Chapter 2
Watershed Description

This chapter describes existing land uses and resource values in the watershed, and provides the foundation for assessing environmental conditions, which, along with input provided by the stakeholder community, provides the basis for developing management action recommendations presented in Chapter 6.

The objectives of this chapter are to describe the watershed's geographical and historical setting, to list natural and human-caused changes in the watershed that have occurred over time, and to describe key physical, chemical, and biological conditions that relate to existing beneficial uses and potential preservation, restoration, and enhancement opportunities in the watershed.

2.1 Geographical Setting

The Laguna Creek Watershed encompasses approximately 65 square miles of land draining to Laguna Creek and its tributary streams, starting in northeast Sacramento County (Figure 2-1). Laguna Creek flows southwesterly from its headwaters at the eastern watershed boundary through Elk Grove to its confluence with Morrison Creek near the Sacramento Regional Wastewater Treatment Plant (SRWTP) just east of Interstate 5 (I-5). Downstream of the Morrison Creek confluence, water is either pumped to the Sacramento River, or during winter storms, may travel to the Beach Lake-Stone Lake system (Stone Lakes

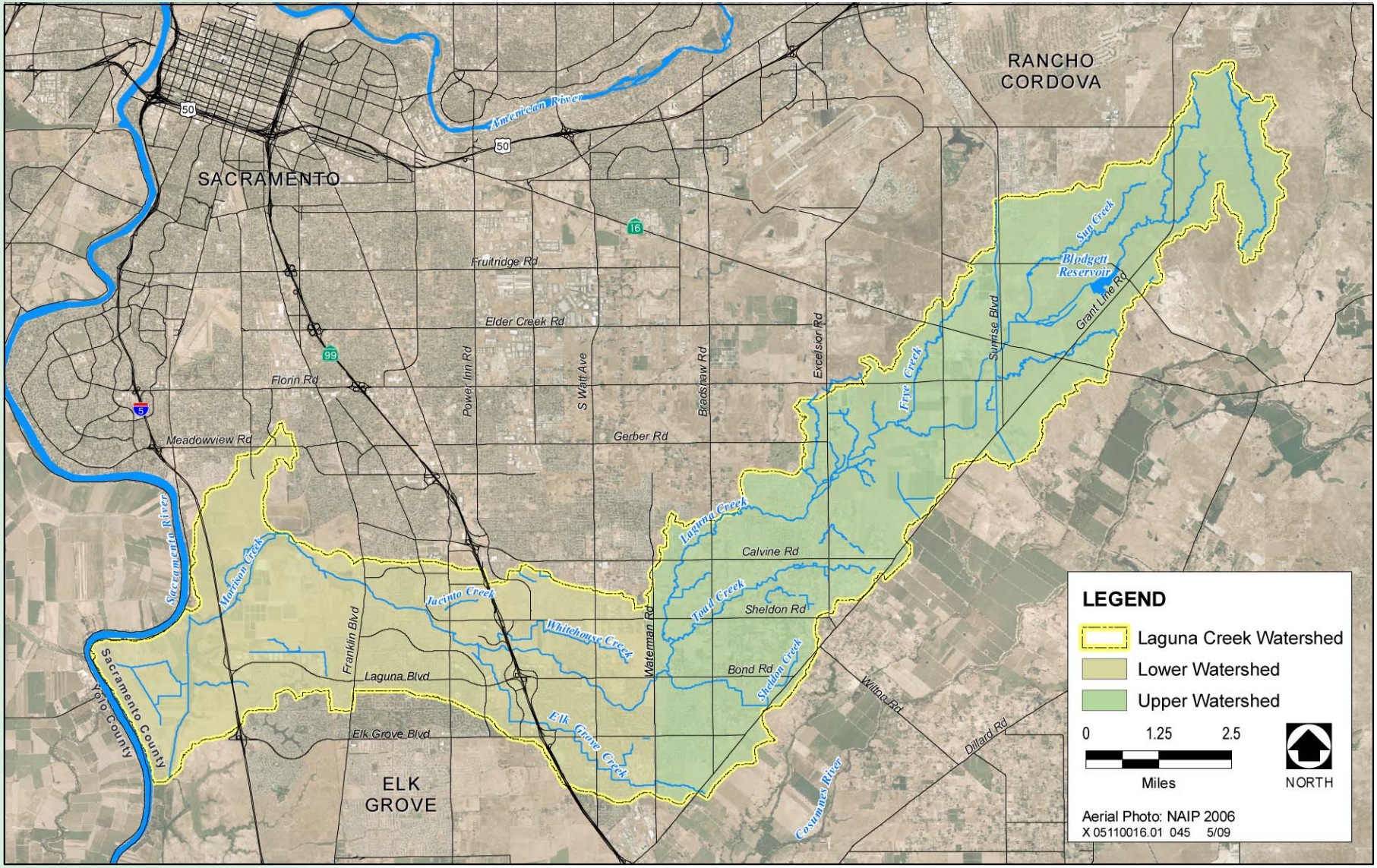


Figure 2-1 Laguna Creek Sub-Watersheds and Primary Tributaries

National Wildlife Refuge) before it ultimately discharges into the Sacramento River within the Sacramento-San Joaquin Delta (Delta) region.

Over time, various planning efforts have divided the Laguna Creek Watershed into two distinct sub-watersheds: upper and lower. The two sub-watersheds are described below (see Figure 2-1).

- Upper Laguna Creek—the upper watershed extends from Laguna Creek's headwaters in northeastern Sacramento County to just upstream of Waterman Road. The upper watershed consists mainly of undeveloped and agricultural lands and semirural/large-parcel residential properties.
- Lower Laguna Creek—the lower watershed spans from Waterman Road to its confluence with Morrison Creek. The lower watershed can be characterized as largely urbanized/suburbanized with residential and commercial development.

There are several main tributaries that drain into Laguna Creek including: Sun Creek, Frye Creek, Toad Creek (aka Tributary #1), Sheldon Creek, Elk Grove Creek, Whitehouse Creek, and Jacinto Creek. Table 2-1 summarizes approximate tributary stream lengths and subwatershed areas, and Figure 2-1 maps tributary locations.

The headwater reaches of Laguna Creek and its tributaries are considered ephemeral (flowing only during large storm events) in some places and intermittent (seasonally flowing) in others. Just upstream of Eagles Nest Road, Laguna Creek becomes a perennial stream. The perennial nature of the creek results from cumulative dry weather flows from agricultural irrigation and urban runoff and other surrounding land uses, including a commercial nursery, school, and park district sprinkler systems.

Table 2-1
Tributaries to Laguna Creek

Stream	Length (miles)	Subwatershed Area (sq. mi.)
Sun Creek	3.6	3.3
Frye Creek	3.2	1.7
Toad Creek (aka Tributary #1)	5.0	5.0
Sheldon Creek	3.2	2.3
Elk Grove Creek	6.5	6.5
Whitehouse Creek	2.8	1.8
Jacinto Creek	1.0	1.0

2.2 Historical Setting

The historical setting of the Laguna Creek Watershed is characterized in this section according to the historic conditions prior to human disturbances, land use changes which have affected the natural resources, and history of watershed stewardship by the community.

Historic Natural Conditions

The Laguna Creek Watershed was formed on the floor of the Central Valley, and thus historical climatic, wildlife, and habitat conditions in the watershed were indicative of conditions in the greater Central Valley region. Seasonal precipitation and flow

patterns sustained a diverse mosaic of natural vegetation communities. These communities provided habitat and stop-over areas to numerous species of fish and wildlife. Arguably, the most important ecological features were grasslands and seasonal vernal pools in the upper watershed and the floodplains, wetlands and riparian scrub/forests in the lower watershed. All of these features likely supported high seasonal concentrations of animals, and contained many species endemic to the Central Valley.

The Central Valley's Mediterranean climate ensured that the aquatic and riparian systems remained highly dynamic, driven by strong annual patterns of wet winters and dry summers and longer multi-year periods of extreme wet and drought conditions. During periods of high rainfall, when much of the Central Valley was transformed into a shallow lake, the lowermost portions of the Laguna Creek Watershed became inundated, forming an extensive lagoon habitat that eventually drained into the Sacramento River (handwritten notes on 1937 aerial photographs describe the lower watershed region west of present-day State Route (SR) 99 as Magoon Slough). During these wetter periods, upstream flows conveyed sediment, nutrients, other dissolved and suspended constituents, wood, organisms, and other debris from the upper watershed downstream to the Sacramento River and the Delta.

During dry periods, only deeper water segments of lower Laguna Creek would remain wet, being reduced to shallow pools and other seasonal wetland features (Thompson and West 1880; USDA 1937 aerial photography of Sacramento County).

Hundreds of species of plants, wildlife, and fish evolved to take advantage of the seasonally varied characteristics of the Central Valley system (California Bay-Delta Authority [CALFED] 2000). The productive floodplain marshlands and seasonal intervening waterways were extremely attractive to waterbirds. The abundant, diverse resident populations of ducks, geese, shorebirds, herons, and other birds were augmented by millions of ducks, geese, shorebirds, and cranes migrating south in fall and winter from summer breeding grounds in the north. The migratory birds could take advantage of expanded wetlands resulting from winter rains and floods, like those conditions found in the lower watershed slough. During periods of drought, there would be wetlands somewhere in the valley, including remnant pools and wetlands in the lower watershed (CALFED 2000).

Localized flooding in some sections of Laguna Creek today resembles historic conditions (photo taken January 1, 2006 looking downstream from Franklin Boulevard).

