

Appendix B:
Biological Resource Correspondence and Documents



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In Reply Refer To:
81420-2010-F-0428-1

SEP 28 2010

Mr. Alessandro Amaglio
Federal Emergency Management Agency
U.S. Department of Homeland Security
1111 Broadway, Suite #1200
Oakland, California 94607-4052

Subject: Formal Section 7 Consultation on the Alamo Creek Detention Basin Project (FEMA File #'s: FEMA-1628-DR-CA and FEMA-1646-DR-CA) in the City of Vacaville, Solano County, California

Dear Mr. Amaglio:

This is in response to the U. S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) October 13, 2009, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed Alamo Creek Detention Basin Project (project) in the City of Vacaville, Solano County, California. The Service received your request on February 23, 2010. FEMA requested concurrence that the proposed project is likely to adversely affect the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle). The Service concurs with your determination that the proposed project is likely to adversely affect the beetle, and this biological opinion addresses the effects of the proposed project on the beetle. While critical habitat has been designated for the beetle, none will be affected by the proposed project. This document is issued pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq.*) (Act).

The findings and recommendations in this formal consultation are based on: (1) the September 24, 2008 *California Red-Legged Frog Site Assessment*, prepared by URS Group, Inc.; (2) the February 5, 2009 results of botanical surveys, submitted by FEMA; (3) the March 9, 2009 *California Red-Legged Frog Survey Report*, prepared by URS Group, Inc.; (4) the May 14, 2009 *Elderberry Shrub Stem Count Survey Letter Report*, submitted by FEMA, (5) the October 13, 2009 *Biological Assessment for USFWS*, prepared by URS Group, Inc.; (6) the October 13, 2009 request for initiation of formal consultation; (7) additional correspondence between the Service and representatives of the City of Vacaville (City); and (8) other information available to the Service.

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CONSULTATION HISTORY

- April 2008: The Service provides technical assistance to URS Group, Inc., as requested, regarding California red-legged frog survey timing and methodology.
- September 25, 2008: FEMA submits to the Service a California red-legged frog site assessment for the proposed project.
- February 9, 2009: FEMA submits to the Service botanical survey results for the proposed project.
- March 11, 2009: FEMA submits to the Service a California red-legged frog survey report for the proposed project.
- May 20, 2009: FEMA submits to the Service the results of an elderberry shrub stem count survey for the proposed project.
- February 23, 2010: The Service receives the request for formal consultation and biological assessment from FEMA for the proposed project.
- March 8, 2010: The Service sends a 30-day letter to FEMA requesting additional information.
- May 14, 2010: FEMA submits additional information by letter as requested by the Service.

BIOLOGICAL OPINION

Description of the Proposed Project

FEMA proposes to provide Hazard Mitigation Grant Program Federal financial assistance to the City in Solano County, California, through the California Emergency Management Agency, to implement the proposed project. The project consists of a detention basin and associated inflow and outflow structures along a portion of Alamo Creek on 77 acres of City-owned property to reduce the potential for damage to property due to flooding. Severe storms in 2005 and 2006 caused Alamo Creek to overrun its channel, resulting in widespread flooding of roads, houses, and buildings adjacent to the creek. Alamo Creek drains an area of approximately 10 square miles in the vicinity of the City, and is one of approximately six main drainage channels that flow through the City. The channel of Alamo Creek has been determined to have insufficient capacity to contain a 10-year flood event.

The proposed detention basin is designed to reduce the existing flood hazard along Alamo Creek. The inlet structure is designed to passively allow flowing water in Alamo Creek to flow into the detention basin when water in the creek is below the 10-year flood event elevation. The detention basin is designed to store up to 575 acre-feet of water with a surface area of approximately 104,000 square yards. The detention basin is designed to provide storage for between a 10-year and 25-year storm event. Water in the detention basin will be retained for

24 to 48 hours. Retained water will be passively released back into Alamo Creek through an outfall structure. Water in the basin will flow over an engineered spillway in the southern berm during flood events that exceed capacity.

The detention basin will be excavated and constructed with an earthen bottom, engineered earthen berms, an emergency spillway, a 300-foot-wide articulated concrete block inlet structure, a 42-inch diameter reinforced-concrete pipe outlet, and a maintenance road. An excavation disposal site, two parking lots, an additional access road, fencing and access gates will also be constructed adjacent to the detention basin within the 77-acre City owned parcel.

The 77-acre project site and a surrounding 100 foot buffer area were surveyed for elderberry shrubs (*Sambucus* sp.), the sole host plant for the beetle, and 91 shrubs with stems larger than 1.0 inch in diameter at ground level were identified. Of these 91 shrubs, the proposed project will directly affect one elderberry shrub with two stems measuring greater than 1.0 inch in diameter at ground level. This shrub will be removed to allow for construction of the inlet structure to the detention basin. The shrub to be directly affected is within the Alamo Creek riparian corridor. In accordance with the Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Guidelines), the applicant has proposed to transplant this shrub and to purchase beetle credits from a Service-approved conservation bank as outlined below.

In addition to the one shrub that will be directly impacted, work may occur within 100 feet of approximately 23 of the 91 elderberry shrubs within the project area. Exit holes were identified on approximately half of the shrubs within the project area, so it is likely that beetles are present in the action area. These 23 shrubs are located within the riparian vegetation on the northern edge of Alamo Creek, and no project work is anticipated within 20 feet of the dripline of these shrubs. Should project work encroach within the 20 foot buffer around the dripline of these shrubs, the City shall cease work and notify FEMA of the need for reinitiation of consultation with the Service.

Proposed Conservation Measures for the Beetle

The City has proposed the following conservation measures consistent with the Guidelines to minimize the effects of the proposed project on the beetle.

One elderberry shrub with two stems greater than 1.0 inch in diameter at ground level will be directly impacted by the project and will be compensated for by transplanting the affected shrub and planting the necessary elderberry and associated native seedlings at a Service-approved conservation bank before groundbreaking work occurs. Transplantation and plantings will occur on no less than 0.0331 acre at the bank, and shall occur between November 1 and February 15 pursuant to the Guidelines. Table 1 below provides information regarding stem size and compensation ratios.

Table 1: Proposed compensation ratios for the beetle for the Alamo Creek Detention Basin Project.

Elderberry Stem Size	Exit Holes	Riparian	Number of Stems	Seedling Ratio	Number of Replacement Elderberries	Assoc. Native Ratios	Number of Assoc. Seedlings	Required Acreage
1”>3”	No	Yes	2	2:1	4	1:1	4	
TOTAL	-	-	2	-	4	-	4	.0331

The following measures will be implemented by the applicant to minimize effects to the beetle:

1. All areas to be avoided during construction will be fenced and flagged. In areas where encroachment occurs within the 100-foot buffer, a buffer of at least 20 feet from the dripline of each elderberry shrub will be established. The fencing and flagging will be clearly marked as an “environmentally sensitive area”. If project work occurs within 20 feet of the dripline of the avoided elderberry shrubs, the on-site City Public Works Inspector, working with the project biologist, will cease project work and notify FEMA that reinitiation of consultation with the Service is necessary.
2. Signs will be erected every 50 feet along the edge of the avoidance areas with the following information: “This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. The Endangered Species Act of 1973, as amended, protects this species. Violators are subject to prosecution, fines, and imprisonment”. The signs will be clearly readable from a distance of 20 feet, and will be maintained for the duration of construction.
3. A Service-approved biologist will brief the contractors and work crews on the status and biology of the beetle and the avoidance and minimization measures.
4. Dust control procedures, such as regular watering of disturbed soils and soil piles, the covering of soil piles, and the establishment of vehicle speed limits will be used throughout the construction period.

The City will ensure restoration and maintenance of disturbed areas within 100 feet of elderberry shrubs will be accomplished by implementation of the following measures:

1. Any damage done to the buffer areas during construction will be restored. Restoration will include erosion control and re-vegetate with appropriate native plants.
2. No insecticides, herbicides, fertilizer, or other chemicals that might harm the beetle or its host plant will be used in the buffer areas, or within 100 feet of any shrubs with one or more stems measuring one inch or greater in diameter at ground level during construction or maintenance of the proposed project.
3. The City will provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

Action Area

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” For the proposed action, the Service considers the action area to consist of the entire 77-acre City owned parcel.

Analytical Framework for the Jeopardy and Adverse Modification Analysis

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the beetle’s range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the beetle in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the beetle; (3) the *Effects of the Action*, which determines the direct and indirect effects of the proposed federal action and the effects of any interrelated or interdependent activities on the beetle; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the beetle.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the beetle’s current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the beetle in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the beetle and the role of the action area in the survival and recovery of the beetle as the context for evaluating the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status and Environmental Baseline of the Beetle

The beetle was listed as a threatened species under the Act on August 8, 1980 (Service 1980). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The first area designated as critical habitat for this species is along the lower American River at River Bend (Goethe) and Ancil Hoffman parks (American River Parkway Zone). The second area is at the Sacramento Zone, an area about a half mile from the American River, downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to *The Valley Elderberry Longhorn Beetle Recovery Plan* (Recovery Plan) (USFWS 1984). These critical habitat areas and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

Life History

The elderberry shrub is the sole host plant for the valley elderberry longhorn beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley *et al.* 2007), indicating that riparian elderberry habitat an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging just prior to the pupal stage. Observations of elderberry shrubs along the Cosumnes River and in the Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or not developed sufficiently to construct one. Larvae appear to be distributed in stems which are one inch or greater in diameter at ground level and can occur in non-living stems. The Recovery Plan (USFWS 1984) and Barr (1991) further describe the beetle's life history.

Population Structure

The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge *et al.* 2001). It has been observed feeding upon both blue and red elderberry (USFWS 1984, Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle (*Desmocerus californicus californicus*) (Collinge *et al.* 2001).

Distribution and Range

When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the Recovery Plan was prepared in 1984; additional occupied localities had been found along the American River and Putah Creek. As of the year 2005, the California range-wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County ([CNDDDB] 2006). The CNDDDB contained 190 occurrences for this species in 44 drainages throughout the Central Valley. However, the number of records should be viewed with caution as a record does not necessarily indicate a unique population. In many cases, there are multiple records within close proximity to one another within the same watershed or river.

The beetle is considered a poor disperser based on the spatial distribution of occupied shrubs (Barr 1991; Collinge *et al.* 2001). Huxel and Hastings (1999) used computer simulations of colonization and extinction patterns based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that dispersal and colonization are limited to nearby sites. At spatial scales greater than 6.2 miles, such as across drainages, beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge *et al.* 2001; Huxel and Hastings 1999). Except for one occasion, drainages examined by Barr that were occupied in 1991, remained occupied in 1997 (Collinge *et al.* 2001;

Huxel and Hastings 1999). The one exception was Stoney Creek, which was occupied in the year 1991, but not in the year 1997. All drainages found by Barr (1991) to be unoccupied in the year 1991, were also unoccupied in the year 1997. Collinge *et al.* (2001) further found that while the proportions of occupancy were similar, the number of sites examined containing elderberry and the density of elderberry at sites had decreased since Barr (1991), resulting in fewer occupied sites and groups. Studies suggest that the beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Barr 1991; Collinge *et al.* 2001). This data suggests that drainages unoccupied by the beetle remain unoccupied.

