Summary Information

River Partners

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Amount sought: $638,851

Duration: 36 months

Lead investigator: Mrs. Helen Swagerty, River Partners

Short Description

Since 1993, riparian restoration has occurred on 3,600 acres of the USFWS Sacramento River National Wildlife Refuge. This project will survey eight selected refuge units spanning 73 river miles (RM 167 to 240) in the middle reach of the Sacramento River. These units represent a golden opportunity to study the recovery of VELB populations and how this recovery is influenced by both local site characteristics and proximity to existing natural beetle populations.

Executive Summary

Since 1993, riparian restoration has occurred on 3,600 acres of the USFWS

Sacramento River National Wildlife Refuge (SRNWR) with the goal "to protect,

enhance, and restore critical habitat and natural communities of native, resident, and migratory wildlife species" (USFWS 1992), including VELB. River Partners is proposing to survey eight selected refuge units spanning 73 river

miles (RM 167 to 240) in the middle reach of the Sacramento River. These units represent a golden opportunity to study the recovery of VELB populations and how this recovery is influenced by both local site characteristics and proximity to existing natural beetle populations.

The census results will document the success of the restoration for increasing the local populations of VELB. The more refined data collection and analyses of the plantings as well as the nearby natural stands of elderberry will, for the first time, allow us to begin to

understand VELB's population growth and spread through restoration plantings. The population parameters that will be quantified in this study are essential first steps to our understanding of the dynamicsof VELB populations in natural and restored habitats. An understanding of the population biology of VELB will be necessary in order to de−list VELB from its legally "threatened" status and represent some very early steps towards aiding the species recovery and assessing the likelihood of persistence of VELB populations. This project will also address the biology of the elderberry shrub as it relates to ecosystem processes that determine elderberry's growth form, density, associated species and VELB occurrence. These data will inform decisions about VELB conservation. For example, the efficacy of horticultural restoration as a recovery tool for VELB can be evaluated in the context of local ecosystem conditions based upon the results of this study.

Results from this study will be presented to the Sacramento River Conservation Area Forum (SRCAF) and the Sacramento US Fish &Wildlife Service Environmental

Services Office—Species Recovery Program. The findings will be reported to the

local newspapers and environmental organizations. Scientific findings will be

published in peer−reviewed scientific journals and presented at national meetings ofthe Society for Conservation Biology and the Ecological Society of America. Publicly accessible reports and articles will also be made available through the River Partners web site (www.riverpartners.org).

This project addresses CALFED and CVPIA's goals. CALFED has established a goal

to recover this species within CALFED Ecosystem Restoration Program Ecological

Management Zones. "The vision for the valley elderberry longhorn beetle is to recover this federally listed threatened species by increasing their populations and abundance through habitat restoration in order to contribute to the overall species richness and diversity and improve water management for beneficial uses of the Bay−Delta System"(CALFED, 2000).

This investigation will measure whether riparian restoration has been successful at linking isolated areas supporting existing VELB populations, and

increasing population and abundance of VELB.

This study entails a comprehensive study to locate and assess VELB populations of restored riparian habitats within the middle Sacramento River. Since the short−term objective of contributing to the recovery of VELB by restoring habitat has been accomplished, it is now

time to monitor the long−term objective of whether restored habitat is suitable for VELB populations.

Under the Multispecies Conservation Strategy, VELB is listed as an “R” species, aspecies designated for recovery. Recovery is equivalent to the requirements of delisting a species under FESA and CESA. However, the VELB recovery plan currently has no specific determination of how to qualify this species as “recovered”. This study will uncover more species−specific information that may lead to understanding what is needed to delist this species.

2004 CALFED Proposal

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Sacramento River National Wildlife Refuge

Tehama, Butte, and Glenn Counties, California

November 19, 2004

First Draft
Version 1.0

River Partners
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VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River
Sacramento River National Wildlife Refuge
Tehama, Butte, and Glenn Counties, California

I. Project Description

A. Problem Description

During the last 20 or so years, conservation has undergone a necessary shift from an emphasis on estimating the viability of the remaining populations of imperiled species to actively trying to restore habitats to enhance recovery (e.g., Young 2000). The new field of restoration biology is still relatively young and there is not generally agreed upon criteria by which habitat restoration can be regarded as successful (Michener 1997, Ehrenfield 2000, Williams 2000). A species that has been the target of a substantial amount of restoration and mitigation effort is the Valley Elderberry Longhorn Beetle, *Desmocerus californicus dimorphus* Fisher (Coleoptera: Cerambycidae), which is endemic to California's Central Valley (Linsley and Chemsak 1972, Barr 1991). The species was listed by US Fish and Wildlife Service (USFWS) as a federally threatened species under the Endangered Species Act in 1980 due to habitat loss and degradation (Federal Register 1980). A recovery plan for the VELB was published in 1984 (USFWS 1984), but was based on the small amount of biological information that was then available. The recovery plan contained no explicit criteria by which the beetle could be regarded as recovered. The recovery plan suggested general biological criteria to aid recovery: planting the beetle's sole host plant blue elderberry (*Sambucus mexicana C. Presl: Caprifoliaceae*), and avoiding factors that are suspected to be harmful (e.g., pesticides, dust, habitat destruction). These recovery strategies have not, however, lead to increases in the abundance or distribution of the beetle. Furthermore, studies reveal that the beetle occupies only 25% or less of apparently suitable elderberry habitat (Collinge et al. 2001; Talley and Holyoak unpub. data) suggesting that there are factors in addition to host plant availability that influence its persistene and abundance. This lack of species-specific biological information has limited our ability to efficiently recover this species and indicates that there is a special need to focus on the VELB in order to learn more about its ecology. Doing so will contribute to revising the VELB's Recovery Plan and to understanding when riparian restoration can be regarded as successful for this species.

The VELB is reliant on blue elderberry for its survival. Most of what is known about the ecology of blue elderberry comes from natural history observations and studies in the gray literature. It is a spreading winter-deciduous shrub typically <8 m in height. It is bird dispersed, often distributed as scattered individuals, and adapted to germination in full sun (Holstein 1995). The species occurs as an understory species in cottonwood and mixed riparian forests (Holland 1986), and elderberry savanna. In forest patches, associated species include Fremont cottonwood (*Populus fremontii*), California black walnut (*Juglans hindsii*), California sycamore (*Platanus racemosa*), valley oak (*Quercus lobata*), box elder (*Acer negundo*), California wild grape (*Vitis californica*) and Himalayan blackberry (*Rubus discolor*) (Conard et al. 1980, Holland 1986, Sawyer and Keeler-Wolf 1995, Vaghti 2003). More detailed habitat

associations of blue elderberry were identified by Vaghti, Holyoak et al. (in prep). Cottonwood and mixed riparian forests are distributed proximate to the Central Valley's major rivers in highly fragmented, often disturbed patches. Blue elderberry is the principle shrub in elderberry savanna (Holland 1986, Sawyer & Keeler-Wolf 1995), an ecotype thought to be formed through disturbance events. The physical processes that create and maintain these forests and savanna have been significantly altered through dam construction, flow management, and river bank stabilization (Mount 1995, Bay Institute 1998, Nilsson and Svedmark 2003). Forest extent in the Central Valley has been further reduced through direct losses to agriculture, urbanization, mining and other human activities (Thompson 1961, Kelley 1989, Bay Institute 1998). For example, there is a reduced frequency of elderberry in sediments along the middle Sacramento River that have accumulated since the construction of Shasta Dam as compared with sediments present before dam construction (Vaghti, Holyoak, et al. In prep.). Vaghti et al. present data that suggests this is due to the effects of damming rather than younger sediments having different physical conditions. These data suggest that the long term dynamics of elderberry and the VELB may be heavily dependent on restoration and mitigation plantings.

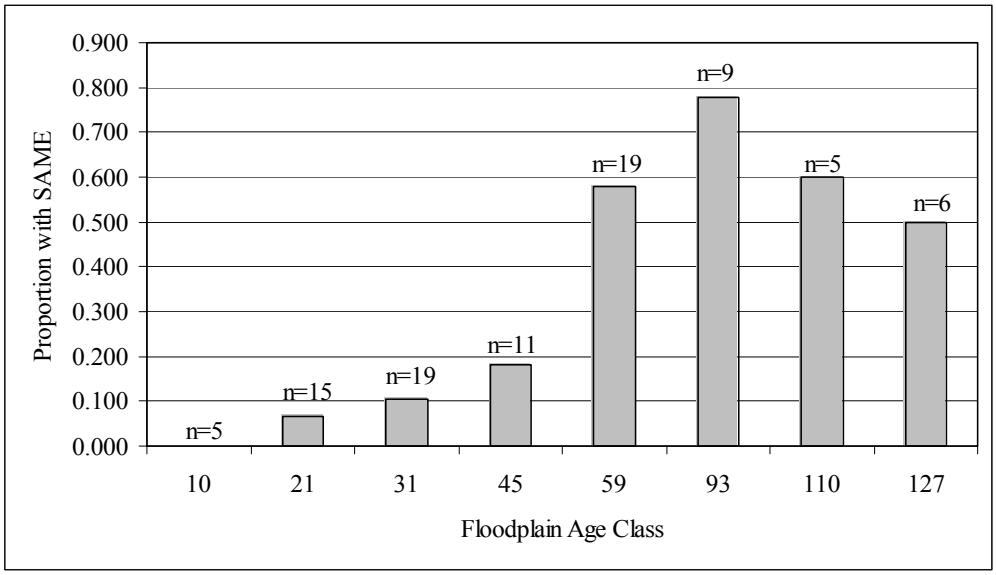


Figure 1 – Observed proportions of sites with blue elderberry (SAME) across 8 flood plain age (FPA) classes (2002, R^2=0.279, χ^2=28.70, p*<0.001, n=89). The filling of Shasta Reservoir commenced in 1943, corresponding to a FPA of 56 years. 10 (1-10 yrs); 21 (10-21 yrs); 31 (22-31 yrs); 45 (32-45 yrs); 59 (46-59 yrs); 93 (60-93 yrs); and 127 (101-127 yrs). FPA classes with <3 sites were excluded: 101 (94-101yrs); 127 (>127 yrs). Data from Vaghti et al. (manuscript) and correspond to 89 sites along the Sacramento River between Colusa Bridge and Woodson Bridge, river miles 143 to 219.

