

Recovery Plan



**VALLEY ELDERBERRY
LONGHORN BEETLE**

VALLEY ELDERBERRY LONGHORN BEETLE
RECOVERY PLAN

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Date

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Valley Elderberry Longhorn Beetle
Recovery Plan Executive Summary

1. Point or condition when species can be considered "recovered".

To be determined. As interim measures, three known sites as well as potential habitat sites shall be preserved.

2. What generally must be done to reach recovery?

Habitat must be protected to prevent degradation at known sites. Newly discovered valley elderberry longhorn beetle habitat along the American, Sacramento, Feather, Tuolumne, Stanislaus, Mokelumne, Calaveras, Cosumnes, and San Joaquin Rivers must be protected.

3. What specifically must be done to meet needs of #2?

Surveys of the beetle's foodplant will be conducted for presence of the valley elderberry longhorn beetle. Habitat protection plans will be developed to protect known sites as well as newly discovered localities. Restoration of these sites, including removal of exotic species, will be required.

4. What management/maintenance needs have been identified to keep species recovered?

Protective measures will consist of minimizing the use of herbicides and insecticides, preventing removal of riparian vegetation, and preventing riprapping of habitat sites.

Valley Elderberry Longhorn Beetle Recovery Plan

PART I INTRODUCTION

Brief Overview

The valley elderberry longhorn beetle, Desmocerus californicus dimorphus Fisher (Coleoptera: Cerambycidae), was described from specimens collected in Sacramento, California, during the early 1900's. Subsequent research has determined that the beetle is endemic to moist valley oak woodlands along the margins of rivers and streams in the lower Sacramento and lower San Joaquin Valleys, where its foodplant, elderberry (Sambucus spp.), grows.

Riparian systems are widely recognized for their diversity of plant and animal life. Several animals and plants endemic to riparian systems are now considered rare or endangered by the State of California and candidates for endangered or threatened status by Federal agencies. These include the yellow-billed cuckoo (Coccyzus americanus occidentalis), California hibiscus (Hibiscus californica), least Bell's vireo (Vireo bellii pusillus), California freshwater shrimp (Syncaris pacifica), and slough thistle (Cirsium crassicaule) (Eng 1981, 1983; Hirsch and Segelquist 1978; Sands 1977, 1982; Shapiro 1974; Smith et al. 1980). During the past 150 years, over 90% of the riparian habitat in California has been destroyed by agricultural and urban development. Although the precise historical range of the

valley elderberry longhorn beetle can never be known, it is presumed that the extensive loss of riparian habitat has reduced its distribution significantly.

One purpose of the Endangered Species Act of 1973, as amended, is "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved." In the case of the valley elderberry longhorn beetle, essential factors which pertain to its life history and ecology are unknown. This recovery plan summarizes our current knowledge of the valley elderberry longhorn beetle, prescribes actions necessary to acquire additional biological data, and offers preliminary recommendations for actions necessary for its preservation, maintenance, and recovery.

Description and Taxonomy

Three species of Desmocerus are known from North America, including two species that occur in California. The taxa are moderate-sized, brightly colored, and sexually dichromatic. All Desmocerus utilize various species of elderberry (Sambucus; Caprifoliaceae) as food plants. Desmocerus californicus is a widely distributed but highly localized beetle in California. Two subspecies have been described. Desmocerus californicus californicus (California elderberry longhorn beetle) was described by Horn in 1881 from a specimen collected in southern California. Its distribution is coastal, ranging from Los Angeles northward to Mendocino County. Desmocerus c. dimorphus (valley elderberry longhorn beetle, Fig. 1) is known from

Figure 1. Photograph of female valley elderberry longhorn beetle collected along the south bank of the American River across from Cal Expo, Sacramento County in May 1983.



riparian areas in the Central Valley of California. It was described by Fisher in 1921 from specimens collected in Sacramento.

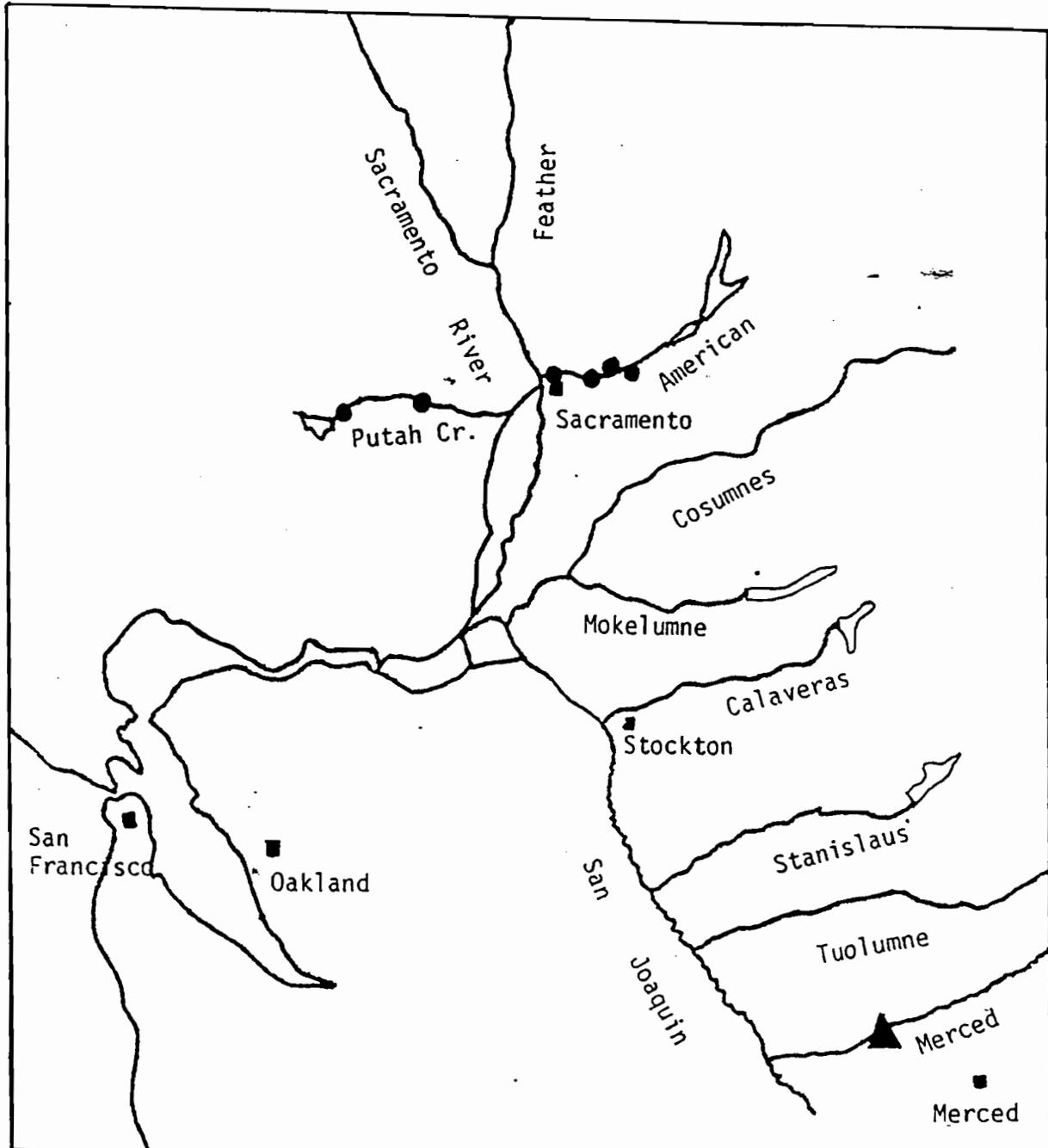
Males of the valley elderberry longhorn beetle exhibit polymorphism in color pattern. Some males resemble D. c. californicus, whose elytra¹ are coarsely punctured and dark metallic green, with a bright reddish-orange border. In other valley elderberry longhorn beetles, the metallic green elytral pattern is generally reduced to four oblong maculations (spots). Intergrades exist between the two color patterns. Too few collections have been made to analyze the frequency of the various morphs, however. Females are larger than males and resemble D. c. californicus males except that the elytra do not fully cover the abdomen when viewed from above. Also, males possess longer, more robust antennae than females. Both male and female valley elderberry longhorn beetles tend to be smaller than D. c. californicus.

Habitat Description

In recent years, the valley elderberry longhorn beetle has been collected at several sites along the American River in Sacramento County and along Putah Creek in Solano County (Fig. 2). These enclaves of riparian forest are remnants of a habitat that once covered thousands of acres in the Central Valley of California.

¹The elytra in beetles is the first pair of wings which are generally hardened and act as protection for the flight wings.

Figure 2. Distribution map of historic (triangles) and recent (since 1975) collection sites of the valley elderberry longhorn beetle.



