Meeting of the Central Valley Flood Protection Board
April 22, 2011

Staff Report – Encroachment Permit

Vino Farms
Landscaping, San Joaquin County

1.0 – ITEM

To consider approval of Permit No. 18609 (Attachment B)

2.0 – APPLICANT

Vino Farms, Lodi, California.

3.0 – LOCATION

The project is located along the right (north) bank of the Mokelumne River Designated Floodway, north of Lockeford, south of Peltier Road (San Joaquin County, Mokelumne River, Figures 1 & 2, Attachment A).

4.0 – DESCRIPTION

The applicant requests authorization of an existing project which removed non-native plants on 20 acres, and then planted 200 Mexican Elderberries and associated riparian plants per acre on this land located within the Mokelumne River Designated Floodway (Figures 3 through 9, Attachment A).

5.0 – PROJECT ANALYSIS

On May 17, 2006 Vino Farms, Inc. contracted with River Partners to prepare a Riparian Enhancement Plan for approximately 22.5 acres of existing riparian vegetation along the lower Mokelumne River Designated Floodway (please see Attachment C). The goal of this project was to improve wildlife habitat and floodway function by decreasing the extent of non-native plant species, and then increasing the species and structural diversity of native Central Valley vegetation. Specifically, the project proposes to decrease the extent and cover of non-native plant species such as Himalayan blackberry, tree of heaven, black walnut, and yellow starthistle; and then plant elderberry shrubs to improve valley elderberry longhorn beetle habitat in this area.

5.1 – Hydraulic Analysis

No hydraulic analysis is required for this project.

5.2 – Geotechnical Analysis

No Geotechnical Analysis is required. Soil type analysis was performed for this area to determine optimum planting zones for native vegetation.

5.3 – Additional Staff Analysis

High rainfall in spring of 2006 coupled with record snow pack in the Sierras resulted in flows that flooded the low elevation areas of the proposed riparian project site. Overall, the low-laying project areas have been flooded approximately 6 to 7 times since 1971, while the rest of the farm is above the FEMA's 100 year flood plain. The vegetation planting plan oriented the bands of vegetation parallel to the general flow direction of the lower Mokelumne River as to not direct flows toward levees or other sensitive structures. To decrease erosion potential along the stream bank, the planting willows, native grasses and herbaceous species was also performed.

Originally River Partners had contracted with Vino Farms to implement and maintain the project, however due to problems they backed out of the agreement. San Joaquin County Resources Conservation District has stepped forward since then to follow through with the scheduled maintenance and monitoring as part of the Vino Farms Riparian Enhancement Plan.

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project, from all pertinent agencies are shown below:

- U.S. Army Corps of Engineers issued a 208.10 review letter dated July 16, 2010 with no comments or recommendations about the project. The letter will be attached to the permit as Exhibit A.

- San Joaquin County Resources Conservation District is acting as the applicant's agent for the owner of the project (Vino Farms).

7.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA determination:

The Department of Fish and Game, as lead agency under CEQA, approved the project (Vino Farms Riparian Habitat Restoration, SCH No. 2007098178) on September 17,

2007 and determined that the project was categorically exempt under Class 4 Categorical Exemption (CEQA Guidelines Section 15304) covering minor alterations to land.

The Board, acting as a responsible agency under CEQA, has reviewed the Department of Fish and Game determination and has independently determined that the project is exempt from CEQA under exempt under Class 4 Categorical Exemption (CEQA Guidelines Section 15304) covering minor alterations to land.

8.0 – SECTION 8610.5 CONSIDERATIONS

1. Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

   The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group.

2. The best available science that related to the scientific issues presented by the executive officer, legal counsel, the Department or other parties that raise credible scientific issues.

   The accepted industry standards for the work proposed under this permit as regulated by Title 23 California Code of Regulations have been applied to the review of this permit.

3. Effects of the decision on the entire State Plan of Flood Control:

   There are no effects on the State Plan of Flood Control as the proposed project does not impact the design channel capacity of the lower Mokelumne River.

4. Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

   Future events, changes in hydrology and climate may increase flows in lower Mokelumne River which in turn would increase the flood risk for the project.

9.0 – STAFF RECOMMENDATION

Staff recommends that the Board determine the project to be exempt from CEQA and approve the permit.

10.0 – LIST OF ATTACHMENTS

A. Vicinity & Location Maps, Photographs and Cross Section.
B. Draft Permit No. 18609
C. Vino Farms Riparian Enhancement Plan

Design/Overall Review:	Sam Brandon, Jon Tice P.E.
Environmental Review:	James Herota
Document Review:	Mitra Emami P.E., Len Marino P.E.

Project Vicinity

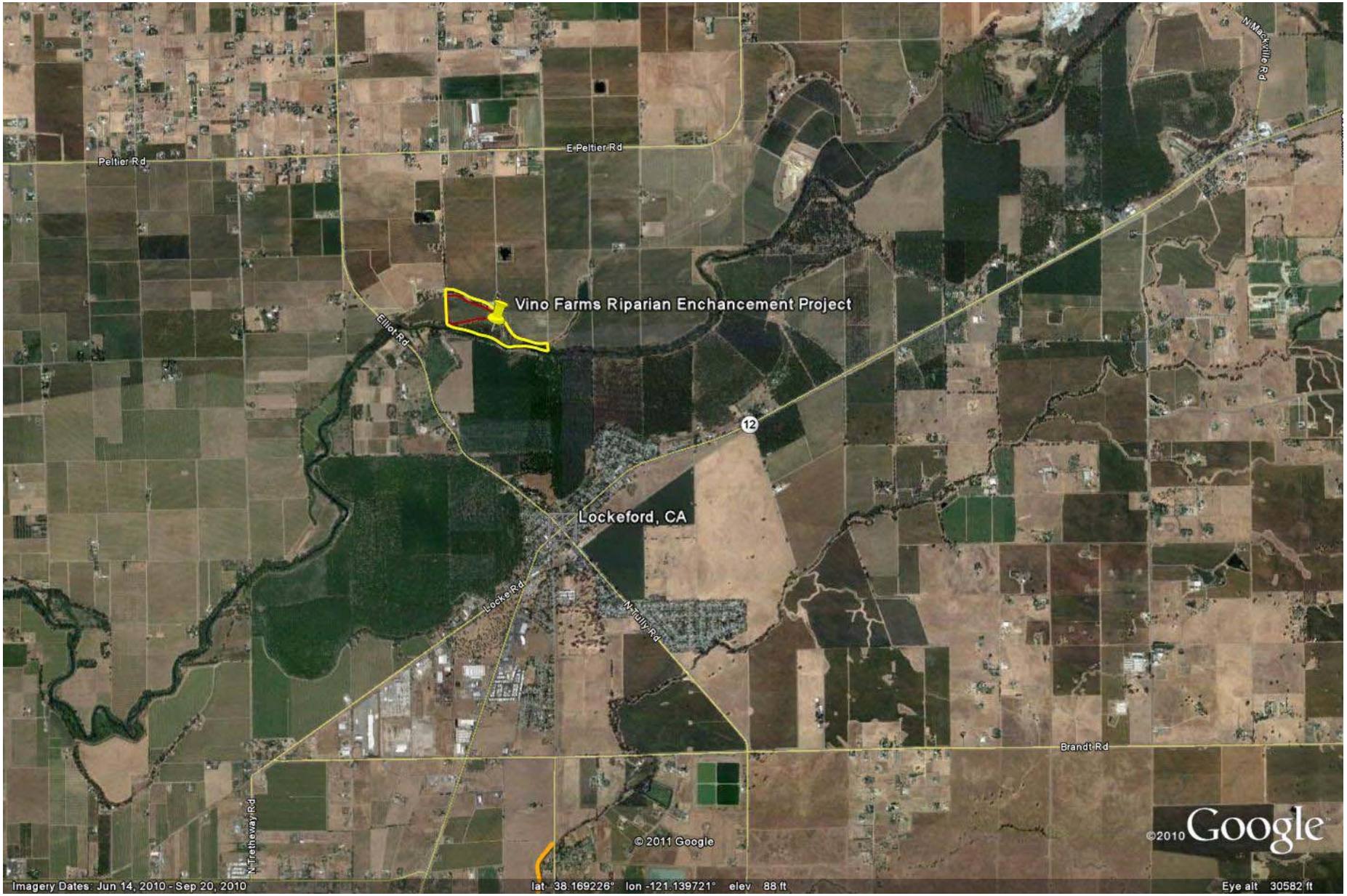


Figure 1, Attachment A

Project Location

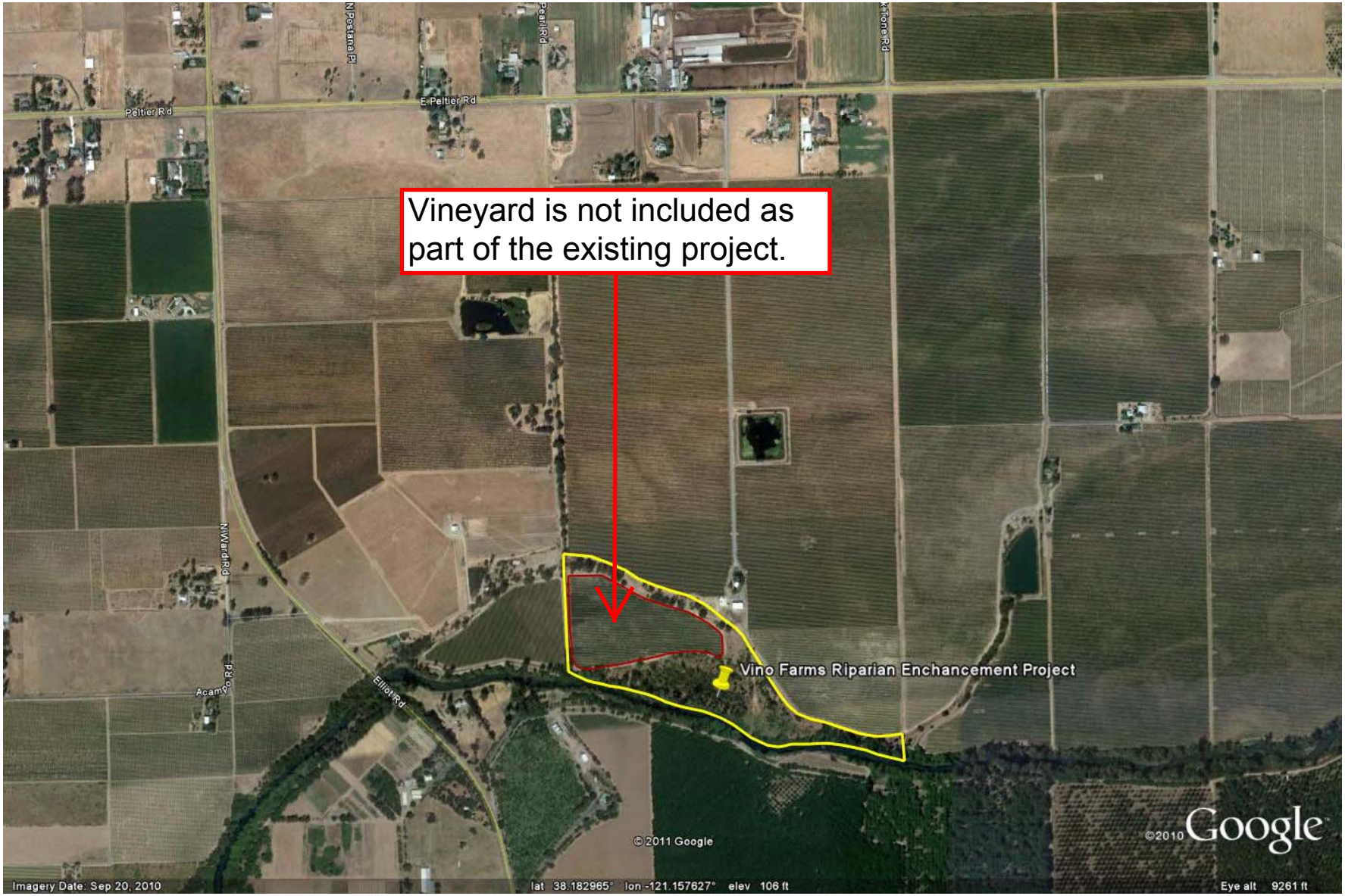
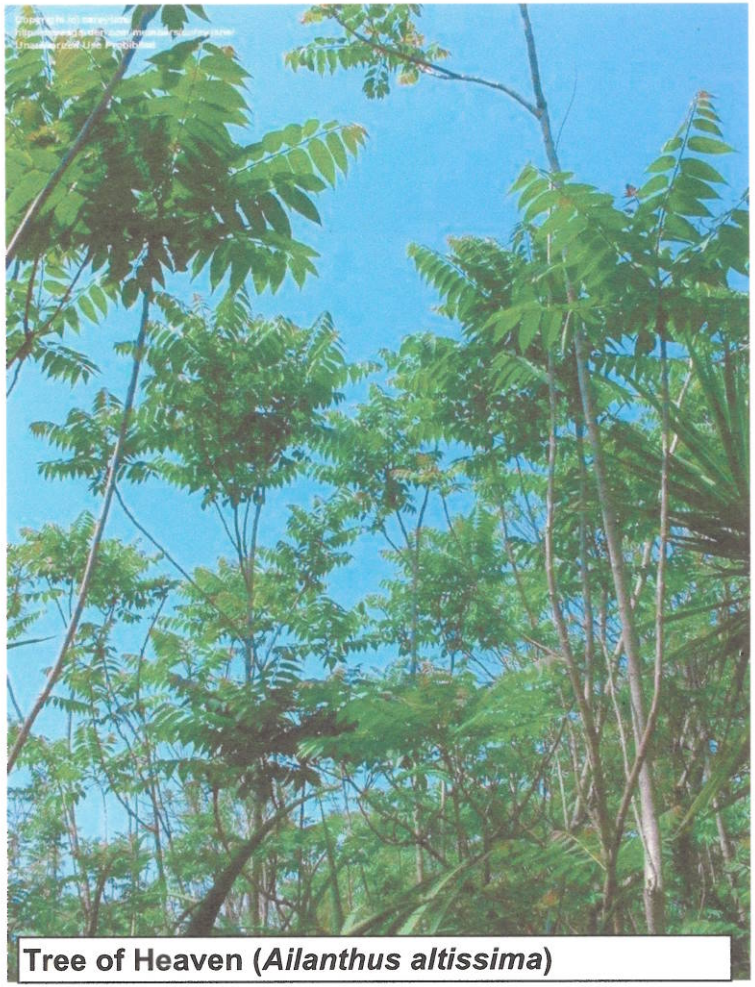