Threats to the Species

The beetle continues to be threatened by habitat loss and fragmentation, predation by non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel *et al.* 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

Habitat Loss

Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel *et al.* 2001; Katibah 1984; Roberts *et al.* 1977; Thompson 1961). As of the year 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainage, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after the year 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984).

In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well as urban development and stream channelization. As of the year 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and stream bank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Frayer *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to

800,000 acres of riparian forest as of approximately in the year 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel *et al* 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer *et al.* 1989).

Based on a California Department of Fish and Game riparian vegetation distribution map, by the year 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of the year 1979 (Katibah 1984). More extreme figures were given by Frayer *et al.* (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

A more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between the year 1900 and the year 1990 in the Central Valley was about 96 percent in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84 percent in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80 percent in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

Habitat Fragmentation

Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge *et al.* (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998). Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding

depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extinct, habitat fragmentation reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge *et al* 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel *et al.* 2001; Huxel 2000) and pesticide contamination (Barr 1991). Several edge effect-related factors may be related to the decline of the beetle.

Predation

The invasive Argentine ant is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creek in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way *et al.* 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel 2000). Between the year 1998 and the year 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987). Huxel (2000) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found. The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson *et al.* 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas. Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson *et al.* 2005).

Pesticide Drift

Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum

pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. Four counties in this region had the highest use: Fresno, Kern, Tulare, and San Joaquin (California Department of Pesticide Regulation (CDPR) 2006). The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley *et al.* 2006). The CDPR in the year 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (same square mile per Marovich and Kishaba 1997 cited in Talley *et al.* 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has affects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.

Invasive Plant Species

Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (*Robinia pseudoacacia*), giant reed (*Arundo donax*), red sesbania (*Sesbania punicea*), Himalaya blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), *Lolium multiflorum*, and starthistle/knapweed (*Centaurea* spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley *et al.* 2006).

Other Threats

Several other factors may threaten the beetle including fire, flooding, and over-grazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire,

however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley *et al.* 2006.). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley *et al.* 2007). No quantitative studies of the net effects of fire on the beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley *et al.* 2007). These findings illustrate that the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolong flooding (i.e., anoxia) and becomes severely stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stresses is uncertain and the levels of stress that affect the beetle is also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle's decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (USFWS 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.

Elderberry shrubs with stems one inch or greater in diameter that provide suitable habitat are found in and adjacent to the action area. The action area contains habitat components that can be used by the listed animal for feeding, resting, mating, and other essential behaviors. Many of the elderberry shrubs in the proposed project site contain exit holes from the beetle, indicating presence of this species on the proposed project area either currently or in the recent past. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as the recent observation of exit holes from this listed species.

Effects of the Action to the Beetle

Direct and Indirect Effects

The proposed project will directly affect one elderberry shrub within the proposed project area. This shrub contains two stems 1.0 inch or larger in diameter at ground level, and will be removed from the project site and transplanted at a conservation bank. The transplanted elderberry shrub may die or experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce its quality as habitat for the beetle, or impair the production of habitat-quality stems in the future. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process. However, if the beetles survive, they will be more likely to persist in a preserve by potentially colonizing a new shrub within a conservation area managed in perpetuity, rather than just being killed as a result of the proposed project.

Indirect effects to the beetle could occur from the operation and construction activities, including sedimentation, erosion, and dust. Also, accidental grading in areas designated as avoidance areas, or other careless handling of heavy equipment during construction could destroy or injure elderberry shrubs used by the beetle. However, these effects will be minimized by the proposed conservation measures which are listed above.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. Human population growth in the Vacaville area and throughout the Central Valley of California is expected to drive further development of agriculture, cities, industry, transportation, and water resources in the foreseeable future. Some of these future activities will not be subject to Federal jurisdiction (and thus are considered to enter into cumulative effects), and are likely to result in loss of habitat for the beetle.

Conclusion

After reviewing the current status of the beetle, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the Alamo Creek Detention Basin Project, as proposed, is not likely to jeopardize the continued existence of the beetle.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat

modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Amount or Extent of Take

The Service anticipates incidental take of the beetle will be difficult to detect or quantify. The cryptic nature of this species and its relatively small body size make the finding of a dead specimen unlikely. This species occurs in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of individuals that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of elderberry stems greater than 1.0 inch in diameter at ground level that will become unsuitable as a result of the action. Therefore, the Service anticipates that all beetles inhabiting two elderberry stems greater than 1.0 inch in diameter at ground level will be taken as a result of the proposed project. The incidental take associated with the proposed action on the beetle is hereby exempted from prohibitions of take under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the beetle.

Reasonable and Prudent Measures

All necessary and appropriate measures to minimize the impacts of incidental take of the beetle resulting from implementation of this project have been incorporated into the project description. Therefore, the Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the effect of the proposed Alamo Creek Detention Basin Project, as described, on the beetle:

All conservation measures as described in the biological assessment, and as re-stated here in the Project Description section of this biological opinion, must be fully implemented and adhered to. Further, these conservation measures shall be supplemented by Terms and Conditions (2) and (3) below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FEMA must ensure that the City complies with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. FEMA shall include full implementation and adherence to the Project Description, including the Conservation Measures, as a condition of any funding awarded for the project.

2. All documentation (i.e. credit sales agreements, bills of sale, and purchase receipts) for purchase of conservation bank credits shall be submitted to the Sacramento Fish and Wildlife Office prior to groundbreaking on the proposed project.
3. The applicant shall comply with the reporting requirements outlined below.

Reporting Requirements

The Service shall be notified within one (1) working day of the finding of any dead or injured federally-listed species. Injured specimens shall be cared for by a licensed veterinarian or other qualified person. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contact is the Division Chief, Endangered Species Program, at (916) 414-6600.

Sightings of any listed or sensitive animal species should be reported to the California Natural Diversity Database of the California Department of Fish and Game. A copy of the reporting form and a topographic map clearly marked with the location of the observed specimens also should be provided to the Service.

Reporting requirements for the beetle are found in the "Monitoring" section of the Guidelines (Service 1999) for this species. The reports shall be combined, where applicable, with the reporting requirements for other species, where appropriate.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

FEMA should work with the Service to address significant, unavoidable environmental impacts to federally-listed species approved by local agencies.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION-CLOSING STATEMENT

This concludes the Service's review of the Alamo Creek Detention Basin Project outlined in your request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not

considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending re-initiation.

If you have any questions regarding this correspondence, please contact Ben Watson, Staff Biologist, or the Acting Sacramento Valley Branch Chief, at (916) 414-6645.

Sincerely,

A handwritten signature in black ink, appearing to read "Susan K. Moore". The signature is fluid and cursive, with a large initial "S" and "M".

FOR
Susan K. Moore
Field Supervisor

cc:
James Loomis, City of Vacaville, Vacaville, California

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2010-F-0428-R001-1

APR 05 2011

Mr. Alessandro Amaglio
Federal Emergency Management Agency
U.S. Department of Homeland Security
1111 Broadway, Suite #1200
Oakland, California 94607-4052

Subject: Reinitiation of the Biological Opinion for the Alamo Creek Detention Basin Project,
Solano County, California

Dear Mr. Amaglio:

This letter is in response to the Federal Emergency Management Agency's (FEMA) September 28, 2010, electronic mail requesting to reinitiate formal consultation with the U.S. Fish and Wildlife Service (Service) on the Alamo Creek Detention Basin Project (proposed project; Service File # 81420-2010-F-0482-1, FEMA File #'s FEMA-1628-DR-CA and FEMA-1646-DR-CA), in Solano County, California. The Service issued the biological opinion (BO) to FEMA on September 28, 2010. The proposed project will adversely affect the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Since the issuance of the BO for this project, the City of Vacaville (applicant) has determined that the necessary permits will not be in place in time to transplant the one directly affected elderberry shrub (*Sambucus* spp.), the sole host plant for the beetle, during the shrub's dormant period. The type of effects to the beetle will change because the directly affected shrub will not be transplanted. The applicant has proposed to purchase additional credits for the beetle at a Service-approved conservation bank(s) in lieu of transplanting the affected shrub. Additionally, the proposed project will need to begin on April 15th rather than June 15th, as stated in the applicant's biological assessment. The Service approves the new construction start date.

The Service's September 28, 2010 BO is hereby amended as follows.

TAKE PRIDE
IN AMERICA 

Remove the following sentence from the Project Description, located at the end of paragraph 3 on page 3:

In accordance with the Service’s 1999 Conservation Guidelines for the Valley Elderberry Longhorn Beetle (Guidelines), the applicant has proposed to transplant this shrub and to purchase beetle credits from a Service-approved conservation bank as outlined below.

Conservation Measure #1; page 3, regarding transplanting and compensation is changed as follows:

One elderberry shrub with two stems greater than 1.0 inch in diameter at ground level will be directly impacted by the project and will be compensated for by transplanting the affected shrub and planting the necessary elderberry and associated native seedlings at a Service-approved conservation bank before groundbreaking work occurs. Transplantation and plantings will occur on no less than 0.0331 acre at the bank, and shall occur between November 1 and February 15 pursuant to the Guidelines. Table 1 below provides information regarding stem size and compensation ratios.

Table 1: Proposed compensation ratios for the beetle for the Alamo Creek Detention Basin Project.

Elderberry Stem Size	Exit Holes	Riparian	Number of Stems	Seedling Ratio	Number of Replacement Elderberries	Assoc. Native Ratios	Number of Assoc. Seedlings	Required Acreage
1”>3”	No	Yes	2	2:1	4	1:1	4	
Total	-	-	2	-	4	-	4	.0331

To:

One elderberry shrub with two stems greater than 1.0 inch in diameter at ground level will be directly impacted by the project. Due to project timing restrictions, this shrub cannot be transplanted during the dormant period (November 1 –February 15), and therefore will be compensated for by purchasing double the beetle conservation credits (including elderberry and associated native seedlings) at a Service-approved conservation bank(s) before groundbreaking work occurs. Plantings will occur on no less than 0.0662 acre. Table 1 below provides information regarding stem size and compensation ratios.

Table 1: Proposed compensation ratios for the beetle for the Alamo Creek Detention Basin Project.

Elderberry Stem Size	Exit Holes	Riparian	Number of Stems	Seedling Ratio	Number of Replacement Elderberries	Assoc. Native Ratios	Number of Assoc. Seedlings	Required Acreage
1”>3”	No	Yes	2	2:1	4	1:1	4	
Subtotal	-	-	2	-	4	-	4	.0331
Total (x2)	-	-	-	-	8	1:1	8	.0662

Direct and Indirect Effects; page 12, regarding effects of the removal of the elderberry shrub are changed as follows:

From:

The proposed project will directly affect one elderberry shrub within the proposed project area. This shrub contains two stems 1.0 inch or larger in diameter at ground level, and will be removed from the project site and transplanted at a conservation bank. The transplanted elderberry shrub may die or experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce its quality as habitat for the beetle, or impair the production of habitat-quality stems in the future. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process. However, if the beetles survive, they will be more likely to persist in a preserve by potentially colonizing a new shrub within a conservation area managed in perpetuity, rather than just being killed as a result of the proposed project.

