
- Wildlife Management and Restoration
- Flood Management
- Wetland and Water Management
- Refuge Proximity to Private Lands

Public Involvement

In a Federal Register Notice dated February 23, 1999, the Service announced that it was preparing a plan for the Refuge. The first planning update for the Refuge was released in March 1999. This update informed the public about the Refuge and Refuge planning process and announced a public workshop to identify issues, concerns, and described preliminary goals and key management areas to be discussed in the CCP and environmental assessment. The planning update also encouraged the public to provide comments and concerns about Refuge management via e-mail, phone, and US Postal Service. The second planning update, released in October 1999, described the issues, concerns, and opportunities identified at the public workshop. The third planning update released January 2000, reported on issues identified by the Community Forum.

Public input received in response to these updates, workshops and briefings is incorporated into the CCP and EA, and a summary of comments is included in Appendix C of the CCP. The original comments are being maintained in files at the California/Nevada Refuge Planning Office in Sacramento, California, and are available for review upon request.

Related Actions

Please see Chapter 1 of the CCP for a description of related actions, projects, and studies in the area.

National Fish and Wildlife Refuge System and Authorities

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

As part of this responsibility, the Service manages the National Wildlife Refuge System (System). The System is the only nationwide system of Federal land managed and protected for wildlife and their habitats. 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.

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

Refuge Purpose and Authority

The Refuge was established in 1987 to provide winter forage and roosting habitat for threatened Aleutian Canada geese, protect other species federally listed as threatened, improve and manage habitat for migratory birds, and conserve native fauna and flora. The Refuge lands encompass a mosaic of valley oak riparian forest, riverine and slough habitats, seasonal and permanent wetlands, vernal pools, natural uplands, and agricultural fields. Great potential for riparian and wetland restoration exists in the area.

The Refuge was established under the authority of the Endangered Species Act. Other Refuge lands were also acquired under the Migratory Bird Conservation Act and the North American Wetlands Conservation Act.

The Refuge is the primary wintering site of Aleutian Canada geese and protection/management of the area has been identified as a critical element in the Aleutian Canada goose recovery plan. In addition, the Refuge is a major wintering and migration area for lesser and greater sandhill cranes, snow geese, white fronted geese, and a variety of species of ducks. The riparian forest at the Refuge contains a large heron/egret rookery and provide important migration and breeding habitat for neotropical migratory landbirds. Federally listed vernal pool invertebrate have been documented within the Refuge and valley elderberry longhorn beetles may be present. The area is also a site designated for the re-establishment of the threatened riparian brush rabbit.

The Refuge purposes are:

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

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

"...For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. § 742f(a)(4) "...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. § 742f(b)(1) (Fish and Wildlife Act of 1956).

Goals of the Refuge

Five broad goals are proposed for the Refuge. They are consistent with the Refuge purpose and vision, Eco-region goals, System goals, the National Wildlife Refuge System Improvement Act of 1997, Service policy, and international treaties.

Goal 1 (Biological Diversity) Conserve and protect the natural diversity of migratory birds, resident wildlife, fish and plants through restoration and management of riparian, upland and wetland habitats on Refuge lands.

Goal 2 (Threatened and Endangered Species) Contribute to the recovery of threatened/endangered species, as well as the protection of populations of special status wildlife and plant species and their habitats.

Goal 3 (Aleutian Canada Goose) Provide optimum wintering habitat for Aleutian Canada geese to ensure the continued recovery from threatened and endangered species status.

Goal 4 (Ecosystem Management) Coordinate the natural resource management of the San Joaquin River National Wildlife Refuge within the context of the larger Central Valley/San Francisco Ecoregion.

Goal 5 (Public Use of the Refuge) Provide the public with opportunities for compatible, wildlife- dependent visitor services to enhance understanding, appreciation and enjoyment of natural resources at the San Joaquin River NWR.

Chapter 2. Alternatives

Introduction

This chapter describes four alternatives for managing the San Joaquin National Wildlife Refuge: Alternative A, Current Management; Alternative B, Wetland Focus; Alternative C, Riparian Focus; and Alternative D, Biodiversity Focus.

All four alternatives, including Alternative A, or Current Management, focus on management of the east unit of the Refuge for Aleutian Canada geese (and other geese and cranes) by maintaining roost ponds, growing grain crops and providing short-height grasslands. Table 1 shows the acreages of habitat under each alternative. Table 2 summarizes the elements of each alternative, organized by issue area. Figures 2 through 5 show the habitat management features of each alternative.

Under Alternative A, natural succession will occur on the remaining fee title lands, which are principally fallow agricultural lands. Visitor services are limited to wildlife photography/ observation from a platform.

Alternative B adds to Aleutian Canada goose management with the restoration of existing fallow agricultural lands into mostly wetland habitat and includes some riparian restoration. This alternative adds the greatest acreage of wetlands to the Refuge. The public use program would include opportunities for all of the priority wildlife dependent uses, including fishing and hunting.

Alternative C combines management for Aleutian Canada geese with conversion of fallow agricultural fields to wildlife habitat, but places greater emphasis on developing riparian habitat over wetland habitat to benefit a variety of woodland-dependent wildlife. Wildlife observation/photography trails and/or auto-tour routes along with interpretation and environmental education would be included in a public use program, but consumptive uses would be excluded.

Alternative D combines elements of all three preceding alternatives. This alternative features management of the east unit for Aleutian Canada geese and other waterfowl, but would restore both wetland and riparian habitats in proportions similar to their perceived occurrence before the land was used for agricultural purposes. Alternative D would benefit both wetland and riparian dependent wildlife in a more balanced manner than Alternatives B and C. Visitor Services under Alternative D would be the same as under Alternative B.

Proposed Action

The planning policy that implements the Improvement Act of 1997 requires the Service to select a preferred alternative that becomes its proposed action under NEPA. The written description of this proposed action is effectively the draft CCP. Alternative D is the proposed action for San Joaquin River Refuge because it best meets the following criteria.

- Achieves the mission of the National Wildlife Refuge System.
- Achieves the purposes of the Refuge.
- Provides guidance for achieving the Refuges' visions and goals..
- Maintains and restores the ecological integrity of the habitats and populations on the Refuges.
- Addresses the important issues identified during the scoping process.
- Addresses the legal mandates of the Service and the Refuges.
- Is consistent with the scientific principles of sound fish and wildlife management and endangered species recovery.

The proposed action described in this EA is preliminary. The action ultimately selected and described in the final CCP will be determined, in part, by the comments received on this version of the EA. The proposed action presented in the final CCP may or may not be the preferred alternative presented in this version; the final CCP may propose a modification of one of the alternatives presented here.

Alternative A: Current Management

The goals, objectives and management techniques described in Alternative A are common to all of the Alternatives. Under Alternative A, management would remain focused on the habitat requirements of Aleutian Canada geese. Current staffing and funding needs at the Refuge would remain the same.

Biological Diversity

Approximately 1,250 acres of agricultural lands and 350 acres of native grasslands and oak savannah uplands are managed to meet the habitat needs of sandhill cranes, arctic-nesting geese and other wildlife. In addition, 219 acres of seasonal wetlands and 750 acres of permanent wetlands are managed as habitat for migratory waterfowl, shorebirds, sandhill

Table 1. Habitat Acreages by Alternative

	Alternatives (acres)			
Habitat Cover Type	***A Current Management***	***B Wetland Focus***	***C Riparian Focus***	***D Biodiversity Focus***
Fallow Cropland / Food Plot	2,842	1,167	772	772
Permanent Wetland	342	409	385	409
Riparian	1,919	2,358	3,639	3,224
Wet Meadow	0	461	0	0
Seasonal Wetland	218	956	556	691
Irrigated Pasture	506	506	506	506
Native Pasture	372	372	372	372
Semi-Permanent Wetland	132	101	101	357
Vernal Pool	4	4	4	4
Developed	56	56	56	56
Canal/Open Water	197	197	197	197
Totals:	**6,587**	**6,587**	**6,587**	**6,587**

Table 2. Summary of Alternatives

Issues	*Alternative A—No Action/ Current Management*	*Alternative B—Wetland Emphasis*	*Alternative C— Riparian Emphasis*	*Alternative D— Biodiversity Emphasis*
Wildlife/Habitat Management				
Wetland habitat restoration	• None	• 1,927 acres	• 1,042 acres	• 1,457 acres
Riparian habitat restoration	• None	• 2,358 riparian ac	• 3,639 riparian ac	• 3,224 riparian ac
Wetland Habitat Management	• 219 ac seasonal wetland	• 510 ac perm wetlands • 1,417 ac seasonal wetland	• 486 ac perm wetlands, • 556 ac seasonal wetland	• 700 ac perm wetlands • 750 ac seasonal wetland
Riparian Habitat Management	• Limit disturbance	• 4,285 acres riparian and floodplain	• 4,681 riparian and floodplain	• Same as Alt C
Short-Grass Foraging Habitat (cranes, geese, etc)	• 1,250 acres of ag lands • 350 acres of native grasslands	• Same as Alt A	• Same as Alt A	• Same as Alt A
Invasive Plants	• Develop invasive weed management plan	• Same as Alt A	• Same as Alt A	• Same as Alt A
Develop a dependable water supply system.	• No additional water	• 30,000 acre feet per year	• 10,000 acre feet per year	• 20,000 acre feet per year
Protect Water Quality	• Ensure water supplies and wetland discharges meet Regional Water Quality Control Board standards	• Same as Alt A	• Same as Alt A	• Same as Alt A
Inventory and Monitoring-	• N/A	• Development and implement inventory and monitoring program within 3 years	• Same as Alt B	• Same as Alt B
Ecosystem Function	• Sediment control	• Restore natural processes where possible	• Same as Alt B	• Same as Alt B
Threatened and Endangered Species				
Riparian Brush Rabbit (Federal/State listed as endangered).	• Re-establish two self-sustaining populations (w/o restoration)	• Re-establish two self-sustaining populations	• Same as Alt B	• Same as Alt B
SJV Woodrat (Federal - Endangered).	• Maintain and enhance at least one self-sustaining population	• Same as Alt A	• Same as Alt A	• Same as Alt A

Table 2. Summary of Alternatives (cont.)

Issues	*Alternative A—No Action/ Current Management*	*Alternative B—Wetland Emphasis*	*Alternative C—Riparian Emphasis*	*Alternative D—Biodiversity Emphasis*
Vernal Pools	• Protect endangered vernal pool species by maintaining existing vernal pools, associated plant communities and surrounding micro-watersheds.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Sandhill Cranes	• Provide foraging and roosting habitat for greater sandhill cranes in conjunction with Aleutian Canada geese and other migratory bird management.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Fish Species-	• Work with Fisheries Agencies	• Provide/enhance habitat for listed fish species. Provide a min of 7 miles of riverine aquatic habitat, and 3,500 ac of floodplain habitat.	• Same as Alt B	• Same as Alt B
T&E Species Inventory	• Complete abundance and distribution inventory of federal and state listed T&E species. Develop management plans w/in 10 yrs.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Aleutian Canada Goose				
Short Grass Habitat	• No program expansion	• No acreage expansion	• Minimum of 500 ac of irrigated pasture and 350 ac of native grasslands as foraging habitat	• Same as Alt C
Ag Food Crops	• No program expansion	• No acreage expansion	• Minimum of 115 ac of grain corn and 430 ac of winter wheat, and 200 ac of foraging habitat.	• Same as Alt C
Roost Ponds	• No acreage expansion	• Manage existing lakes as roost and loafing habitat, and by 2010 create a 60-acre roost pond in the Christman/Colwell Fields area.	• No acreage expansion	• Manage existing lakes as roost and loafing habitat, and by 2010 create a 60-acre roost pond in the Christman/Colwell Fields area.

Table 2. Summary of Alternatives (cont.)

Issues	*Alternative A—No Action/ Current Management*	*Alternative B—Wetland Emphasis*	*Alternative C—Riparian Emphasis*	*Alternative D—Biodiversity Emphasis*
Sanctuary	• Provide 1,200 -1,400 ac of sanctuary in the East Unit.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Disease	• Minimize losses to avian cholera and other diseases.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Management Context	• Manage habitat and populations in the context of FWS post-delisting obligations and Pacific Flyway management objectives.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Ecosystem Management				
Land Conservation Within Approved Boundary	• Land acquisition (fee or easement) from willing landowners. • Maintain existing easement program	• Same as Alt A	• Same as Alt A	• Same as Alt A
Land Conservation Outside Current Boundary	• N/A	• Develop a Conservation Proposal and seek approval from the FWS director to conduct detailed planning which explores options for conserving habitat along the San Joaquin River corridor.	• Same as Alt B	• Same as Alt B
Partnerships	• Only provide information	• Create and foster partnerships with other landowners to coordinate resource management within the Ecoregion.	• Same as Alt B	• Same as Alt B
Research	• Foster Ecoregion-wide research efforts.	• Same as Alt A	• Same as Alt A	• Same as Alt A

Table 2. Summary of Alternatives (cont.)

Issues	*Alternative A—No Action/ Current Management*	*Alternative B—Wetland Emphasis*	*Alternative C—Riparian Emphasis*	*Alternative D—Biodiversity Emphasis*
Visitor Services				
Hunt Program	• N/A	• Pending restoration of wetland habitats, develop and implement a step-down hunt plan. • Provide information, parking, and comfort stations • Provide sanctuaries for Aleutian Canada Geese and ensure protection of T&E species	• N/A	• Same as Alt B
Fishing Program	• N/A	• Develop one or more walk-in car-top boat launching facilities • Develop shoreline fishing access where appropriate • Create a fishing fact sheet.	• N/A	• Same as Alt B
Wildlife Photography & Observation	• Produce & implement public use plan & finish observation platform only.	• Develop ten new public use facilities • Construct either an auto-tour route or foot-trail west of the river • Complete observation platform and kiosk • Build 2 photo blinds • Develop wildlife viewing areas • Develop interpretive materials and maps • Build a visitor info kiosk, parking lot, signs, restrooms and a trailhead at Headquarters Area	• Same as Alt B	• Same as Alt B

Table 2. Summary of Alternatives (cont.)

Issues	*Alternative A—No Action/ Current Management*	*Alternative B—Wetland Emphasis*	*Alternative C—Riparian Emphasis*	*Alternative D—Biodiversity Emphasis*
Interpretive Program	• Construct interpretive kiosks on Beckwith Road and develop interpretive materials.	• Establish eight interpretive programs, facilities or publications. • Construct interpretive kiosks on Beckwith Road and at the headquarters' visitor contact station. • Develop and provide interpretive materials.	• Same as Alt B	• Same as Alt B
Environmental Ed Program	• N/A	• Develop and implement an EE program which supports four college or university groups and 4 secondary/primary school groups per year • Develop outdoor educational facilities, restrooms, and parking. • Create an outreach program to recruit and educate teachers.	• Same as Alt B	• Same as Alt B
Public Safety	• Ensure public safety and security at the Refuge	• Same as Alt A	• Same as Alt A	• Same as Alt A
Outreach	• Develop a public outreach program.	• Same as Alt A	• Same as Alt A	• Same as Alt A
Volunteer & Friends Group	• Volunteer program only	• Develop volunteer program and friends group	• Same as Alt B	• Same as Alt B