These remnants of riparian forest are difficult to accurately characterize because they occur in many different forms throughout the valley. Under pristine conditions, these forests consisted of several canopy layers with a dense undergrowth (Katibah 1983). Fremont cottonwood (Populus fremontii), California sycamore (Platanus racemosa), willows (Salix spp.), and valley oak (Quercus lobata) were common upper canopy species. The intermediate canopies consisted of box elder (Acer negundo var. californicum), Oregon ash (Fraxinus latifolia), elderberry, and various willows. Vines were abundant in all canopy layers of riparian forest. Examples include wild grape (Vitis californica), poison oak (Rhus diversiloba), Dutchman's pipe vine (Aristolochia californica) and wild clematis (Clematis spp.). Canopy layers at sites of recent valley elderberry longhorn beetle collections include at least some if not all of the above noted trees. Undergrowth vegetation was quite diverse and today includes a number of exotic weeds.

Riparian forests have been greatly reduced or eliminated throughout much of the Central Valley. Riparian vegetation was one of the first significant losses in the natural environment. Because its decline was so rapid and extensive, there was little opportunity for scientists to study this habitat in a pristine condition.

Climate in the lower Sacramento Valley region is characterized by cool, rainy winters and hot, dry summers. Annual precipitation generally ranges from 15 to 51 cm (6 to 20 inches). Mean maximum summer temperatures range from 35 to 44°C (95 to 111°F); mean winter minimum temperatures range from 0 to 4°C (32 to 39°F).

Life History, Ecology, and Behavior

Approximately 400 species of cerambycid beetles are found in California (Powell and Hogue 1979). All are herbivorous and are frequently associated with a particular species or group of closely related species for larval foodplants. The valley elderberry longhorn beetle, as the name implies, feeds on at least one species of elderberry (Sambucus) and perhaps as many as three elderberry taxa. Unfortunately, the taxonomy of Sambucus is confused at this time. The taxa S. glauca Nutt., S. caerulea Raf. and S. mexicana Presl. may all be foodplants of the valley elderberry longhorn beetle. Most specimens collected by Arnold in 1982 were identified as S. mexicana (J. Strother, pers. comm.). However, there appears to be extensive phenotypic variability and possibly hybridization between S. mexicana and S. caerulea. The currently muddled state of Sambucus taxonomy will require considerable biological study before it can be clarified.

Collection records indicate that adult beetles may be found from mid-March until early-June, but most records are for late-April to mid-May. Adults have been observed resting on foliage of the elderberry, or actively flying between the trees where their coloration and large size make them conspicuous. Linsley and Chemsak (1972) suggest that adults are probably distasteful to birds, as are many other conspicuously colored insects, including some cerambycid beetles (Eisner 1970).

Specific life history characteristics of valley elderberry longhorn beetle are unknown. Life histories of the related taxa Desmocerus palliatus Forester (Craighead 1923), D. auripennis cribripennis Horn (Burke 1921), and D. auripennis piperi Webb (Craighead 1923) have been described. It is assumed that the life history of valley elderberry longhorn beetle follows a sequence of events similar to those of its relatives. These probably are as follows. Eggs are deposited in cracks and crevices of the bark of living elderberry plants. Presumably the eggs hatch shortly after they are laid. Larvae bore into the pith of larger stems and roots. When larvae are ready to pupate, they work their way up from the roots through the pith of the elderberry, open an emergence hole through the bark and then return to the pith for pupation. The entire life cycle encompasses two years, however, the duration of each life stage is unknown. Adult emergence occurs at about the same time the elderberry flowers.

Craighead (1923) noted adults of Desmocerus palliatus foraging on Sambucus flowers. Many cerambycid beetles feed on flowers. It seems likely, therefore, that valley elderberry longhorn beetles feed on Sambucus flowers. This is with emergence of valley elderberry longhorn beetle in synchrony with the blooming period of its elderberry host. However, Eya (1976) noted valley elderberry longhorn beetles feeding on elderberry foliage. Dr. Larry Eng (pers. comm.), an invertebrate zoologist with the California Department of Fish and Game, has also observed the valley elderberry longhorn beetle consuming elderberry foliage.

Distribution and Status

Although the entire historical distribution of the valley elderberry longhorn beetle is unknown, extensive destruction of riparian forests of the Central Valley during the past 150 years strongly suggests that the beetle's range has decreased and become greatly fragmented. Museum records indicate that the beetle has been collected in four central California counties: Merced, Sacramento, Solano, and Yolo. The Merced County locality is McConnell State Recreation Area near Delhi. Valley elderberry longhorn beetles have been collected at several localities (see Figs. 3-6) along the American River and its floodplain in Sacramento County, including 1) Bushy Lake (Sacramento), 2) C. M. Goethe Park (Rancho Cordova), 3) Johnson Industrial Park (Sacramento), 4) Ancil Hoffman Park (Carmichael), 5) Rossmoor Bar (Rancho Cordova), and 6) Sacramento Bar (Fair Oaks). Many specimens, especially those collected in Sacramento years ago, have no precise locality data. Both Solano County localities are along Putah Creek, Solano Lake Park. Yolo County localities are also along Putah Creek (the creek forms the boundary with Solano County) and include Solano Lake Park and the Monticello Dam area. In 1982, Arnold (unpubl. data) visited all of the above sites except McConnell State Recreation Area. One adult valley elderberry longhorn beetle was found at the Rossmoor Bar sites with a fresh emergence hole noted at Solano Lake Park.

There is little information on former abundance of valley elderberry longhorn beetle for comparison with current population levels. A. T. McClay collected 51 adults during May 1947. Unfortunately, McClay's

Figure 3. Valley elderberry longhorn beetle critical habitat, Sacramento Zone.

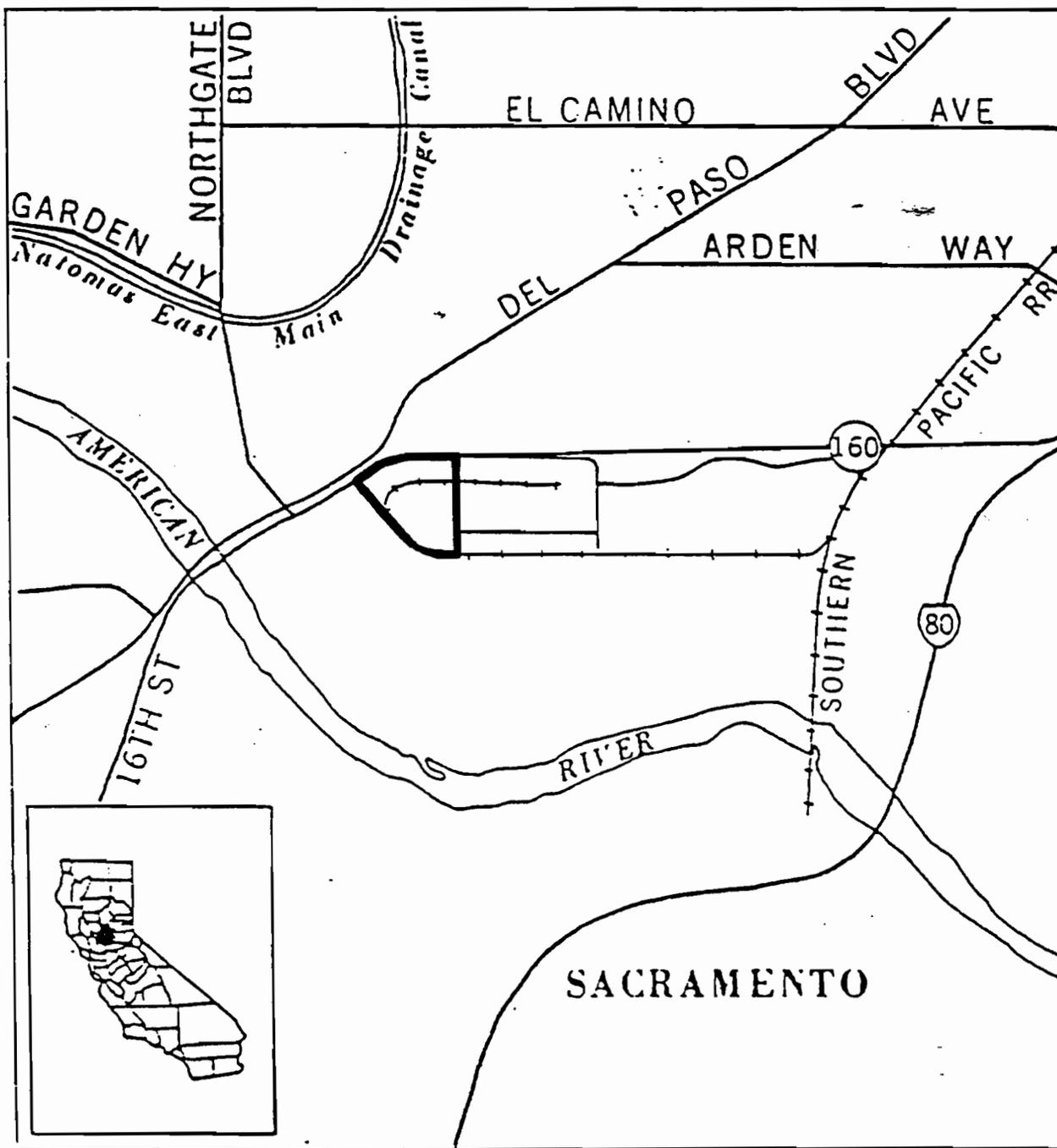


Figure 4. Valley elderberry longhorn beetle critical habitat, American River Parkway Zone.

