

Chapter 2. Existing Conditions and Site Assessment

This chapter contains a description of the historical and existing natural resource and socioeconomic conditions in the study area that form the basis for the restoration plan. The description of the environmental setting and natural resources within the study area includes geology and topography, soils, landform and hydrology, water quality, vegetation, and wildlife resources. The description of the socioeconomic conditions includes cultural resources, existing land use and property ownership, infrastructure, and regulatory compliance. Most sections also contain brief descriptions or bullet lists of identified opportunities and constraints for habitat and open-space enhancement and restoration on the project site.

ENVIRONMENTAL SETTING AND NATURAL RESOURCES

Geology and Topography

The California Division of Mines and Geology has mapped the gently sloping portion of the project site (which appears to consist of a floodplain of the San Joaquin River) as Recent stream channel deposits. At the eastern edge of the site is a steeply sloping escarpment of the Riverbank Formation, which consists of an older, higher alluvial terrace. The Pleistocene Riverbank Formation consists of nonmarine, granitic sandy, silty, and clayey sediments (Matthews and Burnett 1965).

A site-specific geotechnical engineering investigation (Twining Laboratories 1989) was conducted on the site in March and July 1989 to determine the site's suitability as an aggregate quarry. The investigation revealed the site to be generally underlain, to a depth of approximately 35 feet, by silty, sandy, and gravelly alluvium. Groundwater was observed between depths of 17 and 20 feet below grade at the 11 test locations. Groundwater elevation may be roughly level across the site because the site is nearly level and there is little variation in the sample locations.

Soils

Morphological Characteristics

Based on the U.S. Department of Agriculture Soil Conservation Service (now called the Natural Resources Conservation Service) soil survey of the area, most of the soils on the project site consist of the Grangeville series (Figure 2-1), which are soils formed from Recent granitic alluvium. Areas of Grangeville soils are nearly level and, because of their floodplain setting, formed under somewhat poor drainage conditions. However, due to the influence of upstream

dams and local groundwater pumping, areas of Grangeville soils are now generally protected from flooding and the groundwater table has been lowered. (Relictual morphological features in the soil suggest that, before these hydrologic modifications, saturation occurred seasonally within approximately 20 inches of the soil surface.) (Huntington 1971). Based on National Cooperative Soil Survey (1996) information, most areas of Grangeville soils were subject to occasional (i.e., on average, five to 50 times over a 100-year period) flooding. Their existing drainage class is estimated by Jones & Stokes as well drained.

Three phases of the Grangeville series are mapped by the soil survey on the project site: Grangeville fine sandy loam, 0%-2% slopes; Grangeville sandy loam, 0%-2% slopes; and Grangeville fine sandy loam, saline-alkali, 0%-2% slopes. The saline-alkali phase differs from the non-saline-alkali phases in that alkali salts (Huntington 1971) affect subsurface layers; however, it appears that the level of salts would not significantly adversely affect the growth of native vegetation. Field testing of both surface and subsurface layers for electrical conductivity would confirm this observation.

The typical Grangeville soil profile has a neutral pH surface layer of fine sandy loam, which contains a moderate accumulation of organic matter to a depth of approximately 8 inches. The soil is moderately alkaline to about 20 inches deep, at which point it becomes calcareous (i.e., containing relatively high amounts of calcium carbonate, which tends to cause the soil to have a high pH). The fine sandy-loam texture extends to a depth of more than 60 inches. Available water-holding capacity is high in the two fine sandy-loam phases and low in the sandy-loam phase; permeability is moderately rapid; shrink-swell potential is low; and the potential for erosion when the vegetation cover is disturbed is slight to none (Huntington 1971). The native fertility is estimated by Jones & Stokes as moderate.

The eastern boundary of the project site is mapped in the soil survey as Terrace Escarpments. This miscellaneous area consists of a bluff that borders secondary valleys of the San Joaquin River. The drainage class of the escarpment is somewhat excessive, runoff rates are rapid, and the potential for erosion is high. (Huntington 1971.)

Based on Jones & Stokes field observations, the escarpment at the project site has soil textures of loam and fine sandy loam, with slopes that range from vertical to roughly 50%. The soil material ranges from loose to moderately consolidated.

Parts of the escarpment appear to have experienced significant gully and sheet erosion. The sheet erosion is probably a result of livestock grazing. Some areas of the bluff have conspicuous grazing "terraces". Areas in which grazing is presently excluded are generally better vegetated and do not display the terraces.

The area along the banks of the San Joaquin River within the project site is mapped as Riverwash. This miscellaneous area consists of deep sands and gravels and is subject to flooding. (Huntington 1971.)

Associated Native Vegetation

Because only the Grangeville soils have experienced significant changes in their natural drainage/flooding conditions, the native vegetation of only the Grangeville soils is described below. Before hydrologic modifications, the native vegetation of Grangeville soils consisted of annual grasses and forbs, some salt- and alkali-tolerant plants in places, and scattered valley oak. In areas adjacent to rivers, the vegetation was denser and typically consisted of shrubs, vines, and willows. (Huntington 1971.)

Floodplain Hydrology

The Jensen River Ranch is in a reach of the San Joaquin River that is constrained by high flanking terraces. In areas that have not been gravel mined, the river has a low-sinuosity planform (Jones & Stokes Associates 1998a). Most of the Jensen River Ranch is on an intermediate terrace. This terrace may have been a historic floodplain that would flood during very high flow events. However, with Friant Dam in place the property does not flood, even when Friant Dam is spilling water at maximum capacity. The Parkway Trust and FMFCD have aerial photographs of the 1997 flood event when Friant Dam was at maximum discharge, and still the intermediate terrace of the Jensen River Ranch did not flood.

