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TABLE OF CONTENTS

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List of Tables, Appendices, Figures, and Attachments

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Figures

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A. SUMMARY

The Cosumnes Floodplain Mitigation Bank (**Bank**) is located in southern Sacramento County, north of the rural San Joaquin County community of Thornton, at the confluence of the Mokelumne and Cosumnes Rivers (**Figure 1**). The 471.71-acre Bank is bounded on the north by the Cosumnes River, on the west by the Mokelumne River, on the east by Grizzly Slough and on the south by New Hope Road (**Figure 2**). Conservation lands protected within the roughly 40,000 acre Cosumnes River Preserve border the Bank on the north and east sides. Sacramento County cities proximal to the Bank include the City of Galt (6 miles to the east) and the City of Elk Grove (approximately 11 miles to the north). San Joaquin cities proximal to the Bank include the City of Lodi (11 miles to the southeast) and the City of Stockton (21 miles to the south). The Bank lies within the Secondary Zone of the Legal Delta (Section 12220 of the California Water Code) and is therefore subject to the land use authority of the local government and not the Delta Protection Commission.

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The Cosumnes and Mokelumne Rivers, forming the northern and western boundaries of the site respectively, are both tidally influenced and therefore could be considered Traditional Navigable Waterways. Currently, natural hydrology in the Mokelumne River is absent and flows are controlled and regulated by releases from Camanche Dam operated by East Bay Municipal Utility District (EBMUD). Maximum flows for flood control purposes in the Mokelumne River are restricted to 5,000 cubic feet per second (cfs) by EBMUD. Conversely, the Cosumnes River is largely unregulated and is the only remaining western Sierra Nevada river that still has a hydrograph largely similar to pre-settlement conditions (Booth et al. 2006). Peak flows and runoff in the Cosumnes River still routinely flood the Cosumnes River Preserve providing abundant wetland services for dependant wildlife. Protected by levees since the late 1800's the Bank has not been exposed to the natural flood regime of these rivers or by the daily ebb and flow of the tide for over 100 years (Philip Williams & Associates, Ltd. 2004).

The proposed project will restore the entire property to naturally sustained riparian and wetland habitats through construction of a levee breach on the Cosumnes River, excavation and re-establishment of tidally influenced channels, construction of low-floodplain benches adjacent to channels, construction of mounds to increase topographic complexity, and strategic planting of native riparian plant species. Breaching the levee and excavating the channels will re-expose the Bank to the full natural hydrologic flood regime of the Cosumnes River and will also re-introduce natural tidal flows to the site during low-flow periods (i.e., summer and fall).

Grizzly Slough, Bear Slough, and Dry Creek are three smaller tributaries that also drain to the vicinity of the property (**Figures 2 and 3**). Also unregulated drainages, these three drainages will contribute to the overall hydrologic function of the Bank. A review of historical maps and a 1929 aerial photograph indicate that the site likely once supported several small distributory channels flanked on either side by riparian forest. The proposed project will provide benefits to aquatic and terrestrial wildlife, floodplain ecological function, watershed-wide wetland services, and local flood capacity. Additionally, the project will help add to larger regional conservation effort centered on the riparian and floodplain ecosystems of the Cosumnes River within the Cosumnes River Preserve, a joint conservation effort spearheaded by The Nature Conservancy, California Department of Fish and Game, and the Bureau of Land Management. Once

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constructed, the restored wetlands will be adjacent to traditional navigable waterways: the Cosumnes and Mokelumne Rivers.

Because the proposed project is a wetland mitigation bank, all of the assurances characteristic of a mitigation bank in the Sacramento District of the Army Corps of Engineers will be applicable. These assurances include a construction security, performance security, interim management security, conservation easement, and non-wasting endowment for long-term maintenance, management and monitoring. Perpetual stewardship of the Bank will be financed by an endowment account dedicated to the monitoring, management and maintenance of the site. The Interim Management Plan describes the methods to manage and monitor the Bank though the success period. Management and monitoring of the site in perpetuity is described in detail in a separate Long Term Management Plan.

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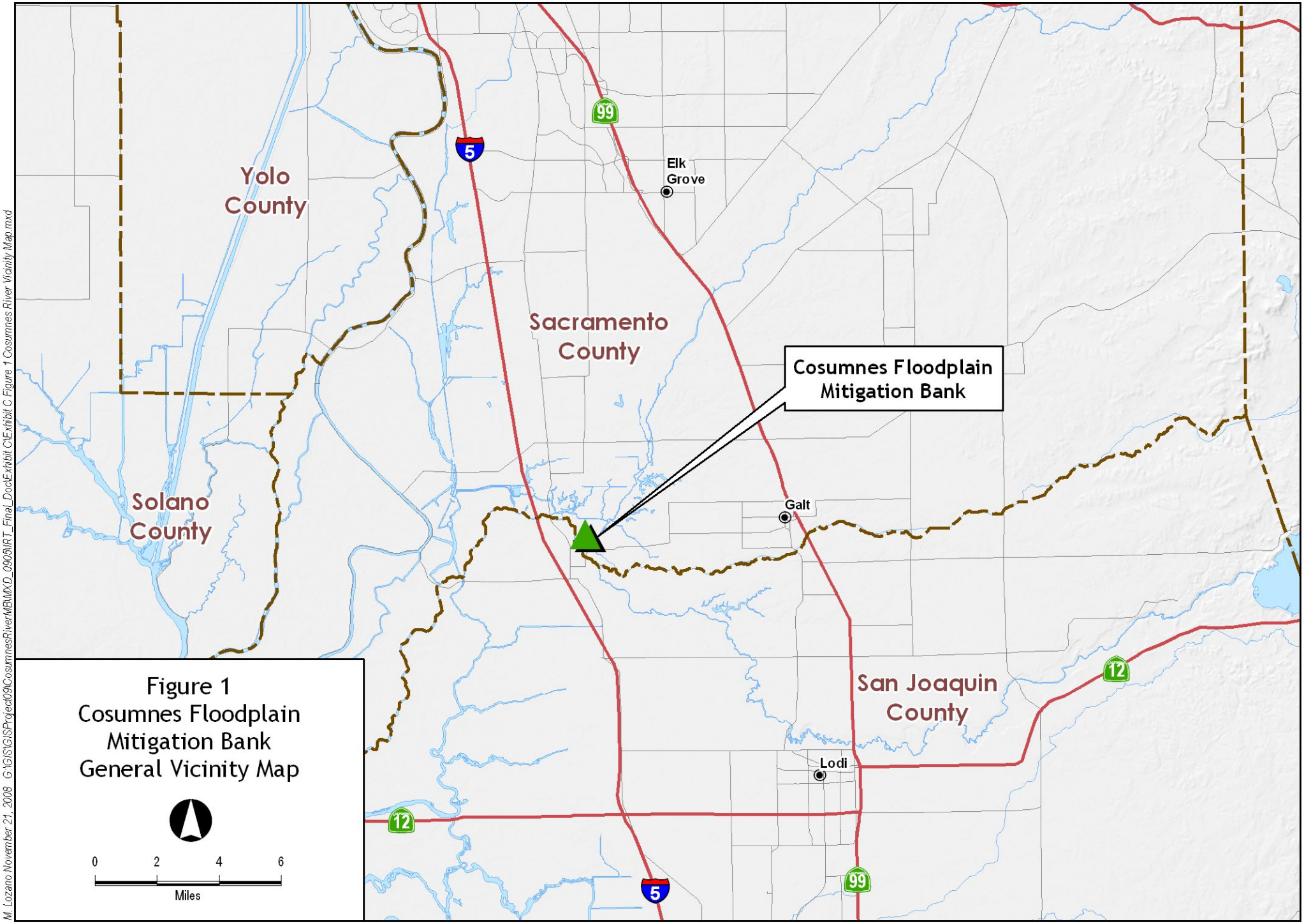

Figure 1
Cosumnes Floodplain
Mitigation Bank
General Vicinity Map

M. Lozano November 21, 2008 G:\GIS\GIS\Project\09\CosumnesRiverMB\MXD_0903\IRT_Final_Doc\Exhibit C\Exhibit C Figure 1 Cosumnes River Vicinity Map.mxd

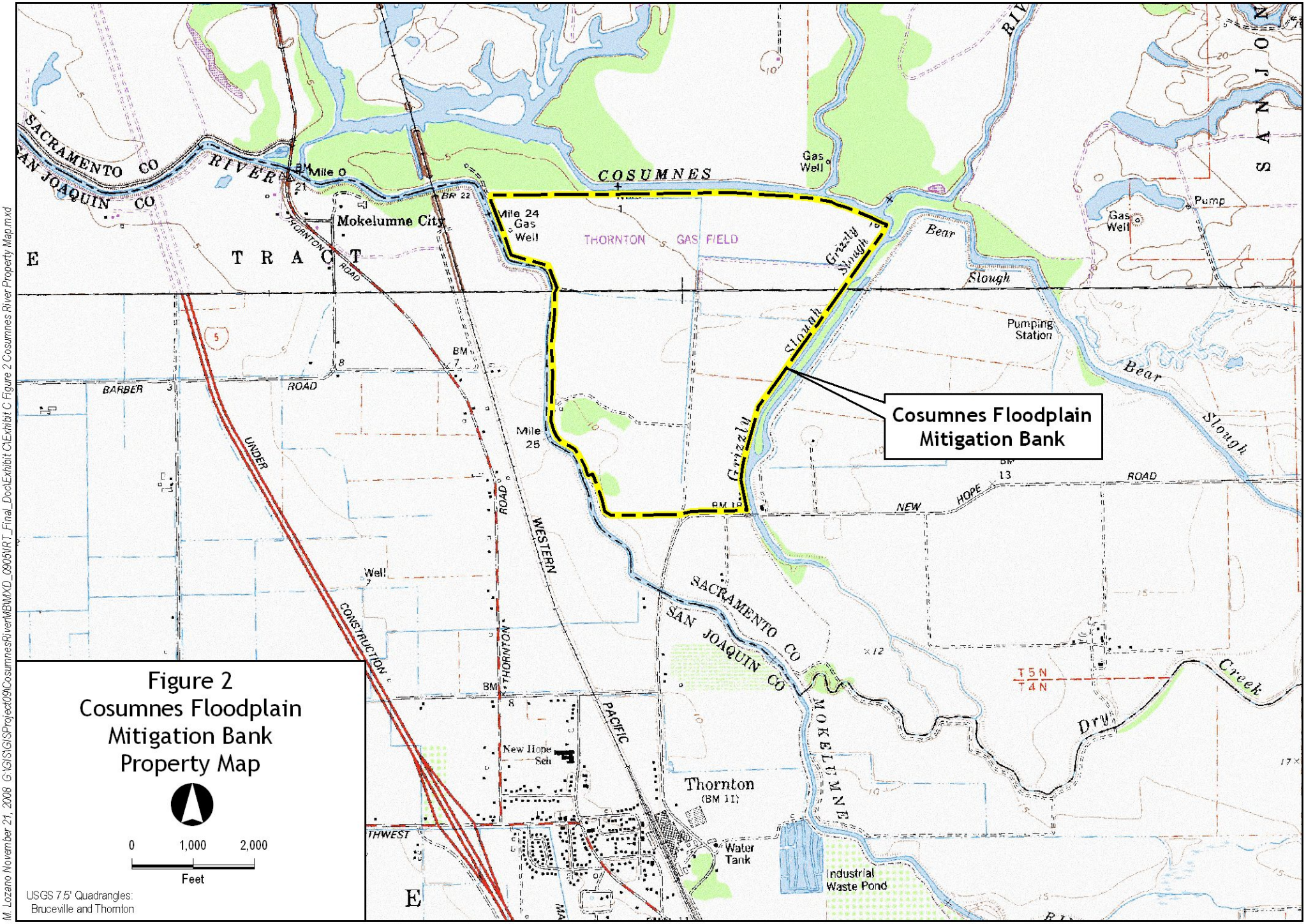

Figure 2
Cosumnes Floodplain Mitigation Bank Property Map

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Bruceville and Thornton

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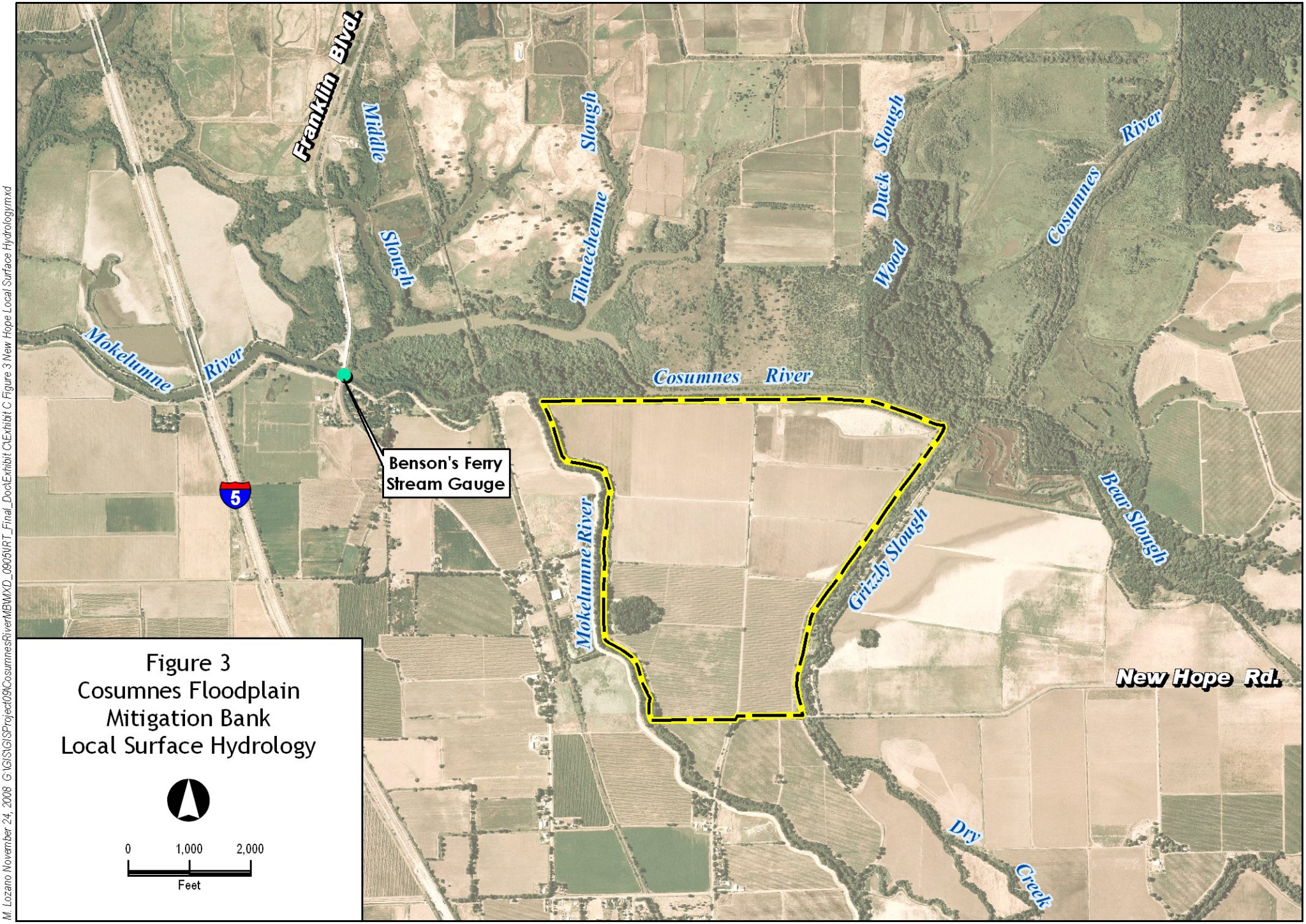

M. Lozano November 24, 2008 G:\GIS\GIS\Project09\CosumnesRiverMBMXD_0905WRT_Final_Doc\Exhibit C\Exhibit C Figure 3 New Hope Local Surface Hydrology.mxd

B. RESPONSIBLE PARTIES

B.1. APPLICANT/PERMITTEE:

Westervelt Ecological Services, LLC
600 N. Market Boulevard, Suite 3
Sacramento, CA 95834
Telephone: (916) 646-3644
Fax: (916) 646-3675
Project Manager: Matt Gause, Senior Ecologist

B.2. APPLICANT'S DESIGNATED AGENT:

No Agent Designated

B.3. PREPARER OF PROPOSED DEVELOPMENT PLAN:

Matt Gause, WES Senior Ecologist

C. PROJECT REQUIRING MITIGATION

The project being proposed is a mitigation bank by Westervelt Ecological Services ("**WES**"), rather than a mitigation proposal corresponding to specific project-related impacts. Therefore, the habitat(s) proposed for creation on the Bank are not intended to have features, functions, or values which directly correlate to a specific project's wetlands or species. Instead, the design proposed on the Bank has been developed with specific attention to the ecological characteristics on site which would allow for the greatest provision of wetland services of the habitat(s) being restored. Design factors have been targeted to create the best fit to landforms, habitats, and ecological processes on site, paying particular attention topography, soils, and hydrology. Based upon the characteristics of the habitat features proposed in this plan, the Army Corps of Engineers ("**USACE**"), US Environmental Protection Agency ("**USEPA**"), and California Department of Fish and Game ("**CDFG**") (collectively referred to as "**Agencies or IRT**") will assesses the applicability of Bank credits to serve as mitigation for project related impacts within the Bank's Service Area (BEI Exhibit B).