To:

The proposed project will directly affect one elderberry shrub within the proposed project area. This shrub contains two stems 1.0 inch or larger in diameter at ground level, and will be removed from the project site. Removal of this shrub will result in the loss of habitat for the beetle, and will lead to the mortality of any beetles inhabiting this shrub. The purchase of credits at a conservation bank will contribute to the long-term preservation and management of the beetle and its habitat that is critical for the species' survival and recovery.

If you have questions regarding this correspondence, please contact Ben Watson, Staff Biologist, or Kellie Berry, Sacramento Valley Branch Chief at (916) 414-6645.

Sincerely,



Fot Kenneth D. Sanchez
Assistant Field Supervisor

cc:

Mr. James Loomis, City of Vacaville, Vacaville, California



FEMA

October 13, 2009

Ryan Olah
Division Chief
U.S. Fish and Wildlife Service
Endangered Species Division—Coast/Bay Delta Branch
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-3901
Attn: Michelle Tovar

Re: Alamo Creek Detention Basin Project
FEMA-1628-DR-CA and FEMA-1646-DR-CA, HMGP #1628-31-14
Subgrantee: City of Vacaville

Dear Mr. Olah:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) proposes to provide Federal financial assistance (Federal action) under the Hazard Mitigation Grant Program (HMGP) to the City of Vacaville (City), through the California Emergency Management Agency (CalEMA), to implement the Alamo Creek Detention Basin Project (proposed project) in Solano County, California. ~~The detention basin, which would be constructed on approximately 77~~ acres of City-owned property, would reduce the potential for damage from flooding on Alamo Creek.

This letter represents FEMA's request for formal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act for the proposed project. Accordingly, FEMA is submitting the enclosed Biological Assessment for your review of the proposed project. FEMA has determined that the project area provides habitat suitable to support five federally listed species under the USFWS jurisdiction: the threatened California red-legged frog (*Rana draytonii*), the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), the endangered Tiburon paintbrush (*Castilleja affinis* ssp. *neglecta*), the endangered Contra Costa goldfields (*Lasthenia conjugens*), and the endangered showy Indian clover (*Trifolium amoenum*).

The attached Biological Assessment describes the proposed project, environmental setting, and federally listed species and analyzes the potential adverse effects on the species.

Protocol-level surveys for Tiburon paintbrush, Contra Costa goldfields, showy Indian clover, and California red-legged frog, were conducted and these species were not found in the project area (or

Mr. Ryan Olah
October 6, 2009
Page 2

in the 1-mile radius for California red-legged frog). Therefore, FEMA has determined that the proposed project would have no effect on these four species.

The valley elderberry longhorn beetle likely occurs within the project area, as indicated by the documented occurrences of the host plant for this species (i.e., elderberry shrub with stems at least 1 inch in diameter at ground level) within the project area. FEMA has determined that the proposed project is likely to adversely affect the valley elderberry longhorn beetle.

In addition, the project area does not overlap with proposed and/or designated critical habitat for the California red-legged frog, valley elderberry longhorn beetle, and Contra Costa goldfields. No critical habitat has been proposed or designated for the Tiburon paintbrush and the showy Indian clover. Therefore, FEMA has determined that the proposed project would not adversely affect critical habitat designations.

If you should require any additional information, please do not hesitate to contact me at (510) 627-7027 or Fema-RIX-EHP-Documents@dhs.gov. Thank you in advance for your assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Donna M. Meyer", with a long horizontal flourish extending to the right.

Donna M. Meyer
Deputy Environmental Officer

Attachment

cc: Paul Ransom, CalEMA
Dennis Castrillo, CalEMA
James Loomis, City

Biological Assessment for USFWS

Alamo Creek Detention Basin

City of Vacaville

FEMA-1628-DR-CA & FEMA-1646-DR-CA, HMGP #1628-31-14

October 2009



FEMA

Federal Emergency Management Agency
Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607

This document was prepared with the support of

URS Group, Inc.

Contract No. HSFEHQ-06-D-0162

Task Order HSFEHQ-07-J-0004

15299521.00200

ACRONYMS AND ABBREVIATIONS v

SECTION 1 INTRODUCTION 1-1

SECTION 2 PROJECT AREA, PRELIMINARY ENGINEERING AND ENVIRONMENTAL INVESTIGATION, AND PROPOSED PROJECT 2-1

 2.1 Project Area..... 2-1

 2.2 Preliminary Engineering and Environmental Investigation 2-1

 2.2.1 Geotechnical Investigations 2-1

 2.2.2 Geoarchaeological Testing and Site Evaluation Program..... 2-2

 2.3 Proposed Project..... 2-2

 2.3.1 Construction of Alamo Creek Detention Basin..... 2-2

 2.3.2 Operation and Maintenance of ACDB 2-5

SECTION 3 STUDY METHODS 3-1

 3.1 Literature Review 3-1

 3.2 Personnel and Survey Dates 3-1

 3.2.1 Reconnaissance-Level Survey..... 3-2

 3.2.2 California Red-Legged Frog Site Assessment and Protocol-Level Field Surveys 3-2

 3.2.3 Federally Protected Plant Species Surveys 3-2

 3.2.4 Elderberry Shrub Stem Count Surveys 3-2

 3.3 Summary of Agency Consultation to Date 3-3

SECTION 4 ENVIRONMENTAL SETTING AND BIOTIC RESOURCES 4-1

 4.1 Climate and Topography 4-1

 4.2 Habitats in the Project Area 4-1

 4.2.1 Alamo Creek 4-2

 4.2.2 Riparian Woodland 4-2

 4.2.3 Orchard..... 4-2

 4.2.4 Wild Oat Agriculture Field 4-3

 4.2.5 Developed..... 4-3

 4.3 Wildlife Observed in the Project Area 4-3

SECTION 5 FEDERALLY LISTED SPECIES WITH SUITABLE HABITATS IN THE PROJECT AREA..... 5-1

 5.1 California Red-Legged Frog 5-1

 5.1.1 Life History 5-1

 5.1.2 Critical Habitat 5-2

Alamo Creek Detention Basin: Biological Assessment for USFWS

5.1.3	Previously Documented Occurrences	5-3
5.1.4	Suitable Habitats in the Project Area and Vicinity	5-3
5.1.5	Survey Results.....	5-3
5.2	Valley Elderberry Longhorn Beetle	5-4
5.2.1	Life History	5-4
5.2.2	Critical Habitat	5-4
5.2.3	Previously Documented Occurrences	5-4
5.2.4	Suitable Habitats in the Project Area and Vicinity and Survey Results.....	5-5
5.3	Tiburon Paintbrush.....	5-5
5.3.1	Life History	5-5
5.3.2	Critical Habitat	5-6
5.3.3	Previously Documented Occurrences	5-6
5.3.4	Suitable Habitats in the Project Area and Vicinity	5-6
5.3.5	Survey Results.....	5-6
5.4	Contra Costa Goldfield.....	5-6
5.4.1	Life History	5-6
5.4.2	Critical Habitat	5-6
5.4.3	Previously Documented Occurrences	5-7
5.4.4	Suitable Habitats in the Project Area and Vicinity	5-7
5.4.5	Survey Results.....	5-7
5.5	Showy Indian Clover.....	5-7
5.5.1	Life History	5-7
5.5.2	Critical Habitat	5-7
5.5.3	Previously Documented Occurrences	5-8
5.5.4	Suitable Habitats in the Project Area and Vicinity	5-8
5.5.5	Survey Results.....	5-8
SECTION 6	POTENTIAL ADVERSE EFFECTS OF THE PRELIMINARY ENGINEERING AND ENVIRONMENTAL INVESTIGATION AND PROPOSED PROJECT.....	6-1
6.1	California Red-Legged Frog	6-1
6.2	Valley Elderberry Longhorn Beetle	6-1
6.2.1	Direct Effects.....	6-2
6.2.2	Indirect Effects	6-6
6.3	Plant Species	6-7
SECTION 7	INTERRELATED PROJECTS, INTERDEPENDENT PROJECTS, AND CUMULATIVE EFFECTS	7-1
7.1	Effects of Interrelated Projects.....	7-1
7.2	Effects of Interdependent Projects	7-1
7.3	Cumulative Effects	7-1

SECTION 8 CONCLUSIONS AND DETERMINATION 8-1

8.1 California Red-Legged Frog 8-1

8.2 Tiburon Paintbrush, Contra Costa Goldfield, and Showy Indian Clover..... 8-1

8.3 Valley Elderberry Longhorn Beetle 8-1

SECTION 9 REFERENCES 9-1

Figures

Figure 1 Project vicinity

Figure 2 Project area

Figure 3 Geotechnical investigation locations

Figure 4 Construction of the Alamo Creek Detention Basin

Figure 5a CNDDDB occurrences within a 10-mile radius of the project area: plants

Figure 5b CNDDDB occurrences within a 10-mile radius of the project area: wildlife

Figure 6 Critical habitat within a 10-mile radius of the project area

Figure 7 Habitat types in the project area

Figure 8 Elderberry shrubs near the fall 2008 geotechnical investigations

Figure 9 Elderberry shrubs near the construction of the Alamo Creek Detention Basin

Tables

Table 6-1 Field data for the elderberry shrubs and associated stems within 100 feet, but greater than 20 feet, of the Fall 2008 geotechnical activities.

Table 6-2 Field data for the elderberry shrubs and associated stems within 20 feet of the Fall 2008 geotechnical activities.

Table A-1 Federally listed species under USFWS jurisdiction with potential to occur in the vicinity of the project area.

Appendices

- A Federally Listed Species under USFWS Jurisdiction with Potential to Occur in the Vicinity of the Project Area
- B Photographs of the Project Area
- C Photographs of the Geotechnical Investigations

°F	degrees Fahrenheit
ACDB	Alamo Creek Detention Basin
BA	Biological Assessment
BMP	Best Management Practice
CalEMA	California Emergency Management Agency
CDFG	California Department of Fish and Game
City	City of Vacaville
CNDDDB	California Natural Diversity Database
CRLF	California red-legged frog
DSOD	California Department of Water Resources Division of Safety of Dams
E	Endangered
ESA	Endangered Species Act
FDB	Florence Detention Basin
FEMA	Department of Homeland Security's Federal Emergency Management Agency
HMGP	Hazard Mitigation Grant Program
ID	identification
LCDB	Laguna Creek Detention Basin
m	meter(s)
NAVD88	North American Vertical Datum of 1988
NMFS	National Marine Fisheries Service
T	Threatened
URS	URS Group, Inc.
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle

SECTION ONE INTRODUCTION

The Department of Homeland Security's Federal Emergency Management Agency (FEMA) proposes to provide Hazard Mitigation Grant Program (HMGP) Federal financial assistance (Federal action) to the City of Vacaville (City) in Solano County, California, through the California Emergency Management Agency (CalEMA), to implement the Alamo Creek Detention Basin (ACDB) Project (proposed project). The detention basin, which would be constructed on approximately 77 acres of City-owned property, would reduce the potential for damage from flooding on Alamo Creek. Severe storms from December 17, 2005, to January 3, 2006, and March 29, 2006, to April 16, 2006, caused the creek to overrun its channel, resulting in widespread flooding of roads, farms, houses, and businesses adjacent to the creek and within the City limits (Presidentially declared Severe Storms, Flooding, Mudslides, and Landslides Disaster of 2005–2006, FEMA-1628-DR-CA and FEMA-1646-DR-CA). HMGP funds are available under these declarations.

