

1 Introduction

1.1 Study Purpose and Overview

This study was conducted to assess existing public recreation uses, access, needs, and opportunities on lands along a 100-mile actively-meandering and often flooded stretch of the Sacramento River between Red Bluff and Colusa. The study was funded by a CALFED grant (97NO2) awarded jointly to The Nature Conservancy (TNC), the U.S. Fish and Wildlife Service (USFWS), the California Wildlife Conservation Board, and the California Department of Fish and Game (DFG). The primary goals of this study were two-fold: 1) to identify and characterize existing public access opportunities and needs associated with public recreation facilities and infrastructure, and 2) to identify and make recommendations for future public recreation access opportunities in the study area through coordinated management. This study is intended to focus on the potential public use of five “focus sites,” including the Gunhill, Rx Ranch, and Ward tracts recently acquired by TNC, and the Dead Man’s Reach and Capay units owned by the USFWS, as part of the Sacramento River National Wildlife Refuge. The USFWS is currently in the process of developing a Comprehensive Conservation Plan for the Refuge, which will make specific determinations as to the use of the Dead Man’s Reach and Capay Units. Secondly, this study is intended to provide general information regarding existing facilities and public recreation opportunities and needs within the 100-mile river corridor.

This study was based on comprehensive site analyses and information gathered from land managers, law enforcement groups, interest groups, the public, and previous recreation studies conducted in the study area. The objectives of this study were to:

- Inventory and assess the current public access facilities and characterize their recreation use, condition, and problems;
- Assess the five focus sites to determine prospects for providing public recreation access facilities at those sites;
- Conduct a recreation needs assessment and determine interests and concerns of managers, interest groups and the public, based on analyses of local and regional socio-demographics and recreation use and activity patterns, interviews with resource agency managers and interest groups, and comments made during public meetings;
- Determine opportunities and constraints for public recreation access and use of the study area, consistent with the goals and mandates of public landowners and private landowners that provide public access, and compatible with the values and landowner concerns in the study area;

- Determine existing land management and law enforcement coordination efforts, and opportunities and constraints for future management coordination efforts regarding public recreation access;
- Provide public recreation access recommendations for facilities and amenities throughout the study area, and concepts and recommendations for the focus sites;
- Discuss permitting and regulatory requirements related to recreation facilities and amenities development and maintenance;
- Provide recommendations for the development of management coordination, law enforcement and other programs to plan for and support recreation use; and
- Make recommendations for further evaluation of the potential for new recreation opportunities within the region.

This document is organized in seven chapters including this introduction. Chapter 2 provides results of the recreation facilities, infrastructure and usage assessment. Chapter 3, based on Chapter 2 findings, provides a general description of site opportunities and constraints. Chapter 4 provides separate sections for the results of several recreational needs analyses and concludes with a synthesis of those studies. Chapter 5 contains the findings regarding management coordination needs, and Chapter 6 provides results of law enforcement needs pertaining to public recreation in the study area. Chapter 7 provides recommendations and conclusions pertinent to this study based on the preceding chapters, and also provides information on permitting and regulatory requirements and the need for further studies.

1.2 Related Studies

Related studies are underway in the study area and in adjacent reaches of the Sacramento River corridor. Studies are being conducted by the USFWS, U.S. Bureau of Land Management (BLM), DFG, California Department of Parks and Recreation (DPR), and the California Department of Water Resources (DWR).

1.2.1 USFWS Comprehensive Conservation Plan

The USFWS is in the process of developing a Comprehensive Conservation Plan (CCP) for the Sacramento River National Wildlife Refuge (SRNWR) and public use and access are major issues being addressed. Public meetings were conducted during the past year to gather information and to discuss ideas for the CCP. The CCP is expected to be completed in the summer of 2003 and will guide management of the Refuge for the next 15 years. Recreation uses being considered would need to be consistent with the Refuge's mission to preserve, restore, and enhance riparian habitat for threatened and endangered species, and other wildlife and vegetation. Compatible recreation opportunities that could be considered in the Refuge

include hunting, fishing, hiking, wildlife observation, environmental education, and nature interpretation. Upon completion of the CCP, portions of the Refuge may become accessible to the public, while other areas may need to remain restricted in terms of public access. The results of this Public Recreation Access Study will be considered as part of the input to the CCP.