The once abundant native resident fish population primarily spawned in streams or floodplains like those that historically occurred in the lower watershed, and did not necessarily find appropriate conditions for spawning and rearing of young every season. As a consequence, they evolved to adopt a life history strategy of living for 5 or more years, enabling these species to spawn on and exploit floodplains on those inconsistent occasions when the rivers and creeks flooded. Middens near Native American village sites throughout the Central Valley and Delta indicate that many of these fishes (e.g., thicktail chub [*Gila crassicauda*], Sacramento perch [*Archoplites interruptus*], Sacramento splittail [*Pogonichthys macrolepidotus*], hitch [*Lavinia exilicauda*], and Sacramento blackfish [*Orthodon microlepidotus*]) were extremely abundant and easy to harvest (CALFED 2000).

Human Occupation

Laguna Creek meanders through what was originally Plains Miwok territory. The native people used the creek as a hunting and gathering resource. As with many native Californian groups, acorns provided the main dietary staple and were collected on yearly excursions to the foothills. Fish and wildlife also provided an important source of sustenance.

The earliest Europeans documented in the southern Sacramento Valley were the Spanish. Laguna Creek itself was christened by a Spanish exploration party in search of new mission sites during the early 1800s (Pinkerton 2002). With the United States acquisition of California, and the discovery of gold at Coloma in the mid 1800s, further Euro-American settlement in the area soon occurred, and with it, changes to the use of the local water system.

The first non-native settlers to inhabit the area established themselves along Laguna Creek and other nearby watercourses. By the late nineteenth and early twentieth centuries, the native people were largely displaced from the area, and Laguna Creek became an agricultural resource for the non-native settlers. Laguna Creek was noted at this time as being dry in the summer, but furnishing ample water during the rainy season (Thompson and West 1880).

Land Use Changes Affecting Natural Resources

While landscape change is continual, the rate and level of change to the Laguna Creek Watershed during the 19th century greatly exceeded that of the century preceding it. Increases in population and expansive land-use impacts, while not dramatic, modified the original flow, use, and appearance of Laguna Creek and its tributaries as evidenced through historic maps and documents.

In the mid-19th century, levee building in the Central Valley resulted in the Sacramento River being disconnected from its floodplain and altered the seasonal inundation processes that occurred via backwaters in the lower portions of its tributaries, including Laguna Creek. Upland landscapes along Laguna Creek and other nearby creeks were first altered by farming starting in the late 19th century when the native grasslands and riparian vegetation were displaced by crops, pasture, and invasive nonnative grasses and weeds. By the late 19th century, much of the land adjacent to Laguna Creek was considered entirely agricultural in nature, and was used for stock watering and irrigation. Hops, wheat, almonds, fruit, and vineyards were all prominent crops in the area surrounding Laguna Creek (Thompson and West 1880). The predominance of grain crops

in the Laguna Creek area continued well into the 20th century, although after the turn of the century some row crops were planted and small, family-run dairies were established. By the turn of the 20th century, the region was being divided into small ranches and farms, ranging from 20 acres to over 240 acres.

Early 20th century hops harvest in Sloughhouse area near Laguna Creek watershed.

In the 20th century, lands throughout the watershed were put into agricultural production through the planting of crops and grazing. In more recent times, lands within the watershed have been undergoing rapid development for residential and commercial uses. This has resulted in changes to the hydrology, geomorphology, and water quality of the creek and loss of natural habitat supporting fish and wildlife.

Watershed Stewardship

The channelization, relocation, and filling of natural streams in Sacramento County continued until the early 1970s when strong public interest (spearheaded by the Friends of Chicken Ranch Slough) led to the formation of a broadly-based Natural Streams Task Force in 1972. Using the work of the Task Force, Sacramento County adopted a Natural Streams Plan in 1980 that called for the protection of the natural amenities of several creeks north of the American River. The Natural Streams Plan helped raise awareness of stream systems as more than conveyance channels, and brought the multiple benefits of streams as natural resource areas into consideration during the subsequent planning and development of Sacramento County.

Until 2002, little effort had gone towards comprehensive planning or assessment of the Laguna Creek Watershed as a whole, including assessment of the cumulative effects of urban development. Up until that time, each of the local agencies in the watershed, including local municipalities, had implemented various stormwater projects independently in different parts of the watershed, typically focusing on flood risk reduction and property protection.

In recent years, however, various groups, cities, and agencies have collaborated towards a more integrated watershed effort to improve and protect the value of the Laguna Creek Watershed. Two main stakeholder efforts have emerged through these efforts with the common goal of protecting and enhancing the watershed's health. These two groups, the Laguna Creek Watershed Council (the Watershed Council), which formed in 2002, and the Upper Laguna Creek Collaborative, which formed in 2003, are discussed in Chapter 3.

2.3 Land Use

This section briefly describes land use and planning areas that directly relate to natural resource conditions in the watershed

and to policy and management action recommendations presented in Chapter 6.

Municipal Planning Areas

The Laguna Creek Watershed crosses four major jurisdictional boundaries: unincorporated Sacramento County, the City of Rancho Cordova, the City of Elk Grove, and the City of Sacramento. The upper watershed is primarily within unincorporated Sacramento County, with portions within the City of Rancho Cordova and the City of Elk Grove (see Figure 2-2). More than half of the lower watershed is within the City of Elk Grove, with a small portion crossing through the City of Sacramento. Planning Commissions have been established in each of the four cities to receive and consider community input and advise the City Councils on land use planning issues.

Several community planning areas within unincorporated Sacramento County intersect the watershed. Community Planning Advisory Councils have been established in these urbanized pockets of the county to provide a forum for public participation in land use planning issues and advise the County Planning Commission (see Figure 2-2); these are discussed in more detail in Chapter 4.

Open Space and Conservation

The Laguna Creek Watershed includes several areas intended to protect natural resources by conserving open space for habitat and/or recreational purposes. Figure 2-3 shows the location of representative areas.

Several upper watershed properties have conservation easements recorded over some or all of their parcels. Most of the conservation easement land occurs in contiguous parcels between Sunrise Boulevard and Excelsior Road, and is located within the South Sacramento County Habitat Conservation Planning Area. Additional areas of significant open space in the upper watershed occur on land owned by the Sacramento County Parks Department and Southgate Recreation and Parks District.

Parks and open space parcels owned by the City of Elk Grove and the Cosumnes Community Services District are scattered throughout the lower watershed within the City of Elk Grove. The need to catalogue the location, ownership, and easement conditions of these parcels is discussed in the action recommendations presented in Chapter 6.

SRCSD established a 2,650-acre buffer between the Sacramento Regional Wastewater Treatment Plant and surrounding neighborhoods that is known as the Bufferlands (see Chapter 3). The Bufferlands have become a valuable open space area for the enhancement of the riparian and wetland resource values of the lower reaches of Laguna and Morrison Creeks.

Since the late 1980s, the development of neighborhoods bordering several segments of Laguna Creek have included open space buffers of several hundred feet in width along both stream banks. These streamside buffers provide recreational and educational opportunities and flood risk reduction for residents, as well as habitat and water quality benefits for Laguna Creek and supported wildlife. Existing and planned segments of streamside buffers with associated trails are part of the Laguna Creek Parkway trail system which is discussed in more detail in Chapter 3.