Figure 2, Attachment A

Figures 3 & 4, Attachment A

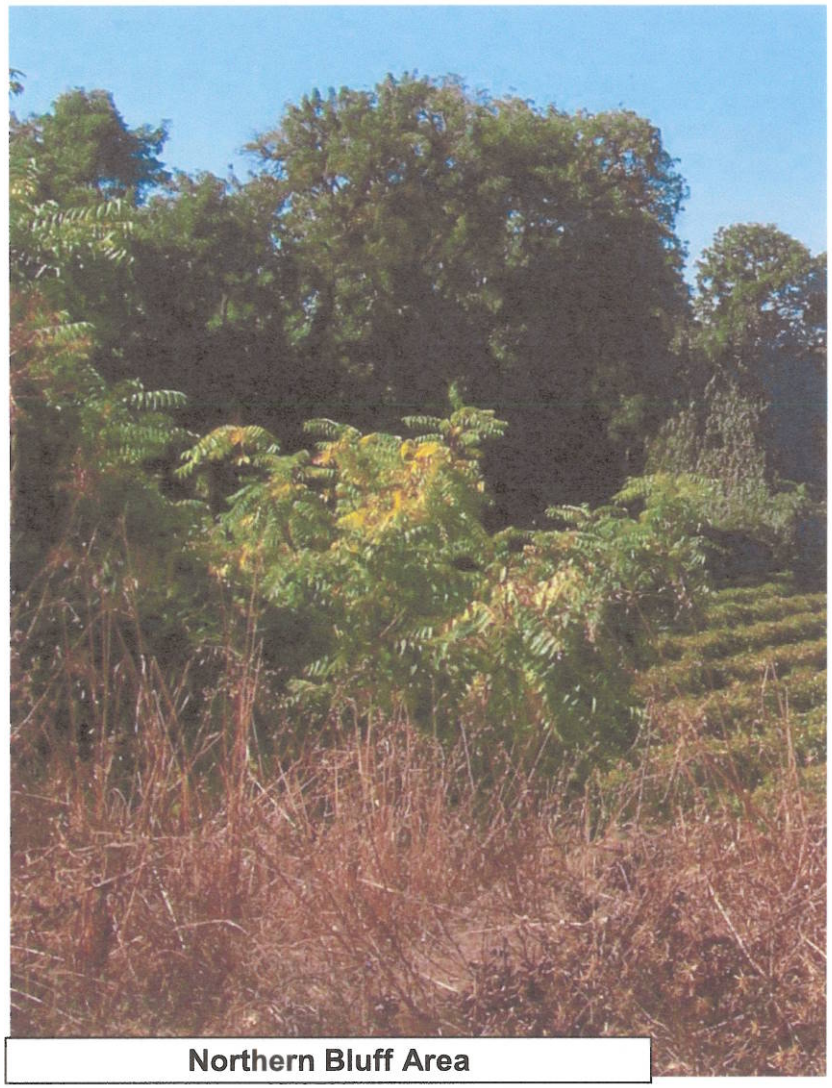
Center/Nonforested Area



Tree of Heaven (*Ailanthus altissima*)

Figures 5 & 6, Attachment A

Mature Walnut/Himalayan Blackberry Area

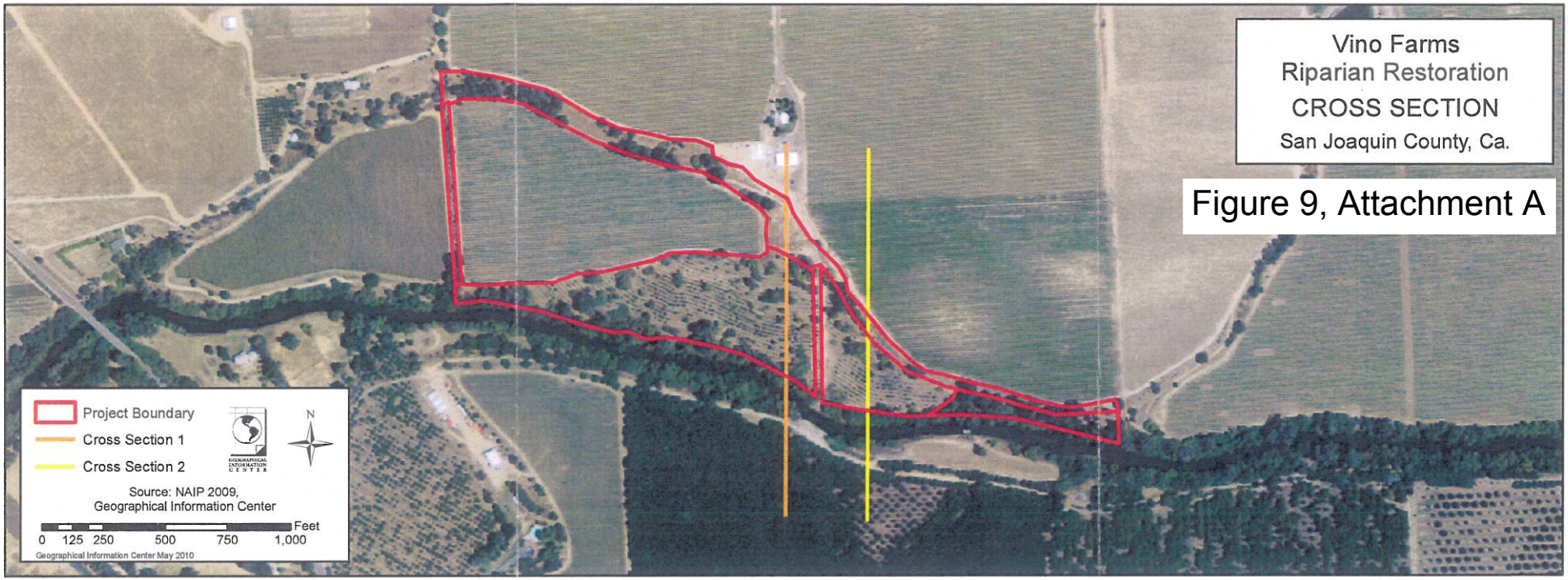


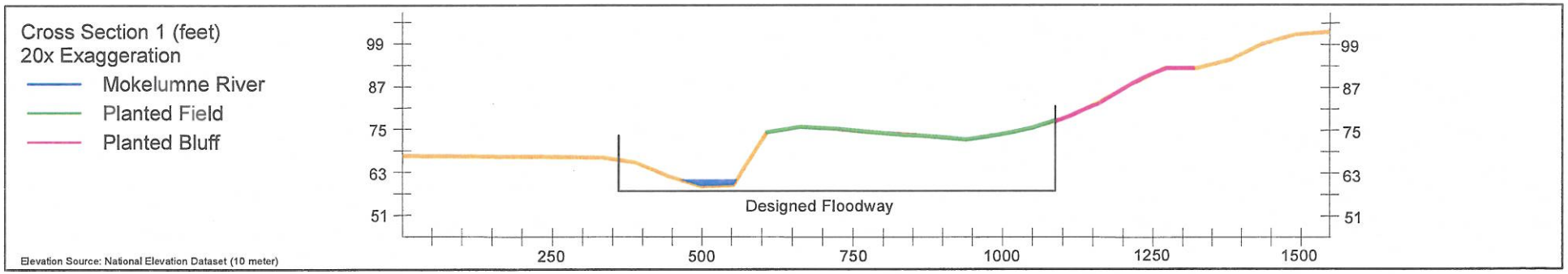
Northern Bluff Area

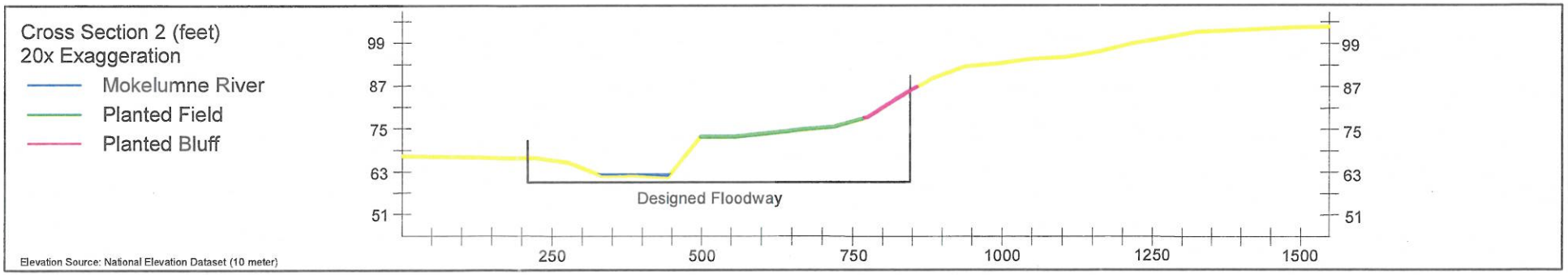
Figures 7 & 8, Attachment A

Vino Farms
Riparian Restoration
CROSS SECTION
San Joaquin County, Ca.

Figure 9, Attachment A







DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18609 BD

This Permit is issued to:

Vino Farms
1377 E. Lodi Avenue
Lodi, California 95240

To authorize an existing project which removed non-native plants on 20 acres, and then planted 200 Mexican Elderberries and associated riparian plants per acre on this land located within the Mokelumne River Designated Floodway. The project is located north of Lockeford, south of Peltier Road (Section 24, T4N, R7E, MDB&M, Mokelumne River, San Joaquin County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15

days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18609 BD

THIRTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FOURTEEN: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

FIFTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion

SIXTEEN: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources, or any other agency responsible for maintenance.

SEVENTEEN: The State of California shall not be held liable for any damages which might be caused to the project by operation of the flood control project or from releases of water from storage reservoirs.

EIGHTEEN: The Central Valley Flood Protection Board and Department of Water Resources shall not be held liable for any damages to the permitted encroachment(s) within the Mokelumne River Designated Floodway resulting from flood fight, operation, maintenance, inspection, or emergency

repair.

NINETEEN: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

TWENTY: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

TWENTY-ONE: All cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-TWO: Tree rows shall not be planted within 15 feet of a protected streambank or within 30 feet of an unprotected streambank.

TWENTY-THREE: Levees or like obstructions shall not be constructed along the riverbank or within the overflow area.

TWENTY-FOUR: After each period of high water, debris that accumulates in the project area shall be completely removed from the floodway.

TWENTY-FIVE: In the event the riparian vegetation area is abandoned, all trees shall be removed from the floodway by the permittee at permittee's expense.

TWENTY-SIX: Landscaping, appurtenances, and maintenance practices shall conform to standards contained in Section 131 of the Central Valley Flood Protection Board's Regulations, unless a variance thereto is specifically granted by the Central Valley Flood Protection Board.

TWENTY-SEVEN: Any vegetation which interferes with the successful execution, functioning, maintenance, or operation of the adopted plan of flood control must be removed by the owner at owner's expense upon request by the Central Valley Flood Protection Board, Department of Water Resources, or local maintaining agency. If the owner does not remove such vegetation upon request, the Central Valley Flood Protection Board reserves the right to remove the vegetation at the owner's expense.

TWENTY-EIGHT: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

TWENTY-NINE: A letter from the Department of the Army dated July 16, 2010, is attached to this

permit as Exhibit A and is incorporated by reference.

Exhibit A

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Flood Protection and Navigation Section (18609)

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

JUL 16 2010

Dear Mr. Punia:

We have reviewed a permit application by Vino Farms (application number 18609). This project includes authorizing the removal of non-native plants and planting 200 Mexican Elderberries and associated riparian plants per acre on 20 acres within the Designated Floodway of the right (north) bank of the Mokelumne River. The proposed project is located north of Lockford, south of Peltier Road, at 38.1778°N 121.1563°W NAD83, San Joaquin County, California.

The District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

Based upon the information provided, no Section 10 or Section 404 permit is needed.

A copy of this letter is being furnished to the acting chief, Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821.

Sincerely,

Meegan G. Nagy, P.E.
Chief, Flood Protection and Navigation Section

Vino Farms Riparian Enhancement Plan

Mokelumne River Mile 54
San Joaquin County, California

June 2007

Prepared for

Vino Farms, Inc.

RIVER PARTNERS

806 14th Street
Modesto, CA 95354
info@riverpartners.org

Phone: (209) 521-1700
Fax: (209) 521-7327
www.riverpartners.org

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Suggested citation:
River Partners. 2007. Vino Farms Riparian Enhancement Plan. San Joaquin County, California. Modesto, California.

ACKNOWLEGEMENTS

The following individuals contributed to this unit plan:

Name	Affiliation
John Ledbetter	Vino Farms, Inc.
Marissa Ledbetter	Vino Farms, Inc.
Kent Reeves	East Bay Municipal Utility District
Brook Edwards	Robertson-Bryan, Inc.
Tom Griggs	River Partners
Stacy Small	River Partners
Tamara Sperber	River Partners
Lauren Singleton	River Partners
Sara Taylor	River Partners

Vino Farms Riparian Enhancement Plan

EXECUTIVE SUMMARY

River Partners proposes three habitat restoration alternatives for 22.5 acres of the Vino Farms, Inc. property along the Mokelumne River in Acampo, California. These alternatives seek to benefit wildlife by removing invasive non-native plant species and replacing with native trees, shrubs and herbaceous species. In this plan, River Partners presents details of these three alternate plans with budgets and potential funding sources.