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D. MITIGATION DESIGN

D.1. LOCATION

The 471.71-acre Bank is located in an unincorporated portion of southern Sacramento County, south of the city of Elk Grove, CA and west of the city of Galt, CA (**Figure 1**). The 493-acre property (**Property**) on which the Bank occurs is owned in fee title by WES. The parcels within which the Bank will be established are identified by the following assessor parcel numbers: 146-140-003 and 146-140-004. Access to the site is off New Hope Road; the nearest major crossroad is Interstate 5 and West Walnut Grove/Thornton Road (**Figure 2**). This Bank location corresponds to portions of Sections 26, 27 and 34 of Township 5 N, Range 5 E, M. D. B & M., of the Thornton, California 7.5 minute quadrangle [U.S. Department of the Interior, Geological Survey].

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D.2. BASIS FOR DESIGN

Presently, floodplain wetlands and riparian woodlands along the lower reaches of rivers in the upper Sacramento-San Joaquin Delta (Delta) are either limited to narrow corridors along the toe of flood protection levees or exist as small remnants of once expansive floodplains. Exceptions to these are patches of in-channel islands or small preserves scattered throughout the Delta, but these are often limited in size. Extensive shallowly flooded habitat has all but disappeared from the Delta and the highly productive floodplains feeding the Delta are all but gone. The remaining backwater wetlands and floodplains that can be used by native fish during flood events are in short supply. The existing Bank property is moderate to low-lying land (approximately 3 to 10 feet above mean sea level – NGVD) that is surrounded by an earthen levee built to protect the site from small flood events and daily tidal fluctuations. **Figure 4** (1929 aerial photo) shows the faint outlines of the previously flooded channels within the diked interior of the property.

Bounded on the north by the unregulated Cosumnes River, on the east by Grizzly Slough and on the west by the Mokelumne River, the Bank is ideally situated for a floodplain restoration project. The Bank is located at Mile 25 on the Mokelumne River and near the confluence with the Cosumnes River. Without a levee, the entire site would normally flood during winter peak storm events, spring snowmelt runoff periods, and non-flood related inundation would be tidally influenced during the regular growing season. The low lying landscape and soil condition would support a mosaic of freshwater wetland types of habitats as evidenced from adjacent, un-leveed floodplain habitats to the north on the Cosumnes River Preserve (CRP).

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The CRP, which occurs immediately to the north of the Bank, is managed as a wildlife and nature preserve. As the CRP supports examples of early-, mid-, and late-succesional riparian habitats, as well as areas that were actively revegetated through direct planting of riparian tree species, it serves as an excellent reference design site for the restoration program at the Bank.

Early restoration efforts at the CRP focused on the planting of climax tree species (e.g., valley oak [*Quercus lobata*]) in an attempt to restore the presumed climax plant community for the area: Great Valley Valley Oak Riparian Forest. These early efforts focused on old fallow agricultural fields protected by old farm levees (Whitener pers. comm.). These early restoration projects provided mixed results; although many of the planted trees survived, other habitat elements were lacking and the characteristic riparian understory plants were not naturally recruiting as expected.

In the early to mid 1990's restoration efforts began to focus on re-introducing the natural physical and ecological processes to the floodplain to facilitate natural regeneration and succession of native riparian habitats. Two levee breach projects were undertaken in the mid- to late- 1990's to reconnect the floodplain upstream of the Bank with winter and spring flood flows on the Cosumnes River. Early successional riparian habitats rapidly established, and the results of these early breaching projects illustrate the benefits of natural process restoration on the Cosumnes River floodplain. Furthermore, re-introduction of flood waters to the floodplain provided demonstrable positive effects on native fisheries (Moyle et. al. 2007).

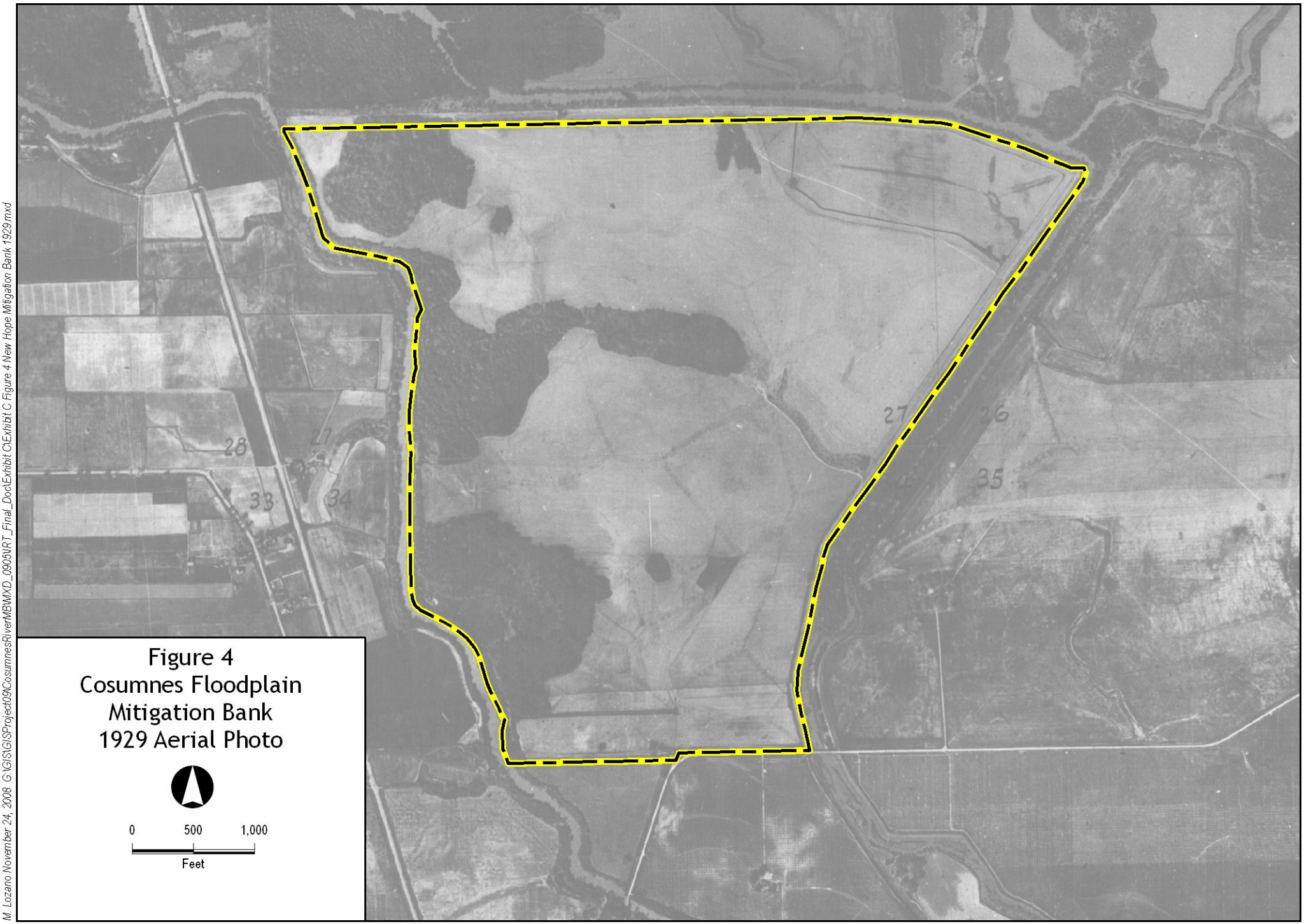

Figure 4
Cosumnes Floodplain
Mitigation Bank
1929 Aerial Photo

M. Lozano November 24, 2008 G:\GIS\GISProject09\CosumnesRiverMBMXD_0905\RT_Final_Doc\Exhibit C\Exhibit C Figure 4 New Hope Mitigation Bank 1929.mxd

The combination of the early restoration efforts as well as the later natural process based restoration efforts on the CRP form the basis for design of the restoration program at the Bank.

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D.3. CHARACTERISTICS OF DESIGN REFERENCE SITE

As previously mentioned, several areas within the CRP were used to guide the restoration planning process for the Bank; these areas are described throughout this document as "Reference Wetlands" (**Figure 5**). The Reference Wetlands are accessed through proper coordination with the CRP Preserve manager. These design Reference Wetlands represent the continuum of seral stages of riparian habitat on the Cosumnes River floodplain and encompass both planted and natural process restoration sites, as well as, un-altered riparian habitats. The Guidebook for Applying the Hydrogeomorphic Approach to Functional Assessment of the Riverine Floodplain of the Lower-Cosumnes/Lower-Mokelumne Rivers (**Attachment C**) provides additional detail as to contribution of these Reference Wetlands to the overall design of the Bank, and relationship of the proposed habitats on the Bank to these Reference Wetlands over time.

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The Bank occurs on the edge of Sacramento and San Joaquin Counties, on a geological landscape identified as Holocene alluvial deposits by Heely and Harwood (1984). Several unique soils occur on this landscape, and all are associated with riparian / fluvial processes. Soils present on the Bank are representative of the natural levee, low floodplain, basin, and basin rim geomorphic surfaces. The soils indicative of these surfaces are described in more detail later in the document.

The biological communities (both flora and fauna) of the floodplain have adapted to the soils, landform, climate, and hydrology in which they occur. The reference riparian landscape supports the same site conditions as the Bank and provides an accurate comparison of functions to the restored habitats.

The CRP landforms and elevations closely match the Bank; the four Reference Wetlands (identified as RW1 through RW4 on Figure 5) were used for design reference and development of the performance standards for the Bank. The portion of the Preserve that is located adjacent the northwestern corner of the Bank, and south of the Cosumnes River, will serve as the primary Reference Wetland (Reference Wetland 1 [RW1]); it represents a similar topographic cross section to the Bank, floods naturally, and the riparian vegetation is unaltered and mature. Additionally, the floodplain microtopographic complexity (i.e., abandoned channels, basins, and distributory channels) is intact, providing a good analog for the Bank. Reference Wetland 1 encompasses the full environmental gradient extending from near sea-level to roughly 10 feet NVGD. RW1 will function as the primary reference site for assessing progress and achievement of success criteria for the habitats proposed on the Bank.

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The Reference Wetlands contains several different riparian plant communities (based on Holland 1986) including Great Valley Valley Valley Oak Riparian Forest, Great Valley Mixed Riparian Forest, Oregon Ash Riparian Forest, Mixed Riparian Scrub, and Buttonwillow Scrub.

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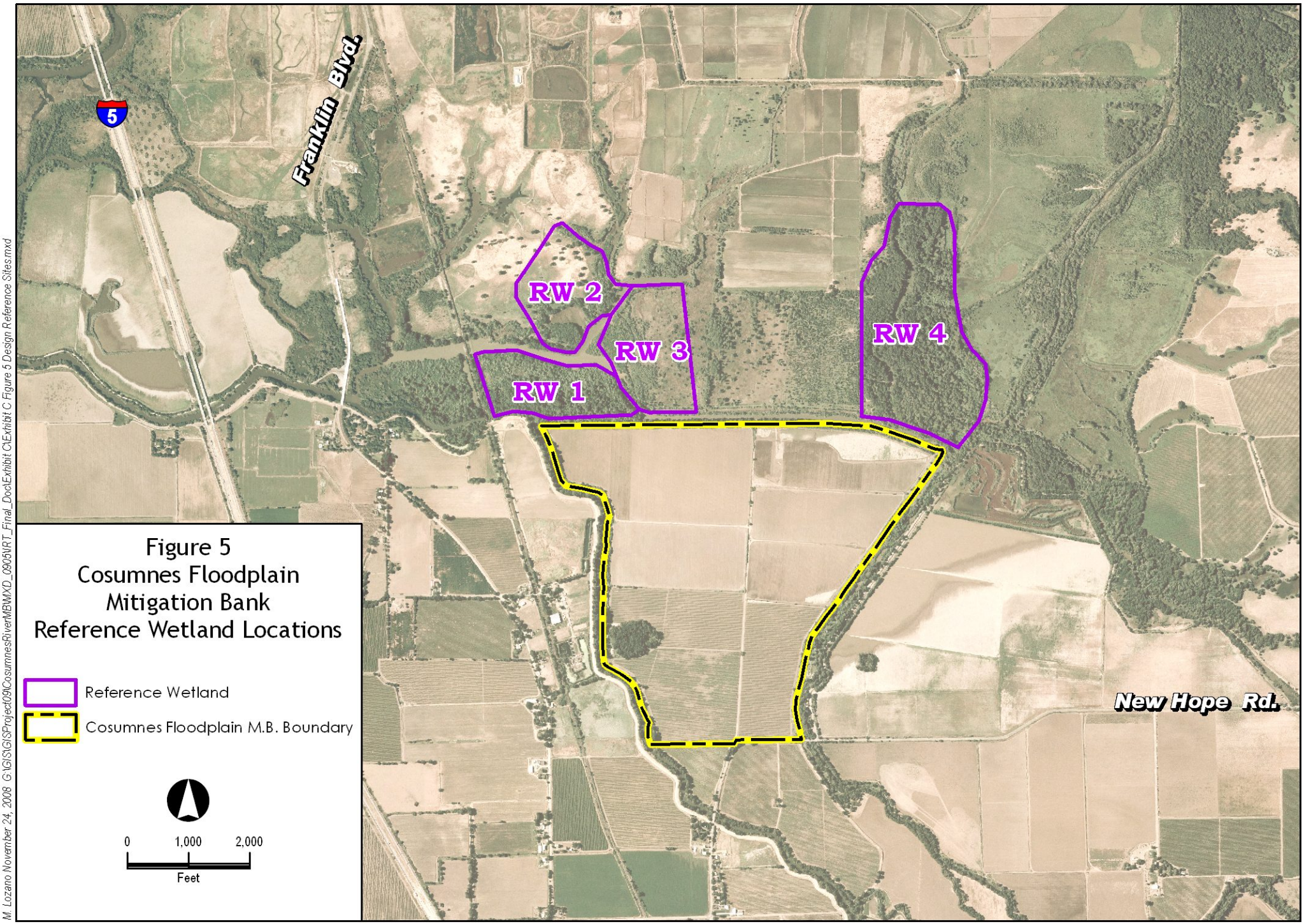
No formal wetlands delineation has been conducted on the Reference Wetlands. A planning level wetlands delineation following the U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual was conducted in the area in 1993 as part of the then nascent North Delta Project. That wetlands delineation indicated that the vast majority of riparian habitats within the Cosumnes River Floodplain met the three mandatory technical criteria for wetlands. ¶



M. Lozano November 24, 2008 G:\GIS\GIS\Project09\CosumnesRiverMBMXD_0905WRT_Final_Doc\Exhibit C\Exhibit C Figure 5 Design Reference Sites.mxd

D.3.a. Jurisdictional Areas

No formal wetlands delineation has been conducted on the Reference Wetlands. A planning level wetlands delineation following the U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual was conducted in the area in 1993 as part of the then nascent North Delta Project. That wetlands delineation indicated that the vast majority of riparian habitats within the Cosumnes River Floodplain met the three mandatory technical criteria for wetlands.