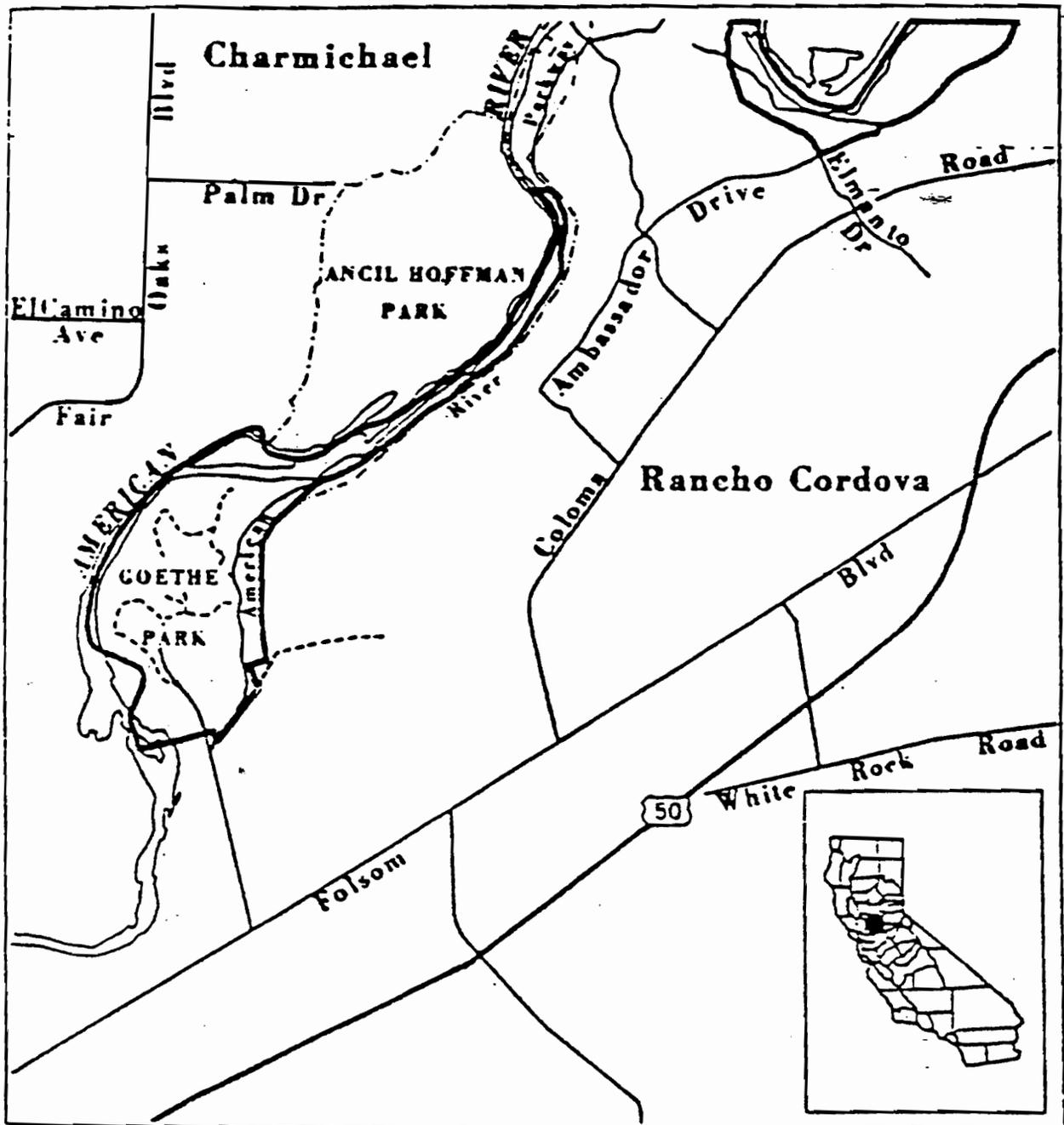


Figure 5. Essential habitat in relation to designated critical habitat for the American River Zone.

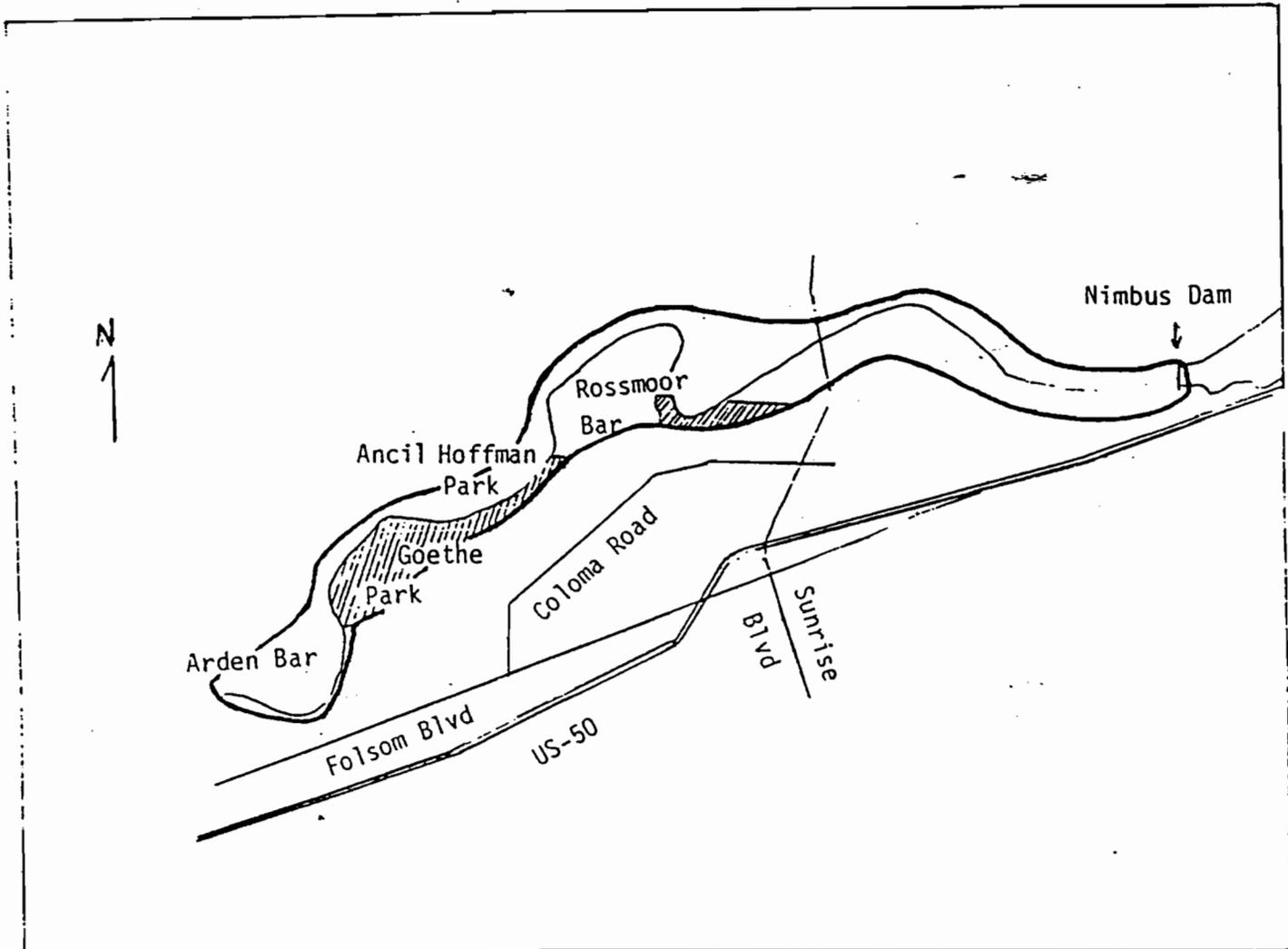
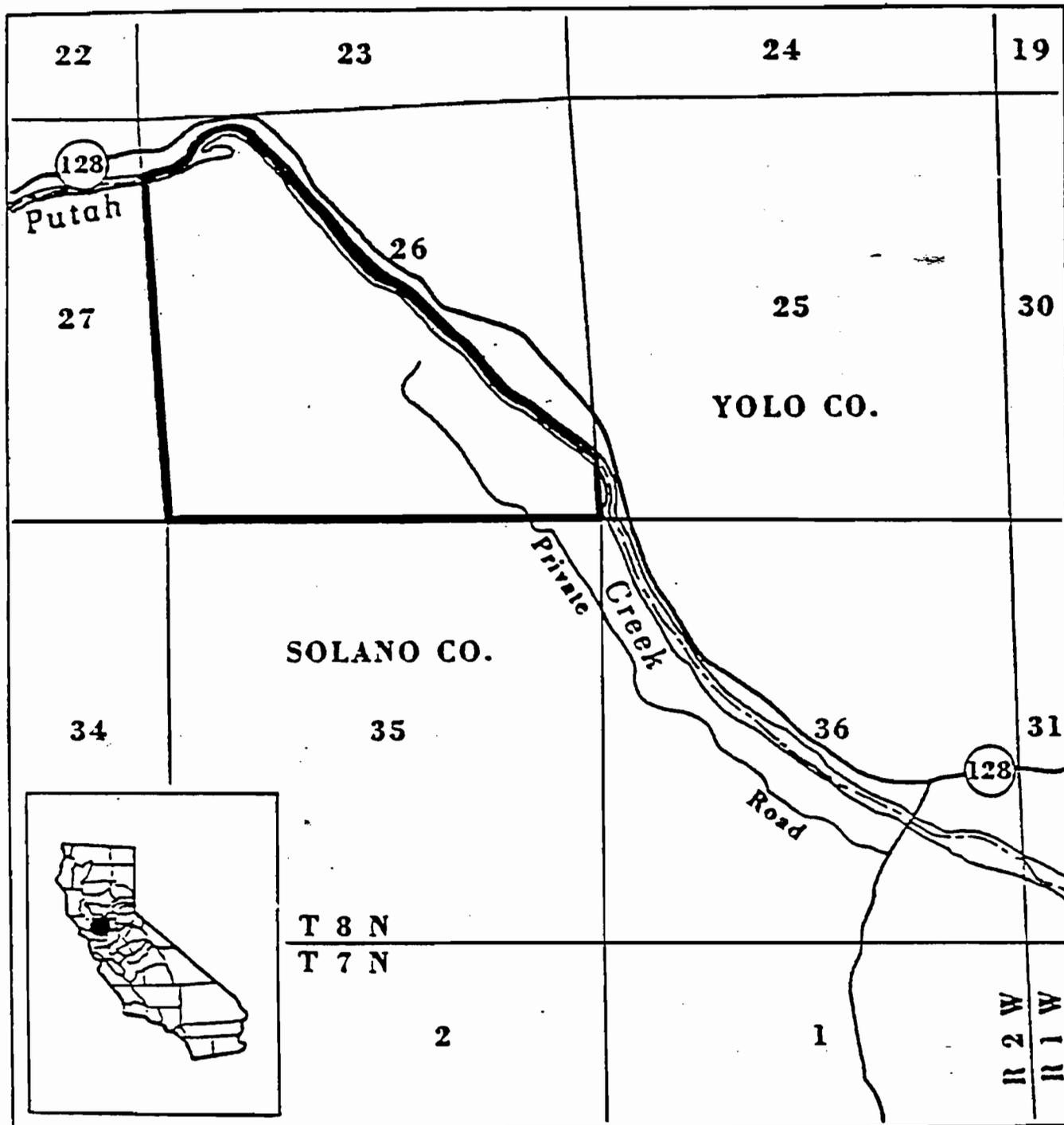