Figure 2: Alternative A: No Action

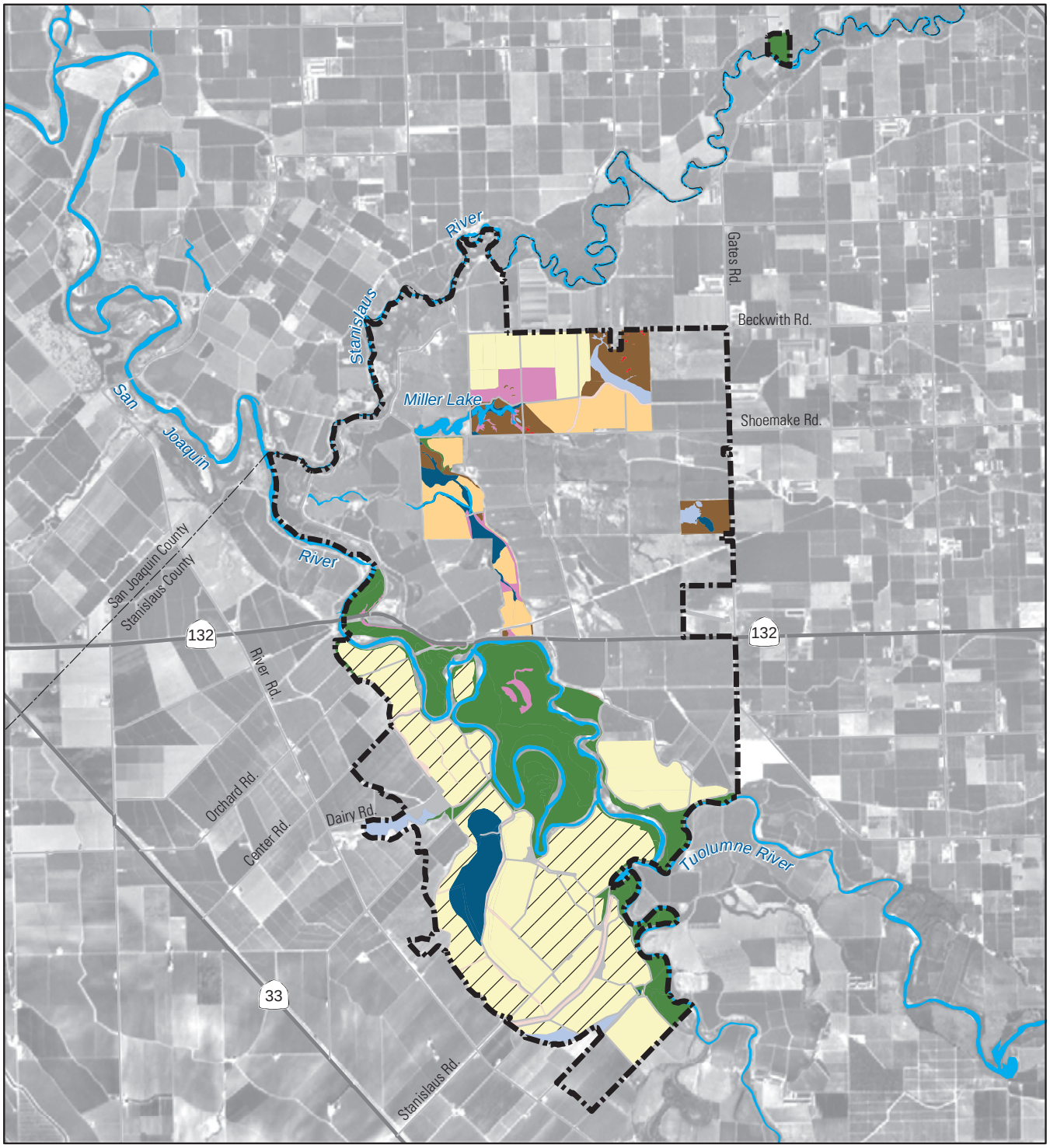


Figure 3: Alternative B: Wetlands Emphasis

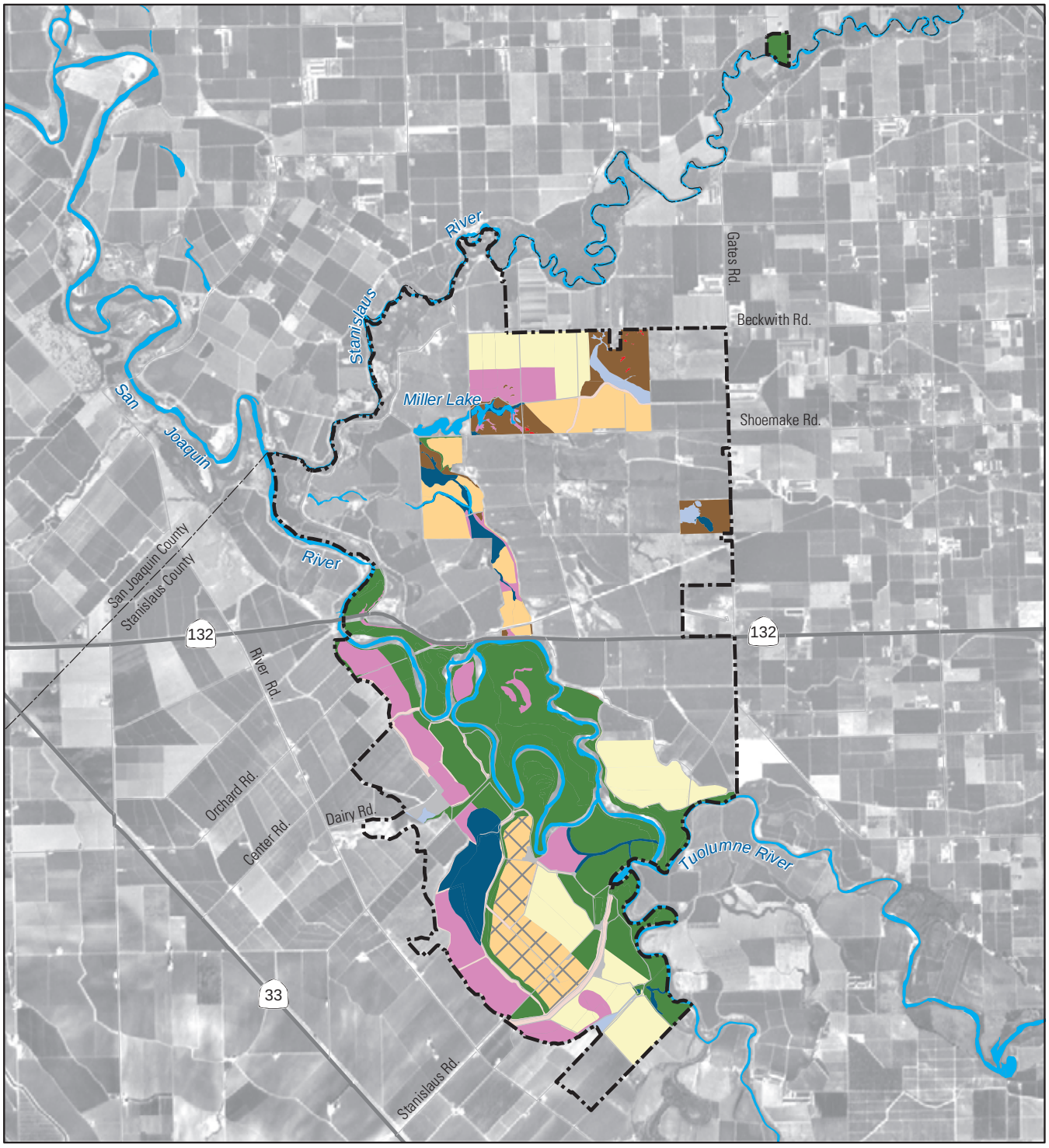


Figure 4: Alternative C: Riparian Habitat Emphasis

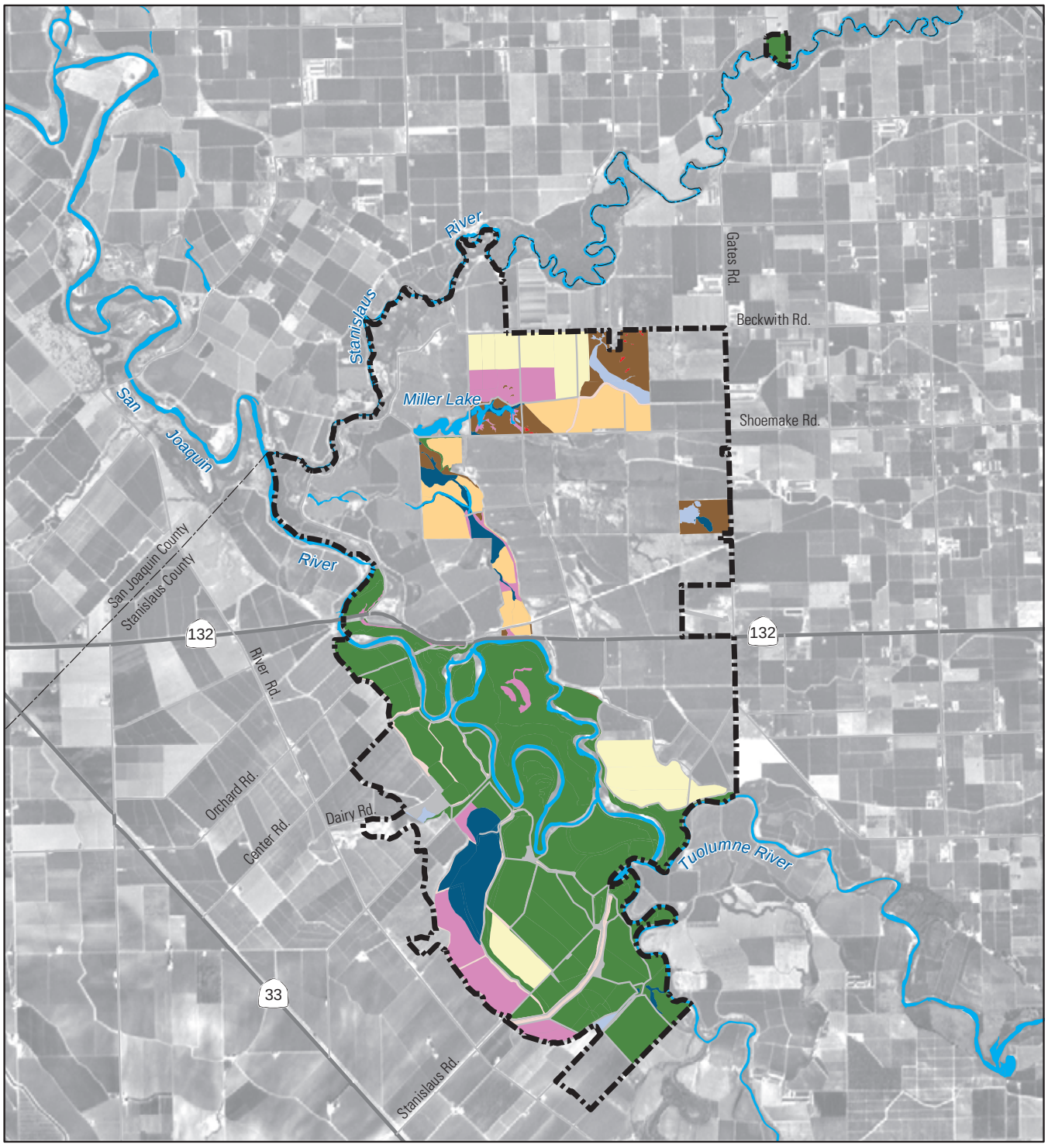
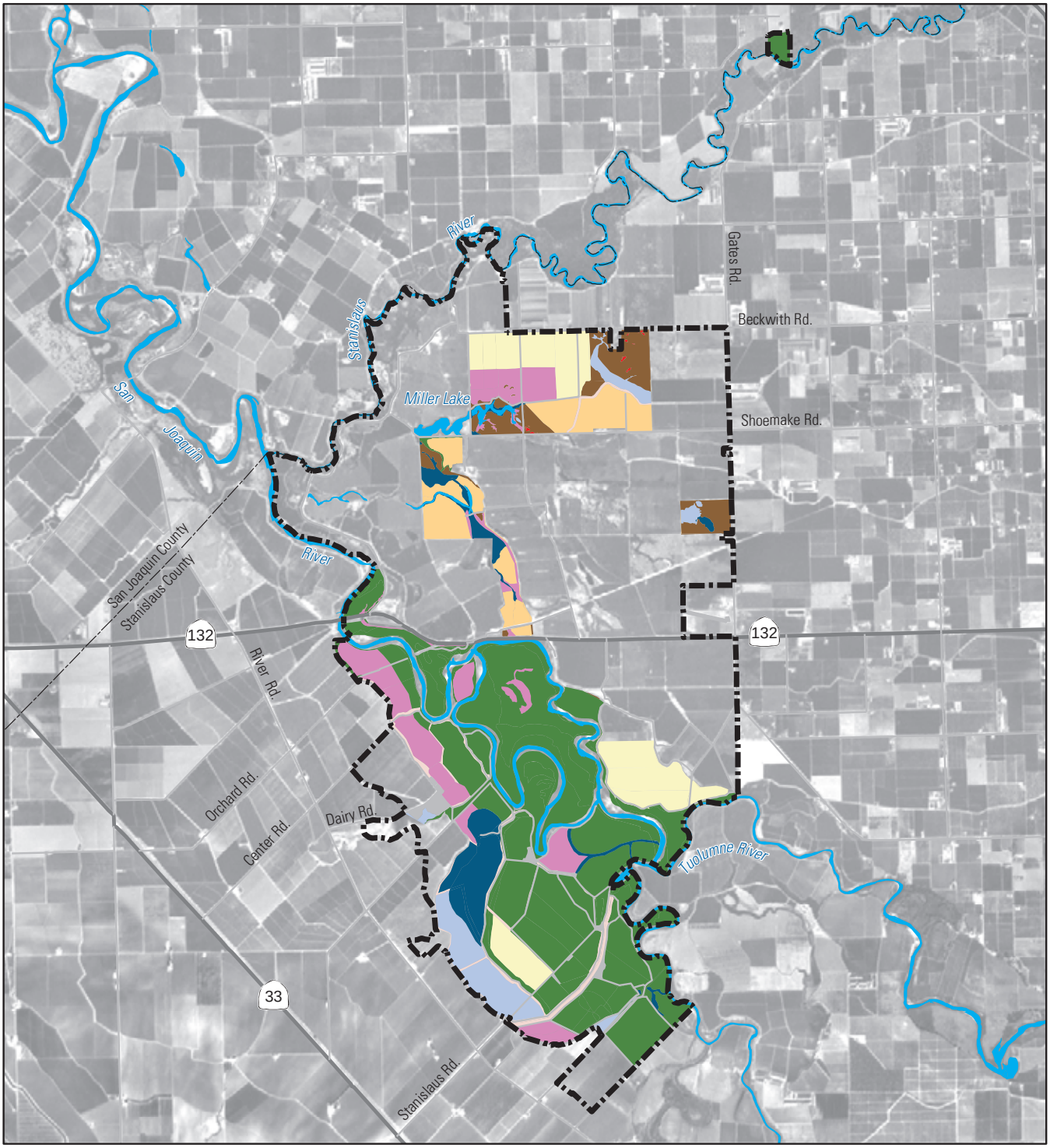


Figure 5: Alternative D: Species Diversity



cranes and other wildlife. To facilitate this management, a Wetland Management Plan would be developed along with annual draw-down and flood-up plans, and staff would record water management activities in a long-term database. No habitat restoration would take place but derelict developed lands would be cleaned up. Summer water levels would be maintained and excessive vegetation controlled in roost ponds and wetlands. Grazing would be managed to maintain short-grass forage and control invasive weeds while still providing for ground nesting birds and protecting young valley oaks. Disturbance and negative edge effects to riparian habitat would be reduced.

Regular monitoring and inventory of invasive weeds would be conducted and within two years an invasive weed management program would be developed and implemented. The refuge would continue to seek funding opportunities for controlling invasive weeds.

Within ten years, the Refuge would develop a dependable water supply and delivery system, and within four years, Refuge staff would ensure that water supplies and discharges met RWQCB standards.

The refuge would develop and implement a wildlife inventory and monitoring program within two years and integrate it with habitat and landuse GIS layers. Natural resource management research projects would be developed.

Threatened and Endangered Species
Riparian brush rabbits and San Joaquin Valley woodrats would be re-established using existing habitat. The refuge would protect vernal pool species along with their habitat and complete an abundance and distribution inventory of T&E species. Winter foraging and roost habitat would be provided for greater sandhill cranes in conjunction with Aleutian Canada geese and other migratory bird management.

Aleutian Canada Geese
The Refuge would provide optimum wintering habitat for Aleutian Canada geese to ensure their continued recovery from threatened and endangered species status. 500 acres of irrigated pasture and 350 acres of native grasslands would be managed as short-grass foraging habitat, and 115 acres of corn and 430 acres of winter wheat forage would be provided. Refuge lakes are to be managed for roost and loafing habitat, and sanctuary preserved in the East Unit by minimizing disturbance. Losses to avian cholera and other diseases would be minimized through monitoring and water quality management. Aleutian Canada goose habitat and populations would be managed in context of FWS post-delisting obligations and Pacific Flyway management objectives.

Ecosystem Management
Staff would seek to coordinate Refuge management within the context of the larger Central Valley/San Francisco Ecoregion. Under Alternative A, acquisition of new lands would be from within the approved boundary, and existing easement agreements would be managed but no new lands would be added to the easement program. Natural resource information collected at the Refuge would be available to other agencies or researchers and research opportunities would be fostered, but regional partnerships and planning would not be pursued.

Visitor Services
A public use plan would be developed within 2 years under this alternative. The wildlife observation platform and kiosk at Beckwith Road would be completed. Entrances with signs would be developed at public access points. Interpretive materials such as maps and brochures would be developed and distributed at entrance stations.

Public safety and security would be ensured at the Refuge by periodic patrols and examination of public use facilities by law enforcement staff. All wildfires would be extinguished immediately.

A public outreach and volunteer programs would be developed. Volunteers would be actively recruited, recognized in an annual event, and their tasks and projects reviewed on a quarterly basis.

Alternative B: Wetland Focus

Alternative B includes and expands on all of the Refuge management goals and techniques described in Alternative A.

Biological Diversity

Under Alternative B, 1,927 acres of wetlands and 2,358 acres of riparian habitat would be restored and/or enhanced. The West Unit, East Unit, Christman Island and Gardner's Cove area would be restored to natural habitats and enhanced. Flood control levees would be breached in cooperation with the Army Corps of Engineers and the remaining fallow agricultural lands would be restored. Restoration project proposals would be submitted to Calfed, NAWCA and other funding programs.

The Service would manage 510 acres of permanent wetlands and 1,417 acres of seasonal wetlands to meet the habitat needs of migratory waterfowl, shorebirds, sandhill cranes, and other wetland dependant wildlife. About 4,285 acres of riparian habitat would be managed to meet the needs of riparian/forest associated wildlife. The establishment of native riparian vegetation would be promoted after restoration through active methods, such as replanting, irrigation, and fencing, as well as by allowing floodwaters through levee breaches.

Oak savannah habitat would be increased where appropriate by the planting of young valley oak trees. Existing valley oaks would yet be protected from grazing as outlined in Alternative A.

In addition to the invasive weed management described in Alternative A, weeds would be controlled on the newly restored riparian habitat of the West Unit.

Under Alternative B, 30,000 acre feet of water per annum would be needed. Existing water delivery infrastructure would be upgraded and new infrastructure developed, including wells.

A habitat monitoring plan would be developed and implemented to measure the results/ impacts of restoration efforts.

Natural processes would be restored wherever possible. The natural floodplain function of Refuge lands would be facilitated through levee breaches, and the role of fire ascertained and restored. Sediment loads of waters flowing through the Refuge into the San Joaquin River would not be reduced.

Threatened and Endangered Species

In addition to the T&E species management goals outlined in Alternative A, riparian brush rabbit habitat would be enhanced or created. Migration, spawning and rearing habitat would be created or enhanced for T&E anadromous fish and other listed fish species along the San Joaquin, Stanislaus and Tuolumne Rivers. Stranding due to floodplain restoration would be minimized and fish screens installed to avoid entrapping juvenile fish.

Aleutian Canada Geese
Under Alternative B, the short-grass foraging habitat maintained in Alternative A will be increased by working with CLMA operators to temporarily flood some pastures in fall to create wet meadow conditions. Direct funding of corn production will be pursued to reduce reliance on share cropping. A new 60 acre roost pond would be added to existing roost areas in the East Unit.

Ecosystem Management
Building on the management described in Alternative A, key lands outside of the approved boundary would be considered for acquisition, particularly if they could contribute to riparian corridors. Within the approved boundary, new lands would be introduced into the easement program where appropriate. The Refuge would participate in regional planning for the conservation of T&E species and species of special concern. A Refuge Friends Group would be developed and staff would actively participate in Ecoregion-wide research projects pertaining to natural resource management issues.

Visitor Services
In addition to the activities described in Alternative A, Alternative B would expand public use at the Refuge by building an auto-tour route or trail for wildlife observation and photography on the west side of the San Joaquin River. Two photo blinds would be built along with a free-roaming wildlife viewing area at Christman Island and a visitor use area at Gardener's Cove, provided safe access can be engineered.

A visitor contact station, trailhead and headquarters area would be developed within 10 years. The headquarters/visitor area at Dairy Road would also include a parking lot, signs, restrooms and a trail. Four interpretive programs, facilities or publications would be developed over the next five years with another four to come over the following five years.

The Service would also construct one or more car-top boat launches to facilitate access from small watercraft and promote recreational angling. A recreational fishing program would be developed, both from car-top boats and from the shore. Shoreline fishing would be sited to minimize shoreline damage and conflicts with sensitive natural resources or other recreational uses. Access for recreational fishing would be developed at Gardner's Cove.

Within five years, the Refuge would develop and implement a recreational hunt program. In support of the hunt program, maps, pamphlets, comfort stations and parking lots would be developed. Sanctuary would also be provided for the protection of Aleutian Canada geese as well as for threatened and endangered species.

An environmental education program specific to the resources and goals of the Refuge would be developed and implemented under Alternative B. An outreach program to recruit teachers and promote use of the Refuge for environmental education programs would be created and outdoor education facilities necessary to accommodate school groups would be built. Partnerships with local educational groups would be fostered and school use of the Refuge expanded over the next 5 years.

A Refuge Friends Group would be established along with the volunteer program described under Alternative A.

Alternative C: Riparian Focus

Alternative C builds on the Refuge management goals and techniques described in Alternatives A and B while shifting emphasis to riparian habitat.

Biological Diversity

Under Alternative C, 1,042 wetland acres and 3,639 acres of riparian habitat would be restored or enhanced. Riparian habitat would be created and natural floodplain function restored to the Mohler tract, however, restoration of the East Unit would not take place. The West Unit alfalfa fields would also be restored to riparian forest. Riparian restoration would be prioritized with areas providing corridors from lowland to upland habitat, within the 100 year floodplain, and adjacent to existing riparian habitat receiving the highest priority. The proportions of wetland and riparian habitat being managed elsewhere in the refuge would change from Alternative B to Alternative C; 486 acres of permanent wetlands, 556 acres of seasonal wetlands, and 4681 acres of riparian and floodplain acres would be managed under Alternative C (as compared to 510 acres of permanent wetlands, 1,417 acres of seasonal wetlands, and 4,285 acres of riparian habitat managed in Alternative B).

The water supply necessary under Alternative C would amount to 10,000 acre feet per annum, otherwise all elements relating to water remain the same as in Alternative B.

Threatened and Endangered Species

Under Alternative C, the Refuge would manage threatened and endangered species according to the practices describe in Alternative B.

Aleutian Canada Geese

Aleutian Canada goose management would remain the same as under Alternative B except that existing roost pond habitat would not be expanded whereas foraging habitat would be increased. An additional 200 acres of goose foraging habitat would be converted from agricultural production and the Johnson Corral Field rank pasture rehabilitated.

Ecosystem Management

Under Alternative C, the management of Refuge natural resources within an Ecoregional context would remain the same as in Alternative B.

Visitor Services

Visitor Services under Alternative C would be the same as under Alternative B except that no recreational hunting or fishing programs would be established.

Alternative D: Biodiversity Focus

Alternative D incorporates the Refuge management described in Alternative C but seeks to equally highlight wetland and riparian habitat.

Biological Diversity

Under Alternative D, 1,457 wetland acres and 3,224 acres of riparian habitat would be restored or enhanced. Restoration and enhancement of the wetland and riparian habitat of the East Unit would occur as in Alternative B. The proportions of wetland and riparian habitat being managed would not change from Alternative C to Alternative D.

The water supply necessary under Alternative D would amount to 20,000 acre feet per annum, otherwise all elements relating to water remain the same as in Alternatives B and C.

Threatened and Endangered Species
Under Alternative D, the Refuge would manage threatened and endangered species according to the practices describe in Alternative B.

Aleutian Canada Geese
Aleutian Canada goose management would remain the same as under Alternative B, including the expansion of existing roost pond habitat.

Ecosystem Management
Under Alternative D, the management of Refuge natural resources within an Ecoregional context would remain the same as in Alternative B.

Visitor Services
Visitor services under Alternative D would be the same as under Alternative B.

Chapter 3. Affected Environment

Chapter 3 of the CCP provides a detailed description of the affected environment for San Joaquin River Refuge.

Chapter 4: Environmental Consequences

Overview of NEPA Analysis Parameters

This chapter describes the direct, indirect, and cumulative impacts of the four alternatives. The purpose of this analysis is to provide the *context* and *intensity* of the impacts of the action, such that a determination of significance can be made by the deciding official.

In 1978, the Council on Environmental Quality promulgated regulations for implementing NEPA. These regulations include a definition of *significantly* as used in NEPA (40 CFR 1508.27). The elements of this definition are critical to reducing paperwork through use of a Finding of No Significant Impact (FONSI) when an action will not have a significant effect on the human environment and is therefore exempt from requirements to prepare an environmental impact statement (EIS). *Human environment* is a comprehensive phrase that includes the physical and natural environments and the relationship of people with those environments. Many of the analyses focus on the different resource areas such as; air quality, water quality, wildlife, vegetation, recreation, and others. It is important to note that for each of these criteria all of these resources, or human environments, have been considered.

The significance of an action must be analyzed in several contexts, such as the whole of society (e.g., ethical considerations, national interests); affected region; affected interests; and locality. Significance varies with the setting. In the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

The regional context of the action alternatives is the San Joaquin River Basin . Even in a local context, the action alternatives would not pose significant short- or long-term effects. The action alternatives are designed to minimize and avoid adverse impacts to the extent that such impacts are less than significant, even at the local level.

Intensity refers to the severity of impact.

The No-Action alternative (Alternative A) provides a baseline reference point against which to compare and describe the other action alternatives. Discussions of the action alternatives (Alternatives B, C and D) follow each discussion of No Action.

Many of the impacts related to breaching the levees and the associated periodic flooding have been discussed as part of the Environmental Assessment PL 84-99 Levee Rehabilitation Reclamation District 2099, produced by the U.S. Army Corps of Engineers, Sacramento District, July 1997. This document is hereby incorporated by reference and is available for review at the main office of the San Luis National Wildlife Refuge Complex, Los Banos, CA. Summaries of the impacts are reflected in the discussions below under each resource type.

Air Quality

All alternatives require standard management activities, including mowing, disking and tilling. These activities cause periodic increases in fugitive dust and vehicular emissions from the construction equipment. Additionally, the action alternatives (B, C, and D) all include construction activities to support restoration efforts. These types of activities would comply with the standards set forth by the San Joaquin Valley Air Pollution Control District (SJVAPCD), including Rule 8021 for fugitive dust.

Alternatives B, C and D wouldresult in an increase in vehicular emissions due to increased visitation. Alternative D would have the greatest increase because it provides the broadest spectrum of visitor activities. Currently, minimal vehicle emissions are the result of visitation because the Refuge is closed to the public, and only limited tours are allowed. However, highway 132, a two-lane highway that has fairly high traffic, traverses the Refuge. While the specific number of new visitors is not known, additional emissions as a result of visitor use of the Refuge would not be expected to be significant.

All of the alternatives include the use of prescribed fire as a tool to manage noxious weeds, reduce fuels, or simulate natural disturbance regimes (only the action alternatives are using fire to restore ecosystem processes). Burning the fuels would temporarily increase PM10 concentrations. Prior to conducting a burn, a prescribed burn plan would be prepared and a burn permit would be obtained from SJAPCD. Close coordination with SJAPCD during the planning would result in an appropriate prescription, and conditions that would minimize the smoke impacts of the burn. Mitigation measures, including smoke management practices applicable to prescribed fire, would be detailed in the prescribed fire plan prepared before each fire.

Soils and Geology

Common to all Action Alternatives

All of the alternatives include land disturbing construction activities. These include removal of abandoned buildings and debris sites, restoration grading, tilling and planting activities.

Breaching the levees and restoring a more natural flooding regime would restore and regenerate the soils. This action would allow deposition to occur on areas previously protected by the levees. This would cause an accumulation of organic materials. It also has the potential to accumulate contaminants from the river water. However, because Refuge soils would only be inundated during flooding events when contaminants of concern (selenium, boron, pesticides and herbicides, electrical conductivity) would be in their lowest concentrations, the effects on soil health are expected to be minimal. Additional effects are discussed in Environmental Assessment PL 84-99 Levee Rehabilitation Reclamation District 2099, produced by the U.S. Army Corps of Engineers.

Alternative A
There are minimal effects on soils and geology under the no action alternative. These are associated with normal operation and maintenance, using equipment to grade, plant and provide access will compact and disturb soils.