National Wetlands Inventory (NWI) data for the Reference Wetlands show the following wetland categories based on Cowardin et. al. (1979): Palustrine emergent temporary, seasonally, semi-permanently and permanently flooded (PEMA, PEMC, PEMF and PEMH, respectively), Palustrine scrub-shrub seasonally and semi-permanently flooded (PSSC and PSSF, respectively), Palustrine forested seasonally flooded (PFOC), Palustrine unconsolidated bottom semi-permanently flooded (PUBF), and Riverine lower perennial unconsolidated bottom permanently flooded (R2UBH). These areas correspond to the locations that still contain a riparian woodland community of plants. The immediately adjacent fields that had been used for agricultural activities were not given any wetland classification even though the fields hold a similar position in the landscape as the scrub-shrub and forested wetlands.

D.3.b. Aquatic Functions

Reference Wetland habitats in the reference domain (defined as the entire lower Cosumnes River floodplain in Attachment C - also "**Reference Domain"**) fall primarily within the Riverine hydrogeomorphic class with some off-channel basins falling within the Depressional hydrogeomorphic class (Smith et. al. 1995, Brinson 1993). Depressional class wetlands within the reference domain are largely the result of anthropogenic activities and do not represent the natural condition of the floodplain. Riverine class wetlands are the focus of this wetland restoration program; therefore the functions of the depressional class wetlands will not be discussed further.

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Arguably, portions of the riparian scrub habitats within the reference domain could be considered within the Tidal Fringe hydrogeomorphic class; however, following convention for forested tidal fringe class wetlands elsewhere in the nation (Shafer and Yazzo 1998), these wetland areas are being included in the Riverine class because their primary hydrologic input is derived from riverine flows and their functional capacities are more related to riverine class wetlands.

Regional subclasses of Riverine wetlands have not been defined for California's Central Valley; therefore, this document suggests "Lower Perennial Riparian Forested Wetland" to represent the riverine class wetlands within the reference domain. This subclass can be characterized as a low-gradient riverine system that receives overbank flooding as a result of backwatering during large valley-wide flood events (primarily winter events and some spring snowmelt events), as a traditional overbank flooding riverine system during winter and spring floods, and with some tidal hydrologic inputs during low-flow periods (generally summer months). Because of the unregulated nature of the Cosumnes River and the unique position of the site adjacent to the Delta, this regional subclass is very

limited in extent and probably not applicable to other riverine class sites in the Central Valley.

These wetlands provide a number of hydrological, biogeochemical, biotic and habitat functions. The following functions have been identified for the Lower Perennial Riparian Forested Wetland regional subclass:

- Dynamic Surface Water Storage
- Nutrient Cycling
- Retention of Particulates
- Organic Carbon Export
- Maintenance of Characteristic Plant Community

This suite of functions is based on the ecological characteristics of the subclass related to the subclass' position on the landscape, topographic complexity, hydrologic regime, soil characteristics, and geology. Although riverine wetlands can provide additional functions beyond those identified above, the selected functions were chosen because they are: 1) most indicative of the ecological benefits provided by the system; 2) relatively quantified and characterized; and 3) consistent with other HGM functional assessment models prepared for other similar regional subclasses of riverine wetlands in the nation. The following references were used to develop the list of wetland functions that characterize this subclass:

- The "Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands" (Brinson et al. 1995);
- "A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Low-Gradient, Blackwater Riverine Wetlands in Peninsular Florida" (Uranowski et al. 2002);
- "A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of riverine floodplains in the northern Rocky Mountains," (Hauer et al. 2002); and
- "A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of low-gradient riverine wetlands in western Tennessee" (Wilder and Roberts 2002)

A detailed functional assessment of the Reference Wetlands and baseline functional assessment of the Bank can be found in Attachment C.

D.3.c. Hydrology/Topography

Hydrology of the reference domain and Reference Wetlands is derived from a combination of direct precipitation, tidal fluctuation, and flows from the Cosumnes River, Mokelumne River, Grizzly Slough (a.k.a. Dry Creek) and Bear Slough. The Mokelumne River historically provided the majority of flows in this area with considerable peak flows related to runoff from storm events and significant sustained snowmelt flows. Peak

flows are now capped at roughly 5,000 cubic feet per second (cfs) at Camanche Dam; therefore, the Mokelumne River now has little contributory effect to the local flood regime. Dry Creek is a relative "flashy" system with a comparatively small watershed; however, due to increasing development in its watershed, peak flows associated with low-elevation storm events can be substantial but short lived, lasting several hours to perhaps a day.

Similar to Dry Creek, the Cosumnes River is a fairly "flashy" system but with a much larger watershed. The roughly 800 square mile Cosumnes River watershed begins at about 7,500 feet above sea level in the Sierra Nevada and is about 80 miles in length. As mentioned previously the Cosumnes is the last un-regulated river on the west slope of the Sierra Nevada and still supports a relatively natural hydrograph. Flood events on the Cosumnes fall into two general categories: flashier floods with higher peaks and shorter durations related to storm events within the watershed (generally November to February), and longer duration floods with smaller peak flows related to snowmelt within the watershed (generally March to May) (Booth et al. 2006). Bankfull flows in the Cosumnes River flood the Reference Wetland sites on the order of every year to every 1.5 years (Booth et al. 2006, Philip Williams Ltd. 2004).

During low-flow periods (i.e., summer and fall months) the hydrology of the Cosumnes River is primarily driven by tidal processes. The tidal cycle on the Cosumnes River is best characterized as a semi-diurnal mixed tide with two distinct peaks and two troughs per day. Tidal benchmarks are not available for this area, and the nearest published tidal benchmarks are for New Hope Landing approximately 5.5 miles downstream of the Bank on the Mokelumne River. However, lowest low-water on the Cosumnes River can be approximated from the California Department of Water Resources' Benson's Ferry stream gauge approximately 0.6 miles downstream of the Bank (Philip Williams Ltd. 2004). An analysis of the Benson's Ferry gauge data suggests that mean lowest low-water is at about 1.5 feet NGVD with lower tidal events below 0.0 feet NGVD occurring sporadically. Mean higher high water lies at approximately 3.6 feet NGVD. These approximated mean higher high-water tidal benchmarks can vary considerably from year to year within this reach of the Cosumnes River, with highest high-water in some years approaching or exceeding 5.0 feet NGVD (Philip Williams Ltd. 2004).

Topography of the Reference Wetland sites is generally flat to gently sloping with some minor topographic complexity within the floodplain associated with natural levees, high flow or abandoned channels, and scour holes downstream of very large downed woody debris. RW1 was selected for a detailed topographic cross section due to its immediate proximity to the Bank, undisturbed character, and the habitat in that location being the most representative of the proposed future condition of the Bank. The survey extended northward to the Cosumnes River from the northern levee on the Bank, traversing the floodplain perpendicular to the flow of the Cosumnes River (**Figure 6**), and revealed the characteristic topographic relief of the floodplain. Other than the levee on the north side of the Bank and its associated borrow ditch, the topography within this cross section has not been altered. Elevations within the RW1 floodplain vary from roughly 10 feet NGVD near the levee on the Bank

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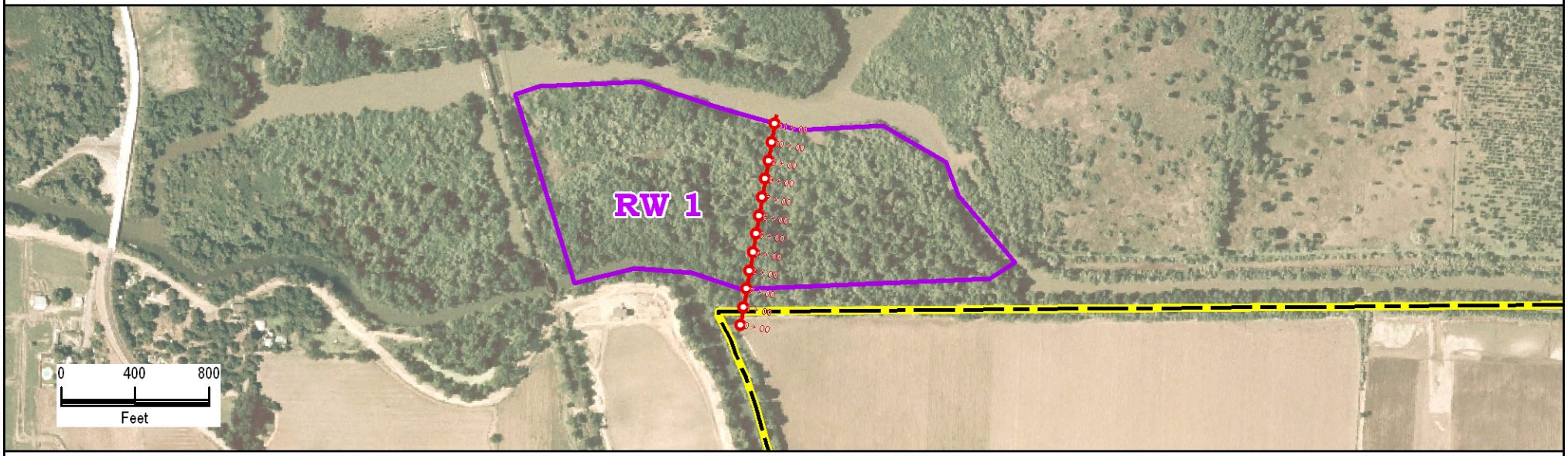

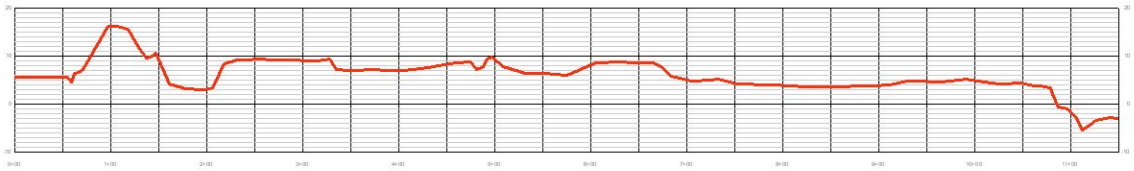

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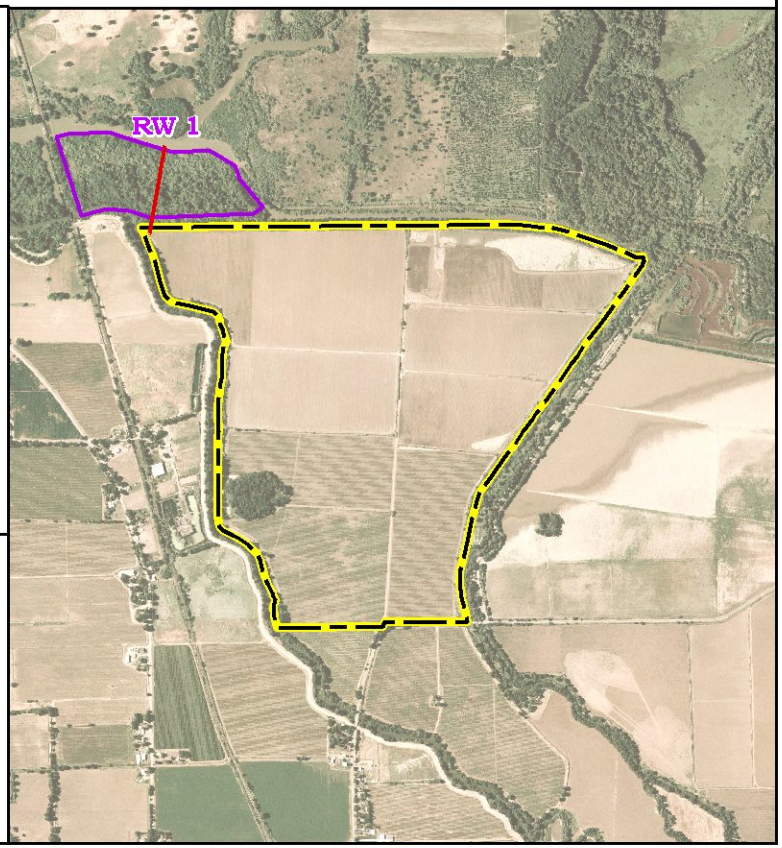

Figure 6
Cosumnes Floodplain
Mitigation Bank
Topographic Cross-section
of Reference Wetland 1

M. Lozano revised May 6, 2009 G:\GIS\GIS\Project09\CosumnesRiverMBMXD_0909\RT_Final_Doc\Exhibit C\Exhibit C Figure 6 Cross-section F-F Ref Wetland.mxd

to approximately 3.5 feet NGVD at the bank of the Cosumnes River. Within the floodplain slope there are subtle changes in topography (±1-3 feet) throughout the cross section representing former channels, high flow channels, and natural levees. The topographic range of RW1 is characteristic of the other Reference Wetland sites.