Since the publication of the recovery plan for the VELB by USFWS in 1984, ecologists have learned more about the species' biology. Barr (1991) conducted extensive surveys that determined the extent of the beetle's distribution and established that it requires elderberry with stems of a minimum diameter of approximately 1 inch. This means that planted shrubs need to reach a certain minimum age before they become suitable for the VELB, but a mean age is not known, which hinders the ability of USFWS to accurately calculate mitigation ratios in response to incidental take of the beetle. Huxel (2000) found a negative correlation

between the occurrence of the aggressive predatory Argentine ants (*Linepithema humile*) and the presence of the beetle in Yolo County. The general extent of this pattern is not yet clear and merits investigation, yet the Argentine ant is continuing to spread, and is known to have substantial effects in reducing the diversity of native insects (e.g., Ward 1987, Huma and Gordon 1997). Collinge et al. (2001) investigated the regional population structure and described the occurrence of regional "metapopulations" within watersheds that appeared relatively isolated from one another. The metapopulation structure implies limited dispersal of beetles, which leads us to expect that restoration sites that are less isolated will be more likely to be colonized by VELB. Finally, the efficacy of mitigation efforts for the VELB was investigated by Holyoak, et al. (in prep.) using a survey of all mitigation progress reports available in the Sacramento Field Office of USFWS (totaling 95 reports from 45 sites). Analysis of the reports showed that mitigation sites are being poorly tracked with only 56-67% of reports being filed with USFWS for sites of up to 4 years old, and 20-30% of reports being filed for 5-10 year old sites. Hence, at best we have a very incomplete record of how successful mitigation is for the VELB. The available data indicated that 48% of sites were colonized by VELB in all but one of these sites. The VELB arrived in initially inhabited transplanted elderberry rather than seedlings. In only 1 of 45 sites did VELB appear to have arrived unaided by humans. This indicates the need for longer term monitoring of restored and mitigated sites. The Middle Sacramento River restoration sites are ideal for this purpose, since some of these sites are now 13 years old (with 7 years being a typical age for colonization-Holyoak and Talley unpublished data). In planted sites the growth of plants is also likely to influence colonization by VELB; quantification of elderberry growth characteristics would facilitate determination of which restoration treatments and sites are most effective at promoting VELB recovery.

The composition and quality of sediments can contribute to the survival or mortality of plantings and ultimately the composition of the restoration site. In turn, the plant community influences the quality of the sediments through organic inputs and alteration of abiotic properties (e.g., soil moisture), as well as the subsequent establishment and survival of plants and animals. Riparian forest restoration sites often begin with relatively disturbed, denuded sediments that become enriched as the plant community develops. However, the quality of initial sediments can greatly vary with restoration site location, local geology and/or hydrology, and land use history (e.g., fill or fallow agricultural land). Differences in riparian plant survival and condition within and between restoration sites have been anecdotally linked to sediment quality (Theresa S. Talley and M. Holyoak personal observation; J. Silveira, USFWS, personal communication) but these relationships are rarely if ever quantitatively explored.

Assessing the recovery of VELB requires comparison with natural, reference sites (Michener 1997, Ehrenfield 2000, Williams 2000). The middle reach of the Sacramento River offers a wide variety of natural sites that are adjacent to restoration sites, which make ideal comparisons. These natural sites may also act as a source of colonizing VELB and other species (possibly the Argentine ants). For VELB it is

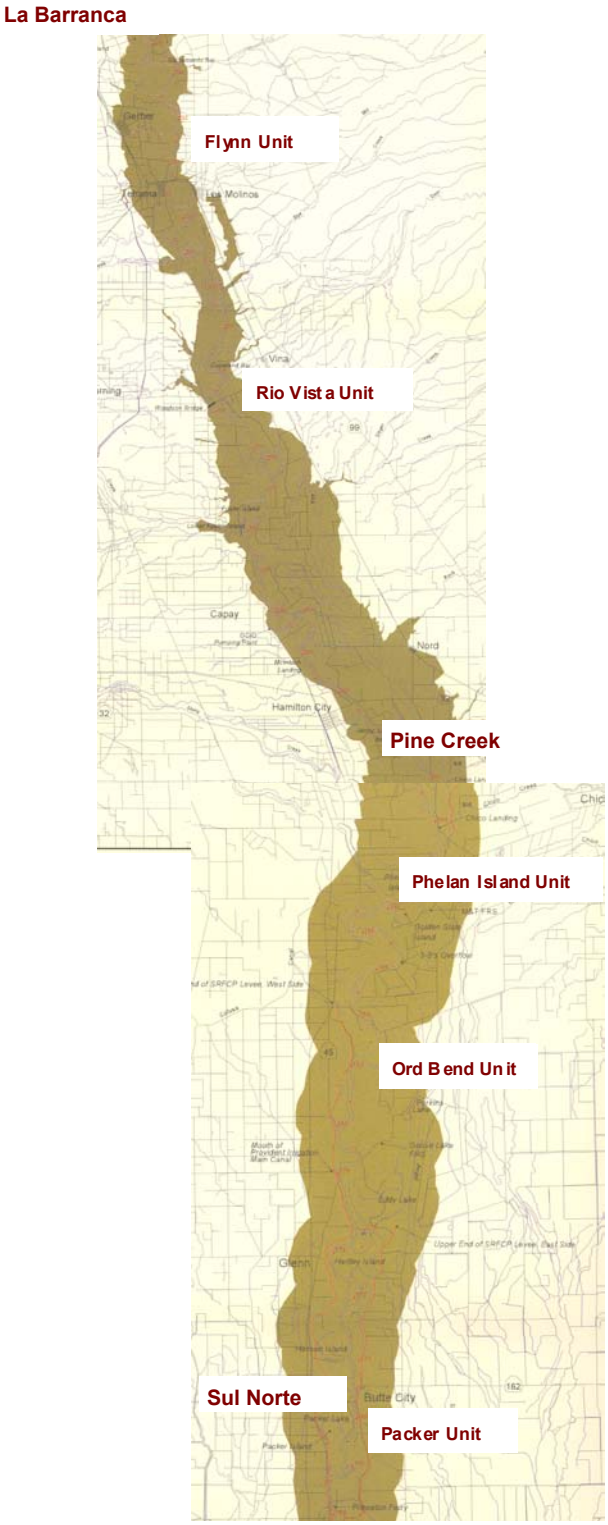
valuable to determine the extent of the spread of VELB populations from natural sites, since this could be used with the age of sites to calculate rates of population growth and dispersal distances. Such pieces of information would be valuable for assessing (1) the viability of VELB populations, (2) the relative value of restoration sites of different kinds (e.g., plant species compositions) and (3) the criteria that are most appropriate for selecting the locations of mitigation sites.

Since 1993, riparian restoration has occurred on 3,600 acres of the USFWS Sacramento River National Wildlife Refuge (SRNWR) with the goal "to protect, enhance, and restore critical habitat and natural communities of native, resident, and migratory wildlife species" (USFWS 1992), including VELB. Approximately 1,376 acres of the USFWS Sacramento River National Wildlife Refuge that have received direct support from CALFED and CVPIA to fund projects focused on acquisition and riparian restoration have been completed. However, no comprehensive monitoring has taken place to assess VELB colonization and estimate VELB population in these newly restored units. Existing survey data suggests that 5 SRNWR units have been colonized by VELB (River Partners). River Partners proposes surveying eight selected refuge units (Table 1) for the presence of VELB, in which two of these restoration units were previously funded by CALFED. Although funded by other sources, the additional six units will serve as additional reference sites to compare restoration of similar ages. These units represent a golden opportunity to study the recovery of VELB populations and how this recovery is influenced by both local site characteristics and proximity to existing natural beetle populations. The current proposal represents a low-cost efficient use of labor to collect data to conduct quantitative population modeling that will inform us about the significance of different kinds of restoration sites relative to natural riparian sites. Furthermore, this project will be the most extensive data collection ever conducted to describe VELB recovery.

Table 1. Selected Sacramento River National Wildlife Refuge Units to monitor in the proposed VELB colonization study.

Site Name	CALFED Funded	CVPIA Funded	Other Sources	Acres
Flynn Unit	**Y**	N	N	**285**
Rio Vista Unit	**Y**	N	N	**885**
Ord Bend Unit	N	N	Y	**111**
Packer Unit	N	N	Y	**175**
Phelan Island Unit	N	N	Y	**174**
Pine Creek Unit	N	N	Y	**205**
La Barranca Unit	N	N	Y	**116**
Sul Norte Unit	N	N	Y	**304**
Total				**2255**

Figure 1. Map of selected SRNWR units to monitor in proposed VELB colonization study.



B. Goals and objectives

River Partners is proposing to survey eight selected refuge units spanning 73 river miles (RM 167 to 240) in the middle reach of the Sacramento River (Figure 2) to investigate the following, which are both GOALS and TASKS in the remainder of the proposal:

1. Estimate VELB populations at selected USFWS Sacramento River National Wildlife Refuge units. This would provide the most detailed demographic data to date on VELB demography in restoration sites.
2. Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations.
3. Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.
4. To determine the influence of associated vegetation on elderberry growth and VELB colonization.
5. To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry. Comparison with survival in planting sites will also inform us about differences between restored and natural sites.

Ultimately, this monitoring and analyses will result in an estimate of the VELB habitat and population at these selected sites that will provide information about VELB dispersal, population growth and habitat suitability. This information will lead to better planting designs and site selection to facilitate more frequent colonization by VELB and larger population sizes.

This proposal complements a proposal submitted by The Nature Conservancy (TNC). Our proposal concentrates on local site factors; whereas the TNC proposal concentrates on regional habitat for the VELB. Holyoak is a contractor on both submitted proposals. Our proposal will obtain detailed population dynamic information for the VELB within individual restoration sites and nearby natural sites. It allows us to characterize VELB population growth, dispersal and site suitability, which will feed back into VELB recovery and improving restoration practices and management. The within-site population data we collect would also aid the TNC modeling efforts by providing details of year-to-year population variability, which would improve the metapopulation modeling efforts in the TNC proposal. The TNC proposal uses analyses of aerial photographs, GIS models and ground truthing to assess regional habitat for the VELB and bird species. A stochastic metapopulation model would be used to calculate regional persistence probability for the VELB. The VELB component of the TNC proposal does not assess detailed within-site conditions because efforts are instead concentrated on ground-truthing GIS model predictions and assessing regional population viability.