Alternatives B, C, D
These alternatives will create and maintain wetlands, as well as plant riparian vegetation; differences lie in the number of acres devoted to each community (see table 1 for comparison of acres). Soils, which had previously been exposed year round, will now be flooded for part to all of the year. This will alter soil development in these areas, increasing anaerobic activities. Additional areas will be heavily planted to create riparian communities; this will decrease insulation affecting soil temperature; it will also provide a source for organic materials.

Topography, River Geomorphology, and Drainage

Alternative A
Under the no action alternative the levees would be allowed to breach through failures rather than active breach creation. This will affect the location and timing of breaches such that they may not occur at a desirable location for future drainage, or be timed to assist the restoration of wetland and riparian communities. This may reduce the potential that floodplains and secondary channels will establish, reducing the beneficial fluvial effects.

Alternatives B, C, D
All of the action alternatives restore periodic flooding which would, over time, produce a more typical fluvial system including side channels, adjacent wetlands, and filtration.

The action alternatives include excavation, creation of elevated earthen mounds, and breaching of the levees. The topography over which these actions occur is generally flat with only a few sources of flowing water. These actions are expected to have minimal water quality impacts through erosion. Alternative B creates the greatest wetland area through excavation of depressions; Alternative C creates the most riparian area through planting.

Flood Management and Water Quality

Alternative A
Under the no action alternative, no active, planned breaching would occur; however, the levees will not be maintained, and breaching would be expected to occur at some point in the future. It is not known whether this would occur during the expected lifetime of the plan. Most of the effects of an uncontrolled breaching would be similar to those described under alternatives B, C, D below. Exceptions are that under a failure breach, more erosion would be expected, and the locations of the breach(es) may not be conducive to post-inundation drainage.

Alternatives B, C, D
Breaching the levees would allow adjacent fields (formerly floodplains) to be inundated. Lands formerly protected by these levees would experience more frequent flooding. This is desirable on the Refuge lands as a natural process. Since all of the levees that would be breached have not been maintained, and were not going to be maintained in the future, breaching would be expected to occur at some point. A designed and controlled breaching would reduce the chance of a flood event that would be typical of a levee failure, and produce a more gradual inundation. Furthermore, because the locations are planned, habitat restoration and planting would help stabilize the flood entry point.

This action could compromise the adjacent un-breached areas of the levee, and increase erosion during flood episodes. However, effects would be short-term and limited in area and are not considered significant as the levee remnants are not functionally for flood control.

The San Joaquin River is known to have contaminants that would be undesirable in the Refuge's wetlands. With the restoration of normal flooding regimes through levee breaches, the Refuge would not have control over the quality of the water that inundates the area during these flood events (every 5 to 10 years). Some contaminants in the San Joaquin River would be more dilute during the flooding period while others would have increased concentrations. Dissolved contaminants such as selenium and total salts would have reduced concentrations, while suspended sediments would increase.

Over the period of the plan it is expected that the action alternatives would result in an improvement of water quality in the San Joaquin River. As riparian areas and floodplains are restored, side channels and deposition areas would develop, reducing fine sediments in the river. The new floodplains could act as water storage to help reduce downstream flooding. These beneficial impacts would be localized, and have minimal impacts on the greater San Joaquin system.

Vegetation

Common to all Alternatives

The action alternatives place varying emphasis on management of different habitat types. They would all provide positive vegetation impacts, in that there would be an increase in species diversity, a decrease of non-native species components, and restoration of conditions that approach historical ecosystem components. All of the action alternatives restore riparian communities on what had been fallow croplands. This would expand the existing riparian corridor, and increase the biodiversity of these acreages. All alternatives include measures to reduce the chance of noxious weed establishment (see description in Chapter 2: Alternatives). Additional differences between alternatives are depicted in Table 1.

Alternative A

Under the no action alternative, a large portion of the Refuge would continue to be composed of fallow croplands or food plots (2,842 acres). These lands have a low diversity of species, most of which are non-native species. These sites are also the most likely to provide sources for the invasion of noxious weed species into adjacent natural communities.

Other habitats are represented under this alternative; however, it has the least amount of wetland acreage (692 acres). Wetlands are a highly diverse and productive habitat, which is desirable given that one mission of the Refuge is to encourage and maintain the re-establishment of the Aleutian Canada goose.

Alternative B

This alternative focuses on the wetland component of the Refuge. It also increases the amount of cropland, to support the many migratory waterfowl that would use the various types of wetlands. The focus on wetlands results in less area available for riparian communities; none-the-less, it still provides an increase of riparian habitat over alternative A. Compared to existing conditions, alternative B would add 67 acres of permanent wetland, 461 acres of wet meadow, 738 acres of seasonal wetland, and 439 acres of riparian. The alternative would reduce semi-permanent wetland by 31 acres. These increases in wetland and riparian habitats are significant, given that the Central Valley/San Francisco Bay Ecoregion has lost 94% and 89% respectively of its wetlands and riparian woodlands to human development (Schoenherr 1992).

Alternative C
This alternative focuses on the expansion of riparian habitat. It almost doubles the amount of riparian cover over alternative A, adding 1,720 acres. The alternative also adds 43 acres of permanent wetland and 338 acres of seasonal wetland.

Alternative D
This alternative attempts to optimize the diversity of communities, while still providing adequate croplands to support migrating waterfowl. It has a large focus on riparian, with 866 more acres than alternative B and 1,305 more acres than alternative A. Alternative D adds 67acres of permanent wetland and 473 acres of seasonal wetland to existing conditions. It also adds 225 acres of seasonally flooded wetlands on the southern edge of the Refuge, in areas that are currently fallow cropland.

Wildlife and Fish

Common to All Alternatives
Under all alternatives, the Service would continue to allow the Turlock and East Side Mosquito Abatement Districts to monitor and control mosquitoes on the Refuge. The typical monitoring and control period is April through November. The mosquito species targeted on the Refuge are *Culex erythrothorax*, *C.pipiens*, *C. tarsalis*, *Orahlerdatus dorsalis*, *O. melanimon*, *O. nigromaculis*, and *Aedes vexans*. The agent used most frequently to treat mosquitoes on the Refuge is *Bacillus thuringiensis israelensis* (Bti). The bacterium Bti is a microbial insecticide that, when ingested, is toxic to mosquitoes, black flies and several other members of the nematocera suborder within the order diptera. Methoprene, an insect growth regulator, is also used. It interferes with the normal maturation process of mosquitoes.

The intact Bti toxin is not active against vertebrates (Boisvert and Boisvert 2000). The greatest susceptibility are within a few families of invertebrates: culicidae (mosquitos), simuliidae (black flies) and chironomidae (midges); with mosquitoes and black flies being the most susceptible (Boisvert and Boisvert 2000). Laboratory and field studies have shown that Bti is toxic to some larval chironomids, but many factors, such as temperature, water depth, aquatic vegetation, and suspended organic matter, reduce its toxicity to chironomids in the environment (Charbonneau *et al*. 1993; Merritt et al. 1989). Chironomids are an important part of the diet of pintail and green-winged teal, especially after January (Euliss and Harris 1993). However, during the fall and early winter when most mosquito control on San Joaquin River Refuge occurs, pintail and teal feed mostly on seeds. Methoprene kills mosquito larvae during emergence. However, it is not as specific as Bti (Breaud *et al*. 1977). Studies have shown deleterious effects of methoprene on aquatic beetles (Norland and Mulla 1975), and backswimmers (Miura and Takahashi 1974), but low toxicity to other organisms such as zooplankton (Niemi *et al*. 1999; Miura and Takahashi 1973).

Alternative A
Lack of fish screens would affect fish, including native species such as fall run Chinook salmon, steelhead and Sacramento splittail, during the times when lift pumps are operated to provide water to the managed wetland areas. If breaching occurs, there would be an increased likelihood of fish stranding, because post-flooding drainage has not been planned.

Alternative B,C,D
All of the action alternatives would place fish screens on all lift pumps that provide water to the Refuge from the adjacent rivers. As a result, the potential for fish entrapment in the pumps machinery would be reduced.

The levee breaches and corresponding floodplain restoration would increase spawning habitat for some native species such as Sacramento splittail. Additionally, it would provide rearing habitat for many salmonid species. These seasonally flooded habitats are important and rare, with the majority of upstream and downstream river being channelized, with very narrow to non-existent floodplain. These habitats have the potential to cause stranding as floodwaters recede. However, this impact can be minimized through careful design.

Wildlife would benefit through the increase of native habitats. Riparian and wetland habitat both provide high species diversity. Riparian wildlife that would benefit range from neotropical migrant birds to reptiles including a variety of snakes and lizards and small mammals such as rabbits and rodents. The wetland habitat expansion would benefit migrating waterfowl, various amphibian species, and water-dependent mammals such as beaver, muskrat and otter. These two habitat types are rare outside of the Refuge; all of the action alternatives would expand the existing habitat. The main wildlife benefits would be for riparian associated species, and migratory species.

Endangered and Threatened Species

Common to All Action Alternatives

The effects of levee breaching are common to all of the action alternatives. These effects have been discussed as part of the Environmental Assessment PL 84-99 Levee Rehabilitation Reclamation District 2099, produced by the U.S. Army Corps of Engineers. This document has been incorporated by reference and should be used as the source for a detailed discussion of these effects and mitigations.

It was found that only three of the species that were listed or proposed for listing were likely to be impacted by the levee breaching activities. These were valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Aleutian canada goose (*Branta Canadensis leucopareia*), and the Sacramento splittail (*Pogonichthys macrolepidotus*). Measures were incorporated into the project design to minimize the impacts for all of these species. A changed condition since the EA was written is the Sacramento splittail is no longer a listed species.

Alternative A

Currently, all endangered and threatened species gain some benefit from the habitats available within the Refuge. However, portions of the Refuge consist of less valuable habitats such as fallow croplands.

Alternative B

This alternative provides the greatest amount of wetland habitat, which in turn benefits the species associated with this habitat. This includes Aleutian Canada goose and sandhill crane, and could include the giant garter snake in the future. There is an increase in riparian habitat over alternative A, but less than with alternative C. The riparian habitat expansion would benefit the San Joaquin Valley woodrat, the bald eagle, Swainsons hawk and the Valley elderberry longhorn beetle. It could also provide habitat for new populations of the riparian brush rabbit and the yellow-billed cuckoo. This alternative also converts some of the fallow cropland into active food plots to support select wetland-associated migratory species, including the Aleutian Canada goose .

Alternative B proposes to add a hunting program at the Refuge. While the step-down hunting program would be developed to minimize risk to Aleutian Canada geese, this public use would pose some risk of accidental take of the geese. However, these effects should be minimized by hunter education activities.

Alternative C
This alternative provides the greatest amount of riparian habitat, which in turn benefits the species associated with this habitat (see the discussion above for alternative B). This includes the riparian brush rabbit, and riparian woodrat. As the riparian area expands, elderberry shrubs would increase in number. This expansion should increase the numbers of valley elderberry longhorn beetle on the Refuge. There is an increase in wetland habitat over alternative A, but less than with alternative B. As indicated above for alternative B, wetland expansion at the Refuge would benefit a number of protected species, including Aleutian Canada goose, sandhill crane, and possibly the giant garter snake. There is no change in vernal pool habitat

Alternative D
This alternative provides an increase in riparian habitat, greater than either alternative A or B, but less than alternative C. It also provides an increase in wetland habitat greater than either alternative A or C, but less than B. The inclusion of hunting under this alternative does pose some risk to endangered and threatened species, primarily the Aleutian Canada goose. The potential for accidental take would be the same as described for alternative B above.

Cultural Resources
Common to All Alternatives
The Refuge lands consist chiefly of a modified landscape; including laser leveled fields and constructed levees. Construction and restoration activities do have the potential to locate undiscovered cultural resources. If any previously unrecorded cultural resources were discovered during this action, all project-related activities would cease immediately and the consultation process as outlined in Section 800.13 of the Advisory Council on Historic Preservation's regulations (36 CFR 800) would be initiated.

Visitor Services
There is good access to the Refuge; highway 132 bisects the Refuge, and at least some of the facilities for visitors would be located off this highway. This exposure would help to increase visitation to the remaining areas of the Refuge as allowed.

The various alternatives explore a range of visitor services, from little public access, to trails, auto tour routes, boat use, hunting and fishing. Currently, visitation is low, limited to a few groups and an unknown amount of incidental or unauthorized visitation. Once the Refuge allows public access, visitation would be expected to increase. Some visitation already occurs under the current management, and public have requested additional access. The amount of increase is not known, however Alternatives B and D would be expected to have the greatest increases because they provide the widest range of public opportunities.

Alternative A
This alternative limits visitor services to a single wildlife observation deck. No other facilities would be provided, or uses allowed.

Alternative B
This alternative provides a variety of wildlife dependant visitor services that focus on wildlife observation. Supporting facilities include foot trails, an auto tour route, informational kiosk, restrooms, a parking lot, photography blinds, and maps. This alternative also includes the establishment of a hunting and fishing program on the Refuge. This alternative has the greatest potential to increase the visitation to the Refuge, across the widest variety of user groups.

Alternative C
This alternative has the same visitor service program as alternative B but would not include a hunting and fishing program.

Alternative D
This alternative has the same visitor service program as alternative B.

Socioeconomics
The action alternatives would all increase visits to the Refuge; this could benefit the local economy and local employment if visitors utilized local businesses (e.g., gas stations, markets, and restaurants). Additionally, the increased visitation provides an opportunity for public education, which can foster value for these native habitats.

The loss of farmland is an issue in the San Joaquin Valley; all of the action alternatives would convert fallow croplands to native wetlands and riparian areas. Most of the losses occurring in the valley are related to human development, and convert cropland into human infrastructure. This type of land conversion is not considered reversible, whereas native wetlands and riparian areas can be converted back into productive croplands if desirable.

No actions would have negative impacts on low-income, disadvantaged, or minority populations.

References

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Appendix C: Public Scoping & Involvement Process

The Planning Process

The planning process followed for the development of this CCP was guided by the Refuge Planning Chapter of the Fish and Wildlife Manual (Part 602 FW 2.1, November 1996) and evolving policy related to the Refuge System Improvement Act of 1997. Key steps have included: (1) preplanning, (2) identifying issues and developing vision; (3) gathering information; (4) analyzing resource relationships; (5) developing alternatives and assessing environmental effects; (6) identifying a preferred alternative; (7) publishing the draft plan; 8) documenting public comments on the draft plan; (9) preparing the final plan; (10) securing approval of the Regional Director; and finally (11) implementing the plan. The life-span of the plan is 15 years, but the Service will review the CCP periodically. The CCP may be amended as necessary at anytime under the adaptive management strategy.

A series of planning updates were used to inform the public of the CCP Process and potential refuge operations. These updates were a forum to announce upcoming public workshops and meetings, as well as update the public on the progress the CCP team was making. These updates were mailed to interested and affected parties.

The Refuge held quarterly Community Forum Meetings to develop components of the draft plan, identify issues, concerns, and opportunities, and update the public on refuge operations. The first planning update for the Refuge was released in March 1999 . This update informed the public about the Refuge and Refuge planning process and announced a public workshop to be held to identify issues, concerns, and described preliminary goals and key areas of management focus to be discussed in a management plan and environmental assessment. The planning update also encouraged the public to provide comments and concerns about Refuge management via e-mail, phone, and US Postal Service.

In a Federal Register Notice dated February 23, 1999, the Service announced that it was preparing a plan for the Refuge. The second planning update, released in October 1999, described the issues, concerns, and opportunities identified at the public workshop. The Refuge held quarterly Community Forum Meetings during this time. The third planning update released January 2000, reported on issues identified by the Community Forum.

The Draft CCP and EA will be distributed to Refuge partners, adjacent landowners, government agencies, local jurisdictions, community groups and private citizens. The final CCP, EA and planning update are scheduled for release in 2003. The CCP will begin implementation following approval and the signing of the documents.

The CCP will be reviewed by Refuge staff while preparing annual work plans and updating the Refuge Management Information System (RMIS) database. RMIS is a master database that contains refuge realty information, operation needs, maintenance needs, as well as CCP schedules. It may also be reviewed during routing inspections or programmatic evaluations. Results of the reviews may indicate a need to modify the plan. The periodic review of the objectives and strategies is an integral part of plan implementation, and management activities may be modified if the desired results are not achieved. If minor changes are required, the level of public involvement and NEPA documentation will be determined by the Project Leader. The CCP will be formally revised about every 15 years.

Public Involvement

Four planning updates for the Refuge were sent from a mailing list of over 400 individuals, groups, and agencies in March 1999, October 1999, January 2000, and March 2000. A public open house was held on March 17, 1999 and another on April 18, 2000. The purpose of the meetings were to gather information on the issues and concerns that the public had with the Refuge and refuge management. An additional open house was held on 16 November 1999. The purpose of this meeting was to share the draft alternatives developed by the core planning team and to solicit comments from scientists regarding these draft alternatives.

In a Federal Register Notice dated February 23, 1999, the Service announced that it was preparing a plan for the Refuge. The first planning update for the Refuge was released in March 1999. This update informed the public about the Refuge and Refuge planning process and announced a public workshop to be held on March 17, 1999 to identify issues, concerns, and described preliminary goals and key areas of management focus to be discussed in a management plan and environmental assessment. The planning update also encouraged the public to provide comments and concerns about Refuge management via e-mail, phone, and US Postal Service.

The second planning update, released in October 1999, described the issues, concerns, and opportunities identified at the public workshop. The Refuge holds quarterly Community Forum Meetings. The third planning update released January 2000, reported on issues identified by the Community Forum.

The draft CCP and EA are scheduled for release in 2003. Public input received in response to these updates, workshops and briefings is incorporated into the CCP and EA, and a summary of comments is included in Chapters 2 and 4 of the CCP. The original comments are being maintained in planning team files at the California/Nevada Refuge Planning Office in Sacramento, CA, and are available for review upon request.
The Draft CCP and EA will be distributed to Refuge partners, adjacent landowners, government agencies, local jurisdictions, community groups, and private citizens. A public workshop will be scheduled to solicit comments and to provide answers to questions on the draft documents.

Detailed Listing of all Issues, Concerns, and Opportunities and Service Responses to Each Item

Issues, concerns, and opportunities were identified through early planning discussions and through the public scoping process, which began with the mailing of the first planning update in March 1999 The planning team held a public open house in March 1999 and a second open house in April 2000. The first meeting was a scoping meeting held to gather the public's issues and concerns about the refuge. The Core team presented preliminary alternatives at the second meeting. In addition, Service staff held quarterly Community Forums to meet with the public and discuss concerns in further detail. Other comments were received orally from meetings and in writing.

The following issues, concerns, and opportunities are a compilation of information received by the Service throughout the planning process:

Wildlife Management and Restoration:

One person stated that they support the concept of multiple use land management and considered cattle and cropping to be compatible with wildlife. They wanted the Service to consider strongly any decision to discount cattle on the Refuge. Others felt that the

Refuge's primary concern should be wildlife and that the Refuge should remain focused on what attracted geese and waterfowl to the area in the first place before making improvements. Others felt that the Refuge should have an interest in permanent wetlands in addition to other habitat types. Also, dairies to the east are concerned about crop depredation. One person suggested that the Refuge consider the reintroduction of Tule elk. Lastly, a comment was made that any environmental restoration that would involve levee breaching in the new Refuge land west of the San Joaquin River must consider potential fish entrapment.

One individual strongly advised the Service to pursue screening water diversions by the West Stanislaus Irrigation District to prevent fish from entering into the irrigation pumps and dying. Another suggested that the operator of the 262 cfs pump should screen their diversion on the new Refuge property to prevent fish entrainment and mortality and that the operator should be able to fund the screen to release them from their responsibility of their unscreened diversion.

A duck club operator expressed that the Refuge was causing a disruption of waterfowl distribution because waterfowl would tend to migrate toward the Refuge, where there is no hunting, and abundant food.

Concern was expressed about the restoration of the new Refuge addition. Sacramento River Partners, a nonprofit organization, has been hired by the Refuge to prepare a pre-restoration plan for the new Refuge lands west of the San Joaquin River. This plan has subsequently been sent to the USDA Natural Resources Conservation Service for review.

Visitor Services (Recreation and Public Use):
Several comments were raised about public use. Many people felt that the Service should preserve the Refuge for wildlife and people to enjoy and that the Service should provide access which would provide something there for the people. It was felt that people would want to protect and support the Refuge if the Service provided them with access and educated them. One person felt that no public camping should be allowed at the Refuge, with the possible exceptions of the Boy Scouts and educational groups.

Several people were concerned about the impact of visitors on the adjacent landowners. One individual said that an observation tower may bring in too many people. Another comment that the Service shouldn't let too many people into the Refuge and that the Refuge should be kept as private as possible in the near term. Another commented that the Service should monitor public use. Local landowners have expressed that Refuge public access should not be located near private residences.

Several people requested access to the Refuge, especially at Christman Island. Others wanted the Refuge to provide interior access where compatible with sensitive species and allow access to the river to show and educate students about the river and Refuge. Others requested canoeing access.

Members of the public suggested many non-consumptive activities and facilities, including a docent program so that volunteers could be trained to provide tours for adults, students, and families. Others requested that the program with the outdoor recreation specialist and school groups be allowed to continue to provide opportunities for community building and environmental education. Others requested birding and photography opportunities in the form of maps that identify good areas for these activities that minimize bird disturbance but provide viewing opportunities. Requested facilities include photography blinds with

north, east, and west camera ports and a visitor education center needed. However, it was requested that the visitor center be located away from any houses.

Comments were made that were in favor and against hunting. Some felt that the Service should minimize hunting and promote non-consumptive activities such as catch and release fishing. Other individuals requested that there be no hunting on the Refuge, "even of birds."

Others wanted the Refuge to include hunting opportunities, including waterfowl and upland game and felt that local support would increase if hunting were considered. One individual expressed concern that Refuge operations affects waterfowl distribution by attracting waterfowl away from hunting clubs onto the Refuge. Members of the Old Fisherman's Club members expressed concern that the Service will acquire the club or limit their activities. However, the land on which the club is located is owned by the Lyon's family, who have said that they weren't interested in selling the land, and the Service is not interested in acquiring it.