Precipitation will be the main source of non-irrigation water on the site. The average rainfall is 11.03 inches per year, with a record maximum of 21.61 inches and a minimum of 6.07 inches (Western Regional Climate Center 1999). Most of the rain falls in the late fall to early spring, and the records show that it is possible that less than one tenth of an inch will fall in any month of the year. Runoff enters the site from Woodward Park and the DK area channel; however, the average amount of runoff from winter storms, summer nuisance, and park irrigation is not known.

Water Quality

In a natural system, surface water quality is primarily dependent on mineral composition of rocks within the upper source areas of a stream. Further downstream, the water quality continues to be influenced by mineral characteristics of materials through which it flows as well as by secondary contributions of other water types from tributaries. In an urban or developed system, water quality is also affected by a variety of discharges from point and nonpoint sources.

In and upstream of the DK area watershed, almost all surface water contamination is derived from nonpoint source runoff from urban development. During dry periods, pollutants accumulate on the land surface. These pollutants include inorganic chemicals and minerals (metals, salts), suspended solids, nutrients, pesticides, bacteria, and oil and grease. At the beginning of the rainy season the accumulated pollutants are washed off surfaces and are typically conveyed directly to streams.

A number of studies have been conducted locally and nationally to characterize urban runoff pollutant concentrations. Of these studies, the Nationwide Urban Runoff Program (NURP), provides the most comprehensive information on urban runoff quality (U.S. Environmental Protection Agency 1983). FMFCD participated in the NURP study to collect information regarding the quantity and quality of stormwater runoff and rainfall and the quality of dry deposition and street particulate mater. The NURP study found that heavy metals were by far the most prevalent priority pollutant constituents found in urban runoff. Heavy metal concentrations were found to exceed EPA ambient water quality criteria and drinking water standards in many cases.

The initial study prepared for the DK area channel to the San Joaquin River identified that without mitigation, implementation of that project would degrade water quality by substantially increasing the concentration of total suspended solids, ammonia, and metals (aluminum, cadmium, chromium, copper, iron, lead, mercury, and zinc) in stormwater discharged to the river. To mitigate the adverse water quality effects, the DK area channel flows through a 2,000-foot long, naturally contoured grassed channel rather than a closed pipe. The open grassy channel is designed to reduce the discharge velocity to less than 1 foot per second, which will allow settleable solids to drop out of the flow (Jones & Stokes Associates 1987). The target settling rate for the channel is 75% of settleable solids.

In 1987, the Clean Water Act was amended to require that stormwater discharges from municipal storm drain systems obtain coverage under a nationwide surface water permit program called the National Pollutant Discharge Elimination System (NPDES). In 1990 the U.S. Environmental Protection Agency (EPA) completed regulations describing how municipalities must apply for municipal stormwater NPDES permits. The EPA has delegated to the State Water Resources Control Board (SWRCB) and the local Regional Water Quality Control Boards (RWQCB) the authority to adopt and enforce these permits. A municipal stormwater permit (CA0083500) was issued by the Central Valley RWQCB to the FMFCD. The permit requires that FMFCD implement a receiving water quality (river) monitoring program and an in-system (detention basin) monitoring program (Larry Walker Associates 1998).

Recent monitoring data show that urban stormwater has a minimal effect on water quality in the San Joaquin River (Larry Walker Associates 1998). Three monitoring stations are monitored during storm events. The uppermost (station 1) is located immediately downstream of Friant Dam, which presumably would be the least affected by urban stormwater. Station 2 is located above the FMFCD stormwater discharges, approximately midway between stations 1 and 3. Station 3 is located downstream of the FMFCD discharges near the Highway 99 overcrossing. Water quality monitoring data show that, generally, station 2 had slightly higher concentrations of pollutants than either of the other stations. Concentrations of pollutants were slightly higher at station 1 than at station 3 (Larry Walker Associates 1998). The monitoring data also showed seasonal variation in pollution concentrations. The dry-season samples tended to have lower concentrations than the wet-season samples (Larry Walker Associates 1998).

Vegetation

Historical Conditions

Information on historical vegetation patterns can provide valuable insight with regards to restoration planning on disturbed sites. The San Joaquin River Riparian Habitat Restoration Program recently completed a study of historical riparian habitat conditions on the San Joaquin River between Friant Dam and the confluence with the Merced River (Jones & Stokes Associates 1998a). Numerous human activities, including agricultural and urban development, water storage reservoirs, flood control projects, and mining, have modified the river's hydrology and associated vegetation.

In the historical vegetation study, the reach from Friant Dam to Gravelly Ford, which includes the project site, showed a decline in riparian scrub and an increase in riparian forest from 1937 to 1993. This suggests that a vegetation succession to mature forest may have been prevented by periodic flooding before construction of Friant Dam or may be resulting from increasing water table depth. In this reach, succession from cottonwood riparian forest to mixed riparian forest and then to valley oak riparian forest occurred, perhaps because oaks were more tolerant of hydrologic changes than were cottonwood or willow species.