Alternative 1 provides the least habitat structure as it does not call for the removal of black walnut stands. Alternative 2 calls for herbicide treatment of a stand of young black walnuts, but leaves the mature stand untouched. The first two approaches will reduce short-term costs, but will increase long term maintenance costs as the remaining walnut trees will continue to produce seed, and saplings will need to be removed annually. Alternative 3 will result in herbicide treatment of all walnut trees and has the most potential to provide habitat for a diverse group of wildlife species.

Vino Farm, Inc. as well as several other conservation-minded farmers and corporations in the lower Mokelumne River watershed are setting the pace for private lands conservation in the San Joaquin Valley through their commitment to watershed protection and habitat preservation. As a member of the Lodi-Woodbridge Winegrape Commission, Vino Farms, Inc. has made a pledge to use sustainable vineyard management practices.

Members of the Winegrape Commission are also part of the Lower Mokelumne River Watershed Stewardship Plan. The mission of the plan is to connect biological resource management programs to maintain and improve the quality and quantity of biological resources in the watershed, increasing educational opportunities through the study of biological resources, supporting existing biological resources and education programs, and encouraging conservation of biological resources and habitats.

The Vino Farms, Inc. restoration plan meets the goals set forth by the Lower Mokelumne River Watershed Stewardship Plan and creates a general template for use on other farms in the watershed. This is a unique opportunity to create and enhance wildlife habitat in a large area by working on small parcels of individual farms.

I. INTRODUCTION

A. Project Overview

On May 17, 2006 Vino Farms, Inc. contracted with River Partners to prepare a Riparian Enhancement Plan for approximately 22.5 acres of existing riparian vegetation along the lower Mokelumne River. On the Vino Farms, Inc. site, part of the riparian area contains almost exclusively native riparian species, while non-native species dominate most of the remaining area, providing very poor habitat for riparian dependent wildlife species. The goal of this project is to improve wildlife habitat by decreasing the extent of non–native plant species and increasing the species and structural diversity of native vegetation.

This Riparian Enhancement Plan will describe current site conditions, enhancement alternatives for the project area, enhancement designs, and estimated project timeline and costs. Potential funding sources for enhancement activities on private lands will also be included.

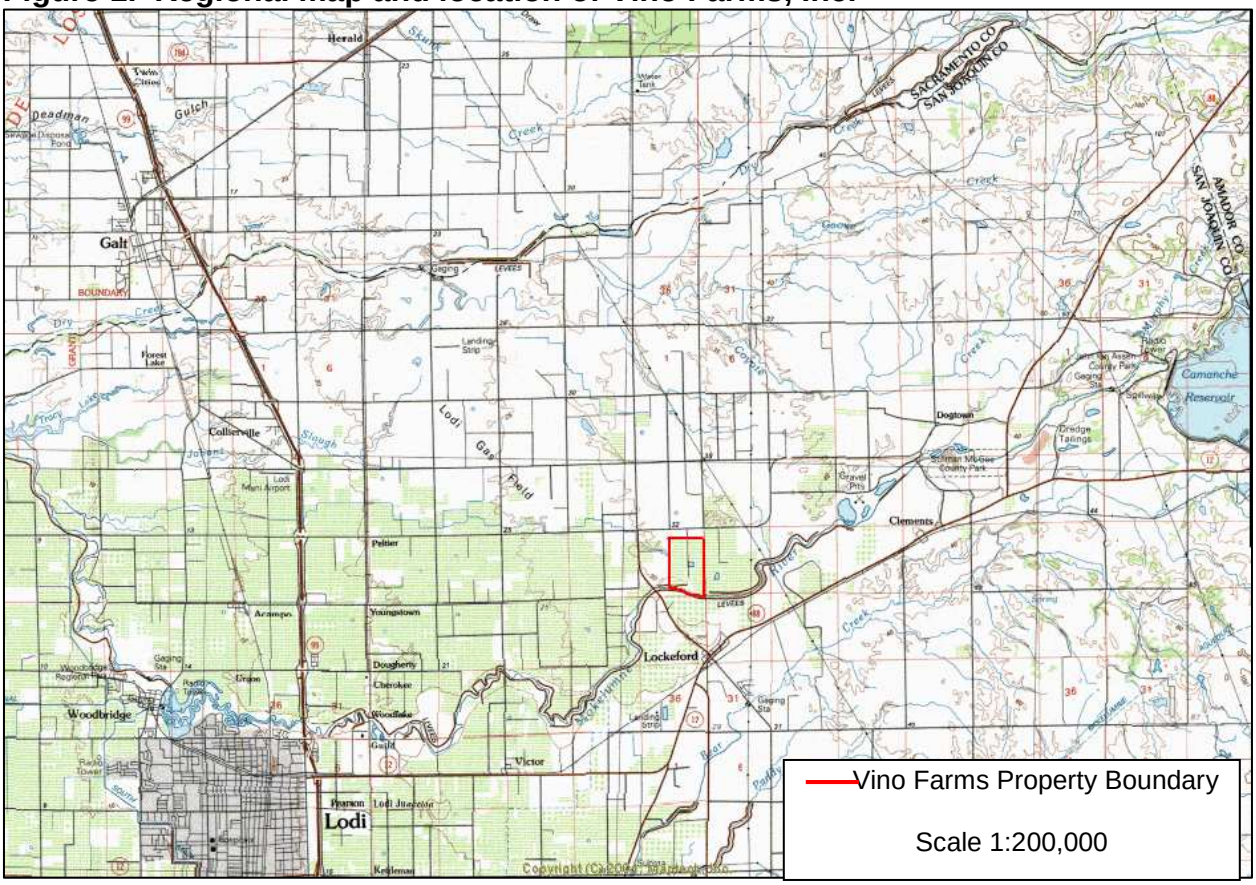
B. Project Area and Location

Vino Farms, Inc., located on the north side of the lower Mokelumne River off of East Peltier Road, is one of five vineyards in San Joaquin County owned by John Ledbetter and his family. The farm is situated in the predominantly agricultural community of Acampo, approximately 9 river miles downstream from the Camanche Dam (Figure 1). Wine grapes, one of the dominant crops in this area, border the northern perimeter of the enhancement site.

Of the 254-acre Vino Farms, Inc., approximately 221 acres are vineyard and 22.5 acres support remnant riparian forest that is proposed for enhancement (Figure 2). Approximately 3.5 acres of the enhancement area lies along a northern bluff between vineyards, the remaining 19 acres are located adjacent to the river (Figure 3).

This proposed riparian enhancement site is also directly adjacent to the 24 acre-El Rio Farms property. Like Vino Farms, El Rio Farms is primarily vineyard, and its southern boundary also borders the Mokelumne River. As of now, the farm maintains a small strip of remnant riparian habitat that buffers the vineyard from the river. With support from a conservation easement funded by the San Joaquin County Council of Governments, 7 acres of El Rio Farms' vineyard will be replaced with native riparian habitat along a 1.2 mile stretch of river (Kent Reeves, personal communication).

Figure 1. Regional map and location of Vino Farms, Inc.



C. Cooperative Relationships and Funding Sources

As part of a unique partnership of local wine growers in the San Joaquin Valley, Vino Farms, Inc. is a member of the Lodi-Woodbridge Winegrape Commission and one of six farms certified as sustainable under the Lodi Rules Program (LWWC 2005). Within this commission growers are encouraged to follow ecological standards to preserve and enhance native habitat and use sustainable viticulture practices, including reducing pre-emergent herbicide use and installing owl boxes and raptor perches, among other practices (Ohmart and Matthiasson 1999, Dlott et al., 2002, LWWC 2005).

The commission is also part of the Lower Mokelumne River Watershed Stewardship Plan, funded through the San Joaquin County Resource Conservation District by CalFed. This plan brings together multiple biological, educational, agricultural, and recreational groups to preserve the integrity of the lower Mokelumne River watershed. The mission of the plan is to connect biological resource management programs to maintain and improve the quality and quantity of biological resources in the watershed, increasing educational opportunities through the study of biological resources, supporting existing biological resources and education programs, and encouraging conservation of biological resources and habitats. The Vino Farms, Inc., Riparian

Enhancement Plan is in alignment with the goals set forth in the Lower Mokelumne River Watershed Stewardship Plan.

River Partners is working closely with the East Bay Municipal Utilities District (EBMUD) Division of Fisheries and Wildlife, Mokelumne Unit. Staff at EBMUD have experience developing restoration and enhancement projects that benefit wildlife and enhance agricultural areas and operations. EBMUD has provided River Partners with technical advice as well as biological monitoring data gathered in and along the lower Mokelumne River (LMR)

Funding for the Riparian Enhancement Plan is being provided by Vino Farms, Inc. Funding for riparian enhancement activities will need to be secured from other sources. Potential funding programs will be described in Section IX of this document.

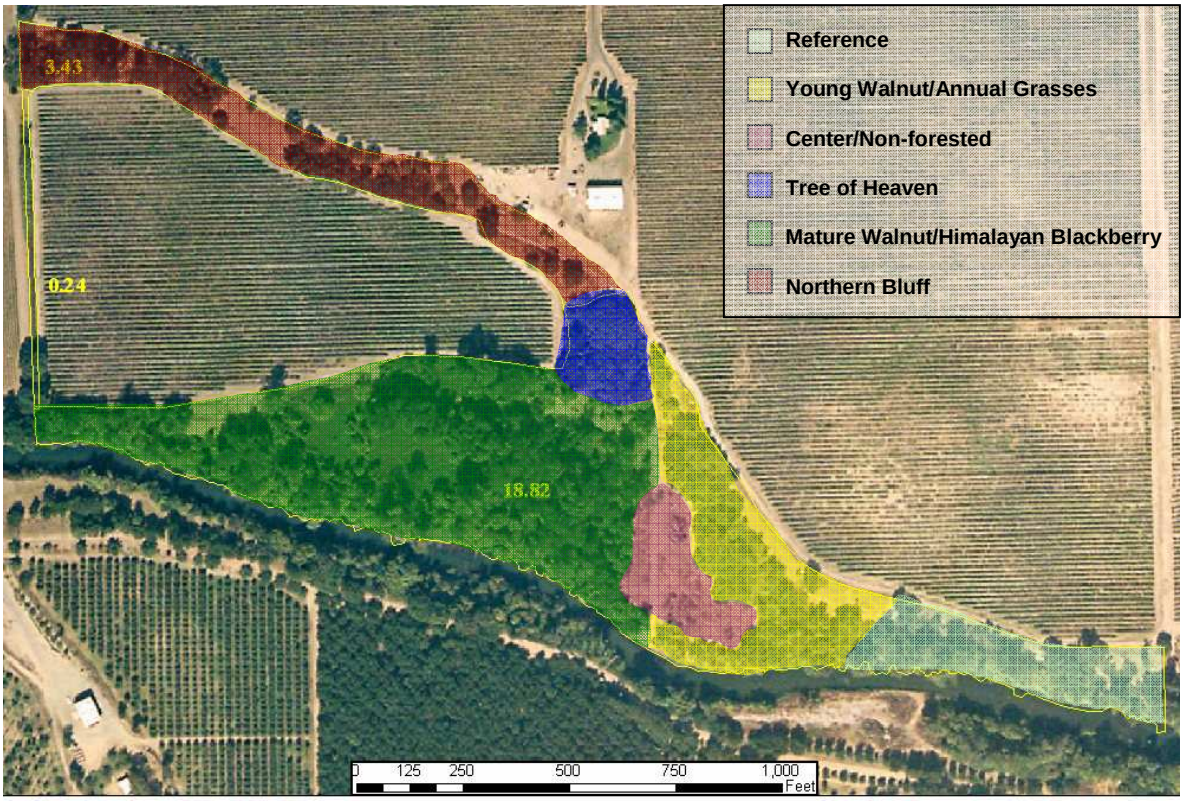
Figure 2. Riparian enhancement project area on Vino Farms, Inc., San Joaquin County.

D. Project Goals and Objectives

The overall goal of this project is to improve wildlife habitat along the lower Mokelumne River by decreasing the extent of non-native species and enhancing existing riparian vegetation by planting native species. Goals and objectives to this enhancement include:

- Decrease the extent and cover of non-native plant species such as Himalayan blackberry, tree of heaven, black walnut, and yellow starthistle
- Diversify the understory with native shrub and herbaceous species
- Design plantings that will improve habitat for riparian nesting and migrating songbirds and other wildlife
- Plant elderberry shrubs to improve Valley elderberry longhorn beetle habitat.

Figure 3. Areas of the enhancement site delineated by dominant vegetation.