Refuge Staffing:
Members of the community said that they would feel better if one consistent person were available at the Refuge to communicate with, such as a full time Refuge Manager and that they would like to see continuity of Refuge management as well as an operational budget for the Refuge. Another individually felt strongly that the plan was like putting the cart before the horse and that the Service should not develop CCP before a manager is in place for the Refuge. A request was made for staff presence on weekends for public access

Flood Management:
Some people offered support for Non-Structural Agreement (NSA). The Refuge staff expressed concern that the Corps has not signed their agreement to implement its portion of the NSA. Congressman Condit's representative stated that their number one priority is the adjacent landowners' desire to complete the NSA flood control project with the Corps. One individual felt that dredging San Joaquin River was not an appropriate method of flood control. Another was concerned about flood control at Red Bridge slough. Other landowners are concerned about flood control and their ability to continue to drain across the Refuge's newly acquired property on the west side of the San Joaquin River.

Modesto Irrigation District (MID) pays to operate Miller Lake pumps to prevent flooding in winter. Water is pumped into river when the water in Miller Lake is high, otherwise, Miller Lake water flows by gravity into the river. One individual expressed concern over who would pay for the pumping in the future and questioned whether MID or the Service would pay for the pumping or would the area flood instead.

Wetland and Water Management:
One individual expressed concern that winter water storm drainage of probably poor quality drains from Modesto into Miller Lake. Another was concerned about the impacts of poor quality water from upstream on the Refuge and wondered what the Refuge would do to avoid attracting waterfowl to a site with poor water quality on the Refuge.

Concern was expressed by a Community Forum participant that water management on the new Refuge lands west of the San Joaquin River was causing a rise in the groundwater level. Adjacent landowners expressed concern that an elevated groundwater level would make the lands surrounding the Refuge more difficult to farm. Refuge staff informed those attending the Community Forum that a letter had been sent to adjacent landowners requesting permission to establish observation wells on lands adjacent to the Refuge. These observation wells would monitor groundwater levels.

Refuge Proximity to Private Lands:
Adjacent landowners are concerned that the Refuge will curtail their abilities to operate and use their lands. They are concerned that the Refuge will limit their use of chemicals, require adjacent landowners to have buffers, and/or fill their fields with endangered species. Landowners were also concerned about trespassing from the Refuge onto their property. Adjacent farmers to the west are concerned about additional restrictions on them that may be placed on them because of their proximity to the Refuge.

Public Issues Pertaining to All Alternatives

There are certain issues addressed by the public that would remain consistent under all alternatives of the Environmental Assessment. The following describes issues and concerns received by the Service throughout the planning process, that will be addressed separately from the above:

Land Protection and Boundary Expansion:
Several people at the public workshop and in letters expressed a desire for the Refuge to expand its boundary as did other agencies and programs within the U.S. Fish and Wildlife Service such as the Anadromous Fish Restoration Program. Landowners outside the current Refuge boundary, up to several miles south of the Refuge, expressed an interest in either selling an easement on their property or selling their property in fee to the Service. Also, Stanislaus County is interested in complementing San Joaquin River NWR with mitigation banking proposal.

Transportation:
California Department of Transportation (Caltrans) has been investigating the expansion and realignment of State Highway 132 since the 1980's. One person commented that they did not want a freeway. Others complained about the danger of Highway 132, including people driving 65 - 100 mph, passing on double yellow lines, and 2 accidents per month at the intersection of Gates and 132. One person said that the Refuge should construct pullouts along 132, however others commented that Highway 132 is not safe for a pull out because traffic moves so fast. Another individual commented that it was very helpful to close Page Road because it resulted in much less traffic in the area.

Mosquito Abatement:
At one of the community forums, Turlock Mosquito Abatement District (TMAD) and East Side Mosquito Abatement District (ESMAD), were concerned that they will be unable to control mosquitoes produced on the Refuge the way they traditionally do. The Districts expressed their concern that people within their Districts may be exposed to mosquito-transmitted diseases. The Community of Grayson is concerned that mosquito levels will be higher than they have been in the past, should TMAD and ESMAD not be allowed to control mosquitoes in the traditional way on the Refuge.

U.S. Fish and Wildlife Service Staff Key Issues

The following key issues, concerns and opportunities were identified during the planning process by FWS Staff:

Wildlife Management and Restoration:
Refuge staff commented that Aleutian Canada goose, anadromous fish, and other former and current endangered species should receive a high level of consideration in the CCP process. Goose flyway management and control of nonnative weeds, such as *Arundo* will continue to be an important issue for the Service.

Fish have a tendency to be come entrapped by unscreened diversions, adversely affecting fish resources.

Avian cholera is a disease that affects the birds on the Refuge. If it is uncontrolled, this disease has the potential to decimate the waterfowl population on the Refuge, including the Aleutian Canada geese. Furthermore, waterfowl using the Stanislaus County sewage treatment plant located about seven miles southeast of the Refuge are especially in danger of contracting avian cholera due to the high concentrations of birds using the area.

Nonnative weeds on the Refuge adversely affect native plants.

Recreation and Public Use:
The Service recognizes public access as an important issue to address in the CCP and sees uncontrolled access, or trespassing as an issue for the Refuge and adjacent landowners.

Refuge staff noted that they would like to avoid locating visitor facilities near adjacent private residences.

Refuge staff have expressed that the hunting on the Refuge may not be of sufficient quality or quantity to justify a hunting program. Refuge staff have also expressed that fishing access must be controlled to prevent trespassing on other parts of the Refuge.

Refuge Staffing:
The lack of a Refuge Manager has been an ongoing issue. Law enforcement continues to be an issue for FWS staff with vandalism, illegal dumping of hazardous waste, trespass, theft included on the list of crimes committed at the Refuge.

Flood Management:
The Service is concerned that the Corps' non-structural alternative for levees be implemented as soon as possible.

Wetland and Water Management:
The Service is concerned about the water quality of the San Joaquin River since it has been designated as a water quality impairment area. The river carries a high load of sediment from the steeper gradient of the incoming Stanislaus and Tuolumne rivers which are sometimes exacerbated by human activity. The sediment carries contaminants.

The Service is also concerned that the Refuge has sufficient reliable water supply and rights for habitat management.

Agricultural drainage has presented challenges for the Refuge. When the Refuge acquired the properties west of the Stanislaus River, it acquired two drainage systems that provide drainage for about 8,000+ acres of agricultural lands. The first system drains through what was formerly the Hagemann property. Agricultural lands southwest of the Hagemann property formerly drained through ditches running through the Hagemann property. Originally, these waters drained to the river with a gravity drainage system. Water would pool in Upper White Lakes, a low spot on the Hagemann property. Sometime in the 1930's or 1940's, a drainage system was constructed that allowed Upper White Lakes to drain via tile drains, and the drainwater was pumped into the San Joaquin River. The pumping lowered the water table enough so that the Upper White Lakes area could be farmed. After the Refuge acquired the Hagemann property, the pumps which drain agricultural water into the San Joaquin River broke, resulting in a rise in the water table. Since the flooding of Upper White Lakes was beneficial for wildlife, the Refuge opted to replace the

pump drainage system to the original gravity drainage system. Nevertheless, adjacent landowners (Chunn and Bettencourt) complained that the increased water table adversely affected their farms. Neighbors are also concerned about their ability to continue to drain across the Refuge's newly acquired property, particularly Chunn, Tosta, NASCA, Lopes and Bettencourt.

The Refuge inherited another drainage system north of the Hagemann system when it acquired the Lara, Hagemann, and Vierra properties. Hospital Creek provides drainage into the San Joaquin River for properties north of Ingram Creek, all of which are in the West Stanislaus Irrigation District (WSID). Hospital Creek has a tendency to accumulate silt. In the summer 1999, silt accumulation blocked a culvert, causing water to back up in Hospital Creek, flooding an adjacent landowner. Although WSID is responsible for clearing Hospital Creek, the Refuge opened a gate from Hospital Creek onto Refuge property so that Refuge, rather than private agricultural lands, would flood. The arrangement suited the farmer. However, the mosquito population in these temporarily flooded Refuge lands increased, drawing the attention of the local mosquito abatement district and the community of Grayson.

Refuge Proximity to Private Lands:
FWS staff are concerned about land use changing on properties adjacent to the Refuge.

FWS Staff Issues Pertaining to All Alternatives

There are certain issues addressed by FWS staff that would remain consistent under all alternatives of the Environmental Assessment. The following describes issues and concerns received by the Service throughout the planning process, that will be addressed separately from the above:

Land Protection and Boundary Expansion:
Refuge staff have identified land acquisition as a beneficial and necessary tool for managing wildlife. However, other entities may have an issue with converting farmland to wildlife habitat.

Transportation:
Caltrans is investigating the expansion and realignment of State Highway 132. Refuge staff are concerned that the realignment and expansion of State Highway 132 realignment does not harm the Refuge.

Mosquito Abatement:
Same as public issues. A memorandum of understanding (MOU) is currently being developed by the Service with ESMAD and TMAD and should be completed. In response to a request from TMAD and ESMAD, the MOU and CCP will provide a written plan of Refuge management activities.

Refuge Opportunities

Although there are may issues facing the Refuge, there are also opportunities. There are many opportunities to work with other entities. Through CALFED, restoration and land protection opportunities exist. The Anadromous Fish Restoration Program has funding to acquire land, but no funding or authority for management. They have approached the Refuge on several occasions to partner and manage lands that they acquire. The nonstructural project with the Corps provides the Refuge staff an opportunity to combine

flood management with environmental restoration. The Endangered Species Recovery Program is also working with the Refuge to create habitat for the listed riparian brush rabbit and riparian wood rat. The Natural Resources Conservation Service's Wetlands Reserve Program has been working with the Service on land protection and is active in the Merced area with Refuge expansion. The Nature Conservancy has also agreed to assist the Refuge with land protection (Mapes Ranch). The Sierra Club (observation platform), Safari Club (interpretive panels), and Ducks Unlimited (Page Lakes expansion) have participated in Refuge construction projects and may continue to do so. Audubon continues to provide political support for the Refuge.

There are also opportunities to open the Refuge to a variety of public uses, including volunteerism. With so many entities, such as the Sierra Club, and Old Fisherman's Club, interested in the Refuge, there is a large pool of potential volunteers.

Appendix D: Compatibility Determinations

COMPATIBILITY DETERMINATION for Recreational Waterfowl Hunting on the San Joaquin River National Wildlife Refuge

Use Considered: Recreational Waterfowl Hunting

Refuge Name:

San Joaquin River National Wildlife Refuge—a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The Refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

The San Joaquin River National Wildlife Refuge would establish a recreational waterfowl hunt program for the public. No hunting activity is presently allowed at the San Joaquin River NWR. A waterfowl hunt program similar to programs at other Central Valley National Wildlife Refuges would be established and developed after significant progress in habitat restoration, particularly wetlands, on the refuge has been accomplished and the necessary infrastructure for a waterfowl hunt program has been developed. It is expected that this will occur within the first five years of the CCP.

Hunting is identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Other priority wildlife-dependent public uses identified by the Act include fishing, wildlife observation, photography, environmental education and interpretation. Hunting would be permitted on designated areas of the refuge, pursuant to the conditions of a cooperative agreement with the State of California, Department of Fish and Game, during the established state waterfowl hunting season. The Refuge would remain closed to all other forms of hunting and target shooting.

Before any hunt program is opened at the Refuge a waterfowl hunt plan and associated compliance documents will be developed. This plan will outline any proposed program including season, hunt areas, hunter carrying capacity, and procedures. Associated with the plan will be an environmental assessment to meet NEPA compliance which will address impacts to the environment and community. Interested individuals and agencies will have the opportunity for input into the plan and to comment on any proposed hunt program. Any waterfowl hunt program developed will conform to state and federal regulations and be similar to existing waterfowl hunt programs at other National Wildlife Refuges in the Central Valley of California.

Availability of Resources:

Adequate funding and staff exist to manage a waterfowl hunt program at the San Joaquin River NWR. To facilitate this use, the Refuge can provide adequate staff which includes administrative, managerial, biological, and when available, a refuge law enforcement officer to perform hunter compliance enforcement. Due to changes in Service policy regarding refuge law enforcement personnel, there may be times when a trained Service law enforcement officer (LEO) will not be available on the refuge in a full time capacity. When this is the case, LEO's from other refuges will be detailed to the refuge to provide the necessary patrol activities. Additional law enforcement can be provided by California Department of Fish and Game wardens and on occasion, Fish and Wildlife Service special agents.

The California Department of Fish and Game (CDFG) will likely provide employees to administer any waterfowl hunt program including staffing any hunter check station for the processing of hunters and monitoring of game taken. Public hunt programs on other NWRs in California are administered cooperatively with the California Department of Fish & Game under the provisions of a Cooperative Agreement last amended in 2001. This agreement details the responsibilities and costs associated with the implementation of the hunt program on each refuge and provides a detailed list of costs to be reimbursed to the Service by the State. Some of the cost items listed for reimbursement include: signs, brochures, permit compliance, access control, maintenance of the check station, blinds, and parking lots, and administrative functions such as managerial, biological and clerical support. In addition to staffing the hunter check station and performing refuge clean-up duties, the CDFG staff also

perform all refuge sign posting tasks as directed by the Refuge Manager to conform with current habitat conditions.

Anticipated Impacts of the Use:

The proposed hunt program will be limited to waterfowl, coots, and moorhens only within portions of the wetland areas of the refuge. Sportsmen associated with this activity may disturb or harm both target and non-target migratory birds but only in some riparian, and wetland habitats on the refuge. Hunters may accidentally take non-target migratory birds due to misidentification, however, this is rare and usually reported to refuge or CDFG staff by other hunters. A certain level of self enforcement is expected by the refuge hunters. Select numbers of waterfowl belonging to target species would be taken by hunters each season, but this is not expected to result in significant adverse effects on their populations. Hunting regulation frameworks which include hunting limits are established annually through the adaptive harvest management process which includes factors such as anticipated hunter harvest of waterfowl. These guidelines are proposed for the Pacific Flyway and the State establishes hunting limits which fall within these framework guidelines.

Litter discarded by refuge visitors including sportsmen could entangle wildlife or possibly be ingested, resulting in death or injury. Litter control will be a major emphasis item in the routine maintenance of the refuge public use areas. Trash cans and restrooms will be provided year round in parking areas for use by the public while involved in wildlife observation, photography, education, interpretation as well as hunting.

Additional potential impacts to resident and migratory wildlife include the trespass of hunters outside the established hunt zone and dogs harassing wildlife. The hunt area will be patrolled on shoot days and refuge employees performing routine work also actively watch for hunters outside of their assigned areas. While hunter trespass may cause a temporary disturbance to wildlife in the immediate vicinity of the activity, this violation is deemed rare and wildlife temporarily displaced have large areas closed to hunting in which to seek refuge. Dogs have not generally been observed harassing wildlife at other refuges with hunt programs and are normally kept under close control by the hunters themselves.

Public Review and Comment:

Public review and comment was sought during the initial phases of the comprehensive conservation planning process for the San Joaquin River NWR. The public was provided the opportunity to review and comment on current and potential refuge programs as part of the Comprehensive Conservation Planning process for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. Main topics of public interest were visitor access and appropriate recreational or educational uses of the refuge. Some public comments expressed interest in a waterfowl hunt program at the refuge. A step-down public use plan or recreational hunt plan and supporting environmental assessment will be developed for any recreational hunt program at the San Joaquin River NWR. During this process, input will be sought from the public regarding proposed public use activities and hunting at the refuge.

Determination (check one below):

____ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

- When the draft Comprehensive Conservation Plan is finalized a Public Use Plan and/or a refuge Hunt Plan will be developed as a step down along with associated compliance documents from the CCP that will provide management guidelines for operation of the refuge hunting program.

- Fallow agricultural lands at the refuge will be restored to natural habitats before public use facilities/programs are fully developed.

- All refuge rules and regulations must be followed unless otherwise excepted, in writing, by project leader.

- All laws applicable to any refuge hunting program included in the Code of Federal Regulations and the State of California Fish and Game Code will be enforced. Law enforcement patrols will be conducted on a routine basis in cooperation with California Department of Fish and Game wardens to ensure regulation compliance and the protection of Refuge resources. The Refuge will increase law enforcement patrols when staff is available, particularly during opening weeks of waterfowl hunting season, to document hunter use and ensure compliance with Refuge and California regulations

- For any developed refuge hunt program, regulatory directional signs, as well as maps, will clearly mark hunting areas (free roam and blind site units), closed areas, and available parking lots. Additional pamphlets at the refuge headquarters will provide further information including special season restrictions, California, and refuge regulations. Signs will be maintained and replaced on an as needed basis.

- When a recreational hunt program is established, annual monitoring of waterfowl hunter use and impacts will continue to be implemented. The information gathered will be used to review and possibly revise hunting regulations to enhance the quality and safety of the Refuge's hunting program, and ensure hunting would continue to be compatible with the refuge purpose and the mission of the National Wildlife Refuge System.

Justification:

The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Recreational waterfowl hunting by the public at the San Joaquin River NWR as indicated in this determination is compatible with the purposes for which the refuge was established. Hunting is a high priority public use for the National Wildlife Refuge System.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Literature Cited:

Williams, B.K. and F.A. Johnson, 1995. Adaptive Management and the Regulation of Waterfowl Harvests. The Wildlife Society Bulletin, Vol. 23(3):430-436.

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Recreational Fishing on the San Joaquin River National Wildlife Refuge

Use Considered: Recreational Fishing

Refuge Name:

San Joaquin River National Wildlife Refuge—a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

The San Joaquin River National Wildlife Refuge would establish a recreational fishing program for the public. No fishing activity from the refuge is presently allowed at the San Joaquin River NWR, however, the San Joaquin, Tuolumne and Stanislaus Rivers, which are all navigable waters, extend across the refuge and it is legal for boaters to fish in these waters without accessing them through the refuge. A recreational fishing program on the

refuge would include developing several bank sites where sportsmen could fish and a small boat launch area where they could launch watercraft. This program would be established and developed after significant progress in habitat restoration on the refuge has been accomplished and the necessary infrastructure for a fishing program has been developed. It is expected that this will occur within the first five years of the CCP.

Recreational fishing is identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Other priority wildlife-dependent public uses identified by the Act include hunting, wildlife observation, photography, environmental education and interpretation. Fishing would be permitted on designated areas of the refuge

Before any fishing program is opened at the refuge a public use plan and associated compliance documents will be developed. This plan will outline any proposed program including locations, roads, public carrying capacity, and procedures. Associated with the plan will be an environmental assessment to meet NEPA compliance which will address impacts to the environment and community. Interested individuals and agencies will have the opportunity for input into the plan and to comment on any proposed public use program. Any recreational fishing program developed will conform to state and federal regulations and be similar to existing fishing programs at other National Wildlife Refuges in the Central Valley of California.

Availability of Resources:

Adequate funding and staff exist to manage a recreational fishing program at the San Joaquin River NWR. To facilitate this use, the Refuge can provide adequate staff which includes administrative, managerial, biological, and when available, a refuge law enforcement officer to perform compliance enforcement. Additional law enforcement can be provided by California Department of Fish and Game wardens and on occasion, Fish and Wildlife Service special agents.

Anticipated Impacts of the Use:

Short-term impacts for the recreational fishing program will be associated with the establishment of fishing sites, parking lots and a boat launch facility. These short-term impacts include increased noise from construction activities, an increase in the number of vehicles and people on the refuge, and soil disturbance where signs, posts and the boat launch are situated. Wildlife will likely avoid areas where work is being conducted but are expected to resume normal activities and patterns when these facilities have been completed. Once these facilities are in place, we expect that terrestrial and aquatic animals will continue to use the fishing sites and surrounding areas.

Long-term impacts will be associated with the construction of a parking lot(s), boat launch facility, signs, and use of the roads. These include loss of habitat, increase in manmade permanent structures, and increased use by the public. The creation of the parking lots will result in the permanent loss of less than two acres of introduced grasses and will not impact any sensitive, threatened, or endangered plant or animal species. Terrestrial and burrowing animals will be displaced by this action but are expected to continue to use the area. The increase in permanent structures will add a vertical and human-made component to an otherwise natural and relatively flat environment. Disturbance to wildlife will be increased for select species at and along the developed facilities. The major anticipated impact of these activities is disturbance of wildlife and trampling of plants. However, the disturbance to wildlife including migratory birds will be minimal by keeping sportsmen confined to

specific areas for fishing and confining their movement across the refuge to specific trails/ roads.

Public Review and Comment:

Public review and comment was sought during the initial phases of the comprehensive conservation planning process for the San Joaquin River NWR. The public was provided the opportunity to review and comment on current and potential refuge programs as part of the Comprehensive Conservation Planning process for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. Main topics of public interest were visitor access and appropriate recreational or educational uses of the refuge. Few public comments were received regarding fishing at the refuge. A step-down public use plan including a section on a recreational fishing program and supporting environmental assessment will be developed for any recreational fishing program at the San Joaquin River NWR. During this process, input will be sought from the public regarding proposed public use activities at the refuge.

Determination (check one below):

____ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

- When the draft Comprehensive Conservation Plan is finalized a Public Use Plan including a section on recreational fishing will be developed as a step down along with associated compliance documents from the CCP that will provide management guidelines for operation of the refuge fishing program.

- Fallow agricultural lands at the refuge will be restored to natural habitats before public use facilities/programs including recreational fishing are fully developed.

- All laws applicable to any refuge fishing program included in the Code of Federal Regulations and the State of California Fish and Game Code will be enforced. Law enforcement patrols will be conducted on a routine basis in cooperation with California Department of Fish and Game wardens to ensure regulation compliance and the protection of refuge resources.

- For any developed refuge fishing program, regulatory directional signs, as well as maps, will clearly mark fishing areas, closed areas, and available parking lots. Additional pamphlets at the refuge headquarters will provide further information including special fishing restrictions, California, and refuge regulations. Signs will be maintained and replaced on an as needed basis.

- When a recreational fishing program is established, annual monitoring of angler use and impacts will be implemented. The information gathered will be used to review and possibly revise the fishing program to enhance the quality and safety of the refuge's fishing program, and ensure fishing would be compatible with the refuge purpose and the mission of the National Wildlife Refuge System.

Justification:

The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Recreational fishing by the public at the San Joaquin River NWR as indicated in this determination is compatible with the purposes for which the refuge was established. Fishing is a high priority public use for the National Wildlife Refuge System.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Wildlife Observation, Nature Interpretation and Photography on the San Joaquin River National Wildlife Refuge

Use Considered: Wildlife observation, nature interpretation, and photography uses by the public.

