A.23 Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

A.23.1 Legal Status

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is listed as threatened under the federal Endangered Species Act (50 FR 52803). On October 2, 2006, the USFWS announced a recommendation for this species to be removed from the endangered species list (USFWS 2006).

Critical habitat was designated for this species in the initial listing of the species (50 FR 52803); however, neither of the two sites designated as critical habitat occur within the Planning Area.

The valley elderberry longhorn beetle has no state regulatory status.

A.23.2 Species Distribution and Status

Range and Status

Valley elderberry longhorn beetle is one of three species of *Desmocerus* in North America and one of two subspecies of *D. californicus*. The valley elderberry longhorn beetle subspecies is a narrowly defined, endemic taxon, limited to portions of the Central Valley below 900 m (2,953 feet) elevation (Figure A.23.1) (USFWS 1999, 2006).

Historically, valley elderberry longhorn beetle presumably occurred throughout the Central Valley of California. Little is known about the historical abundance of valley elderberry longhorn beetle. The extensive destruction of its habitat, however, suggests that the beetle's range has been largely reduced and fragmented (USFWS 1984).

Studies to assess the distribution and extent of the valley subspecies began in the late 1970s (Eya 1976), and the USFWS proposed the species for listing in 1978. Since valley elderberry longhorn beetle was listed in 1980 (50 FR 52803), numerous distributional studies have been conducted (summarized in Talley et al. 2006).

Subsequent to various surveys throughout the Central Valley (Linsley and Chemsak 1972, Eya 1976, Jones & Stokes 1985, 1986, 1987a, 1987b, Barr 1991, Collinge et al. 2001), the USFWS (1999) prepared a map of the presumed range of valley elderberry longhorn beetle. This map encompasses the entire California Central Valley and the Sacramento River Delta below 900 m (2,953 ft) elevation.

Habitat occupied by valley elderberry longhorn beetle tends to form and exist in riparian corridors and on the level open ground of periodically flooded river and stream terraces and floodplains. This geomorphic setting historically has been desirable for agricultural, urban, or industrial development. As a result, much of this habitat type has been converted through dams and levees for use as developable land. Although it has been estimated that 90 percent of California riparian habitat has been lost over the last century and a half (Smith 1980, Barr 1991, Naiman et al. 1993, Naiman and Décamps 1997), these losses are difficult to accurately quantify in terms of direct valley elderberry longhorn beetle habitat losses (Talley et al. 2006). Therefore, an unknown amount of riparian forest and elderberry savannah habitat has been lost and an unknown number of valley elderberry longhorn beetle populations as well (Collinge et al. 2001).