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D.3.d. Soils/Substrate

Soils of the Reference Wetlands are very similar to the soils of the Bank with the only differences being the frequency of flooding. The Soil Survey of Sacramento County (Tugel 1993) lists four soil map units for the reference domain (**Figure 7**):

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- Columbia sandy loam, drained, 0 to 2 percent slopes, occasionally flooded (map unit 118)
- Columbia sandy loam, clayey substratum, drained, 0 to 2 percent slopes (map unit 121)
- Cosumnes silt loam, drained, 0 to 2 percent slopes, occasionally flooded (map unit 129)
- Dierssen sandy clay loam, drained, 0 to 2 percent slopes (map unit 134)

The Columbia and Cosumnes soils are geographically associated, and are found in, recent (Holocene) alluvial deposits on either natural levee or low floodplain geomorphic surfaces. The Dierssen series soil is found on basin rim geomorphic surfaces and is associated with slightly older alluvial deposits. The "drained" modifier for both map unit 121 and map unit 134 are incorrect in that the levees that had effective drained these units are no longer present. Each of these soil series are described briefly below (from Tugel 1993).

Columbia Series. The Columbia series soil (Coarse-loamy, mixed, nonacid, thermic Aquic Xerofluvent) is a very deep soil on narrow, low flood plains along rivers and streams. Sandy phases of the Columbia series are often associated with the former natural levees of some river systems. In some areas levees and groundwater overdraft have altered the drainage of the soil. The soil formed in somewhat poorly drained alluvium derived from mixed rock sources. The surface layer is typically light yellowish brown sandy loam about 11 inches thick. Below 11 inches to a depth of 60 inches or more is stratified yellowish sand, brownish sand, silt loam, or loam. In some areas a clayey substratum is present below 60 inches. When not flooded, a seasonally high water table is often present at 36 inches or less. Both map units of the Columbia series soils are considered hydric soils in Sacramento County.

Cosumnes Series. The Cosumnes series soil (Fine, mixed, nonacid, thermic Aquic Xerofluvent) is a very deep soil found on narrow low floodplains along rivers. In some areas groundwater overdraft has altered the drainage of the soil. The soil formed in somewhat poorly drained alluvium from mixed rock sources. Typically, the surface layer is pale brown silt loam to about 8 inches. The next 13 inches consists of pale brown silty clay loam and clay. Below 13 inches to approximately 35 inches is a buried layer of gray clay. Gray and pale brown clay loam is present to a depth of greater than 60 inches. Layers of interbedded sands are also often present in the subsoil. Cosumnes series soils are on the Sacramento County list of hydric soils.

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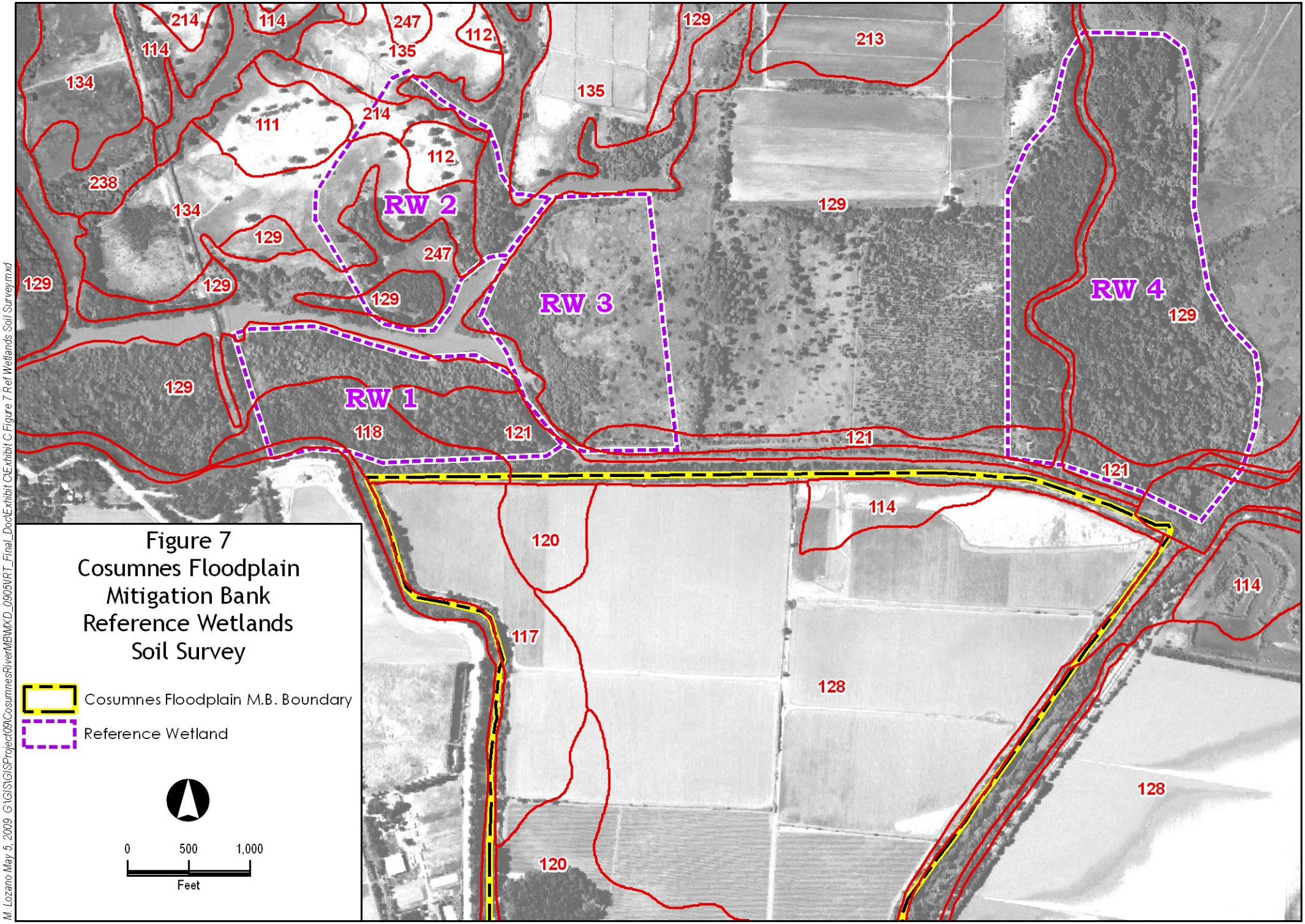
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Figure 7
Cosumnes Floodplain
Mitigation Bank
Reference Wetlands
Soil Survey
Cosumnes Floodplain M.B. Boundary
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M. Lozano May 5, 2009 G:\GIS\GIS\Project09\CosumnesRiverMBMXD_0905WRT_Final_Doc\Exhibit C\Exhibit C Figure 7 Ref Wetlands Soil Survey.mxd

Dierssen Series. The Dierssen series soil (Fine, mixed, thermic Argic Durixeralf) is a moderately deep, artificially drained soil on the rims of basins. This soil formed in somewhat poorly drained alluvium derived from mixed rocks, predominantly granite. This soil is older, and occupies a higher position in the landscape than either the Columbia or Cosumnes series soils. The surface layer of this soil is dark grayish brown and brown sandy clay loam or clay loam to about 14 inches in depth. The subsoil is yellowish brown calcareous clay to a depth of 31 inches. Below the clay is a yellowish, weakly cemented, continuous hardpan. Dierssen series soils are on the Sacramento County list of hydric soils.

D.3.e. Vegetation

The Reference Wetlands are dominated by three distinct vegetative communities, sorted primarily by elevations relative to tidal influence and flooding hydroperiod. Vegetation within the reference domain and within the Reference Wetlands is characteristic of the spectrum of seral stages of riparian vegetation communities associated with low-gradient river floodplains of the Sacramento Valley. Early-successional riparian habitats are represented by areas dominated by herbaceous riparian vegetation with some additional habitat complexity contributed by a scattering of riparian shrubs and young trees. Mid-successional riparian plant communities are represented by more densely vegetated areas dominated by dense thickets of riparian shrubs and young trees. Late-successional riparian vegetation communities are best represented by dense forests with nearly closed canopies and sparse to somewhat dense understories depending on the degree of light penetration. Within the reference domain, valley oak (*Quercus lobata*) dominated riparian forest can be considered the characteristic late-successional, or climax plant community. Each of these successional plant communities is briefly described below.

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Herbaceous Riparian: Herbaceous riparian within the reference domain is the early-successional riparian plant community and is characteristic of areas where former agricultural land was allowed to naturally revegetate following the re-introduction of natural river hydrology and resultant flood flows. Some areas were also actively planted with valley oak trees, the presumed dominant tree species in the climax plant community. Plant species dominance varies on a fine scale depending on elevation, microtopography (e.g., convex or concave surface) and degree of past disturbance. Shrubs and vines/brambles contribute less than 5% absolute cover in this community. Typical dominant plant species include creeping wildrye (*Leymus triticoides*), Italian ryegrass (*Lolium multiflorum*), bird's-foot trefoil (*Lotus corniculatus*), mugwort (*Artemisia douglasiana*), blue sailors (*Cichorium intybus*), goldenrod (*Euthamia occidentalis*), dogbane (*Anthemis cotula*), Mexican tea (*Chenopodium ambrosioides*). Common pioneer riparian tree species encountered in this cover type include Fremont cottonwood (*Populus fremontii*), narrow-leaf willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), Oregon ash (*Fraxinus latifolia*), and box elder (*Acer negundo* ssp. *californicum*). Trees in this cover type are typically less than 15 feet tall.

Riparian Scrub: Riparian scrub within the reference domain spans a relative broad elevational range with species composition and community structure stability dependant on topographic position in the landscape. Some sites supporting riparian scrub can be considered successional riparian forest; however, other sites (e.g., buttonbush scrub) in close proximity to elevated groundwater and tidal influence may be considered a climax

community as the hydrologic and edaphic factors of the site prohibit further successional development. Nonetheless, over a broad timescale aggradation of the floodplain and entrenchment of the stream channel within buttonbush scrub may eventually create conditions suitable for succession to another climax plant community such as valley oak riparian forest.

Within sites that have been allowed to restore themselves through natural process restoration, riparian scrub exist as areas of dense scrub with intervening areas dominated by plant species characteristic of herbaceous riparian communities described above. Dominated by small trees and shrubs, vegetation varies from 5 to 15 feet in height and is dominated by a mixture of willows (*Salix* spp.), young cottonwood trees, boxelder, and Oregon ash. Absolute cover of shrubs often exceeds 50%. Cover from vines such as California blackberry (*Rubus ursinus*) and Himalayan blackberry (*Rubus armeniacus*) is also pronounced is this community. Young lianas of California wild grape (*Vitis californica*) and hybrid grape (*V. californica* X *vinifera*) also begin to appear in this community.

Buttonbush riparian scrub within the reference domain appears to be a climax scrub community because of topographic position on the floodplain. This scrub community is within the upper range of tidal influence within the reference domain, occurring in a topographic band spanning from roughly 3 feet NVGD to 5 feet NVGD. This community consists almost entirely of a nearly impenetrable thicket of buttonbush; it intergrades with open water on the lower end of the topographic gradient and with Oregon Ash dominated riparian forest on the upper end of the gradient.

Riparian Forest: Riparian forest in the reference domain occupies a fairly broad elevational range occurring from just above 5 feet NVGD to roughly 12 feet NVGD. Great Valley Mixed Riparian Forest (Holland 1986) is the predominant riparian forest type closer to the active channel of the Cosumnes and Mokelumne Rivers, occupying elevations ranging from 5 feet to 10 feet NVGD. Great Valley Valley Oak Riparian Forest (Holland 1986) typically occurs on higher floodplains, generally between 7 feet and 12 feet NVG. Excellent examples of mature Great Valley Valley Oak Riparian forest occur within the Reference Wetlands used for this project. Each of these riparian forest plant communities is described below.

> **Great Valley Mixed Riparian Forest** is a tall, dense, broadleafed winter-deciduous riparian forest. The tree canopy is usually fairly well–closed and moderately to densely stocked with several riparian tree species including: box elder (*Acer negundo var. californicum*), Oregon ash, Fremont cottonwood (*Populus fremontii*), and several species of willows. Valley oak trees are also often present in the overstory of this community; however, valley oak is never the dominant tree species. Understories consist of these taxa plus shade-tolerant shrubs like buttonwillow (*Cephalanthus occidentalis*). Lianas of wild grape are also abundant in this plant community. At its upper elevational range the understory of this forest type consists of a nearly impenetrable layer of shrubs and vines including poison oak (*Toxicodendron diversilobum*), Himalayan blackberry, California blackberry, and wild grape. Owing to dense shading there is no pronounced herb layer, with herbaceous plant species limited to openings in the

canopy due to wind-throw of mature trees. This plant community occurs on relatively fine-textured alluvium near active river channels. These sites experience overbank flooding without severe physical battering or erosion. It is distributed on the floodplains of low-gradient, depositional streams of the Great Valley, usually below 500 feet (Holland 1986).

Great Valley Valley Oak Riparian Forest is characterized as a medium to tall (rarely to 100 feet) broadleafed, winter deciduous, closed-canopy riparian forest dominated by valley oak. Understory species include scattered Oregon ash, California black walnut, and box elder, as well as young valley oak. Climbing vines are often conspicuous, quickly occupying wind-throw generated light gaps. In areas where the canopy is more open allowing light penetration to the ground, surface extensive swards of creeping wildrye grass and Barbara sedge (*Carex barbarae*) can be found. Great Valley valley oak riparian forest is restricted to the highest parts of floodplains, most distant from, or higher above, active river channels and less subject to physical disturbance from flooding, but still receiving annual inputs of silty alluvium and subsurface irrigation. This vegetation community intergrades with Great Valley mixed riparian forest closer to rivers. This vegetation community was formerly extensive on low-gradient, depositional reaches of the major streams of the Sacramento and northern San Joaquin valleys. It has been virtually eliminated by land use conversion to agriculture and fire wood harvesting.

D.4. PROPOSED MITIGATION SITE

D.4.a. Location

See Section D1.

D.4.b. Ownership Status

The Cosumnes River Mitigation Bank is owned in fee title by Westervelt Ecological Services.

A review of the Title Report for the Property (Exhibit E.1 of the BEI) indicates several exceptions to title. The Bank and surrounding lands are enrolled in the Land Conservation Act of 1973 (Williamson Act); WES will amend the Williamson Act Contract to include Open Space and the restoration activities in this Plan. The amended document will be included in the Property Assessment and Warranty (Exhibit E.2 of the BEI). The remaining title issues will not be included in the Bank, and will therefore no effect the implementation of this Plan; the exceptions are described in detail in the Exhibit E.2 of the BEI.

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The Center for Natural Lands Management, or another Interagency Review Team (IRT) approved "qualified organization", will record the permanent conservation easement (Exhibit E.4 of the BEI) over the Bank property as the acting Easement Holder. Copies of the recorded easement will be provided to the Agencies within 30 days of recordation.

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D.4.c. Jurisdictional Areas

The Preliminary Delineation of Wetlands and Other Waters of the United States of the Cosumnes River Mitigation Bank (Valley Environmental Consulting 2007) indicates that the Bank supports 1.242 acres of existing wetlands, including 0.440 acre of wetland ditches and 0.802 acre of farmed wetland (**Figure 8**). The extent of the wetlands are limited due to the historic farm activities that have occurred since roughly 1900. The preliminary wetland delineation was verified by the U.S. Army Corps of Engineers on August 4, 2008. Limited impacts will occur to these wetlands through the habitat development on the Bank. The overall function of these wetlands is expected to be increased through the increased inundation, additional inputs of nutrients during flood periods, and termination of disturbance regimes associated with standard agricultural practices.