The project site has been in agricultural production since at least 1937. However, soil surveys, similar sites in this reach of the river, and anecdotal evidence suggest that the site at one time supported riparian forest, and that with current river hydrology it could support a combination of mixed riparian forest and valley oak/sycamore woodland. The low flood plain was probably dominated by winter deciduous broad leafed riparian forest characterized by Fremont cottonwood, several species of willow, sycamore, box elder, Oregon ash, valley oak, buttonwillow, wild grape, California blackberry, and clematis (Jones & Stokes Associates 1998a). The upper terrace probably supported riparian trees, shrubs, or vines that are less dependent on the water-table including valley oak, sycamore, Oregon ash, box elder, Mexican elderberry, blackberry, poison oak, grape, clematis, and wild rose.

Existing Conditions

Vegetation resources of the Jensen River Ranch were evaluated by reviewing aerial photographs; reviewing existing information resources, including the California Department of Fish and Game (DFG) Natural Diversity Data Base (NDDB); and conducting site visits on August 25, 1999. The restoration site supports four broad vegetation types: riparian woodland, irrigated pasture, seasonal wetland, and annual grassland (Figure 2-2). The riparian woodland contains Fremont cottonwood, Oregon ash, valley oak, elderberry, and willow species. The irrigated pasture is dominated by annual and perennial grasses, yet also contains sedges, smartweed, and stinging nettle. The pasture is currently grazed. A seasonal wetland (non-jurisdictional) has developed within the channel of the FMFCD. The channel area is periodically mowed and contains cattails and sedges. The annual grassland is dominated by annual grasses, with a few scattered valley oaks. The weeds on site include star thistle, arundo, and annual grasses such as rip-gut brome.

No special-status plant species (e.g., state or federally listed species, candidates for federal listing, or federal species of concern) were found at the site. However, a complete botanical survey has not been done, and site visits were late in the summer when many special-status plants are not present or identifiable.

Constraints

- Non-native invasive plants pose a potential problem to restoration on the site. Without control of non-native invasive plants, it may be difficult to establish native vegetation. Currently, grazing is reducing the populations of non-natives. If grazing is suddenly halted, non-native invasive plants may dominate the site.

Opportunities

- Habitat creation could support a greater variety of vegetation types and a greater diversity of species. Although restoration of pre-dam hydrologic conditions is not possible, valuable habitat and vegetation communities could be created on site. Such habitats include grasslands, riparian wetlands, oak/sycamore woodlands, seasonal wetlands, and riparian forest.

Wildlife Resources

Existing Conditions

Wildlife resources of the restoration site were also evaluated by reviewing aerial photographs of the restoration site; reviewing existing information resources, including the DFG NDDDB; and conducting site visits. The restoration site supports three wildlife habitats: riparian woodland, irrigated pasture, and annual grassland. The riparian woodland is considered high-quality wildlife habitat because it consists of mature native trees and shrubs and is adjacent to the San Joaquin River and to grassland and irrigated pasture. Fremont's cottonwood and valley oak provide substrates for cavity nesting birds. Cottonwood, oak, willow, ash and elderberry also provide foraging habitat for resident birds and mammals and for neotropical migrant birds, including flycatchers, warblers, vireos, and grosbeaks. Wildlife species observed during the field survey include red-tailed hawks, American kestrels, belted kingfishers, Nuttall's woodpeckers, downy woodpeckers, western scrub-jays, and house finches. The irrigated pasture is considered low-quality breeding habitat for ground nesting birds because it is flood irrigated. Despite this, the pasture provides foraging habitat for many species of birds and mammals, including red-tailed hawks, kestrels, finches, mourning doves, European starlings, Say's phoebes, western kingbirds, coyotes, gray foxes, and Botta's pocket gophers. The annual grassland is considered moderate-quality wildlife habitat. Many of the animals that forage in the irrigated pasture also forage in the grassland. The edge of the bluff provides den and burrow sites for coyotes, gray foxes, and ground squirrels. The bluff also creates thermals, which are frequented by foraging raptors.

No special-status wildlife species (e.g., state or federally listed species, candidates for federal listing, federal species of concern, or state species of special concern) were found at the restoration site. However, several special-status species may potentially occur at this site (see Table 2-1). Although suitable habitat was found for the valley elderberry longhorn beetle (VELB), a federally listed threatened species, no exit holes were found onsite. Elderberry shrubs are the host plants for these beetles.

Constraints

- The U.S. Fish and Wildlife Service's VELB mitigation guidelines recommend that no construction activities (e.g., construction of paths, buildings, or other facilities) occur within 20 feet of the canopy of elderberry shrubs. The VELB guidelines also recommend including a 100-foot buffer area around elderberry shrubs to maintain habitat around them.
- Providing public access along the entire length of the riparian corridor could create a barrier to wildlife movement and reduce habitat quality for wildlife along the river; consequently, installation of new trails should be limited to a portion of the riparian corridor, rather than extending through its entire length.

Opportunities

- Planting higher terrace native riparian species, such as cottonwood, oak, willow, ash, elderberry, coyote brush, mule fat, California blackberry, and box elder could widen the riparian corridor. Widening the riparian corridor would provide additional nesting and foraging habitat and cover for many species of riparian-dependent and other wildlife.
- Converting the irrigated pasture to oak savannah and grassland would enhance the area for woodland and riparian wildlife species. Several species of native trees and shrubs could be planted in the area, including valley oaks, interior live oaks, blue oaks, coyote brush, elderberry shrubs, California blackberries, and coffeeberries. Planting native grasses and forbs would also provide cover and forage for many species of birds, rodents, and beneficial insects.
- Planting elderberry shrubs in areas apart from buildings, pathways, or other facilities would increase breeding and foraging habitat for VELB.
- Creating seasonal wetlands could create additional foraging habitat for wildlife dependent on a habitat type that is rare in the area. Wildlife species that could benefit from the creation of seasonal wetlands include Pacific treefrogs, herons, egrets, killdeer, and greater yellowlegs.