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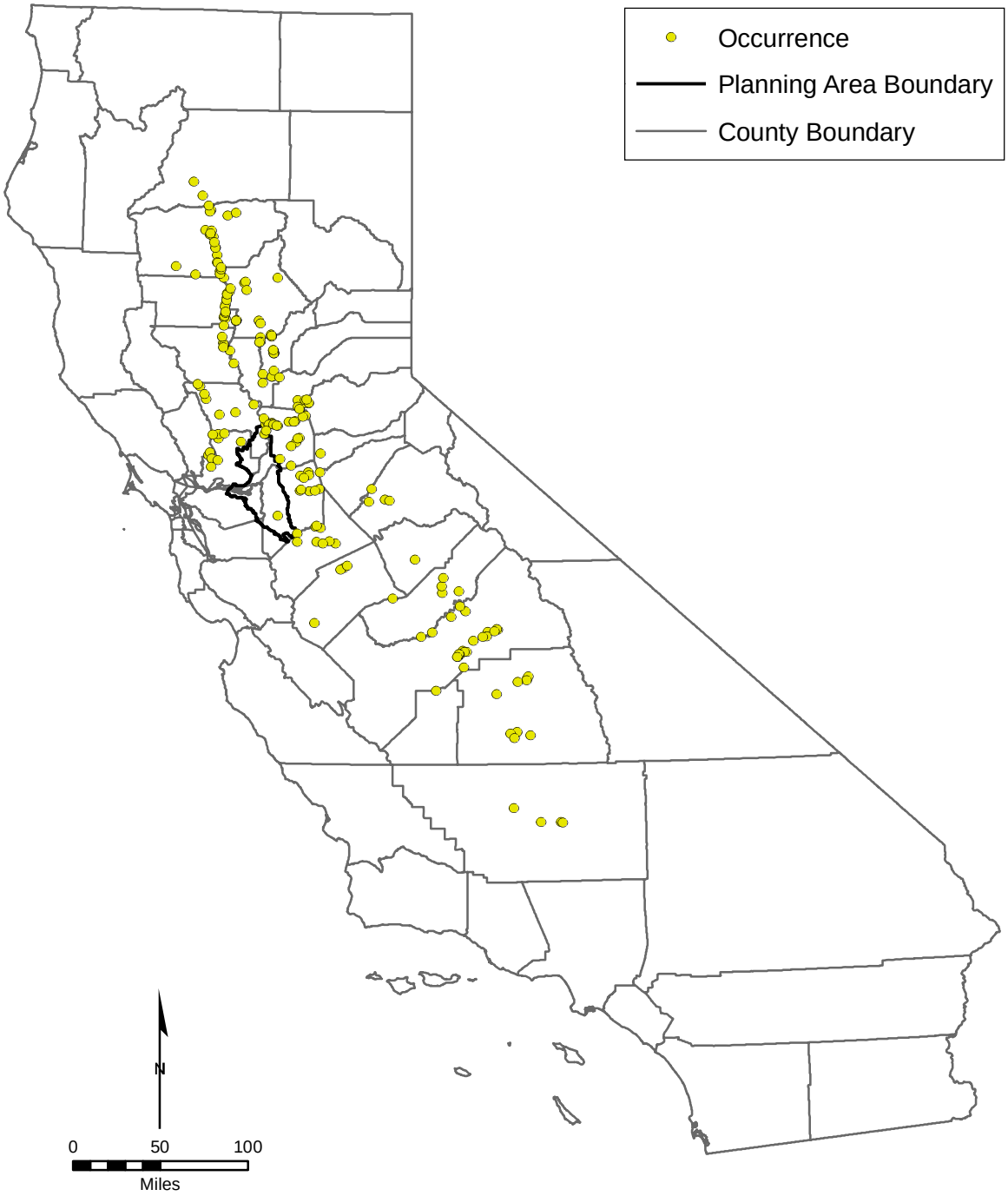

Source: California Department of Fish and Game, CNDDB, 2008.

Figure A.23.1. Valley Elderberry Longhorn Beetle Statewide Recorded Occurrences

Due to current pressures from increasing human populations in California, more valley elderberry longhorn beetle habitat is being encroached on and affected throughout the species' range (Technology Associates International Corporation 2008).

Distribution and Status in the Planning Area

There are only three reported occurrences of valley elderberry longhorn beetle from the BDCP Planning Area, including one along Old River north of Tracy and two recent occurrences along small drainages between the Sacramento River and the Sacramento Deep Water Ship Channel in the vicinity of West Sacramento (Figure A.23.2) (CNDDB 2008). There are additional historical occurrences from along the Sacramento River corridor and Putah Creek in Yolo County (Eya 1976, Jones & Stokes 1985, 1986, 1987a,b, USFWS 1984, Barr 1991, Collinge et al. 2001). Comprehensive surveys for the species or its host plant, elderberry, have not been conducted and thus the population size and location of the species within the BDCP Planning Area is unknown. Distribution is typically based on the occurrence of elderberry shrubs, which are known to occur along riparian corridors throughout the BDCP Planning Area, including the Sacramento River, Stanislaus River, San Joaquin River, and along smaller natural and channelized drainages; as well as in upland habitats. The valley elderberry longhorn beetle is considered to potentially occur in all mature elderberry shrubs in the BDCP Planning Area.