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D.4.d. Aquatic Function

Presently aquatic function of the Bank is extremely limited due to the presence of levees that prevent routine flooding and an agricultural drainage system that facilitates site drainage during winter months. Baseline aquatic functions of the Bank are detailed in Attachment C.

D.4.e. Hydrology/Topography

Currently the Bank does not support any natural wetland hydrology beyond that found within some small areas of farmed wetland that pond water during winter and spring rains and some wetland ditches that are supported by agricultural runoff and groundwater. The site is essentially flat having been leveled over the last 100 years for irrigated agriculture.

In general, the site slopes gradually to the north with the highest topographic point on the site being 11 feet NVGD near the property's southern boundary at New Hope Road and the lowest point (3 feet NVGD) being on the north end of the site at the base of the Cosumnes River levee. The elevations of the top of the levees forming the north, east, and west sides of the Bank average between 16 and 17 feet NVGD. Currently the site does not flood naturally, except during major flood events where water surface elevations overtop the existing levee (generally events with a 25-year recurrence interval or greater) flooding the Bank. At present the farm berms on the Bank are sufficient to prevent flood flows in the Cosumnes River or Dry Creek (a.k.a. Grizzly Slough) from entering the site for any flood less than a 25-year event. Flood stages for the 25 year event are roughly equivalent to 18 feet NVGD which are one foot greater than the height of the perimeter berm (Northwest Hydraulic Consultants 2008).

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D.4.f. Soils/Substrate

Based on the Soil Survey of Sacramento County (Tugel 1993) the following soil map units occur on the Bank (**Figure 9**):

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- Clear Lake clay, partially drained, 0-2 percent slopes, frequently flooded (map unit 114)
- Columbia sandy loam, drained, 0-2 percent slopes (map unit 117)
- Columbia sandy loam, clayey substratum, drained, 0-2 % slopes (map unit 120)
- Cosumnes silt loam, drained, 0-2 % slopes (map unit 128)
- Dierssen clay loam, deep, drained, 0-2 % slopes (map unit 35)

Prior to reclamation, Cosumnes silt loam, Columbia sandy loam, Dierssen clay loam, and Clear Lake clay occupied the low floodplain, natural levee, basin rim, and basin landforms respectively.

The specific physical characteristic of the soil series contained in these map units is described in detail above in Section D.3.d. The primary differences between the map units contained within the reference domain and the Bank is that within the Bank the soils are shown as "drained" indicative of the lack of natural hydrology due to the presence of levees.

D.4.g. Vegetation

There are six vegetation communities within the proposed Bank including Cultivated Lands, Ruderal, Valley Freshwater Marsh, Great Valley Mixed Riparian Forest, Great Valley Valley Oak Riparian Forest, and Riparian Scrub. Each of these communities and their distribution on the Bank are described below.

Cultivated lands are those on which the native vegetation has been completely removed by grading, plowing, and cultivation. Such areas are not expected to support any naturally occurring vegetation, although invasive native and non-native plant species frequently colonize cultivated lands as weeds, particularly when left fallow. The majority of the Bank is under cultivation. Cultivated lands within the Bank are characterized by grapevines (*Vitis vinifera*[*]) and row crops, including corn (*Zea mays* ssp. *mays*). The vineyards are maintained and lack vegetation between the rows of vines. Similarly, the corn fields support few weeds. Herbaceous weed species were found growing along the margins of the fields, along irrigation/drainage ditches and access roads, and in fields that have been left fallow. These areas are considered ruderal vegetation and are described in detail below. Native trees, predominately Fremont cottonwood with a few Arroyo willow (*Salix lasiolepis*) and Goodding's black willow (*Salix goodingii*), have naturally colonized drainage ditches along the northern and southern property boundaries and along irrigation ditches.

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Ruderal vegetation is characteristic of frequently disturbed areas such as field edges, roadsides, areas around outbuildings, houses etc. Ruderal vegetation within the Bank is generally located along dirt roadways, levees, berms, ditches, edges of agricultural fields, and in similar undeveloped areas that have been subjected to ground disturbance or grading. Characteristic herbaceous grass and forb species present within the project site include poison hemlock (*Conium maculatum**), milk thistle (*Silybum marianum**), Italian thistle (*Carduus pycnocephalus**), hoary mustard (*Hirschfeldia incana**), horseweed (*Conyza canadensis*), field mustard (*Brassica rapa**), ripgut brome (*Bromus diandrus**), Italian ryegrass (*Lolium multiflorum**), Bermuda grass (*Cynodon dactylon**), annual blue grass (*Poa annua**), cheeseweed (*Malva parviflora**), bristly ox-tongue (*Picris echioides**), common sow thistle (*Sonchus oleraceus**), field bindweed (*Convolvulus arvensis**), fennel (*Foeniculum vulgare**), rough pigweed (*Amaranthus retroflexus**), white sweet clover (*Melilotus alba**), cocklebur (*Xanthium strumarium**), dwarf nettle

[*] Denotes a non-native species that has an origin other than that of California

Figure 8
Delineation of Wetlands and Other Waters of the U.S. for The Cosumnes Floodplain Mitigation Bank Sacramento County, CA

July 22, 2008

- Wetland Data Point (DP)
- Wetland Ditch (WD)
- Farmed Wetland (FW)
- Mitigation Bank Boundary

Wetland Acreage Table

FW 1	0.568
FW 2	0.243
WD 1	0.124
WD 2	0.093
WD 3	0.030
WD 4	0.060
WD 5	0.073
WD 6	0.051
Total Wetlands	1.242 Acres

Wetland delineation conducted by:
Valley Environmental Consulting, LLC
September 17 and 18, 2007

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WESTERVELT ECOLOGICAL SERVICES

M. Lozano November 25, 2008 G:\GIS\GIS Project\09\CosumnesRiverMBMX\D_0903\IRT_Final_Doc\Exhibit C\Exhibit C Figure 8 Wetland Delineation.mxd

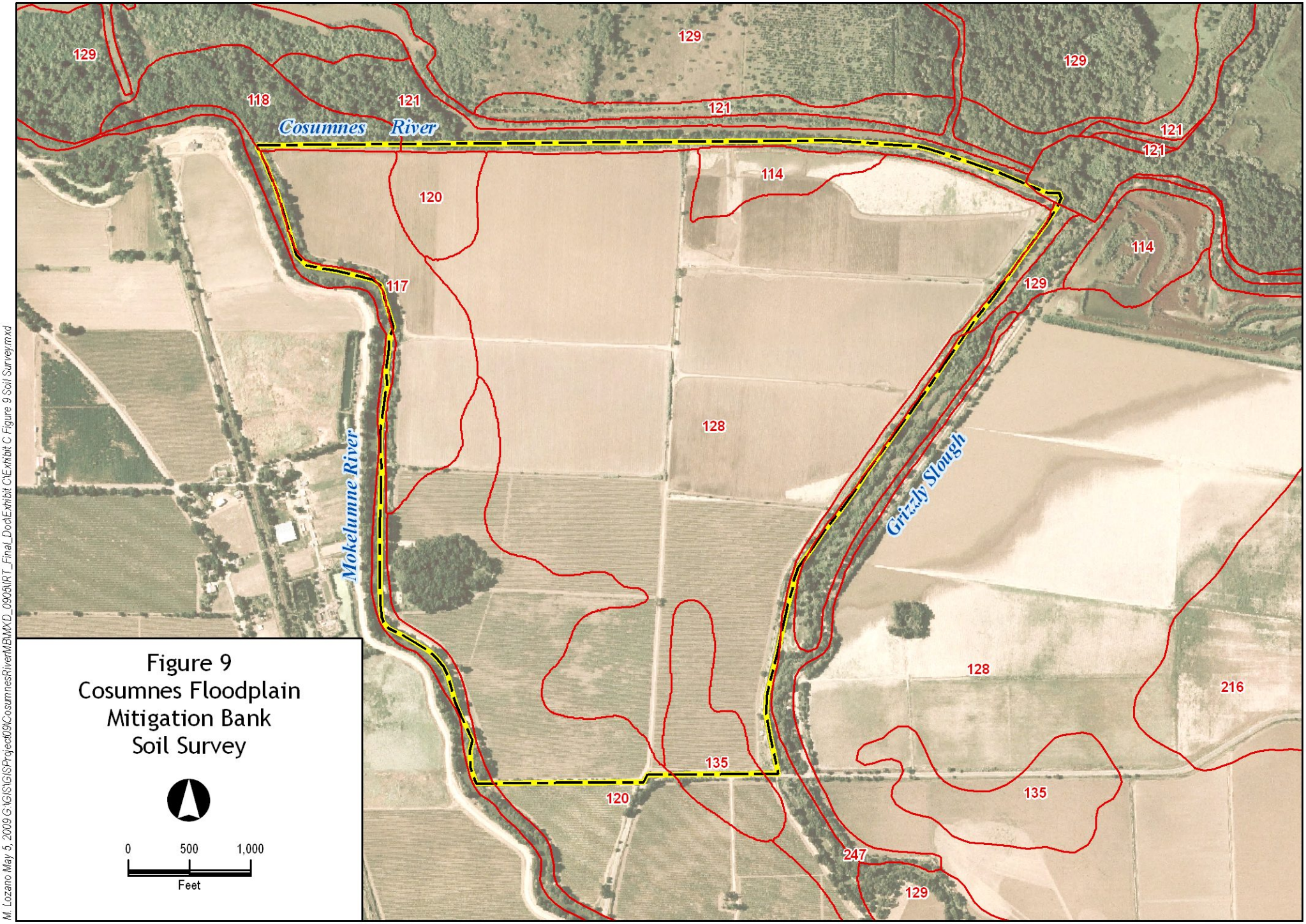

Figure 9
Cosumnes Floodplain Mitigation Bank Soil Survey

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M. Lozano May 5, 2009 G:\GIS\GIS\Project09\CosumnesRiver\MBM\MXD_0905\RT_Final_Doc\Exhibit C\Exhibit C Figure 9 Soil Survey.mxd

(*Urtica urens**), Mexican tea (*Chenopodium ambrosioides**), and lamb's quarters (*Chenopodium album**), in part.

Valley Freshwater Marsh is dominated by perennial, emergent monocots 1 to 15 feet (0.40 to 4.5 meters) tall adapted to growing in conditions of prolonged inundation (Holland 1986). It typically occurs on sites that lack a significant current that are permanently flooded by freshwater along the edges of water bodies, dune swales, slough terrace edges, banks, channels and mouth margins of rivers, bottomlands, ditch margins, lagoons, ponds, reservoir margins, and along geologic faults. This community is most extensive in the upper portion of the Sacramento-San Joaquin River Delta.

Within the Bank, freshwater marsh is very limited in extent and found only in portions of the ditches that bisect the Bank. These areas are not well developed, and are defined by patches of common tule and narrow-leaved cattail (*Typha angustifolia*). Other species present include rabbitfoot grass (*Polypogon monspeliensis**), dallisgrass (*Paspalum dilatatum**), Johnson grass (*Sorghum halapensis**), western goldenroad, mugwort, curly dock (*Rumex crispus**), umbrella sedge (*Cyperus eragrostis*), Himalayan blackberry, horseweed, poison hemlock*, and lamb's quarters*. Arroyo willow seedlings are also present in the ditches on site.

Great Valley Mixed Riparian Forest is a tall, dense, broadleafed winter-deciduous riparian forest. The tree canopy is usually fairly well–closed and moderately to densely stocked with several riparian tree species. This plant community occurs on relatively fine-textured alluvium near active river channels. These sites experience overbank flooding without severe physical battering or erosion. It is distributed on the floodplains of low-gradient, depositional streams of the Great Valley, usually below 500 feet (Holland 1986).

Within the Bank, Great Valley Mixed Riparian Forest forms a continuous band along the banks of the Mokelumne River. Overstory plant species present on site include valley oak, coast live oak (*Quercus agrifolia*), Fremont cottonwood, Oregon ash, box elder, California black walnut (*Juglans californica* var. *hindsii*), Goodding's black willow, and arroyo willow. The understory consists of a dense continuous shrub layer of poison oak, California rose (*Rosa californica*), and California blackberry. Scattered shrubs of blue elderberry (*Sambucus mexicana*) and sandbar willow (*Salix exigua*) are also present. Understory herb species include poison hemlock*, mugwort, purpletop vervain (*Verbena bonariensis**), tall annual willowherb (*Epilobium brachycarpum*) and umbrella sedge, in part. Scattered stands of coyote brush (*Baccharis pilularis*) are present along the edge of the mixed riparian forest along the levee. It should be noted that the vast majority of blue elderberry shrubs on the project site were found in mixed riparian forest along the Mokelumne River

Great Valley Valley Oak Riparian Forest is characterized as a medium to tall (rarely to 100 feet) broadleafed, winter deciduous, closed-canopy riparian forest dominated by valley oak. Understory species include scattered Oregon ash, California black walnut, and sycamore, as well as young valley oak. Climbing vines are often conspicuous, quickly occupying wind-throw generated light gaps. Great Valley valley oak riparian forest is restricted to the highest parts of floodplains, most distant from or higher above active

river channels and less subject to physical disturbance from flooding, but still receiving annual inputs of silty alluvium and subsurface irrigation.

Within the Bank, Great Valley valley oak riparian forest is present along the banks of the Cosumnes River and Grizzly Slough and in a circular stand in the southwest portion of the project site. The circular stand of valley oak riparian is likely a remnant of extensive forest that bordered the Mokelumne River, and was left when the area was converted for agriculture. This stand of valley oak riparian forest is characterized by a continuous overstory of mature valley oak trees. The understory consists of dense poison hemlock*, purpletop vervain*, Himalayn blackberry*, California blackberry, and poison oak. Densities of up to 70 valley oak seedlings per square meter were observed in this area in the spring of 2008. The valley oak riparian forest along the north and eastern property boundaries, along the Cosumnes River and Grizzly Slough differs from the mixed riparian forest along the Mokelumne River, in that the overstory is dominated by mature valley oak trees. Scattered trees typical of the mixed riparian forest are also present including Fremont cottonwood, arroyo willow, Oregon ash, box elder, and California black walnut. The understory in these areas is composed of poison oak and California rose.

Riparian Scrub is characterized as an open to dense, broadleafed, winter deciduous shrubby streamside thicket dominated by any of several riparian shrub species such as willows, buttonbush, and box elder. Dense stands usually have few herbaceous understory species. More open stands have grassy understories, typically dominated by introduced species. This community type is distributed along all of the major rivers and most of the smaller streams throughout the Great Valley watershed, usually below 1,000 feet.

Within the Bank, riparian scrub is present in scattered locations in the ditches that bisect the site and adjacent to the riparian forest along the Bank boundaries. This vegetation community is characterized by dense arroyo willow and sandbar willow stands. Native species present in the understory include common tule, poison oak, and California rose, in part. Non-native species in this community include cocklebur* and poison hemlock*.

D.4.h. Present and Historical Uses of Mitigation Area

The Bank has been continuously used for agricultural production since conversion (i.e., levee construction and clearing) in the period between 1894 and 1910 (Philip Williams & Associates 2004), and significant land clearing and agricultural production was well under way by 1929 (Figure 4). Several natural gas wells were established on the property during the mid 20th century; however, these wells are no longer in use and were officially abandoned following California Department of Conservation Division of Oil and Gas abandonment procedures between 1968 and 1979. One recent natural gas well is currently located in the northern portion of the property but it is currently inactive.