1.2.2 Bureau of Land Management

The Bureau of Land Management has indicated that it plans to transfer two properties in the study area, Todd Island and Foster Island, to USFWS, subject to public access being permitted as part of the CCP. The Bureau is very active along the river, just north of the study area, in the Jelly's Ferry / Paynes Creek area, which has been determined to be an Area of Critical Concern. This area is also proposed as a National Conservation Area as part of pending federal legislation.

1.2.3 California Department of Fish and Game

DFG has initiated the development of a Comprehensive Management Plan for the Sacramento River Wildlife Area. The Plan will involve detailed inventory and analysis of the 13 units, extensive public outreach and coordination with other management agencies active in the study area. The plan will update DFG's management strategy for the Wildlife Area. All of the Wildlife Area is currently open to public recreation and public use is expected to be a major consideration in the planning effort. The results of this Public Recreation Access Study will be considered as part of the input to the Comprehensive Management Plan.

1.2.4 California Department of Parks and Recreation

DPR is currently preparing a General Plan for the Sacramento-Bidwell State Park that will guide the Park's resources management, including facilities and land uses, for the next 20 years. Development of the General Plan will begin in 2003 and will be completed by June 2004. The results of this Public Recreation Access Study will be considered as part of the input to the General Plan.

1.2.5 California Department of Water Resources

DWR has initiated a project to develop a Sacramento River Access Website. The intent of the project is to consolidate and organize information from this Public Recreation Access Study and other sources to provide online public information in regard to public access and recreation along the river.

1.3 Approach

1.3.1 Study Area

The project study area includes the 100-mile Sacramento River corridor from Red Bluff to Colusa, including all publicly owned and privately owned properties with public recreation access opportunities in proximity to the river (Exhibit 1-1). Publicly owned land with no current public access was also included in the study. All properties were entirely or partly within the “inner river zone” (IRZ). The IRZ is defined as the 150-year meander zone of the Sacramento River, or the location in which the river has meandered within the past 100 years and is predicted to meander over the next 50 years. Most of these properties also lie within the 2½- to 4-year flood zone of the river, which means that they get flooded, on average, once every 2 to 4 years, generally in winter or spring. The IRZ defines a planning boundary called the Sacramento River Conservation Area. The Conservation Area extends from Keswick Dam near Redding to Verona, just north of Sacramento. The study area includes the central portion of the Conservation area. The four counties in the study area, from north to south, are Tehama, Butte, Glenn, and Colusa.

1.3.2 Facilities, Infrastructure, and Usage Assessments

As a basis for evaluating recreational needs and site opportunities and constraints for development and/or renovations, a general visual inventory and analysis was conducted at all sites in public and private ownership with facilities or infrastructure (including public trails) within the inner river zone to identify existing resources and amenities and evaluate their condition. Phone and e-mail correspondence was conducted with site managers as follow up to further evaluate the sites and to determine the types and level of use and problems at the sites. The sites were identified through coordination with local, state, and federal agencies, and TNC. Privately owned property with no public access was excluded from the study. Assessments of sites in the study area, including focus sites purchased with CALFED funding, were conducted by boat, car, and on foot between July and September 2002 by an environmental planner and a recreation analyst. Additional surveys, which included a biologist, were conducted at the focus sites again in October 2002. Information on the characteristics of the USFWS sites was obtained primarily through communications with the SRNWR managers and biologists.