Figure 6. Essential habitat for valley elderberry longhorn beetle along Putah Creek, Solano County.



labels only give "Sacramento" as the locality with no specific data to indicate if one or more sites were involved. Dr. John Chemsak (pers. comm.), a cerambycid specialist from the University of California, Berkeley, believes that the valley elderberry longhorn beetle has probably always been rather rare and of limited abundance.

In an effort to document the distribution of D. c. dimorphus and assess its abundance, Eya (1976) visited four sites along the American River in Sacramento during April and May of 1974 and 1975. The girth of infested elderberry trees was measured and the number of emergence holes per tree noted. Valley elderberry longhorn beetle emergence holes are about 1 cm in diameter and rounded in appearance. Eya reported that trees utilized by valley elderberry longhorn beetle larvae appeared less healthy and had reduced foliage compared to non-infested elderberries. He noted that valley elderberry longhorn beetles preferred trees with a trunk girth of 15 to 65 cm, and exit holes were anywhere from 10 cm to 3 m above the ground. Infestation frequencies (i.e., at least one valley elderberry longhorn beetle emergence hole per tree) at four sites ranged from 20 to 50 percent of trees present.

During May 1982, Arnold (unpubl. data) surveyed 1,247 elderberries along the American River from Rancho Cordova to Johnson Industrial Park in Sacramento. One adult valley elderberry longhorn beetle was seen at Rossmoor Bar of the Lower Sunrise Recreation Area and emergence holes were noted on about 27% of the elderberries. An additional 228 elderberries were surveyed along Putah Creek in Solano

and Yolo Counties (T8N, R2W, Secs. 26, 35, and 36). Although no adults were noted, 44 percent of the trees had emergence holes. Only one hole appeared to represent a 1982 emergence, based on the fresh frass (i.e., debris or excrement) observed in the hole. All other emergence holes seemed to be from previous years. These findings supported the earlier observations of Eya (1976). Clearly, additional research is required to deduce many specific details on the life history and ecology of the valley elderberry longhorn beetle.

Reasons for Decline

Loss of riparian forests began soon after California was annexed to the United States in 1848 (Katibah 1983). The Gold Rush began the following year and thousands of prospectors and settlers, hoping to strike it rich, poured into the Mother Lode area to pan and placer mine for gold in its rivers and streams. Many of the immigrants turned to farming to make a living. Thompson (1961) noted that the riparian forests offered the only significant woody vegetation on the valley floor, thus it was used for fencing timbers and fuel by the growing number of settlers and for steamships. More forest habitat was lost as farmers realized that its soil was highly fertile.

Katibah (1983) notes that "water, so tied to the agricultural, commercial, and urban development of the valley, was at least indirectly responsible for the degradation of the remaining riparian forests." As agriculture flourished, the demand for water exceeded the supply, thus water development and reclamation projects destroyed

significant forest areas. Flood control became necessary as more crops were planted and urban areas grew. Artificial levees, river channelization, dam construction, water diversion, and heavy groundwater pumping, all contributed to the reduction of riparian forests to the small, scattered remnants known today.

Katibah (1983) conservatively estimated that riparian forest habitat formerly covered about 373,410 ha (922,000 acres) prior to its conversion to agriculture. Based on a 1979 aerial survey, Katibah et al. (1981) determined that about 41,310 ha (102,000 acres) of riparian forest remain today in the Central Valley. Most of the remaining acreage has been severely disturbed by man's activities, however, key floral species remain.

Conservation Efforts

Individuals, conservation organizations, and governmental agencies have attempted to preserve many remnant riparian forest areas because of their ecological and recreational values. The decline of riparian habitat was recognized by several conservation organizations in the mid-1970's. Because of their value, the California State Legislature enacted legislation (Assembly Bill No. 3147, Fazio, August 1978) that funded investigations into the nature and extent of riparian vegetation and provided guidelines for protection of this natural resource. Kraemer (1981) has proposed purchase of meander zones as an alternative to riprapping remaining parcels of riparian forest along the Sacramento River.

In 1979, the geography departments at California State Universities of Chico and Fresno were contracted by the California Department of Fish and Game (CDFG) to compile riparian vegetation maps for the Central Valley. This mapping effort, formally known as the Central Valley Riparian Mapping Project 1979, provides a thorough inventory of all riparian vegetation (not just riparian forest habitat) for the entire Central Valley. The project area encompassed 20,390,750 acres (Katibah et al. 1983). In early 1980, CDFG contracted with the Remote Sensing Research Program (Dept. of Forestry and Resource Management at University of California, Berkeley) to investigate the condition of riparian vegetation in the project area. Preliminary reports on study methods (Katibah et al. 1981), geological and cultural history (Katibah 1983) and analyses of current conditions (Katibah et al. 1983) have been prepared.

The U.S. Fish and Wildlife Service proposed the valley elderberry longhorn beetle as threatened, with critical habitat, on August 10, 1978 (Federal Register 43:35636-35643). The critical habitat portion of the proposal was withdrawn by the Service on March 6, 1979 (Federal Register 44:12382-12384) in compliance with procedural changes mandated by the 1978 amendments to the Endangered Species Act of 1973. Critical habitat was repropoed on May 2, 1980 (Federal Register 45:29373-29375). The valley elderberry longhorn beetle was listed as a threatened species with critical habitat on August 10, 1980 (Federal Register 45:52803-52807). Although not officially designated as critical habitat, portions of Putah Creek and the American River Parkway just west of Nimbus Dam are herein considered essential habitat (see Appendix A).

Two sites where the valley elderberry longhorn beetle has been observed in recent years, including a portion of the critical habitat, are now in public ownership. The first site includes approximately 500 acres of parkland along the American River and is administered by the Sacramento County Parks and Recreational Department. The valley elderberry longhorn beetle has been collected at Goethe and Ancil Hoffman Parks, and on the Rossmoor and Sacramento Bars of the Lower Sunrise Recreation Area. County officials are cognizant of the unique riparian habitat and endemic species, and plan to protect and manage the parklands in an appropriate manner.

The second site is Solano Lake Park, along Putah Creek, at the junction of Pleasant Valley Road and California Highway #128. It is administered by the Solano County Department of Parks.