Refuge Name:

San Joaquin River National Wildlife Refuge - a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

At the present time, public opportunities for wildlife viewing, nature interpretation and photography at the San Joaquin River NWR are limited to the wildlife observation deck off of Beckwith Road. However, once habitat restoration projects on the refuge have progressed converting fallow agricultural land to native habitats, additional public

use facilities will be developed for increased public use for wildlife observation, nature interpretation and photography similar to the facilities at the San Luis NWR and Merced NWR. These facilities will include nature trail(s), auto tour route (if feasible), interpretive panels, observation platforms, comfort stations, benches, waste receptacles, photography blinds and parking lots. Only portions of the refuge will be open to public use, other sections will be closed to public use to limit disturbance to select habitats and wildlife. A public use plan will be developed to guide the implementation of an expanded public use program at the refuge. This plan will be developed by the staff of the San Luis National Wildlife Refuge Complex working in conjunction with the FWS's Regional Office along with local partners and the public.

Once facilities are developed, access to the refuge will be daily from 2 hour before sunrise to 2 hour after sunset. The current estimate of public use at the Refuge is 1,500 per annum, however, with the development of additional facilities, use is expected to increase to approximately 50,000 per annum - similar to other refuge units in the Central Valley. The majority of this use would occur from autumn through spring coinciding with bird migrations, waterfowl/waterbird use of wetland habitats, and spring vegetative green-up. Lesser use is expected during the summer months when conditions are dry and daytime temperatures are high. Visitors will have use of the facilities for wildlife observation, nature interpretation and photography during the approved hours and seasons which are set by the Refuge Manger.

Availability of Resources:

Adequate funding and staff exist, are available or are attainable for the San Luis National Wildlife Refuge Complex to conduct and expand a public use program involving wildlife viewing, interpretation and photography at the San Joaquin River NWR.

Initial costs would include the preparation or construction of the following: trails, auto tour route (if feasible), interpretive panels, observation platforms and blinds, benches, comfort stations, parking lots, access gates, signage, and brochures. The project can be completed in phases with each phase consisting of individual trails. Annual maintenance costs will involve trail and parking area maintenance, entrance road maintenance, cleaning and maintenance of comfort stations, refuse removal, periodic maintenance of wooden structures (i.e., benches, platforms and blinds), and repair/replacement of signs and gates.

Anticipated Impacts of the Use:

Short-term impacts will be associated with the establishment of the trails (and auto tour route if feasible) and observation platform. These short-term impacts include increased noise from construction activities, an increase in the number of vehicles and people on the refuge, and soil disturbance where signs, posts and the observation platforms/blinds are situated. Wildlife will likely avoid areas where work is being conducted but are expected to resume normal activities and patterns when these facilities have been completed. Once these facilities are in place, we expect that terrestrial animals will continue to use the trail corridors and surrounding areas.

Long-term impacts will be associated with the construction of a parking lot(s), observation platform(s), signs, and use of the trail(s)/tour route. These include loss of habitat, increase in manmade permanent structures, and increased use by the public, especially from autumn through spring. The creation of the parking lots will result in the permanent loss of less than two acres of introduced grasses and will not impact any sensitive, threatened, or endangered plant or animal species. Terrestrial and burrowing animals will be displaced by this action but are expected to continue to use the area. The increase in permanent

structures will add a vertical and human-made component to an otherwise natural and relatively flat environment. Disturbance to wildlife will be increased for select species along the nature trail(s), observation platforms/blinds, kiosks, and parking areas. The major anticipated impact of these activities is disturbance of wildlife and trampling of plants. However, the disturbance to wildlife including migratory birds will be minimal if the stipulations listed below are followed. Trampling of plants and erosion of sensitive habitats from this activity are minimized by only allowing public access to a trail/tour route system.

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 for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. A main topic of public interest for many individuals was the opportunity for public use at the refuge specifically wildlife viewing, nature interpretation, and photography. The vast majority of individuals indicated a preference for these activities to occur on the refuge. Some landowners adjacent to the refuge preferred that public use activities occur away from refuge boundaries to preclude potential trespassing problems on private lands.

Determination (check one below):

____ Use is Not Compatible

__X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following conditions apply to ensure compatibility of these activities with the refuge's primary purpose: 1) a public use plan for the refuge with public input is completed for the facility along with compliance documents, 2) restoration of fallow agricultural land is restored to native habitats before public use facilities are developed, 3) wildlife and habitat surveys (with an emphasis on key trust species) are conducted and the results reviewed by refuge staff to check for negative trends in wildlife/habitat use associated with public use activities, 4) monitoring visitor use to accurately gauge use levels, 5) periodic and random law enforcement patrols, 6) adequate signage indicating Service regulations and refuge public use policies, and 7) reduction of elements of this public use program if it is ascertained that wildlife or habitat is being negatively impacted..

Justification:

Wildlife observation, nature interpretation, and photography are public uses that will allow the visiting public to enjoy, experience, and learn about native wildlife, plants and habitats. Since the majority of the land near and adjacent to the refuge has been highly modified and converted to agriculture, opening these trails/tour route on a regulated basis will provide wildlife-dependent recreational opportunities for the public. All three of these uses (i.e., wildlife observation, interpretation and photography) are considered priority public uses for the National Wildlife Refuge System. This program will confine the visiting public to designated trail systems for a quality experience while leaving the majority of refuge land free from disturbance for wildlife. Concerns about the protection of native plants and animals, and the overall integrity of the wetland and upland habitats, require that public access be limited to select designated areas (i.e., contact stations, trails, parking lots, etc.) which will permit other portions of the refuge to provide sanctuary areas (i.e., free of

disturbance) to wildlife resources (Burger 1981). The stipulations listed above will protect migratory birds from disturbance on the refuge.

Limited public access and restrictions will reduce the likelihood of adverse long-term impacts to plant and wildlife resources. The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. A public use program featuring wildlife observation, nature interpretation and photography by individuals or small groups will not negatively impact the natural resources at the San Joaquin River NWR as indicated in this determination and these programs are deemed compatible with the purposes for which the refuge was established.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Literature Cited:

Burger, J. 1981. The effect of human activity on birds at coastal bay. Biol. Conserv.; 21: 231-241).

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Environmental Education on the San Joaquin River National Wildlife Refuge

Use Considered: Environmental education programs for the public.

Refuge Name:

San Joaquin River National Wildlife Refuge - a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

Environmental education programs at a refuge provide opportunities for the visiting public to learn about and experience native wildlife and their habitats. At the present time, environmental educational opportunities for the public at the San Joaquin River NWR are limited to the wildlife observation deck off of Beckwith Road. However, once habitat

restoration projects on the refuge have progressed in converting fallow agricultural land to native habitats, additional public use facilities will be developed for increased public use for wildlife observation, nature interpretation and photography similar to the facilities at the San Luis NWR and Merced NWR. These facilities will include nature trail(s), auto tour route (if feasible), interpretive panels, observation platforms, comfort stations, benches, waste receptacles, photography blinds and parking lots. These facilities will also be used for environmental education programs both those performed by schools and the refuge. Only portions of the refuge will be open to public use including environmental education, other sections will be closed to public use to limit disturbance to select habitats and wildlife. A public use plan including environmental education programs will be developed to guide the implementation of an expanded public use program at the refuge. This plan will be developed by the staff of the San Luis National Wildlife Refuge Complex working in conjunction with the FWS's Regional Office along with local partners and the public.

Once facilities are developed, access to the refuge will be daily from 2 hour before sunrise to 2 hour after sunset. The current estimate of public use at the Refuge is 1,500 per annum, however, with the development of additional facilities, use is expected to increase to approximately 50,000 per annum - similar to other refuge units in the Central Valley. It is expected that between 5,000 and 10,000 visits to the refuge per annum will be for environmental education. The majority of public use would occur from autumn through spring coinciding with bird migrations, waterfowl/waterbird use of wetland habitats, and spring vegetative green-up. Lesser use is expected during the summer months when schools are closed and conditions are dry and daytime temperatures are high. Environmental education visitors will have use of the facilities developed for wildlife observation, nature interpretation and photography during the approved hours and seasons which are set by the Refuge Manger.

Availability of Resources:

Adequate funding and staff exist, are available or are attainable for the San Luis National Wildlife Refuge Complex to conduct and expand an environmental education program at the San Joaquin River NWR. Initial costs for expanding the environmental education program at the refuge would include the preparation or construction of the following: trails, auto tour route (if feasible), interpretive panels, observation platforms and blinds, benches, comfort stations, parking lots, access gates, signage, and brochures. The project can be completed in phases with each phase consisting of individual trails. Annual maintenance costs will involve trail and parking area maintenance, entrance road maintenance, cleaning and maintenance of comfort stations, refuse removal, periodic maintenance of wooden structures (i.e., benches, platforms and blinds), and repair/replacement of signs and gates.

Anticipated Impacts of the Use:

Short and long-term impacts are similar to the public uses of wildlife observation, nature interpretation and photography as the same facilities will be used for environmental education programs. Short-term impacts will be associated with the establishment of the trails (and auto tour route if feasible) and observation platform. These short-term impacts include increased noise from construction activities, an increase in the number of vehicles and people on the refuge, and soil disturbance where signs, posts and the observation platforms/blinds are situated. Wildlife will likely avoid areas where work is being conducted but are expected to resume normal activities and patterns when these facilities have been completed. Once these facilities are in place, we expect that terrestrial animals will continue to use the trail corridors and surrounding areas.

Long-term impacts will be associated with the construction of a parking lot(s), observation platform(s), signs, and use of the trail(s)/tour route. These include loss of habitat, increase in manmade permanent structures, and increased use by the public, especially from autumn through spring. The creation of the parking lots will result in the permanent loss of less than two acres of introduced grasses and will not impact any sensitive, threatened, or endangered plant or animal species. Terrestrial and burrowing animals will be displaced by this action but are expected to continue to use the area. The increase in permanent structures will add a vertical and human-made component to an otherwise natural and relatively flat environment. Disturbance to wildlife will be increased for select species along the nature trail(s), observation platforms/blinds, kiosks, and parking areas. The major anticipated impact of these activities is disturbance of wildlife and trampling of plants. However, the disturbance to wildlife including migratory birds will be minimal if the stipulations listed below are followed. Trampling of plants and erosion of sensitive habitats from this activity are minimized by only allowing public access to a trail/tour route system.

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 for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. A main topic of public interest for many individuals was the opportunity for public use at the refuge specifically wildlife viewing, nature interpretation, and photography. The vast majority of individuals indicated a preference for these activities to occur on the refuge. Environmental educational activities were also requested to occur on the refuge but to a lesser degree than wildlife observation. Some landowners adjacent to the refuge preferred that public use activities occur away from refuge boundaries to preclude potential trespassing problems on private lands.

Determination (check one below):

____ Use is Not Compatible

__X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following conditions apply to ensure compatibility of these activities with the refuge's primary purpose: 1) a public use plan including environmental education for the refuge with public input is completed for the facility along with compliance documents, 2) restoration of fallow agricultural land is restored to native habitats before public use facilities are developed, 3) wildlife and habitat surveys (with an emphasis on key trust species) are conducted and the results reviewed by refuge staff to check for negative trends in wildlife/habitat use associated with public use activities, 4) monitoring visitor use to accurately gauge use levels, 5) periodic and random law enforcement patrols, 6) adequate signage indicating Service regulations and refuge public use policies, and 7) reduction of elements of this public use program if it is ascertained that wildlife or habitat is being negatively impacted..

Justification:

Environmental education is one of six priority public uses for the National Wildlife Refuge System. Environmental educational activities will confine the visiting public to designated trail systems for a quality experience while leaving the majority of refuge land free from

disturbance for wildlife. Concerns about the protection of native plants and animals, and the overall integrity of the wetland and upland habitats, require that public access including for environmental education be limited to select designated areas (i.e., contact stations, trails, parking lots, etc.) which will permit other portions of the refuge to provide sanctuary areas (i.e., free of disturbance) to wildlife resources (Burger 1981). The stipulations listed above will protect migratory birds from disturbance on the refuge

Limited public access and restrictions will reduce the likelihood of adverse long-term impacts to plant and wildlife resources. The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. A public use program featuring environmental education by individuals or small groups will not negatively impact the natural resources at the San Joaquin River NWR as indicated in this determination and these programs are deemed compatible with the purposes for which the refuge was established.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Literature Cited:

Burger, J. 1981. The effect of human activity on birds at coastal bay. Biol. Conserv.; 21: 231-241).

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Scientific Study on the San Joaquin River National Wildlife Refuge

Use Considered: Scientific Study

Refuge Name:

San Joaquin River National Wildlife Refuge - a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The Refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

Scientific studies concerning natural resources conducted by private individuals, groups and/or agencies at the San Joaquin River NWR.

Availability of Resources:

Adequate funding and staff exist to manage scientific studies concerning natural resources conducted by private individuals or groups at the San Joaquin River NWR. Administrative staff costs associated with this use consists of Refuge staff time to review research proposals, collected data, special use permits, research summaries, and to evaluate impacts and that researchers are in compliance. Other staff time includes monitoring the use of the Refuge temporary quarters where researchers are allowed to stay during their data collection period if space is available. Annual monetary costs expended by the Refuge to administer this use averages $1,000.00. Most of the research conducted on the Refuge in the past has been funded from outside sources and this trend is expected to continue.

Anticipated Impacts of the Use:

The principal potential impact by this activity on the refuge's natural resources is disturbance to wildlife and habitat. However, research conducted on the natural resources of the refuge can benefit the management of those resources (Leopold et al. 1968 and Primack 1993). To conduct research on the refuge, an investigator needs to submit a research proposal on a project and indicate the purpose of the research, techniques to be used in the field and for analyses, time frame for the field work, and the proposed study area on the refuge. If the research project is deemed valuable for the refuge and that it will not negatively impact the natural resources than a Special Use Permit is issued to the investigator and any controls or stipulations regarding the research are indicated on the permit to ensure protection of the refuge's natural resources. The permit is issued on an annual basis and an annual or final report on the research is required to be sent to the refuge at the start of each year. Failure to comply with the Special Use Permit results in a revocation of the permit or failure to renew the annual permit. Scientific studies conducted under these guidelines have minimal negative impact on refuge lands, waters and interests and frequently provide benefits in the information they provide on natural resource inventories and processes at the refuge.

Public Review and Comment:

Public review and comment was sought during the initial phases of the comprehensive conservation planning process for the San Joaquin River NWR. The public was provided the opportunity to review and comment on current and potential refuge programs as part of the Comprehensive Conservation Planning process for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. Main topics of public interest were visitor access and appropriate recreational or educational uses of the refuge. No public comments addressed scientific research concerning natural resources conducted by private individuals or groups on the refuge.

Determination (check one below):

____ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following stipulations are required to ensure compatibility of this activity: a research proposal is required for any investigation, the proposal is reviewed by San Luis NWR Complex staff as to its potential value and impacts to the Refuge's natural resources, a one year Special Use Permit is issued to approved research projects, restrictions regarding the specific research project are listed in the Special Use Permit, and an annual/final report are required for all investigations. Failure to comply with the provisions of the Special Use Permit results in revocation of permit privileges. Specifically all scientific studies on the Refuge will require the following:

- The principal investigator submit a study proposal for approval to the Complex.
- All work will be coordinated with the project leader, or designated refuge staff, and researcher.
- Research will adhere to current approved protocols for data collection as indicated in the study proposal and special use permit.
- Proposed research methods which will adversely affect, or would have the potential to adversely affect Refuge resources will require the researcher to develop mitigation measures to minimize potential impacts; mitigation measures will be listed as a condition in the Special Use Permit.
- Refuge staff will be free to accompany researchers at any time to assess potential impacts; to insure Special Use Permits are adhered to; and to determine if approved research proposals and Special Use Permits should be terminated because of adverse impacts.
- All refuge rules and regulations must be followed unless otherwise excepted, in writing, by project leader.
- The researcher will be responsible for acquiring all necessary permits, both from the State of California or U.S. Fish and Wildlife Service, if applicable, and to demonstrate that these permits are up to date prior to the beginning of research approval.

Justification:

The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Scientific studies by individuals or groups on the natural resources at the San Joaquin River NWR as indicated in this determination is compatible with the purposes for which the refuge was established.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Literature Cited:

Leopold, A.S., C. Cottam, I.M. Cowan, I.N. Gabrielson and T.L. Kimball. 1968. The National Wildlife Refuge System-1968. Trans. N. Am. Wildl. and Nat. Res. Conf. 33:30-53.

Primack, R.B. 1993. Essentials of Conservation Biology. Sinauer, Mass.

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Grazing by Livestock on the San Joaquin River National Wildlife Refuge

Use Considered: Grazing by livestock (cattle and sheep) to enhance habitats for wildlife.

Refuge Name:

San Joaquin River National Wildlife Refuge - a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The Refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

A grazing program, where sheep and cattle are used to enhance Refuge habitats for the benefit of wildlife and native plant communities. This Compatibility Determination is a re-evaluation of a 1994 Compatibility Determination for the Refuge Biological Program which specifically addressed grazing on the San Joaquin NWR.

The ongoing grazing program uses both sheep and cattle as habitat management tools. Cattle grazing occurs in both improved irrigated pastures and natural uplands on a long-term annual basis. Sheep grazing is currently a short-term practice used to control exotic invasive weeds in fallow agricultural fields until those areas are restored to riparian forest or wetland communities. Grazing would be used to manage habitats in a manner that is consistent with the Refuge System mission and the purposes for which the San Joaquin NWR was established:

1) In irrigated pastures, the results of grazing provide foraging habitat for wintering and migratory birds that require habitat characterized by short vegetation heights. These wildlife species include Aleutian Canada goose, white-fronted goose, snow and Ross' goose, sandhill crane, white-faced ibis, and long-billed curlew.

2) In natural uplands, the results of grazing provide winter foraging habitat for the migratory birds listed above. It also provides foraging, denning and nesting habitat for species which are characteristic of Central Valley grasslands and require habitat characterized by short vegetation heights. Such species include California ground squirrel, Heerman's kangaroo rat, American badger, burrowing owl, and long-billed curlew.

3) In natural uplands, grazing maintains and improves the health and integrity of native plant and vernal pool communities by decreasing the amount of accumulated litter (dead plant material) and by decreasing the competitive influence of exotic grasses and forbs.

4) In irrigated pastures, natural uplands and fallow agricultural fields, grazing reduces and controls the abundance and proliferation of exotic invasive weeds such as yellow star thistle, prickly lettuce, Russian thistle, perennial pepperweed, amongst others.

The grazing period for irrigated pastures is year-round with the objective of having individual pastures grazed a total of eight months out of a year. Late summer/fall grazing levels are managed with the objective of having the pastures in a short-cropped condition when geese arrive in mid-October. Projected annual stocking rates on individual fields range from 0.6 to 1.3 AU/acre/month for eight months depending on productivity, condition of the pasture and refuge management objectives.

The grazing period for natural uplands during years with average to high precipitation amounts is from December 1 through June 15 with the objective of having individual pastures grazed for a total of four months. Projected annual stocking rates are 1 AU/acre/month for four months. During years with below-average precipitation amounts, stocking levels are decreased accordingly and/or periods of use are reduced.

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 Cooperative Land Management 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.

Grazing cooperators are chosen according to the process described in the U.S. Fish and Wildlife Service Refuge Manual, 5 RM 17.

The value of cattle grazing in both natural uplands and irrigated pastures is set at $10.00/AUM and reflects fair-market pasture rental rates characteristic of Stanislaus County, with adjustments made for water and irrigation costs incurred by the Cooperator. The value of sheep grazing is adjusted downward from fair-market pasture rental rates to reflect costs associated with temporary fencing, repeated movements of animals between pastures, required presence of a sheep-herder, and quality of forage. The value of grazing is credited against the Cooperator's cost of performing work for the Refuge, such as the planting of wildlife food-crops (corn and winter wheat), in lieu of cash payment.

Availability of Resources:

The grazing program is administered by refuge staff who identify the desired objectives of the grazing program, prepare Cooperative Land Management Agreements and Refuge Grazing Plans, provide coordination for grazing Cooperators as well as compliance monitoring. The grazing Cooperator is responsible for the cost of installation and/or maintenance of all range improvements (watering facilities, cross-fencing, etc.) associated with grazing activities. Facilities installed primarily for refuge purposes are constructed or maintained at refuge expense. Adequate funding and staff exist to manage the grazing program at the San Joaquin River NWR.

Anticipated Impacts of the Use:

Anticipated positive impacts of the grazing program at San Joaquin NWR include the following:

- The creation and maintenance of short-cropped foraging habitat for wintering and migratory birds in irrigated pastures and natural uplands.
- The creation and maintenance of year-round foraging, denning and nesting habitat, characterized by short vegetation, in natural uplands.
- Improvement and maintenance of the health and integrity of native plant and vernal pool communities in natural uplands.
- A reduction in the abundance and proliferation of noxious weeds in irrigated pastures and natural uplands.
- A reduction in the seed bank of exotic invasive weeds in fallow agricultural fields which are scheduled to be restored to riparian forest communities.

Potential negative impacts of a grazing program at San Joaquin NWR include:

- mproper fence placement and rotation of livestock within pastures can result in sensitive areas, such as wetlands and riparian corridors, being grazed and/or trampled excessively. This can result in damage to desirable vegetation, soil erosion, noxious weed invasion and reduced water quality of streams and wetlands.
- Poor management of livestock distribution within a pasture can result in portions being grazed and/or trampled excessively (i.e., around watering or mineral facilities). This can result in the same negative impacts mentioned above.
- Poor management of periods when livestock are present in pastures can reduce or prevent the use of those pastures by wildlife species that would otherwise benefit from the habitat enhancements provided by livestock grazing.

Positive impacts can be maximized and negative impacts can be minimized through:

- The establishment of Cooperative Land Management Agreements and Grazing Plans which clearly identify Refuge goals, objectives, strategies and prescriptions.

- Continuous and effective collaboration and coordination between refuge staff and Cooperators.
- Diligent compliance monitoring by refuge staff.

Public Review and Comment:

Public review and comment was sought during the initial phases of the comprehensive conservation planning process for the San Joaquin River NWR. The public was provided the opportunity to review and comment on current and potential refuge programs as part of the Comprehensive Conservation Planning process for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. Main topics of public interest were visitor access and appropriate recreational or educational uses of the refuge. No public comments addressed the topic of grazing on the refuge to benefit wildlife habitat.

Determination (check one below):

____ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The Cooperator will operate under the terms and conditions of a Cooperative Land Management Agreement and a Refuge Grazing Plan. These documents provide the necessary information and assistance from the Refuge to determine periods of use and stocking rates. Refuge staff will set the value of grazing so as to reflect current fair market values, monitor Cooperator compliance, and maintain complete files on all grazing activities.