SOCIOECONOMIC CONDITIONS

Cultural Resources

Existing Conditions

Cultural resources of the project site were identified by reviewing existing information. Existing texts regarding the prehistoric, ethnographic, and historical context of the area were reviewed to analyze the potential for cultural resources within the project area. Data held at the Southern San Joaquin Valley Information Center at California State University Bakersfield was reviewed. This data included previously conducted cultural resources studies and previously recorded cultural resources within the site. Additional information was requested from the Native American Heritage Commission regarding traditional cultural properties. In addition, Jones & Stokes cultural resources staff requested the Native American Heritage Commission to refer us to interested individuals with knowledge of resources of concern to Native Americans at the restoration site.

Prehistory

The project area lies within the San Joaquin Valley cultural region (Moratto 1984). This region includes several complexes, a term that describes specific cultural traits within a given time period. The Positas Complex ranges from 3300 to 2600 B.C. and is characterized by small shaped mortars, short cylindrical pestles, millingstones, perforated flat cobbles, and spire-topped *Olivella* beads. The Pacheco Complex ranges from 2600 B.C. to A.D. 300 and includes two phases. The Pacheco, Phase B (2600 to 1600 B.C.) is characterized by foliated bifaces, rectangular *Haliotis* ornaments, and thick, rectangular *Olivella* beads. The Pacheco, Phase A (1600 B.C. to A.D. 300) is represented by more varied types of shell beads; *Olivella* beads of spire-ground, modified saddle, saucer, and split-drilled types are present, as well as *Haliotis* disc beads and ornaments. Other artifacts characteristic of this phase are perforated canine teeth, bone awls, whistles, and grass saws; large-stemmed and side-notched points; and an abundance of millingstones, mortars, and pestles. (Moratto 1984; Olsen and Payen 1968).

The Gonzaga Complex (A.D. 300 to 1000) is characterized by extended and flexed burials; bowl mortars and shaped pestles; squared- and tapered-stem projectile points; few bone awls and grass saws; and a shell industry composed of distinctive *Haliotis* ornaments and rectangular, split-punched, and oval *Olivella* beads. The Panoche Complex (A.D. 1500 to European contact) is characterized by the presence of few millingstones and varied mortars and pestles; small side-notched arrow points; clamshell disc beads; *Haliotis* epidermis disc beads; *Olivella* lipped, side-ground, and rough disc beads; and bone awls, whistles, saws, and tubes. Flexed burials and primary and secondary cremations are found. (Moratto 1984; Olsen and Payen 1968).

Ethnography

The project area lies within the traditional homelands of the Northern Valley Yokuts, whose territory extended southward from just north of the Calaveras River to the bend of the San Joaquin River near Fresno. The foothills of the Diablo Range probably marked the western boundary of Northern Valley Yokuts territory, and the lower foothills of the Sierra Nevada marked the eastern boundary. The Northern Valley Yokuts made their livelihood through fishing, hunting game and waterfowl, and gathering various plant foods, especially acorns. Most principal settlements sat perched atop low mounds on or near the banks of large watercourses. The elevated positions helped to keep the inhabitants, their houses, and possessions above the waters of the spring floods. A strong tendency towards sedentary life, fostered by the abundant riverine resources, was evident, with the same sites occupied for generations (Wallace 1978).

Historical Context

Spanish explorers passed through the San Joaquin Valley during the nineteenth century along the El Camino Viejo trail. During the Spanish and Mexican period, a small agricultural settlement, Posa de Chiné, was established in what is now Fresno and Madera Counties. Jedediah Strong Smith passed through the area in 1827 after his expulsion from California by Mexican authorities. Later, American explorers associated with the Ewing Young, John C. Fremont, and Joseph Walker expeditions traveled through the valley (Hoover et al. 1990).

Between 1848 and 1852, the California Gold Rush led to the establishment of mining camps in what is now Kings Canyon National Park. Valley settlements by cattle ranchers and farmers followed soon thereafter. Fresno County was incorporated in 1856, with Fresno as its county seat (Madera County was formed from part of Fresno County in 1893). The burgeoning of Fresno and Madera Counties began, however, with the development of agriculture in the 1860s and the coming of the Central Pacific Railroad in 1872. The town of Fresno was laid out in the same year that the Central Pacific Railroad arrived in the area (Hart 1978).

The building of the first irrigation system in 1876 spurred development of the region's rich agricultural potential. Settlers poured into Fresno and Madera Counties to establish farming colonies. In time, a number of self-sufficient communities emerged, prompting the development of roads, schools, and other small industries. Fresno and Madera Counties' agricultural economy grew steadily throughout the twentieth century. By the mid-1950s, the region had become the nation's leading agricultural center, producing more than 250 different crops. Today, Fresno and Madera Counties produce about 60% of the world's raisins and about 90% of the raisins sold in the U.S. (Clough and Secrest 1984).