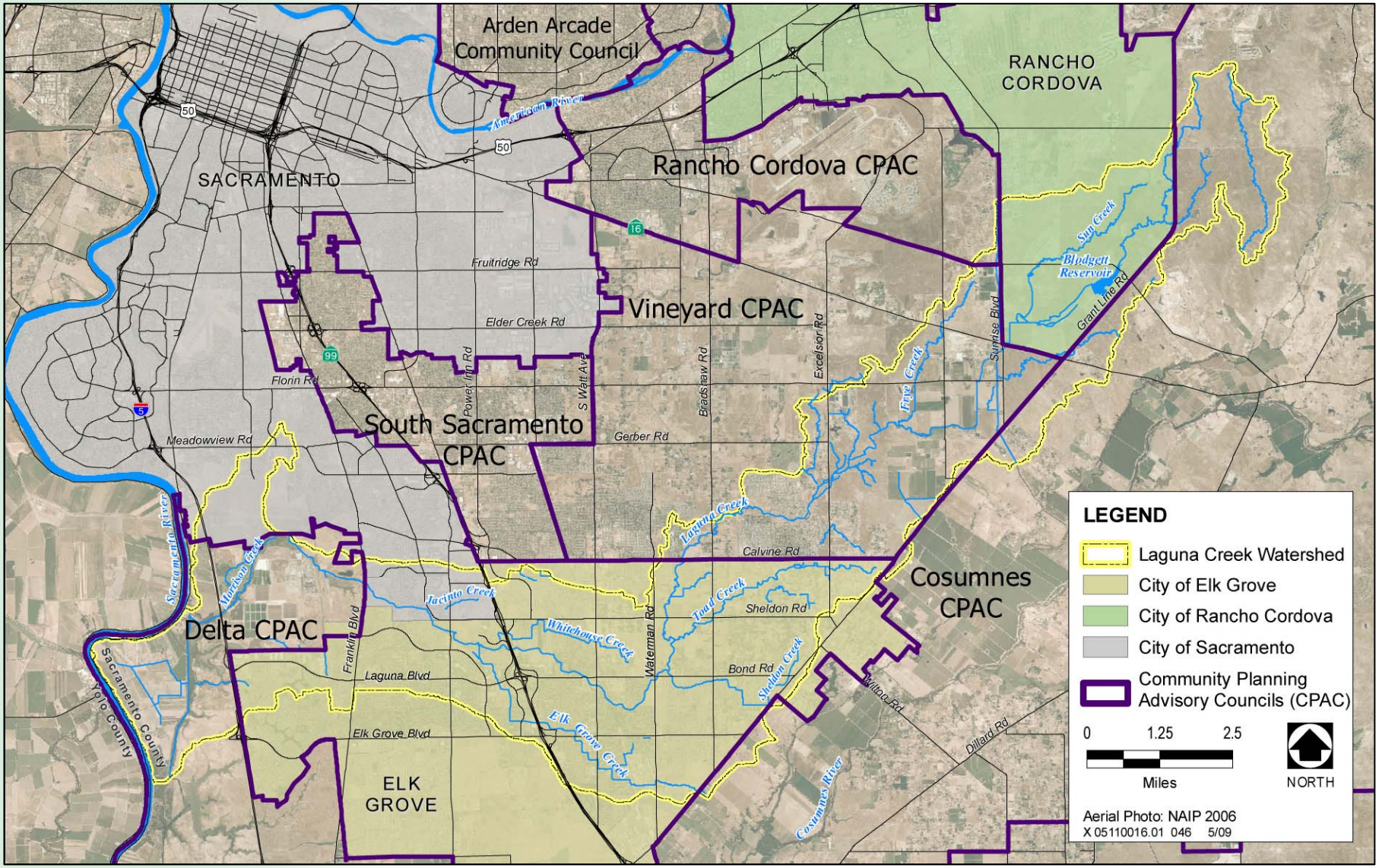


Figure 2-2 Municipal Planning Areas in the Laguna Creek Watershed

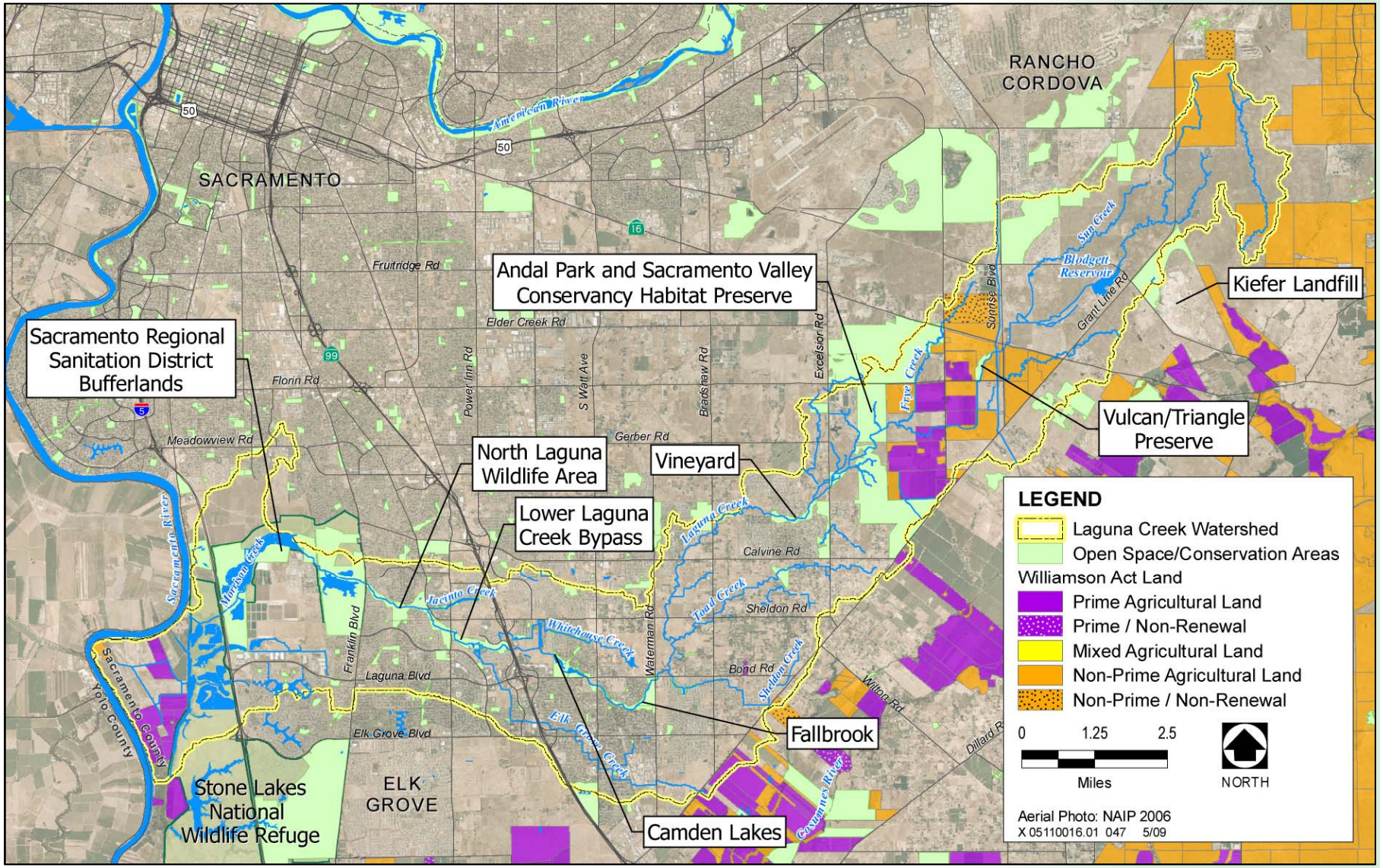


Figure 2-3 Representative Open Space, Conservation, and Important Farmlands in the Laguna Creek Watershed

Agriculture

The upper watershed is primarily agricultural land with some large-parcel rural residential uses. The agricultural area is predominately dry pasture land suitable for cattle and sheep grazing, with some portions suitable for growing a variety of crops including row crops, orchards, vineyards, and some irrigated pasture. Much of this land is considered important farmland by the California Department of Conservation (DOC), as reflected on its 2007 map (Figure 2-3).

Grazing in the upper watershed.

The California Land Conservation Act of 1965 (also known as the Williamson Act) is designed to preserve agriculture and open space lands. Local governments can enter into contracts with homeowners and give them a property tax break (lower tax assessment) for keeping their land in agricultural or related open space use. Approximately 5,200 acres of the land within the Laguna Creek Watershed is held under Williamson Act contracts (Figure 2-3).

DOC's Farmland Mapping and Monitoring Program (FMMP) assesses the location, quality, and quantity of the state's agricultural lands and conversion of these lands over time, and FMMP designations can be important for land use planning purposes. In 2008, FMMP-designated land types in the watershed include: Farmland of Local Importance (5,100 acres), Farmland of State Importance (2,300 acres), Prime Farmland (2,000), and Unique Farmland (410 acres). FMMP land types are defined in the Glossary.

Industrial and Transportation Land Use

This section describes some of the major industrial land uses which occur within the watershed.

In the upper watershed, the County operates the Kiefer Municipal Solid Waste Landfill along the northeastern border of the watershed.

Downstream of Sunrise Boulevard, an aggregate mining facility is operated along Laguna Creek by Triangle Rock Products, Inc. (Vulcan Materials Co.). A wetlands preserve has been established on a portion of the facility located north of Florin Road. Adjacent to the rock quarry is a composting, soil blending, and materials recycling facility that sends runoff via an irrigation canal to wetlands areas both north and south of Florin Road.

A plant nursery growing facility operates on approximately 155 acres at the corner of Excelsior Road and Florin Road, and contributes runoff to Laguna Creek via two tributary streams.

At the downstream end of the watershed, SRCSD operates the Sacramento Regional Wastewater Treatment Plant, which

discharges treated effluent into the Sacramento River. The facility is surrounded by the 2,650 acre Bufferlands.

Industrial land use occurs along Elk Grove Creek near Waterman Road where an industrial park (Waterman Business Park) and the Elk Grove Water Service's water treatment plant operate just east of the Union Pacific Railroad (UPRR) tracks.

Several major transportation corridors traverse the watershed, including: I-5, SR 99, Grant Line Road, and the UPRR lines. Planning efforts to widen Grant Line Road, which borders the watershed's eastern boundary, into a major transportation route connecting SR 50 and SR 99 could significantly increase the use of this transportation corridor in the future.

Residential and Commercial Land Use

Residential and commercial properties constitute the predominant land uses throughout the lower watershed, and within portions of the upper watershed.

2.4 Climate, Geology, and Soils

This section describes the climate, geology, and soils of the Laguna Creek Watershed with an emphasis on information that is relevant to development of the Watershed Management Action Plan. More detailed information regarding Laguna Creek Watershed's climate, geology, soils, and channel geomorphology is presented in Appendix E.

Climate

Climate plays a significant role in the ecology of local creeks. The watershed's vegetation communities have adapted to seasonal cycles of precipitation and the longer drying and wetting trends in climate.

The Laguna Creek Watershed has a Mediterranean climate that is characterized by hot, dry summers and cool, rainy winters. Temperatures in the watershed vary from low temperatures of 24 to 44˚F to highs of 80 to 110˚F. Average annual rainfall in the watershed ranges from 20 to 22 inches per year falling primarily from October through April (City of Elk Grove 2007). During the summer, the Coast Range prevents moist cool air from the ocean from reaching the Sacramento Valley, and high pressure conditions generally keep storm fronts from reaching central California. In winter, occasional breakdowns in the high pressure system allow storms to reach Sacramento County producing precipitation. Humidity is high in the winter and very low in the summer. As a result, potential evapotranspiration is high in the summer and soil moisture drops rapidly.

As changes in global climatic patterns present new challenges worldwide, much uncertainty remains of potential future effects at the regional and watershed level. This uncertainty underlines the need to integrate flexibility into plans involving assessments of hydrologic conditions and water resource management.

Geology

Lands within the watershed are generally flat or mildly undulating, and become steeper in the upper reach. Channel elevation ranges from approximately 250 feet above mean sea level (amsl) in the headwaters region to 6 feet amsl at Laguna Creek's confluence with Morrison Creek.

Laguna Creek is cut into alluvium deposited by the ancestral American River.

Laguna Creek is cut into both old and young alluvium deposited by an ancestral American River from several hundred-thousand years to a million years ago. Laguna Creek essentially drains the land surface of an ancient American River terrace. The creek flows southwest along the older terrace deposits (Laguna, Arroyo Seco, and Upper Fair Oaks Gravel Formations), eventually crossing the western facing escarpment of the terrace near Excelsior Road, and dropping onto the younger formation (Riverbank) before flowing into Morrison Creek.