Justification:

The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. A grazing program to protect and enhance wildlife habitat at the San Joaquin River NWR as indicated in this determination is compatible with the purposes for which the refuge was established.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

COMPATIBILITY DETERMINATION for Mosquito Monitoring and Control on the San Joaquin River National Wildlife Refuge

Use Considered: Mosquito Monitoring and Control

Refuge Name:

San Joaquin River National Wildlife Refuge - a unit of the San Luis National Wildlife Refuge Complex. The San Joaquin River NWR is located in western Stanislaus and San Joaquin Counties, California. The refuge presently consists of approximately 6,500 acres situated along the San Joaquin River from just south of the confluence with the Tuolumne River north to the north bank of the Stanislaus River. The approved boundary for the refuge comprises 12,887 acres; land presently not part of the refuge is proposed for the conservation easement program.

Establishing and Acquisition Authority(ies):

The San Joaquin River National Wildlife Refuge was established in 1987 to protect the, at the time, endangered Aleutian Canada Goose, listed as endangered in 1967 and relisted as threatened in 1991. The refuge was originally established under the authority of the Endangered Species Act. Other refuge lands were acquired under the Migratory Bird Conservation Act and the Fish and Wildlife Act of 1956.

Refuge Purpose(s):

The Refuge purposes are

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

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

"For the development, advancement, management, conservation, and protection of fish and wildlife resources." 16 U.S.C. 742f(a)(4) "…. 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. 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System 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." 16 U.S.C. 668dd-668ee (National Wildlife Refuge Administration Act of 1966, as amended).

Description of Use:

The Turlock and Eastside Mosquito Vector Control Districts (Districts) propose to continue the monitoring and controlling of mosquitoes at the San Joaquin River NWR to address nuisance and human health concerns of neighboring communities. The Refuge is located in the San Joaquin Valley.

While mosquitoes at certain levels are considered a nuisance because of their biting, many species are also known vectors of serious diseases in California. Twelve mosquito-borne viruses are known to occur in California, however, only western equine encephalomyelitis virus (WEE) and St. Louis encephalitis virus (SLE) have caused significant outbreaks of human disease in the past (CA Dept. of Health Services 2003). Within the last few years, California has also been at risk for West Nile virus (WNV) which was first detected in the summer of 2003. WEE tends to be most serious in very young children, whereas elderly people are most at risk to SLE and WNV (CA Dept. of Heath Services 2003). WEE and WNV can cause serious diseases in horses and emus, and WNV kills a wide variety of endemic and imported birds. Mosquito control is the only known practical method of protecting people and animals from WEE, SLE, and WNV (CA Dept. of Health Services 2003).

The mosquito species identified by the Districts for monitoring and control are *Culex erythrothorax*, *C. pipiens*, *C. tarsalis*; *Ochlerotatus dorsalis*, *O. melanimon*, *O. nigromaculis*, and *Aedes vexans*. *C. tarsalis* is the primary vector of WEE and SLE in California and is also considered to be a significant vector of WNV (CA Dept. of Health Services 2003). *C. pipiens, C. erythrothorax*, *O. melanimon, O. dorsalis,* and *A. vexans* may also contribute to disease transmission (Goddard 2002).

Mosquito Monitoring

The Districts' monitoring activities are designed to ascertain the abundance of immature (larvae and pupae) and adult mosquito populations. During an average mosquito monitoring period, typically between the months of April through October, the Districts assess larval mosquito populations by using the 'dipper' method in various wetlands, moist soil units, irrigated pastures, and riparian areas. Adults are monitored using carbon dioxide (CO_2) and light traps.

The Districts' monitor larval stage mosquito populations and identifies species using the dipper method. This entails using a long-handled ladle (ca 500 ml) called a dipper to collect water samples from water potentially serving as mosquito sources. Dipping occurs from every one to two weeks depending on breeding conditions. Dip counts are used to estimate the abundance of immature mosquitoes and to determine the need for mosquito control.

The Districts use carbon dioxide (CO_2) baited traps to monitor the abundance of adult mosquitoes and to identify species. The trap used is baited with 1-2 kg of dry ice. The use and placement of CO_2 baited traps on the refuge depends on perceived numbers and the potential disease threat. Increased use of CO_2 baited traps occurs when adult numbers are high or the disease threat is significant. A single light trap is operated at the refuge's shop and checked weekly throughout most of the year. Light traps are cylinders with a light, fan, and collecting jar. The mosquitoes are attracted to the light and enter the cylinder.

The monitoring activities described above are conducted under a Special Use Permit between the refuge and the Districts.

Mosquito Control with larvicides:

The Districts control mosquitoes by treating areas infested with larval stages of *C. erythrothorax*, *C. pipiens*, *C. tarsalis*; *O. dorsalis*, *O. melanimon*, *O. nigromaculis*, and *A. vexans*. Mosquito control would be initiated with the use of larvicides when breeding is considered widespread in an area as determined by the larval sampling program. Permission needs to be given by the Refuge Manager to the Districts immediately prior to any application of larvicides on the refuge. The Districts treat larval mosquitoes using

Bacillus thuringiensis serovar. *israelensis* (Bti) and methoprene, which are applied mainly with ground application methods and occasionally with aerial methods. Depending on need, multiple treatments can be used in the same area during a season but typically are separated by at least a two week period.

Bti is a microbial insect pathogen used to control larval stages of mosquitoes and black flies. It is a naturally occurring anaerobic spore forming bacteria that is mass produced using modern fermentation technology. Bti produces protein endotoxins that are activated in the alkaline mid-gut of insect species and subsequently bind to protein specific receptors of susceptible insect species resulting in the lethal response (Lacey and Mulla 1990). Bti must be ingested by the target insect to be effective. It is most effective on younger mosquito larval instars. The Districts use the formulated Bti product Teknar HP-D at rates of 0.5-1.0 pt/acre and Vectobac 12AS at rates of 0.25-1 pt/acre.

Methoprene is a synthetic insect growth regulator that mimics juvenile hormones (Tomlin, 1994). It interferes with the insect's maturation stages preventing the insect from transforming into the adult stage, thereby precluding reproduction. Methoprene is a contact insecticide that does not need to be ingested. It is most effective on early larval instars (Extension Toxicology Network, 1996). Treated larvae will pupate, but will not emerge as adults. The Districts use the formulated methoprene product Altosid Liquid Larvicide Concentrate at a rate of 0.75-1.0 oz/acre.

During the early stages of larval growth, typically stages 2-4, Bti is most effective for control as larvae at these stages of life tends to feed on bacteria. Altosid is used at later stages of larval growth when feeding ceases. Altosid is absorbed into the bodies of larvae, inhibiting their growth into adults.

Applications of larvicides may occur anywhere in wetlands, moist soil units, irrigated pastures and/or riparian habitat at the Refuge depending on larval abundance. The potential areas for mosquito breeding and consequently mosquito treatment total approximately 3,000 acres. Mosquito control applications can occur anytime between April through November, depending on environmental conditions, but normally occur during August, September, and October when water is being added to the wetland units.
Annual precipitation amounts can also have a direct effect on mosquito populations. During drought years mosquito populations tend to be low, and during wet years mosquito populations tend to be high. Mosquito control is consequently conducted as a response to seasonality and/or climatic cycles. The Districts have been controlling mosquito populations with larvicides on the refuge since its creation in 1987. The larvaciding activities described above are conducted under a Special Use Permit between the Refuge and the Districts.

Treatment has been conducted mainly by ground application in areas where monitoring has documented high mosquito larval densities or high concentrations of a specific vector bearing mosquito species. Aerial application has been done only rarely using either fixed-wing or rotary aircraft flown at an altitude of 10-20 feet above the vegetation and at airspeeds of 130-140 miles per hour. Treatment duration would average 20 minutes, but would vary given the size of the treatment area. Aerial pass distance would vary depending on the treatment area, but would average 70 feet. The pilot would use a map of units to be treated as well as utilizing a GPS system as an additional guide.

Mosquito control with adulticides

The preferred mosquito control technique on the refuge is the use of larvacides. However, in cases where a public health emergency is declared due to adult mosquitoes, permission to use adulticides on the refuge by the Districts will be approved through the use of a Special

Use Permit. In such cases, the Districts would use the adulticides Pyrocide or Pyrenone, which have natural pyrethrins as their active ingredient.

Pyrethrins are naturally occurring compounds produced by certain species of chrysanthemum flowers. The flowers of the plant are harvested shortly after blooming and are either dried and powdered, or oils within the flowers are extracted by solvents. Pyrethrins are non-systemic contact poisons which quickly penetrate the nerve system of the insect and cause paralysis and subsequent death (EXTOXNET 1994, Tomlin 1994). A few minutes after application, the insect cannot move or fly away. But, a "knockdown dose" does not mean a killing dose. Pyrethrins are swiftly detoxified by enzymes in the insect. Thus, some pests will recover. To delay the enzyme action so a lethal dose is assured, commercial products are formulated with synergists such as piperonyl butoxide, which inhibit detoxification (Tomlin, 1994). Both products KMVCD proposes, Pyrocide and Pyrenone, are composed of 5% pyrethrins and 25% piperonyl butoxide. These adulticides are applied as an ultra-low volume (ULV) fog at a rate of 0.1 fluid oz/ac (0.0025 lbs ai/ac pyrethrin) by air and/or ground.

Availability of Resources:

Adequate funding and staff exist to manage this activity. Monitoring and control will be conducted by the Districts 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:

This activity has three principal potential impacts on Service lands, waters or interests. These include disturbance to wildlife caused by the application of Bti/Altosid, impacts to 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 refuge staff and by requiring approval for treatment by the Refuge Manager. Thus instead of being treated weekly, whether needed or not, like many sites, 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. There will be relatively little of this impact, as dipping is done at most once a week. Placing and checking of CO_2 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. There will be no disturbance of habitat associated with the single light trap, as it is 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 et al. 1987, Lee and Scott 1989, Marten et al. 1993, Mittal et al. 1991, Parsons and Surgeoner 1991, and 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. 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 crustacaceans (Brown et al. 2002, Brown et al. 2000, Garcia et al. 1980, Lee and Scott 1989, and Wipfli et al. 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 et al. 1986, Wipfli et al. 1994). Field studies indicated 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. Also affected are members of the Family Simuliidae (black flies) and some chironomids midge larvae (Boisvert and Boisvert 2000, Garcia et al. 1980). The most commonly 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 et al. 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 hrs 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 (U.S. EPA 2000, and 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 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 % 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 to those taxa resulting from direct exposure using maximum labeled rates for mosquito control (Urban et al. 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, 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 hornfly (WHO, undated). Methoprene is highly toxic to aquatic invertebrates with a 48 hour EC50 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 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, and Hershey et al., 1998).

Methoprene has a ten day half life in soil, a photolysis half life of ten hours, and solubility in water is 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).

Pyrethroids. 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, Milam et al. 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.

Wildlife:

Anticipated impacts 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, nor 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.

Fish

Areas most likely to be treated with larvacides 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.

Wetlands and Waterfowl:

The Refuge was established in part to provide habitat for migratory birds, in particular waterfowl which includes 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. There is not likely to be much impact on geese and swans 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 which may be used by geese and

swans, it has been found that birds are not 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 the majority 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 comprise the most important duck food in the summer-dry habitats of the San Joaquin Valley (Miller 1987). Thus any food chain impacts resulting from larvicide and adulticide treatment will have limited impacts to 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. Recent 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 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 1978). 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 in general tend to feed on seeds when they reach their wintering areas, perhaps to regain energy lost during long flights (Heitmeyer 1988, Miller 1987). Thus 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 which 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. There are primarily two California State Species of Concern which forage and nest on the refuge, they are tri-colored blackbirds, and white-faced ibis. 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. While Hanowski et al. (1997) found no direct evidence to indicate Bti or methoprene negatively impacted the reproduction, growth, or foraging of red-winged blackbirds, to minimize impacts to these species, in particular, during their breeding season, no applications will occur where tri-colored blackbirds or white-faced ibis are nesting.

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 re-analyzed on the basis on new evidence.

Public Review and Comment:

Public review and comment was sought during the initial phases of the comprehensive conservation planning process for the San Joaquin River NWR. The public was provided the opportunity to review and comment on current and potential refuge programs as part of the Comprehensive Conservation Planning process for the refuge. This process included three large mailings of plan updates encouraging public input on the development of refuge programs as well as having the opportunity to participate at a public planning workshop. Main topics of public interest were visitor access and appropriate recreational or educational uses of the refuge. No public comments addressed mosquito management at the refuge.

Determination (check one below):

____ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The following stipulations are required to ensure compatibility: that the Districts apply for and receive a Special use permit annually from the refuge, that larvae control only be conducted when breeding is widespread as documented by sampling efforts, that only BTI and altosid may be applied on the refuge as a larvacide, that the Refuge Manager has final approval for any larvacide treatments on the refuge, that mosquito adulticide only be used on the refuge during a declared public health emergency, that only Pyrocide or Pyrenone be used as an adulticide, that the Refuge Manager has final approval for any adulticide treatments on the refuge, and that a final report of all control activities conducted on the by the Districts be sent at the end of the year to the Refuge Manager. Specifically for mosquito monitoring and control to occur on the refuge will require the following:

1. 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. Prior to all larvacide applications, the Districts will provide a map and sampling results to the Refuge Manager and obtain verbal approval.

2. Mosquito larvae will be widespread and abundant as documented by sampling for permission to be granted for the Districts to larvacide any portion of the refuge.

3. The Districts will provide the refuge with interim and final reports regarding mosquito sampling on the refuge.

4. Mosquito adulticides will 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 in Stanislaus or San Joaquin Counties.

5. Spraying of any kind will not be conducted on vernal pools or other such water basins resulting from rainwater accumulations in upland sites.

6. 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.

7. Application of mosquito control measures is to be conducted in accordance with approved Pesticide Use Proposals and labels.

8. 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.

Justification:

The San Joaquin River NWR was established to conserve fish or wildlife which are listed as endangered species or threatened species or plants...; as an inviolate sanctuary, or for any other management purpose, for migratory birds; for the development, advancement, management, conservation, and protection of fish and wildlife resources; and for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Mosquito monitoring and control by the Districts at the San Joaquin River NWR as indicated in this determination is compatible with the purposes for which the refuge was established. For many years the refuge has worked cooperatively with these two Districts and their mosquito control activities. After a review of these activities, the refuge has determined that allowing these uses to continue would not interfere with the purposes for which the refuge was established, nor the mission of the National Wildlife Refuge System.

Mandatory Re-Evaluation Date:

_____ Mandatory 15 year Re-Evaluation Date (for priority public uses)

__2014____ Mandatory 10 year Re-Evaluation Date (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision:

_____ Categorical Exclusion without Environmental Action Statement

___X_____ Categorical Exclusion and Environmental Action Statement

_____ Environmental Assessment and Finding of No Significant Impact

_____ Environmental Impact Statement and Record of Decision

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Refuge Determination:

Prepared by: _____
(Signature and Date)

Refuge Manager Approval: _____
(Signature and Date)

Concurrence:

Refuge Supervisor: _____
(Signature and Date)

Assistant Manager,
National Wildlife
Refuge System _____
(Signature and Date)

California/Nevada
Operations Manager _____
(Signature and Date)

Appendix E: Species List

Invertebrates

Artemia franciscana	brine shrimp
Branchinecta coloradensis	Colorado fairy shrimp
Branchinecta conservatio	Conservancy fairy shrimp (E)
Branchinecta lindahli	*(no common name)*
Branchinecta longiantenna	*longhorn fairy shrimp (E)*
Branchinecta lynchi	***vernal pool fairy shrimp (T)***
Branchinecta mackini	***(no common name)***
Branchinecta mesovallensis	*midvalley fairy shrimp*
Lepidurus packardi	***vernal pool tadpole shrimp (E)***
Linderiella occidentalis	***California linderiella***
Anticus antiochensis	*Antioch Dunes anthicid beetle (CS)*
Anticus sacramento	Sacramento anthicid beetle (CS)
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle (T)
Hygrotus curvipes	curved-foot hygrotus diving beetle (CS)
Lytta moesta	moestan blister beetle (CS)
Lytta molesta	molestan blister beetle (CS)

Vertebrates

AMPHIBIA

Caudata:		
Ambystomatidae	***Ambystoma californiense***	**California tiger salamander (CP, CS)**
Anura:		
Pelobatidae	***Spea hammondii***	**western spadefoot (CP, CS)**
Bufonidae	***Bufo boreas***	**western toad**
Hylidae	***Hyla regilla***	**Pacific treefrog**
Ranidae	*Rana aurora*	red-legged frog (FT, CP, CS)
	Rana boylii	foothill yellow-legged frog (CP,CS, FS)
	Rana catesbeiana	**bullfrog (H)**

REPTILIA

Testudines:		
Emydidae	***Clemmys marmorota***	**western pond turtle (CP, CS, FS)**
	Trachemys scripta	**slider**
Squamata:		
Iguanidae	*Gambelia sila*	blunt-nosed leopard lizard (FE, CE, CP)
	Sceloporus occidentalis	**western fence lizard**
	Uta stansburiana	side-blotched lizard
	Phrynosoma coronatum	coast horned lizard (CP, CS)
Scincidae	***Eumeces gilbertii***	**Gilbert's skink**
Teiidae	*Cnemidophorus tigris*	western whiptail
Anguidae	*Elgaria multicarinatus*	southern alligator lizard
	Elgaria coerulea	northern alligator lizard
Anniellidae	*Anniella pulchra*	California legless lizard

Colubridae	***Coluber constrictor***	**racer**
	Masticophis flagellum	coachwhip (CP, CS)
Arizona elegans	glossy snake	
Pituophis melanoleucus	**Pacific gopher snake**	
	Lampropeltis getula	**common kingsnake**
	Rhinochielus lecontei	long-nosed snake
	Thamnophis sirtalis	**common garter snake**
	Thamnophis gigas	giant garter snake (FT, CT, CP)
Viperidae	*Crotalus viridis*	western rattlesnake

FISH

Petromyzontidae	***Lampetra tridentata***	**Pacific Lamprey***
Acipenseridae	***Acipenser transmontanus***	**white sturgeon***
Clupeidae	***Alosa sapidissima***	**American shad**
	Dorosoma petenese	**threadfin shad**
Cyprinidae	***Cyprinus carpio***	**common carp**
	Carassius auratus	**goldfish**
	Notemigonus crysoleucas	**golden shiner**
	Lavinia exilicauda	**hitch***
	Orthodon microlepidotus	**Sacramento blackfish***
	Pogonichthys macrolepidotus	**Sacramento splittail****
	Ptychocheilus grandis	**Sacramento pikeminnow***
	Cyprinella lutrensis	**red shiner**
	Pimephales promelas	**fathead minnow**
Catostomidaeca	***Catostomus occidedntalis***	**Sacramento sucker***
Ictaluridae	***Ameiurus catus***	**white catfish**
	Ameiurus nebulosus	**broun bullhead**
	Ameiurus melas	**black bullhead**
	Ictalurus punctatus	**channel catfish**
Salmonidae	***Oncorhynchus tshawytscha***	**chinook salmon****
	Oncorhynchus mykiss	**rainbow trout***
Poeciliidae	***Gambusia affinis***	**western mosquitofish**
Atherinidae	***Menidia beryllina***	**inland silverside**
Cottidae	***Cottus asper***	**prickly sculpin***
Percichthyidae	***Morone saxatilis***	**striped bass**
Centrarchidae	***Pomoxis migromaculatus***	**black crappie**
	Pomoxis annularis	**white crappie**
	Lopomis gulosus	**warmouth**
	Lopomis cyanellus	**green sunfish**
	Lopomis macrochirus	**bluegill**
	Lopomis microlophus	**redear sunfish**
	Micropterus salmoides	**largemouth bass**
	Micropterus dolomieu	**smallmouth bass**
Percidae	***Percina macrolepida***	**bigscale logperch**
Embiotocidae	***Hysterocarpus traski***	**tule perch***

AVES

Podicipediformes:		
Podicipedidae	***Aechomophorus clarkii***	**Clark's grebe**
	Aechomophorus occidentalis	**western grebe**
	Podiceps auritus	**horned grebe**

	Podiceps nigricollis	**eared grebe**
	Podilymbus podiceps	**pied-billed grebe**
Pelecaniformes:		
Pelecanidae	***Pelecanus erythrorynchos***	**American white pelican**
Phalacrocoracidae	***Phalacrocorax auritus***	**double-crested cormorant**
Ciconiiformes:		
Ardeidae	***Ixobrychus exilis***	**least bittern**
	Botaurus lentiginosus	**American bittern**
	Nycticorax nycticorax	**black-crowned night heron**
	Butorides striatus	**green-backed heron**
	Bubulcus ibis	**cattle egret**
	Egretta thula	**snowy egret**
	Ardea alba	**great egret**
	Ardea herodias	**great blue heron**
Threskiornithidae	***Plegadis chihi***	**white-faced ibis**
Anseriformes:		
Anatidae	***Cygnus columbianus***	**tundra swan**
	Anser albifrons	**greater white-fronted goose**
	Chen caerulescens	**snow goose**
	Chen rossii	**Ross' goose**
	Branta canadensis leucopareia	**Aleutian Canada goose (T)**
	Branta canadensis minima	**cackling Canada goose**
	Branta canadensis moffitti	**Great Basin Canada goose**
	Branta canadensis parvipes	**lesser Canada goose**
	Branta bernicla	**brant**
	Anas platyrhynchos	**mallard**
	Anas strepera	**gadwall**
	Anas crecca	**green-winged teal**
	Anas americana	**American wigeon**
	Anas penelope	**Eurasian wigeon**
	Anas acuta	**northern pintail**
	Anas clypeata	**northern shoveler**
	Anas discors	**blue-winged teal**
	Anas cyanoptera	**cinnamon teal**
	Oxyura jamaicensis	**ruddy duck**
	Aix sponsa	**wood duck**
	Aythya valisineria	**canvasback**
	Aythya americana	**redhead**
	Aythya collaris	**ring-necked duck**
	Aythya marila	greater scaup
	Athya affinis	**lesser scaup**
	Bucephala clangula	**common goldeneye**
	Bucephola albeola	**bufflehead**
	Mergus merganser	common merganser
	Lophodytes cucullatus	**hooded merganser**
	Aix galericulata	**Mandarin duck**
	Branta rufficollis	**red-breasted goose (accidental)**
Gruiformes:		
Rallidae	***Rallus limicola***	**Virginia rail**
	Porzana carolina	**sora**
	Gallinula chloropus	**common moorhen**
	Fulica americana	**American coot**