During the site assessments, an inventory and characterization was made of facilities, apparent amenities, and other site characteristics and their condition both onsite and in adjacent areas. Features assessed included buildings, trails, road access, boat facilities, camp and picnic sites, and physical and vegetation conditions and site stability. Maintenance levels and problems were also assessed because they can affect the level of use of a facility. A general evaluation

Exhibit 1-1

was also made as to the feasibility of adding new facilities to a site, based on site sensitivities and likely use and impact levels if the facilities were developed.

1.3.3 Recreational Needs Analysis

The recreational needs analysis for this study was based on a combination of analyses of information gathered from existing local, state, and national studies, including data pertinent to the study area. It was also based on interviews with facility managers and representatives of interest groups, and on statements provided during public meetings. Manager interviews were conducted by EDAW planners between September and November 2002. Public meetings were held in Hamilton City on September 23, 2002, and at the Woodson Bridge RV Park near Corning on November 6, 2002. Additional details of the methods used for conducting these studies and analyses are provided in Chapter 4, Recreational Needs Analysis.

The purpose for these studies was to identify unmet needs and to characterize the types of recreation uses, and levels and patterns of use, and to determine the needs and preferences of recreational users. The studies were also conducted to determine maintenance and operations issues and concerns, concerns from, or issues with, adjacent private landowners, public safety issues, and needs and priorities for development and/or renovations.

1.3.4 Management Coordination and Law Enforcement Needs Analyses

The management coordination analysis was based on phone interviews with land managers and on a series of three facilitated meetings held in the fall of 2002. Land managers included federal, state, and local owners of public and private land with public recreation access opportunities or potential. The purpose of the study was to determine existing management coordination efforts, and opportunities and constraints for management coordination in the future.

The law enforcement coordination analysis was based on a limited set of phone interviews by EDAW planners conducted in November and December 2002, and an analysis of existing data from other studies. The purpose of the study was to determine the level of law enforcement support required to adequately patrol existing recreation areas, as well as the support needed in the future. The study was also conducted to determine the need for coordination between law enforcement staff and land managers in the region to develop effective approaches for public safety. Additional details on the methods used to conduct the management and law enforcement coordination studies are provided in Chapters 5 and 6.

1.4 Regional Setting

This section includes a discussion of the history, physical characteristics, land uses, and biological resources typifying the study area and providing the context within which the public recreation access study is conducted.

1.4.1 History

Historically, prior to the development of agriculture during the 1800s and 1900s, vast seasonal wetlands, grasslands, riparian forest and valley oak woodland existed in the Sacramento Valley and were used by millions of waterfowl migrating down the Pacific Flyway to winter in the valley (among resident water birds, deer, elk, pronghorn, and grizzly bear). Much of this natural habitat was replaced with rice, orchards and other crops as the Sacramento Valley became one of the most productive agricultural areas in the world. Additionally, levees were constructed in many areas along the river, to confine the river for irrigation and flood control. These levees also served to prohibit the natural creation of new wetlands, which only exacerbated the problem of shrinking natural habitat (Sacramento River Conservation Area Forum [SRCAF] 2002).

In the late 1970s, the State of California Reclamation Board recognized the need to retain and preserve riparian vegetation along the Sacramento River within the study area reach to stabilize the river channel, protect levees, reduce erosion and maintain proper operation of the Sacramento River Flood Control Project. This resulted in the acceptance of the Murray, Burns and Kienlen letter report in 1978 (entitled “Retention of Riparian Vegetation: Sacramento River, Tisdale Weir to Hamilton City”)(Reclamation Board 1978). The Board directed and encouraged “that all activities carried out along the Sacramento River Flood Control Project from Tisdale Weir to Hamilton City be consistent with the recommendations” of the report (SRCAF 2002).