A.23.3 Habitat Requirements and Special Conditions

Valley elderberry longhorn beetle is endemic to moist valley oak riparian corridors in the lower Sacramento and lower San Joaquin Valleys (USFWS 1984). Valley elderberry longhorn beetle is closely associated with a few species of elderberry (*Sambucus* spp.). These plants are an obligate host plant for larvae and are necessary for the completion of the life cycle (Linsley and Chemsak 1972, 1997, Eng 1984, Barr 1991, Collinge et al. 2001). The two main species of elderberry utilized by this species are the blue elderberry (*S. mexicana*) and red elderberry (*S. racemosa*). This shrub is a component of riparian forests throughout the Central Valley. Although this shrub occasionally occurs outside riparian areas, shrubs supporting the greatest beetle densities are located in areas where the shrubs are abundant and interspersed among dense riparian forest. The existing remnants of riparian woodlands and forests within the distribution of valley elderberry longhorn beetle are a collection of various canopy layers and dominant species. Ideally, the riparian ecosystem consists of several canopy layers with dense understory. Fremont cottonwood (*Populus fremontii*), California walnut (*Juglans californica*), California sycamore (*Platanus racemosa*), willow (*Salix* spp.), and valley oak (*Quercus lobata*) commonly compose the upper canopy of the woodland (USFWS 1984). Common species contributing to the intermediate canopy include box elder (*Acer negundo* var. *californicum*), Oregon ash (*Fraxinus latifolia*), elderberries, and several willows. The understory can be widely diverse and may include wild grape (*Vitis californica*), California hibiscus (*Hibiscus californica*), and poison oak (*Toxicodendron diversilobum*), as well as many non-native species (USFWS 1984, 1999, Barr 1991, Collinge et al. 2001). In some areas, the margins of riparian woodlands and forests are lined with elderberry savanna with *S. mexicana* as the dominant species (Holland 1986). Isolated elderberry shrubs separated from contiguous habitat by extensive development are not typically considered to provide viable habitat for the valley elderberry longhorn beetle (USFWS 1998, Collinge et al. 2001).

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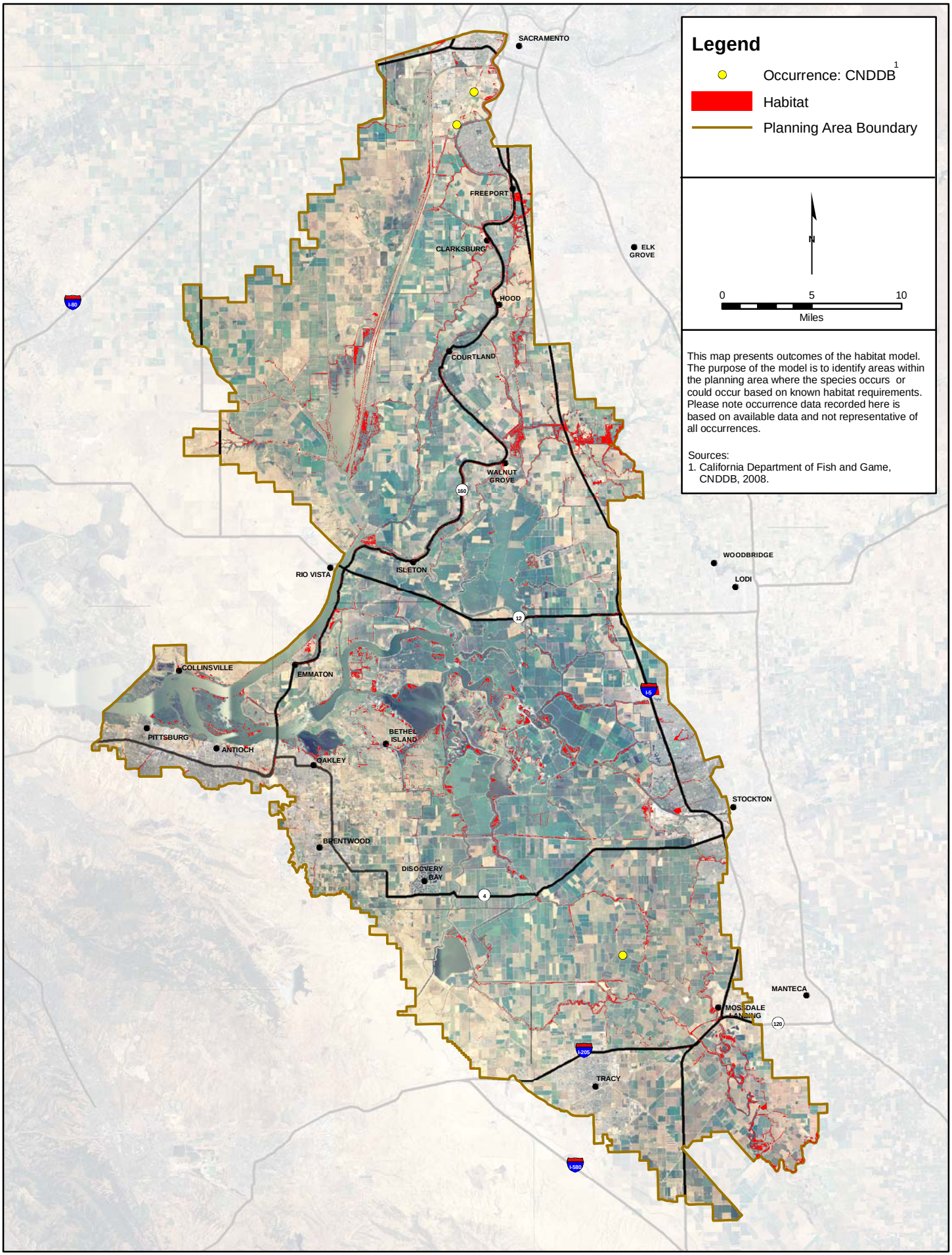