Charadriiformes:		
Recurvirostridae	***Recurvirostra americana***	**American avocet**
	Himantopus mexicanus	**black-necked stilt**
Charadriidae	*Charadrius alexandrinus*	snowy plover
	Charadrius semipalmatus	semipalmated plover
	Charadrius vociferus	**killdeer**
	Charadrius montanus	mountain plover
	Pluvialis squatarola	**black-bellied plover**
	Pluvialis dominica	**American golden plover**
Scolopacidae	*Limosa fedoa*	marbled godwit
	Newmenius phaeopus	whimbrel
	Newmenius americanus	**long-billed curlew**
	Catoptrophorus semipalmatus	willet
	Tringa melanoleuca	**greater yellowlegs**
	Tringa flavipes	lesser yellowlegs
	Tringa solitaria	**solitary sandpiper**
	Actitis macularia	**spotted sandpiper**
	Phalaropus tricolor	Wilson's phalarope
	Phalaropus lobatus	red-necked phalarope
	Limnodromus griseus	short-billed dowitcher
	Limnodromus scolopaceus	**long-billed dowitcher**
	Gallinago gallinago	**common snipe**
	Calidris alpina	**dunlin**
	Calidris mauri	**western sandpiper**
	Calidris minutilla	**least sandpiper**
	Calidris bairdii	Baird's sandpiper
	Calidris melanotos	pectoral sandpiper
Laridae	***Larus philidelphia***	**Bonaparte's gull**
	Larus delawarensis	**ring-billed gull**
	Larus argentatus	**herring gull**
	Larus californicus	California gull
	Larus glaucescens	glaucous-winged gull
	Sterna forsteri	**Forster's tern**
	Chlidonias niger	black tern
	Sterna caspia	**Caspian tern**
Falconiformes:		
Cathartidae	***Cathartes aura***	**turkey vulture**
Accipitridae	***Aquila chrysaetos***	**golden eagle**
	Haliaeetus leucocephalus	**bald eagle (T)**
	Elanus leucurus	**white-tailed kite**
	Circus cyaneus	**northern harrier**
	Accipiter striatus	**sharp-shinned hawk**
	Accipiter cooperii	**Cooper's hawk**
	Buteo lineatus	**red-shouldered hawk**
	Buteo jamaicensis	**red-tailed hawk**
	Buteo swainsoni	**Swainson's hawk**
	Buteo lagopus	rough-legged hawk
	Buteo regalis	**ferruginous hawk**
	Pandion haliaetus	osprey
Falconidae	***Falco sparverius***	**American kestrel**
	Falco columbarius	**merlin**
	Falco mexicanus	**prairie falcon**
	Falco peregrinus	**peregrine falcon (E)**

Galliformes:		
Phasianidae	***Callipepla californica***	**California quail**
	Phasianus colchicus	**ring-necked pheasant**
Columbiformes:		
Columbidae	***Columba livia***	**rock dove**
	Zenaida macroura	**mourning dove**
Cuculiformes:		
Cuculidae	*Coccyzus americanus*	yellow-billed cuckoo
Strigiformes:		
Tytonidae	***Tyto alba***	**barn owl**
Strigidae	*Asio flammeus*	short-eared owl
	Asio otus	long-eared owl
	Bubo virginianus	**great horned owl**
	Otus kennicottii	**western screech owl**
	Athene cunicularia	burrowing owl
Caprimulgiformes:		
Caprimulgidae	*Chordeiles acutipennis*	lesser nighthawk
Apodiformes:		
Apodidae	*Chaetura vauxi*	Vaux's swift
	Aeronautes saxatalis	**White-throated swift**
Trochilidae	***Archilochus alexandri***	**black-chinned hummingbird**
	Calypte anna	**Anna's hummingbird**
	Selasphorus rufus	rufous hummingbird
Coraciiformes:		
Alcedinidae	***Ceryle alcyon***	**belted kingfisher**
Piciformes:		
Picidae	***Colaptes auratus***	**northern flicker**
	Melanerpes formicivorus	**acorn woodpecker**
	Melanerpes lewis	Lewis' woodpecker
	Picoides pubescens	**downy woodpecker**
	Picoides nuttallii	**Nuttall's woodpecker**
Passeriformes:		
Tyrannidae	***Tyrannus verticalis***	**western kingbird**
	Tyrranus vociferans	Cassin's kingbird
	Myiarchus cinerascens	**ash-throated flycatcher**
	Contopus sordidulus	**western wood-pewee**
	Sayornis nigricans	**black phoebe**
	Sayornis saya	**Say's phoebe**
	Empidonax oberholseri	dusky flycatcher
	Empidonax traillii	willow flycatcher
	Empidonax difficilis	**Pacific-slope flycatcher**
Alaudidae	***Eremophila alpestris***	**horned lark**
Hirundinidae	***Tachycineta bicolor***	**tree swallow**
	Tachycineta thalassina	**violet-green swallow**
	Progne subis	purple martin
	Riparia riparia	bank swallow
	Stelgidopteryx serripennis	**northern rough-winged swallow**
	Petrochelidon pyrrhonata	**cliff swallow**
	Hirundo rustica	**barn swallow**
Corvidae	***Aphelocoma californica***	**western scrub jay**
	Pica nuttalli	**yellow-billed magpie**
	Corvus brachyrynchos	**American crow**
	Corvus corax	**common raven**

Regulidae	*Regulus satrapa*	golden-crowned kinglet
	Regulus calendula	**ruby-crowned kinglet**
Muscicapidae	***Chamaea fasciata***	**wrentit**
	Sialia mexicana	**western bluebird**
	Catharus ustulatus	Swainson's thrush
	Catharus guttatus	**hermit thrush**
	Ixoreus naevius	varied thrush
	Turdus migratorius	**American robin**
Paridae	***Baeolophus inornatus***	**oak titmouse**
Aegithalidae	***Psaltriparus minimus***	**bushtit**
Certhiidae	*Certhia americana*	brown creeper
Sittidae	***Sitta carolinensis***	**white-breasted nuthatch**
	Sitta canadensis	red-breasted nuthatch
Troglodytidae	***Troglodytes aedon***	**house wren**
	Troglodytes troglodytes	winter wren
	Thyromanes bewickii	**Bewick's wren**
	Cistothorus palustris	**marsh wren**
	Salpinctes obsoletus	rock wren
Laniidae	***Lanius ludovicianus***	**loggerhead shrike**
Mimidae	***Mimus polyglottos***	**northern mockingbird**
	Toxostoma redivivum	California thrasher
Motacillidae	***Anthus rubescens***	**American pipit**
Bombycillidae	***Bombycilla cedrorum***	**cedar waxwing**
Sturnidae	***Sturnus vulgaris***	**European starling**
Vireonidae	*Vireo cassinii*	Cassin's vireo
	Vireo gilvus	**warbling vireo**
	Vireo bellii pusillus	**least Bell's vireo (E)**
Emberizidae	***Vermivora celata***	**orange-crowned warbler**
	Vermivora ruficapilla	**Nashville warbler**
	Dendroica coronata	**yellow-rumped warbler**
	Dendroica nigriscens	black-throated gray warbler
	Dendroica townsendi	Townsend's warbler
	Dendroica occidentalis	Hermit warbler
	Dendroica petechia	**yellow warbler**
	Oporornis tolmiei	MacGillivray's warbler
	Wilsonia pusilla	**Wilson's warbler**
	Geothlypis trichas	**common yellowthroat**
	Icteria virens	yellow-breasted chat
	Pheucticus melanocephalus	**black-headed grosbeak**
	Guiraca caerulea	**blue grosbeak**
	Passerina amoena	**lazuli bunting**
	Pipilo maculatus	**spotted towhee**
	Pipilo crissalis	**California towhee**
	Ammodramus savannarum	grasshopper sparrow
	Pooecetes gramineus	vesper sparrow
	Passerculus sandwichensis	**savannah sparrow**
	Melospiza melodia	**song sparrow**
	Chondestes grammacus	**lark sparrow**
	Amphispiza belli	sage sparrow
	Spizella passerina	**chipping sparrow**
	Junco hyemalis	**dark-eyed junco**
	Zonotrichia leucophrys	**white-crowned sparrow**
	Zonotrichia atricapilla	**golden-crowned sparrow**

	Passerella iliaca	**fox sparrow**
	Melospiza lincolnii	**Lincoln's sparrow**
	Sturnella neglecta	**western meadowlark**
	Xanthocephalus xanthocephalus	**yellow-headed blackbird**
	Agelaius phoeniceus	**red-winged blackbird**
	Agelaius tricolor	**tricolored blackbird**
	Euphagus cyanocephalus	**Brewer's blackbird**
	Molothrus ater	**brown-headed cowbird**
	Icterus bullockii	**Bullock's oriole**
	Icterus cucullatus	hooded oriole
	Piranga ludoviciana	**western tanager**
Passeridae	***Passer domesticus***	**house sparrow**
Fringillidae	*Carduelis pinus*	pine siskin
	Carduelis tristis	**American goldfinch**
	Carduelis psaltria	**lesser goldfinch**
	Carduelis lawrencei	Lawrence's goldfinch
	Carpodacus purpureus	purple finch
	Carpodacus mexicanus	**house finch**

MAMMALIA MAMMALS

Marsupia1ia:		
Didelphidae	***Didelphis virginiana***	**Virginia opossum (H)**
Insectivora:		
Soricidae	***Sorex ornatus***	**ornate shrew (CS)**
Talpidae	*Scapanus latimanus*	broad-footed mole (CS)
Chiroptera:		
Vespertilionidae	*Myotis lucifugus*	little brown myotis (CS)
	Antrozous pallidus	pallid bat (CS)
	Myotis ciliolabrum	western small-footed myotis
	Myotis evotis	long-eared myotis
	Myotis thysanodes	fringed myotis
	Myotis volans	long-legged myotis
	Myotis yumanensis	Yuma myotis
	Plecotus townsendii	Townsend's big-eared bat (CS)
Molossidae	*Tadarida brasiliensis*	Brazilian free-tailed bat
	Eumops perotis	western mastiff bat (CS)
Carnivora:		
Canidae	***Canis latrans***	**coyote (H)**
	Canus domesticus	**domestic dog**
	Urocyon cinereoargenteus	**gray fox (H)**
	Vulpes vulpes	red fox (H)
	Vulpes macrotis mutica	San Joaquin kit fox (FE, CT)
Procyonidae	***Procyon lotor***	**raccoon (H)**
Mustelidae	***Lutra canadensis***	**northern river otter (CS)**
	Mephitis mephitis	**striped skunk (H)**
	Spilogale gracilis	western spotted skunk (CS)
	Mustela frenata	long-tailed weasel (H)
	Mustela vison	**mink (H)**
	Taxidea taxus	badger (H)
Felidae	***Felis catus***	**housecat**
	Lynx rufus	bobcat (H)
Perissodactyla:		
Equidae	***Equus caballus***	**domestic horse**

Artiodactyla:		
Suidae	***Sus scrofa***	**wild pig (H)**
Cervidae	***Odocoileus hemionus***	**mule deer (H)**
Bovidae	***Bos taurus***	**domestic cattle**
	Ovis aries	**domestic sheep**
Rodentia:		
Sciuridae	***Spermophilus beecheyi***	**California ground squirrel**
Geomyidae	*Thomomys bottae*	Botta's pocket gopher
Heteromyidae	*Dipodomys heermanni*	Heerman's kangaroo rat (FE, CE, CP)
	Perognathus inornatus	San Joaquin pocket mouse (CS)
Castoridae	***Castor canadensis***	**beaver (H)**
Cricetidae	*Neotoma fuscipes riparia*	San Joaquin Valley woodrat (FE, CE)
	Peromyscus boylii	brush mouse
	Peromyscus maniculatus	**deer mouse (CS)**
	Reithrodontomys megalotis	western harvest mouse
Arvicolidae	***Microtus californicus***	**California vole**
	Ondatra zibethicus	**muskrat**
Muridae	***Mus musculus***	**house mouse**
	Rattus norvegicus	Norway rat
	Rattus rattus	**black rat**
Lagomorpha:		
Leporidae	*Lepus californicus*	black-tailed hare (CS, H)
	Sylvilagus audubonii	**Desert cottontail (H)**
	Sylvilagus bachmanii riparius	riparian brush rabbit (CE)

Source of statuses: www.dfg.ca.gov/wmd/cwhr/natives.html

FE: federally endangered
FT: federally threatened
CE: California endangered
CT: California threatened
CP: California protected
CS: Callifornia special concern
FS: Forest Service sensitive
BS: BLM sensitive
H: harvest

NOTE:
1. Confirmed species appear in bold print
2. List from *San Joaquin River National Wildlife Refuge Riparian Habitat Protection and Flood Restoration Project*, Biological Inventory and Monitoring 1998, USFWS, August

Appendix F: Intra-Service Section 7 Consultation

Will be included in the final Comprehensive Conservation Plan.

Appendix G: Step-Down and Other Plans Pertaining to the San Joaquin River National Wildlife Refuge—a Unit of the San Luis National Wildlife Refuge Complex

Title of Plan	*Status*	*Purpose*
–Station Plans–		
Fire Management Plan	Completed (2001)	Provides the proper procedures for all management activities involving fire on the Refuge including wildfire presuppression activities, wildfire suppression, and the use of prescribed fire. Step-down portions of this plan include the wildfire dispatch plan and step-up plan.
Disease Management Plan	Completed (1983)	Outlines procedures for the prevention and control of disease in migratory birds.
Chronic Wasting Disease Surveillance and Response Plan	Completed (2005)	Provides guidelines for dealing with chronic wasting disease issues with mule deer on the Refuge Complex.
Water Management Plan	Needs to be Completed	Provides guidelines for the management of wetlands on the Refuge.
Law Enforcement Plan	Needs to be Completed	Plan provides guidance for the law enforcement program on the Refuge.
Emergency Management Plan	Completed (1993)	Provides the protocol for the Complex when dealing with disaster and emergency situations.
Public Use Management Plan	Needs to be Completed	Describes and provides the procedures/guidance for all aspects of the Refuge's public use program.
Hunt Management Plan	Needs to be Completed	Documents the waterfowl resource and associated recreational waterfowl hunt program on the Refuge.
Upland Management Plan	Needs to be Completed	Document provides the upland management goals and implementation procedures for upland habitats on the Refuge.
Spill Response Plan	Completed (1973)	Outlines procedures for the prevention, handling and cleanup of hazardous materials and oil spills.
Safety Management Plan	Completed (1970)	Safety procedures outline for the San Luis National Wildlife Refuge Complex.
Fisheries Management Plan	Needs to be Completed	Documents the fisheries resource and associated aquatic management activities on the Refuge.
Biological Inventory Plan	Needs to be Completed	Procedures for documenting, monitoring and analyses of biological resources on the Refuge.

Title of Plan	*Status*	*Purpose*
Invasive Exotic Plant Control Plan	Needs to be Completed	Documents goals and techniques/procedures for controlling invasive, exotic plants on the Refuge.
–FWS Region 1 Plans–		
FWS Migratory Bird Disease Contingency Plan - Region 1	Completed (1984)	Documents the procedures and responsibilities for prevention and management of migratory bird diseases.
FWS Recovery Plan for Upland Species of the San Joaquin Valley, California–Region 1	Completed (1998)	Includes recovery plans for threatened and endangered species in the San Joaquin Valley including San Joaquin kit fox, riparian brush rabbit and riparian woodrat.
FWS Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes–Region 1	Completed (1995)	Includes recovery plans for threatened and endangered native fish species of the Sacramento-San Joaquin Delta including the chinook salmon, Sacramento splittail and Sacramento perch.
–FWS National or Other Regional Plans–		
FWS Director's Priorities	Completed (1999)	Provides goals and action items for the management of the National Wildlife Refuge System.
FWS Energy Management Plan	Completed (1986)	Outlines procedures and responsibilities for the FWS to reduce energy use and costs on its facilities.
FWS Aleutian Canada Goose Recovery Plan–Region 7	Completed (1982)	Plan outlines the efforts needed for the recovery of the Aleutian Canada Goose in North America.
–Other Plans–		
U.S. Shorebird Conservation Plan–Southern Pacific Region	Completed (1999)	Provides a review of issues and regional goals concerning the management of shorebirds.
California Partners in Flight. Riparian Bird Conservation Plan: A Strategy for Reversing the Decline of Birds Associated with Riparian Habitats in California	Completed (1998)	Outlines migratory birds of special concern which use Californian riparian habitats and provides recommendations for their monitoring, preservation and management.

Appendix H: Levee Breach Study

San Joaquin River National Wildlife Refuge—Phase I
Analysis of the Proposed Levee Breaches

CONTEXT AND RATIONALE FOR THE PWA (Phil Williams & Assoc.) STUDY
As a result of the January 1997 floods several levees failed along the west side of the San Joaquin River in the vicinity of the Tuolumne River confluence. After the flood, the levees were partially repaired; however, the San Joaquin River National Wildlife Refuge (SJRNWR) worked with the US Army Corps of Engineers (USACE) to plan a non-structural flood management alternative (NSA). This alternative includes breaching existing mainstream San Joaquin River levees on recently acquired Refuge land to restore wetland and riparian habitat. The proposed NSA will provide floodplain inundation behind project levees of up to 3,100 acres of Refuge land in some years.

The focus of this study is to examine habitat effects of proposed levee breaches and NSA refinements with particular emphasis on the needs of fish. The primary analysis tool used in this study was a one dimensional, looped network hydrodynamic model, MIKE ll. Model results include depth and time of inundation as well as simulated flow on reactivated floodplain at the Refuge.

The PWA report describes the historical setting of the site, the hydrodynamic modeling, evaluation criteria being used to assess the results and finally, the challenges of the project. Evaluation criteria being used include: frequency, duration, depth and area of flooding; potential for fish stranding; and potential for creation of non-native or predator fish species habitat. In addition, potential refinements of the currently proposed NSA are identified.

LIMITATIONS OF THE STUDY
Phase 1 of the present study (PWA phase one) represents an initial overview of the proposed non-structural flood management alternative proposed by the USACE. Refinements to the proposed alternative will be made in Phase 2 of the project. The results contained in the report represent the potential conditions of the Refuge under the existing topographical conditions and flow regimes. Modifications to these parameters are likely under proposed Phase 2 alternatives to improve potential habitat conditions at the Refuge.

No hydrodynamic model calibration or validation data were available at the time of the Phase One study and therefore the results should be considered with this in mind. In addition, no sensitivity analysis has been conducted in this Phase of the study.

FINDINGS
1. The floodplains outside the project levees at the SJRNWR (i.e. Lara, Hagemann, and Vierra properties) are likely to flood at approximately 16,000 cfs if breaches are made as proposed in the USACE NSA, and are cut to the depth of the adjoining ground elevation.

2. Implementation of the NSA is expected to cause flooding of this SJRNWR floodplain every two to three years, on average; this frequency is appropriate to achieve anadromous fish habitat enhancement goals.

Additional work has been funded by AFRP in concert with the Refuge to conduct a more detailed study which includes design recommendations. The results of this work are anticipated shortly after completion of the Refuge CCP.

Appendix I: References & Resources

Reports and Studies

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Final Emergency Levee Repairs, San Joaquin River Basin
Reclamation Districts 2100 and 2102, Stanislaus County, California USACE

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Appendix J: Relevant Federal Laws and Mandates

American Indian Religious Freedom Act (1978):
Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Americans With Disabilities Act (1992):
Prohibits discrimination in public accommodations and services.

Architectural Barriers Act (1968):
Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Clean Water Act (1977):
Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Emergency Wetland Resources Act of 1986:
This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973:
(16 U.S.C. 1531-1544, 87 Stat. 884), as amended
Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 act had amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through Federal action and by encouraging the establishment of State programs. The Act:

- Authorizes the determination and listing of species as endangered and threatened;
- Prohibits unauthorized taking, possession, sale, and transport of endangered species;
- Provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- Authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;
- Authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and
- Authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act of any regulation issued thereunder.

Environmental Education Act of 1990:
(20 USC 5501-5510; 104 Stat. 3325)
Public Law 101-619, signed November 16, 1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program.

Responsibilities of the Office include developing and supporting programs to improve understanding of the natural and developed environment, and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a Federal grant program; and administering an environmental internship and fellowship program. The Office is required to develop and support environmental programs in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service.

Executive Order 11988, Floodplain Management:

The purpose of this Executive Order, signed May 24, 1977, is to prevent Federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, Federal agencies Ashall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Executive Order 11990:

E.O. 11990 directs Federal agencies to (1) minimize destruction, loss, or degradation of wetlands and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372:

(Intergovernmental Review of Federal Programs):
Directs the Service to send copies of the Environmental Assessment to Iowa State Planning Agencies for review.

Executive Order 12898 (1994):

Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996):

Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the System.

Executive Order 13006 Locating Federal Facilities on Historic Properties in Our Nation's Central Cities:

Directs Federal agencies to select, utilize and maintain historic properties and districts, especially those located in cities' central business districts, whenever operationally appropriate and economically prudent.

Executive Order 13007 Indian Sacred Sites (1996):

Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Executive Order 13112, Invasive Species (1999):

Directs federal agencies to prevent introduction and provide control of invasive species.

Executive Order 13186, of Jan. 10, 2001:

Responsibilities of Federal Agencies to Protect Migratory Birds. FR 66(11), Jan. 17, 2001.

Federal Farmland Protection Policy Act (1979)
as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Federal List of Birds of Conservation Concern:
Draft Region 1and BCR 32 Birds of Conservation Concern.

Federal Noxious Weed Act (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.

Federal Records Act (1950):
Directs preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Act of 1956:
(16 U.S.C. 742a-742j, not including 742 d-l; 70 Stat. 1119), as amended:
The Act of August 8, 1956, as frequently amended, establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also with a direction to administer the Act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it directs a program of continuing research, extension, and information services on fish and wildlife matters, both domestically and internationally.

Section 7(a) of the Act (16 U.S.C. 742f; 70 Stat. 1122) requires the Secretary of the Interior to: 1) develop measures for "maximum sustainable production of fish"; 2) make economic studies of the industry and recommend measures to insure stability of the domestic fisheries; 3) undertake promotional and information activities to stimulate consumption of fishery products; 4) take steps "required for the development, advancement, management, conservation, and protection of the fisheries resources," and take steps ***"required for the development, management, advancement, conservation, and protection of fish and wildlife resources" through research, acquisition of land and water or interests therein, development of existing facilities, and other means.*** (Note: subsection 5 was amended and combined into subsection 4 by P.L. 95-616, November 8, 1978.).