The United States Congress established the Sacramento River National Wildlife Refuge (Refuge) in 1989 by the authority granted them under the Endangered Species Act of 1973 and the Emergency Wetlands Resources Act of 1986, and used funds available through the Land and Water Conservation Fund Act of 1965. The purpose of the Refuge “is to preserve, restore and enhance riparian habitat for threatened and endangered species, neotropical migrants, waterfowl and other migratory birds, anadromous fish, residential riparian wildlife and plants.” The riparian community along the Sacramento River was and is viewed as “one of the most important wildlife habitats in California and North America.” The Refuge is serving to protect and restore a small portion of habitat that once existed; hence, as the birds continue to fly their ancient routes along the Pacific Flyway, the Refuge provides a significant amount of the wintering habitat for waterfowl (SRCAF 2002).

In 1986, the State Legislature passed Senate Bill 1086 calling for a management plan for the Sacramento River and its tributaries “that would protect, restore, and enhance both fisheries and riparian habitat” and which established an Advisory Council to develop specific, action-oriented plans. The Sacramento River Conservation Area Handbook (2002) was developed to address “both the dynamics of riparian ecosystems as well as the realities of local agricultural issues” and set forth a set of guiding principles and planning tools to be used for riparian habitat management along the river. In May 2000, the Sacramento River Conservation Area Forum (SRCAF), a non-profit, public benefit corporation was formed to coordinate activities along the river. A Board of Directors made up of private landowners, public interest representatives from each of the seven counties involved, ex-officio members from six state and federal agencies, and an appointee of the Resource Agency governs the SRCAF. Most of the work of the organization focuses on the area within the “inner river zone” primarily between Red Bluff and Colusa where flooding and channel movement occur (SRCAF 2002).

Additionally, the mission of the CALFED Bay-Delta Program, formed in 1994, is “to develop a long-term, comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta System (CALFED 2002).” The strategies and elements of the Program will contribute to improvements in four resource areas: water quality, water-use efficiency, ecosystem restoration and levee system integrity.

In addition to government actions, private land trusts and conservancies, such as TNC, are focusing their efforts on riparian protection, restoration, and sustainable agriculture along the river seeking to “develop and demonstrate examples of successfully integrated land use along the Sacramento River” (SRCAF 2002). TNC, working closely with a variety of public partners and willing landowners, acquires existing riparian forest habitat for protection of natural resources, and flood-prone agricultural lands for ecological restoration with the goal of creating large contiguous blocks of riparian forest for natural resource values and functions. Land purchased by TNC is generally conveyed to the public agency deemed most suitable for managing the site.

The study area now includes over 18,500 acres of land that has come into conservation ownership over the past 20 years and another 40 acres of private recreation-oriented resorts. Along with the increase in public land in the study area, has come public pressure to have access to use it for recreation.

1.4.2 Physical Characterization

The Sacramento River is a large alluvial river that drains much of northern California and serves as a water source for millions of acres of farmland and millions of people throughout the state. Within the study area the Sacramento River is classified as a meandering river, where “relatively stable, straight subreaches alternate with more sinuous, dynamic subreaches” (SRCAF 2002).

Within a dynamic river system, the processes of erosion and deposition result in a constantly changing river course. The area where the river has flowed in the past and is anticipated to flow in the future is designated as the inner river zone. The **inner river zone** is defined in the Sacramento River Conservation Area Handbook as “the estimated portion of river alluvium that has experienced river channel migration in the recent past and is likely to experience channel movement in the near future; the area includes the 100-year meander belt and area of projected bank erosion over the next 50 years” (SRCAF 2002). Additionally, a river is composed not only of the channel but also includes the adjacent floodplain. The floodplain within the study area ranges from between 1½–4 miles wide downstream of Red Bluff to below Chico Landing where the levee system constrains the pattern of flooding and sediment deposition. The natural dynamics of intermittent flooding, meander migration, and sediment deposition help to maintain a healthy riparian ecosystem that provides crucial habitat for hundreds of resident and migratory birds, fish and wildlife species. It also provides a rich bed load of fine soil and nutrients in the extended flood zone that have enabled productive farming for miles along the broad river corridor.