Figure A.23.2. Valley Elderberry Longhorn Beetle Habitat Model and Recorded Occurrences

Elderberry savannah was a habitat type that was previously more extensive in the California Central Valley, but now is limited to the confluence area of the American River, which is outside the BDCP Planning Area (USFWS 1984, 1999, Jones & Stokes 1985, 1986, 1987a,b, Barr 1991), and the valley elderberry longhorn beetle was probably a component of this habitat. Therefore, potential valley elderberry longhorn beetle habitat is defined as stands of elderberry shrubs that are adjacent to, or contiguous with, riparian forest, floodplains, or relict elderberry savannah (Technology Associates International Corporation 2008).

A.23.4 Life History

Description. The valley elderberry longhorn beetle is an atypical lepturine (the Lepturinae is a subfamily of the Cerambycidae, longhorn beetle family). Elderberry beetles are separated from all other lepturines by the form of the mandibles, which are broad and short, without internal pubescence (Linsley and Chemsak 1972). Originally described by Horn (1881), the valley elderberry longhorn beetle is black in color, with red to orange margins on the elytra (wing covers), which fades to yellow after death. The pronotum (plate behind the head) is smooth, with confluent punctuations. The elytra are densely punctate or rugose. Adult beetles range from 14 to 25 mm in length (Linsley and Chemsak 1972).

The valley elderberry longhorn beetle was described as a separate species by Fisher (1921) and was reduced to subspecific status by Doane et al. (1936). The majority of male valley elderberry longhorn beetle can be separated from other subspecies by the short, suberect, pale setae (bristle or hair-like structures) on the antennae (as opposed to dark setae) and the black markings on each forewing (Linsley and Chemsak 1972). The female valley elderberry longhorn beetle cannot be separated morphologically from other subspecies.

Life Cycle. Little research has been conducted on the life cycle of the valley elderberry longhorn beetle; therefore, current knowledge has been gathered from individual field observations and assumed similarities with closely related taxa. The following account of the life cycle chronicles the one reported in the USFWS Recovery Plan (USFWS 1984).

The beetle can be found from mid-March through early-June and is most active from late-April to mid-May. The adult beetles feed on the elderberry foliage and possibly its flowers. During this time of activity, the beetles mate, and the females lays between 8 and 20 eggs on the living elderberry plant host. The eggs are placed individually or in small clusters within crevices in the bark or junctions of the stem and truck or leaf petiole and stem. The egg is attached to the shrub by a thin secretion, and the larva encloses within 30 to 40 days (Burke 1921). The eggs most likely hatch after a short time and the newly emerged larvae bore into the wood of the host plant (Linsley and Chemsak 1972, Barr 1991). Burke (1921) and Eya (1976) reported that the larvae take 2 years to mature; however, Halstead (1991) believes that 1 year is the norm. The larva typically bores into the central pith of stems and feeds there; however, on large trunks, the larvae feed on the wood (Burke 1921). The larvae create an elongated, longitudinal gallery through the heart of the stems, filling it with debris and shredded wood (Barr 1991). When the larva is ready to pupate, it chews a circular to slightly oval exit hole (seven to 10 mm in diameter) to the outside, which it plugs with frass. The exit holes are distinctive and typically are the only sign of the beetle's presence. Then the larva backs up into the gallery and constructs a pupal chamber out of shredded wood and frass (Barr 1991). Jones & Stokes (1985, 1986, 1987a, 1987b) and Halstead (1991) reported that 70 percent of exit holes are within 3.9 ft of the ground in stems greater than 13 mm in diameter; however, holes may be as high as 10 ft above the ground (Barr

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1991). Pupae can be found between January and April, and the pupal stage lasts about one month (Burke 1921).