E. Purpose of Riparian Enhancement Plan

The purpose of this Riparian Enhancement Plan is to:

- Identify project goals and objectives
- Summarize the site history, soils, topography, hydrology, vegetation, and wildlife
- Outline our current understanding of the physical and biological factors that influence site ecology (a conceptual site model)
- Describe enhancement alternatives for the project area including site designs and rationale
- Describe recommended enhancement implementation and monitoring activities
- List potential funding sources for riparian enhancement on private lands
- Provide an estimated timeline for the project and cost estimates

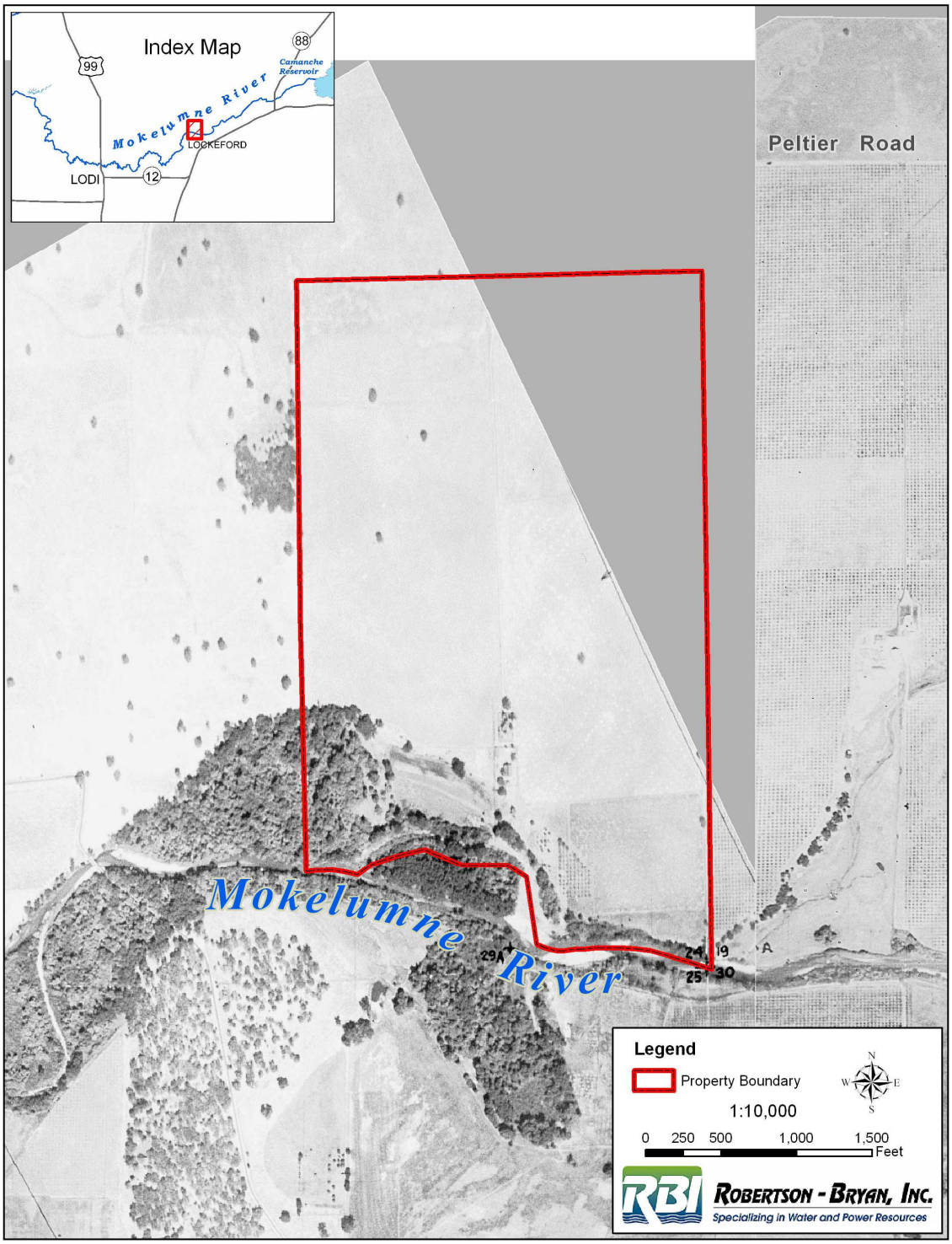
II. SITE DESCRIPTION

A. Land Use History

During the last 150 years, the lower Mokelumne River watershed has changed dramatically. Historically, the riparian areas supported a diverse and dynamic ecosystem of oxbow lakes, seasonal wetlands, secondary channels and extensive, forested floodplain. Human disturbance began impacting the river with the inception of California's gold rush in the late 1840s. A recent spatial analysis study of the lower Mokelumne River from 1910 to 2001 by Brook Edwards shows startling human impacts to the Mokelumne River. Over 80% of seasonal lakes have been converted to agriculture and 73% of the floodplains have been cleared of riparian forest and shrub communities, leaving a narrow ribbon of vegetation adjacent to the river (Edwards 2005).

Most of the 254-acre ranch has been in agricultural production since at least the 1920s (Figure 4). The property was used primarily for cattle grazing prior to acquisition by John Ledbetter in 1971. Since then, 221 acres have been converted to vineyard.

Figure 4. Vino Farms, Inc. 1927 historical aerial photo (Edwards 2005).



Vino Farms Property: 1927 Aerial Photo

Source: EBMUD 1927 Aerial Photo

B. Soils

Soil characteristics partially determine riparian vegetation composition, structure, and patterns. There are three different soil types in the project area (Table 1, Figure 5). Channeled Columbia fine sandy loam (SMU 132), covers a majority of the project area, which is a landscape channeled by intermittent drainage ways. This very deep, somewhat poorly drained and nearly level soil is on floodplains with a 0 to 2 percent slope. It formed in alluvium derived from mixed rock sources. Permeability is moderately rapid in this Columbia soil and available water capacity is moderate. The soil is subject to frequent, brief or long periods of flooding from December through April (McElhiney 1992). The northern 10% of the site has the similar Columbia fine sandy loam soil (SMU 131) but the landscape is not channeled.

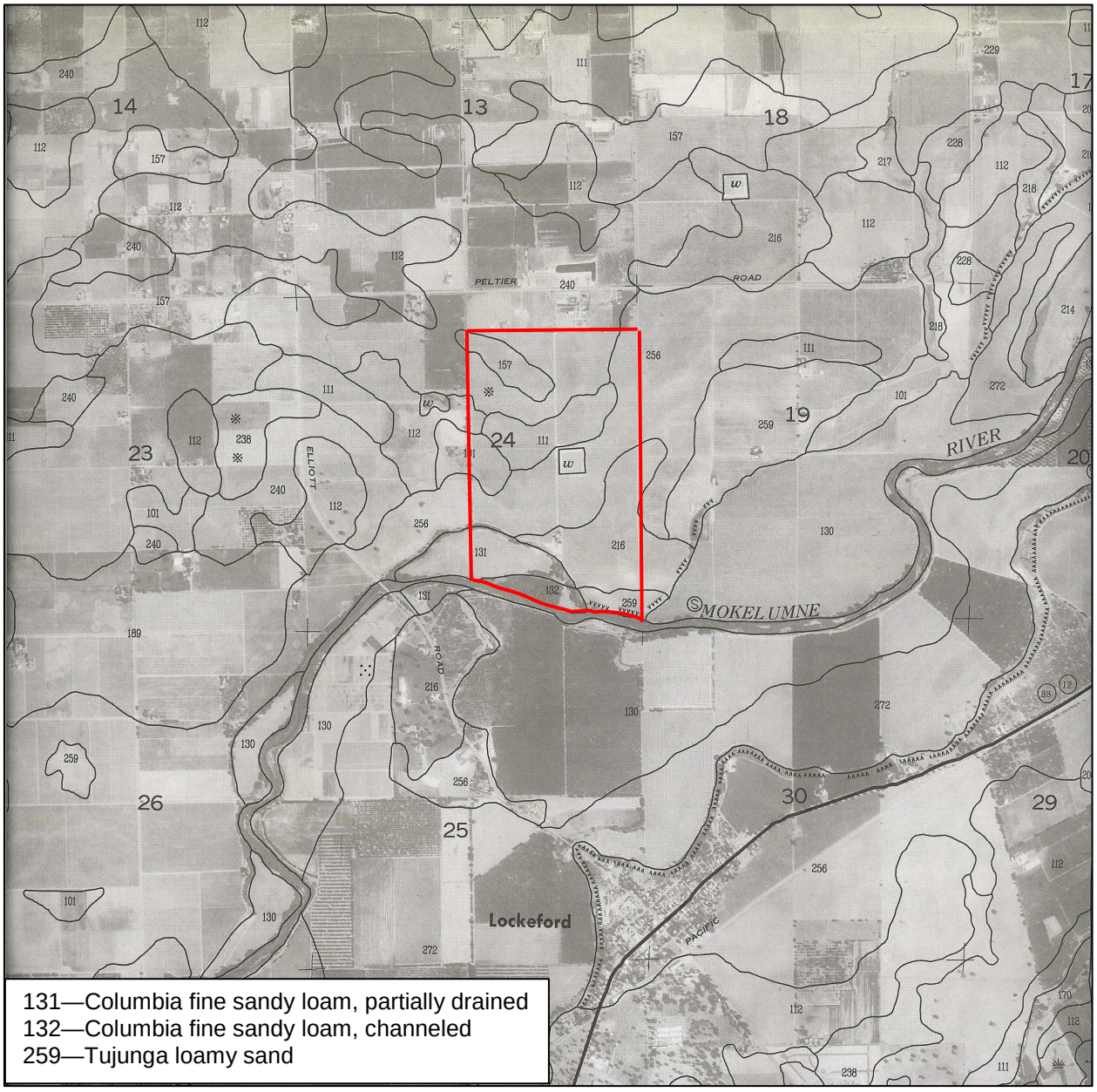
Tujunga loamy sand (SMU 259) covers the remaining 10% of the project area, along the river on the eastern part of the site. This very deep, well-drained, and nearly level soil occurs on floodplains and elongated channel remnants. It formed in alluvium derived from granitic rock sources. Permeability is rapid in the Tujunga soil and the high percentage of sand in the soil reduces the amount of moisture available for plant growth. The soil is subject to rare flooding during years of very high precipitation (McElhiney 1992).

Soil surveys (excavated soil pits or augured soil cores) will be done to further assess soil conditions. These surveys will indicate whether there are any soil characteristics that may preclude root growth of native vegetation such as pure sand layers or hardpan, and will also indicate height of the water table.

Table 1. Summary of soil types within Vino Farms, Inc. project area (McElhiney 1992).

Soil Series	Columbia loam	Columbia loam, channeled	Tujunga sand
Mapping Unit	131	132	259
Percent Slope	0-1%	0-8%	0-3%
Textures	Fine sandy loam	Fine sandy loam	Loamy sand
Drainage	Partially	Partially	Excessive
Permeability	Moderately rapid	Moderately rapid	Rapid
Available water capacity	Moderate	Moderate	Low
Fertility	Moderate	Moderate	Very low
Plant growth limitations	High water table; occasional flooding	High water table; frequent flooding; channeled landscape	Low available water capacity; soil blowing

Figure 5. San Joaquin County Soil Survey map for Vino Farms, Inc. (McElhiney 1992).



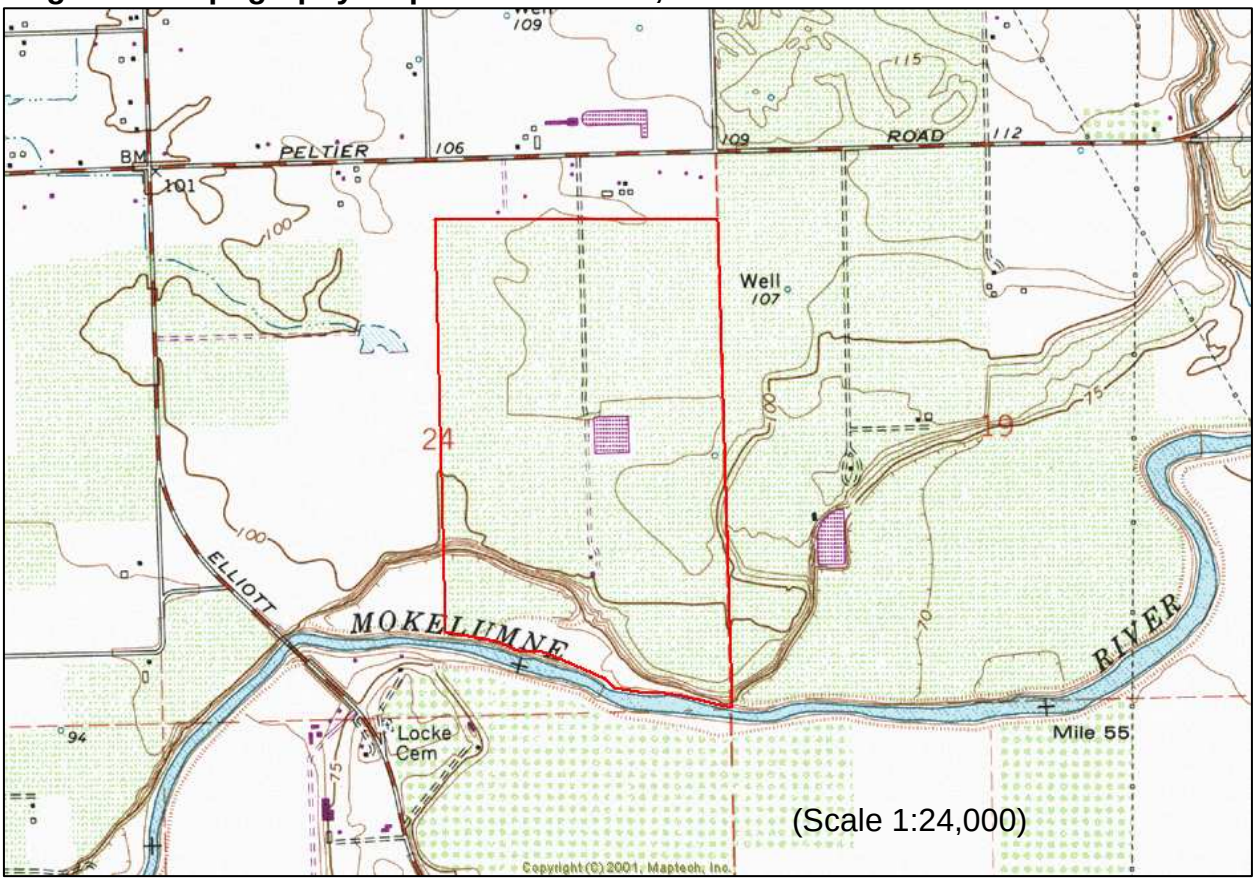
C. Topography

The topography of the Vino Farms, Inc. project area ranges from low elevation on the west boundary to a higher elevation on the east boundary. The northwest to central portion of the property ranges in elevation from 10 to 55 ft and its eastern portion 40 to 70 ft (Figure 6).