1.4.3 Land Use

The Sacramento River is an important farming and natural resource conservation region of California. In the subreach between Red Bluff and Chico Landing about 30% of the inner river zone is planted in agricultural crops (walnuts, almonds and prunes) with orchards found along more stable subreaches and riparian woodland habitat covering about 35% of the land area, primarily along the more dynamic reaches. Within this same corridor, there is very little development within the inner river zone other than four bridges that span the river. In contrast to the northern and central subreaches, the southern subreach of the study area is characterized by a much higher proportion of riparian woodland habitat and substantially lower proportion of agriculture. Between Chico Landing and Colusa, only about 16% of the inner river zone is used for agriculture while riparian vegetation covers approximately 48% of the land area. Several small towns are located on the river within the subreach from Chico Landing to Colusa, including Glenn, Princeton, Butte City and Ord Ferry in addition to two bridges that span the river.

1.4.4 Biological Resources

The biological resources of the study area are shaped and supported by the physical and hydrological patterns of the dominating river system. The geology of the study area is characterized by sedimentary features associated with the river. Major physiographic features of the Sacramento River corridor in the project region include floodplains, basins, terraces, active and remnant channels, and oxbow lakes (Exhibit 1-2). These features, together with the historic and current hydrology and dynamic meander pattern of the Sacramento River, provide for a diverse array of riparian plant communities and associated wildlife habitats along the river

Exhibit 1-2

channel intermixed in a broad arable floodplain. Most of these habitats are currently fragmented remnants of the historically extensive riparian forest and the river is bounded by levees and agricultural development in numerous locations. Regardless, because of the extensive conversion of California's natural habitat to important agricultural, urban, and rangeland uses over the past 150 years, remaining riparian communities now provide the most important habitat for once extensive populations of now threatened resident and migratory birds, reptiles, amphibians, and mammals. Populations of many species may recover in abundance and distribution if sufficient habitat is made available again.

Based on GIS data from TNC and vegetation classification data from the University of California, Santa Barbara/DFG (UCSB/DFG) Gap Analysis Program (GAP), the major natural plant communities in the study area are mixed riparian forest, riparian scrub, ruderal, emergent wetlands, valley oak woodland, and grassland. Other land cover types include open water, agricultural, urban, and barren/gravel. The natural plant communities are confined almost entirely to areas immediately adjacent to the river or where historic channels occurred. Discussed below are the general plant communities, cover types, and associated wildlife species that are expected to be found in the study area. Sensitive biological resources in the study area are discussed briefly in Chapter 3 and Appendix A.

1.4.4.1 Mixed Riparian Forest

The most common natural community within the study area is mixed riparian forest. The mixed riparian forest is characterized by a multistory canopy dominated by upper story species, including Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*); mid story trees including California black walnut (*Juglans californica* var. *hindsii*), valley oak, box elder (*Acer negundo*), Goodding's black willow (*Salix gooddingii*); and understory vines, shrubs, grasses, and forbs, including Himalayan blackberry (*Rubus discolor*), native blackberry (*Rubus ursinus*), California wild grape (*Vitis californica*), and poison oak (*Toxicodendron diversilobum*). Wild grape and occasional blackberry vines grow up through the forest canopy layers forming lianas. Numerous other species occur, but do not dominate this plant community, including trees and shrubs such as Oregon ash (*Fraxinus latifolia*), white alder (*Alnus rhombifolia*), blue elderberry (*Sambucus mexicana*), arroyo willow (*Salix lasiolepis*), narrow-leaf willow (*Salix exigua*), coyote bush (*Baccharis pilularis*), mule fat (*Baccharis salicifolia*), and California wild rose (*Rosa californica*); and herbaceous species such as mugwort (*Artemisia douglasii*), poison oak, Dutchman's pipe (*Aristolochia californica*), wild cucumber (*Marah fabaceus*), virgin's bower (*Clematis ligusticifolia*), and Barbara's sedge (*Carex barbarea*).