Previous Studies

Two surveys for cultural resources have been conducted at the restoration site (Peak 1975; Uli 1987). These surveys covered approximately 40 acres (roughly 25%) of the restoration site. As a result of these surveys, one cultural resource site, CA-Fre-2123-H, was

identified and recorded within the restoration site. This site is identified as a historical refuse area.

Constraints

The California Environmental Quality Act (CEQA) requires that public or private projects financed or approved by public agencies must assess the effects of the project on historical resources. CEQA requires that if a project results in an effect that may cause a substantial adverse change in the significance of a historical resource, alternative plans or mitigation measures must be considered. Therefore, prior to the development of a concept plan and subsequent mitigation measures, the significance of cultural resources must first be determined. The steps that are normally taken in a cultural resources investigation for CEQA compliance are:

- identify cultural resources,
- evaluate the significance of resources,
- evaluate the effects of the project on *all* resources, and
- develop and implement measures to mitigate the effects of the project only on *significant* resources.

Section 106 of the National Historic Preservation Act requires that, before beginning any undertaking, a federal agency must take into account the effects of the undertaking on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on these actions. The steps involved in complying with the Section 106 process are:

- identify and evaluate historic properties;
- assess effects of the project on historic properties;
- consult with the State Historic Preservation Officer (SHPO) regarding adverse effects on historic properties, resulting in a Memorandum of Agreement (MOA);
- submit the MOA to the ACHP; and
- proceed in accordance with the MOA.

Both processes (CEQA compliance and Section 106 compliance) begin with the identification of cultural resources. This step is carried out by conducting a cultural resources survey of the project site and by recording any cultural resources identified within the restoration site area. Although approximately 40 acres of the project site have already been surveyed, the surveys were conducted 24 and 12 years ago. Because of the length of time that has elapsed since these surveys were conducted, current professional protocol requires that the areas be resurveyed. The entire restoration site area, then, consisting of approximately 180 acres, must be

surveyed for cultural resources. The previously identified cultural resource, CA-Fre-2123-H, will be visited and its existing site record updated to reflect the site's current condition. Additional cultural resources, if identified as a result of the new survey, will be recorded and their significance evaluated in compliance with both CEQA and Section 106. The survey will be used to further refine the proposed concept plan.

Opportunities

By conducting a cultural resources survey of the site, any cultural resources found could potentially be preserved, minimizing impacts to a less-than-significant level. In addition, the existence of cultural resource sites may provide the opportunity for specific site information to be integrated into interpretive and educational exhibits. The feasibility of using site information will depend largely on the type and sensitivity of any site(s) identified.

The project site may provide the opportunity for interpreting the general prehistory and history of the area.

Land Use and Property Ownership

Regional and Local Setting

The project site is located approximately 8 miles north of downtown Fresno. As is characteristic of the area, a majority of the project site is in agricultural production (e.g., irrigated pasture). According to historical aerial photographs, the site has been in agricultural production since the 1930s. While a majority of the land surrounding the project site is used for agricultural production, suburban development associated with the growth of the Fresno metropolitan area is characteristic of land near the southern and southeastern boundaries of the site.

As shown in Figure 2-3, the roughly 167-acre site is bordered to the west by the San Joaquin River, State Route 41, and Woodward Bluffs Mobile Home Estates; to the south by the roughly 300-acre Woodward Regional Park (one of Fresno's largest and most heavily used parks); and to the east by the Friant Expressway and several vacant Fresno County properties. Land uses in Woodward Park and on County land at the bluff top include several bicycle and equestrian trails associated with the Lewis S. Eaton Trail (part of the San Joaquin River Parkway). Across the Friant Expressway, land uses include single-family residential and commercial development. Land uses to the north include a small parcel retained by the Jensen family (which will likely remain in agriculture for the time being). Beyond the project site to the north is an open-pit aggregate mine, low-density residential development, and agriculture. Other areas preserved for wildlife habitat enhancement include Rank Island, located 2 ½ miles up the San Joaquin River, and the Wildwood Property, located directly across the San Joaquin River to the west. Both areas consist of public lands managed by the DFG and the Wildlife Conservation Board.

The project site is currently owned by the San Joaquin River Conservancy. The FMFCD has an easement across the site for the DK area channel. The City of Fresno owns a long thin parcel between the site and the mobile home park to the west.

General Plan and Zoning Designations

The project site is located within an unincorporated area of Fresno County and, therefore, falls within the jurisdiction of the Fresno County General Plan. Adopted in 1976, the Fresno County General Plan is currently undergoing a general plan update process. Overall existing goals of the plan are to protect agricultural land and discourage urban and other intensive development on productive or potentially productive agricultural land. Related goals promote the concentration of urban and other intensive development around existing urban centers. Additionally, the plan provides objectives and policies regarding River Influence Areas, including the San Joaquin River area.

The 1977 Fresno County General Plan designates the project site as Open Space. The Open Space designation is defined as follows:

Open Space: Shall mean land or water areas, which are essentially unimproved and planned to remain open in character. These areas are to be devoted to uses resulting in one or more of the following:

- Preservation of Natural Resources,
- Parks and Recreation, and
- Hazardous Areas (e.g., land subject to flooding, seismic impacts, etc.).

Infrastructure

Existing Irrigation Equipment

Most of the Jensen River Ranch is flood irrigated from an underground delivery system (Figure 2-4). The water is pumped from the San Joaquin River. A 50-foot channel has been dug from the river into the south bank to allow the pump not to be placed in the active river channel. The pump, although rated at 50 gallons per minute (gpm), is described as “old and not working well” by a worker onsite. The actual capacity of the pump is not known.