William Lettis & Associates (2005) summarized the large scale geologic features forming the ridges, valleys, and deposits within the watershed. The WLA report included a discussion of geologic formations and deposits that have developed over a million years and shaped the landscape as we see it today. More complete information on the watershed's underlying geologic materials and their influences on channel gradient, channel planform, bed material size and availability, and associated soil types are presented in the WLA report. Geosyntec Consultants (2007) further assessed geomorphic conditions in the watershed to evaluate current conditions of the creek system and to evaluate the creek system's susceptibility to the effects of urban development and their findings are summarized in Chapter 5 of this Plan.

Laguna Creek begins as a narrow, grassland prairie stream in its upper reaches.

Soils

Watershed soils are highly diverse and are linked to large-scale geologic features. The geologic material of Laguna Creek formed from alluvial deposits of the ancestral American River. These deposits have been weathered, cemented, and modified to form the current soil horizons and hardened sub-layers. These soils and the hardpan sub-layer have a strong influence on observed landscape and channel morphology, and on the types of vegetation that can be supported in the watershed.

Twenty-five soil series have been identified within the boundaries of the Laguna Creek Watershed (Figure 2-4). A soil series is a group of soils that have horizons that are similar in arrangement and characteristics. Soils in the watershed are usually dry from June until September and are moist during most of the rest of the year. Descriptions of the most common soil series found in the watershed, including a description of drainage characteristics and ability to support different natural vegetation and agricultural crops (NRCS 1972), are provided in the Geosyntec report (Geosyntec 2007).

2.5 Hydrology, Geomorphology, and Water Quality

This section summarizes current hydrologic, geomorphic, and water quality conditions for Laguna Creek and its main tributaries. See Appendix E for additional details.

Hydrology

Laguna Creek extends approximately 25 miles in length from its headwaters to its termination at Morrison Creek. The creek flows across broad floodplains and terraces created by the ancestral American and Sacramento Rivers. The channel cuts into these ancient deposits generally following topographic lows and valleys. Laguna Creek is one of many tributary streams to Morrison Creek that collectively form the Morrison Creek Stream Group, and flow generally east to west across central Sacramento County between the American River

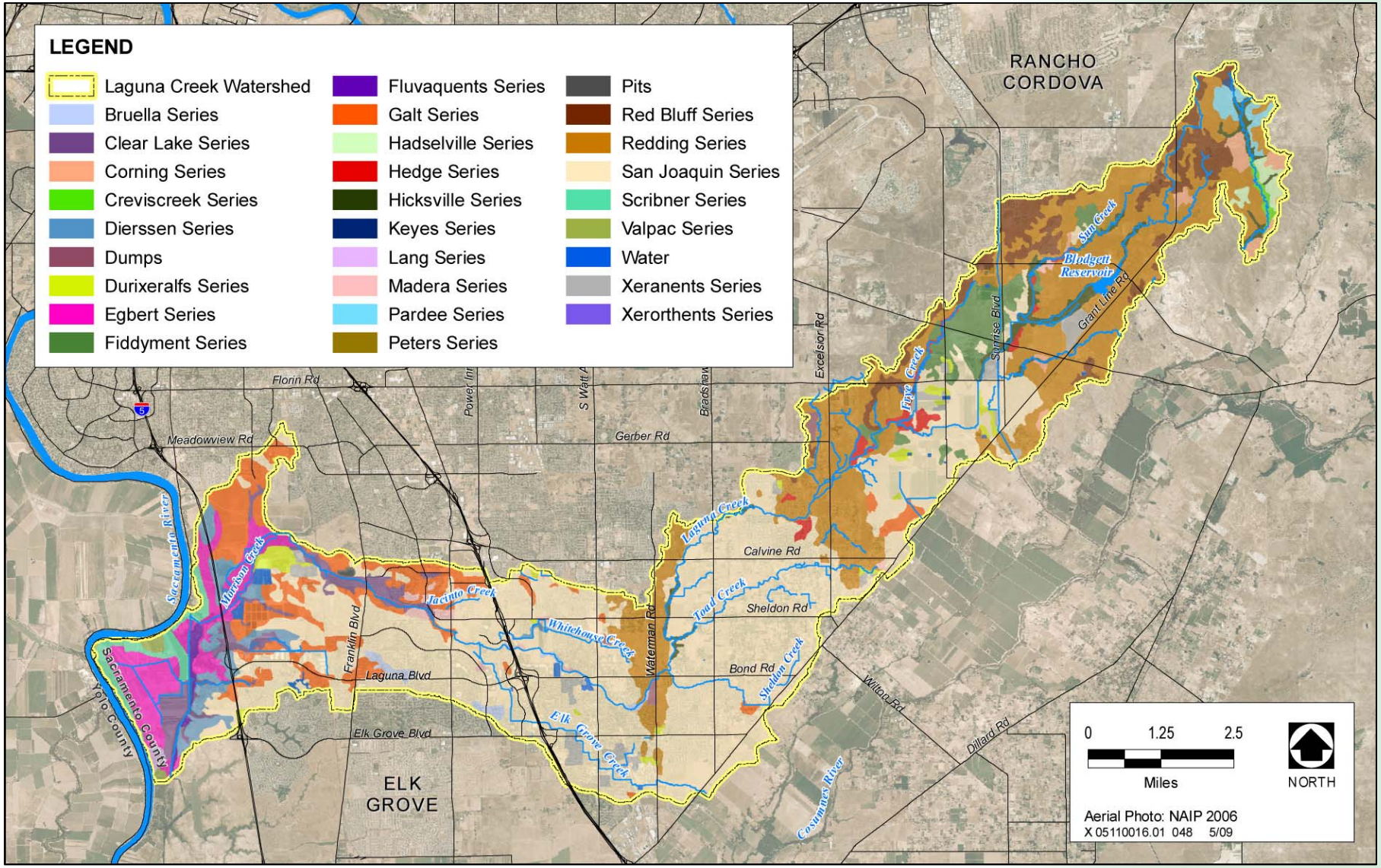


Figure 2-4 Soil Types in the Laguna Creek Watershed

to the north, and Deer Creek and the Cosumnes River to the south. Major streams in the Morrison Creek Stream Group include: Morrison Creek, Elder Creek, Gerber Creek, Union House Creek, Strawberry Creek, Laguna Creek, and Elk Grove Creek.

For most of its length, Laguna Creek is a single threaded, meandering channel with moderate to high width-to-depth ratios (except where channelized), with a low to moderate sinuosity and low gradient. With the watershed's broad valley plains and gentle relief, stormwater historically occupied the watershed's topographic depressions and drainage swales, forming seasonal wetlands and vernal pools across the landscape. Small remnant portions of this landscape still exist today. However, much of the landscape has been altered by agricultural practices and urban development, which have leveled these features and redirected stormwater to the single primary channel.

Annual average rainfall in the Laguna Creek Watershed is 16–17 inches with most of the rainfall falling between October and May. Wet weather flows result from the combination of stormwater runoff, shallow subsurface interflows (subsurface flows that lie between the surface and the hardpan layer), and deeper subsurface baseflows migrating to stream channels during the wet seasons. Interflow tends to extend the period of flow in channels between storms and into spring and early summer. Baseflows are deeper subsurface flows which, together with dry weather surface runoff, maintain the perennial nature of lower Laguna Creek and several of its tributary streams (Geosyntec 2007). Dry weather surface runoff originates from various sources in the watershed and delivers a variety of associated water quality constituents to the watershed's streams.

Laguna Creek

From its headwaters downstream to Blodgett Reservoir, Laguna Creek is a shallow ephemeral channel where water flow is dependent upon larger storm events, and no flow occurs during dry weather seasons.

Downstream of Blodgett Reservoir to approximately 0.5 mile south of Florin Road (to the southern property boundary of the aggregate mining facility), Laguna Creek is an intermittent stream where dry weather flows are periodic and dependent upon runoff from irrigation of pastures located east of Sunrise Boulevard, and stormwater flows can be more persistent than upstream of the reservoir. During the rainy season, channel flows result from a combination of stormwater runoff, interflow, and inputs from Blodgett Reservoir when lake levels are able to overtop the spillway. The confluence of Sun Creek with Laguna Creek occurs in this intermittent segment, approximately 1.5 miles downstream of Blodgett Reservoir. Recent interbasin transfer flow of urban runoff from new housing developments in neighboring Morrison Creek watershed to the north has contributed additional water into this reach of Laguna Creek via the Sun Creek tributary.

Downstream of the aggregate mining property to its termination at Morrison Creek, Laguna Creek transitions to a perennial stream as runoff from irrigated lands in the upper watershed and from urban land use in the lower watershed maintain water in the Laguna Creek channel throughout the year. Dry weather flows are maintained upstream of Excelsior Road by agricultural and commercial (nursery) runoff, and

downstream of Excelsior Road predominantly by urban runoff as the creek passes through urbanized areas of unincorporated Sacramento County, the City of Elk Grove, and the City of Sacramento. Additional dry weather flows come from wells pumping groundwater into Laguna Creek upstream of the Camden Lakes community to prevent stagnant low-flow conditions in the lakes.

Several on and off-line features affect flows in the Laguna Creek channel by either adding water to the channel at various times throughout the year and/or providing temporary or permanent off-line storage of precipitation and runoff for the channel. These features include: Blodgett Reservoir, the shallow lake associated with the Birch Ranch community, the Bradshaw Christian School detention basin, and other off-line storage basins associated with Toad Creek, Sheldon Creek, and Tributary #3 (at Pleasant Grove High School) in the upper watershed; and the Camden Lakes, Shortline Lake, the Laguna Bypass and associated detention basin downstream of Bruceville Road, Fish Head Lake in the Bufferlands, and other off-line storage basins associated with Elk Grove Creek, Whitehouse Creek, and Jacinto Creek in the lower watershed.