Of the existing plant communities in the study area, mixed riparian forest is expected to support the highest diversity of wildlife, including birds, reptiles, amphibians, and mammals. The

number of bird species is expected to be particularly high, and this habitat could support relatively large numbers of breeding birds. Bird species expected to occur in mixed riparian forest on the site include Bewick's wren (*Thryomanes bewickii*), black-headed grosbeak (*Pheucticus melanocephalus*), spotted towhee (*Pipilo maculatus*), tree swallow (*Tachycineta bicolor*), and western wood-pewee (*Contopus sordidulus*). A number of mammals, including gray fox (*Urocyon cinereoargenteus*), ringtail (*Bassariscus astutus*), and a variety of rodents, occur in riparian forest in the Sacramento Valley.

1.4.4.2 Valley Oak Woodland

The valley oak riparian forest is characterized by a multistory canopy and species composition similar to the mixed riparian forest. The primary distinctions are dominance by valley oaks and a smaller presence by species that dominate mixed riparian forest. The upper story canopy is often more open than that of mixed riparian forest, with the more open areas often containing a grass-dominated understory.

Valley oak riparian forest generally supports a very similar variety and number of species as mixed riparian forest. However, some cavity-nesting birds and others that are associated with oak woodland, such as ash-throated flycatcher (*Myiarchus cinerascens*), Bullock's oriole (*Icterus bullockii*), oak titmouse (*Baeolophus inornatus*), and western kingbird (*Tyrannus verticalis*) could occur in larger numbers in valley oak forest than in mixed riparian forest.

1.4.4.3 Riparian Scrub

Riparian scrub, including stands of invasive riparian scrub, occurs interspersed in strips along the banks of the Sacramento River and slough channel edges. Riparian scrub is characterized by a dense shrub canopy that may be dominated by willow or other shrub species such as blackberry and coyote bush. Riparian scrub may also include thickets of saplings of Fremont cottonwood, box elder, Goodding's black willow, western sycamore, and Oregon ash. The riparian scrub understory may include mugwort patches interspersed with invasive grasses such as Johnsongrass (*Sorghum halepense*), and Bermuda grass (*Cynodon dactylon*). Invasive riparian scrub includes arundo (*Arundo donax*) and tamarisk (*Tamarix* sp.). These invasive plants can out-compete native plants, and prevent the establishment of native plant communities along the sand bar.

Riparian scrub supports many of the same wildlife species found in mixed riparian and valley oak riparian forests. Some of the birds mentioned above that require large trees for nesting are not expected to breed in willow and riparian scrub, which can provide foraging habitat. Birds expected to nest in willow and riparian scrub include American goldfinch (*Carduelis tristis*), black-headed grosbeak, blue grosbeak (*Guiraca caerulea*), and lazuli bunting (*Passerina amoena*). Mammals that prefer dense shrub cover, such as Audubon's cottontail (*Sylvilagus*

auduboni), can be particularly abundant in this type of habitat. Areas of willow or riparian scrub that are characterized by only one or a few shrub species are likely to have a lower diversity of wildlife species than scrub areas with a greater diversity of plants. Also, areas of scrub that are heavily infested with arundo or tamarisk are expected to have reduced wildlife habitat value. These introduced and invasive species are known to support a much lower number of wildlife species than the native plant communities discussed above (Riparian Habitat Joint Venture 2000). Few bird species are likely to nest in this habitat, but it can provide suitable foraging habitat for a number of species.