Water is pumped into the pipe system for distribution. There are two sets of valves in the system. The master valves control which pipes receive water, and the second set of valves controls where the water leaves the pipes and enters the field. The irrigation worker that was interviewed said that only small segments of the system could be opened at one time. Roughly one-seventh of the irrigated area can be irrigated at one time. It takes 2 or more weeks to irrigate the pastures.

The City of Fresno has installed a small drip irrigation system along the far western edge of the property adjacent to Woodward Bluffs Mobile Home Estates. This system was used to irrigate two rows of trees. The City has also installed a potable water tap on the property near the river access on the western edge of the site. Water for these systems originates within Woodward Park.

The FMFCD has installed an irrigation system within their right-of-way. This system consists of pop-up overhead sprinklers that can irrigate the entire right-of-way. A 20-horsepower pump near the DK area outfall structure supplies the water, and 27 valves control the system. The system is not currently functioning but may be repairable. The pump is reportedly in working order.

Storm Drain Discharge

The FMFCD manages and maintains a storm drainage discharge to the San Joaquin River across the project site. The DK area drainage zone consists of 2,179 acres of land east of Blackstone Avenue and north of Audubon Drive. Single-family residential development is the primary land use in the drainage zone; however, a parcel immediately across the Friant Expressway from the site is proposed for commercial development. The storm drain discharge facilities consist of:

- a storm drain pipe crossing Friant Expressway;
- a concrete chute with baffle blocks to dissipate energy extending down the bluff face to the project site;
- a maintenance access road from the top to the bottom of the bluff;
- a 2,000-foot-long grassy swale to the river;
- a concrete detention structure; and
- an underground bypass pipe.

During a once-in-two-year frequency storm, flows are approximately 183 cubic feet per second (cfs) thus reducing flows about 10% before discharge into the river.

The storm drainage system can accommodate a maximum flow of 350 cfs. Flows in the channel are slow, allowing suspended sediment to settle out before reaching the San Joaquin River. Velocities are estimated at slightly less than 1.0 foot per second for 147-cfs and 183-cfs flows and slightly less than 1.5 feet per second for 350-cfs flows.

A 1985 Environmental Impact Report on San Joaquin River discharges, including the DK area channel in the cumulative analysis, concluded that the potential for adverse effects on water quality existed from discharging urban storm drainage to the river. This effect, however, could be mitigated through the use of retention basins to collect sediment and provide partial treatment.

Industrial and commercial runoff is intercepted separately and discharged to onsite retention basins. As runoff flows through the grassy swale, suspended solids settle out of the water. Suspended solids include a wide range of mineral soil particles, organic matter, metals, and other materials that wash off of yards, gutters, and street surfaces.

Easements and Utilities

There are two easements of the project site: the Jensen family's reserved easement and the FMFCD easement for the DK area channel. The Jensen's reserved easement is approximately 60 feet wide and follows the toe of the bluff from the Woodward Bluffs Mobile Home Estates to the Jensen property at the north end of the project site.

There are two overhead utility lines and five pole-mounted transformers on the project site. One line follows the river at the top of the bank, the second line follows the north bank of the DK area channel. Pacific Gas and Electric Company (PG&E) owns the lines and transformers.. One transformer is near the domestic well, two are near the lift pump, and two are near the second water well at the upstream end of the DK area channel (Krazan and Associates 1996).

According to the Phase I Environmental Site Assessment, no handling and/or storage of hazardous materials has occurred on the project site. A residence, located near the hay barn, burned down in the 1980s and a septic system or tank may have been part of the residence. The septic tank has not been located but should be identified and removed prior to any construction activities (Krazan and Associates 1996).

Constraints

- There may be constraints associated with water quality requirements if the grassy swale is expanded or transformed into seasonal or permanent wetlands.
- The current settling rate of 75% will be maintained.
- Existing utilities will need to be removed, relocated, or avoided based on the final restoration plan.

Opportunities

- Generally, urban stormwater runoff from the DK area channel is the most reliable source of water on the site that does not require a well or pump. There is excellent opportunity to redirect urban runoff water for use as supplemental irrigation, and to utilize stormwater flows to expand the project site's potential for riparian and seasonal wetland vegetation.

Regulatory Compliance

Agencies with potential jurisdiction over restoration activities at the Jensen River Ranch property include the U.S. Army Corps of Engineers (USACE), State Water Resources Control Board, Central Valley RWQCB, and the DFG.

U.S. Army Corps of Engineers

Section 404 of the federal Clean Water Act requires that a permit be obtained from the USACE for any activity that results in the discharge of dredged or fill material into waters of the United States. The type of permit required depends on the type and extent of waters of the United States that would be filled or adversely affected by fill activities. A site is determined to be a wetland if vegetation, soils, and hydrology meet the parameters outlined in the federal manual for identifying jurisdictional wetlands. Since the entire site is flood irrigated and is dominated by marginal wetland plant species (e.g., bermuda grass), soil and groundwater data may be useful in determining whether the site would naturally support wetlands should irrigation cease. This supporting information could be presented to the USACE with a request for a jurisdictional determination.