Generally throughout the watershed, high flows in Laguna Creek and its tributaries are able to overtop their banks and spread across upland floodplains and/or terraced upland benches. Exceptions exist where stream channels have been disconnected from their floodplains as a result of engineered changes in channel form (a segment of Laguna Creek downstream of Blodgett Reservoir, a segment of Toad Creek upstream of the California Traction Railroad tracks, and most of Sheldon Creek), past dredging practices (segments of Laguna Creek between Vineyard Road and Calvine Road), and/or the construction of levees along reaches of stream bank (segments of Laguna Creek between Vineyard Road and Calvine Road).

Tributary Streams

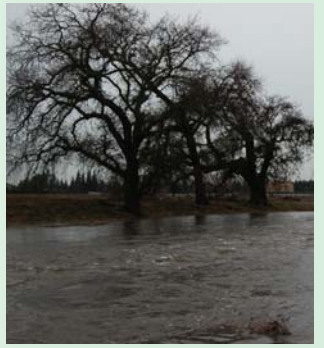
Several tributaries contribute water at various points along the course of Laguna Creek, adding volume and water quality constituents to seasonal flows that reflect upland land uses found in the tributaries' subwatersheds. Stream length and subwatershed area values for Laguna Creek's tributaries are presented in Table 2-1.

Sun Creek flows generally southwest from the west of Grant Line Road and south of Douglas Road, to its confluence with Laguna Creek 0.7 mile upstream of Sunrise Boulevard. The hydrology of Sun Creek is in transition from what once was an ephemeral channel much like Laguna Creek above Blodgett Reservoir, to an urban runoff influenced stream. Downstream of Jaeger Road, the Sun Creek channel has recently been straightened and realigned to follow property boundaries and receives runoff from new housing developments to the north. Upstream of Jaeger Road, plans for future developments along Sun Creek include preserving the current stream alignment and establishing riparian open space buffers.

Frye Creek originates southwest of the intersection of Eagles Nest Road and Kiefer Road and enters Laguna Creek on private property just upstream of the county's Andal Park. Frye Creek in an intermittent stream with periodic dry weather flows resulting from upland agricultural irrigation.

Two unnamed tributaries flow into Laguna Creek from the north with confluences at points 0.7 mile upstream and 0.3 mile downstream of Excelsior Road, and both carry effluent from a plant nursery growing facility. In recent years, nursery effluent

Laguna Creek upstream of Vineyard Road during dry weather flows.



Laguna Creek upstream of Vineyard Road during wet weather flows.

has transformed both tributaries from ephemeral channels into perennially flowing streams (pers. com. local Spiva Road community land owners). The tributary entering upstream of Excelsior Road flows through the Birch Ranch community before entering Laguna Creek. The tributary entering downstream of Excelsior Road (locally referred to as Maka's Creek) also carries water from a cattle stock pond just south of Florin Road, and runoff from the Spiva Road community into Laguna Creek.

Toad Creek (a.k.a. Tributary #1) is a perennially flowing tributary stream that begins near the southwest corner of Calvine Road and Grant Line Road, and flows southwesterly through the rural areas of eastern Elk Grove to its confluence with Laguna Creek 0.7 mile downstream of Sheldon Road. Dry weather flows are the result of irrigation runoff from ranchettes and rural residential land use in the rural block of east Elk Grove.

Sheldon Creek originates in the rural residential area to the northwest of the Bond Road/Grant Line Road intersection. Since 2002, most of Sheldon Creek's stream length has been widened and deepened, and reshaped into a vegetated, trapezoidal channel that has been realigned to flow along property boundaries. The channel conveys runoff from low and medium density suburban land use, westward to its confluence with Laguna Creek near the northeast corner of Bond Road and Waterman Road. Dry weather flows in Sheldon Creek are therefore dominated by urban runoff from lawn, park, and school field irrigation, and from other outdoor residential water usage.

Elk Grove Creek is Laguna Creek's largest tributary. Beginning near the intersection of Grant Line Road and Elk Grove Boulevard in southeast Elk Grove, the creek runs generally northwest to its confluence with Laguna Creek just upstream of the Lewis Stein Road bridge. Elk Grove Creek receives periodic agricultural runoff from fields east of Grant Line Road; otherwise, dry weather flows are predominantly urban runoff from the City of Elk Grove.

Whitehouse Creek begins west of Waterman Road upstream of UPRR, and travels west through rural residential and light industrial properties as an intermittent channel. Whitehouse Creek becomes an urban runoff dominated perennial stream immediately downstream of the UPRR tracks as it passes through urban developments. The channelized stream travels north around Shortline Lake, then south via a diversion channel to its confluence with Laguna Creek 0.2 mile east of SR 99.

Jacinto Creek is a channelized stream running from just west of SR 99 and north of Sheldon Road through urban development and into Laguna Creek in the North Laguna Wildlife Area. Urban runoff into the channel maintains perennial flows in Jacinto Creek.

Geomorphology

The geomorphic character of Laguna Creek is highly influenced by the ancient American River alluvial deposits that have been weathered, cemented, and modified to form the current soil layers and lower sub-layers of the watershed landscape. Channel bed and bank materials consist of a combination of stratified soil and subsurface hardpan, locally derived alluvium, and exposed outcrops of bedrock. WLA (2005) defined five sub-reaches for Laguna Creek based on changes in the channel's underlying geologic material and associated changes in

longitudinal channel slope. Geosyntec (2007) (see Appendix) used these five geomorphic sub-reach classifications to present detailed accounts of sub-reach stability, erosion processes, sediment supply and transport, channel bed and bank form and materials, and bank vegetation. Their findings are summarized in relation to overall stream channel stability in Chapter 5 of this Plan.

Water Quality

Water quality conditions in the watershed reflect the sum of in-stream and riparian conditions, and of impacts from both the quality and quantity of urban and agricultural runoff in the watershed.

Laguna Creek and its tributaries are low-gradient valley floor prairie streams with little to no riparian canopy. Dry weather conditions are generally characterized by shallow, warm, and slow-moving water overlying mud and fine silt channel substrates. In several upper watershed reaches and a few lower watershed locations, stream channels cut through deposits of ancient American River gravels, and here substrates are composed of sand, pebbles, and small gravels.

Water quality constituents commonly found in agricultural runoff associated with the type of rangeland and cropland practices that occur in the upper watershed include bacterial contaminants, inorganic forms of nitrogen and phosphorous, herbicides, pesticides, and sediment load imbalance. Constituents commonly found in urban runoff commonly associated with developed areas like the lower watershed and parts of the upper watershed include trash, oil and grease, metals, polycyclic aromatic hydrocarbons (PAHs), bacterial contaminants, inorganic forms of nitrogen and phosphorous, sediment, and pesticides.

Bacteria are common contaminants of stormwater that originate mainly from animal excrement and sanitary sewer overflows. Fecal coliform (bacteria) is frequently monitored and is regulated as an indicator organism for the presence of human pathogens.

Inorganic forms of nitrogen and phosphorous are used for fertilizing landscapes, and are commonly found in stormwater. These nutrients can result in excessive or accelerated growth of aquatic vegetation, such as algae, which can be toxic and can affect other water quality parameters, including causing depressed dissolved oxygen.

Sediment is typically characterized in water courses as suspended solids and turbidity, and can be considered a significant pollutant. Excess sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. In addition, sediment can transport other pollutants that are attached to it including nutrients, trace metals, pesticides, and hydrocarbons (California Stormwater Quality Association [CASQA] 2003).

Pesticides (including herbicides, fungicides, rodenticides, and insecticides) may be present in runoff from agricultural land uses. Pesticides have been repeatedly detected in stormwater from other watersheds throughout the United States at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton,

Aquatic weeds and trash in Elk Grove Creek downstream of Elk Grove Boulevard.

provides an avenue for bio-magnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds (CASQA 2003). EPA is phasing out the use of organochlorine-type pesticides for urban and most agricultural uses; however, there is concern that the replacement pesticides, which commonly have pyrethroids as the active ingredient, may also be harmful to aquatic organisms.

Trash and debris typically occur in urban residential and commercial environments, as well as industrial and construction sites, and in agricultural and landscaped areas. These pollutants may include heavy metals, pesticides, and bacteria, as well as plant debris, animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills (CASQA 2003). Trash and debris have the potential of occurring throughout the watershed.

Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking hydraulic systems, restaurants, and waste oil disposal (CASQA 2003).

Exposed surfaces in the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Depending on the constituent, much of the trace metal load carried in stormwater can be associated with sediments. Metals are of concern because they can be acutely toxic to aquatic organisms, can bioaccumulate in organisms and cause chronic toxicity, and have the potential to contaminate drinking water supplies. Common source of metals include copper in brake pads, zinc from galvanized roofing materials and tire wear, and mercury from lighting and instruments.

Sources of polycyclic aromatic hydrocarbons (PAHs) in urban runoff may derive from incomplete combustion of fossil fuels, spills from petroleum products, and by anaerobic decomposition of organic material in soil or sediment.

In addition to the quality of runoff, the quantity of runoff entering stream channels can play a part in the water quality conditions in the watershed. The volume, duration, and frequency of flows from the outfalls of stormwater management features (pipes, basins, and open drainage channels) that exceed the erosive potential of the receiving channel's boundary material can cause or lead to the erosion of downstream channel boundaries and to increased channel instability over time. Unstable channel bank and bed conditions can trigger a cascade of events that result in decreased water quality conditions downstream of the stormwater management feature. A few examples include: weakened or eroded banks leading to the loss of riparian canopy and increased water temperatures; bank erosion leading to channel widening, decreased water depth, increased water temperatures, and increased growth of emergent aquatic vegetation; and eroded bank materials increasing water turbidity.