Alamo Creek drains an area of approximately 10 square miles in the vicinity of the City of Vacaville and is one of approximately six major drainage channels that flow through the City. The channel of Alamo Creek has been determined to have insufficient capacity to contain a 10-year flood event, and the creek is known to overflow its banks within the City boundary during storm events. In recent years, heavy rainfall has caused the creek to overflow onto City streets, businesses, public property, and private property. Damages in the City from the 10-year flood event on Alamo Creek that occurred in December 2002 totaled approximately \$3.4 million, and damages in the City from the 28-year flood event on Alamo Creek that occurred in December 2005 totaled approximately \$26.5 million. The proposed project would reduce the potential for damage from flooding on Alamo Creek.

This report contains the results of a Biological Assessment (BA) that FEMA has prepared. The BA was conducted to evaluate the potential effects of the proposed project on species that are listed or proposed for listing under the Endangered Species Act of 1973 (ESA) (16 U.S.C. §§ 1531–1544 [2007]) and that are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). The potential effects on federally listed species have been evaluated in accordance with Section 7 of the ESA (16 U.S.C. § 1536).

FEMA is consulting separately with the National Marine Fisheries Service (NMFS) regarding the potential adverse effects to species that are listed and proposed to be listed under the ESA and that are under NMFS jurisdiction.

The remainder of the BA is organized as follows:

- Section 2: Description of the project area and proposed project
- Section 3: Description of the study methods
- Section 4: Description of environmental setting and biotic resources in the region and project area

Alamo Creek Detention Basin: Biological Assessment for USFWS

- Section 5: Discussion of the species that are federally listed or proposed to be listed and that are relevant to the proposed project
- Section 6: Evaluation of the potential adverse effects to the species that are federally listed or proposed to be listed and that are relevant to the proposed project
- Section 7: Evaluation of potential cumulative effects
- Section 8: Conclusions on the potential effects that the proposed project would have on federally listed or proposed species
- Section 9: References cited in the report

**SECTION TWO PROJECT AREA, PRELIMINARY ENGINEERING AND
ENVIRONMENTAL INVESTIGATION, AND PROPOSED PROJECT**

2.1 PROJECT AREA

The project vicinity is the area northwest of Vacaville, California, approximately 54 miles northeast of San Francisco and 34 miles southwest of Sacramento (Figure 1). The project area is northwest of the City (Figure 2) between Pleasants Valley Road (west) and Rogers Lane (east) and Vaca Valley Road (north). The southern boundary of the project area is along the northern bank of Alamo Creek. The project area consists of approximately 77 acres, which are owned by the City.

The project area is defined as the limit of proposed construction activities associated with implementation of the proposed project (e.g., access and construction staging areas). The project area includes all areas that may be permanently or temporarily disturbed by the proposed project.

2.2 PRELIMINARY ENGINEERING AND ENVIRONMENTAL INVESTIGATION

The preliminary engineering and environmental investigation consist of geotechnical investigations (Figure 3) and a geoarchaeological testing and site evaluation program. Geotechnical investigations were conducted in October and November 2008, and are necessary for the City to initiate its detailed project design and to begin its approval process with the California Department of Water Resources' Division of Safety of Dams (DSOD). A geoarchaeological testing and site evaluation was conducted between June 30 and July 2, 2009 and was necessary for FEMA to comply with Section 106 of the National Historic Preservation Act.

2.2.1 Geotechnical Investigations

As a part of the process of designing the ACDB and the process of obtaining approval from the DSOD for the ACDB, the City conducted geotechnical investigations, which involved ground-disturbing activities within the project area. Between October 13, 2008, and November 10, 2008, the City conducted test borings, dug test pits, and conducted cone penetration tests (Figure 3). Test borings were 4 to 8 inches in diameter, were performed by a truck-mounted or track-mounted drill rig, and were drilled to depths ranging from approximately 31 to 90 feet below ground surface. The City drilled 14 borings. On completion of the drilling, the borings were filled with cement grout. Test pits were excavated between October 28, 2008, and October 30, 2008, by a backhoe. The 21 test pits were excavated to depths that ranged from 7 to 16 feet below ground surface. On completion, the test pits were backfilled with the excavated soils and bucket-tamped and wheel-rolled with the backhoe. The City made six cone penetration test soundings on November 6, 2008, and November 7, 2008, with a track-mounted and truck-mounted cone rig. Biological monitors were present for most of the geotechnical investigations.

Alamo Creek Detention Basin: Biological Assessment for USFWS

If required by DSOD, the City would conduct additional geotechnical investigations involving ground-disturbing activities before beginning construction. The investigations could include activities such as the preparation of test borings, test pits, and cone penetrations within the project area. All future geotechnical investigations would be conducted with the following constraints:

- Ground-disturbing activities would occur during the dry season, specifically between June 15 and October 15; and
- Ground-disturbing activities would occur 100 feet or more from the drip line of all elderberry shrubs

If the City requires modifications to the above buffers, the City would notify FEMA prior to conducting the activity and FEMA would consult with the USFWS.

2.2.2 Geoarchaeological Testing and Site Evaluation Program

As a part of the process of FEMA's compliance with Section 106 of the National Historic Preservation Act for the proposed project, geoarchaeological testing and site evaluation was conducted within the project area. Ground-disturbing activities associated with the geoarchaeological testing and site evaluation program were completed between June 30 and July 2, 2009 and involved the use of mechanical trenching techniques. The excavation depth averaged approximately 12.5 feet below ground surface.

The geoarchaeological testing and site evaluation program was performed within the following constraints:

- Ground-disturbing activities occurred during the dry season, specifically between June 15 and October 15; and
- Ground-disturbing activities occurred 100 feet or more from the drip line of all elderberry shrubs.

Any future geoarchaeological testing and site evaluations conducted by the City would be conducted within the constraints above. If the City requires modifications to these buffers, then the City would notify FEMA prior to conducting the activity and FEMA would consult with the USFWS.

2.3 PROPOSED PROJECT

2.3.1 Construction of Alamo Creek Detention Basin

The entire ACDB would be designed and constructed to meet the requirements of the DSOD. The geological conditions and characterization of the project area would be ongoing until the ACDB would be under construction, and DSOD does not complete its approval of the proposed project design until construction is under way. The ACDB design could be subject to change per DSOD requirements once construction has been initiated. Thus, most elements of the proposed

Project Area, Preliminary Engineering and Environmental Investigation, and Proposed Project

project described below could be subject to change as the proposed project design proceeds or once construction is initiated.

The proposed ACDB would be designed to reduce the existing flood hazard from Alamo Creek within the City boundaries during flood events. The inlet structure would be designed to passively allow flowing water in Alamo Creek to flow into the ACDB when water in the creek is less than the 10-year flood event elevation. The ACDB would be designed to store up to 575 acre-feet of water, with a surface area of approximately 104,000 square yards. At this capacity, the ACDB would provide storage for between a 10- and 25-year storm event. The ACDB would be designed to retain water for a period of 24 to 48 hours. Retained water would be passively released back into Alamo Creek through an outfall structure. The outfall structure would limit, but not stop, the gravity flow of floodwater back into Alamo Creek. Water in the ACDB would flow over an engineered spillway in the southern berm during flood events that exceed the capacity of the basin. The ACDB would be excavated and constructed with an earthen bottom, engineered earthen berms, an emergency spillway, a 300-foot-wide articulated concrete block inlet structure, a 42-inch-diameter reinforced-concrete pipe outlet, and a maintenance road. An excavation disposal area, two parking lots, an access road, perimeter fencing, and access gates would also be constructed adjacent to the ACDB on the 77-acre City-owned parcel as permanent features of the facility (Figure 4).

Construction of the ACDB would be initiated with mass grading of the project area. Mass grading would include the removal of trees and other vegetation located within the project area and the demolition of several structures located along the eastern side of the project area. Aside from trees and vegetation in the vicinity of the intake and outfall structures, which would be permanently removed, trees and other vegetation within the riparian zone would primarily be protected and not subject to removal. The basin footprint, intake footprint, outfall footprint, and foundation area for the berms would be excavated. The maximum depth of excavation would be approximately 17 feet below ground surface. The basin bottom would consist of native soil and would have a lowest depth of 227 feet above the North American Vertical Datum of 1988 (NAVD88). The berm nearest to Alamo Creek would be constructed outside of the 100-year floodplain. The berms would have a maximum crest elevation of 255 feet above NAVD88 and an approximate crest width of 20 feet. An approximately 12-foot-wide maintenance road would be constructed atop the crest. An emergency spillway would be constructed across the crest on the eastern side of the southern berm. The emergency spillway would have a reinforced-concrete bottom and would be 50 feet wide at its bottom, with an invert elevation of 250 feet above NAVD88. The berms would be constructed on an engineered fill foundation that would be built on undisturbed native soil. Soil excavated for the basin, intake structure, and outlet structure would be used to construct the berms. The berms would have a maximum side slope of 3 horizontal to 1 vertical (3:1).

The ACDB intake structure would consist of an inlet weir lined with articulated concrete block placed on undisturbed native soil. The block would be designed based on the flow characteristics of the inlet and the block manufacturer's recommendations. Riprap could be placed at the

Alamo Creek Detention Basin: Biological Assessment for USFWS

junction between the intake structure and Alamo Creek to prevent scour. As the intake structure would function passively, it would not extend into the natural stream channel. The inlet weir would have an invert elevation of 242 feet above NAVD88 and a bottom width of 300 feet.

The ACDB outfall structure would consist of a 42-inch-diameter reinforced-concrete culvert constructed on a reinforced-concrete bed. This structure would be designed to meter the detained water into Alamo Creek. Water would be conveyed through the outfall structure by gravity. The outfall structure would be constructed using open channel trenching methods. The creek bank would be lined with half-ton rock riprap at the terminus of the outfall structure to prevent scour, and the terminus of the culvert could include a flap gate.

To minimize off-site disposal and truck trips, some excess excavated soil would be stored at an on-site disposal area. This disposal site would have a height of approximately 265 feet above NAVD88, would be constructed on undisturbed native soil, and would have a maximum slope of 3:1. Any additional excess soil from excavation of the ACDB would be trucked to other locations in accordance with local, State, and Federal requirements.

On completion of mass grading activities, construction of the berms, construction of the disposal site, construction of the intake structure, and construction of the outfall structure, the project area would be finish-graded. This activity would include the completion of the maintenance road along the berms; the permanent parking areas; and the access road that would be used for maintenance-related access to the intake structure, one of the parking areas, the southern berm, and the maintenance road along the southern berm. Temporarily disturbed soils within the project area would be hydroseeded, a fence would be installed in upland areas around the perimeter of the property boundary, and access gates would be installed.