In the case of the Jensen River Ranch site, the San Joaquin River qualifies as waters of the United States; a 404 permit would be required for any discharge of fill material below the ordinary high water mark of the river. Potential waters of the United States include the DK area channel and any wetlands that may occur on the property. The drainage channel was constructed in the late 1980s to convey stormwater runoff from surrounding development. Water flows down the embankment in a concrete channel and into a vegetated channel that drains into the river. A concrete weir near the river outfall causes water to back up in the channel, creating a settling basin. A pipe runs under the length of the vegetated channel; water can be diverted from the concrete channel into this pipe when maintenance (e.g., vegetation removal, trash cleanup) is necessary in the vegetated channel. Drainage channels constructed in uplands are generally not considered to be waters of the United States. Given this, together with the fact that the water can be completely diverted from the vegetated channel, it appears likely that the USACE would not have jurisdiction over the drainage channel.

If a Section 404 permit is required, the project must also comply with Section 106 of the National Historic Preservation Act.

Central Valley Regional Water Quality Control Board and State Water Resources Control Board

Depending on the type of restoration activity conducted on the site, up to three authorizations may be required:

- Section 401 water quality certification or waiver,
- a construction stormwater permit, and

- modification of an existing municipal stormwater permit.

Any 404 permit issued by the Corps will require that 401 certification or waiver be obtained from the RWQCB. The RWQCB will not issue a certification or waiver until a CEQA document has been certified for the project.

Construction activities that cause five or more acres of ground disturbance require a NPDES construction stormwater permit under Section 402 of the Clean Water Act. In California, the State Water Resources Control Board administers this program. To be covered under the state's construction stormwater permit, a stormwater pollution prevention plan (SWPPP) must be prepared and kept onsite during construction activities. A Notice of Intent form and project map must be submitted to the State Water Resources Control Board at least 10 days before construction begins in order to be covered by the state's construction stormwater permit.

The FMFCD is currently covered under an NPDES municipal stormwater permit for operation of the stormwater drainage system. The permit requires the District to implement a receiving water quality (river) monitoring program and an in-system (drainage channel/detention basin) monitoring program. Any manipulation of the drainage channel may require modification to either the stormwater permit or the monitoring programs.

California Department of Fish and Game

The DFG requires a 1603 Agreement (Stream or Lakebed Alteration Agreement) for proposed projects or activities that may impact a stream, river, or lake. Depending on the types of activities proposed for this project, a 1603 Agreement may be required. Early consultation with DFG should be conducted to determine whether they would have jurisdiction over the DK area drainage channel.

State Historic Preservation Office

If the project is considered a federal agency proposal and occurs in an area where properties are listed, or are eligible for listing, on the National Register of Historic Places (NRHP), compliance with Section 106 of the National Historic Preservation Act (16 USC 470 et seq.) is required. NRHP requires federal agencies to evaluate the effects of federal undertakings on historical, archaeological, and cultural resources.

Under Section 106 of the National Historic Preservation Act, federal agencies are required to:

- identify historical or archaeological properties near proposed sites, including properties listed on the NRHP and those properties that the agency and the State Historic Preservation Officer agree are eligible for listing on the NRHP and

- if the project is determined to have an adverse effect on NRHP-listed properties or those eligible for listing on the NRHP, to consult with the State Historic Preservation Officer and the Advisory Council on Historic Preservation to develop alternatives or mitigation measures to allow the project to proceed.

State Lands Commission

The State Lands Commission (SLC) has jurisdiction and management control over those public lands received by the state on its admission to the United States in 1850 (also known as “sovereign lands”). Generally these sovereign lands include all ungranted tidelands and submerged lands and beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits. The SLC manages these sovereign lands for the benefit of all the people of the state, subject to the public trust, for water-related commerce, navigation, fisheries, recreation, open space, and other recognized public trust uses. SLC’s Land Management Division administers the surface uses of state-owned sovereign lands under SLC’s jurisdiction. Examples of activities that would require SLC authorization include, but are not limited to, implementation of habitat management plans, installation of structures, sand and gravel extraction, and dredging or disposal of dredged materials on the state’s lands. Early consultation with SLC should be conducted to determine if a land use lease is required.

Mosquito Abatement¹

The Jensen River Ranch consists of habitats capable of sustaining populations of several mosquito species. Most of the mosquitoes breed in two distinct habitats—the irrigated pasture used for grazing and the grassy swale and maintenance basin (DK Area Channel) used for trapping sediment and particulate matter from stormwater conveyed from the adjacent bluff area. Each of these habitats supports distinctly different mosquito breeding. Other habitat characteristics that support mosquito species include shoreline areas of the San Joaquin River and water-filled treeholes. (Smith 2001)

Irrigated Pasture

Irrigated pasture is ideal for *Ochlerotatus* (formerly *Aedes*) *nigromaculis*, commonly called the irrigated pasture mosquito. It is a multivoltine (multiple generation) floodwater species, which has the ability to produce broods from water that needs to stand for only a few days. Adult mosquitoes emerge in tremendous numbers and immediately seek blood meals from any warm-blooded animal within reach. After water disappears from flooded areas, female mosquitoes lay eggs on the damp soil. When subsequent floodwater inundates the area, a new generation of mosquitoes begins to develop.

¹ The information in this section was written and provided by Charles W. Smith, Entomologist / Source Reduction Specialist, Consolidated Mosquito Abatement District.