2.6 Biological Resources

This section describes the primary habitats, wildlife, and fish species of the Laguna Creek Watershed with an emphasis on those traits or characteristics that are relevant to development

of the Watershed Management Action Plan. In addition to the biological assessment conducted for this project (EDAW 2008; see Appendix F) and previous studies (EIP 1998), a number of references were consulted in the preparation of this section (Holland 1986, Sawyer and Keeler-Wolfe 1995, Hickman 1993, California Natural Diversity Database [CNDDB] 2007, California Native Plant Society 2007).

Vegetation Communities and Habitat Use

The floral and faunal associations presented in this section describe the primary vegetation communities and habitat use found in the Laguna Creek Watershed, and represent important ecological information that must be considered when planning policy and management decisions involving the watershed's natural resources.

Generally, in the upper watershed upstream of Excelsior Road, the main vegetation community is vernal pool grassland and a few scattered locations of open water and seasonal marsh. This area is largely undeveloped rangeland that provides quality habitat for native plant and wildlife species. Downstream of Excelsior Road in the upper watershed, the majority of the land use is primarily low-density development characterized by 1- to 5-acre lots that support irrigated pastures, dry-land pastures, and hobby agricultural endeavors. In the lower watershed, most of the area is dominated by residential and commercial development.

Table 2-2 and Figure 2-5 illustrate the primary vegetation communities/habitats found in the Laguna Creek Watershed and their approximate percent coverage in specific regions of the Watershed.

Table 2-2
Vegetation Communities/Habitats and Percent Coverage in the Laguna Creek Watershed

Community / Habitat Type	Watershed Unit	
	Upper Watershed	Lower Watershed
Grasslands		
Annual Grassland	5	13
Vernal Pool Grassland	54	6
Savannah	Trace	0
Valley Riparian Woodlands		
Mixed Riparian Woodland	Trace	< 5
Valley Oak Riparian Woodland	Trace	Trace
Cottonwood Woodland	Trace	Trace
Mixed Riparian Scrub	Trace	Trace
Eucalyptus Woodland	Trace	Trace
Wetlands		
Freshwater Marsh	< 5	< 5
Seasonal Marsh	< 5	Trace
Open Water	< 5	< 5
Other		
Agricultural Land/Crops	10	< 5
Urban/Developed	29	68

Source: Compiled by EDAW in 2008

Grasslands

Grassland communities present in the watershed include annual grassland and vernal pool grassland. Annual grassland is primarily composed of introduced nonnative annual grasses and is generally open with very little tree cover. Annual

Raccoon paw prints found on a portion of the dry Laguna Creek bed.

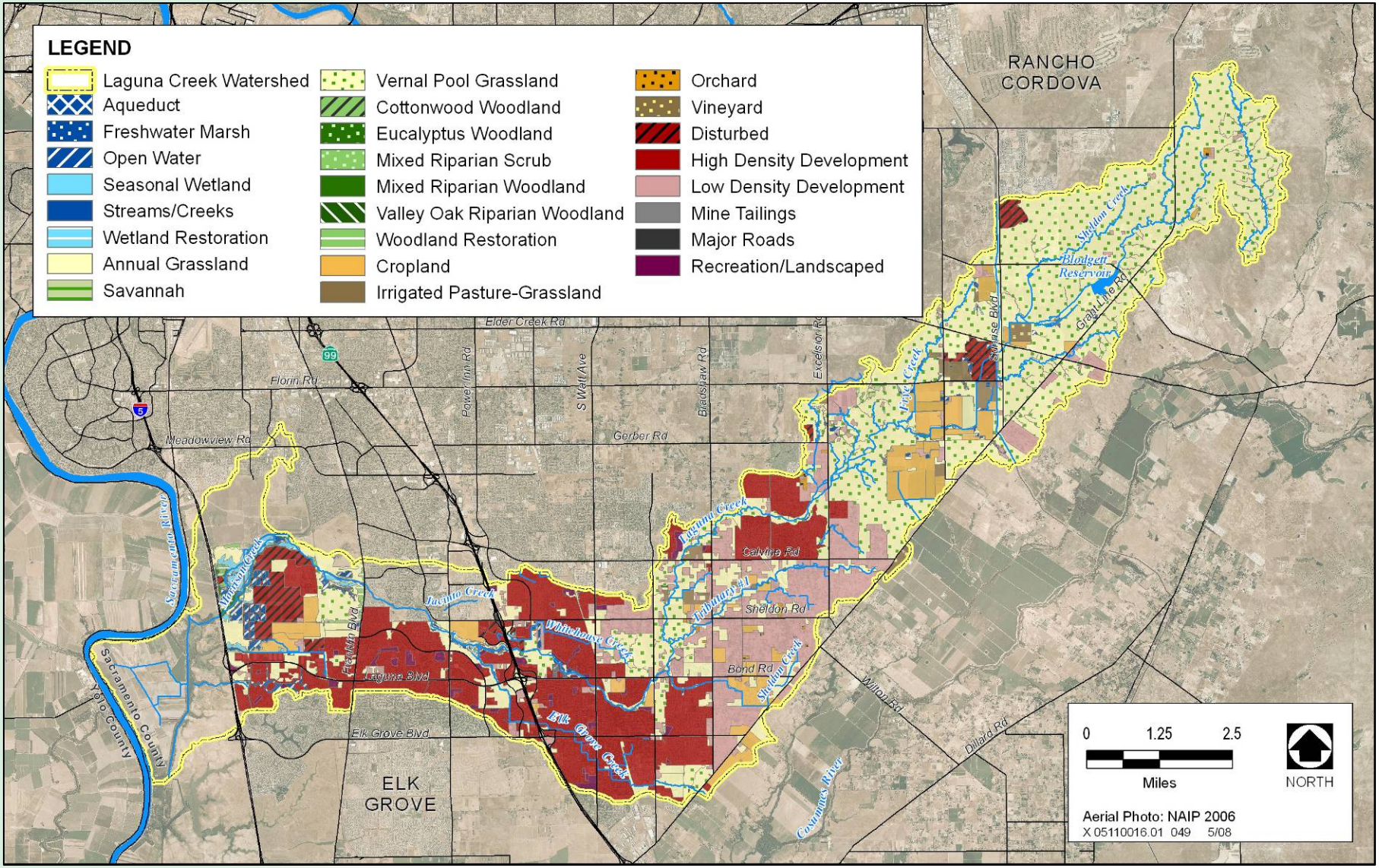


Figure 2-5 Land Use Cover, Vegetation Communities, and Habitat Types in the Laguna Creek Watershed

grassland supports many wildlife species including coyote (*Canis latrans*), vole (*Microtus californicus*), ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), black-tailed jackrabbit (*Lepus californicus*), western burrowing owl (*Athene cunicularia*), American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsonii*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western meadowlark (*Sturnella neglecta*), ring-necked pheasant (*Colchicus phasianus*), and California quail (*Callipepla californica*). Vernal pool grassland is composed of annual grassland that supports vernal pool complexes and scattered vernal pools and provides habitat for vernal pool fairy shrimp (*Branchinecta lynchi*), conservancy fairy shrimp (*Branchinecta conservatio*), tadpole shrimp (*Lepidurus packardi*), California tiger salamander (*Ambystoma californiense*), and western spadefoot toad (*Spea hammondii*). Grasslands are the dominant vegetation community type throughout the watershed.

Savannah

Savannah is characterized by annual grassland with a very sparse canopy (<40% canopy cover) dominated mainly by valley Oaks (*Quercus lobata) and* blue oaks (*Quercus douglasii*). Where soils are shallow, forbs and wildflowers typical of annual and perennial grasslands provide groundcover beneath the scattered trees. Savannah occurs in more open areas of the Sheldon Community in the upper watershed, along some open space areas of the Laguna Creek Parkway (Vineyard, Fallbrook, and North Laguna Wildlife Area reaches) and at the Bufferlands.

Riparian Woodlands and Scrub

Riparian woodlands and scrub within the watershed include mixed riparian woodland, valley oak riparian, cottonwood woodland, and mixed riparian scrub. Mixed riparian woodland typically has one or more well-developed canopy layers. These canopy layers may be dense or more open and savannah-like. Valley oak riparian woodland is comprised of partially closed canopies dominated almost exclusively by valley oaks. Cottonwood woodland has a dense canopy dominated by Fremont cottonwood (*Populus fremontii*), Goodding's willow (*Salix gooddingii*), and a dense understory. Mixed riparian scrub is interspersed with mixed riparian forest within the floodplain of waterways throughout Sacramento County. In the watershed, it consists of an open to dense shrubby thicket dominated by a mixture of northwest sandbar willow (*Salix sessifolia*), arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*), and immature stands of mixed riparian woodland tree species.

Riparian communities within the watershed provide foraging habitat for many waterfowl and neotropical migrants and for resident species as well. Many neotropical migrants also breed in riparian woodlands. These species include Swainson's hawks, Wilson's warbler (*Wilsonia pusilla*), blue grosbeak (*Guiracea caerulea*), yellow warbler (*Dendroica petechia*), and yellow-breasted chat (*Icteria virens*). Other raptors such as Cooper's hawk (*Accipiter cooperi*) andred-shouldered hawk (*Buteo lineatus*) nest in trees of the upper canopy. Several species, such as barn owl, raccoon (*Procyon lotor*), and opossum (*Didelphis virginiana*) nest or make dens in hollowed trees. Rodent species found in riparian communities within the watershed include California vole (*Microtus californicus*), western gray squirrel (*Sciurus gresius*), gopher, American

beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). Mixed riparian scrub habitat occurs along Laguna Creek between Eagles Nest Road and Andal County Park. Small stands of valley oak riparian and mixed riparian woodlands occur along Laguna Creek between Vineyard Road and Calvine Road, at the Bufferlands just upstream of the Morrison Creek confluence, and along Toad Creek downstream of both Bader Road and Bradshaw Road.