Land use alteration in the lower Mokelumne River system during the past 150 years has included reduction in the number of channel segments, leveling of topography and minimization of floodplain sedimentation and inundation (Edwards et al. 2004). However, some historical features are still evident in the project area including a secondary channel near the non-forested center area and the elevated northern bluff. The northern bluff is likely the result of large historical floods and changes in soil type.

Original topography still exists throughout the western portion of the project area. Some of the eastern portion of the project area may have been disturbed in the past and possibly scraped or leveled, and little natural topography is evident in this area.

Figure 6. Topography map for Vino farms, Inc.



D. Hydrology

1. Historical Conditions

Historically, the Mokelumne River channel migrated within a floodplain ranging from ¼ to 1 mile wide, scouring and depositing sediment (Piper et al. 1939). Within the project area the river traversed the Victor Plain and its floodplain was delineated by steep cut banks and ground water levels fluctuated in response to changes in river stage. Rising river stages created ground water waves that stored relatively large volumes of water in alluvium close to the river (Piper et al. 1939). During falling stages, much of the water stored in the adjacent alluvium percolated back into the river.

John C. Fremont, one of the first Western explorers in the mid 1840s, described the lower Mokelumne River as having broad alluvial bottoms of very fertile soil, sometimes 1,500 feet wide, bounded by uplands 30 to 40 feet above the floodplain wooded with evergreen oaks (Spence 1984). He also noted natural flood cycles of the river, important to travelers in those days as there were no bridges, and rivers had to be forded or boated across. He described easily crossing the 177-foot wide river in December 1847 before the commencement of winter rains. Prior to that however, in June of 1847, the Mokelumne River had to be crossed by boat, along with other tributaries of the San Joaquin River, because the rivers had swollen to 300 to 600 ft wide with great volumes of melted snow from the Sierras (Spence 1984).

2. Current Conditions

Since the late1800s, the Mokelumne River has been modified by mining, agriculture, forestry, levee and dam construction, as well as municipal water diversion (Edwards 2005). Two major dams were constructed along the river; Pardee Dam, completed in 1928 in the Sierra foothills, and Camanche Dam constructed further downstream and completed in 1965. The natural pulse of the instream flow from spring snowmelt in the upper reaches has been reduced by over 80% in May, and bankfull discharge has been similarly reduced (Edwards et al. 2004, Edwards 2005). Channel width declined in the upstream reaches, while remaining static or increasing slightly downstream. Secondary channels were filled or leveled to increase acreage for agriculture. However, the historic secondary channel that cuts through the center/non-forested area of the Vino Farms project area was never completely filled and is still visible from aerial photos. This secondary channel likely filled with flood waters prior to the construction of Comanche Dam.

High rainfall in spring 2006 coupled with record snow pack in the Sierras resulted in flows that flooded the low elevation areas of the riparian project site. Overall, the low-lying project area has been flooded approximately 6 to 7 times since 1971, while the rest of the farm is above the 100 year flood plain.

E. Vegetation

1. Pre-development conditions

Pre-settlement riparian areas of the lower Mokelumne River supported dense vegetation from the waters edge to the outer margin of the riparian zone (Katibah 1984). These plant communities were high in structural and species diversity, created and sustained by river processes (i.e., flooding, scouring, and sediment deposition).

The historic Mokelumne River floodplain covered approximately 6,807 acres (Edwards et al. 2004, Edwards 2005). Riparian cover (within 131 ft of the channel) was originally dominated by native woody vegetation. Aerial photographs indicate that in some areas along the lower Mokelumne River, up to 1 mile of riparian forest was completely removed leaving no vegetation adjacent to the river. From 1927 to 2001, floodplain forests were reduced by 73%, with a majority of land being converted to agriculture (Edwards et al. 2004, Edwards 2005). The actual change may be greater than this estimate, since large areas of riparian forest had likely been cleared before 1927 at the Vino Farms, Inc. location and upstream.

2. Current on-site conditions

The general habitat type for the area is classified as Valley Foothill Riparian and the vegetation for this area was mapped by EBMUD (Reeves and Jones 2004). The Vino Farms project area currently supports a multi-layer canopy with an overstory consisting of native tree species Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), interior live oak (*Quercus wislizenii*), a stand of invasive, non-native tree of heaven (*Ailanthus altissima*), and agricultural escapees almond (*Prunus dulcis*), walnut (*Juglans regia*) and fig (*Ficus carica*) (Tables 2 and 3). The sub-canopy is composed of sandbar willow (*Salix exigua*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), Oregon ash (*Fraxinus latifolia*), mulberry (*Morus alba*) and box elder (*Acer negundo* var. *californicum*). The shrub understory is dominated by invasive Himalayan blackberry (*Rubus discolor*) and interspersed with native California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicana*), California rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*) and snowberry (*Symphoricarpos albus* var. *laevigatus*). The herbaceous layer is a mix of native and invasive, non-native forbs and grasses. Basket sedge (*Carex barbarae*) grows in some low, moist areas and there are also patches of native California grape (*Vitis californica*) and hybridized grapes. The site can best be described by dividing the project area into sections delineated by dominant vegetation (Figure 3; Table 4). Photos in Figure 7, taken during the site assessment, are representative of each corresponding section.

Table 2. Summary of existing native species at Vino Farms, Inc.

Common Name	Species Name	Common Name	Species Name
Woody		**Herbaceous**	
Arroyo willow	*Salix lasiolepis*	Basket sedge	*Carex barbarae*
Box elder	*Acer negundo*	Cucumber	*Marah fabaceus*
California blackberry	*Rubus ursinus*	Creeping wildrye	*Leymus triticoides*
California rose	*Rosa californica*	Fiddleneck	*Amsinckia menziesii*
Elderberry	*Sambucus mexicana*	Gumplant	*Grindelia camporum*
Fremont cottonwood	*Populus fremontii*	Hedge-nettle	*Stachys albens*
Interior live oak	*Quercus wislizenii*	Lippia	*Phyla nodiflora*
Oregon ash	*Fraxinus latifolia*	Monkeyflower	*Mimulus guttatus*
Poison oak	*Toxicodendron diversilobum*	Mugwort	*Artemisia douglasiana*
Red willow	*Salix laevigata*	Stinging nettle	*Urtica dioica*
Sandbar willow	*Salix exigua*		
Snowberry	*Symphoricarpos albus*		
Valley oak	*Quercus lobata*		
Wild grape	*Vitis californica*		

Table 3. Summary of existing non-native species at Vino Farms, Inc.

Common Name	Species Name	Common Name	Species Name
Woody		**Herbaceous**	
Almond	*Prunus dulcis*	Bermuda grass	*Cynodon dactylon*
Fig	*Ficus carica*	Foxtail	*Hordeum murinum*
Himalayan blackberry	*Rubus discolor*	Grape	*Vitis sativa*
Mulberry	*Morus alba*	Johnson grass	*Sorghum halepense*
Tree of heaven	*Ailanthus altissima*	Horehound	*Marrubum vulgare*
Black walnut	*Juglans hindsii X*	Mare's tail	*Conyza canadensis*
		Milk thistle	*Silybum marianum*
		Mustard	*Brassica rapa*
		Morning glory	*Convolvulus arvensis*
		Poison hemlock	*Conium maculatum*
		Prickly lettuce	*Lactuca serriola*
		Ripgut brome	*Bromus diandrus*
		Starthistle	*Centaurea solstitialis*
		Verbena	*Verbena bonariensis*
		Vetch	*Vicia sativa*
		Wild oat	*Avena fatua*

Table 4. Acreages of the enhancement areas delineated by dominant vegetation.

Area	Acreage
Reference	2
Young Walnut/Annual Grasses	2.5
Center/Nonforested	1.5
Tree of Heaven	1
Mature Walnut/Himalayan Blackberry	12
Northern Bluff	3.5
Total	22.5

a) Reference

In the upstream (eastern) portion of the site, there is high native species diversity with a predominantly native understory of California blackberry, rose, poison oak, snowberry, basket sedge, creeping wild rye, and mugwort. The overstory consists of cottonwoods, valley and interior live oaks, box elder, and scattered walnut trees. The high density of native species suggests that this area was likely never disturbed by agriculture. Therefore, this area will be used as a reference area for the enhancement design.

b) Young Walnut/Annual Grasses

Directly west of the reference area there is a closed canopy of young walnuts, box elder, and scattered oaks with the understory dominated by non-native annual grasses (including ripgut brome). Creeping wild rye can be found in small, scattered patches. The growth form of the smaller, young walnuts in this area differs from the larger, more mature walnuts to the west.

c) Center/Nonforested

A large open space near the center of the project area is most likely part of the historical secondary channel. This area is dominated by non-native, herbaceous vegetation such as: vetch, Bermuda grass, yellow starthistle, Johnson grass, and ripgut brome. This area appeared devoid of woody vegetation even in the 1927 aerial photo (Figure 4). The only natives in this area, red willow, arroyo willow, and sandbar willow, are mainly along the river's edge.

d) Tree of Heaven

A large patch of tree of heaven dominates the far north corner. This closed canopy area has little vegetation in the understory, likely due to severe shading. This highly invasive species is an ecological threat to the project site and will be discussed further in Section V.A, along with the impacts of other non-native vegetation found on the project site.

e) Mature Walnut/Himalayan blackberry

Large, mature walnuts, box elder, and few scattered oaks create a mostly closed canopy on the western portion of the project area. Very dense and tall Himalayan blackberry dominates the understory. Other natives such as California blackberry, stinging nettle, and hedge-nettle are rare. The dominance of non-native vegetation is most likely due to historical disturbance, possibly a walnut orchard. Fire scarring is visible on oaks and walnuts throughout the project area, indicating another historic disturbance factor.

f) Northern Bluff

Oaks and mature elderberry are scattered along the northern bluff. Due to the bluffs high elevation and lack of flooding, elderberry seem to be thriving here. This location will be a priority for Valley Elderberry Longhorn Beetle habitat expansion.

3. Current off-site conditions

Land use along the Mokelumne River is primarily agriculture. Vineyards dominate the surrounding area north of Vino Farms, Inc., while orchards dominate the acreage south of the river. Riparian vegetation along the river is very narrow, even absent in some places. However, the Vino Farm's project area is notable as one of the largest tracts of riparian habitat along the north end of the lower Mokelumne River, and it is connected to a riparian corridor on its east and west sides, making this particular site ideal for riparian enhancement.

F. Wildlife

EBMUD conducted a survey of falcons, kites, hawks, and owls in the lower Mokelumne River watershed from April 1998 to April 2001 which yielded 2,172 observations of 16 species. Red-tailed hawk, American kestrel, Swainson's hawk, White-tailed kite, Red-shouldered hawk, Northern harrier, and Osprey were the most commonly observed species (Reeves and Smith 2004).

Amphibian and reptile populations were inventoried along the lower Mokelumne River (LMR) from Camanche Dam to tidewater from spring 2000 to spring 2004. Potentially 12 amphibian and 27 reptile species occur in San Joaquin and Sacramento counties. The inventory identified 3,858 individuals of 16 species (3 amphibians and 13 reptiles) during the four-year survey period (Workman and Smith 2004).

Small mammal populations were inventoried along the lower Mokelumne River from Camanche Dam to tidewater from April 2002 to July 2004. Potentially 43 native and 12 non-native mammal species occur along the LMR in San Joaquin and Sacramento counties (Reeves and Jones 2004b). The inventory identified 1,136 individuals of 14 species during the survey period (Reeves and Jones 2004b, Reeves and Jones 2005).

Researchers from California State University, Sacramento conducted neotropical bird monitoring from April 1999 to February 2000 along the lower Mokelumne River from Camanche Reservoir to Woodbridge, California. A total of 119 species were identified as occurring along the lower Mokelumne River, including a number of species of special concern: Long-billed Curlew, Loggerhead Shrike, Common Yellowthroat, Yellow Warbler, and Yellow-breasted Chat. Breeding activity was recorded for the following neotropical migrants: Swainson's Hawk, Tree Swallow, Cliff Swallow, Northern Rough-winged Swallow, Western Wood-peewee, Ash-throated Flycatcher, Western Kingbird, Black-headed Grosbeak, and Bullock's Oriole (Reeves et al. 2001, Reeves et al. 2003, Smith 2004).

PRBO Conservation Science has conducted bird monitoring along the Mokelumne River since 2003 (Pfeffer et al. 2006). A total of 156 species of birds were recorded using point counts, mist netting, and nest searches. A total of 56 species were identified on the Vino Farms property from area searches during fall migration (Pfeffer et al. 2006). This site had an average species richness of 49 over three years and was the lowest of the seven sites monitored during fall migration (Pfeffer et al. 2006). This is most likely due to an overstory primarily composed of black walnut and a sparse understory (Pfeffer et al. 2006).

Observations of wildlife on the Vino Farms, Inc. project site, from the Ledbetter family and River Partners field staff, include deer, raccoon, coyote, wild turkey, and bobcat. During the site assessment Cooper’s hawk, Spotted towhee, California quail, Western kingbirds, Nuttall’s woodpecker, California towhee, House wren, and a White-breasted nuthatch were observed. Several mature elderberry bushes exist on site, and there is evidence of the Valley Elderberry Longhorn Beetle (VELB).

Figure 7. Representative photos of enhancement areas.