After pupation, the adult remains in the pupal cell for several weeks prior to emergence (Burke 1921). The adult eventually emerges from the pupal chamber, through the exit hole (Barr 1991). The adults readily fly from shrub to shrub. The valley elderberry longhorn beetle is most often seen on, in, or immediately under the host plant's flowers. However, copulation occurs on the lower parts of the stems (Barr 1991). The adults feed on the leaves (Linsley and Chemsak 1972, Barr 1991, Talley et al. 2006) and are active from March to early June.

A.23.5 Threats and Stressors

The greatest historical threat to the valley elderberry longhorn beetle has been the elimination, loss, or modification of its habitat by urban, agricultural, or industrial development and other activities that reduce or eliminate its host plants (Talley et al. 2006). While mitigation and restoration actions do not come close to restoring the enormous amount of lost habit lost in the more remote past they appear to be adequate for current levels of impact (Talley et al. 2006). However Talley et al. (2006) observed that the quality and persistence of mitigation and restoration efforts are uncertain and that there have been declines in the total number of valley elderberry longhorn beetle-occupied sites and in the number of riparian sites. Talley et al. (2006) also noted that the information included in reports is often unusable making assessments of mitigation and restoration success difficult.

The greatest current threat to the valley elderberry longhorn beetle is from the invasive non-native Argentine ant (*Linepithema humile*) and European earwig (*Forficula auricularia*) (Talley et al. 2006). The non-native invasive Argentine ant has been observed attacking and killing valley elderberry longhorn beetle larvae. The ants enter the exit hole that the beetle makes prior to pupation and remove the larva (Huxel 2000; Huxel et al. 2003). Given that the invasion of riparian systems by Argentine ant in the Central Valley is continuing to spread, it is unclear how the invasion will impact the valley elderberry longhorn beetle, but it appears that the Argentine ant may have caused the disappearance of some populations (Talley et al. 2006). Field bait and trapping experiments have determined that Argentine ant has been introduced widely through mitigation plantings and irrigation (Klasson et al. 2005). Irrigation plays a major role in Argentine ant's rate and distance of dispersal in other ecosystems (Menke and Holway 2006). Those data also suggest that there may be a threshold of Argentine ant density above which Valley elderberry longhorn beetle is extirpated from a site (Klasson et al. 2005). If confirmed, this would be a serious threat to the valley elderberry longhorn beetle's recovery because once the valley elderberry longhorn beetle is extirpated from a site recolonization is unlikely (Talley et al. 2006). The non-native invasive European earwig is also considered to be a threat to the valley elderberry longhorn beetle through direct predation or by supporting higher populations of predators of insects (Talley et al. 2006), and earwig populations are also significantly larger in mitigation plantings and irrigated areas (Klasson et al. 2005).

Non-native invasive plant species such as 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*), may have significant indirect impacts on the valley elderberry longhorn beetle by impacting elderberry shrub vigor and recruitment (Talley et al. 2006). It is also predicted that ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), *Lolium multiflorum*, and yellow starthistle

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(*Centaurea* solstitialis) may increase seedling mortality through competition for light and water or through increased fire return intervals (Talley et al. 2006).

Long term data regarding site persistence, population size and dynamics, extirpation, and recolonization are also lacking as are estimates regarding the minimum self-sustaining population size, riparian forest corridor size, or habitat complex size for the valley elderberry longhorn beetle or other riparian forest organisms.