Eucalyptus Woodland

Eucalyptus trees (*Eucalyptus* spp.) are not native to California and have been planted extensively for both windbreaks and hardwood production and harvesting since the 1850s. They are often found in dense monotypic stands with a closed canopy. Eucalyptus stands range from single-species thickets with little or no shrubby understory to scattered trees over a well-developed herbaceous and shrubby understory. Wildlife that use this community type include American crow (*Corvus branchyrhychos*), red-tailed hawk, Swainson's hawk, great horned owl, and barn owl. The tall canopy structure provides excellent roosting and nesting habitat for raptors, great egrets (*Ardea alba*), and great blue herons (*Ardea herodias*). Eucalyptus stands are scattered throughout the watershed, the largest of which occurs near the headwaters of Laguna Creek east of Grant Line Road. Other notable occurrences are between Camden Lakes and the Sacramento County Vector Control facilities, and within the North Laguna Wildlife Area.

A vernal swale adds spring colors to the grassland prairie.

Wetlands

Wetlandss in the watershed include perennial marsh, seasonal marsh, and vernal pools; and occurrences are widespread throughout the watershed. Perennial marsh is composed of emergent herbaceous vegetation in slow-moving water or ponded water. It also encompasses open water areas such as reservoirs. The water is usually 1 to 3 feet deep for a significant portion of the year, generally 6 to 9 months. The vegetation is generally between 4 and 8 feet tall and is well-adapted to saturated soil conditions. Seasonal marsh, like perennial marsh, is composed of emergent herbaceous vegetation; however, this community tends to occur in shallow, still-water ponds or is isolated and off of main channels of rivers and creeks. Vegetation tends to be shorter than in perennial marsh (i.e., less than 2 feet tall), and has a shorter period of inundation, typically between 1 and 3 months during winter and early spring. Wetlands, including perennial and seasonal marsh and areas of open water, are very productive habitats for wildlife. Many birds, both resident and migratory, breed within perennial marsh and forage in seasonal marsh and open water habitats. These include red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*), marsh wren (*Cistothorus palustris*), mallard (*Anas platyrhynchos*), and common yellowthroat (*Geothlypis trichas*). Wetlands also provide high-quality foraging and breeding habitat for reptiles and amphibians such as Pacific tree frog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), giant garter snake (*Thamnophis gigas*), garter snake (*Thamnophis* spp.), California king snake (*Lampropeltis getulus californiae*), gopher snake (*Pituophis melanoleucus*), and western toad (*Bufo boreas*). Mammal species associated with wetlands include beavers, muskrats, and northern river otters (*Lontra canadensis*), Migratory and resident waterfowl associated with wetlands include cinnamon teal (*Anas cyanoptera*), ring-necked duck (*Aythya collaris*),

northern pintail (*Anas acuta*), canvasback (*Aythya valisineria*), and mallard (*Anas platyrhynchos*). Plant and animal species associated with vernal pool wetlands are discussed in *Special-status Species and Sensitive Habitats* sections below.

Open Water

Primary open water throughout the Laguna Creek Watershed includes Laguna Creek and its tributaries, small ponds and reservoirs, and other permanent wetlands hydrologically connected to the creek. Laguna Creek and its tributaries provide important aquatic habitat for a diverse group of plant, wildlife, and fish species. The creek also serves as an important corridor, hydrologically connecting aquatic and upland habitats throughout the watershed. Throughout the different reaches of Laguna Creek, the use of different aquatic habitats by various species is influenced by variations in creek habitat conditions and by the habitat requirements and behavior of each species. Urbanization and the associated altered flow regimes within the watershed have affected available habitat and ecological processes (see also "Geomorphology, Hydrology, and Water Quality," above for additional information on physical processes).

Large portions of Laguna Creek in the upper watershed are largely unvegetated with the exception of scattered riparian scrub and tree species (described above).

Aquatic vegetation species commonly found within the lower watershed occur in reaches characterized by a series of wide, slow-moving flatwater habitats (i.e., pools and glides) with varying depths connected by narrow channel stretches. Many portions of these stream segments exhibit attributes similar to a freshwater slough system (e.g., relatively deep low gradient channels with steep banks, turbid waters, and marsh growth along the banks). Vegetation communities associated with lower watershed open water conditions include cattail, bulrush, and water primrose, all species that can eventually form dense stands that slow down the flow of water and create flood water conveyance problems.

Wildlife use of Laguna Creek varies within the watershed according to location. Middle and lower portions of the watershed, which exhibit perennial flows throughout summer provide important habitat for the giant garter snake, federally and state-listed as threatened. This aquatic species commonly travels through creeks, forages for amphibians and small fish, and uses the dry associated banks for basking and thermoregulation. Laguna Creek and its tributaries also support the foraging of other aquatic wildlife such as western aquatic garter snake, Pacific chorus frog, the nonnative bullfrog, and dabbling ducks such as mallard.

The current fisheries community occupying habitats in Laguna Creek is largely dominated by nonnative warmwater species. Alterations in the fish community are largely due to human-induced modifications of the Laguna Creek Watershed and both direct and indirect introductions of nonnative species. Fish species that are likely present within Laguna Creek include largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), white and black crappie (*Pomoxis annularis* and *P. nigromaculatus*), channel catfish (*Ictalurus punctatus*), white catfish (*Ameiurus catus*), brown bullhead (*Ictalurus nebulosus*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), mosquitofish (*Gambusia affinis*), and golden shiner (*Notemigonus crysaleucas*). Blodgett Reservoir in the upper watershed has been stocked with

largemouth bass, crappie, bluegill, channel catfish, and redear sunfish (*Lepomis microlophus*).

Agricultural Land/Cropland

Agriculture is a significant community type within the watershed. This broad category includes a variety of cropland, including active and fallow fields, orchards, and irrigated and dryland pastures. Cultivated crops include ornamental flowers, fruits, vegetables, grains such as corn and alfalfa, and Sudan straw. Fallow fields are often colonized by weedy, or ruderal, non-native plants. Irrigated and dryland pastures are similar to annual grasslands in vegetation structure and coverage and are used to support grazing cattle, sheep, or horses. However, unlike annual grasslands, irrigated pasture is green through the dry season, which allows for perennial grasses and forbs to become established. Agricultural lands provide habitat for rodents such as deer mouse (*Peromyscus maniculatus*), California vole, and pocket gopher. This in turn provides prey for foraging raptors such as Swainson's hawk, American kestrel, northern harrier, and red-tailed hawk. Other birds that use agricultural lands and disced or fallow fields for foraging include songbirds such as killdeer (*Charadrius vociferus*), savannah sparrow (*Passerculus sandwichensis*), Brewer's blackbird (*Euphagus cyanocephalus*), American crow, and European starling (*Sturnus vulgaris*).

Urban/Developed

Urban/developed habitat is one of the main land uses in the watershed. It ranges from primarily rural residential in the upper watershed, to high density residential and commercial development in the lower watershed. Other types of development include industrial, golf courses, regional parks, the Sacramento Regional Waste Water Treatment Plant, aggregate mining, plant nurseries, and low density residential and commercial. In addition, there are major transportation corridors which traverse the watershed, including; the Southern Pacific railroad, SR 99, I-5, and Grantline Road. Urban/developed areas are typically lacking in vegetation cover. Urban areas tend to have little habitat value for wildlife species because the natural habitat has been greatly modified. These areas support many nonnative species such as house sparrow (*Passer domesticus*), European starling, and Norway rat (*Rattus norvegicus*). Other wildlife common in urban areas include raccoon, opossum, American crow, mourning dove (*Zenaida macroura*), western gray squirrel, and western fence lizard (*Sceloporus occidentalis*).

Urban areas tend to have little habitat value for wildlife species because the natural habitat has been greatly modified.

Special-status Species and Sensitive Habitats

Special-status species include plants and animals that are legally protected or are otherwise considered sensitive by federal, state, or local resource conservation agencies and organizations. Both Laguna Creek and the upland portions of its watershed are known to provide habitat for several special-status species, and have the potential to support others, underscoring the importance of watershed protection and stewardship. Efforts to improve the quality of aquatic and riparian habitats along the banks of Laguna Creek and its tributaries have the potential to benefit 23 special-status plant and wildlife species. Similarly, nearly 15 special-status plant and wildlife species depend on high-quality grasslands and vernal pools for their survival, and may benefit from upland habitat preservation and enhancements within the Laguna Creek Watershed. A map of special-status species occurrences

in the watershed that have been documented in the CNDDB is provided in Figure 2-6.

Special-status Plants

Of the thirteen special-status plant species that are known or have the potential to occur in the Laguna Creek Watershed, nine occur in vernal pool habitat, and the remaining four occur in creek-side marsh and riparian habitats.

Special-status plants associated with vernal pool and marsh habitats within the watershed include dwarf downingia (*Downingia pusilla*), bogg's lake hedge-hyssop (*Gratiola heterosepala*), legenere (*Legenere limosa*), slender orcutt grass (*Orcuttia tenuis*), ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*), succulent owl's clover (*Castilleja campestris* ssp. *succulenta*), pincushion navarretia (*Navarretia myersii* ssp. *myersii*), rose mallow (*Hibiscus lasiocarpus*), and delta tule pea (*Lathyrus jepsonii* var. *jepsonii*). Suitable habitat for the Northern California black walnut (*Juglans californica* var. *hindsii*) also occurs within the vicinity of the lower watershed along dense riparian areas bordering the Sacramento River.

Special-status Wildlife

Forty special-status wildlife species are known or have the potential to occur within the Laguna Creek Watershed. Many of these species are known or are likely to breed in the watershed, and thus have a high potential to benefit from conservation and restoration activities. Other special-status species are known or have the potential to over-winter in or migrate through the watershed, and may benefit from restoration affecting conditions during the times of year in which they are present. Roughly half of the species described below are associated primarily with creek and riparian habitats, while the other half occur primarily in grassland and vernal pool habitats.