C. Justification

1. Conceptual Model

Figure 3 shows a conceptual model of the different elements of this project. Fluvial and geomorphological processes have been altered by damming, and channelization

of the Sacramento River. These processes interact with local site characteristics, such as sediment type and depth to groundwater to determine site suitability for blue elderberry and associated vegetation. Associated vegetation may also influence site suitability for elderberry (Goal 4), which will be tested through investigating correlations between associated vegetation and elderberry growth and survival. Comparison of elderberry in natural sites with that in nearby planted sites will test the suitability of restoration sites for creating VELB habitat (Goal 2). Within planted sites, measurement of VELB populations (Goal 1) and comparison with natural sites will show whether elderberry and site characteristics influence VELB colonization and population growth (Goal 2). A GIS analysis of distance between natural VELB-occupied sites and VELB colonization and spread within planted sites will investigate VELB population growth rates and dispersal distances (Goal 3). Repeated annual surveys of VELB will improve these estimates (Goal 3) and provide data on inter-annual variability for large-scale modeling that is not described in this proposal. A comparison of the survival across years of elderberry seedlings in natural and planted (control) habitat types (from associated vegetation and classification, e.g., Vaghti 2003) will reveal whether elderberry is recruiting to and surviving in different habitat types. Effects of damming (Goal 5) would be indicated if there are low levels of recruitment of elderberry, and high summer mortality in low-lying habitats that are not usually flooded (increased summer flow is an effect of damming). Conversely, high winter mortality of shrubs in low-lying (flooded) areas would be more consistent with a natural phenomenon that can account for the absence of elderberry in young low lying habitats, and not an effect damming (Goal 5).

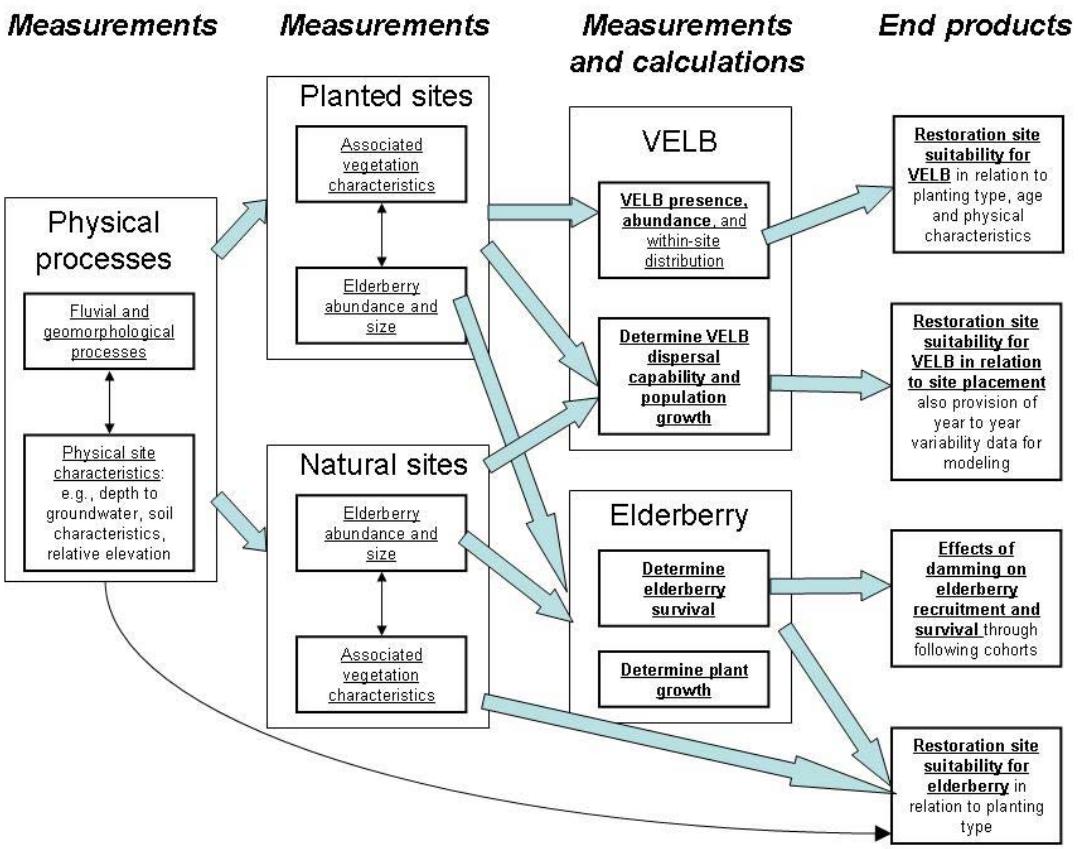


Figure 3. Conceptual model linking field measurements, calculations and conservation/restoration benefits from the proposed work. Double headed arrows indicate correlations and single headed arrows go from explanatory variables to dependent variables. Variation in thickness of arrows has no meaning. A few arrows are omitted for simplicity, but this also reflects where we expect the strongest effects to lie, e.g., although physical processes may directly influence VELB, the effects are expected to be weaker than those of elderberry (host plant) characteristics.

2. Hypotheses of the proposed study

This monitoring project involves the following hypotheses:

1. Recolonization is more a function of connectivity to existing elderberry shrubs than age and quality of shrubs. This would be investigated both through VELB initial colonization (presence/absence) and subsequent population growth through time.
2. VELB dispersal range is low.
3. Restoration next to existing riparian vegetation (which includes elderberry) increases the likelihood of VELB colonization because of the shorter dispersal distance involved.
4. Physical site characteristics influence the growth and survival rate of blue elderberry.
5. The woody vegetation associated with blue elderberry will influence elderberry's growth and survival, and VELB use of elderberry plants.

6. Sediment characteristics will influence the initial survival and growth of elderberry and associated vegetation, and plant community development will in turn influence the characteristics of the soils.
7. Elderberry seedling recruitment (indicated by seedling frequency) in natural sites will be low relative to the expected rate required for no net loss of elderberry.
8. Elderberry seedling mortality in low-lying habitats will be high during summer months because of increased water levels during these months (increased summer flow is an effect of damming).
9. Winter mortality of elderberry seedlings in low-lying (flooded) areas will be low relative to summer mortality. The converse of this would be more consistent with a natural phenomenon than damming causing the absence of elderberry in young, low-lying, habitats.

In combination, Hypotheses 6, 7 and 8 allow us to determine whether there is an effect of damming on blue elderberry recruitment and survival. In these analyses, the planted sites serve as measures of the potential survival of elderberry under unflooded conditions.

D. Previously Funded Monitoring

In fall 2003, River Partners received funding from the Recovery Program of the Sacramento Fish and Wildlife Office to sample 10% of the 76,000 planted elderberry shrubs in the USFWS Sacramento River National Wildlife Refuge. This marks the first attempt to document VELB in Sacramento River National Wildlife Refuge restoration units. Elderberry shrubs on five selected units (Flynn, Ord, Rio Vista, Phelan Island, and Packer Units) were sampled for the presence or absence of VELB exit holes. Data were collected on elderberry shrubs such as stem width of branches containing exit holes and height above ground. In addition, the presence and absence of Argentine ants (*Linepithema humile*), which are suspected predators of the VELB. However, the main focus of the study was to determine whether VELB have colonized recently restored riparian habitat.

All units contained elderberry shrubs with VELB exit holes, with some shrubs containing multiple exit holes. A total of 449 exit holes in 299 shrubs were observed in the selected refuge units. As expected, older sites had more VELB exit holes than younger sites, which may be a function of stem width. However, younger sites, such as Field 4 (planted 1998) and Field 5 (planted in 2000) of the Flynn Unit had a relatively high percentage of shrubs with exit holes. However, this phenomenon may be more a function of geographical location, as these sites were closer to existing riparian vegetation along Elder and Oat Creeks. Mean stem width in which exit holes were found was 5.2 ± 2.5 cm and mean height above ground was 22.3 ± 12.5 inches.

It is not likely that Argentine ants *(Linepithema humile*) occurred in any of the fields surveyed during the course of this study. However, field observations took place in late fall, in which cooler temperatures may have inhibited ant activity.

E. Approach and Scope of Work

1. Tasks

Task 1: Estimate VELB populations at selected USFWS Sacramento River National Wildlife Refuge units.

All of the riparian restoration plantings to be sampled under this proposal occur on different units of the Sacramento River NWR. A unit of the Refuge is defined as an area of contiguous acreage with the same management goals. There are many "Refuge units" along the 100 river miles that define the Refuge between Red Bluff and Colusa. Each Refuge unit is composed of several fields and variable acreage (Table 1). Restoration planning and implementation takes place within each Refuge Unit at the level of the field. Historically, each field has been managed slightly differently due to varying soils among fields, different irrigation methods, and crop histories. The restoration plans for each field called for variable species compositions based upon physical and biological factors unique to each field. Thus, the number of elderberry shrubs planted within a given field was likely not the same density or proportion of the species planting mix as was designed for an adjacent field. Also, fields within a Refuge unit were usually planted in different years, thus the plantings are of different ages.

Table 2. Estimate of elderberry shrubs at selected Sacramento River National Wildlife Refuge Units for the proposed VELB colonization study.

Site Name	Acres	Number of Fields with Elderberry	Number of Elderberry Shrubs
Flynn	**285**	**4**	6,619
Rio Vista	**885**	**8**	36,109
Ord Bend	**111**	**5**	1,616
Packer	**175**	**2**	7,597
Phelan Island	**174**	**4**	4,360
Pine Creek	**205**	**2**	3,245
La Barranca Unit	**116**	**3**	6,164
Sul Norte	**304**	**3**	3,168
Total	**2,255**	**31**	**68,878**

River Partners will complete an annual census of elderberry shrubs for presence or absence of VELB exit holes for all three years of the project at eight Sacramento River National Wildlife Refuge Units. The study sites include Flynn, Rio Vista, Phelan Island, Pine Creek, Ord Bend, Packer, La Barranca, and Sul Norte Units (Table 1). In year 1, trained observers will examine all individual elderberry shrubs that have been planted on the selected Sacramento River NWR units for adult VELB exit-holes in stems larger than one inch in diameter. All elderberry shrubs will be GPS to characterize habitat. If any exit holes are found, the shrub will be flagged for follow-up evaluations by biologists trained in aging VELB exit holes. Shrubs containing exit holes will be photographed and a GPS reading of the shrub location will be taken. Photographs will include a label that incorporates the following information: Unit, Field #, GPS # and date, and are useful for confirming shrub identity in subsequent years. Specific units will be surveyed to collect data from planted elderberry shrubs ranging in age from 3 to 13 years old. Surveys will take place after the VELB emergence period (April to early June) so that we know that the proportion of VELB emerged will not change as the season progresses.