A.23.6 Relevant Conservation Efforts

Conservation Guidelines were established by the USFWS in 1999 (USFWS 1999). The guidelines were designed mainly to mitigate development-related impacts on the valley elderberry longhorn beetle habitat. Using a formula based on stem sizes, habitat association, and presence of emergence holes, the guidelines require losses of elderberry shrubs that meet the minimum standard for potential occupancy to be mitigation through a program that: 1) identifies and secures suitable and approved mitigation land, 2) transplanting of mature elderberry shrubs to the mitigation site, and replacement compensation using a standardized stem replacement formula. In response to the increasing need for valley elderberry longhorn beetle mitigation, numerous private valley elderberry longhorn beetle mitigation banks have become established throughout the Sacramento region. While the USFWS valley elderberry longhorn beetle mitigation compensates for the loss of elderberry shrubs (USFWS 1999), there is no evidence that it has been successful either mitigating direct impacts on valley elderberry longhorn beetle or has successfully compensated for the loss of occupied valley elderberry longhorn beetle habitat.

Valley elderberry longhorn beetle conservation has also been addressed in several regional conservation plans. The majority of the Planning Area overlaps with other conservation planning efforts that are either currently being implemented (e.g., Contra Costa HCP/NCCP, San Joaquin County HCP) or are in development (e.g., Yolo County HCP/NCCP, Solano County HCP, South Sacramento County HCP).

The CALFED Bay-Delta Ecosystem Restoration Program Plan's Multi-Species Conservation Strategy designates the valley elderberry longhorn beetle as "Recovery" (CALFED Bay-Delta Program 2000). This means that CALFED has established a goal to recover the species. Recovery is equivalent to the requirements of delisting a species under federal and State ESAs.

A.23.7 Species Habitat Suitability Model

Habitat: Habitat for the valley elderberry longhorn beetle in the BDCP Planning Area (Figure A.23.2) consists of all valley riparian habitat types including those dominated by:

- overstory trees such as white alder (*Alnus rhombifolia*), willow (*Salix* spp.), Oregon ash (*Fraxinus latifolia*), box elder (*Acer negundo*), walnut (*Juglans hindsii*), Fremont cottonwood (*Populus fremontii*), and valley oak (*Quercus lobata*), coast live oak (*Quercus agrifolia*); and
- shrub species such as coyotebush (*Baccharis pilularis*), blackberry (*Rubus discolor*), California wild rose (*Rosa californica*), elderberry (*Sambucus mexicana*), and dogwood (*Cronus sericea*).

Assumptions: The valley elderberry longhorn beetle is endemic to moist riparian corridors in the Sacramento and San Joaquin Valleys (USFWS 1984). The species is completely dependent on its host plant, the elderberry (*Sambucus* spp.) (Collinge et al. 2001). This model identifies habitat for the valley elderberry longhorn beetle as locations where the elderberry shrub is

expected to be found in the planning area. Elderberry is a common component of the remaining riparian forests and woodlands of the Central Valley (USFWS 1984). In these forests and woodlands, a variety of tree species compose the upper canopy, including Fremont cottonwood, valley oak, willow, walnut, alder, and Oregon ash. However, elderberry also occurs in shrub-dominated riparian habitats and along streams and artificial channels that lack or support degraded riparian vegetation. Elderberry shrubs also occur in upland areas, mainly in grasslands adjacent to riparian forests and woodlands (Barr 1991). Therefore, this model designates additional habitat as grasslands within one-quarter mile of streams and channels with and without riparian vegetation. Elderberry shrubs also occur incidentally along fence rows and in a variety of other disturbed conditions, particularly where birds may congregate and deposit seeds. This model does not include these incidental habitat areas, and thus may underestimate the distribution of potential habitat (i.e., elderberry shrubs) for the valley elderberry longhorn beetle in the planning area.

A.23.8 Recovery Goals

The Recovery plan for valley elderberry longhorn beetle was established in 1984 (USFWS 1984). Due to limited knowledge of the species requirements, recovery objectives were restricted to these: 1) preserve and protect known habitat sites to provide adequate conditions for the beetle; 2) survey riparian vegetation along certain Central Valley rivers for remaining colonies and habitat; 3) determine ecological requirements and management needs; 4) preserve and protect newly discovered habitat to provide suitable conditions for the species; 5) reestablish the species at rehabilitated habitat sites within the presumed historical range; 6) increase public awareness of the species through education and information programs; and 7) enforce laws and regulations to protect the species.

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