Threats to Survival

Because of limited knowledge about the life history of the valley elderberry longhorn beetle, and its ecological requirements, precise threats to its survival are difficult to identify. Clearly the primary threat to survival of the valley elderberry longhorn beetle has been, and continues to be, loss and alteration of habitat by agricultural conversion, grazing, levee construction, stream and river channelization, removal of riparian vegetation, riprapping of shoreline, plus recreational, industrial and urban development. Although the elderberry is still widely distributed throughout the Central Valley, many stands visited by Arnold in 1982 consisted of

older trees that lacked emergence holes and new basal growth. All of these sites were located on agricultural lands. CDFG wildlife biologists R. Hines and R. Brueggeman (L. Eng, pers. comm.), noted that cattle readily forage on new growth of elderberry, which may explain the absence of beetles at manicured Sambucus stands. Likewise, insecticide and herbicide use in agricultural areas may be factors limiting the beetle's distribution.

The age and quality of individual elderberry shrubs/trees and stands as a foodplant for valley elderberry longhorn beetles may also be a factor in the beetle's limited distribution. Larvae are borers and feed on the soft pith in stems and roots of the elderberry. Full-grown larvae and adults typically are 1.5 to 2.5 cm long. Their size may restrict them to larger branches and stems on older elderberries. Eya (1976) found valley elderberry longhorn beetle emergence holes on trees whose girth measured 15 to 65 cm. It is doubtful whether a particular elderberry could simultaneously support more than a few valley elderberry longhorn beetle larvae. Arnold (unpubl. data) noted that about 20% of the elderberry shrubs/trees with more than one emergence hole had been attacked by an unidentified fungus and were dead. This suggests that elderberries infested with valley elderberry longhorn beetles may be weakened and thus more susceptible to attack by disease or other insects. They may eventually be killed as a direct or indirect result of beetle infestation. The scarcity of valley elderberry longhorn beetles may be related to a requirement that the elderberry host be of a particular age and/or physical dimensions. Once such a tree is

located by the beetle, it is infested and may be rendered unsuitable as habitat for future valley elderberry longhorn beetle generations. Or perhaps habitat destruction and the concomitant reduction of large elderberries has forced remaining beetles to infest certain trees at greater than historic levels. Certainly the beetle-elderberry relationship requires further study.

PART II RECOVERY

Objectives

The objective of most recovery plans is to propose a program of activities whereby a listed endangered or threatened species can be secured and its status improved to the point of removal from the List of Endangered and Threatened Wildlife and Plants. At this time, there is insufficient information on the life history, distribution, and habitat requirements of the valley elderberry longhorn beetle to make such precise recommendations. However, interim actions that will secure the known populations of the beetle are given.

The valley elderberry longhorn beetle is threatened because its distribution is limited to a few sites in an area dominated by urban or agricultural activities. Prevention of further loss and degradation of its existing habitat is necessary to arrest the decline of this beetle. The primary interim objectives of the Valley Elderberry Longhorn Beetle Recovery Plan are to protect the three known localities, survey riparian vegetation along certain Central Valley rivers for remaining valley elderberry longhorn beetle colonies and habitat, provide protection to remaining valley elderberry longhorn beetle habitat within its suspected historic range, and determine the number of sites and populations necessary to eventually delist the species.

Step-down Outline

Prime Objective: The primary interim objectives of the Valley Elderberry Longhorn Beetle Recovery Plan are to protect the three known localities, survey riparian vegetation along certain Central Valley rivers for remaining valley elderberry longhorn beetle colonies and habitat, provide protection to remaining valley elderberry longhorn beetle habitat within its suspected historic range, and determine the number of sites and populations necessary to eventually delist the species.

1. Preserve and protect known habitat sites to provide adequate conditions for the VELB.
 11. Minimize further degradation, development or environmental modification of VELB habitat.
 111. Minimize use of insecticides, herbicides and other toxic substances.
 112. Minimize other activities that are incompatible with vegetation and habitat maintenance.
 113. Remove selected exotic plants.
 12. Protect habitat through long-term administrative actions.
 121. American River sites.
 122. Merced River site.
 123. Putah Creek sites.
 13. Develop management plans.

2. Survey riparian forests of the Sacramento and San Joaquin Valleys for presence of VELB and incorporate findings into short- and long-term management programs.
 21. Sacramento River - Red Bluff Diversion Dam downstream to the confluence with the American River.
 22. Feather River - Marysville downstream to the confluence with the Sacramento River.
 23. Tuolumne River - Waterford downstream to the confluence with the San Joaquin River.
 24. Stanislaus River - Oakdale downstream to confluence with the San Joaquin River.
 25. Mokelumne River - Comanche Reservoir Dam downstream to confluence with the San Joaquin River.
 26. Calaveras River - Bellota downstream to confluence with San Joaquin River.
 27. Cosumnes River - Bridgehouse downstream to confluence with San Joaquin River.
 28. San Joaquin River - Merced River to Stockton.
 29. Merced River - the lower portion of the river around McConnell State Recreation Area.
3. Determine ecological requirements and management needs of VELB.
 31. Conduct field studies on autecology of VELB at known colonies, and at any newly discovered sites.
 311. Determine salient features of VELB life history.
 312. Determine population structure and size of each colony.
 313. Identify predators, parasitoids, and other mortality or limiting factors.

314. Describe adult behavior, mating, foraging, oviposition, dispersal, etc.
32. Conduct laboratory studies to determine VELB life history.
33. Conduct field studies to identify potential management needs and actions for riparian forest vegetation at Goethe Park, Ancil Hoffman Park, other applicable portions of the American River Parkway, and Solano Lake Park.
 331. Determine synecology of riparian forest vegetation at these sites.
 332. Investigate autecology of Sambucus spp.
 333. Investigate the effects of grazing, disturbance and successional processes on Sambucus and VELB.
 334. Test various management practices for effect on Sambucus and VELB.
34. Investigate rehabilitation techniques for riparian areas and incorporate into long- and short-term management programs.
35. Determine VELB population status and success of management actions.
36. Determine delisting criteria.
4. Preserve and protect newly discovered VELB habitat to provide suitable conditions for the species.
 41. Minimize further degradation, development or environmental modification of VELB habitat.
 42. Protect newly discovered habitat through long-term administrative actions.
 43. Minimize use of insecticides, herbicides and other toxic substances.

44. Minimize other activities that are incompatible with vegetation and habitat maintenance.
5. Reestablish VELB at rehabilitated habitat sites within the presumed historical range in the Sacramento and San Joaquin Valleys.
 51. Determine suitability of potential habitat sites or habitat rehabilitation sites for VELB introduction.
 52. Protect selected habitat sites.
 53. Develop and implement a management program for each site.
 531. Rehabilitate selected riparian forest habitat sites.
 5311. Remove exotic flora, fauna or other deleterious materials.
 5312. Introduce necessary biological components of VELB habitat as identified by autecological and synecological studies.
 532. Obtain VELB stock for introduction from existing colonies or captive propagation, if feasible.
 54. Reintroduce VELB into selected sites.
6. Increase public awareness of VELB through education and information programs.
 61. Establish information signs at county parks.
 62. Develop audio-visual programs, publications, brochures and press releases.
 63. Distribute information to local parks, schools, newspapers, radio and TV stations.
7. Enforce laws and regulations to protect VELB.

71. Inform local government officials of the legal status of the VELB and applicable laws and regulations.
72. Eliminate illegal collecting.
73. Examine effectiveness of existing laws and regulations and propose changes as necessary.

Narrative

1. Preserve and protect known habitat sites to provide adequate conditions for the VELB.

The valley elderberry longhorn beetle is known to occur in the following three areas: the American River in riparian vegetation along the American River Parkway, the Merced River in remnant riparian vegetation found at McConnell State Recreation Area and at Putah Creek in riparian remnants at Solano Lake Park. Operators of these parks are generally cognizant of the presence of the beetle, yet because these are dynamic systems, activities in areas upstream may prove to be ultimately destructive in these protected areas. Even within these protected areas, occasional destruction of remnant elderberry groves occurs. It is therefore necessary to engage local, State and Federal agencies in active protection of the small remnants of riparian vegetation within the known range of the beetle.

11. Minimize further degradation, development or environmental modification of VELB habitat.

Within the known sites, as well as upstream from them, development of parking areas, high use visitor areas, rip-rapping, and spraying of herbicides or insecticides should be restricted. American River Parkway lands are surrounded by the rapidly expanding Sacramento metropolitan area.

Pressure to build visitor areas such as a marina at Discovery Park or new parking lots at Cal Expo is increasing. In those areas that abut agricultural lands, the spraying of herbicides and pesticides can be a major threat to the valley elderberry longhorn beetle. Riprapping may pose a direct threat by removal of elderberry groves or an indirect threat because of hydrologic changes downstream.

111. Minimize use of insecticides, herbicides and other toxic substances.

Pesticide drift from agricultural land is a serious threat to the beetle. However, not only agricultural activities, but also herbicide application associated with levee maintenance is a threat to remnant populations of the beetle. Cooperation among U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Department of Water Resources, California State Parks and Recreation Department and California Department of Boating and Waterways is necessary to prevent deleterious impacts to the beetle and its habitat.