In addition, surveyors will search for existing elderberry shrubs in naturally occurring riparian vegetation adjacent (within 1 kilometer) to restoration sites.

During the following years, monitoring staff will revisit these units and census all elderberry shrubs for new exit holes. This will result in the ability to compare numbers of holes in each field between years to give an estimate of the population of adult beetles for that year.

River Partners will map and record elderberry and VELB characteristics in the selected units using a spatially uniform sampling scheme. This will enable us to determine the size of VELB populations and their spatial distribution. Mapping will be conducted in all three years of the project. For this proposal, we are using the field as the primary geographical unit of study. Within a field all elderberry shrubs are the same age and, adjacent fields are typically of different ages and different species compositions. In statistical analyses we will determine the correlation among fields to determine the appropriate level of replication, which may be a field or a unit (tests of autocorrelation in residuals from preliminary statistical tests will facilitate this). If fields turn out to not be independent, as undoubtedly will be the case for some fields, we will use blocked designs, repeated measures and randomization statistics as is appropriate for the particular statistical problem that is revealed. We will thereby avoid pseudoreplication issues.

We will map a total of 500 shrubs per site, or all that are available if less than this. The shrubs to be mapped will be selected as the nearest shrub to each of 500 evenly located geographic points within the study sites. The same shrubs will be mapped each year. In addition, 200 random shrubs at each of the sites mapped by River Partners in 2003 will be recensused annually. Population totals will be calculated separately for <1, 1 year and older VELB exit holes. Numbers of VELB exit holes

and the proportion of bushes occupied by VELB represents alternative measures of VELB abundance and *a priori* one is not better than another.

Data will be assessed to estimate:

1. The influence of site age on VELB abundance using linear regression analyses. Separate analyses will be conducted on 1-year old and all VELB holes. The proportion of bushes occupied by VELB will also be analyzed by using a logistic regression. If residuals reveal nonlinearity, we will either transform data or use nonlinear regression as is appropriate. Such analyses will help us to understand the relative value of restoration sites of different ages and are useful for informing the likelihood of colonization of mitigation sites of different ages (which is not currently known) and would aid USFWS in their management of the VELB.
2. How VELB abundance is influenced by elderberry size will be determined by conducting similar analyses to those in (1) except the independent variable is now mean elderberry basal stem diameter. This information would help us to tie site conditions that influence elderberry size to the value of those sites for aiding recovery of VELB populations.
3. Within areas occupied by beetles (fields or portions of them), we will look at per shrub colonization rates for initially unoccupied shrubs and per shrub "extinction" rates for initially occupied shrubs. These estimates from a variety of sites are important for estimating extinction probabilities for populations (Task 2). Ultimately, such data will inform us about the value of different size VELB populations for buffering against local extinction of the VELB.
4. The between-year variation in abundance will be calculated as the coefficient of variation of the number of <1 year-old or 1 year-old holes. Again, this can be related to extinction probability and will also inform us about the reliability of single year abundance estimates. Further analyses using the census data are covered in Tasks 2 and 3 because they use additional information collected as a part of these other tasks.

Quality assurance will be conducted by estimating sampling error by double mapping 100 shrubs in year 1 in each unit and comparing the two mapping data sets. The coefficient of variation of number of VELB exit holes, proportion of shrubs with VELB and shrub basal diameter will indicate how accurate the data are. The measurement of the position of shrubs is assumed to be a negligible source of error.

Task 2: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations.

River Partners will map the distribution and abundance of VELB within natural sites that are proximate to each of the restored sites. We will determine the natural or planted habitat that contains VELB that is closest to each selected restoration study site and which is a potential colonization source for the VELB. The nearest area of natural vegetation to a restoration site (within 1 km) will be chosen for surveying. If VELB are found in this area, then other areas will be surveyed only if they are

approximately equidistant from the restoration site. If no VELB are found, then other sites will be surveyed up to 1 km away. This distance could be revised if we discover longer distance colonization by VELB. In many of these natural sites, few elderberry are available and all shrubs will be mapped, in others we will use a map of the site to randomly pick 200 spatial points and then to survey the first elderberry found closest to these points. A sample size of 200 plants is adequate to give a reasonably accurate estimate of VELB abundance with typical levels of shrub occupancy (Talley and Holyoak unpublished data). The data recorded will be identical to Task 1 and will be recorded in all three years.

Dr. Holyoak will use data from the repeated annual censuses of natural sites (Task 1) and the information about distance and size of nearest natural populations to analyze population growth and colonization of VELB in natural sites. We will analyze colonization probability of sites as a function of site age and distance from the nearest occupied VELB sites using logistic regression; if spatial autocorrelation is a concern (revealed by autocorrelated residuals) we will use an equivalent randomization method that does not assume independence of data points. The regression equation will allow us to calculate the site age of mean (50% probability) and variance of colonization and distance over which VELB colonize. This serves as a direct test of Hypothesis 3 and part of Hypothesis 1 (Section 4).

Holyoak's lab will calculate VELB finite population growth rates (number per shrub or site in year 2 divided by numbers in year 1). Analyses will be performed separately for occupied shrubs and for all shrubs in sites. Log-transformed finite growth rates are expected to be normally distributed and will be used as dependent variables in analyses (after checking common statistical assumptions). We will test for differences in finite growth rates between sites using ANOVA since if these are not present then it is unlikely that we will be able to find any differences related to site age or isolation from natural riparian areas. Regression analyses will then test whether finite population growth rates vary with site age and distance from natural sites (independent variables). We expect that VELB finite growth rates will rise with site age due to an increase in the amount of suitable habitat (elderberry), which is also directly tested in Task 3 and is part of Hypothesis 1 (Section 4). If finite growth rates increase for sites that are closer to natural sites this would indicate that population growth is being contributed to by immigration of beetles from natural sites (Hypothesis 3).

For fields that contain some VELB spatially explicit analyses will plot the probability of a shrub changing from unoccupied in year t to occupied in year t+1 as a function of the distance from the nearest occupied shrubs. Logistic regression will allow statistical quantification (or a randomization test if assumptions are not met). A negative slope to this regression would indicate a higher shrub colonization probability closer to existing areas occupied by VELB and would support hypotheses 1, 2 and 3. The regression equation would serve as a predictor of probability of dispersal over different distances.

Finite growth rates will be regressed against within site abundance of beetles to test for density dependence in beetle growth rates. Presence of density dependence would indicate whether beetle populations are buffered from extinction since density dependence has been shown to be critical in estimates of population viability (e.g., Dennis et al. 1991). Between year variability in the finite growth rates (comparing estimates from years 1-2 with those from years 2-3) will also be calculated. A comparison of values from restored and natural sites is an indicator of whether one type of site is more valuable for enhancing VELB persistence (indicated by lower interannual variability in the finite growth rate). Regressing interannual variability in the finite growth rate against VELB abundance will show whether larger populations of VELB are more buffered against extinction than smaller populations. Such information is valuable for estimating regional extinction risks, like in the TNC's submitted CALFED proposal. The other estimates obtained from this task are also valuable for understanding the extinction of VELB and will contribute to regional modeling efforts.

Task 3: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.

Measurements will be taken by Dr. Holyoak's lab to determine elderberry growth and the details of plant size (numbers of branches of particular sizes). The data from River Partners in Tasks 1 and 2 will allow assessment of survival of elderberry. In combination, data from Tasks 1 and 2 will provide the growth and detailed size data for elderberry. Different fields will randomly be selected in years 1 and 2 to build up a dataset of elderberry characteristics for use in analyses of the effects of plant age. Use of these shrubs by VELB will also be recorded. Associated vegetation may also influence elderberry growth characteristics and is tackled in Task 4. Separate analyses are conducted for restored and natural sites for all parts of this task.

Detailed measurements of elderberry size will be recorded for 30 randomly selected shrubs per field. Elderberry will be measured by recording diameter of all branches over 2.5 cm in diameter at the point of branching for mapped shrubs the. Lengths of branches to either the next branching point or to where diameters become <2.5 cm will also be recorded. This information will provide an index of the total amount of habitat available within each elderberry shrub. Records of branch diameters at holes are already available and we will use branch sizes and frequencies of use by VELB to calculate an index of habitat quantity. Habitat quantity will equal the sum for all branch size classes of "proportional frequency of use of 1-cm interval size classes by VELB" multiplied by the "total length of size class available in the shrub". This index will then be regressed against basal diameter of shrubs to see if there is a simple relationship that can sufficiently account much of the variation of the assumption that habitat quantity is adequately represented by basal diameter (e.g., if r-squared is greater than 0.8). Similar relationships will be sought with site age (part of Hypothesis 1).

Furthermore, we will collect a variety of further site characteristics that are listed in Table 3. These may be broken down into within-site and spatial characteristics. Most of the variables in Table 3 are self explanatory; however the soil characteristics require more introduction and description.

Table 3. Data from field surveys and GIS layers to be assembled during this project. GIS data will be obtained through collaboration with Steven Greco at U.C. Davis. **=data collected for natural sites only.

Within-site data to be mapped	
Presence/absence (new, 1-yr old, old holes)	Slope and aspect
Abundance (new, 1-yr old, old holes)	Soil variables (N, P, K, texture, etc.)
Extinction rate (per shrub)	Argentine ant presence & relative abundance
Colonization rate (per shrub)	% leaf damage (herbivory)
Total number of stems per patch**	% plant canopy cover
Stems basal diameter (cm)	% shrub cover (other than elderberry)
Depth to groundwater (where available)	% groundcover
Elderberry habitat quantity index (see text)	Presence/absence of water source
Spatial attributes from GIS analysis	
Number of natural patches within 1 km	Relative elevation estimates
Distance to nearest natural patch	Floodplain age estimates
Distance to nearest occupied natural patch	Patch area**
Presence/absence of water source	Patch perimeter**
Depth to groundwater estimates	Patch perimeter:area ratio**
Vegetation type (from Vaghti 2003 and Greco collaboration)	Elevation
Flood recurrence interval estimates.	

Comparisons of the sediment characteristics in restored sites across a range of ages and remnant natural reference sites provide insight into the trajectory, or rate and direction, of recovery in restoration sites. We expect that as sites mature, there will be increases in litter cover, organic matter and nutrient contents, soil moisture (i.e., less desiccation), and decreased proportions of coarse soil particles. Comparisons with nearby remnant natural soils will allow assessments of recovery progress and shed light on the functional equivalency of systems. For example, similar amounts of soil organic matter and C:N ratios suggest that microbial activity and decomposition rates may be similar between the sites being compared.