The area of temporary and permanent disturbance would be limited to the project area. As stated above, with the exception of areas where the outfall and intake structures would be installed, the riparian zone would not be disturbed. All equipment would be staged in the project area outside of the riparian and stream zones. Rogers Lane would be used to access the project area. The proposed project would not include improvements to Rogers Lane. The City would implement all standard and necessary Best Management Practices (BMPs) to protect water quality, wetlands, waters of the United States, and the Alamo Creek streambed, through its compliance process with Sections 401, 402, and 404 of the Clean Water Act of 1972 and Section 1600 *et seq.* of the California Fish and Game Code. Any construction-related BMPs required under local regulations or by local regulatory agencies (for example, BMPs to reduce construction-related air quality effects, noise effects, or traffic control) would be implemented, as applicable.

The proposed project would take approximately 450 working days to construct. Construction activities would result in at most 15 to 20 personnel on-site at any one time. An estimate of the maximum number of equipment pieces that could be used at the project area at any one time is provided below.

- Water trucks, rubber tired: 3
- Excavators, tracked: 3
- Backhoes, rubber tired: 2
- Bulldozers, tracked: 4
- Scrapers, rubber tired: 5
- Compactors, sheep's foot: 4
- Bottom dump trucks, rubber tired: 10
- Pickup trucks, rubber tired: 10

2.3.2 Operation and Maintenance of ACDB

Operation and maintenance of the ACDB would be minimal. The intake and outfall structures would operate passively and thus would not require any personnel to operate mechanical devices to allow water to enter or exit the ACDB. The basin is anticipated to operate less than once every 10 years (or less than a 10 percent chance of operation every rainy season). The bottom of the ACDB may be used for agricultural use. Debris removal and cleanup would occur after the winter and spring rainy season. Some debris removal may occur during the winter, but this activity would be infrequent and only occur as needed. Accumulated silt would be removed bi-annually using a backhoe or excavator. Weed abatement would occur throughout the summer. Weed abatement through mowing and/or use of an herbicide (Aquamaster) would be performed two to three times in the summer to restrict the accumulation of fire fuel and maintain water flow in the ACDB. If the ACDB bottom is used for agricultural purposes, weed abatement activities could occur less frequently.

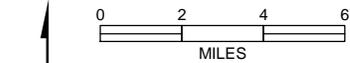


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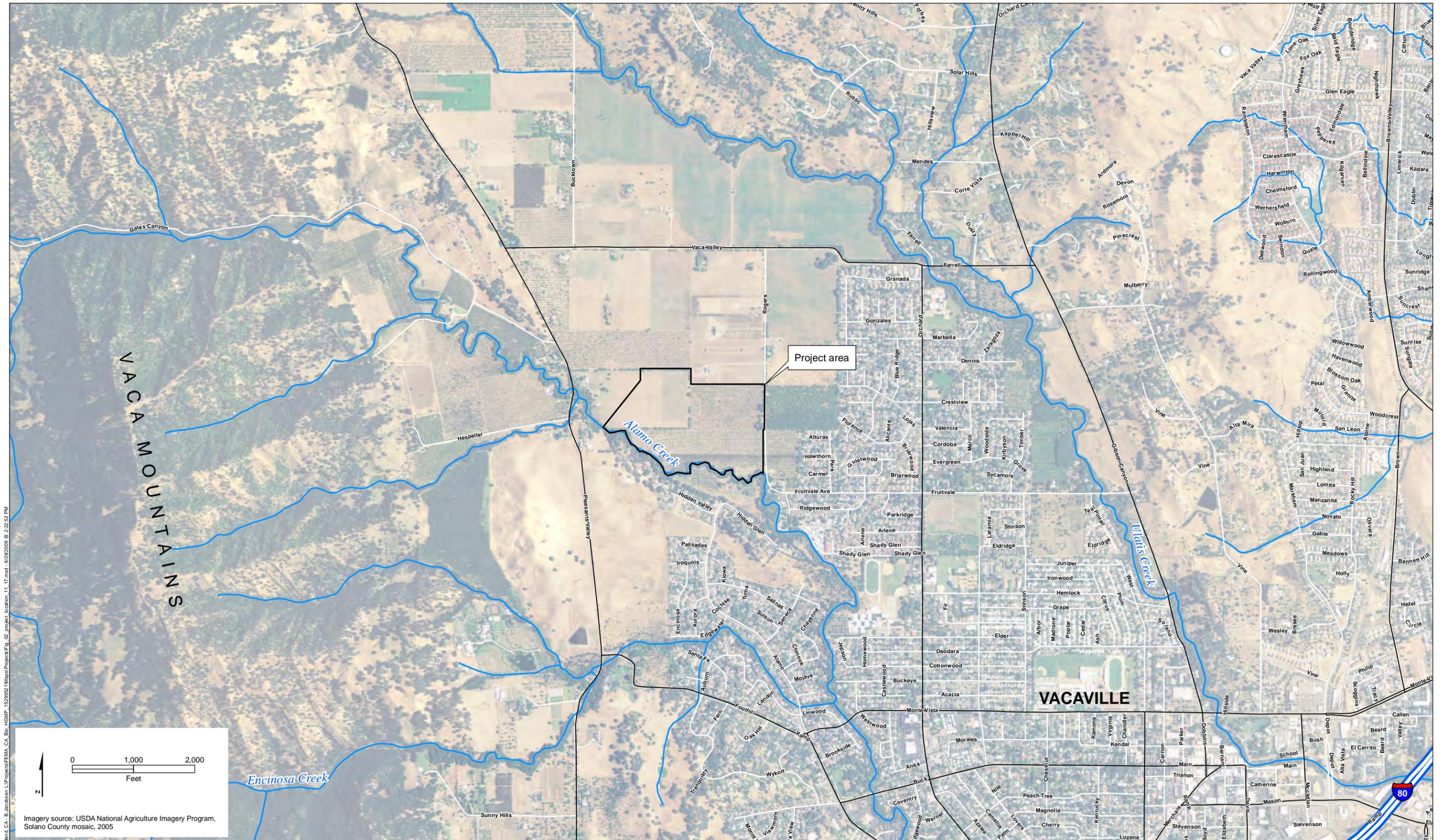
FEMA-1628-DR-CA & FEMA-1646-DR-CA,
HMGP #1628-31-14

City of Vacaville
Alamo Creek Detention Basin

Figure 1
Project vicinity



Base map source: USGS 1x2-degree topographic series, Santa Rosa and Sacramento quadrangles



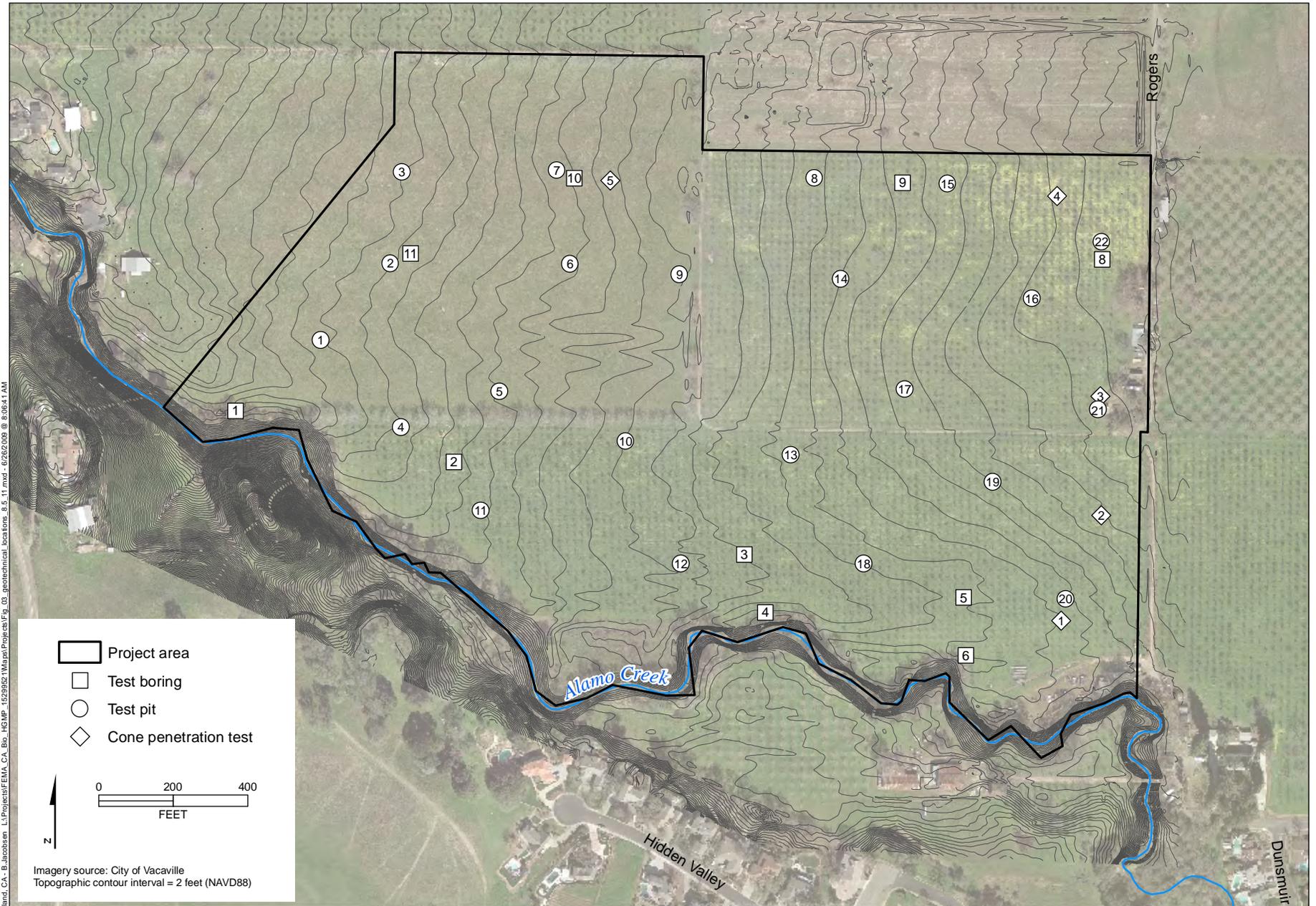
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Imagery source: USDA National Agriculture Imagery Program,
 Solano County mosaic, 2005