112. Minimize other activities that are incompatible with vegetation and habitat maintenance.

Upstream activities and development are potentially

serious threats to maintenance and recovery of riparian areas. Riprapping can significantly change the hydraulics of a river system and cause erosion of areas downstream. Levee construction, agricultural land conversion, dredging, and other activities can alter the energetics and flow of the river - especially during periods of high flow. Flood waters, which in pristine times spread out over large expanses of land, are now confined to discrete channels between levees. This prevents the dissipation of energy by the flooding of low-lying areas and increases the erosional force of the river. Riprapping deflects this energy to the vegetated areas downstream, which are often riparian vegetation remnants. Overgrazing by livestock may be a problem in certain areas. Cooperation among agencies involved in river management is needed to prevent further damage caused by these activities.

113. Remove selected exotic plants.

Certain exotic plants [e.g., Chinese tree-of-heaven, (Ailanthus altissima), black locust (Robinia pseudo-acacia), scotch broom (Cytisus scoparius)] have spread rapidly in the American River Parkway and may negatively affect elderberries. Such exotics may need to be removed in selected portions of the parkway.

12. Protect habitat through long-term administrative actions.

In order to protect and secure known colonies, coordinated, long-term agreements (e.g., cooperative agreements, memoranda of understanding or conservation easements) are necessary among California Department of Water Resources, California Water Resources Control Board, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, Sacramento, Merced and Yolo Counties, and private landowners.

121. American River sites.

The American River Parkway was designated by Sacramento County and the State of California as an area where riparian vegetation would be preserved. The legal proscription on development in the area is still not well-defined. In order to preserve the best areas of known valley elderberry longhorn beetle habitat, the U.S. Fish and Wildlife Service should enter into an agreement with Sacramento County, Water Resources Control Board, Department of Water Resources, City of Sacramento, Bureau of Reclamation, and U.S. Army Corps of Engineers. Development pressures along the American River Parkway are high for construction of marinas and condominiums, as well as for expansion of Cal Expo. The Bureau of Reclamation controls flows from Folsom Lake and Lake

Natomas that are necessary for continued health and reproduction of the elderberry trees. U.S. Army Corps of Engineers has permitting authority over proposals for aggregate removal, dredge spoiling, levee construction and maintenance, which could severely impact the beetle's habitat in this area.

122. Merced River site.

The valley elderberry longhorn beetle was collected from McConnell State Recreation Area in Merced County, near Delhi. This area is a remnant of a much larger riparian area that has been severely reduced by agricultural activities. State Park officials are aware of the beetle's presence but this population could be severely impacted by pesticide drift from nearby orchards. Landowners who have active agricultural operations nearby should be notified of the potential problem and agreements made as to the wind velocity and direction necessary to minimize pesticide drift into riparian areas. Removal of undergrowth should be limited to that absolutely necessary.

123. Putah Creek sites.

The Putah Creek sites are surrounded by agricultural

activities and the same agreements with landowners should be made as was discussed above. Solano County controls Solano Lake Park and the managers are informed as to the valley elderberry longhorn beetle's presence. It is possible that agreements prescribing the kind of activities and development in the riparian zone would be necessary.

13. Develop management plans.

Management plans should be developed to protect the three known sites. American River sites may be adequately protected through provisions of the American River Parkway plan, currently being developed by Sacramento County.

2. Survey riparian forests of the Sacramento and San Joaquin Valleys for presence of VELB and incorporate findings into short- and long-term management programs.

The valley elderberry longhorn beetle very likely exists outside of the three known sites. Elderberry groves within the suspected range of the beetle should be searched for the insect, its exit holes, or other signs of occurrence. Areas within the Central Valley where the beetle could be found include elderberry groves along portions of the Sacramento, Feather, Tuolumne, Stanislaus, Mokelumne, Calaveras, Cosumnes and San Joaquin Rivers. The specific areas of the rivers that should be searched are detailed

in items 211-218. Additionally, the McConnell State Recreation Area in Merced County should be thoroughly searched. Management plans should be modified as such information becomes available.

21. Sacramento River.

Elderberry groves from the Red Bluff Diversion Dam downstream to the confluence with the American River should be surveyed. The Corps of Engineers has entered into a cooperative agreement with the Fish and Wildlife Service for a 3-year survey of the river.

22. Feather River.

Elderberry groves from Marysville downstream to the confluence with the Sacramento River should be surveyed.

23. Tuolumne River.

The area from Waterford downstream to the confluence with the San Joaquin River should be surveyed.

24. Stanislaus River.

The Stanislaus River from Oakdale downstream to the confluence with the San Joaquin River should be surveyed.

25. Mokelumne River.

From Comanche Reservoir Dam downstream to the confluence with the San Joaquin River are remnants of riparian areas that are potentially high quality habitat for the beetle.

26. Calaveras River.

The Calaveras River from Bellota downstream to the confluence with the San Joaquin River should be surveyed.

27. Cosumnes River.

The Cosumnes River from Bridgehouse downstream to the confluence with the San Joaquin River should be surveyed.

28. San Joaquin River.

Even with the extensive alterations to the San Joaquin River that have taken place over the previous 100 years, there still may be historic or reestablished elderberry groves from the Merced River to Stockton that could support the beetle.

29. Merced River.

McConnell State Recreation Area is a historic locality for

the beetle. This portion of the lower Merced River should be thoroughly surveyed.

3. Determine ecological requirements and management needs of VELB.

Field and laboratory studies are needed to manage and better understand the valley elderberry longhorn beetle.

31. Conduct field studies on autecology of VELB at known colonies, and at any newly discovered sites.

Because most of the basic ecological information concerning the valley elderberry longhorn beetle is unknown, research should be a high priority in order to effectively manage the species and its habitat.

311. Determine salient features of VELB life history.

Field studies should be performed to determine habitat preference of various life stages of the beetle.

312. Determine population structure and size of each colony.

Known and newly discovered colonies should be examined to determine their population size (numbers and distribution) and structure (sex ratios, age class distribution, demography, etc.).

313. Identify predators, parasitoids, and other mortality or limiting factors.

Factors contributing to the low numbers of valley elderberry longhorn beetle should be identified through field observation and studies. The importance of these factors to the beetle's population dynamics and potential recovery should be assessed.

314. Describe adult behavior, mating, foraging, oviposition, dispersal, etc.

Reproductive behavior and feeding ecology are virtually unknown and should be thoroughly examined.

32. Conduct laboratory studies to determine VELB life history.

Some features of valley elderberry longhorn beetle life history are very difficult to access by field studies. Therefore, factors such as longevity, fecundity, tolerances to environmental extremes, and tolerances to chemicals should be examined in the laboratory.

33. Conduct field studies to identify potential management needs and actions for riparian forest vegetation at Goethe Park, Ancil Hoffman Park, other applicable portions of the American River Parkway, and Solano Lake Park.

A preliminary floral inventory of riparian forest areas in the Sacramento Valley is provided by Roberts et al. (1977). Habitat studies are also to better understand synecology of the forest community, the autecology of selected plants characteristic of the beetle's microhabitat, especially Sambucus, and identify specific management needs and actions.

331. Determine synecology of riparian forest vegetation at these sites.

The overall requirements of maintaining viable stands of riparian vegetation should be determined and incorporated into long-term management plans for the beetle.

332. Investigate autecology of Sambucus spp.

The autecology of elderberries should be investigated so that proper habitat can be maintained and improved.

333. Investigate the effects of grazing, disturbance and successional processes on Sambucus and VELB.

The effects of grazing on elderberries and the forest community should be elucidated and related to long-term management goals. Other processes that are identified

as related to the successional processes of Sambucus should be investigated.

334. Test various management practices for effect on Sambucus and VELB.

Several potential management activities, for example, controlled burns or elimination of the eucalyptus trees or weedy herbs, must be evaluated in study plots prior to large-scale action. Once the beetle's biological and habitat requirements are more thoroughly understood, short- and long-term management plans should be formulated.

34. Investigate rehabilitation techniques for riparian areas and incorporate into long- and short-term management programs.

Because some current colonies and perhaps newly discovered colonies are mere remnants of past distribution and abundance, methods to rehabilitate riparian areas and thereby increase distribution and abundance of the valley elderberry longhorn beetle should be investigated. Promising techniques should be examined on a small scale and, if successful, incorporated into overall management programs.

35. Determine VELB population status and success of management actions.

Annual population estimates should be made at known and newly discovered colonies.

36. Determine delisting criteria.

The number and areal extent of colonies necessary to delist the VELB should be determined. In part, the delisting criteria will be determined by remaining habitat and colonies as found during survey work.

4. Preserve and protect newly discovered VELB habitat to provide suitable conditions for the species.

The present distribution of the valley elderberry longhorn beetle is poorly known. Therefore, comprehensive status surveys of potential beetle sites are needed. Any VELB habitat discovered during status surveys or examination of U.S. Army Corps of Engineers permit sites should be protected from disturbance and destruction.

41. Minimize further degradation, development or environmental modification of VELB habitat.

Efforts are needed to preserve the remaining riparian areas

from agricultural conversion, development, riprapping, erosion and riparian vegetation removal. Agencies must be made aware of the plight and legal status of the beetle and project areas should be surveyed for its presence. If the valley elderberry longhorn beetle or emergence holes are found, it may be necessary to modify projects to protect habitat of the beetle.