Sediment and litter samples will be collected from the same places as the restored and natural vegetation surveys so that plant and soil data can be paired for correlation analyses. The location of sediment and litter collections will be recorded with a GPS so that spatial analyses can be completed and soil maps can be made for use by site managers and scientists. Samples will be collected at 1 m from the base of each of 25 elderberry per field that are approximately uniformly distributed. A 0.25 m^2 quadrat will be set at each sampling point. The plant litter within the quadrat will be collected for estimates of litter biomass. Three 1.25 cm diameter 30 cm depth soil cores will be taken from within the 0.25 m^2 quadrat. The sediments from 5-10 cm and 25-30 cm depths will each be combined in an airtight bag and used for analyses of combustible organic matter, soil moisture, C:N ratios and sediment grain size.

Sediments at 5-10 cm fall within the root zone of most annual plants, while a 25-30 cm depth is within the root zone of most woody seedlings and herbaceous perennials. This sediment depth profile will also allow an assessment of the accumulation rate of surface organic material deposition across the restored sites of different ages.

Spatial variables (Table 3) will be calculated using GIS (ArcView) and most of these values are already available from work by Dr. Steve Greco (U.C.-Davis). The attached letter describes an agreement to collaborate with Dr Holyoak. This collaboration will provide information on the vegetation classification of existing planted and natural sites, and estimates of depth to groundwater estimates, relative elevation above the river, flood recurrence interval and floodplain age.

Multiple regression will be used to assess the effects on shrub occupancy by VELB of the variables in Table 3 in a general linear model where the occupancy probability of shrub i, $p_i = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_n x_n$, where α= y intercept, β_n = slope, and x_n = the independent variables selected from Table 3. The list of potential variables will first be reduced by using principle components analysis to identify which site and spatial variables are independent (an assumption of multiple regression). The regression equation that results will provide a direct test of Hypothesis 1 and will provide details of a number of other site and regional characteristics that may influence VELB abundance. For brevity, we do not extol these beyond the hypotheses that we have proposed. If spatial autocorrelation is problematic, we will turn to spatial statistics that allow for the presence of such autocorrelation.

Elderberry size as basal diameter will be regressed against the variables in Table 3 and site age. This analysis is similar to that described above for VELB occupancy but includes site age as an independent variable with a different dependent variable, which will be log-transformed basal-diameter. Stepwise regression will be used giving priority for site age because this is expected to have a strong influence on elderberry size. We will test Hypothesis 4 by determining which physical variables in Table 3 influence elderberry size. The growth rate of elderberry is given by the slope of (log) elderberry size against site age. The regression also allows us to test effects of soil factors as described above. Identifying physical factors responsible for increased growth of elderberry can feed directly back into future selection of mitigation sites. Comparison of physical variables that were identified to influence elderberry between natural and restoration sites will indicate whether current restoration treatments are adequate in reproducing natural conditions.

Similarly, survival of shrubs from Tasks 1 and 2 in relation to the variables in Table 3 and site age will indicate the relative value of natural and restored sites for survival of elderberry. This would form part of the test of Hypothesis 4. This analysis requires a complex survival analysis, which we will seek advice from a statistical consultant (available to Dr Holyoak at U.C. Davis) once we know what the data looks like in terms of sample sizes of shrubs that died. If sample sizes of dead shrubs are not

adequate, we will perform a more simple regression analysis that has less demanding data requirements.

Task 4: To determine the influence of associated vegetation on elderberry growth and VELB colonization.

To test Hypothesis 5, Holyoak's lab will perform two analyses. They will analyze elderberry growth data from Task 3 and VELB presence and abundance from Task 3 in relation to habitat type data from GIS analyses that will come from collaboration with Dr. Steven Greco at UC Davis. Secondly, they will collect data on associated woody species that are adjacent to elderberry shrubs mapped in Tasks 1 and 2. This includes canopy forming species that potentially compete with elderberry for light and other resources, and shrubs at the same height as elderberry that are potentially competing for water and nutrients, but are less likely to compete for light. For VELB analyses, they will investigate the influence of surrounding vegetation on presence/absence within shrubs and abundance.

Associated woody species will be recorded for every shrub that is measured in Task 3. All shrubs or trees that might have roots or canopies overlapping with elderberry will be recorded. A multivariate analysis (similar to Vaghti 2003) will then be used to simplify the data to associated vegetation types. Separate analyses of all kinds in this section would be conducted for natural and restored sites.

ANCOVA will be used to determine whether vegetation type is associated with the habitat quantity index from Task 3 or elderberry size from Tasks 1 and 2. Site age will be a covariate if this is significant in the analyses in Task 3 (otherwise the analysis reduces to an ANOVA). Assumptions of ANCOVA/ANOVA will be tested prior to conducting the test. The results of this analysis will guide whether the associated species planted with elderberry influence its growth (Hypothesis 5). An equivalent analysis using appropriate statistics will use elderberry survival as a dependent variable. Both of these analyses will guide the choice of species for planting in restoration sites.

An equivalent general linear model of a logistic form with VELB presence/absence as a covariate will be used to conduct an ANCOVA of the effects of vegetation type on site use by VELB. Differences between the results of the elderberry analysis and VELB analyses will indicate whether VELB respond directly to vegetation other than elderberry or not.

Task 5: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry.

Holyoak's lab will conduct a separate set of investigations to test the survival of elderberry seedlings in restored and natural sites, and whether there are survival patterns that are consistent with low recruitment of elderberry in natural sites in

relation to damming. Preliminary data from Vaghti et al. (2003) and Figure 1 indicate that elderberry may be prevented from recruiting by the damming of the Sacramento River. This is an important effect to test and testing is facilitated by a comparison of natural and restored sites.

Ten 20x20m quadrats will be randomly placed within sites and marked using iron stakes and GPS-recorded locations in each of 6 relative elevation (RE) categories (0-1, 1-2…5-6m—the typically available range of value based on analyses by Steven Greco and Alex Fremier unpublished data). We will include both natural and mature (>10 year old) restored sites with two-thirds of sites being natural. In each plot, we will record the area that is within each RE category and count the number of elderberry stems of <5 cm diameter that are within that area and measure the size of each to allow separation of new recruits from losses of larger stems due to mortality. This will be repeated twice yearly for three years: post winter in March-April to record winter mortality and post-summer (September-October) to record summer mortality. If densities of seedlings prove to be too low, we will increase the size of quadrats. Additionally we will use bark scars and records of browse damage from deer and beaver to indicate whether herbivory is responsible for mortality. We will record the number of seedlings recruiting and proportion dying each year as a function of relative elevation and analyze these using general linear models.

We will test the following hypotheses:

Hypothesis 6: Elderberry seedling recruitment (indicated by seedling frequency) in natural sites will be low relative to the expected rate required for no net loss of elderberry. We will have an estimate of elderberry mortality from natural sites from Task 2 and will compare this rate with the rate of recruitment of elderberry seedlings in natural sites. A greater mortality rate than recruitment rate would indicate an absence of sufficient elderberry recruitment to maintain natural elderberry stands and would be consistent with an effect of damming. Similarly reduced mortality in irrigated restoration sites might also be an indicator of an effect of damming. Alternatively, the frequency of herbivore damage of seedlings might indicate that elevated herbivore densities are responsible for reduced elderberry recruitment. Elderberry are a favored species of deer (M. Holyoak personal observation).

Hypotheses 7 and 8: Elderberry seedling mortality in low-lying habitats will be high during summer months because of increased water levels during these months (increased summer flow is an effect of damming). Winter mortality of elderberry seedlings in low-lying (flooded) areas will be low relative to summer mortality. The converse of this would be more consistent with a natural phenomenon than damming causing the absence of elderberry in young, low-lying, habitats. General linear models (formally contingency tables) will investigate proportion surviving and numbers recruiting (separate analyses) as a function of relative elevation class. A second factor in these analyses will be whether sites are natural or restored. Reduced mortality in restored sites due to natural sites would be consistent both with effects of damming and that restoration practices are appropriate.

Analysis will also compare seedling survival as a function of flood recurrence interval and soil nitrogen availability. Seedling growth and mortality have been shown to be sensitive to nitrogen availability and saturated soil conditions (Chirman 1994 unpublished report), however the relevance of these experimental results to field conditions is unknown. It is expected from horticultural knowledge that elderberry will die if the soil remains saturated for several days, or the entire plant is inundated (Chirman 1994 unpublished report). We will analyze surviving proportion of elderberry in relation to flood recurrence interval and soil nitrogen using multiple linear regression. These findings would have direct implications for the selection of restoration sites, and irrigation and fertilization practices.

2. Application

The census results (Task 1) will document the success of the restoration for increasing the local populations of VELB. The more refined data collection and analyses of the plantings as well as the nearby natural stands of elderberry (Task 2) will, for the first time, allow us to begin to understand VELB's population growth and spread through restoration plantings. The population parameters that will be quantified in this study are essential first steps to our understanding of the dynamics of VELB populations in natural and restored habitats. An understanding of the population biology of VELB will be necessary in order to de-list VELB from its legally "threatened" status and represent some very early steps towards aiding the species recovery and assessing the likelihood of persistence of VELB populations. Tasks 3, 4 and 5 will address the biology of the elderberry shrub as it relates to ecosystem processes that determine elderberry's growth form, density, associated species and VELB occurrence. These data will inform decisions about VELB conservation. For example, the efficacy of horticultural restoration as a recovery tool for VELB can be evaluated in the context of local ecosystem conditions based upon the results of this study.

Results from this study will be presented to the Sacramento River Conservation Area Forum (SRCAF) and the Sacramento US Fish & Wildlife Service Environmental Services Office—Species Recovery Program. The findings will be reported to the local newspapers and environmental organizations. Scientific findings will be published in peer-reviewed scientific journals and presented at national meetings of the Society for Conservation Biology and the Ecological Society of America. Publicly accessible reports and articles will also be made available through the River Partners web site (www.riverpartners.org).