Another floodwater mosquito, *Ochlerotatus melanimon*, also breeds in irrigated pastures. Although it is usually much less common than *Oc. nigromaculis*, *Oc. melanimon* has occasionally been a serious nuisance in the vicinity of the Jensen River Ranch. Both of these species are daytime biters and very active at dawn and dusk.

DK Area Channel

The DK Area Channel supports mosquitoes that breed in permanent rather than intermittent water sources. Adult females lay eggs on the surface of the water in calm or stagnant areas. Hydrophytic plants on the surface and along the sides of the maintenance basin provide shelter for mosquito larvae and pupae. The vegetation lining the sides and bottom of the swale also enhance the habitat for mosquito breeding. Species common to this source include *Culex tarsalis*, the encephalitis mosquito, and *Culex quinquefasciatus*, the southern house mosquito. Both of these species are multivoltine and principally night biters.

Other Habitats

The shoreline area of the San Joaquin River supports breeding of riparian mosquito species in protected places where the flow becomes negligible. *Anopheles punctipennis*, the woodland malaria mosquito, is a multivoltine species that usually occurs sporadically and in relatively small numbers. Various species of hardwood trees are capable of harboring *Ochlerotatus sierrensis*, the Western treehole mosquito. This species breeds in rain-filled rot holes of trees. It is univoltine and usually active from late winter to early summer. *Oc. sierrensis* is the principal vector of canine heartworm.

Mosquito Abatement Procedures and Problems

Consolidated Mosquito Abatement District (CMAD) personnel conduct surveillance for mosquito breeding by examining suspected sources. When larvae or pupae are discovered in a source, a decision is made as to what action to take. Wherever possible, physical modification of the habitat is encouraged because it can greatly reduce or eliminate continued mosquito breeding. If physical control cannot be achieved, biological or chemical control is employed. Introducing *Gambusia affinis*, a predaceous fish that is used extensively in mosquito control throughout California, can often control Mosquito larvae in a permanent source.

Chemical control employs the use of several treatment strategies depending on the mosquito species and the stage of its life cycle. Larvae are highly susceptible to pesticides that are target-specific and safe to use. Pupae and adults must be controlled with alternative pesticides. Larval control is always the most effective and least costly method to suppress mosquito populations with pesticides. CMAD encourages all landowners and water users to engage in good water management so that mosquitoes can be reduced or even eliminated from sources.

Ochlerotatus nigromaculis is the major mosquito pest produced on the Jensen River Ranch. Although it does not carry disease, its prolific breeding and vicious biting behavior obligates CMAD to protect the residents and visitors from this pest. *Culex tarsalis* is the most important vector of mosquito-borne encephalitis in California, including Western equine and St. Louis encephalitis. *Culex quinquefasciatus* is a frequent invader of homes and other dwellings. In California it is currently considered to be of minor importance in disease transmission. However, it is an important vector of encephalitis in states east of California and has the potential to transmit West Nile virus—a disease expected to enter California within two years.

Irrigated Pasture

Due to the large amount of acreage, the lengthy irrigation schedule, and the practices employed by the people who manage the cattle, substantial reduction in mosquito breeding through physical means has been unsuccessful. *Ochlerotatus nigromaculis* is quite temperature sensitive, i.e., high temperatures shorten the time necessary to complete its life cycle. During the summer, eggs hatch within minutes of flooding, and larvae grow rapidly. Three or four days may be all that is required for water to stand in order for the life cycle to be completed.

Applying insect growth regulator or bacterial agents to the water in a timely fashion control larvae of *Oc. nigromaculis*. These materials effectively destroy larvae thus breaking the life cycle. If pupae are discovered, they must be killed using petroleum based insecticide. Adult mosquitoes can be controlled only with the use of aerosol fogging compounds.

In the past, the Jensen River Ranch irrigation system has been poorly managed. The pasture has consistently been overwatered with little or no consideration to water conservation and reduction of mosquito breeding. In addition, the lengthy irrigation schedule usually precludes the possibility of allowing the pasture to dry before the next irrigation. This practice has cost CMAD tremendous time and budget repeatedly monitoring and treating the site.

Water mismanagement has often interfered with pesticide applications designed to destroy larvae. This occurs, for example, when part of a pasture becomes infested with larvae, is treated with a larvicide, and then receives additional water spilling over from an adjacent area being irrigated. This results in the treated area becoming flushed with new water, diluting the larvicide, and rendering the application ineffective. Following such a scenario, adult mosquitoes emerge requiring CMAD personnel to apply misting or fogging insecticides to obtain control. Adult control of mosquitoes is the least effective and most costly method of abatement. It is also the least environmentally desirable approach.

DK Area Channel

The maintenance basin of the DK Area channel is a permanent water source at the base of the bluff. Within this source, the life cycle of *Culex tarsalis* and *Culex quinquefasciatus* is usually completed in seven to fourteen days depending on the temperature. Larvae can be controlled using *Gambusia affinis* or bacterial agents. When water inundates the grassy swale, bacterial agents are usually applied as this source does not stand long enough to support fish. Pupae and adults of *Culex* species are controlled with the same materials used to control other species.

Mosquito control in the DK Area channel is hindered by emergent marsh plants and protective vegetation along the shorelines. These conditions shelter mosquito larvae from natural predators and inhibit efforts to treat the source with larvicides. Introduction of *Gambusia affinis* into the maintenance basin has helped reduce the need to apply larvicides. Fresno Metropolitan Flood Control District (FMFCD) has helped improve treatment efforts in the grassy swale by periodically mowing it.