42. Protect newly discovered habitat through long-term administrative actions.

A cooperative agreement or memorandum of understanding should be made with U.S. Army Corps of Engineers, that any activities for which they issue a permit in the riparian areas delimited in tasks 211 to 219, would be subjected to a survey for valley elderberry longhorn beetle habitat and indications of the beetle's presence. These areas may contain valley elderberry longhorn beetle habitat of various qualities. Newly discovered colonies could receive protection through interagency consultation requirements of Section 7 of the Endangered Species Act, as amended.

43. Minimize use of insecticides, herbicides and other toxic substances.

The use of insecticides, herbicides, and other toxic substances should be minimized to the maximum extent

possible by coordination with California Department of Food and Agriculture and their pesticide permitting program as well as U.S. Army Corps of Engineers and their levee maintenance activities.

44. Minimize other activities that are incompatible with vegetation and habitat maintenance.

Overgrazing, destruction of riparian vegetation by levee or road maintenance, as well as other activities that negatively impact elderberries should be minimized by cooperation with the appropriate agencies until surveys for the valley elderberry longhorn beetle can be completed.

5. Reestablish VELB at rehabilitated habitat sites within the presumed historical range in the Sacramento and San Joaquin Valleys.

Since 1975, all known collections of the valley elderberry longhorn beetle have occurred along the American River or Putah Creek. Nonetheless, there are several other localities for riparian forest habitat supporting elderberries in the lower Sacramento and upper San Joaquin Valleys (Katibah et al. 1981). These and similar remnants, as well as historical collection sites in the Central Valley should be surveyed and evaluated as sites for reestablishment of the beetle, once its biological and habitat requirements are identified.

51. Determine suitability of potential habitat sites or habitat restoration sites for VELB introduction.

Elderberry groves within the suspected historic range of the valley elderberry longhorn beetle should be surveyed to determine suitability for introduction of the species. Information gained from the riparian forest survey (Task 21) should be useful in determining reintroduction sites.

52. Protect selected habitat sites.

Once the habitat sites have been identified, they should be protected by cooperative agreements, memoranda of understanding, conservation easements, or other long-term administrative action.

53. Develop and implement a management program for each site.

As each site is secured, a management program outlining the steps necessary to provide for long-term survival of the valley elderberry longhorn beetle and its habitat should be formulated. Development of a viable management program will depend upon information gained from Task 2.

531. Rehabilitate selected riparian forest habitat sites.

Most sites will probably require rehabilitation to

provide acceptable or optimum habitat for the valley elderberry longhorn beetle.

5311. Remove exotic flora, fauna or other deleterious material.

Removal of exotic species or other unnatural community components considered deleterious to the survival of the valley elderberry longhorn beetle may need to be completed prior to introduction of the beetle.

5312. Introduce necessary biological components of VELB habitat as identified by autecological and synecological studies.

All requirements of the life history of the beetle must be provided at each site. Specific plants (e.g., Sambucus spp.) or other organisms may need to be introduced to provide elements essential to the life history of the valley elderberry longhorn beetle.

532. Obtain VELB stock for introduction from existing colonies or captive propagation, if feasible.

Securing stock for reintroduction of the valley

elderberry longhorn beetle may be difficult because of the beetle's scarcity. As such, a captive breeding program may be essential for obtaining sufficient numbers of adults (or other life stages) necessary for reintroduction efforts and possibly for laboratory studies as well. Several cerambycid species have been reared successfully under laboratory conditions on artificial diets (Singh 1977). The techniques employed for raising other cerambycid species should be adapted for rearing valley elderberry longhorn beetles.

54. Reintroduce VELB into selected sites.

After sites have been secured and rehabilitated as necessary, valley elderberry longhorn beetles should be reintroduced within the suspected historical range.

6. Increase public awareness of VELB through education and information programs.

Efforts to preserve the valley elderberry longhorn beetle could be greatly facilitated by interpretive education activities that inform the public of the beetle's threatened status.

61. Establish information signs at county parks.

Five of the six known localities where the beetle occurs are county parklands. One historic collection site in Merced County is on state park property. Establishing informational signs in these areas could provide an excellent educational tool for people living near or visiting known colonies. The signs could show the beetle's life history, habitat, and reasons for its decline.

62. Develop audio-visual programs, publications, brochures and press releases.

Information concerning the plight of the beetle should be compiled for distribution via mass media and small publications or brochures.

63. Distribute information to local parks, schools, newspapers, radio and TV stations.

A combination of visual and audio programs, plus printed matter are suggested to satisfy this subobjective of the recovery plan. These education materials could be distributed at the parks and local education institutions.

7. Enforce laws and regulations to protect VELB.

All laws and regulations that protect the valley elderberry longhorn beetle and its habitat should be strictly enforced.

Local law enforcement agencies should be made aware of the distribution and status of the species.

71. Inform local government officials of the legal status of the VELB and applicable laws and regulations.

Sacramento, Solano and Merced County officials should be briefed on the status of the valley elderberry longhorn beetle and methods to protect existing populations.

72. Eliminate illegal collecting.

Collecting of the species may be a problem and should be eliminated by patrols during the short adult flight season.

73. Examine effectiveness of existing laws and regulations and propose changes as necessary.

Gaps in current protective legislation and regulations should be identified and changes proposed as necessary.

Literature Cited

- Burke, H. E. 1921. Biological notes on Desmocerus, a genus of roundhead borers, the species of which infests various elders. J. Econ. Ent. 14:450-452.
- Craighead, F. C. 1923. North American cerambycid larvae. A clarification and the biology of North American cerambycid larvae. Can. Dept. Ag., Ottawa. Bull. 27. 239 pp.
- Eisner, T. 1970. Chemical defense against predation in arthropods. pp. 157-218. IN, Sondheimer, E. and J.B. Simeone (Eds.), Chemical ecology. Academic Press, New York.
- Eng, L. L. 1981. Distribution, life history, and status of the California freshwater shrimp, Syncaris pacifica (Holmes). California Dept. Fish and Game, Inland Fish. Endang. Species Prog. Spec. Publ. 81-1, 27 pp.
- Eng, L. L. 1983. Rare, threatened and endangered invertebrates in Californian riparian systems. California Riparian Systems Conference (in press).
- Eya, B. K. 1976. Distribution and status of a longhorn beetle, Desmocerus californicus dimorphus Fisher (Coleoptera: Cerambycidae). Unpubl. ms., 6 pp.

Hirsch, A. and C. A. Segelquist. 1978. Protection and management of riparian ecosystems: activities and views of the U.S. Fish and Wildlife Service. pp. 344-352. IN, R.R. Johnson and J.F. McCormick (Tech. Coords.). Strategies for protection and management of floodplain wetlands and other riparian ecosystems. U.S. For. Serv., Wash., D.C., Gen. Tech. Rep. WO-12.

Katibah, E. F. 1983. A brief history of riparian forests in the Great Central Valley of California. California Riparian Systems Conference (in press).

Katibah, E. F., K. J. Dummer, and N. Nedeff. 1981. Evaluation of the riparian vegetation resource in the Great Central Valley of California using remote sensing techniques. Technical Papers Amer. Soc. Photogrammetry. ASP-ACSM Fall Tech. Mtg., San Francisco Sept. 9-11 and Honolulu Sept. 14-16, 1981. pp. 234-246.

Katibah, E. F., K. J. Dummer, and N. Nedeff. 1983. An analysis of the current condition of the riparian resource in the Great Central Valley of California. California Riparian Systems Conference (in press).

Kraemer, T. J. 1981. The Sacramento River, Glenn, Butte and Tehama Counties: a study of vegetation, deposition and erosion and a management proposal. M. A. Thesis. California State University, Chico. 179 pp.

- Linsley, E. G. and J. A. Chemsak. 1972. Cerambycidae of North America, Part No. 1. Taxonomy and classification of the subfamily Lepturinae. University of California Publ. Entomol. Vol. 69.
- Powell, J. A. and C. L. Hogue. 1979. California insects. University of California Press, Berkeley. 388 pp.
- Roberts, W. G., J. G. Howe, and J. Major. 1977. A survey of riparian forest flora and fauna in California. pp. 3-19. IN, A. Sands (Ed.), Riparian forests in California: their ecology and conservation. Inst. Ecol. Publ. No. 15, University of California, Davis.
- Sands, A. (Ed.). 1977. Riparian forests in California: their ecology and conservation. Inst. Ecol. Publ. No. 15, University of California, Davis. 122 pp.
- Sands, A. 1982. The value of riparian habitat. *Fremontia* 10:3-7.
- Shapiro, A. M. 1974. The butterfly fauna of the Sacramento Valley, California. *J. Res. Lepidoptera* 13:73-82, 115-122, 137-140.
- Singh, P. 1977. Artificial diets for insects, mites and spiders. Plenum Publications Co., New York. 594 pp.