F. Feasibility

The proposed tasks demonstrate the work is feasible within the proposed project duration. River Partners have extensive experience of surveying elderberry and VELB populations (see River Partners 2004 in references for a World Wide Web reference). The track record of the principle investigators in presenting talks and publishing popular articles (e.g., see the River Partner's website) speaks for itself

about their ability to convey the results to a broad audience. Dr. Holyoak's lab has extensive experience of working with the VELB and elderberry, including mapping of over 22 km of the American River Parkway during the last 3 years and conducting several manipulative experiments on VELB and elderberry. Dr. Holyoak's PhD is in the application of biostatistics to temporal population data and he has extensive experience of working with spatial population data in both single species and predator-prey systems (e.g., Holyoak 2000, Collinge et al. 2001, Donahue and Holyoak 2003). His experience with population models makes him well qualified to conduct the present work (e.g., Holyoak et al. 2000, Amarasekare et al. 2004). His collaboration with Dr. Steven Greco at U.C.-Davis will give him access to GIS data and members of Holyoak's own lab (Theresa S. Talley) are currently working with GIS data.

The work proposed is cost-effective and able to be conducted independent of weather conditions. Prior to any field monitoring, River Partners and Holyoak's lab will secure a Special Use Permit to access all USFWS SRNWR units.

G. Expected Outcomes and Products

We anticipate the following products from this planning project:

- Three annual VELB surveys of approximately 68,000 elderberry plants completed by June 30, 2008.
- Spatial analysis of VELB exit holes within each restoration unit and in naturally occurring riparian vegetation.
- Presentation of findings to Sacramento Fish and Wildlife Environmental Services Office- Species Recovery Program and the Sacramento River Conservation Area Forum (SRCAF).
- A paper on the success of restoration will be written for a journal like *Restoration Ecology* (Task 1).
- A scientific paper will be written reporting the success of restoration, with the spread and growth of VELB populations and how this was influenced by proximity to natural sites in April-Aug 2008 (the final project year). It will be submitted to *Conservation Biology* (Task 2).
- A paper about the ecology of elderberry growth and use by VELB prepared for publication during September to December 2007 (year 3). The paper will be submitted to *Environmental Management* or a similar journal (Task 3 and 4).
- A paper reporting the effects of habitat type and damming on elderberry recruitment will be prepared for a journal like *Landscape Ecology* or *Environmental Management* during May-August 2008 (Task 5).
- All reports and articles will be made available through the River Partners web site (www.riverpartners.org).
- Recommendations for additional VELB research on Refuge restoration sites.
- Quarterly, annual, and a final progress reports.

H. Data Handling and Storage

Data collection for field tasks will be collected on already existing forms developed by River Partners and UC Davis. Any data and information collected for this project will be summarized in the final report. The final report will be made available online at the River Partners website. All reports will be archived at the Sacramento River National Wildlife Refuge Complex, River Partners, and at Sacramento Fish and Wildlife Office.

I. Public Involvement and Outreach

Findings from this investigation will be shared with the Sacramento River Conservation Area Forum as well as Species Recovery Program of the Sacramento Fish and Wildlife Service. Several scientific reports will be submitted to various conservation journals to communicate our findings on VELB population dynamics, dispersal, ecology of elderberry growth and the effects of damming on elderberry recruitment. In addition, we will write articles in local newspapers to inform the public on the success of restoration and its impact on the federally threatened VELB.

J. Work Schedule

Table 4 identifies all tasks and deliverables that will be accomplished during the project period.

Table 4. Schedule of Tasks and Deliverables for the Proposed VELB Colonization Study on the Middle Sacramento River.

Year 1 (September 2005-August2006)												
Tasks/Deliverables	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JULY**	**AUG**
Task 1: Estimate VELB populations at selected USFWS Sacramento River National Wildlife Refuge units.												
1.1 Conduct annual census of all elderberry shrubs and aging of VELB exit holes									■	■	■	■
1.2 Survey of existing elderberry shrubs in naturally occurring stands adjacent to study sites									■	■	■	■
Task 3: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.												
3.1 Collect detailed measurements of elderberry growth										■	■	■
3.2 Collection of site characteristics (within-site and spatial attributes)										■	■	■
Task 5: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry												
5.1 Monitor elderberry seedling recruitment	■	■					■	■				
Year 2 (September 2006- August 2007)												
Tasks/Deliverables	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JULY**	**AUG**
Task 1: Estimate VELB populations at selected USFWS Sacramento River National Wildlife Refuge units.												
1.1 Conduct annual census of all elderberry shrubs and aging of VELB exit holes									■	■	■	■
1.2 Survey of existing elderberry shrubs in naturally occurring stands adjacent to study sites									■	■	■	■
1.3 Map spatial distribution of shrubs with exit holes.	■	■	■	■								
1.4 Calculate key attributes from census data.	■	■	■	■								
Task 2: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations.												

Year 2 continued (September 2006- August 2007)												
Tasks/Deliverables	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JULY**	**AUG**
2.1 Map distribution and abundance of VELB in naturally occurring elderberry stands adjacent to study site.												
2.2 Population analyses and modeling												
Task 3: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.												
3.2 Collection of site characteristics (within-site and spatial attributes)												
Task 5: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry												
5.1 Monitor elderberry seedling recruitment												
Year 3 (September 2007-August 2008)												
Tasks/Deliverables	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JULY**	**AUG**
Task 1: Estimate VELB populations at selected USFWS Sacramento River National Wildlife Refuge units.												
1.1 Conduct annual census of all elderberry shrubs and aging of VELB exit holes												
1.2 Survey of existing elderberry shrubs in naturally occurring stands adjacent to study sites												
1.3 Map spatial distribution of shrubs with exit holes.												
1.4 Calculate key attributes from census data.												
1.5 Write paper on success of restoration												
Task 2: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations.												
2.1 Map distribution and abundance of VELB in naturally occurring elderberry stands adjacent to study site.												
2.2 Perform population analyses and modeling												
2.3 Report success of restoration with the spread and growth of VELB populations and how this was influenced by proximity to natural sites.												

Year 3 continued(September 2007-August 2008)												
Tasks/Deliverables	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JULY**	**AUG**
Task 3: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.												
3.1 Detailed measurements of elderberry growth												
3.2 Collection of site characteristics (within-site and spatial attributes)												
3.3 Write paper on ecology of elderberry growth and use by VELB												
Task 4: To determine the influence of associated vegetation on elderberry growth the VELB colonization.												
4.1 Analyze elderberry growth and VELB presence and abundance in relation to habitat type data.												
4.2 Analyze influence of surrounding vegetation and VELB presence and abundance.												
Task 5: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry												
5.1 Monitor elderberry seedling recruitment												
5.2 Prepare publication on seedling recruitment												

II. Applicability to CALFED Bay-Delta Program ERP Goals, the ERP Draft Stage 1 Implementation Plan, and CVPIA Priorities

A. ERP and CVPIA Priorities

This project addresses CALFED and CVPIA's goals. CALFED has established a goal to recover this species within CALFED Ecosystem Restoration Program Ecological Management Zones. "The vision for the valley elderberry longhorn beetle is to recover this federally listed threatened species by increasing their populations and abundance through habitat restoration in order to contribute to the overall species richness and diversity and improve water management for beneficial uses of the Bay-Delta System" (CALFED, 2000).

This investigation will measure whether riparian restoration has been successful at

- linking isolated areas supporting existing VELB populations, and
- increasing population and abundance of VELB.

This study entails a comprehensive study to locate and assess VELB populations of restored riparian habitats within the middle Sacramento River. Since the short-term objective of contributing to the recovery of VELB by restoring habitat has been accomplished, it is now time to monitor the long-term objective of whether restored habitat is suitable for VELB populations.

Under the Multispecies Conservation Strategy, VELB is listed as an "R" species, a species designated for recovery. Recovery is equivalent to the requirements of delisting a species under FESA and CESA. However, the VELB recovery plan currently has no specific determination of how to qualify this species as "recovered". This study will uncover more species-specific information that may lead to understanding what is needed to delist this species.

K. Relationship to Other Ecosystem Restoration Actions, Monitoring Programs, or System-wide Ecosystem Benefits

From this study, we will gain essential information to understand VELB population dynamics, VELB dispersal capability, ecology of elderberry growth and recruitment. Future riparian restoration projects will benefit in the form of developing and implementing improved planting designs that targets and aids VELB colonization. Furthermore, understanding factors influencing elderberry growth and recruitment will lead to better selection of riparian restoration and mitigation sites.

L. Request for Next-Phase Funding

No previous stages of this project have been funded by CALFED.

M. Previous Recipients of CALFED Program or CVPIA funding

The previous CALFED Program and CVPIA funding received are summarized in Table 5.

Table 5. Previous Funding Received from CALFED Program or CVPIA

a) USFWS and The Nature Conservancy

Project Title and CALFED or CVPIA Project Number	Current Status	Progress and Accomplishments of the Project to Date
Ecosystem and Natural Process Restoration on the Sacramento River: Floodplain Acquisition and Management CALFED 97-NO2 ERP	Extension Requested	Two additional properties (Capay and Dead Man's Reach) are in the process of initiating restoration.
Ecosystem and Natural Process Restoration on the Sacramento River: Active Restoration of Riparian Forest CALFED 97-NO3 ERP	Maintenance and monitoring completed in fall 2001.	Completed Site Preparation and planting of 264 acres.
Ecosystem and Natural Process Restoration on the Sacramento River: A Meander Belt Implementation Project CALFED 97-NO4 ERP	Grant completed.	Purchased 94+ acre Flynn property and adjacent levee in December 1998. Levee removed. Site now supports one of the largest bank swallow colonies recorded on the Sacramento River.
Hartley Island Acquisition CVPIA 1448-11332-7-G017 AFRP	Grant completed.	Purchased two parcels on Hartley Island (321-acre Sandgren & 76 acre Southern parcel).
Pine Creek Revegetation CVPIA 1160-97-J243 ERP	Maintenance completed fall 2001	Completed planning, preparation and planting of 238 acres of riparian habitat.

b) USFWS and Sacramento River Partners

Project Title and CALFED or CVPIA Project Number	Current Status	Progress and Accomplishments of the Project to Date
Sacramento River Active Riparian Habitat Restoration CVPIA 114200J088	Grant completed.	Completed restoration of 206 acres of savanna habitat.
La Barranca Feasibility Report CVPIA 1162000J331	Completed	Hosted six meetings with neighbors and interested parties. Conducted report on topographic map of the site and conceptual grading alternatives.

III. Qualifications

A. Biographical sketches of principal participants

1. Key River Partners Staff

Tom Griggs – Senior Restoration Ecologist. Dr. Griggs has 22 years of experience in riparian restoration. He developed the original riparian restoration efforts on the Sacramento River and has been published extensively in professional journals on riparian restoration. He obtained a B.S. in Biology from California Polytechnic University, Pomona, a M.S. in Botany from C.S.U. Chico and a Ph.D. in ecology from U.C. Davis.