D.4.i. Present and Proposed Uses of All Adjacent Areas

The majority of the areas adjacent to the Bank are under conservation as part of the CRP. Areas to the north of the Bank are under conservation easement and are either preserved examples of riparian habitat and floodplain or are in the process of habitat restoration. The property to the east of the Bank is owned by California Department of Fish and

Game and has a small (± 60 acre) wetland and riparian mitigation site; the balance of the 700 acre property has been proposed as a wetland/floodplain restoration project by the California Department of Water Resources (Grizzly Slough Project). Areas to the south of the Bank are currently farmed as vineyards and are in an area prone to occasional flooding from breaches on the Dry Creek levee. Areas to the west of the Bank on the opposite banks of the Mokelumne are largely in agriculture or rural residential land uses. Overall the Bank is well buffered from incompatible land uses.

D.5. CREATED/RESTORED HABITATS

D.5.a. Compensation Ratios

WES proposes to preserve 38.13 acres of existing, mature Great Valley mixed riparian forest and to restore 295.45 acres of the site to Floodplain Mosaic Wetlands (FMW) and 126.26 acres of the site to Floodplain Riparian Habitat (FRH). An additional 12.52 acres (51,706 linear feet) of Shaded Riverine Aquatic (SRA) habitat will be restored along the newly created channels. **Table 1** lists these categories of habitat and their location within the Bank and **Table 2** provides a classification crosswalk between the habitat types proposed for restoration and several commonly used wetland and habitat classification schemes.

As this is a mitigation bank rather than a permittee responsible mitigation project, credits will be established at a 1:1 ratio for the acreage preserved or created on site. Mitigation ratios for use of these credits will be determined by the Agencies on a case by case basis for each impact project requiring a permit.

D.5.b. Long-Term Goals

The habitat restoration activities at the Bank will restore a mosaic of wetland types (Table 1) and associated floodplain riparian functions and services. The floodplain, when inundated, and the created channels will additionally serve as aquatic habitat for native fish species. The restored features will include riparian habitat features, floodplain wetlands, and channels that provide SRA habitat. The opening of the levee to allow natural inundation events should facilitate the re-establishment of native riparian vegetation on the Bank, via natural recruitment or assisted by direct planting. While Reference Wetlands will be used as a guide, the individual riparian ecotones within the restored Bank will be expected to naturally sort themselves out based on landscape / ecological preferences.

Swainson's hawk individuals and pairs have been recorded in the California Natural Diversity Database as nesting in the vicinity of the Bank (Exhibit H of the BEI). After the removal of the grape vines and before the trees and shrubs take hold, the upland vegetation on site would temporarily support suitable foraging habitat for Swainson's hawk. After the cottonwood trees have grown, they could support future nesting locations

The restoration plan will allow for the floodplain to undergo natural succession over time through natural process restoration and limited active restoration (i.e., planting). Because of the location of the Bank at the confluence of Cosumnes and Mokelumne Rivers and Dry Creek the site has excellent potential to persist as a riparian floodplain wetland in the

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absence of human intervention. Additionally, the proximity of the Bank to other conserved habitat areas (e.g., the Cosumnes River Preserve) buffers the site from potentially deleterious adjacent land uses.

Limiting site access and trespass is also a long-term goal so that the restored habitats can provide wildlife habitat support functions without disturbance or potential introduction of non-native species.

Table 1. Expected Habitat Types at Cosumnes River Mitigation Bank

Expected Habitat Type	Location on Bank	Rough Description
Floodplain Mosaic Wetlands	Lower lying ground along the northern property line and within the excavated channels and channel benches up to approximately +6.5 feet NVGD elevation.	Subject to periodic inundation and saturation during the growing season, and dominated by vegetation typically found in wetland environments. The intended wetland types include emergent herbaceous, willow dominated scrub-shrub and forested vegetation cover.
Floodplain Riparian Habitat	Higher ground along the edges of the property, outside the excavated channels and above the +6.5' NVGD elevation	Subject to infrequent inundation, primarily winter or spring flood conditions, and composed primarily of mixed riparian forest. This forest is composed of several species of tall-stature trees such as willows, cottonwoods, and Oaks with a dense, shade-tolerant understory of shrubs and vines including poison oak, California blackberry and wild grape.
"Upper Delta" Shaded-Riverine Aquatic (SRA)	Excavated channels throughout site	Linear edges of the tidally inundated channels that support riparian vegetation which either overhangs, or protrudes into, the channel. Vegetation consists primarily of willow and floodplain-adapted tree and shrub species.

Deleted: Jurisdictional Wetland Habitat

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Table 2 Crosswalk Comparison of Cosumnes River Mitigation Bank Credit Types and Commonly Used Habitat Classification Systems

Credit Type	DFG (Delta Levees Program)	Terrestrial Natural Communities of California (Holland 1986) vegetation type	Classification of Wetlands & Deepwater Habitats of the U.S. (Cowardin et al. 1979)	California Wildlife Habitat Relationships (Mayer and Laudenslayer 1988)
Floodplain Mosaic Wetlands (FMW)	Shaded Riverine Aquatic (SRA) Habitat (channels within FW only)	Great Valley Valley Oak Riparian Forest (61430) (in part)	Palustrine Forested Wetland, Seasonally Flooded (PFOC)	Valley Foothill Riparian (VRI)
		Great Valley Cottonwood Riparian Forest (61410) (in part)	Palustrine Forested Wetland, Seasonally Flooded (PFOC)	Valley Foothill Riparian (VRI)
		Great Valley Mixed Riparian Forest (61420) (in part)	Palustrine Forested Wetland, Seasonally Flooded (PFOC)	Valley Foothill Riparian (VRI)
		Great Valley Willow Scrub (63410) (in part)	Palustrine Scrub Shrub Wetland, Seasonally Flooded (PSSC) and Seasonal-tidal (PSSR)	Valley Foothill Riparian (VRI)
		Buttonbush Scrub (63430) (in part)	Plaustrine Scrub Shrub Wetland, Semi-permanently flooded, (PSSF), Seasonally Flooded (PSSC) and Seasonal-tidal (PSSR)	Valley Foothill Riparian (VRI)
		Coastal and Valley Freshwater Marsh (52410) inlcusive of fringing seasonal wetlands (in part)	Palustrine Emergent Wetland, Seasonal-tidal (PEMR), Semi-permanently flooded (PEMF), Seasonally Flooded (PEMC), Saturated/Semipermanent/Seasonal (PEMY)	Fresh Emergent Wetland (FEW)
Floodplain Riparian Habitat (FRH)	Riparian Forest (RF)	Great Valley Valley Oak Riparian Forest (61430) (in part)	Palustrine Forested Wetland, Temporarily flooded (PFOA), Intermittently Flooded (PFOJ)	Valley Foothill Riparian (VRI)
		Great Valley Cottonwood Riparian Forest (61410) (in part)	Palustrine Forested Wetland, Temporarily flooded (PFOA), Intermittently Flooded (PFOJ)	Valley Foothill Riparian (VRI)
		Great Valley Mixed Riparian Forest (61420) (in part)	Palustrine Forested Wetland, Temporarily flooded (PFOA), Intermittently Flooded (PFOJ)	Valley Foothill Riparian (VRI)
	Scrub-Shrub (SS)	Great Valley Willow Scrub (63410)	Palustrine Scrub Shrub Wetland, Temporarily Flooded (PSSA), Intermittently Flooded (PSSJ)	Valley Foothill Riparian (VRI)

D.5.c. Aquatic Functions

The proposed restoration plan will re-introduce the ecological processes favoring the restoration of the aquatic functions characteristic of those identified for the Reference Wetlands within the reference domain. The anticipated suite of functions is based on the ecological characteristics of the Reference Wetlands related to the Bank's position on the landscape and post-construction site topographic complexity, hydrologic regime, and soil characteristics. Although riverine wetlands can provide additional functions beyond those identified below, the selected functions were chosen because they are: 1) most indicative of the ecological benefits provided by the system; 2) relatively easily quantified and characterized; and 3) consistent with other HGM functional assessment models prepared for other similar regional subclasses of riverine wetlands in the nation. The following references were used to develop the list of wetland functions that characterize this subclass:

- The "Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands" (Brinson et al. 1995);
- "A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Low-Gradient, Blackwater Riverine Wetlands in Peninsular Florida" (Uranowski et al. 2002);
- "A regional guidebook for applying thehydrogeomorphic approach to assessing wetland functions of riverine floodplains in the northern Rocky Mountains," (Hauer et al. 2002); and
- "A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of low-gradient riverine wetlands in western Tennessee" (Wilder and Roberts 2002)

These wetlands provide a number of hydrological, biogeochemical, biotic and habitat functions. The following functions have been identified for the Lower Perennial Riparian Forested Wetland regional subclass:

- Dynamic Surface Water Storage
- Nutrient Cycling
- Retention of Particulates
- Organic Carbon Export
- Maintenance of Characteristic Plant Community

A detailed functional assessment of the Reference Wetlands and baseline functional assessment of the Bank can be found in Attachment C.

D.5.d. Hydrology/Topography

As stated previously the Bank does not currently support any natural wetland hydrology beyond that found within some small areas of farmed wetland that pond water during winter and spring rains and some wetland ditches that routinely collect agricultural runoff. The general hydrologic characteristics of the reference domain are discussed in Section D.3.c above.

The restoration plan for this Bank involves de-leveling the existing agricultural fields to restore the floodplain topography and re-establishing a connection between the Bank and the full natural hydrology of the Cosumnes River. Through an iterative process among WES ecologists, landscape architects, engineers, and consulting hydraulic engineers (Northwest Hydraulic Consultants and MBK Engineers), the landscape restoration concept has been refined to produce a restoration plan that maximizes ecological benefits while minimizing effects on local flood characteristics. As part of the iterative design process, Northwest Hydraulic Consultants (NHC) has conducted modeling of low-flow (i.e., tidal) and sub-10 year recurrence interval flood flows for the Bank. Additional hydraulic modeling for the site under the 10, 25, 50, 100, and 200 year recurrence interval flood flows was performed by MBK Engineers.

A graphic depiction of iterative design process is provided in **Figure 10**. The current design features include a 30 foot wide main stem channel (north-south orientation) and 20 foot lateral channels. Channel bottom elevations will vary from 0.0 feet NGVD at the breach opening and will slope up to 3.0 feet NGVD at their termini. Floodplain benches will be excavated (where necessary) along the edges of the channels sloping gradually from 5.0 to 6.5 feet NGVD (see Attachment B and **Figure 11**). Floodplain benches are being excavated in certain locations to create a more naturalistic transition between channels, wetlands, and upland riparian forest similar to those observed in the Reference Wetlands (Figure 11).

NHC modeling results indicate that with the proposed channel configuration (Figure 10), a 30-foot wide breach excavated to 0.0 NGVD on the Cosumnes River is sufficiently sized to accommodate daily tidal flows throughout the Bank without a significant fluctuation in sediment accretion or erosion at the breach, within the channels, or downstream from the breach within the Cosumnes River (see Sediment Study-Attachment E). With 3:1 side slopes, a 30- foot wide breach would result in a gap in the Cosumnes River berm of roughly 150 wide at the top of berm (at ±17 feet NGVD) tapering to 30 feet in width at the bottom (at 0.0 feet NGVD). Under natural full tidal flows, the channels on the Bank are designed to drain completely, or nearly completely, during lowest low-water period for approximately 2 to 3 hours on a roughly monthly basis. This design is intended to help disrupt the breeding cycle of non-native predatory fish (additional details provided in the "NOAA Fisheries Briefing Package" included in Exhibit H.1 of the BEI). The drainage of the channels will only occur during low flow periods in the Cosumnes River (i.e., summer and fall months). During typical winter and spring months, the hydrology of the site is primarily driven by storm and snowmelt runoff and water surface elevations are greater as a result of these peak flows.

Winter and spring peak flows are the primary natural processes driving habitat establishment and succession at the Bank. The cumulative stage duration exceedance

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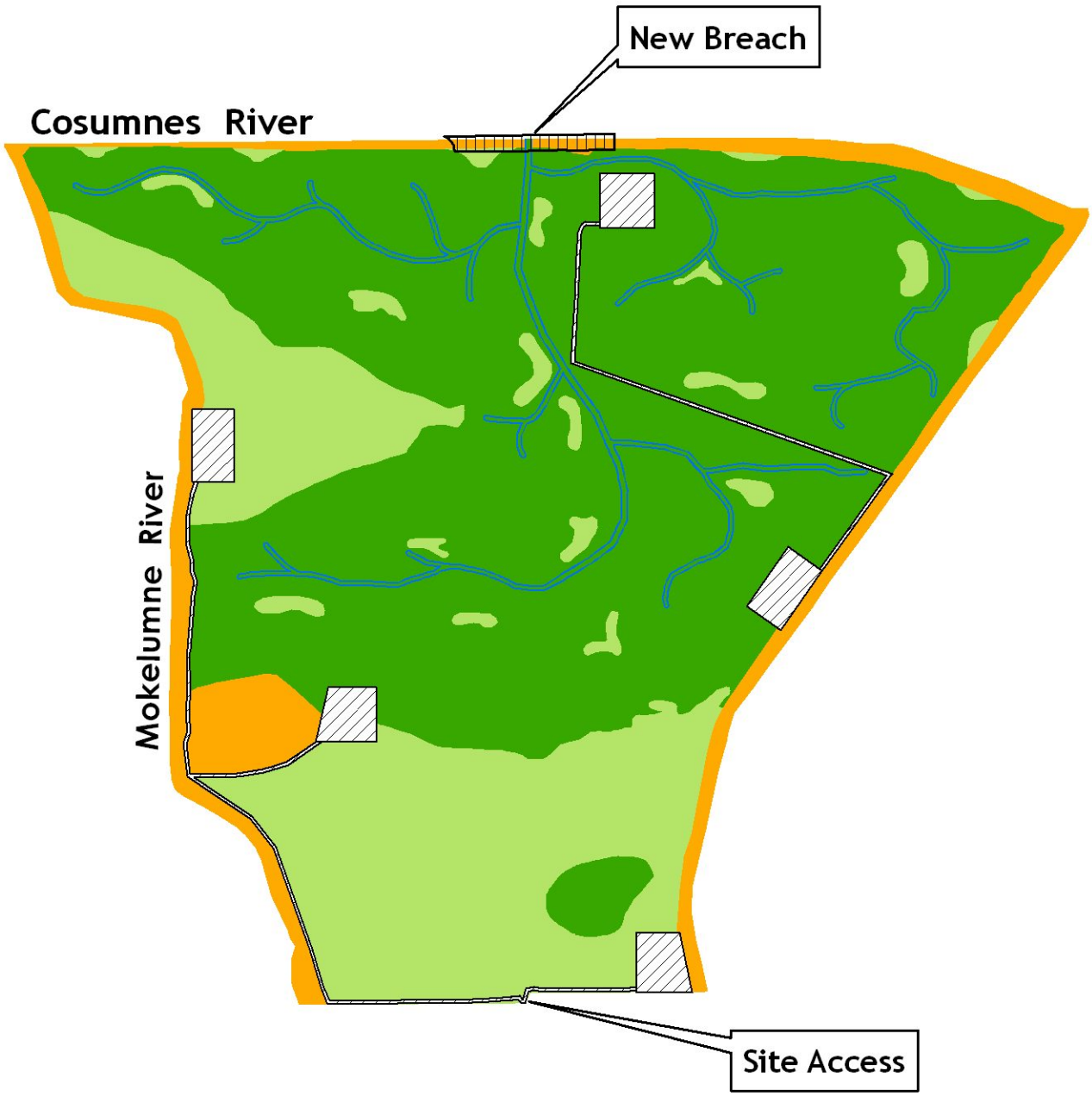