FEMA-1628-DR-CA & FEMA-1646-DR-CA,
 HGMF #1628-31-14

City of Vacaville
 Alamo Creek Detention Basin

Figure 2
 Project area

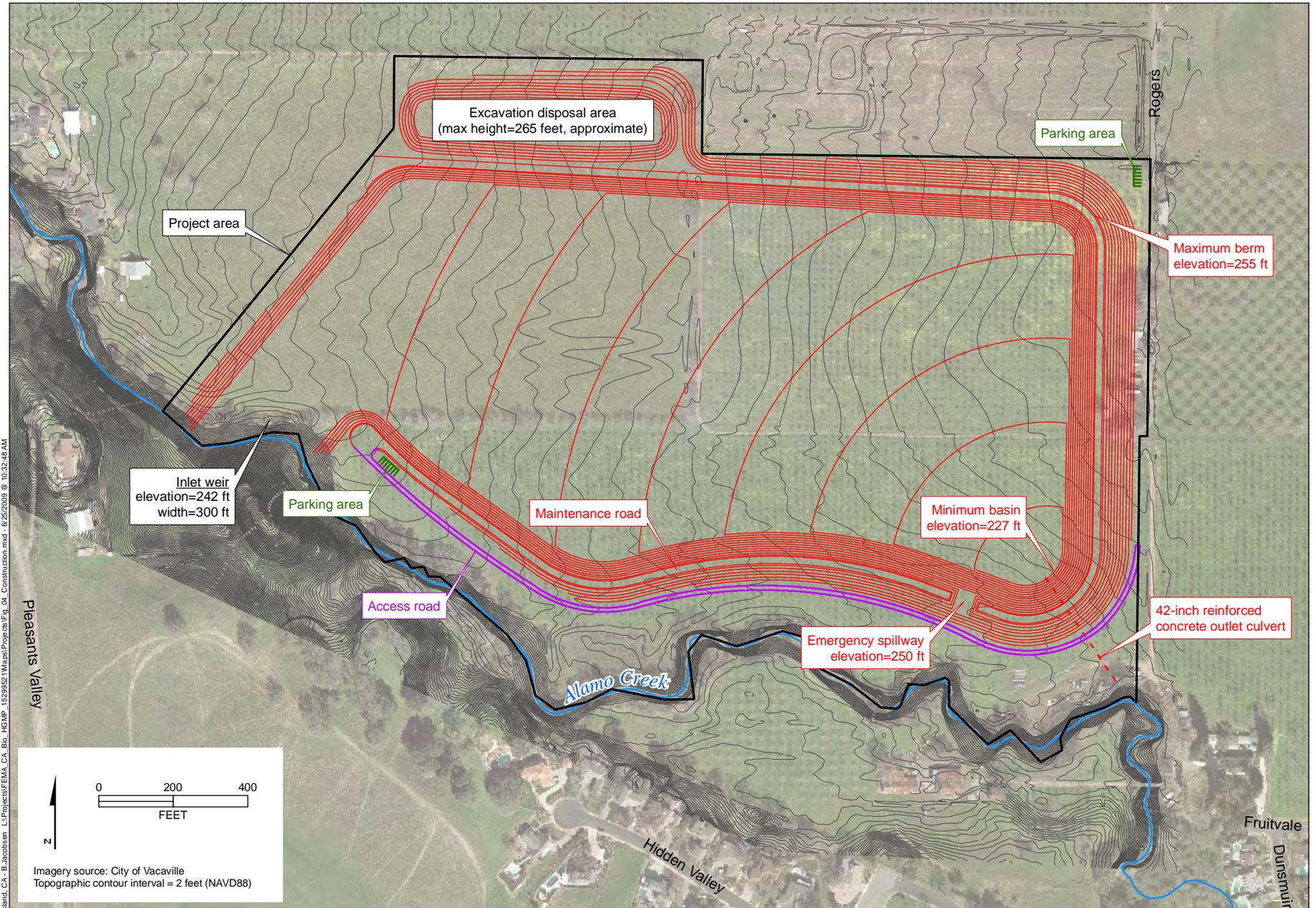


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HMGP #1628-31-14

City of Vacaville
Alamo Creek Detention Basin

Figure 3
Geotechnical investigation locations



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 HMGP #1628-31-14

City of Vacaville
 Alamo Creek Detention Basin

Figure 4
 Construction of the Alamo Creek Detention Basin

SECTION THREE STUDY METHODS

This section presents the study methods that were used to evaluate the potential effects of the proposed project to federally listed species.

3.1 LITERATURE REVIEW

FEMA obtained a list of species that are listed as endangered, threatened, or proposed for listing as endangered or threatened under the ESA that may occur in the vicinity of the project area from the following sources:

- United States Fish and Wildlife Service (USFWS) (USFWS 2009)
- California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) (CDFG 2009)

For each of the record searches the following nine United States Geological Survey (USGS) 7.5-minute quadrangles were searched for known occurrences of federally listed or proposed species: Fairfield North (project area), Denverton, Fairfield South, Cordelia, Allendale, Elmira, Mt. Vaca, Capell Valley, and Mt. George. Documented occurrences of federally listed or proposed species are shown on Figure 5a (plants) and Figure 5b (wildlife), and designated and proposed critical habitat within a 10-mile radius of the project area is shown on Figure 6.

The wildlife and plant species identified by the sources as having potential to occur in the vicinity of the project area that are under the jurisdiction of USFWS under the ESA are listed in Table A-1 (Appendix A). A literature review was conducted to identify habitat requirements and distribution of these species. The literature review included a review of the Federal Register, designated and proposed critical habitat, draft and final recovery plans, and other published reports including the California Wildlife Habitat Relationship System (CDFG 2005).

3.2 PERSONNEL AND SURVEY DATES

FEMA's consultant, URS Group, Inc. (URS), conducted numerous surveys of the project area and vicinity in 2008, to ascertain the potential presence of the federally protected species included in Table A-1 (Appendix A). General habitat characteristics of the project area were evaluated during the surveys. Qualitative assessments of each habitat, along with focused species surveys for federally protected plant species, elderberry shrubs, and the California red-legged frog (CRLF) were used to determine whether each of the species identified in Table A-1 (Appendix A) are likely to occur in the project area. A summary of the habitat assessments and focused species surveys is provided below.

3.2.1 Reconnaissance-Level Survey

A reconnaissance-level survey of the project area was conducted by URS during the February 11, 2008, kick-off meeting and site visit attended by the City, FEMA, CalEMA, and URS.

3.2.2 California Red-Legged Frog Site Assessment and Protocol-Level Field Surveys

URS biologists conducted a CRLF site assessment of the project area and a 1-mile radius surrounding the project area on April 15 and 16, 2008. Habitats suitable for breeding, dispersal, and aestivation of the CRLF were determined to be present within the CRLF site assessment study area, as described in the CRLF site assessment report that was submitted to the USFWS on September 24, 2008 (FEMA 2008). As recommended by USFWS (M. Tovar, Biologist, U.S. Fish and Wildlife Service, oral and written communication, 2008), protocol-level field surveys for the CRLF were conducted in the vicinity of the project area by URS biologists in May through August 2008. A CRLF survey report describing the survey methodology and results was submitted to the USFWS on March 9, 2009 (FEMA 2009a). No CRLF were observed or heard in the project area or 1-mile radius surrounding the project area during the surveys. The site assessment and protocol-level field surveys were conducted in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog*, issued by the USFWS on August 2005 (USFWS 2005a). FEMA has not received any comments from the USFWS on the CRLF survey results.

3.2.3 Federally Protected Plant Species Surveys

URS biologists conducted botanical surveys in the project area on April 24 and 25, May 19 and 20, and June 11, 2008. During the botanical surveys, the biologists documented all identifiable plant species in the project area but focused on locating plant species listed under the Federal ESA or proposed to be listed under the Federal ESA (federally protected plant species). No federally protected plant species were observed within the project area during any of the surveys. A letter report, dated February 5, 2009, detailing the federally protected plant species surveys and results has been submitted to USFWS (FEMA 2009b). FEMA has not received any comments from the USFWS on the federally protected plant species survey results.

3.2.4 Elderberry Shrub Stem Count Surveys

URS biologists conducted focused surveys for elderberry shrubs (*Sambucus* sp.) in the project area plus a 100-foot buffer surrounding the project area on June 10 and 11, July 3, and September 15 and 16, 2008. The surveys were conducted using the guidelines established in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*, issued by the USFWS in July 1999 (USFWS 1999). A letter report, dated May 14, 2009, describing the elderberry shrub stem count surveys and results, has been submitted to the USFWS (FEMA 2009c). FEMA has not received any comments from the USFWS on the elderberry shrub stem count survey results.

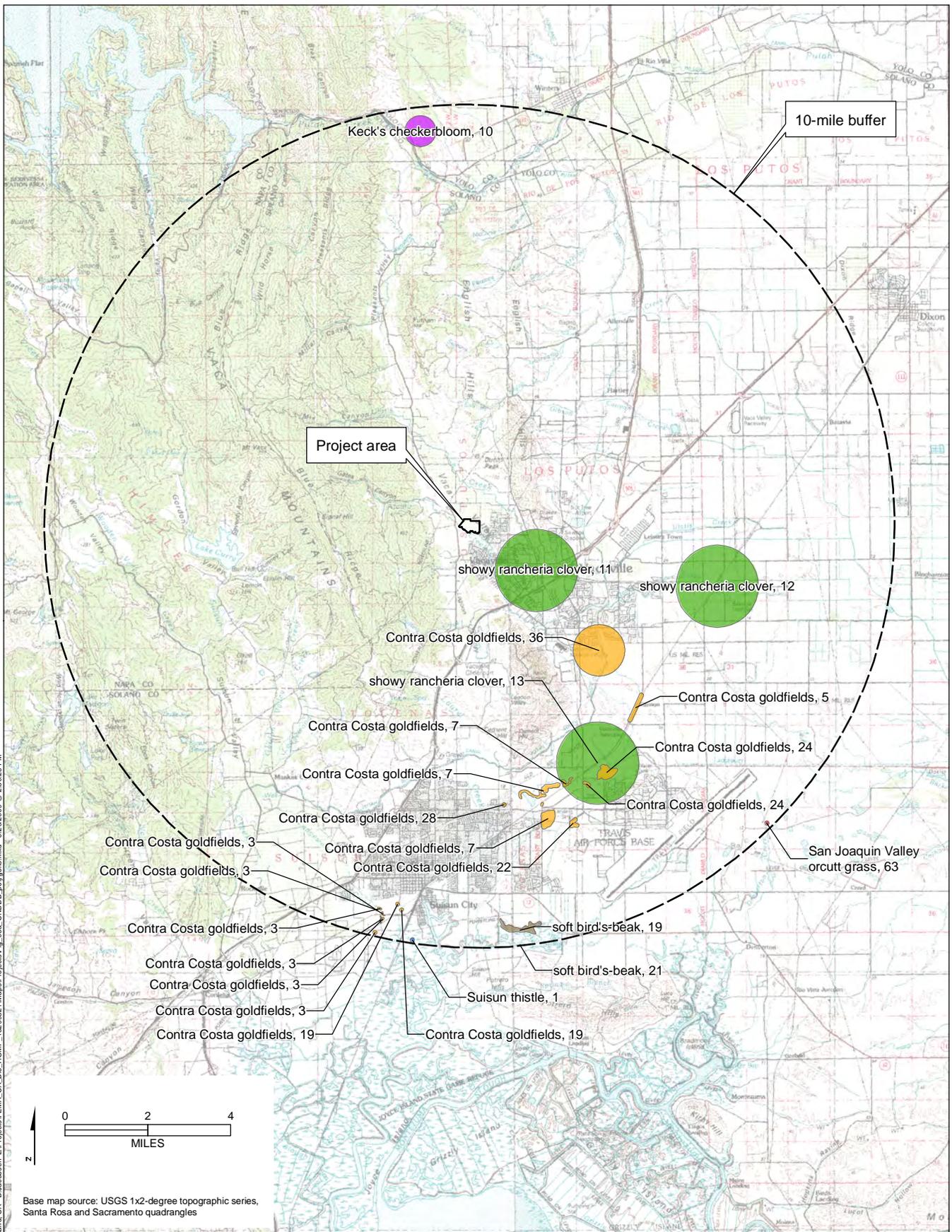
3.3 SUMMARY OF AGENCY CONSULTATION TO DATE

On behalf of FEMA, URS biologists Lorena Solórzano-Vincent and Melissa Newman have engaged in informal consultation with Michelle Tovar of the Sacramento Fish and Wildlife Office. A summary of the consultations with this agency is provided below.