Smith, J. P., Jr., R. J. Cole, J. O. Sawyer, Jr., and W. R. Powell.
1980. Inventory of rare and endangered vascular plants of
California. California Native Plant Soc. Special Publ. No. 1
(2nd ed.).

Thompson, K. 1961. Riparian forests of the Sacramento Valley,
California. *Annals Assoc. Amer. Geogr.* 51:294-315.

PART III IMPLEMENTATION SCHEDULE

Table 1 that follows, is a summary of scheduled actions and estimated costs for the valley elderberry longhorn beetle recovery program. It is a guide to meet the objectives of Valley Elderberry Longhorn Beetle Recovery Plan, as elaborated in Part II. This table indicates the general category for implementation duration of the tasks, which agencies are responsible to perform the tasks, and lastly, the estimated costs to accomplish these tasks. Implementing Part III is the action of the recovery plan, that when accomplished, should bring about the recovery of this threatened species.

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

RECOVERY ACTION PRIORITIES

- 1 = an action that must be taken to prevent extinction or to prevent the species from declining irreversibly
- 2 = an action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction
- 3 = all other actions necessary to provide for full recovery of the species

Part III
 Implementation Schedule
 Valley Elderberry Longhorn Beetle Recovery Plan

General Category	Plan Task	Task Number	Task Priority	Duration of task (yrs.)	Responsible Agency* FMS	Estimated Costs ² (\$1,000)			Comments
						FY 1	FY 2	FY 3	
M3	Minimize further degradation, development, or environmental modification of VELB habitat	11	1	Continuous	Region 1 SE	1	1	1	Includes 11-113; costs are largely administrative except for removal of exotic plants (Task 113)
					*CDFG	1	1	1	
					Sacramento Co.	1	2	2	
					City of Sacto.	1	2	2	
					Solano Co.	1	1	1	
					DWR	0.5	0.5	0.5	
					WRCB	0.5	0.5	0.5	
					COE	1	1	1	
					CDPR	0.5	0.5	0.5	
					CDBW	0.5	0.5	0.5	
					SCS	0.5	0.5	0.5	
A7	Protect American River sites	121	1	2	1 SE ES	To be determined	To be determined	To be determined	Cooperation of private landowners necessary in some areas
					*CDFG				
					Sacramento Co.				
					DWR				
					WRCB				
					COE				
					CDBW				
A7	Protect Merced River site	122	1	1	1 SE	To be determined	To be determined	To be determined	
					*CDPR				
					CDFG				
					WRCB				
					COE				

General Category	Plan Task	Task Number	Task Priority	Duration of task (yrs.)	Responsible Agency ¹		Estimated Costs ² (\$1,000)			Comments
					FWS	Other Agencies	FY 1	FY 2	FY 3	
A7	Protect Putah Creek sites	123	1	1	1	SE	*CDFG Solano Co. DWR WRCB COE	To be determined		
M7	Develop management plans	13	2	1	1	*SE	CDFG CDPR Sacramento Co.	2 2 1 1		
R1	Survey Sacramento River	21	2	3	1	*SE	COE	1 20 15	1 15	
R1	Survey Feather River	22	3	1	1	SE	*CDFG		3 2	Survey should be conducted in FY3 or FY4
R1	Survey Tuolumne River	23	3	1	1	SE	*CDFG		2 2	Survey should be conducted in FY3, FY4 or FY5
R1	Survey Stanislaus River	24	3	1	1	SE	*CDFG		3 2	Survey should be conducted in FY3, FY4 or FY5
R1	Survey Mokelumne River	25	3	1	1	SE	*CDFG		3 3	Survey should be conducted in FY3, FY4 or FY5

General Category	Plan Task	Task Number	Task Priority	Duration of task (yrs.)	Responsible Agency*		Estimated Costs ² (\$1,000)			Comments
					PMS Region	Other Agencies	FY 1	FY 2	FY 3	
R1	Survey Calaveras River	26	3	1	1	SE	*CDFG COE		2 2 1	Survey should be conducted in FY3, FY4 or FY5
R1	Survey Cosumnes River	27	3	1	1	SE	*CDFG		3 3	Survey should be conducted in FY3 or FY4
R1	Survey San Joaquin River	28	2	1	1	SE	*CDFG	0.5 11		Funds through Section 6 of Endangered Species Act
R1	Survey Merced River	29	2	1	1	SE	*CDFG CDPR		3 2 2	This survey is high priority because of historic locality at McConnell State Recreation Area
R1	Conduct field studies on autecology of VELB at known colonies, and at any newly discovered sites	31	2	3	1	*SE	CDFG	3 3 3		Includes 311-314
R1	Conduct laboratory studies to determine VELB life history	32	2	2	1	*SE	CDFG		2 1	

General Category	Plan Task	Task Number	Task Priority	Duration ¹ of task (yrs.)	Responsible Agency*		Estimated Costs ² (\$1,000)			Comments				
					FWS Region	Program Agencies	Other Agencies	FY 1	FY 2		FY 3			
R2	Determine synecology of riparian forest vegetation at these sites	331	2	1	1	SE	*CDFG		2					
R2	Investigate autecology of <u>Sambucus</u> spp.	332	2	1	1	SE	*CDFG		2	2				
R4	Investigate the effects of grazing, disturbance and successional processes on <u>Sambucus</u> and <u>VELB</u>	333	2	1	1	SE	*CDFG		3	2				
R4	Test various management practices for effect on <u>Sambucus</u> and <u>VELB</u>	334	3	2	1	SE	*CDFG							Task to begin in FY4
R3	Investigate rehabilitation techniques for riparian areas and incorporate into long- and short-term management programs	34	3	2	1	*SE	CDFG							Task to begin in FY4
R1	Determine <u>VELB</u> population status and success of management actions	35	2	Continuous	1	*SE	CDFG	1.5	1.5	1.5	1.5			

General Category	Plan Task	Task Number	Task Priority	Duration of task (yrs.)	Responsible Agency*		Estimated Costs ² (\$1,000)			Comments
					Region	Other Agencies	FY 1	FY 2	FY 3	
M2	Reintroduce VELB into selected sites	54	3	2	1	SE	*CDFG	To be determined		
01	Establish information signs at county parks	61	3	1			*Sacramento Co. *Solano Co.	2	1	
01	Develop audio-visual programs, publications, brochures, and press releases	62	3	2	1	*SE	CDFG	0.5	0.5	
01	Distribute information to local parks, schools, newspapers, radio and TV stations	63	3	2	1	*SE	CDFG Sacramento Co. Solano Co.	0.5	0.5	
02	Enforce laws and regulations to protect VELB	7	1	Ongoing	1	LE	*CDFG Sacramento Co. Solano Co.	3	3	Included in LE Program Advice Objectives; includes 71-73

1 Ongoing = tasks currently underway and will continue from year to year.

2 Continuous = once funded, task will continue from year to year.

2 FY1 = 1984

Abbreviations

ES - U.S. Fish and Wildlife Service (Ecological Services)

SE - U.S. Fish and Wildlife Service (Endangered Species)

LE - U.S. Fish and Wildlife Service (Law Enforcement)

CDFG - California Department of Fish and Game

APPENDIX A

Critical and Essential Habitat

At the time of listing the valley elderberry longhorn beetle as a threatened species, two sites in Sacramento County were designated as critical habitat:

1) Sacramento Zone (Fig. 3). An area in the city of Sacramento enclosed on the north by the Route 160 Freeway, on the west and southwest by the Western Pacific railroad tracks, and on the east by Commerce Circle and its extension southward to the railroad tracks.

2) American River Parkway Zone (Fig. 4). An area of the American River Parkway on the south bank of the American River, bounded on the north by latitude 30 37'30"N, on the west and southwest by Elmanto Drive from its junction with Ambassador Drive to its extension to latitude 38 37'30"N, and on the south and east by Ambassador Drive and its extension north to latitude 38 37'30"N. Goethe Park, and that portion of the American River Parkway northeast of Goethe Park, west of the Jedediah Smith Memorial Bicycle Trail, and north to a line extended eastward from Palm Drive.

Based on recent collections of the VELB on Rossmoor and Sacramento Bars of the Lower Sunrise Recreation Area, the area along the American River Parkway eastward to Nimbus Dam should also be considered essential for the VELB (Fig. 5).

In addition, essential habitat exists along Putah Creek, at Solano Lake Park (Fig. 6). This site should be referred to as the Putah Creek Zone and delimited as follows: Solano County, R2W, T8N, Sections 25, 26, 35, and 36.

APPENDIX B

List of Agencies Asked to Submit Review Comments.

U.S. Corps of Engineers - Sacramento, CA
U.S. Fish and Wildlife Service - Washington, D.C. and Portland, OR
U.S. Soil Conservation Service - Davis, CA
California Department of Boating and Waterways - Sacramento, CA
California Department of Fish and Game - Sacramento, CA
California Department of Parks and Recreation - Sacramento, CA
California Department of Water Resources - Sacramento, CA
Sacramento County Parks and Recreation Department -
Sacramento, CA
Solano County Parks Department - Vacaville, CA
Pacific Gas and Electric (Dept. of Engineering Research) -
San Ramon, CA