Fish and Wildlife Conservation Act, 1988:
Amendment. Requires the Service to identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, likely to become candidates for listing under the Endangered Species Act of 1973". The Act also requires the Service monitor and assess migratory nongame birds and track efferts of environmental changes on these species. Report every 5 years to Congress. The Services' list of Birds of Conservation Concern derives from this legislation.

Fish and Wildlife Coordination Act (1934):
as amended: Requires that the Fish and Wildlife Service and State Fish and Wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources

development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

Fish and Wildlife Improvement Act of 1978:

This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.

Historic Preservation Acts:

There are various laws for the preservation of historic sites and objects.

Antiquities Act: (16 USC 431–433)—The Act of June 8, 1906, (34 Stat. 225) authorizes the President to designate as National Monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archeological and Historic Preservation Act: (16 U.S.C. 469-469c)—Public Law 86-523, approved June 27, 1960, (74 Stat. 220) as amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174) to carry out the policy established by the Historic Sites Act (see below), directed Federal agencies to notify the Secretary of the Interior whenever they find a Federal or Federally assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeologic data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such data.

Archaeological Resources Protection Act: (16 U.S.C. 470aa–470ll)—Public Law 96-95, approved October 31, 1979, (93 Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items.
This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resoruces; for any trafficking in such resources removed from Federal or Indian land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any State or local law.

Historic Sites, Buildings and Antiquities Act: (16 USC 461-462, 464-467)—The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971) declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January, 1989, 31 national wildlife refuges contained such sites.

National Historic Preservation Act of 1966: (16 U.S.C. 470-470b, 470c-470n)—Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the States. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation

(16 U.S.C. 468-468d). The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. As of January, 1989, 91 historic sites on national wildlife refuges have been placed on the National Register.

Public Law 100-588:

approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from $5,000 to $500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the Nation.

Land and Water Conservation Fund Act of 1948:

(1965) This act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

Migratory Bird Conservation Act of 1929:

(16 U.S.C. 715-715d, 715e,715f-715r)
This Act established the Migratory Bird Conservation Commission which consists of the Secretaries of the Interior (chairman), Agriculture, and Transportation, two members from the House of Representatives, and an ex-officio member from the state in which a project is located. The Commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary for sanctuaries or for other management purposes. Under this Act, to acquire lands, or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Hunting and Conservation Stamp Act:

(16 U.S.C. 718-718j, 48 Stat. 452), as amended:
The "Duck Stamp Act," as this March 16, 1934, authority is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

Migratory Bird Treaty Act (1918):

Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulation including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

National and Community Service Act:

Will make grants to States for the creation of full-time and/or part-time programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive post-employment benefits of up to $1000 per year for part-time and $2500 for full-time participants.

Thousand Points of Light B

Creates a non-profit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer in order to solve critical social issues, and to discover new leaders and develop institutions committed to serving others.

National and Community Service Act of 1990:

(42 U.S.C. 12401; 104 Stat. 3127)
Public Law 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the U.S. Fish and Wildlife Service.

American Conservation and Youth Service Corps B As a Federal grant program established under Subtitle C of the law, the Corps offers an opportunity for young adults between the ages of 16-25, or in the case of summer programs, 15-21,to engage in approved human and natural resources projects which benefit the public or are carried out on Federal or Indian lands.

To be eligible for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control and similar projects. A stipend of not more than 100 percent of the poverty level will be paid to participants. A Commission established to administer the Youth Service Corps will make grants to States, the Secretaries of Agriculture and Interior and the Director of ACTION to carry out these responsibilities.

National Environmental Policy Act of 1969:

(P. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by P. L. 94-52, July 3, 1975, 89 Stat. 258, and P. L. 94-83, August 9, 1975, 89 Stat. 424).
Title I of the 1969 National Environmental Policy Act (NEPA) requires that all Federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment."

The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

National Trails System Act:

Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

National Wildlife Refuge System Administration Act of 1966:

(16 U.S.C. 668dd-668ee) -- as amended:
This Act, derived from sections 4 and 5 of Public Law 89-669 (October 15, 1966; 80 Stat. 927), provides guidelines and directives for administration and management of all areas in the system, including "wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas." The Secretary is authorized to permit by regulations the use of any area within the system provided "such uses are compatible with the major purposes for which such areas were established." The purchase consideration for rights-of way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40% of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40% of such area would be beneficial to the species. The Act requires an Act of Congress for the divestiture of lands in the system, except (1) lands acquired with Migratory Bird Conservation Commission

funds, and (2) lands can be removed from the system by land exchange, or if brought into the system by a cooperative agreement, then pursuant to the terms of the agreement.

National Wildlife Refuge System Improvement Act of 1997:

Public Law 105-57, amends the National Wildlife System Act of 1966 (16 U.S.C. 668dd-ee), providing guidance for management and public use of the Refuge System. The Act mandates that the Refuge System be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management.

The Act establishes priorities for recreational uses of the Refuge System. Six wildlife-dependent uses are specifically named in the Act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These activities are to be promoted on the Refuge System, while all non-wildlife dependant uses are subject to compatibility determinations. A compatible use is one which, in the sound professional judgement of the Refuge Manger, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s).

As stated in the Act, "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."

The Act also requires development of a comprehensive conservation plan for each refuge and management of each refuge consistent with the plan. When writing CCP, planning for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other Federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination or developing a CCP.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998):

Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

Native American Graves Protection and Repatriation Act (1990):

Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

North American Wetlands Conservation Act:

(103 Stat. 1968; 16 U.S.C. 4401-4412)
Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, U.S. and Mexico.

The Act converts the Pitman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the Act, along with an authorization for annual appropriation of $15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act.

Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

A North American Wetlands Conservation Council is created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. The Council

is to be composed of the Director of the Service, the Secretary of the National Fish and Wildlife Foundation, a State fish and game agency director from each Flyway, and three representatives of different non-profit organizations participating in projects under the Plan or the Act. The Chairman of the Council and one other member serve ex officio on the Commission for consideration of the Council's recommendations.

The Commission must justify in writing to the Council and, annually, to Congress, any decisions not to accept Council recommendations.

Oil Pollution Act of 1990:

Public Law 101-380 (33 U.S.C. 2701et. seq.; 104 Stat. 484) established new requirements and extensively amended the Federal Water Pollution Control Act (33 U.S.C. 1301 et. seq.) To provide enhanced capabilities for oil spill response and natural resource damage assessment by the Service. It required Service consultation on developing a fish and wildlife response plan for the National Contingency Plan, input to Area Contingency Plans, review of Facility and Tank Vessel Contingency Plans, and to conduct damage assessments associated with oil spills. The following are the pertinent provisions.

Title I, section 1006, provided that Federal trustees shall assess natural resource damages for natural resources under their trusteeship. Federal trustees may, upon request from a State or Indian tribe, assess damages to natural resources for them as well. Trustees shall develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of natural resources under their trusteeship.

Title I, section 1011, provides that trustees are to be consulted on the appropriate removal action to be taken in connection with any discharge of oil.

Title I, section 1012, provided for the uses of the oil pollution fund. In addition to response costs, the fund may be used without appropriations to pay the costs of assessments, as well as to pay claims for natural resource damages if there are no funds or insufficient funds from a responsible party. (A claims procedure was to be developed under section 1013.) This section also stipulated deadlines for the submission of removal cost claims and damage claims.

Title IV, section 4202, amended subsection 311(j) of the Federal Water Pollution Control act with respect to the National Planning and Response System. It defined area committees and area contingency plans, and requirements and deadlines for agencies. Under this section, the Service is required to generate a list of all equipment, including fire fighting equipment, as well as personnel and any other equipment and supplies that could be used to expedite the removal of oil or mitigation of a spill.

One aspect of particular interest to the Service involves the identification of ecologically sensitive areas and the preparation of scientific monitoring and evaluation plans. Research conducted by the Service is to be directed and coordinated by the National Wetland Research Center.

Public Law 98-293:

approved May 22, 1984 (98. Stat. 207)
Renamed the Brigantine National Wildlife Refuge and Barnegat National Wildlife Refuge, collectively, as the Edwin B. Forsythe National Wildlife Refuge, in memory of the late Congressman Forsythe of New Jersey, ranking member of the House Merchant Marine and Fisheries Committee for many years.

Refuge Recreation Act of 1962:

This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational

facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Refuge Revenue Sharing Act:

(16 U.S.C. 715s)
Section 401 of the Act of June 15, 1935, (49 Stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges.

Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as:

1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and

2) on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662), payment in lieu of taxes on public lands.
This amendment also authorized appropriations to make up any difference between the amount in the Fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county which suffer losses in revenues due to the establishment of Service areas.

Rehabilitation Act of 1973:

(29 U.S.C. 794)as amended:
Title 5 of P. L. 93-112 (87 Stat. 355), signed October 1, 1973, prohibits discrimination on the basis of handicap under any program or activity receiving Federal financial assistance.

Rivers and Harbor Act (1899):

(33 U.S.C. 403): Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Surface Mining Control and Reclamation Act (1977):

(Public Law 95-87) (SMCRA):as amended:
Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Transfer of Certain Real Property for Wildlife Conservation purposes Act of 1948:

This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970):

as amended:
Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

Wilderness Act of 1964:

(16 U.S.C. 1131-1136; 78 Stat. 890)
Public Law 88-577, approved September 3, 1964, The Wilderness Act of 1964 directs the Secretary of the Interior to review, within ten years, every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a "minimum Tool" management approach which requires refuge managers to use the least intrusive methods, equipment and facilities necessary for administering the areas.

Youth Conservation Corps Act:

(16 U.S.C. 1701-1706, 84 Stat. 794)as amended:
Public Law 91-378, approved August 13, 1970, declares the YCC pilot program a success and establishes permanent programs within the Department of Interior and Agriculture for young adults who have attained the age of 15, but not the age of 19, to perform specific tasks on lands and waters administered under jurisdiction of these Secretaries. Within the Fish and Wildlife Service, YCC participants perform various tasks on National Wildlife Refuges, National Fish Hatcheries, research stations, and other facilities.

The legislation also authorizes the Secretary of Interior and the Secretary of Agriculture to establish a joint grant program to assist States employing young adults on non-Federal public lands and waters throughout the U.S.

Requires the Secretaries of Interior and Agriculture to prepare a joint report to the President and Congress prior to April 1 of each year.

Appendix K: Mailing List

Elected Federal Officials
U.S. Senator Feinstein
U.S. Senator Boxer
U.S. Representative Condit

Federal Agencies
USDA/Natural Resource Conservation Service
USDI/Fish and Wildlife Service, Region 1 (Portland, Oregon), Region 2 (Albuquerque, New Mexico), Region 3 (Fort Snelling, Minnesota), Region 4 (Atlanta, Georgia), Region 5 (Hadley, Massachusetts), Region 6 (Denver, Colorado), Region 7 (Anchorage, Alaska), National Conservation Training Center (Shepherdstown, West Virginia)
U.S. Army Corps of Engineers
U.S. Department of Agriculture
Bureau of Reclamation
Cooperative Alliance for Refuges
Fish and Wildlife Service–CVPIA Implementation Team
Fish and Wildlife Service–CA/NV Operations Office
Fish and Wildlife Service–Central Valley Habitat Joint Venture
Fish and Wildlife Service–Realty, Sacramento
U.S. Environmental Protection Agency
Farm Bureau

Elected State Officials
Governor Gray Davis
State Representative Monteith
State Assemblyman Cordoza
State Assemblyman Frusetta

State Agencies
Tuolumne River Restoration Center - DFG
CALTRANS
California Reclamation Board
California Department of Fish and Game
California Department of Conservation
State Water Resources Control Board-Delta Unit
California Department of Food & Agriculture
California Department of Parks & Recreation
California State Clearinghouse
California Department of Water Resources
Resources Agency–Water Policy and Science Advisor
CALFED Bay-Delta Program
ESRP–Endangered Species Recovery Program

Tribes
Me-Wuk Tribe
Ione Band of Miwork Indians
American Indian Council of Mariposa County
Table Mountain Rancheria
Picayune Rancheria
Tuolumne Rancheria

Santa Rosa Rancheria
Tuolumne Band of Me-Wuk
Native American Heritage Commission
American Indian Council of Mariposa County

City/County/Local Governments

City of Atwater
City of Modesto
San Joaquin County Board of Supervisors
Stanislaus County Board of Supervisors
City of Ripon Fire Department
El Solyo Water District
San Joaquin Valley-Southern Sierra Region
City of Patterson
Stanislaus County Parks
Stanislaus County Farm Bureau Board
Stanislaus County Fish and Wildlife Committee
City of Ripon
City of Oakdale
Turlock Mosquito Abatement District
Farm Bureau Stanislaus County
Farm Bureau Modesto
Sacramento/San Joaquin Estuary FRO
Turlock Irrigation District
Department of Planning and Community Development, Stanislaus County
Stanislaus County
Fire Chief, City of Patterson
City of Merced
Stanislaus Area Ass. of Governments
White Lake Mutual Water Dist.
Resources Agency, Water Policy and Science Advisor
West Stanislaus Irrigation District
City of Modesto, Community Development Dept.
Grasslands Water District
AICP-City of Modesto, Community Development Dept.
City of Tracy
City of Stockton
Resource Conservation District-West Stanislaus County
East Side Mosquito Abatement District-Modesto

Public Libraries

Modesto Public Library
Atwater Public Library
Tracy Public Library
Stockton Public Library
Stanislaus Public Library

Organizations

Defenders of Wildlife
Ducks Unlimited
National Audubon Society
National Wildlife Refuge Association
Sierra Club

The Conservation Fund
The Nature Conservancy
Wilderness Watch
Wildlife Management Institute
Sacramento/San Joaquin Estuary FRO
California Striped Bass Association
San Joaquin Audubon Society
California Farm Bureau Federation
Golden Gate Audubon Society
Napa-Solano Audubon Society
Central Sierra Audubon Society
Morro Coast Audubon Society
National Marine Fisheries Service
All Pro Environmental Corporation
CAFF
Stanislaus Audubon Society
Sacramento River Partners
American Farmland Trust
Trust for Public Land
Stanislaus Stakeholders Group
Tulare Audubon Society
Yokuts Group of the Sierra Club
EDAW
Yosemite Audubon Society–Field Trip Chair
American Farmland Trust
Mt. Diablo Audubon Society
Sacramento Audubon Society
Ecology Action
Community Resource Center, Modesto
Friends of the Tuolumne
Sutter Basin Corporation
Jones & Stokes Associates, Inc.
Stanislaus Connections
Point Reyes Bird Observatory
Stillwater Sciences
Tuolumne River Preservation Trust
Yolo Audubon Society-Field Trip Chair
James J. Stevinson Corp.
Old Fisherman's Club
David Evans & Associates, Inc.
Rocky Mountain Elk Foundation
Beveridge & Diamond
Stanislaus Fly Fisherman
Fresno Audubon Society
Cal Trout
Central Sierra Audubon Society
Pacific Institution
Friends of the River-Senior Policy Advocate
William and Flora Hewlett Foundation
Riparian Habitat Joint Venture/CA Audubon Society
Dry Creek Homeowners Association
Great Valley Center
Wolfe & Associates

Office of Historic Preservation
National Wildlife Federation
Natural Heritage Institute
Great Valley Center
Native American Heritage Comm.
California Waterfowl Association
Marjal Corp.
California Native Plant Society
Sacramento River Partners
Natural Resources Defense Council
National Fish and Wildlife Foundation
Sierra Club-Tehipite Chapter
San Joaquin Wildlife Rescue Center
Trust for Public Land
Environmental Defense Fund

Colleges/Universities

Modesto Junior College
Stanislaus State University
California State University, Stanislaus

Local Landowners

Faith Ranch
G&H Farms
PMZ Ranch RE
The Orchard RV Park
Chicken Ranch Rancheria of Me-Wuk
Joseph Gallo Farm
El Solyo Dairy
Collier Farms Inc.
Maring Farms, Inc.

Newspapers

The Modesto Bee
Stockton Record

Others

Individuals who participated in open house session or focus group or who requested to be on the mailing list
National Wildlife Refuge, planning team members, other agencies

Note: This list includes individuals and organizations who were mailed the Draft and/or Final CCPs upon their release. Others were made aware of these documents' availability through notices, the World Wide Web, word of mouth, etc, and/or requested copies.

Appendix L: List of Preparers

CCP Core Team:
Tina Chouinard, Refuge Biologist–San Luis NWR Complex
Scott Fraser, Refuge Operations Specialist–San Luis NWR Complex
Miki Fujitsubo, Refuge Planner–FWS CNO Office
Leslie Lew, Refuge Planner–FWS CNO Office
Dennis Woolington, Supervisory Wildlife Biologist–San Luis NWR Complex

CCP Expanded Team:
John Beam, Biologist–California Department of Fish and Game
Mike Chouinard, Easement Program Manager–San Luis NWR Complex
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Scott Frazer, Refuge Operations Specialist–San Luis NWR Complex
Miki Fujitsubo, Refuge Planner–FWS CNO Office
John Fulton, Refuge Operations Specialist, Visitor Services–San Luis NWR Complex
Leslie Lew, Lead Refuge Planner–FWS CNO Office
Mark Pelz, Refuge Planner / GIS Analyst–FWS CNO Office
Dennis Woolington, Supervisory Wildlife Biologist–San Luis NWR Complex
Gary Zahm–Independent Consultant

CCP Contributors:
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Rhonda Reed, AFRP Biologist–California Department of Fish and Game
Chris Schoneman, Assistant Refuge Manager–San Luis NWR Complex
Scott Spaulding, Biologist–FWS AFRP
Todd Williams, Refuge Biologist–San Luis NWR Complex

Note: During the CCP process numerous changes and transitions in personnel and team make up occurred.

Appendix M: Wilderness Review

A wilderness review is the process used by the U.S. Fish and Wildlife Service to determine whether or not to recommend lands or waters in the National Wildlife Refuge System to Congress for designation as wilderness. The Service is required to conduct a wilderness review for each refuge as part of the CCP process. Lands or waters that meet the minimum criteria for wilderness are identified in the CCP and further evaluated to determine whether these lands or waters merit recommendation for inclusion in the Wilderness System.

According to Section 13 of the Service's Directors's Order No. 125 (12 July 2000), in order for a refuge to be considered for wilderness designation, all or part of the refuge must:

- Be affected primarily by the forces of nature, with the human imprint substantially unnoticeable;
- Have outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- Have at least 5,000 contiguous acres (2,000 ha) or be sufficient in size to make practicable its preservation and use in an unimproved condition, or be capable of restoration to wilderness character through appropriate management, at the time of review; and
- Be a roadless island.

The San Joaquin River NWR comprises 6,587 non-contiguous acres in fee title and various conservation and wetland reserve easements. The Refuge's landscape has significant evidence of past and current human agricultural use and activities. This land use evidence includes roads and state highways, farm and dairy structures, levees and water conveyance structures. Some Refuge lands are still in agricultural production along with adjacent properties. Within the Refuge boundaries are various levee and utility easements including a major California water pipeline.

For these reasons, it is determined that the San Joaquin River National Wildlife Refuge does not meet the criteria for wilderness designation.

Appendix N—Estimate of Refuge Water Needs

9-10-01, rev. 9/18

Land use Areas

1. Wetlands
Permanent units require 10 acre feet (AF) per year
Semi-permanent units require 8 AF per year
Seasonal units require 6.5 AF per year

East units	***Size***	***Water Regime***	***Consumptive Use***
Upper Miller Lake	16 ac.	permanent	160 AF
Nelson Lake	56 ac.	semi-perm.	448
Goose Lake	80 ac.	seasonal	520
Page Lake	70 ac.	seasonal	455
Ringneck Slough	100ac.	seasonal	650
Colwell Roost	80 ac.	seasonal	520
Subtotal	**402 ac.**		**2753 AF / year**
West Units			
River Bend	95 ac.	seasonal	618
Creekside	5 ac.	seasonal	32
Lower White Lake	367 ac.	permanent	3670
Upper White Lake	182 ac.	semi-perm	1456
Subtotal	**649 ac.**		**5776 AF /year**
Total Wetland use			**8,529 AF/ year**
2. Irrigated pasture	**467 ac.**		**3736 AF**

• 8 AF per year gross application (as per NRCS pers. comm. Dan Johnson 9-11-01)

List of Irrigated Pastures

90 acre field	97 ac.
Beet field	48 ac.
Johnson field	102 ac.
South Johnson field	68 ac.
Lower 34	17 ac.
Maze Bottom	105 ac.
Quresma field	30 ac.
	467 acres

3. Irrigated cropland 700 ac. 3325 AF

- 4.75 AF per year with double cropping corn and winter wheat
- Consider alternative use of alfalfa (alfalfa uses 41.85 inches of water (3.5 AF) per year, as per NRCS, Modesto Field Office)
- Riparian restoration planting varies each year of implementation. Assume 700 acre maximum irrigation at full development and water requirement assumed to be same as a mature orchard at 5.5 AF per acre. Total: 3,850 AF

List of Irrigated Crop Fields

Page field	65 ac.
Dairy field	205 ac.
Colwell new	150 ac.
Arambel hay	130 ac.
Hagemann food plo	150 ac.
	700 acres

Grand total, all water requirements 19,440 AF/YR

4. Water Delivery "System"

Water sources for the Refuge are varied by field location. Some portions of the Refuge have combinations of the following water sources; wells, Modesto Irrigation District canal, riparian lift pump, and agricultural tail water. The reliability, cost and quality of water varies within a wide range of variation. The dry upland sites on the Refuge are in close proximity to wetland or irrigated fields. Therefore habitat quality and conditions are closely associated with the type of water available.

Generally the East units have water sources that were used by the previous landowner for agricultural operations. These sources are intertwined with the continuing operation of neighboring ranches. Distribution of Refuge water sources is accomplished as part of the Cooperative Land Management Agreement with the Mapes Ranch. A new ground water well was installed in 2000 in the Dairy field.

Water sources for the West units consist primarily of riparian diversions and tail water. Three lift pump stations have been abandoned due to concerns of fish screen installation, maintenance cost and flood damage. Selected lift pump stations will be retained for continued use. The Refuge is conducting a consultation with the National Marine Fisheries Service as required by section seven of the endangered species act on the potential impact of lift pumps on salmon and steelhead. Additional consultations are anticipated to consider potential impacts to other listed fish species (ie. Sacramento splittail). Well water quality and cost has prohibited sustained use to meet Refuge requirements from ground water sources.