Center/Nonforested Area

Tree of Heaven (*Ailanthus altissima*)

Mature Walnut/Himalayan Blackberry Area

Northern Bluff Area

III. WILDLIFE AND ENVIRONMENTAL BENEFITS

A. Importance of Riparian Habitat

In agricultural areas, riparian forest vegetation and buffers have many positive impacts on adjacent waterways. Buffers slow water runoff, trap sediment, and enhance water infiltration. They also trap fertilizers, pesticides, bacteria, pathogens, and heavy metals, lessening the chance these pollutants will reach surface or ground water sources (USDA Program Aid 1615 2000). Riparian-vegetated floodplains are 80 to 150% less erodable than agriculture-dominated floodplains and tend to reduce river migration rates (Micheli et al. 2004). This ultimately protects the surrounding areas, especially the people and wildlife that live there.

Riparian systems are also some of our most important and most neglected renewable natural resources. River hydrology that has been altered by dams, levees, and water diversions, as well land clearing and leveling for agriculture and development, poorly planned grazing, and invasion by exotic species have critically degraded riparian habitat in California's Central Valley (Edwards et al. 2004, Edwards 2005).

While small in total area when compared to California's size, riparian areas are of special value as wildlife habitat. Over 135 species of California birds either completely depend upon riparian habitats or use them preferentially at some stage of their life history, and another 90 species of mammals, reptiles, invertebrates and amphibians depend on California's riparian habitats (RHJV 2004). Riparian habitat also provides riverbank stabilization, reduces flooding and sedimentation rates, cools water temperatures, and enhances scenery (Vilkitis et al. 2003) .

A primary goal of this riparian restoration project is to improve wildlife habitat along the Mokelumne River corridor. Target wildlife species for this project include the valley elderberry longhorn beetle and Neotropical migratory birds. In order to develop a restoration and enhancement strategy for the Vino Farms project area, habitat needs of the target wildlife species must be considered.

B. Valley Elderberry Longhorn Beetle

The threatened valley elderberry longhorn beetle (VELB; *Desmocerus californicus dimorphus*) is endemic to riparian oak woodlands in California's Central Valley (Barr 1991). The beetle is found only in association with its host plant, blue elderberry (*Sambucus mexicana)* where it spends its entire life cycle.

The life cycle takes one to two years to complete. Adults feed on the foliage and possibly flowers. Females lay eggs in bark crevices and after hatching larvae bore into the pith stems. The insect spends most of its life cycle in the larval stage, living within the stems of the elderberry plant and, at maturity emerges through a hole created in the stem. Barr (1991) conducted extensive surveys, which determined the extent of the beetle's distribution and established that it requires elderberry with stems of a minimum diameter of approximately 1 inch. Research has also indicated that VELB has limited

dispersal abilities, which suggests isolated riparian habitat will be less likely to be colonized (Collinge et al. 2001). Additionally, VELB or its host plant may be negatively impacted by insecticide or herbicide drift.

River Partners staff observed exit holes on elderberry stems on the Vino Farms, Inc. property, indicating the presence of VELB. However, an intensive survey was not conducted on the property. VELB activity has been reported elsewhere along the lower Mokelumne River. Possible current occupancy by VELB of the project area and close proximity to existing elderberry shrubs increases the potential of the proposed project to provide habitat for this at-risk species.

1. US Fish and Wildlife Service Conservation Guidelines

The US Fish and Wildlife Service Conservation Guidelines for VELB limit activities that can occur near elderberry. Its purpose is to create guidelines for project development, restoration plans, and survey and monitoring procedures in VELB habitat. On any project site, complete avoidance may be assumed when a 100 ft (or wider) buffer is established and maintained around elderberry plants containing stems 1.0 inch or greater in diameter at ground level. In areas where encroachment on the 100 ft buffer has been approved by the US Fish and Wildlife Service, a minimum setback of at least 20 ft from the dripline of each elderberry plant must be provided. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer area of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level (USFWS 1999).

2. Safe Harbor Agreement

In 2006, a programmatic Safe Harbor Agreement for VELB along the lower Mokelumne River was entered into by the California Association of Resource Conservation Districts and the US Fish and Wildlife Service. This agreement promotes ecosystem restoration and provides regulatory assurances to landowners participating in restoration activities, while not negatively affecting farming operations. Landowners who enroll in the program must maintain at least as many elderberry bushes as were present when the landowner entered into the program. The objective of restoration activities on enrolled lands is to restore riparian plant communities that include elderberry bushes, therefore enhancing and expanding VELB habitat. This partnership benefits this threatened species while giving landowners assurances from additional restrictions (USFWS 2006).

C. Riparian Bird Focal Species

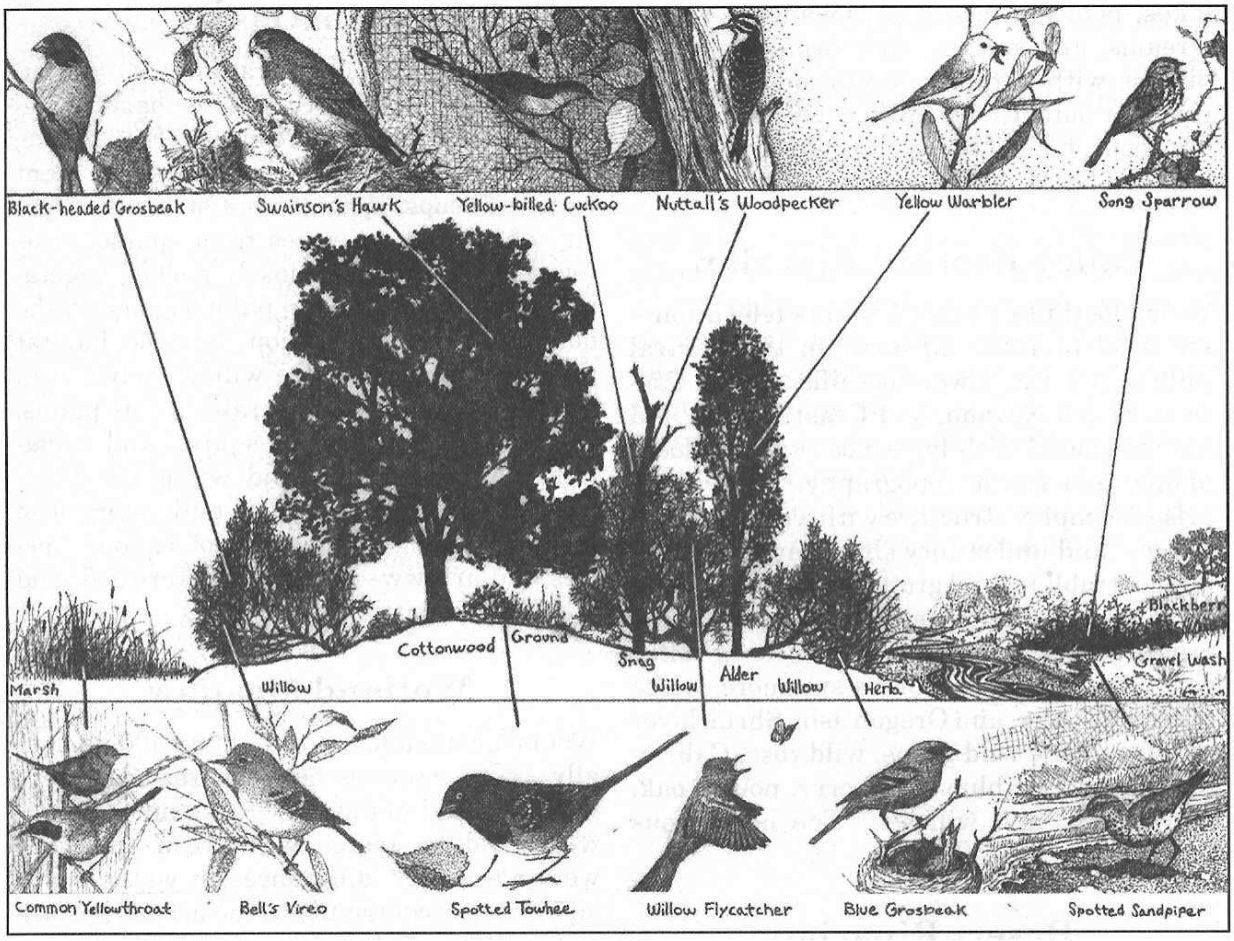
Songbirds are excellent indicators of ecosystem health and restoration success because of their specific habitat requirements, detectability, high metabolic rates, and distribution within and across habitats (Gardali et al. 2006).

The Riparian Habitat Joint Venture selected 17 riparian bird focal species that indicate ecologically healthy riparian systems (RHJV 2004). Six riparian focal species and 15 Neotropical migrants were recorded on the Vino Farms site by Point Reyes Bird

Observatory (PRBO) (Pfeffer et al. 2006). As one would expect, there is a wide range of spatial and structural habitat requirements among the species (Figure 8). For example, the Common Yellowthroat may occupy a breeding and foraging territory as small as one acre, while the Yellow-billed Cuckoo requires a minimum of 40 acres during breeding season. While some species avoid agricultural areas, the Blue Grosbeak will nest along farm roads and forage in certain types of cultivated crops.

The Least Bell's Vireo (LBV; *Vireo bellii pusillus*) is currently Federally listed as Endangered, but was once common in the lowland riparian plant communities from southern California to the Sacramento Valley (Grinnell and Miller 1944). The species was extirpated from the San Joaquin and Sacramento Valleys in the 1980s due to the loss of suitable habitat (USFWS 1998). In the spring of 2005 a nesting pair was discovered by PRBO in one of River Partners' fields recently restored to riparian habitat on the San Joaquin River National Wildlife Refuge. A sighting in the Mokelumne watershed in August 2006 has further energized the effort to restore LBV habitat in the area (Kent Reeves, personal communication). This plan incorporates the habitat needs of the LBV in hopes of promoting movement of mating pairs further north in the species' historical range.

Figure 8. Structurally diverse riparian vegetation is needed to support a variety of riparian birds (RHJV 2004, Illustration by Zac Denning).



IV. CONCEPTUAL SITE MODEL

A. Past Environmental Conditions

The riparian areas of the lower Mokelumne River historically supported a diverse and dynamic ecosystem of oxbow lakes, seasonal wetlands, secondary channels and extensive, forested floodplains (Edwards et al. 2004, Edwards 2005).The natural processes of flooding, scouring, and deposition along the lower Mokelumne River created and sustained healthy riparian systems. These systems provided high quality habitat for riparian dependent wildlife species and for a greater variety of wildlife than any other habitat found in California.

B. Likely Successional Patterns without Enhancement

Since the construction of both the Pardee and Comanche Dams, the natural pulse of the instream flow from spring snowmelt in the upper reaches has been reduced by over 80% for the month of May and bankfull discharge has been similarly reduced (Edwards 2005). Many riparian plant species depend upon seasonal flooding for mineral substrate deposition, seed dispersal, and seed germination. In the absence of flooding, natural regeneration of the riparian forest will likely not occur.

Most of the riparian zone on Vino Farms, Inc. is currently dominated by non-native, invasive vegetation. Without removal and revegetation with native plants, these noxious species will continue to dominate and degrade wildlife habitat. Noxious weeds and shrubs also create a seed bank that will germinate and disperse locally and long distance by water, wind, and animals. Restoration activities are also potentially beneficial to agriculture. The removal of the adjacent invasive weed patch will decrease the likelihood of infestation in the vineyard, and may also result in a reduction of pest insects and diseases that are associated with non-native species.

C. Comparison of Site to Nearby Vegetation (Reference Sites)

One of the fundamental components of a restoration or enhancement plan is the identification of reference sites to guide restoration design and plant species composition. Even though the Vino Farms, Inc. project area overall has a history of disturbance, the far eastern part of the site offers a good reference site for the enhancement of the downstream riparian area. This reference area is dominated by natives that provide species and structural diversity, providing optimum habitat for a variety of wildlife. During the site assessment River Partners observed the greatest diversity of bird species in this area. Other sites such as the Nakagawa property and Lodi Lake nature area also provide helpful reference information (Kent Reeves, personal communication).

V. TARGET NON-NATIVE SPECIES

The density and cover of non-native, invasive species within the Vino Farms project area likely has the greatest negative impact on local habitat quality and presents the biggest restoration challenge. We propose to eradicate non-native species and replace them with native riparian vegetation. If native vegetation is not planted after weed eradication, the area will eventually become dominated by non-natives again. All alternatives seek to reduce non-native invasives in the riparian zone and plant with native riparian species.

Continued invasion by non-natives will decrease native plant and animal species diversity. Below is a summary of non-native species targeted for eradication at the Vino Farms, Inc. project site. Tree of heaven, yellow starthistle and Himalayan blackberry are the most invasive and aggressive. Information on methods of removal for each invasive species can be found in Section VIII.G.

A. Tree of heaven

Bossard et al. (2000) state that Tree of heaven (*Ailanthus altissima*) was likely introduced to California from China during the gold rush and now commonly displaces native vegetation in riparian areas of the state. It is a prolific seed producer, grows rapidly, and can quickly overrun native species. Once established, it can produce numerous root sprouts and take over a large area, forming an impenetrable thicket. This tree species also releases allelopathic chemicals into the soil that prevent the establishment of other plant species.

B. Yellow starthistle

Yellow starthistle (*Centaurea solstitalis*) as described by Bossard et al. (2000) is native to Eurasia and was introduced to California around 1850 via South America. It is now common in open areas on roadsides, rangeland, wildlands, hay fields, pastures, and waste areas. Recent reports indicate that yellow starthistle infests between 10 and 12 million acres in California. Disturbances created by cultivation, poorly timed mowing, road building and maintenance, or overgrazing favor this rapid colonizer. It forms dense infestations and rapidly depletes soil moisture, thus preventing the establishment of other species. Yellow starthistle is only found in the center/nonforested area of the project site. Because this species does not tolerate shade, it will likely not invade any closed canopy, forested areas.