- March and April 2008. Lorena Solórzano-Vincent discussed conducting the site assessment and protocol-level field surveys for the California red-legged frog (*Rana draytonii*, formerly *Rana aurora draytonii*) for the proposed project with Michelle Tovar.
- April 9 and 22, 2008. Lorena Solórzano-Vincent submitted request (verbally and by e-mail) to Michelle Tovar to initiate field surveys for California red-legged frog in the study area according to the USFWS (2005a) survey protocol.
- April 24, 2008. Lorena-Solórzano Vincent received an e-mail authorization to conduct protocol-level field surveys for California red-legged frog from Michelle Tovar of the Sacramento Fish and Wildlife Office.
- August 1, 2008. Lorena Solórzano-Vincent and Michelle Tovar discussed, by telephone, two archeological sites identified by URS archeologists within the project area and the need for a geoarchaeological testing and site evaluation program to be conducted prior to the start of construction activities for the ACDB, for FEMA to make conclusions regarding effects to historic properties. It was agreed that a letter requesting informal consultation would be prepared for the geoarchaeological investigations and submitted to the USFWS.
- September 17, 2008. Lorena Solórzano-Vincent and Melissa Newman spoke with Michelle Tovar regarding conservation measures that were included in the Pleasants Valley Encinosa Detention Basin Biological Opinion. Michelle Tovar provided a copy of the Biological Opinion for the Pleasants Valley Encinosa Detention Basin project by e-mail. Ms. Tovar discussed potential mitigation measures that could be included for the ACDB Project and confirmed FEMA was taking the appropriate steps for the ACDB Project in terms of surveys, BAs, and informal consultation for a geoarchaeological testing and site evaluation program.
- September 24, 2008. FEMA submitted the California Red-Legged Frog Site Assessment for the proposed project to the USFWS.
- October, November, and December 2008. Lorena Solórzano-Vincent and Melissa Newman attempted to contact Michelle Tovar requesting guidance on how to proceed on the unannounced geotechnical evaluations conducted by the City in October and November 2008.
- December 4, 2008. Lorena Solórzano-Vincent and Michelle Tovar discussed the appropriate steps to be taken regarding the geotechnical activities that were conducted for the proposed project. Ms. Tovar requested that FEMA include information on the geotechnical activities into the BA for the proposed project for review by the USFWS.

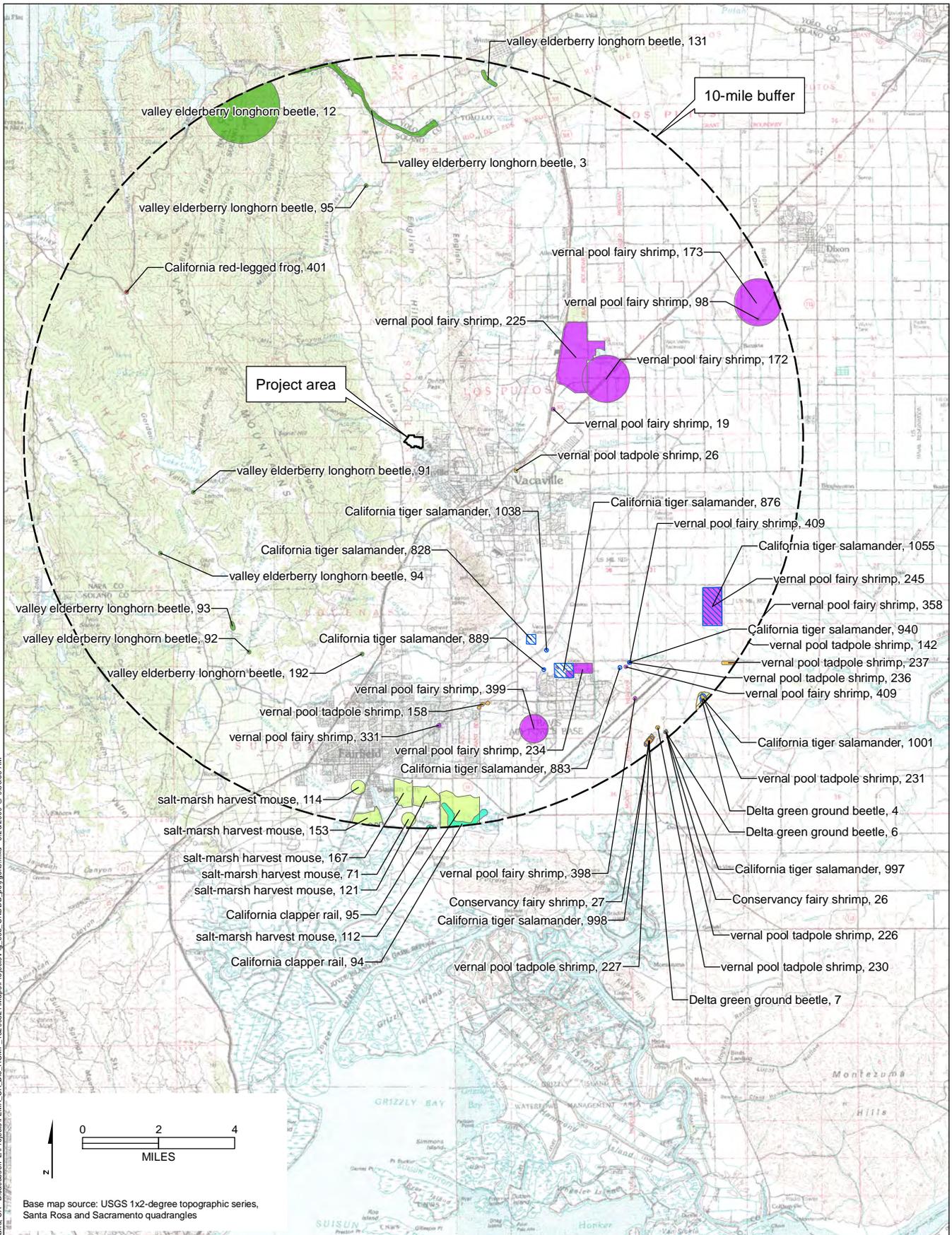
Alamo Creek Detention Basin: Biological Assessment for USFWS

- February 5, 2009. FEMA submitted the Federally Protected Plant Species Survey Letter Report for the proposed project to the USFWS.
- March 9, 2009. FEMA submitted the California Red-Legged Frog Survey Report for the proposed project to the USFWS.
- May 14, 2009. FEMA submitted the Elderberry Shrub Stem Count Survey Letter Report for the proposed project to the USFWS.



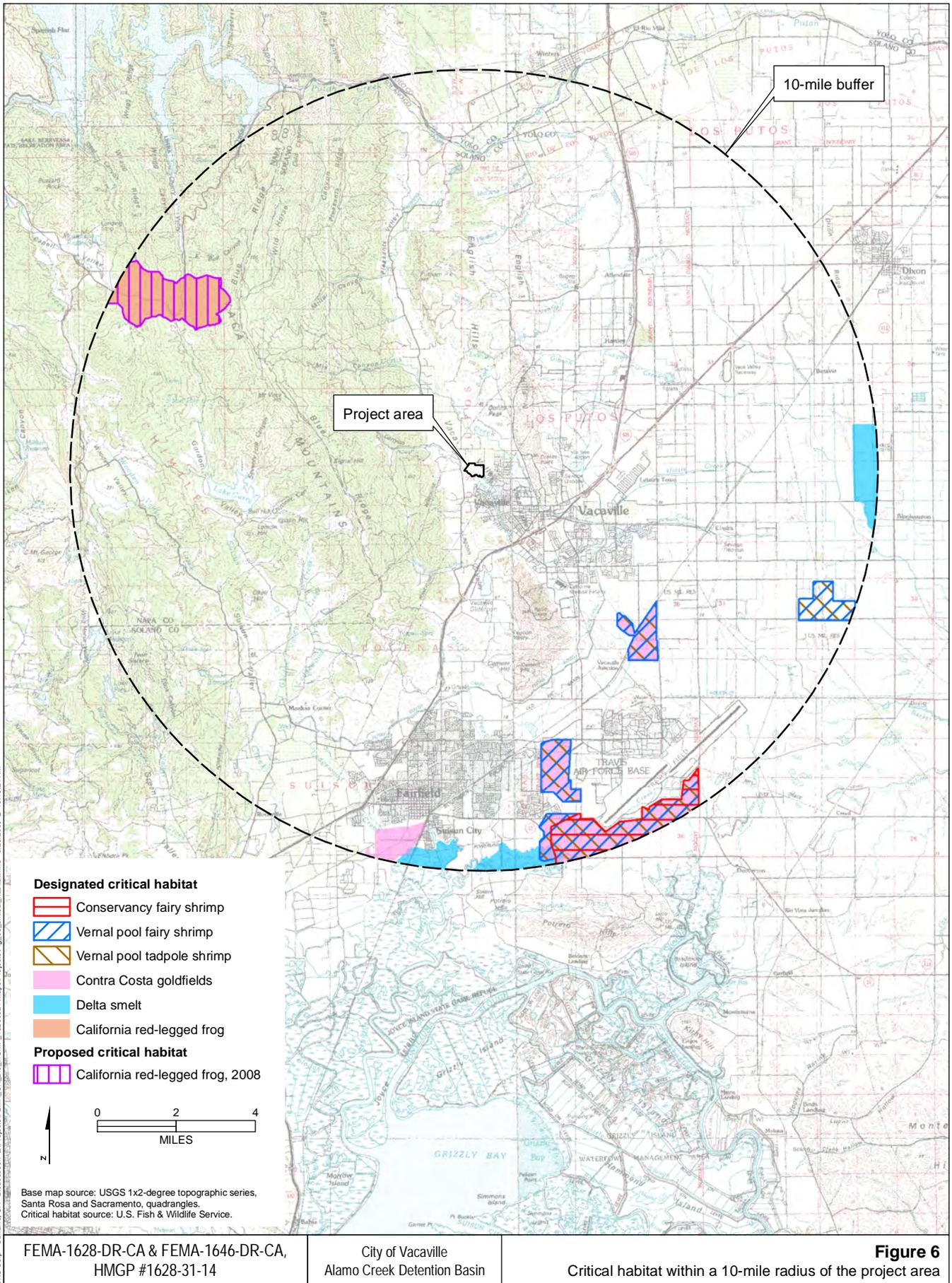
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 City of Vacaville, Alamo Creek Detention Basin
 CNDB occurrences within a 10-mile radius of the project area: plants
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 City of Vacaville, Alamo Creek Detention Basin |
 CNDB occurrences within a 10-mile radius of the project area: plants |
Figure 5a



FEMA-1628-DR-CA & FEMA-1646-DR-CA, City of Vacaville, Alamo Creek Detention Basin, CNDBB occurrences within a 10-mile radius of the project area: wildlife

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SECTION FOUR ENVIRONMENTAL SETTING AND BIOTIC RESOURCES

This section describes the environmental setting in which the proposed project would occur and includes a regional description and a description of the waterways, vegetative communities, and general wildlife in the project area.