Figure 10
Cosumnes Floodplain Mitigation Bank
Bank Habitat Plan

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KEY

- Shaded Riverine Aquatic (SRA) Habitat
- Floodplain Riparian Habitat
- Floodplain Mosaic Wetland
- Riparian Preservation
- Mineral Pads and Access Roads

M. Lozano revised May 14, 2009 G:\GIS\GISProject09\CosumnesRiverMBMXD_0905\RT_Final_Doc\Exhibit C\Exhibit C Figure 10 Bank Habitat Plan REVISED 090514.mxd

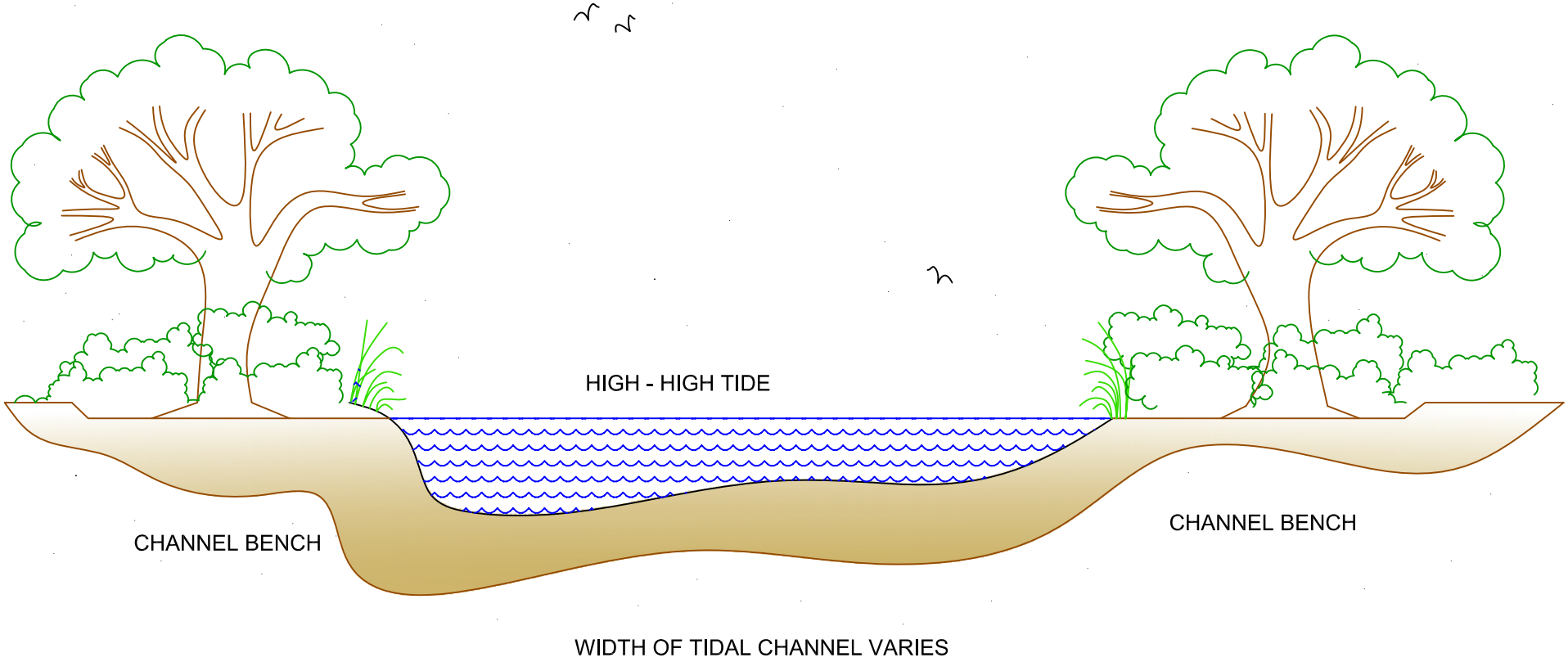

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FIGURE 11: TYPICAL TIDAL CHANNEL SECTION

frequency for 2.0 through 26.0 year recurrence interval flows as recorded at the Benson's Ferry stream gauge (NHC 2008) is provided in **Figure 12**.

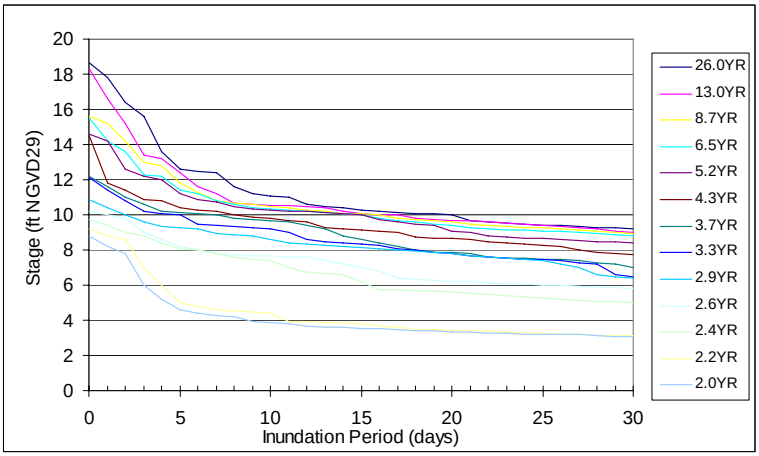

Figure 12. Cumulative stage duration exceedance curves for Benson's Ferry stream gauge, Mokelumne River (period of record 1984-2007. Source: NHC 2008).

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As mentioned above, this stage duration exceedance relationship is for the Benson's Ferry stream gauge approximately 0.6 miles downstream of the Bank on the Mokelumne River. River stage at the Benson's Ferry gauge is dependant on the channel morphology and other physical properties of the floodplain in the vicinity of the gauge, and are therefore only an approximation of the actual stage duration relationships that will occur on the Bank. Nonetheless, the data for Benson's Ferry suggest that the majority of the Bank will be inundated during a 2.0 year recurrence interval event (**Figure 13**).

Similar stage duration exceedance curves were also developed by Philip Williams Ltd. (2004) in support of project planning for the Department of Water Resources' Grizzly Slough project immediately to the east of the Bank. The curves developed for the Grizzly Slough project were developed using a MIKE 11 hydraulic model that took multiple *in-situ* channel and landscape cross sections into account while also evaluating simultaneous flow characteristics of the Cosumnes River, Dry Creek, Grizzly Slough and Bear Slough (Philip Williams Ltd. 2004). The MIKE 11 output for the Grizzly Slough project indicated a stage elevation of 10+ feet NGVD at the confluence of Grizzly Slough and Bear Slough (northeast corner of the Bank) under the 1.3 year event and nearly 18 feet NGVD for a 2.0 year event.

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The stage elevation discrepancies between the Benson's Ferry stream gauge data and the model output generated for the Grizzly Slough Project suggest that actual stage values for the Bank may lie somewhere between the two values. Regardless, these data coupled with observations of wetland conditions along the topographic transect (Figure 6) strongly suggest that wetland hydrology is present below the 7.0 foot NGVD contour. Whether or not the areas below 7.0 feet NGVD are flooded/inundated for long duration, the properties of the soils in within these portions of the bank will promote soil saturation

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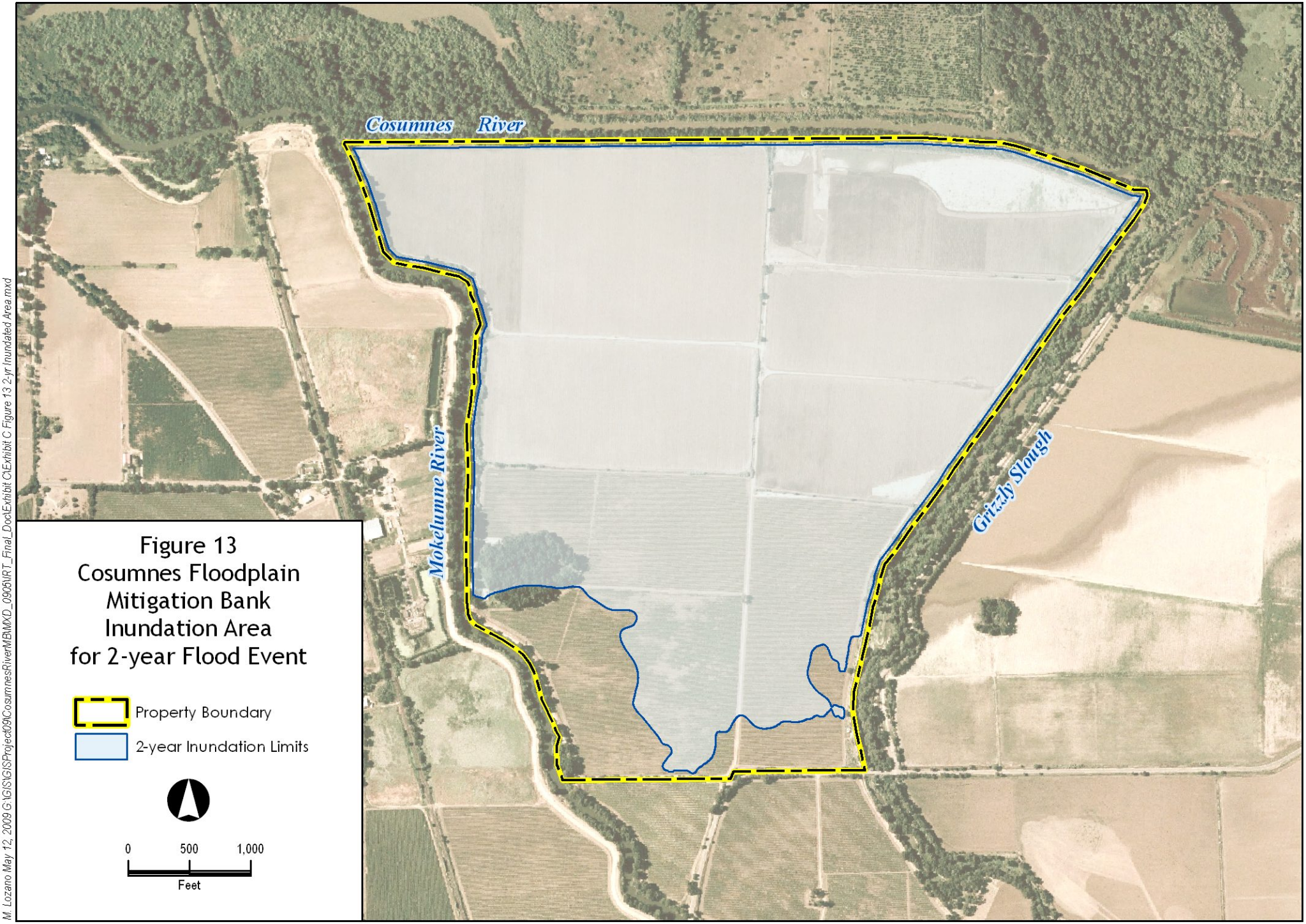

M. Lozano May 12, 2009 G:\GIS\GIS\Project\09\CosumnesRiver\MBMXD_0905\RT_Final_Doc\Exhibit C\Exhibit C Figure 13 2-yr Inundated Area.mxd

for long durations. Soils below 7.0 feet NGVD are all fine textured silt loams and clays that characteristically have capillary fringes 1.5 to 6.0 feet above the water table, respectively (Delleur 1999). Because of this capillary potential, a water surface elevation of between one and five feet would actively contribute to soil saturation within the upper soil profile. Evidence of this condition was observed within the Reference Wetland; topographic elevation reflection this condition are shown in the transect in Figure 6.

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D.5.e. Soil/Substrate

As mentioned previously (soil series are described in detail in Section D.3.d.), the Soil Survey of Sacramento County (Tugel 1993) the following soil map units occur on the Bank (Figure 9).

- Clear Lake clay, partially drained, 0-2 % slopes, frequently flooded (map unit 114)
- Columbia sandy loam, drained, 0-2 % slopes (map unit 117)
- Columbia sandy loam, clayey substratum, drained, 0-2 % slopes (map unit 120)
- Cosumnes silt loam, drained, 0-2 % slopes (map unit 128)
- Dierssen clay loam, deep, drained, 0-2 % slopes

Each of these soil map units was historically associated with riparian floodplain, basin, or basin rim habitats characteristic of the Reference Domain. Following project construction these map units would no longer be considered "drained".

D.5.f. Vegetation

Ultimately, the vegetation within the restored areas will mirror that described above in Section D.3.e consisting of a mosaic of riparian floodplain plant communities based on elevation. A graphical depiction of the relationships between vegetation type and elevation based on observations from transects within the reference standard wetlands is provided in **Figure 14**.

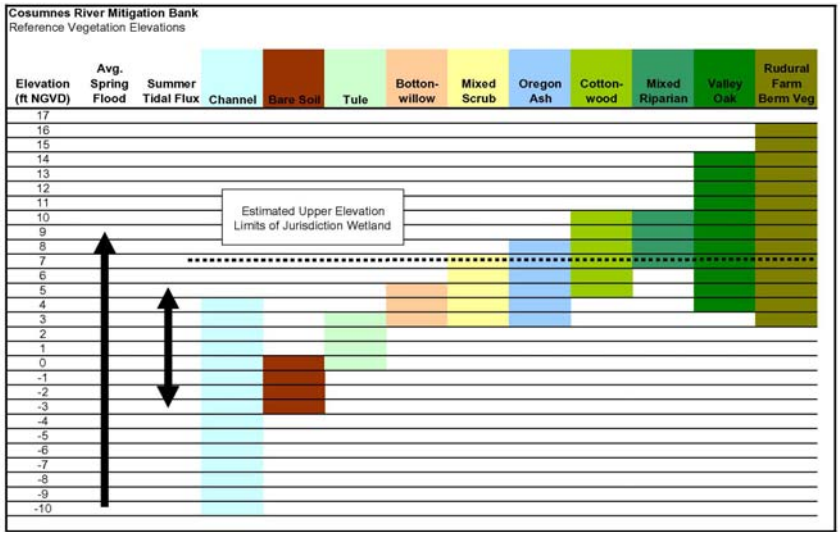

Figure 14. Reference vegetation elevations

Although portions of the wetland area below 6.5 feet NGVD will be cluster planted with riparian tree and shrub species, the initial vegetation community for much of the acreage is anticipated to be herbaceous riparian, followed by riparian scrub and riparian forest as the Bank undergoes natural succession. Portions of the Bank, especially higher elevation areas that flood less frequently (i.e., above 7 feet NGVD), will be planted with native riparian tree and shrub species to help accelerate re-vegetation. A Photoshop image of the predicted climax vegetation types based on the Reference Wetlands is shown in **Figure 15**. The review of historical aerial photographs suggests that given appropriate hydrologic and climatic conditions, a closed canopy valley oak riparian forest requires approximately 70 years to develop following cessation of agriculture.