1.4.4.4 Open Water

The natural dynamism in the study reach is crucial to the existence and recovery of many native anadromous fish populations. The heterogeneity of habitats, including gravel riffles, runs, and pools, and sediment deposition from eroding banks and entrained tree and shrub vegetation, combined with important shaded riverine aquatic (SRA) overhanging and in-stream tree and low vegetation to provide important shaded and cooler habitat for fish rearing. Other open water habitat important to wildlife includes backwater marshes, oxbow ponds and slow moving areas. The open water habitat of the Sacramento River is a vital fish spawning, rearing, and/or migratory pathway for many anadromous fish populations, including winter-run, fall-run, late-fall-run, and spring-run chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss*), white sturgeon (*Acipenser transmontanus*), green sturgeon (*Acipenser medirostris*), lamprey (*Petromyzon marinus*), and striped bass (*Morone saxatilis*). Open water is also important habitat for numerous introduced fish such as carp (*Cyprinus carpio*) and catfish (*Ictalurus* spp.), and for numerous raptors, mammals, amphibians, waterfowl and other birds.

1.4.4.5 Emergent Wetland/Marsh

Freshwater marsh is an herbaceous community consisting of cattails (*Typha* spp.), bulrushes (*Scirpus* spp.), water primrose (*Ludwigia peploides*), and other species commonly found in wetlands. This plant community often forms very dense and sometimes monotypic stands. Small amounts of lower-stature species, such as sedges (*Carex* spp.), are usually restricted to stand edges.

Emergent wetlands are used by a variety of wildlife, including common yellowthroat (*Geothlypis trichas*), marsh wrens (*Cistothorus palustris*), song sparrows, and western aquatic garter snakes (*Thamnophis couchii*). Pacific tree frog (*Hyla regilla*) and western pond turtles (*Clemmys marmorata*) are expected to occur as well.

1.4.4.6 Ruderal

Ruderal (weedy, herbaceous) vegetation occurs throughout the study area, generally in locations where natural or human disturbance has recently (e.g., past 1–10 years) occurred.

Mesic (moist) ruderal vegetation is characterized by weedy grasses and forbs, including native species such as cocklebur (*Xanthium strumarium*), horseweed (*Conyza canadensis*), vervain (*Verbena bonariensis*), and sedges (*Carex* spp.); and non-native species such as curly dock (*Rumex crispus*), nutsedge (*Cyperis eregrostis*), bull thistle (*Cirsium vulgare*), white sweetclover (*Melilotus albus*), Bermuda grass, and Johnsongrass.

Ruderal vegetation typically supports a relatively small number of wildlife species, such as blue grosbeak, and lazuli bunting. In addition, dry ruderal areas can support larger number of reptiles and burrowing mammals, such as California ground squirrel (*Spermophilus beecheyi*).

1.4.4.7 Annual grassland

Annual grassland is found in upland areas adjacent to the river channel, including some terraces along river banks. Annual grassland species in the study area mostly consist of non-native grasses, such as wild oat (*Avena fatua*), Italian ryegrass (*Lolium multiflorum*), brome (*Bromus* spp.), and other grasses.

Wildlife species commonly observed in annual grassland include California ground squirrel, lark sparrow, western meadowlark, gopher snake (*Pituophis melanoleucus*), and western rattlesnake (*Crotalus viridis*). Grasslands can support a variety of small mammals and reptiles. Annual grasslands also provide important foraging habitat for many species of raptors in the study area, such as Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and burrowing owl (*Athene cunicularia*).

1.4.4.8 Agricultural land

Orchards and row crops are the primary land use adjacent to the Sacramento River in the study area. Most orchards were planted with walnut, almond, or plum trees. Orchards are intensively maintained and are generally devoid of native vegetation. Intensively maintained orchards are of low value to most native wildlife species. However, orchards can provide foraging habitat for a number of bird species and some birds, such as yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), and house finch (*Carpodacus mexicanus*), may nest in orchards. Walnuts, in particular, are often used by riparian birds if the orchard is near riparian habitat. Walnuts orchards adjacent to riparian habitat may also be used by several riparian bird species, such as black-headed grosbeak and western wood-pewee.