C. Himalayan Blackberry

Bossard et al. (2000) state that Himalayan blackberry (*Rubus discolor*) reproduces sexually and through several asexual methods. The species' sprawling nature and ability to root from the tips of stems, or canes, can shade out and smother native vegetation. Old stocks of Himalayan blackberry build up over time creating large thickets with living vines covering mounds of old, leafless canes, providing poor habitat for many riparian animal species. Thickets can produce 7,000 to 13,000 seeds per square meter allowing the species to quickly dominate a large area. However the species is not tolerant of dense shade and seeds often cannot germinate under the low light conditions found under a dense thicket.

D. Black Walnut

Northern California Black Walnut (*Juglans hindsii X*) hybrids, which are growing on Vino Farms, Inc. property, are no longer considered native species in the Central Valley. Due to hybridization with the English walnut (*Juglans regia*) from Persia, the true Northern California Black Walnut, *Juglans californica var*. *hindsii*, has become a rare species (Hickman 1993). In general, *Juglans* species are known to produce chemicals which inhibit growth of other plants in two ways. One way is that the chemicals dissolve out of the leaves when it rains, reducing the growth of plants under the tree (Philbrick et al 1979). And second, the roots leach chemicals that inhibit plant growth along the root crown (Huxley 1992). Therefore, black walnuts are not good companion plants and are considered a target for treatment on the project site.

VI. RIPARIAN ENHANCEMENT ALTERNATIVES

This section describes three riparian enhancement alternatives for the 22.5-acre remnant riparian forest based on current scientific knowledge of wildlife habitat needs and the site evaluation. Multiple alternatives, with different levels of intensity and cost, were developed as funding is still being pursued for the project.

Alternative 1 includes the minimum enhancement activities recommended for the project area. The following two alternatives offer additional habitat enhancement opportunities, at some additional cost.

A. Alternative 1—No herbicide treatment of walnuts

Alternative one includes the following enhancement activities:

- **Eradicate Himalayan blackberry under mature walnuts (12 acres)**
- **Treat and leave standing tree of heaven (1 acre)**
- **Plant native woody and herbaceous vegetation in the following areas:**
    - Center/non-forested (1.5 acres),
    - Tree of heaven (1 acre),
    - Mature walnut/Himalayan blackberry (12 acres), and
    - Young walnut (2.5 acres)
- **Plant reference area with herbaceous understory (2 acres)**
- **Plant northern bluff with drought tolerant woody and herbaceous native species (3.5 acres)**

Alternative 1 incorporates the minimum recommended enhancement activities and does not include herbicide application or removal of walnuts. This alternative will be beneficial only because the understory vegetation will be enhanced with native vegetation, but structural diversity will be lacking in a majority of the project site due to shading by the walnuts. The shade will limit the variety of native species that can grow below and will thereby decrease the potential for wildlife species diversity at this site. Furthermore, leaving the black walnut trees untreated will allow the species to set seed and establish more individuals in the future.

B. Alternative 2—Apply herbicides to young walnut stand

Alternative two includes the following enhancement activities:

- **All activities listed in Alternative 1**
- **Herbicide applications on young walnuts without physical removal (2.5 acres)**

The second alternative is to treat with herbicides and leave standing the young walnut trees (2.5 acres). This alternative increases the quality of the wildlife habitat more than Alternative 1 by opening up the canopy and allowing more light into the understory. This will increase the number of native species that can establish and therefore increase the structural diversity.

This alternative does not include treating the mature walnut stand on the western portion of the project area. This area would remain a relatively closed canopy, dominated by mature walnuts with shade tolerant native species being planted in the understory after Himalayan blackberry removal. Leaving the mature walnuts untreated may be cheaper in the short-term but will increase the need for long-term maintenance on the site, as the mature walnuts will continue to produce seed and young saplings will need to be removed annually.

C. Alternative 3—Treat both young and mature walnut stands with herbicides

Alternative three includes the following enhancement activities:

- **All Activities listed in Alternative 2**
- **Herbicide application on mature walnuts without physical removal (12 acres)**

To maximize wildlife benefit, we recommend treating with herbicides both the young and mature stands of walnuts on site (14.5 acres). This alternative provides benefits to wildlife by reducing competition by non-natives, opening up the canopy throughout the area and, increasing native plant species and structural diversity. Leaving walnut trees standing after herbicide treatment may also provide raptor perches and snags for cavity nesters until planted native riparian tree species mature.

Complete removal of walnut stands may maximize restoration success by removing the canopy shade and allowing for the growth of a greater diversity of native plants, not just shade tolerant species. The mature walnuts may be harvested for timber and/or firewood to offset project costs.

VII. RIPARIAN ENHANCEMENT DESIGN

A. Design Considerations

Physical and biological factors weigh greatly on the selection of vegetation associations and essentially dictate what will grow on an area (site potential). Based on these factors, the Vino Farms, Inc. project area can support a variety of riparian forest, riparian shrub, and herbaceous species. However, wildlife objectives and management issues also alter the arrangement, composition, and vegetation associations that are selected. We refer to these factors as design considerations (Table 5).

Table 5. Design considerations for riparian enhancement on Vino Farms, Inc.

Objective	Example of Project Design Considerations
Provide immediate (< 3 years) habitat benefits and high probability of long-term survivorship	The project area on Vino Farms, Inc. is likely to sustain oak woodland in the long-term (>25-80 years), but will support cottonwood, willow, and other species in the short-term, providing several generations of targeted bird species with nesting and foraging habitat. Planting both slow and fast growing species maximizes quality habitat as the slow growing, but shade tolerant, oaks mature.
Maintain high plant species and vegetative structural diversity	PRBO data suggests that bird diversity is highest in areas with 5-7 shrub species over a 50-m^2 area. Design considerations include creating structural differences (grouping trees together will create pockets of shade and light gaps), creating vegetation patches (grouping small shrubs together will mimic larger plants and may attract desirable wildlife species faster than if they were grown apart), and planting herbaceous species (Geupel et al. 1997).
Maintain general flood flow conveyance patterns	Orient bands of vegetation parallel to general flow direction and do not direct flows toward levees or other sensitive structures. Plant willows, native grasses and herbaceous species along streambank to decrease erosion potential.
Provide rapid cover for neotropical migratory birds	Incorporate designs that have a high proportion of low stature plants to increase native cover (include some trees to provide a trellis system).
Provide VELB habitat	Plant elderberry in appropriate areas of the site.
Minimize sources of weeds	Plant native herbaceous understory to displace weeds.
Retain access road to the river and do not plant trees under the power lines parallel to the access road	Plant only native shrubs and herbaceous species along road and under power lines.

B. Rationale for Plant Association Selection

River Partners has developed a site-specific planting design that represents a synthesis of the available information on the site conditions and project objectives. The planting design is based on several factors:

- Soil properties (texture, moisture, seasonal water table),
- Topography/hydrology (flood regime),
- Proximity to existing vegetation,
- Habitat characteristics for targeted species, and
- Management considerations.

Using knowledge of the site factors and design considerations, River Partners developed a plant design for riparian enhancement on Vino Farms, Inc. The plant design will follow the recommendations from PRBO that are based upon field data collected from areas that were known to support individual species of birds (Hammond et al. 2002; see Riparian Bird Conservation Plan (RHJV 2004) for examples of bird diversity related to plant species diversity).

C. Plant Design

1. Walnut areas left untreated (Alternative 1)

The existing black walnuts within the project area provide a closed canopy on the west side of the project area and an almost closed canopy on the east side of the project area. Leaving these walnuts in place limits the native species that can be planted to shade tolerant species, including California blackberry, interior live oak, valley oak, creeping wildrye, and basket sedge (Table 6). California rose and mugwort could be planted in light gaps and around canopy edges. Snowberry could be planted in areas with partial shade and a high canopy. Elderberry should be planted in light gaps as it thrives in full sun, and in higher elevations of the project area that are not prone to flooding.

Native California blackberry will be used to replace Himalayan blackberry, which dominates most areas within the site. The shade tolerant oaks will take decades to mature, but will eventually become dominant.

Table 6. Species composition for walnut areas left untreated (planting density: 200 plants/acre).

Plant Species	% Species Composition	Total Walnut Area (14.5 acres) Number
Blackberry (*Rubus ursinus*)	35%	1,015
California rose (*Rosa californica*)	25%	725
Elderberry (*Sambucus mexicana*)	10%	290
Interior live oak (*Quercus wislizenii*)	5%	145
Snowberry (*Symphoricarpos albus*)	10%	290
Valley oak (*Quercus lobata*)	15%	435
Total	**100%**	**2,900**

2. Walnut areas treated (Alternatives 2 and 3)

Treating the existing walnuts throughout the project area will significantly decrease shading and allow a greater diversity of native species to be planted (Table 7). The high proportion of California blackberry will be used to replace Himalayan blackberry. Greater light availability throughout the area will support willows and cottonwoods and boxelder. Elderberry shrubs will likely also fair better under less shaded conditions and a recent study by River Partners (2007) indicates that the VELB show a preference for unshaded elderberry shrubs.

Table 7. Species composition for treated walnut areas (planting density: 200 plants/acre).

Plant Species	% Species Composition	Young Walnut Area (2.5 ac) Total Number	Mature Walnut Area (12 ac) Total Number
Arroyo willow (*Salix lasiolepis*)	5%	25	120
Blackberry (*Rubus ursinus*)	30%	150	720
California rose (*Rosa californica*)	25%	125	600
Elderberry (*Sambucus mexicana*)	10%	50	240
Fremont cottonwood (*Populus fremontii*)	3%	15	72
Interior live oak (*Quercus wislizenii*)	5%	25	120
Snowberry (*Symphoricarpos albus*)	10%	50	240
Valley oak (*Quercus lobata*)	12%	60	288
Total	**100%**	**500**	**2,400**

3. Tree of heaven and center/nonforested areas (Alternatives 1,2 and 3)

Plant species selection for the tree of heaven and center/nonforested areas is not limited by shade and could support a more diverse plant association including Fremont cottonwood, willows, oaks, and a variety of shrub species (Table 8).

Table 8. Species composition for treated tree of heaven and the center/nonforested areas (planting density: 200 plants/acre).

Plant Species	% Species Composition	Total Number
Arroyo willow (*Salix lasiolepis*)	10%	50
Blackberry (*Rubus ursinus*)	25%	125
California rose (*Rosa californica*)	20%	100
Coyote brush (*Baccharis pilularis*)	5%	25
Elderberry (*Sambucus mexicana*)	5%	25
Fremont cottonwood (*Populus fremontii*)	3%	15
Interior live oak (*Quercus wislizenii*)	5%	25
Red willow (Salix laevigata)	5%	25
Snowberry (*Symphoricarpos albus*)	10%	50
Valley oak (*Quercus lobata*)	12%	60
Total	**100%**	**500**

4. Northern bluff (planting density: 100 plants/acre)

The northern bluff is on a slope, higher in elevation, and not prone to flooding. Drought tolerant native species should be planted in this area to increase native species and structural diversity (Table 9). This area could be enhanced to increase its function as a hedgerow and wildlife corridor. Site conditions in this area make it ideal for planting a high proportion of elderberry for VELB habitat.

Table 9. Species composition for the northern bluff area.

Plant Species	% Species Composition	Total Number
Blackberry (*Rubus ursinus*)	35%	123
California rose (*Rosa californica*)	25%	88
Coyote brush *(Baccharis pilularis)*	10%	35
Elderberry (*Sambucus mexicana*)	20%	70
Interior live oak (*Quercus wislizenii*)	5%	18
Valley oak (*Quercus lobata*)	5%	18
Total	**100%**	**350**

5. Herbaceous understory

Native herbaceous understory species should be planted throughout the project area to increase diversity and as a measure of weed control (Table 10). The planting of herbaceous species should be designed around the existing topography and light availability (Table 11).

Table 10. Herbaceous species planting design.

Herbaceous Species	Walnut Areas	Tree of Heaven	Center/ Nonforested	Northern Bluff	Reference Area
Basket sedge (*Carex barbarae*)	X				X
Creeping wildrye (*Leymus triticoides*)	X	X	X	X	X
Mugwort (*Artemisia douglasiana*)	X	X	X	X	X

Table 11. Herbaceous species planting recommendations and methods.

Herbaceous Species	Planting Design Recommendation	Planting Method	
		Seed	Plug
Basket sedge (*Carex barbarae*)	Lowest and moist areas, shaded		4 ft spacing
Creeping wildrye (*Leymus triticoides*)	Higher areas, shaded or sunny	4 lbs PLS/ac	4 ft spacing
Mugwort (*Artemisia douglasiana*)	Sunny areas	0.5 PLS/ac	

VIII. PROJECT IMPLEMENTATION

This section outlines the steps to complete riparian enhancement on the Vino Farms, Inc. property. The steps are laid out for the three years needed to decrease non-native vegetation and establish riparian species on the project area.

A. Regulatory Compliance

Depending on the funding source (see Section IX), the project will need to comply with all Federal laws and regulations, such as, the National Environmental Policy Act, the Endangered Species Act, the National Historic Preservation Act and the Clean Water Act. The project also needs to comply with applicable state and local laws and regulations, such as California Environmental Quality Act (CEQA), a Reclamation Board Encroachment permit (California Code of Regulations, Title 23) and Department of Fish and Game regulations. Permitting can add significant amounts of time to a project. Regulatory compliance and permitting should be completed as early as possible during the project.

B. Site Preparation

The main goal of the riparian enhancement project is to remove non-native vegetation without impacting local native vegetation. Manual eradication, goats, herbicide, or combinations of these techniques can be used for non-native vegetation removal at this site. Manual eradication would involve using tractors to scrape, pull, or disc non-natives, or hand cutting and removal of plant material. Goats can be used for browsing understory vegetation, mainly Himalayan blackberry, which would decrease costs relative to manual removal. Herbicides will be required to treat unwanted plant species initially and throughout the riparian enhancement process. US Fish and Wildlife conservation guidelines for VELB need be followed when conducting activities around existing elderberry.