Helen Swagerty - Restoration Biologist. Ms. Swagerty received a B.S. in Environmental Science from Oregon State University. With River Partners, she has conducted and organized monitoring surveys for valley elderberry longhorn beetle, plant survivorship and vigor, and native grass establishment and completes monitoring reports.

2. Identified subcontractors

Marcel Holyoak will lead the population dynamic analyses for this project. He has a B.Sc. in biology (1989) and a Ph.D. in ecology from the University of London (Imperial College, 1992). He was a postdoctoral fellow at the Centre for Population Biology (Silwood Park, U.K., 1992-1993), the University of Kentucky (1993-1994), and a research ecologist at the University of California, Davis (1994-2000). For the last 4.5 years he has been an Assistant and then Associate Professor in Environmental Science and Policy at the University of California at Davis. Holyoak's research addresses the influence of spatial habitat factors on populations and communities. He has a broad training, having conducted a PhD on time series analysis of long-term insect population dynamics, he moved onto work with spatial (meta)population models in both large scale field systems and using microorganisms as a model study system in the laboratory. Major current projects address the insect population viability and the effects of habitat fragmentation on community structure. He has worked closely with a variety of public agencies, companies and USFWS to investigate conservation problems for the VELB. He is a subject editor for two leading ecological journals, *Ecology* and *Ecology Letters*. Holyoak's research group currently consists of seven PhD students, several undergraduate assistants and a postdoctoral researcher.

IV. Cost

A. Budget

The total cost of this project is approximately $638,851 for the five main tasks and project management. The overhead rate for River Partners is 21%. Please see the budget forms for details.

1. Cost Sharing

No other funding commitments are proposed for this project.

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Letter of Non-profit Status

Internal Revenue Service

Date: October 6, 2003

Department of the Treasury
P. O. Box 2508
Cincinnati, OH 45201

Person to Contact:
Kaye Keyes 31-07416
Customer Service Specialist
Toll Free Telephone Number:
8:00 a.m. to 6:30 p.m. EST
877-829-5500
Fax Number:
513-263-3756
Federal Identification Number:
94-3302335

River Partners
% John Carlon
539 Flume Street
Chico, CA 95928

Dear Sir or Madam:

This is in response to your request of October 6, 2003, regarding your organization's tax-exempt status.

In December 1998 we issued a determination letter that recognized your organization as exempt from federal income tax. Our records indicate that your organization is currently exempt under section 501(c)(3) of the Internal Revenue Code.

Based on information subsequently submitted, we classified your organization as one that is not a private foundation within the meaning of section 509(a) of the Code because it is an organization described in sections 509(a)(1) and 170(b)(1)(A)(vi).

This classification was based on the assumption that your organization's operations would continue as stated in the application. If your organization's sources of support, or its character, method of operations, or purposes have changed, please let us know so we can consider the effect of the change on the exempt status and foundation status of your organization.

Your organization is required to file Form 990, Return of Organization Exempt from Income Tax, only if its gross receipts each year are normally more than $25,000. If a return is required, it must be filed by the 15th day of the fifth month after the end of the organization's annual accounting period. The law imposes a penalty of $20 a day, up to a maximum of $10,000, when a return is filed late, unless there is reasonable cause for the delay.

All exempt organizations (unless specifically excluded) are liable for taxes under the Federal Insurance Contributions Act (social security taxes) on remuneration of $100 or more paid to each employee during a calendar year. Your organization is not liable for the tax imposed under the Federal Unemployment Tax Act (FUTA).

Organizations that are not private foundations are not subject to the excise taxes under Chapter 42 of the Code. However, these organizations are not automatically exempt from other federal excise taxes.

Donors may deduct contributions to your organization as provided in section 170 of the Code. Bequests, legacies, devises, transfers, or gifts to your organization or for its use are deductible for federal estate and gift tax purposes if they meet the applicable provisions of sections 2055, 2106, and 2522 of the Code.

River Partners
94-3302335

Your organization is not required to file federal income tax returns unless it is subject to the tax on unrelated business income under section 511 of the Code. If your organization is subject to this tax, it must file an income tax return on the Form 990-T, Exempt Organization Business Income Tax Return. In this letter, we are not determining whether any of your organization's present or proposed activities are unrelated trade or business as defined in section 513 of the Code.

Section 6104 of the Internal Revenue Code requires you to make your organization's annual return available for public inspection without charge for three years after the due date of the return. The law also requires organizations that received recognition of exemption on July 15, 1987, or later, to make available for public inspection a copy of the exemption application, any supporting documents and the exemption letter to any individual who requests such documents in person or in writing. Organizations that received recognition of exemption before July 15, 1987, and had a copy of their exemption application on July 15, 1987, are also required to make available for public inspection a copy of the exemption application, any supporting documents and the exemption letter to any individual who requests such documents in person or in writing.
For additional information on disclosure requirements, please refer to Internal Revenue Bulletin 1999 - 17.

Because this letter could help resolve any questions about your organization's exempt status and foundation status, you should keep it with the organization's permanent records.

If you have any questions, please call us at the telephone number shown in the heading of this letter.

This letter affirms your organization's exempt status.

Sincerely,

John E. Ricketts

John E. Ricketts, Director, TE/GE
Customer Account Services

Tasks And Deliverables

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Task ID	Task Name	Start Month	End Month	Deliverables
1	Project Management	1	36	Semiannual and final reports. Periodic invoices Quarterly reports Final report
2	Estimate VELB Populations at Selected SRNWR Units	9	36	Annual census of all elderberry shrubs and aging of VELB exit holes. Survey of all existing elderberry shrubs in naturally occuring stands adjacent to study sites. Map of spatial distribution of shrubs in restoration units with exit holes. Calculate key attributes from census data. Write paper on success of restoration.
3	Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations.	12	36	Map distribution and abundance of VELB in naturally ocurring elderberry stands adjacent to study sites. Analysis of population growth and colonization of VELB in natural sites. Calculation of the site age of mean (50% probability) and variance of colonization and distance over which VELB colonize. Calculation of finite population growth rates (number per shrub or site in year 2 divided by numbers in

				year 1) and analyze this in relation to site age, distance from natural sites and elderberry characteristics. Assessment of interannual variability in VELB abundance in natural versus planted sites will provide a further estimate of the value of restored habitats relative to natural habitats. Analysis of effects of total number of VELB on interannual variability in abundance of VELB or proportion of shrubs occupied. Report success of restoration with the spread and growth of VELB populations and how this was influenced by proximity to natural sites.
4	Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites.	10	36	Measurements taken to determine elderberry growth and the details of plant size (numbers of branches of particular sizes. Collection of site characteristics (within−site and spatial attributes). Write paper on ecology of elderberry growth and use by VELB.
5	To determine the influence of associated vegetation on elderberry growth and VELB colonization.	1	36	Monitor elderberry seedling recruitment. Analyze elderberry growth data from Task 3 and VELB presence and abundance from Task 3 in relation to habitat type data from GIS analyses. Collect data on associated

				woody species that are adjacent to elderberry shrubs mapped in Tasks 1 and 2. Investigate the influence of surrounding vegetation on presence/absence within shrubs and abundance. Associated woody species will be recorded for every shrub that is measured in Task 3.
6	**To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry**	**1**	**36**	**Analysis comparing seedling survival as a function of flood recurrence interval and soil nitrogen availability. Analyze surviving proportion of elderberry in relation to flood recurrence interval and soil nitrogen using multiple linear regression. Record the number of seedlings recruiting and proportion dying each year as a function of relative elevation and analyze these using general linear models. Prepare publication on seedling recruitment.**

Comments

If you have comments about budget justification that do not fit elsewhere, enter them here.

Budget Summary

Project Totals

Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
$101,799	$30,455	$9,168	$24,240	$362,313	$0	$0	$0	$527,975	$110,876	$638,851

Do you have cost share partners already identified?
No.

If yes, list partners and amount contributed by each:

Do you have potential cost share partners?
No.

If yes, list partners and amount contributed by each:

Are you specifically seeking non−federal cost share funds through this solicitation?
No.

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Year 1 (Months 1 To 12)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights	Other Direct Costs	Direct Total	Indirect Costs	Total

							Of Way				
1: project management (12 months)	**6926**	**1670**	**0**	**0**	**0**	**0**	**0**	**0**	$8,596	**1805**	$10,401
2: Estimate VELB Populations at Selected SRNWR Units (4 months)	**23576**	**6965**	**2815**	**9570**	**24696**	**0**	**0**	**0**	$67,622	**14201**	$81,823
3: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations. (1 month)	**1976**	**579**	**241**	**0**	**32536**	**0**	**0**	**0**	$35,332	**7420**	$42,752
4: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites. (3 months)	**0**	**0**	**0**	**0**	**30465**	**0**	**0**	**0**	$30,465	**6398**	$36,863
5: To determine the influence of associated vegetation on elderberry growth and VELB colonization. (12 months)	**0**	**0**	**0**	**0**	**8072**	**0**	**0**	**0**	$8,072	**1695**	$9,767
6: To estimate the frequency and survival of	**0**	**0**	**0**	**0**	**24215**	**0**	**0**	**0**	$24,215	**5085**	$29,300

young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry (12 months)											
Totals	**$32,478**	**$9,214**	**$3,056**	**$9,570**	**$119,984**	**$0**	**$0**	**$0**	**$174,302**	**$36,604**	**$210,906**

Year 2 (Months 13 To 24)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	**6739**	**1688**	**0**	**0**	**0**	**0**	**0**	**0**	$8,427	**1770**	$10,197
2: Estimate VELB Populations at Selected SRNWR Units (12 months)	**23486**	**7317**	**2815**	**7160**	**24937**	**0**	**0**	**0**	$65,715	**13800**	$79,515
3: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations. (12 months)	**2046**	**633**	**241**	**0**	**33828**	**0**	**0**	**0**	$36,748	**7717**	$44,465
4: Determine blue elderberry growth, survival and suitability for	**0**	**0**	**0**	**0**	**26490**	**0**	**0**	**0**	$26,490	**5563**	$32,053