4.1 CLIMATE AND TOPOGRAPHY

The project area is located in Vaca Valley which is bounded by Vaca Mountain to the west and the English Hills to the east. The English Hills represent the transition from the inner North Coast range habitats into the Sacramento Valley habitats. The Sacramento Valley to the east and north has hot, dry summers, and cool winters; the area to the south and west, nearer to the Northern Coast ranges has cool humid summers, and moderate winters (Miles and Goudey 1998). Due to its location between the transition of these ranges, the project area is subject to hot, dry summers, and mild winters, although it still experiences marine influences blowing up from the Carquinez Strait which can modify summer and winter temperatures. The average maximum temperature in Vacaville is 75.5°F, with an average range of 55.3°F in January and 95.1°F in July and average minimum temperature in Vacaville is 46.1°F, with an average range of 36.7°F in January and 56.1°F in July (Western Regional Climate Center 2009 [115 years between 1893 and 2008]). The average annual rainfall in Vacaville is 24.6 inches, mostly falling from November to April.

The topography within the project area consists of broader alluvial plains. This topography is typical of the Sacramento and San Joaquin Valleys. Elevations in the project area range between 220 and 258 ft above mean sea level.

4.2 HABITATS IN THE PROJECT AREA

Five habitats were observed in the project area. The habitat types are shown on Figure 7 and described below. Photographs of the project area are provided in Appendix B.

- Alamo Creek, which parallels the southern boundary of the project area
- Riparian woodland corridor, dominated by valley oak (*Quercus lobata*) and red willow (*Salix laevigata*), surrounding Alamo Creek along the southern side of the project area
- Abandoned fruit (*Prunus* sp.) orchard with non-native annual grasses north of the riparian area covering the majority of the project area
- Active agricultural field planted in wild oats (*Avena fatua*) in the northwestern corner of the project area
- Developed areas—a homestead at the northeastern edge of the project area, a junk pile, a cleared area, and several farm roads that bisect the project area—dominated by ruderal vegetation and ornamental landscaping

4.2.1 Alamo Creek

Alamo Creek is an intermittent drainage that flows west to east through the southern portion of the project area. The creek flows from the Vaca Mountains, approximately 1.5 miles (straight-line distance) northwest of the project area, into Ulatis Creek, approximately 11 miles (straight-line distance) southeast of the project area. Ulatis Creek drains into Cache Slough of the Sacramento-San Joaquin Delta.

Within the project area, Alamo Creek varies in width, depth, composition, and flow rate, and exhibits sinuosity. The creek itself is a slow to medium moving stream with a sandy (mostly)/gravelly bottom. The wetted width of the stream varies from 2 to 15 feet and the stream depth varies from 2 to 6 feet. Intermittent pools and scattered logs and woody debris are located along the stream length. Emergent and overhanging vegetation were present within the stream and along the creek bank. Vegetation along the creek bank is characterized by riparian woodland (described below) dominated by valley oak and red willow. The majority of the creek bank is incised to deeply incised.

4.2.2 Riparian Woodland

The riparian corridor extends approximately 35 to 50 feet on either side of Alamo Creek (approximately 5 acres of the project area) (Figure 7). The canopy is dense and dominated by valley oaks. Other prominent species in the canopy include California walnut (*Juglans californica*), red willow, interior live oak (*Quercus wislizenii*), and big leaf maple (*Acer macrophyllum*). The understory is dominated by Himalayan blackberry (*Rubus discolor*), poison oak (*Toxicodendron diversilobum*), arroyo willow (*Salix lasiolepis*), and blue elderberry (*Sambucus mexicana*). The fringes of the riparian area, where more light penetrates, have a diversity of species including Indian hemp (*Apocynum cannabinum*), smilo grass (*Piptamtherum millaceum*), and mugwort (*Artemisia douglasiana*).

4.2.3 Orchard

The majority of the project area is characterized as an abandoned orchard (approximately 45 acres of the project area) (Figure 7). The orchard consists of plum trees (*Prunus cerasifera* and *Prunus domestica*) with several scattered apricot trees (*Prunus armeniaca*). The northern border is lined with grafted walnut trees (*Juglans regia* on *J. californica* stock). The understory is highly disturbed and dominated by non-native herbs and grasses including wild oat, Mediterranean barley (*Hordeum marnium*), Italian ryegrass (*Lolium multiflorum*), ripgut broom (*Bromus diandrus*), burclover (*Medicago polymorpha*), prickly lettuce (*Lactuca serriola*), and bristly ox-tongue (*Picris echiodes*). The northern orchard (north of the access road dividing the site) is densely covered with field mustard (*Brassica rapa*), in addition to the weedy grasses and herbs listed above.

4.2.4 Wild Oat Agriculture Field

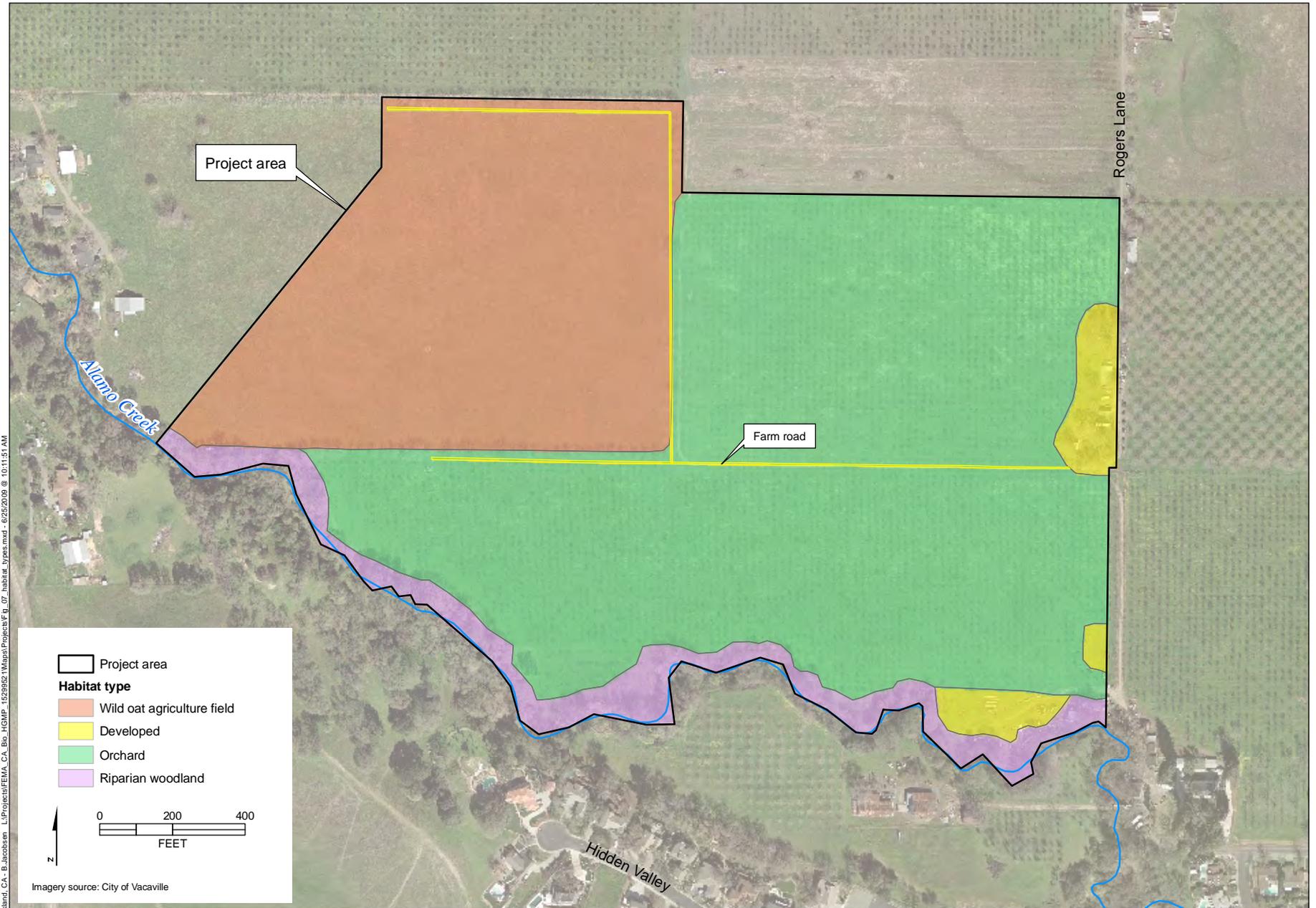
The northwest corner of the property consists of an actively used agricultural field (approximately 23 acres of the project area) (Figure 7). The field has been disked and planted with wild oat. Bindweed (*Convolvulus arvensis*) was beneath the wild oat along with scattered black mustard (*Brassica nigra*) and wild radish (*Raphanus sativus*).

4.2.5 Developed

Approximately 3 acres of the project area are developed habitat (Figure 7). A homestead at the northeastern part of the project area contains houses, trailers, and cars and covers approximately 1 acre of the project area. Adjacent to the homestead is ornamental landscaping, including lawns and fruit trees. The farm roads bisecting the project area, a junk pile, and a cleared area contain bare ground and weedy, non-native grasses (wild oat, Mediterranean barley, Italian ryegrass, and ripgut broom).

4.3 WILDLIFE OBSERVED IN THE PROJECT AREA

During surveys, black-tailed deer (*Odocoileus hemionus*), jackrabbits (*Lepus californicus*), red-winged blackbirds (*Agelaius phoeniceus*), turkey vultures (*Cathartes aura*), and pheasants (*Phasianus colchicus*) were observed multiple times in the orchard and/or the wild oat agriculture field habitats. Pacific tree frogs (*Pseudacris regilla*), bullfrogs (*Lithobates catesbeiana*, formerly *Rana catesbeiana*), Louisiana red crayfish (*Procambarus clarkii*), a mallard duck (*Anas platyrhynchos*), skunk (*Mephitis mephitis*), three-spine stickleback (*Gasterosteus aculeatus*), mosquitofish (*Gambusia affinis*), California roach (*Hesperoleucus symmetricus*), and beaver dams were observed in the creek or bank of Alamo Creek. Red-tailed hawks (*Buteo jamaicensis*) and a barn owl (*Tyto alba*) were also seen in the riparian habitat area.



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City of Vacaville
Alamo Creek Detention Basin

Figure 7
Habitat types in the project area