C. Field Layout

Once the non-native vegetation has been treated, native plants will be planted in rows parallel to the river and spaced around existing native vegetation. Planting rows will be curved to follow topographic contours. Planting rows will be spaced 20 ft apart. For all planting areas, except the northern bluff, spacing of plants within rows will be 11 ft. Plants in the northern bluff will be spaced 22 ft apart within rows.

Plant mortality, recruitment and flood events will alter planting density and orientation in time. Planting densities have been selected to provide good cover in a short period of time and to maintain economies of scale associated with standard plant spacing.

D. Irrigation

Drip irrigation will be used on all enhancement areas to establish the young riparian plants during the project. Potential irrigation water sources include connecting to the existing vineyard system or using a portable river pump to pull water from the river.

The water volume needed to irrigate restoration and enhancement plantings will vary through the season. Early season cool temperatures and small leaf surface of young plants will require much less water than later in the season when hot and dry conditions are common and plants are beginning to develop lateral shoots and greater leaf surfaces. Even though early season water volume needs will be relatively low, cuttings will require constant moisture during this time of root formation and development. This will require regular and frequent irrigation to maintain adequate soil moisture. Varying soil textures and meandering rows of varying lengths will require constant attention by irrigators. Average irrigation frequency is estimated to be at three-week intervals, but this will ultimately be determined by environmental conditions.

E. Plant Material Collection and Propagation

To preserve any ecotype differences, plant material should be collected locally. Table 12 summarizes common plant material sources and optimal planting times. Oak acorns can be collected from approximately September to November and placed in cold storage until planted. Field cuttings of cottonwood and willows should be collected in January-February when trees are dormant. A lead-time of at least 12 to 18 months is required from time of seed collection to transplant maturity for plants grown in containers at a nursery. Seeds for the herbaceous understory can be bought at local nurseries or seed can be collected from sources near the site and processed by River Partners staff.

F. Plant Installation

1. Woody species

Oak acorns should be planted directly into the field during the fall. Cottonwood and willow cuttings should be planted in February and March. Optimally, nursery material (i.e., blackberry, rose, and elderberry) should be planted in the spring or fall when weather conditions are cool and moist.

Table 12. Planting methods and timing for woody species.

Species	Nursery Grown		Direct Planting		Field Planting Time
	Seeds	Cuttings	Seeds	Cuttings	(primary method)
Arroyo willow	(x)	(x)		X	Feb-Mar
Blackberry	X	(x)		(x)	Oct-Apr
California rose	X	(x)		(x)	Oct-Apr
Coyote brush	X	X		(x)	Oct-Apr
Elderberry	X				Oct-Apr
Fremont cottonwood	(x)	(x)		X	Feb-Mar
Interior live oak	(x)		X		Nov-Dec
Red willow				X	Feb-Mar
Snowberry	X				Oct-Apr
Valley oak	(x)		X		Nov-Dec

X – primary method, (x) – secondary method

2. Herbaceous species

Disking is ideal for field preparation prior to planting herbaceous understory species. Most of the site will likely not be accessible by equipment and prescribed burning is not an option given the amount of existing vegetation on site and air quality restrictions. Basket sedge plugs should be planted in clusters with 4 ft spacing within clusters. Creeping wildrye can be planted as plugs in areas that are not accessible by equipment and planted using a no-till drill or broadcast seeder in areas accessible by equipment. Mugwort seed can be broadcast seeded on bare mineral soil.

Planting should begin in the fall, once the rains have “flushed” the winter weeds (Table 13). Herbicide application should take place just prior to planting to kill existing weeds and reduce light and water competition for native species. The herbaceous understory species should be planted after at least one year of weed control.

Table 13. Planting methods and timing for herbaceous understory species.

Planting Methods	Species	Timing
Drilling	Native Grasses	Nov-Jan
Broadcasting	Mugwort	Nov-Jan
Plugging	Basket Sedge	Feb-Mar

G. Plant Maintenance

1. Plant protectors

Plant protectors should be installed with about 4 inches of wood shavings applied as mulch to hold soil moisture and minimize weed growth. These help protect the plant from desiccation, herbivory, and drift from herbicide applications. Additional protectors should be placed around any native trees that colonize the site. Types of protectors that can be utilized include:

- Milk cartons,
- Blue-X, and
- Tubex.

2. Weed control

Once the enhancement is implemented, weeds should be controlled on the planting rows by spraying Roundup® or a generic herbicide brand with glyphosate as the active ingredient. The aisles between the planted rows should be sprayed to remove newly introduced weeds and sprouts of non-native invasive species. Once the herbaceous species are planted, weed control methods will be limited to mowing in areas accessible by equipment and possibly wicking with glyphosate herbicide.

Weed control will need to continue for at least 2-3 years after planting. Himalayan blackberry, tree of heaven, and walnuts are prone to re-sprouting after treatment. In order to have a successful establishment of riparian plant species, weed control of the target non-native plant species is essential during the enhancement project. Below is a summary of various controls for the target non-natives.

a) Himalayan blackberry

In order to effectively treat blackberry the canes must first be significantly cut back either through mechanical means or by grazing goats or sheep. Re-sprouting shoots tend to die more quickly when subjected to heavy grazing and goats readily consume blackberry throughout the year even when more lush vegetation is available (Bossard, 2000, DiTomaso, 2003).

Cane removal should be followed with chemical application of either a glyphosate or tryclophr (Garlon®) product. In wetter soils such as those under the mature walnut stands on the Vino Farms Inc. property, blackberry should be sprayed during times of active growth to ensure that chemicals are translocated to rhizomes and growing points.. In drier soils a fall application of chemicals is ideal (Bossard et al. 2000, Stephen Sheppard, personal communication).

b) Yellow starthistle

Control of yellow starthistle cannot be accomplished with a single treatment or in a single year. Effective management requires control of the current population and suppression of seed production, combined with establishment of competitive, desirable vegetation (DiTomaso, 2001).

Starthistle can be initially treated with Transline (active ingredient clopyralid) preferably when starthistle is in the rosette stage and before flowering. This herbicide has post and pre-emergent qualities and is very effective in controlling starthistle. Glyphosate and 2, 4-D do not have pre-emergent qualities, but may be used to control starthistle in some areas. Grazing by goat, which will eat starthistle before the spiny stage, is also effective in reducing yellow starthistle seed production (Bossard et al. 2000).

c) Tree of heaven

An effective way to eradicate Tree of Heaven is by girdling the bark, usually with a hatchet or machete, and applying 15 to 20 percent triclopyr or 15 to 40 percent glyphosate. This should be done in the spring so the tree is physiologically active, distributing the herbicide throughout its canopy and root system (Bossard et al. 2000). This treatment requires minimal equipment and is advantageous in situations where managers might want to leave dead trees standing. Young sprouts can either be hand-pulled or foliar sprayed with 4 percent glyphosate. Sites should be monitored several times throughout the growing season (Bossard et al. 2000)

IX. POTENTIAL FUNDING SOURCES

Funding for restoration and enhancement activities on private lands is available from several sources.

A. Lower Mokelumne River Partnership

The Lower Mokelumne River Partnership was established by East Bay Municipal Utility District, US Fish and Wildlife Service, and California Department of Fish and Game. The purpose of this funding program is "to protect and enhance the anadromous fishery and lower Mokelumne River ecosystem." Funding from this program can range from $600 to $50,000. Funding matches are not required, but would likely make the proposal more competitive. More information is available from East Bay Municipal Utility District's Lodi Office.

B. Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife Program provides financial assistance on a competitive basis to private landowners who want to restore or improve habitat on their property. The mission of this program is to "efficiently achieve voluntary habitat restoration on private lands, through financial and technical assistance, for the benefit of Federal trust species," which include migratory birds, anadromous fish, Federally threatened and endangered species, and other at-risk species.

Restoration projects may include activities recommended in this riparian enhancement plan, such as planting native species and removing exotic vegetation that has altered natural habitats. There is no formal application process. The initial step is to contact the State Partners coordinator. The goal of the Partners program is to secure at least 50% in cost-sharing or matching, but projects are approached on a case by case basis. This program does not fund planning and research. More information about this funding program is available at http://www.fws.gov/partners/.

C. Wildlife Conservation Board

The Wildlife Conservation Board's California Riparian Habitat Conservation Program's (CRHCP) goals are to protect, preserve, restore and enhance California's riparian ecosystems. This program is a cooperative effort involving state and federal agencies, local government, nonprofit conservation groups, and private landowners. Eligible projects include restoring riparian vegetation on flood-prone land, removal of invasive plant species, and restoration of native riparian vegetation. State departments, federal agencies, local government agencies, and nonprofit organizations are eligible to receive funding through this program. For more information, contact the Riparian Program Manager (916) 445-1072.

D. Natural Resources Conservation Service

1. Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) provides assistance to conservation-minded landowners who want to develop and improve wildlife habitat. The Natural Resources Conservation Service (NRCS) provides technical assistance and up to 75% cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the landowner generally last from 5 to 10 years.

National priorities for this program in fiscal year 2006 included promoting the restoration of declining or important native wildlife habitats, restoring or enhancing wildlife habitat of at-risk species, and reducing the impacts of invasive species on wildlife habitats. For more information, contact the local NRCS.

2. Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) promotes agricultural production and environmental quality as compatible national goals. EQIP provides incentive payments and cost-shares to implement conservation practices on eligible agricultural land. EQIP activities are carried out according to an environmental quality incentives program plan of operations developed in conjunction with the producer that identifies the appropriate conservation practices to address resource concerns. EQIP offers contracts from one to ten years and may cost-share up to 75% of the costs of certain conservation practices. National priorities for this program in fiscal year 2006 include promoting at-risk species habitat conservation.

E. Private Foundations

1. National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation has a mission to sustain, restore and enhance the Nation's fish, wildlife, plants and habitats with measurable outcomes. The foundation invests in a range of projects that focus on developing the best methods and science-based answers for restoration and enhancement projects. The Foundations' Charter initiatives have the purpose of engaging the community and focusing on regional conservation issues and are a potential source of funding for this project.

X. ESTIMATED PROJECT TIMELINE

An estimated project timeline for the Vino Farms, Inc. riparian enhancement project is shown in Table 14.

Table 14. Estimated project timeline for the Vino Farms, Inc. riparian enhancement project.

Task	Year 1				Year 2				Year 3			
	Spring	Summer	Fall	Winter	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Regulatory Compliance												
Plant Propagation												
Removal of Himalayan Blackberry												
Treatment of Tree of Heaven/Walnuts												
Site Preparation												
Irrigation Installation												
Field Planting												
Weed Control & Maintenance												
Monitoring & Reporting												
Project Management												

XI. ESTIMATED PROJECT COSTS

Cost estimates for each of the three enhancement alternatives are listed below. Alternative 1 includes cost estimates for all of the minimum recommended riparian enhancement activities which do not include any treatment of walnuts (Table 15). Table 16 lists the additional cost for treating 2.5 acres of young walnuts for Alternative 2. Additional costs for implementing Alternative 3 are listed in Table 17 (in addition to Alternative 1 costs).

Table 15. Alternative 1, estimated three-year budget for riparian enhancement project on 22.5 acres of Vino Farms, Inc.

ACTIVITY	ACRES	ESTIMATED COST	TOTALS
Himalayan blackberry removal	12.0	$57,499	
Treatment of tree of heaven	1.0	958	
Site preparation	22.5	3,055	
Irrigation installation	22.5	15,453	
Planting native vegetation in lower riparian areas	19.0	25,795	
Planting native vegetation along northern bluff	3.5	2,516	
Planting herbaceous native species	22.5	8,984	
Weed control and maintenance	22.5	23,718	
Monitoring and reporting		1,118	
Project management		13,441	
		Year 1 Sub-total	**$152,537**
Weed control and maintenance	22.5	59,296	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 2 Sub-total	**77,768**
Weed control and maintenance	22.5	35,578	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 3 Sub-total	**54,050**
		Total	**$284,355**

Table 16. Alternative 2, estimated three-year budget for riparian enhancement project on 22.5 acres of Vino Farms Inc.

ACTIVITY	ACRES	ESTIMATED COST	TOTALS
Himalayan blackberry removal	12.0	$57,499	
Treatment of tree of heaven	1.0	958	
Treat and leave standing young black walnuts	2.5	2,795	
Site preparation	22.5	3,055	
Irrigation installation	22.5	15,453	
Planting native in lower riparian areas	19.0	25,795	
Planting natives along northern bluff	3.5	2,516	
Planting herbaceous native species	22.5	8,984	
Weed control and maintenance	22.5	23,718	
Monitoring and reporting		1,118	
Project management		13,441	
		Year 1 Sub- total	**$155,532**
Weed control and maintenance	22.5	59,296	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 2 Sub-total	**77,768**
Weed control and maintenance	22.5	35,578	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 3 Sub-total	**54,050**
		Total	**$287,150**

Table 17. Alternative 3, estimated three-year budget for riparian enhancement project on 22.5 acres of Vino Farms Inc.

ACTIVITY	ACRES	ESTIMATED COST	TOTALS
Himalayan blackberry removal	12.0	$57,499	
Treatment of tree of heaven	1.0	958	
Treat and leave standing all black walnuts	14.5	16,212	
Site preparation	22.5	3,055	
Irrigation installation	22.5	15,453	
Planting native in lower riparian areas	19.0	25,795	
Planting natives along northern bluff	3.5	2,516	
Planting herbaceous native species	22.5	8,984	
Weed control and maintenance	22.5	23,718	
Monitoring and reporting		1,118	
Project management		13,441	
		Year 1 Sub-total	**$168,749**
Weed control and maintenance	22.5	59,296	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 2 Sub-total	**77,768**
Weed control and maintenance	22.5	35,578	
Monitoring and reporting		5,031	
Project management		13,441	
		Year 3 Sub-total	**54,050**
		Total	**$300,567**

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