VELB based on site characteristics that will be measured and by comparison with natural sites. (12 months)											
5: To determine the influence of associated vegetation on elderberry growth and VELB colonization. (12 months)	**0**	**0**	**0**	**0**	**8413**	**0**	**0**	**0**	$8,413	**1767**	$10,180
6: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether damming has halted recruitment of blue elderberry (12 months)	**0**	**0**	**0**	**0**	**25240**	**0**	**0**	**0**	$25,240	**5300**	$30,540
Totals	**$32,271**	**$9,638**	**$3,056**	**$7,160**	**$118,908**	**$0**	**$0**	**$0**	**$171,033**	**$35,917**	**$206,950**

Year 3 (Months 25 To 36)

Task	Labor	Benefits	Travel	Supplies And Expendables	Services And Consultants	Equipment	Lands And Rights Of Way	Other Direct Costs	Direct Total	Indirect Costs	Total
1: project management (12 months)	**10592**	**2912**	**0**	**200**	**0**	**0**	**0**	**0**	$13,704	**2878**	$16,582

2: Estimate VELB Populations at Selected SRNWR Units (12 months)	**24338**	**7999**	**2815**	**7310**	**27137**	**0**	**0**	**0**	$69,599	**14616**	$84,215
3: Determine dispersal capability and population growth of VELB through quantifying the spread of VELB from nearby natural populations. (12 months)	**2120**	**692**	**241**	**0**	**33509**	**0**	**0**	**0**	$36,562	**7678**	$44,240
4: Determine blue elderberry growth, survival and suitability for VELB based on site characteristics that will be measured and by comparison with natural sites. (12 months)	**0**	**0**	**0**	**0**	**27618**	**0**	**0**	**0**	$27,618	**5800**	$33,418
5: To determine the influence of associated vegetation on elderberry growth and VELB colonization. (12 months)	**0**	**0**	**0**	**0**	**8789**	**0**	**0**	**0**	$8,789	**1846**	$10,635
6: To estimate the frequency and survival of young elderberry plants in different natural habitats to assess whether	**0**	**0**	**0**	**0**	**26368**	**0**	**0**	**0**	$26,368	**5537**	$31,905

damming has halted recruitment of blue elderberry (12 months)											
Totals	**$37,050**	**$11,603**	**$3,056**	**$7,510**	**$123,421**	**$0**	**$0**	**$0**	**$182,640**	**$38,355**	**$220,995**

Budget Justification

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Labor

Yr 1 Task 1 Project Manager – 40 hrs @ $46.13/hr Senior Restoration Ecologists – 80 hrs @ $31.69/hr Biologists – 100 hrs @ $16.82/hr Accounting – 36 hrs @ $24.00/hr

Task 2 Biologists – 700 hrs @ $16.82/hr Biology Technicians – 840 hrs @ $14.05/hr

Task 3 Biologists – 64 hrs @ $16.82/hr Biology Technicians – 64 hrs @ $14.05/hr

Yr 2 Task 1 Project Manager – 40 hrs @ $47.79/hr Senior Restoration Ecologists – 80 hrs @ $32.83/hr Biologists – 75 hrs @ $17.42/hr Accounting – 36 hrs @ $24.86/hr

Task 2 Biologists – 680 hrs @ $17.42/hr Biology Technicians – 800 hrs @ $14.55/hr

Task 3 Biologists – 64 hrs @ $17.42/hr Biology Technicians – 64 hrs @ $14.55/hr

Yr 3 Task 1 Project Manager – 40 hrs @ $49.51/hr Senior Restoration Ecologists – 80 hrs @ $34.01/hr Biologists – 275 hrs @ $18.05/hr Accounting – 36 hrs @ $25.75/hr

Task 2 Biologists – 680 hrs @ $18.05/hr Biology Technicians – 800 hrs @ $15.08/hr

Task 3 Biologists – 64 hrs @ $18.05/hr Biology Technicians – 64 hrs @ $15.08/hr

Benefits

Yr 1 Project Manager – 17.22% Senior Restoration Ecologists – 27.53% Biologists – 27.08% Biology Technicians – 32% Accounting – 23%

Yr 2 Project Manager – 17.83% Senior Restoration Ecologists – 29.04% Biologists – 28.36% Biology Technicians – 34% Accounting – 23.94%

Yr 3 Project Manager – 18.51% Senior Restoration Ecologists – 30.69% Biologists – 29.79% Biology Technicians – 36% Accounting – 24.98%

Travel

Task 2, Yrs 1 −3 River Partners Vehicle 5118 miles @ .55/mile
Task 3, Yrs 1−3 River Partners Vehicle 438 miles @ .55/mile

Supplies And Expendables

Yr 1 Task 2 Field Supplies, $2,560 Printing, $50 Toilet Rental, $6,960

Yr 2 Task 2 Field Supplies, $150 Printing, $50 Toilet Rental, $6,960

Yr 3 Task 1 Printing, $200 Task 2 Field Supplies, $150 Printing, $200 Toilet Rental, $6,960

Services And Consultants

River Partners will be collaborating with Dr. Marcel Holyoak of UC Davis. He and his staff will be collecting monitoring data, modeling and analysis of data, and reporting for Tasks 2−6. A total costs for services is $312,039. A specific budget justification for this collaborator is available upon request.

River Partners will employ 6 field laborers from Raphael Hernandez to conduct annual census of elderberry shrubs in the

restoration units (Task 2). Yrs 1,2,3– field laborers 1488 hrs @ $10.50/hr In addition, we will $500 incurred for their travel costs.

CSU Chico Research Foundation will supply our maps for Task 2 and 3 for a total cost of $1900.

Equipment

There are no equipment costs

Lands And Rights Of Way

Not applicable.

Other Direct Costs

Not applicable.

Indirect Costs/Overhead

River Partners average annual overhead rate is 21%. This is the existing rate River Partners receives on current CALFED contracts.

Comments

Environmental Compliance

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

CEQA Compliance

Which type of CEQA documentation do you anticipate?
X none
− negative declaration or mitigated negative declaration
− EIR
− categorical exemption

If you are using a categorical exemption, choose all of the applicable classes below.
− Class 1. Operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of use beyond that existing at the time of the lead agency's determination. The types of "existing facilities" itemized above are not intended to be all−inclusive of the types of projects which might fall within Class 1. The key consideration is whether the project involves negligible or no expansion of an existing use.
− Class 2. Replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced.
− Class 3. Construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure. The numbers of structures described in this section are the maximum allowable on any legal parcel, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 4. Minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
− Class 6. Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies. These may be strictly for information

gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded.
– Class 11. Construction, or placement of minor structures accessory to (appurtenant to) existing commercial, industrial, or institutional facilities, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

Identify the lead agency.

Is the CEQA environmental impact assessment complete?

If the CEQA environmental impact assessment process is complete, provide the following information about the resulting document.

Document Name
State Clearinghouse Number

If the CEQA environmental impact assessment process is not complete, describe the plan for completing draft and/or final CEQA documents.

NEPA Compliance

Which type of NEPA documentation do you anticipate?
X none
– environmental assessment/FONSI
– EIS
– categorical exclusion

Identify the lead agency or agencies.

If the NEPA environmental impact assessment process is complete, provide the name of the resulting document.

If the NEPA environmental impact assessment process is not complete, describe the plan for completing draft and/or final NEPA documents.

Successful applicants must tier their project's permitting from the CALFED Record of Decision and attachments providing programmatic guidance on complying with the state and federal endangered species acts, the Coastal Zone Management Act, and sections 404 and 401 of the Clean Water Act.

Please indicate what permits or other approvals may be required for the activities contained in your proposal and also which have already been obtained. Please check all that apply. If a permit is *not* required, leave both Required? and Obtained? check boxes blank.

Local Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
conditional Use Permit	–	–	
variance	–	–	
Subdivision Map Act	–	–	
grading Permit	–	–	
general Plan Amendment	–	–	
specific Plan Approval	–	–	
rezone	–	–	
Williamson Act Contract Cancellation	–	–	
other	–	–	

State Permits And Approvals	Required?	Obtained?	Permit Number (If Applicable)
scientific Collecting Permit	–	–	
CESA Compliance: 2081	–	–	
CESA Complance: NCCP	–	–	
1602	–	–	
CWA 401 Certification	–	–	
Bay Conservation And Development Commission Permit	–	–	
reclamation Board Approval	–	–	
Delta Protection Commission Notification	–	–	
state Lands Commission Lease Or Permit	–	–	

action Specific Implementation Plan	**–**	**–**	
other	**–**	**–**	

Federal Permits And Approvals	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
ESA Compliance Section 7 Consultation	**–**	**–**	
ESA Compliance Section 10 Permit	**–**	**–**	
Rivers And Harbors Act	**–**	**–**	
CWA 404	**–**	**–**	
other	**–**	**–**	

Permission To Access Property	**Required?**	**Obtained?**	**Permit Number (If Applicable)**
permission To Access City, County Or Other Local Agency Land Agency Name	**–**	**–**	
permission To Access State Land Agency Name	**–**	**–**	
permission To Access Federal Land Agency Name	**–**	**–**	
permission To Access Private Land Landowner Name	**–**	**–**	

If you have comments about any of these questions, enter them here.

Land Use

VELB Colonization of Planted Riparian Restoration Projects along the Middle Sacramento River

Does the project involve land acquisition, either in fee or through easements, to secure sites for monitoring?
X No.
– Yes.

How many acres will be acquired by fee?

How many acres will be acquired by easement?

Describe the entity or organization that will manage the property and provide operations and maintenance services.

Is there an existing plan describing how the land and water will be managed?
– No.
– Yes.

Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal?
– No.
X Yes.

Describe briefly the provisions made to secure this access.

River Partners will apply for a Special Use Permit to conduct monitoring activities on selected US Fish and Wildlife Service Sacramento River National Wildlife Refuge units.

Do the actions in the proposal involve physical changes in the current land use?
X No.
– Yes.

Describe the current zoning, including the zoning designation and the principal permitted uses permitted in the zone.

Describe the general plan land use element designation, including the purpose and uses allowed in the designation.

Describe relevant provisions in other general plan elements affecting the site, if any.

Is the land mapped as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance under the California Department of Conservation's Farmland Mapping and Monitoring Program?
X No.
– Yes.

Land Designation	Acres	Currently In Production?
Prime Farmland		–
Farmland Of Statewide Importance		–
Unique Farmland		–
Farmland Of Local Importance		–

Is the land affected by the project currently in an agricultural preserve established under the Williamson Act?
X No.
– Yes.

Is the land affected by the project currently under a Williamson Act contract?
– No.
– Yes.

Why is the land use proposed consistent with the contract's terms?

Describe any additional comments you have about the projects land use.