Special-status wildlife associated with creek and riparian habitats within the watershed include valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), giant garter snake, and western pond turtle (*Actinemys marmorata*). Aquatic-foraging birds found in the watershed include double-crested cormorants (*Phalacrocorax auritus*), white-faced ibis (*Plegadis chihi*), osprey (*Pandion haliaetus*), southern bald eagles (*Haliaeetus leucocephalus leucocephalus*), American peregrine falcons (*Falco peregrinus anatum*), and merlins (*Falco columbarius*). Riparian-nesting raptors found in the watershed include Cooper's hawks, sharp-shinned hawks (*Accipiter striatus*), Swainson's hawks, white-tailed kites, and long-eared owls (*Asio otus*). Riparian-nesting songbirds that occur in the watershed include tricolored blackbirds (*Agelaius tricolor*), loggerhead shrikes (*Lanius ludovidianus*), little willow flycatchers (*Empidonax traillii brewsteri*), yellow warblers, and yellow-breasted chats. The watershed also supports special-status grassland birds including burrowing owls, northern harriers, short-eared owls, California horned larks (*Eremophila alpestris actia*), golden eagles (*Aquila chrysaetos*), ferruginous hawks (*Buteo regalis*), and greater sandhill cranes (*Grus canadensis tabida*). Vernal pool and grassland species include vernal pool fairy shrimp, midvalley fairy shrimp, vernal pool tadpole shrimp, Ricksecker's water scavenger beetle (*Hydrochara ricksecker*i), California tiger salamander, and western spadefoot toad. Special-status mammals found in the watershed include American badgers (*Taxidea taxus*) and special-status bats including pallid bats (*Antrozous pallidus*), western red bats (*Lasiurus blossevillii*), and Yuma myotis bats (*Myotis yumanensis*).

Giant garter snake (Thamnus gigans) can reach six feet in length.

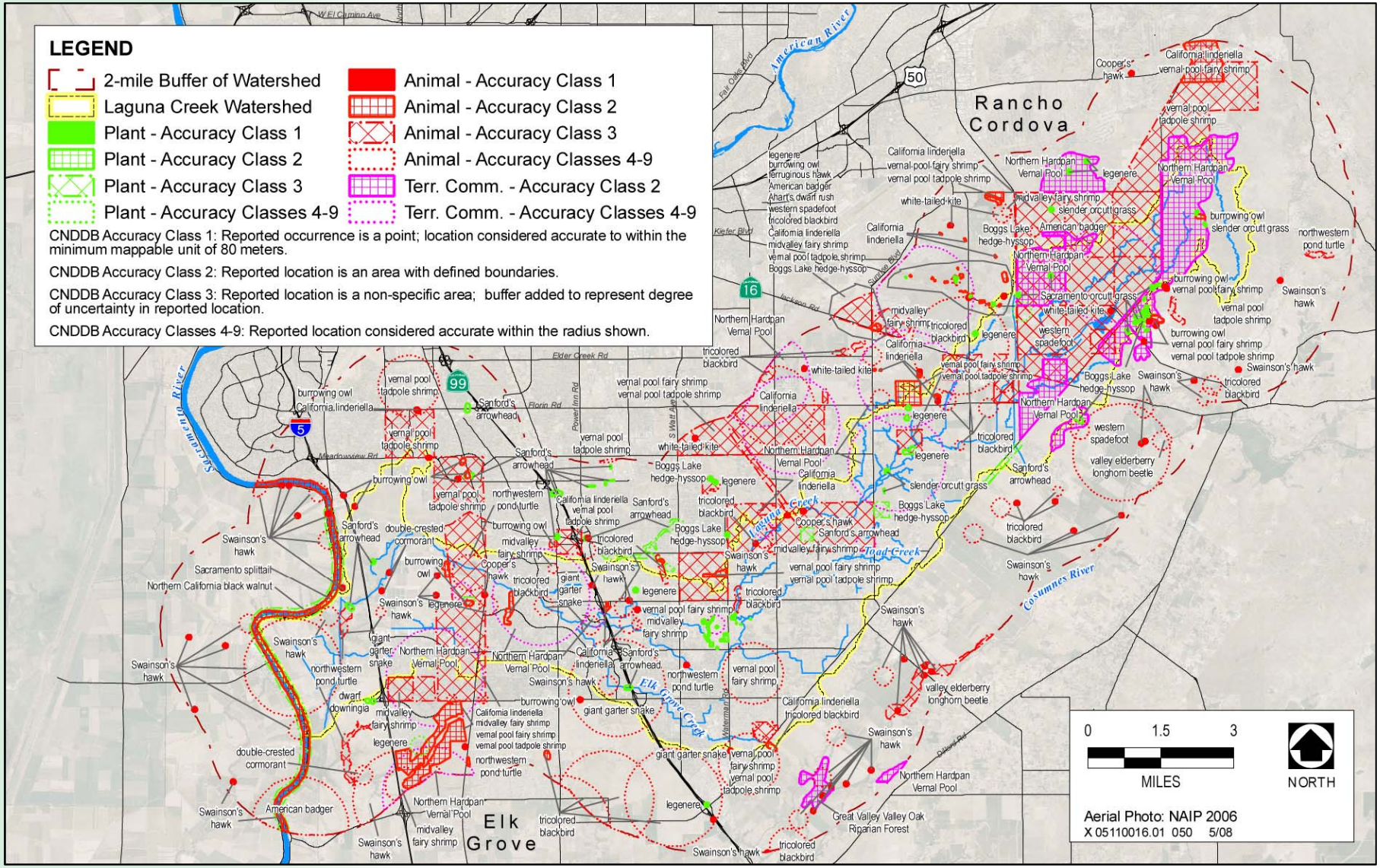


Figure 2-6 Map of CNDDB-Recorded Special-status Species Occurrences in the Laguna Creek Watershed

Special-status Fish

There are no special-status fish species that are known to occur within the Laguna Creek Watershed. As discussed above, altered habitats and the presence of nonnative species are primary limiting factors to the native fish community in Laguna Creek.

Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through the California Environmental Quality Act, Section 1602 of the California Fish and Game Code, Section 404 of the federal Clean Water Act (CWA), and the State's Porter-Cologne Water Quality Control Act. Some plant communities in the Laguna Creek Watershed are currently considered sensitive or rare by the state and/or local counties because of limited distribution locally or regionally. Two sensitive habitats occur within the watershed: great valley valley oak riparian forest and northern hardpan vernal pool.

Great valley oak riparian forest is extremely limited in distribution within the watershed, found in small, patchy areas at the far southwestern edge of the watershed within Stone Lakes National Wildlife Refuge. This habitat is a subcategory of valley foothill riparian and is characterized by a single, moderately-tall canopy layer that is relatively open and dominated by valley oak (*Quercus lobata*) with some interior live oak (*Quercus wislizenii*) occasionally present. Valley oak riparian forest occurs most commonly on the upland terraces and high floodplains of the creek adjacent to mixed riparian forest. The shrub layer is generally sparse and the understory typically has young valley oak and walnut seedlings.

Northern hardpan vernal pools are widely distributed throughout the upper watershed and are present in smaller number in preserve areas in the lower watershed. This habitat is comprised of shallow, intermittent water bodies found in depressions among grasslands and open woodlands throughout the watershed. Vernal pools within the watershed potentially qualify as waters of the state under the Porter-Cologne Water Quality Control Act and may also qualify as jurisdictional wetlands of the United States under Section 404 of the Clean Water Act if it is determined that they are adjacent or connected to waters of the United States.

2.7 Bibliography

CALFED. *See* California Bay-Delta Authority.

California Bay-Delta Authority. 2000 (July). *Final Programmatic Environmental Impact Statement and Environmental Impact Report*. Including portions of the Ecosystem Restoration Program Plan. Including the Multi-Species Conservation Strategy, Technical Appendix. Sacramento, CA.

California Native Plant Society. 2007. Electronic Inventory of Rare and Endangered Vascular Plants of California. Available: <http://www.cnps.org/inventory>.

California Natural Diversity Database. 2007 (November). Database search for sensitive biological resources. California Department of Fish and Game, Biogeographic Data Branch. Sacramento, CA.

California Stormwater Quality Association. 2003. *Stormwater Best Management Practice Handbook, New Development and Redevelopment*. January, 2003 (Errata September, 2004). Available: <http://www.cabmphandbooks.com/>.

CASQA. *See* California Stormwater Quality Association.

City of Elk Grove. 2007. *City of Elk Grove General Plan Background Report*. Elk Grove, CA.

EDAW. 2008. *Laguna Creek Watershed Protection Program, Biological Assessment Findings, Technical Memorandum.* Prepared for the Laguna Creek Watershed Management Action Plan. Sacramento, CA.

EIP. 1998. *Upper Laguna Creek Drainage Master Plan, Biological Resources Background Report*. Prepared for: Sacramento County Water Resources Division. Sacramento, CA.

Geosyntec Consultants, Inc. 2007. *A Technical Study of Hydrology, Geomorphology & Water Quality in the Laguna Creek Watershed*. Prepared for the Laguna Creek Watershed Management Action Plan and the Upper Laguna Creek Corridor Master Plan.

Hickman, James C. (ed.). 1993. *The Jepson Manual*. Berkeley, CA: University of California Press. Berkeley, CA.

Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California.* State of California, The Resources Agency.

Natural Resources Conservation Service (NRCS). 1972. *Soil Survey of Sacramento County*. Reprinted 1990.

Pinkerson, E. 2002. *History Happened Here, Book 2: Fields, Farms, and Schools*. Laguna Publishers. Elk Grove, CA.

Sawyer, J. O. and T. Keeler-Wolfe. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento, CA.

Thompson and West. 1880*. History of Sacramento County*. Oakland, CA.

William-Lettis & Associates. 2005 (September). *Upper Laguna Creek Hydro-Geomorphic Stability Analysis, Draft Report*. Prepared for County of Sacramento, CA.