E. SUCCESS CRITERIA AND MONITORING

E.1. SUCCESS CRITERIA

Success criteria for the Bank are described below. Success criteria are described separately for ***Floodplain Mosaic Wetlands*** and non-wetland ***Floodplain Riparian Habitat***.

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Floodplain Mosaic Wetlands

The Bank provides a unique opportunity to restore riverine wetlands on one of the only remaining free flowing rivers in California. A total of 295.45 acres of FMW are proposed for the Bank. Because wetland restoration at the Bank is dependant on natural riverine processes, successful habitat establishment is truly dependant on the adequacy of the landscape design as well as climatic conditions within the watershed. Because past experience on the CRP has demonstrated that intensive "traditional" habitat restoration approaches such as intensive planting have had limited success in comparison to natural process restoration, the Bank restoration plan relies heavily on re-introduction of natural processes. Unfortunately nature is often difficult to predict. Under the current regime of climate change and sea level rise, predicting future conditions has become more problematic. Historic flow conditions on the Cosumnes River and observations of the Reference Wetlands suggest that the appropriate natural processes are intact and habitats should develop as planned. However, climatic variability may either retard or accelerate wetland development at the Bank. Because of the potential for variability in the rate of wetland development, the following wetland success criteria differ from more frequently employed criteria. Frequently, metrics such as planting survival and wetland hydrology are directly quantified and compared to pre-determined, or fixed, values developed as surrogates for overall wetland function. The following success criteria, and supporting functional analysis (Attachment C), have been developed so that regardless of climatic variations over the short-term, the overall function of the restored wetland can be assessed and evaluated against adjacent Reference Wetlands.

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A functional assessment method was developed for the Bank based on reference standard wetlands on the CRP (See Attachment C). The performance standards are only attained if there is an overall trajectory towards increasing functional capacity of the restored wetland over time, rather than more commonly used fixed metrics for hydrology and vegetation.

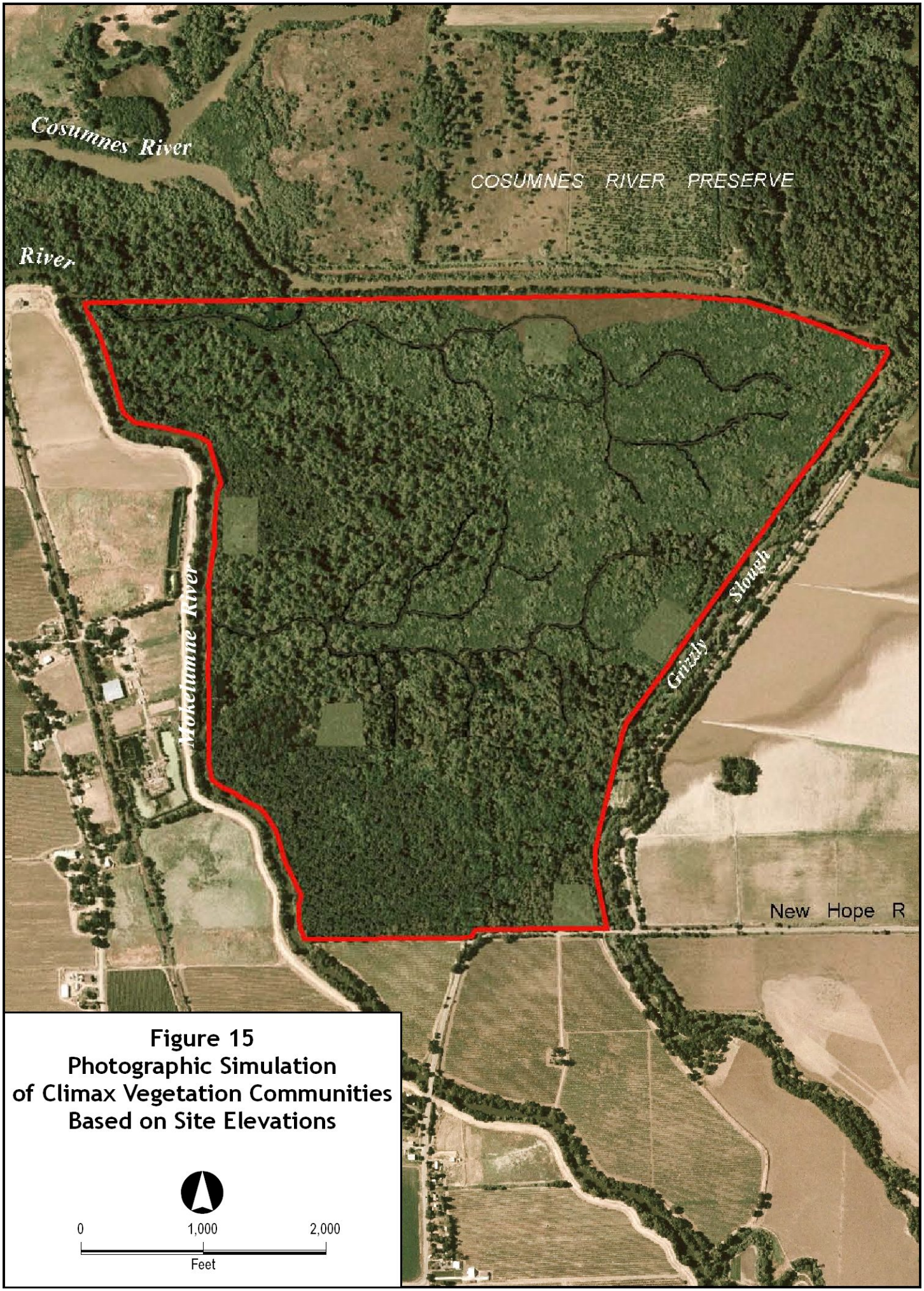

Figure 15
Photographic Simulation of Climax Vegetation Communities Based on Site Elevations

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M. Lozano November 25, 2008 C:_GIS_Projects_0702\New Hope\MXD_0811\IRT Submittal Nov2008\Exhibit C\Exhibit C Figure 15 Photo Simulation.mxd

The following functional capacities are being used to assess success of the wetland restoration project:

- Dynamic Surface Water Storage
- Nutrient Cycling
- Retention of Particulates
- Organic Carbon Export
- Maintenance of Characteristic Plant Community

The justification for, and definitions of, each of these functional capacities is described in Attachment C. Each of these functional capacities is calculated using both quantitative and qualitative data collected during each monitoring event. The data collected in support of scaling each of the variables used in the functional assessment is field based and to the extent feasible relies on sampling using both plotless as well as plot-based methods.

Year 2 Performance Standards: Following construction of the levee breach, floodplain wetlands on the Bank will have increased functional capacity over baseline conditions in the following functional areas:

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- Dynamic Surface Water Storage
- Retention of Particulates
- Organic Carbon Export

The year two performance standard serves as a measure of the success of reintroducing natural hydrological processes to the site. This performance standard assumes that if natural hydrological processes are present and functioning as designed, the colonization of the site by characteristic riparian plant species will proceed as observed within the Reference Wetlands. Meeting this performance standard will require that the Bank site is flooded during winter and spring peak flow events at a similar frequency and duration as the Reference Wetlands.

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Alternative measures that could be used to assess attainment of this performance standard include:

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- Observation of peak flow flooding (winter and spring flood events) and correlation with Benson's Ferry stream gauge data for the monitoring period to verify similarity in flood stage and duration between Reference Wetlands and restored wetlands.
- Observation of tidal flows and direct measurement of maximum elevation of tidal inundation during highest high water tides during the monitoring period.

Year 3 Performance Standards: Floodplain wetlands on the Bank will have equivalent or increased functional capacity over year 2 values for the following functions:

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- Dynamic Surface Water Storage
- Retention of Particulates
- Organic Carbon Export

The Bank will also have increased functional capacity over baseline values for the following functions:

- Nutrient Cycling
- Maintenance of Plant Community

Alternative measures that could be used to assess attainment of this performance standard include:

- Evaluation of vegetation sampling plot data (see Attachment C) to ascertain whether or not the site is being colonized by characteristic native hydrophytic riparian plants and invasive plants are not dominant (i.e., greater than 10% cover, see Attachment C for sampling methods) in any one sampling plot.
- Observation of peak flow flooding (winter and spring flood events) and correlation with Benson's Ferry stream gauge data for the monitoring period.
- Observation of tidal flows and direct measurement of maximum elevation of tidal inundation during highest high water tides for the monitoring period.

A wetlands delineation will be conducted as a component of the year 3 performance standard to measure the extent of jurisdictional Waters of the U.S. The results of the wetland delineation, once field verified by the USACE, will be used to assess the extent of wetland present at year 3.

Year 4 Performance Standards: The Bank will have equivalent or increased functional capacity over Year 3 values for the following functions:

- Dynamic Surface Water Storage
- Retention of Particulates
- Organic Carbon Export
- Nutrient Cycling
- Maintenance of Plant Community

In particular, the restored wetlands should be increasing in functional capacity in regards to nutrient cycling and organic carbon export.

Alternative measures that could be used to assess attainment of this performance standard include:

- Evaluation of vegetation sampling plot data (see Attachment C) to ascertain whether or not the site is being colonized by, or sustaining, characteristic native hydrophytic riparian plants and invasive plants are not dominant (i.e., greater than 10% cover, see Attachment C for sampling methods) in any one sampling plot.
- Observation of peak flow flooding (winter and spring flood events) and correlation with Benson's Ferry stream gauge data for the monitoring period.
- Observation of tidal flows and direct measurement of maximum elevation of tidal inundation during highest high water tides during the monitoring period.

Year 5 Performance Standards: The Bank will have equivalent or increased functional capacity over Year 4 values for the following functions:

- Dynamic Surface Water Storage
- Retention of Particulates
- Organic Carbon Export
- Nutrient Cycling
- Maintenance of Plant Community

A wetlands delineation will be conducted as a component of the year 3 performance standard to measure the extent of jurisdictional Waters of the U.S. The results of the wetland delineation, once field verified by the USACE, will be used to assess the extent of wetland present at year 5.

Alternative measures that could be used to assess attainment of this performance standard include:

- Evaluation of vegetation sampling plot data (see Attachment C) to ascertain whether or not the site is being colonized by, or sustaining, characteristic native hydrophytic riparian plants and invasive plants are not dominant (i.e., greater than 10% cover, see Attachment C for sampling methods) in any one sampling plot.
- Observation of peak flow flooding (winter and spring flood events) and correlation with Benson's Ferry stream gauge data for the monitoring period.
- Observation of tidal flows and direct measurement of maximum elevation of tidal inundation during highest high water tides during the monitoring period.

Floodplain Riparian Habitat

A total of 126.26 acres of the higher elevation areas (above 6.5 feet NGVD) of the site will be planted with a mix of riparian trees, shrubs, vines, forbs and grasses that tolerate periodic flooding. Planting in these less frequently flooded areas is being implemented to help accelerate revegetation and to provide early habitat for local wildlife species. Success will be based on percentage survival of tree and shrub plantings in years one through five following planting:

Year 1 (one year after planting)	80% survival
Year 2	75% survival
Year 3	70% survival
Year 4	65% survival
Year 5	60% survival, or natural recruitment greater than initial planting density for two consecutive years.

Naturally recruited native riparian tree, shrub, or vine species will also be used in evaluating annual success criteria within the FRH. The year five performance standard may also be met if natural recruitment of native riparian plants increase plant density per acre across the Bank, at a level greater than initial planting densities for two consecutive years.

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E.2. MONITORING

E.2.a. Methods

Floodplain Mosaic Wetlands

Monitoring methods for FMW are detailed in Attachment C. In summary the following biotic and abiotic attributes, or variables, will be monitored in late spring or early summer on an annual basis:

- Frequency and duration of overbank flooding
- Average depth of inundation
- Floodplain roughness
- Tree basal area
- Shrub stem density
- Herbaceous cover
- Plant species composition
- Organic horizon biomass
- Coarse woody debris volume
- Surface Water Connections

Values for several of these variables may be well below those of the reference standard wetlands during the initial monitoring period (e.g., tree basal area, organic horizon biomass, coarse woody debris volume); nonetheless, these variables will be monitored to assist in understanding the trajectory of the restored wetland's functional capacity over time.

Additionally, in years 3 and 5, the total length of SRA habitat will be directly measured from low-level aerial photographs.

Floodplain Riparian Habitat

FRH will be monitored in summer using a complete count method (i.e., counting all surviving planted material by species) in Monitoring Years one and two. Data on vigor of surviving plants will also be collected by planting zone to assist in troubleshooting plantings if necessary.

If year two success criteria are met at the end of year two, or if flood events have rendered planted material impossible to discern from other naturally recruited vegetation, year three monitoring will be conducted by sampling shrub stem density within 0.04 ha plots, consistent with the methods utilized in the Functional Assessment (Attachment C).

Wildlife

Wildlife monitoring will be conducted during the FMW monitoring as shown in Table 3 in Section E.2.c. Additional avian surveys will be conducted in cooperation with the CRP and Point Reyes Bird Observatory songbird monitoring program begun in 1995 (http://www.prbo.org/cms/96).

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E.2.b. Photo-Documentation

Ground level photographic documentation will be collected annually during the early summer from a minimum of 15 fixed locations including the breach site. Aerial photographs will be taken in years 3 and 5 to support SRA habitat monitoring and wetland delineation efforts.

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E.2.c. Monitoring Schedule

Table 3. Monitoring Schedule

Monitoring Task	Year 1	Year 2	Year 3	Year 4	Year 5
Floodplain Mosaic Wetland – Functional Assessment Data Collection	X	X	X	X	X
Wetland Delineation			X		X
Floodplain Riparian Habitat – Direct Survival Counts	X	X			
Floodplain Riparian Habitat – plot based sample			X	X	X
Wildlife Survey	X	X	X	X	X
Aerial Photograph			X		X
Ground Level Photographs	X	X	X	X	X

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F. IMPLEMENTATION PLAN

F.1. SITE PREPARATION

F.1.a. Grading Implementation

As part of construction planning, a preliminary grading plan was completed for the property (Attachment B). The topographic contours in the grading plan are designed to re-establish daily tidal inundation over a portion of the property with a diversity of depths, velocities, and subsequent vegetative communities. Layout of wetland excavations will occur using a survey grade GPS system and laser level to create onsite conditions to within sub-inch accuracy to plans. Creation activities will be conducted using heavy equipment, which may include: scrapers, bulldozers, skiploaders, and a water truck. Construction is proposed to occur over two seasons. The first phase of construction will entail excavating the tidal channels and floodplain benches and is scheduled to occur in summer 2010. FRH will also be planted in fall 2010. The second phase of construction planned for 2011 entails planting the constructed channel banks with riparian shrubs and trees and excavation of the breach on the Cosumnes River.

To ensure that constructed wetlands replicate the functions and values of natural wetlands and those of the design Reference Wetland, the following wetland characteristics and criteria have been incorporated in the Bank Habitat Design Plan (Figure 10).

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Jurisdictional Wetland Habitat

The jurisdictional wetland habitat within the FMW will be a mosaic of freshwater wetland types, subject to periodic inundation and saturation during the growing season, and dominated by vegetation typically found in wetland environments. The intended wetland types include emergent, scrub-shrub and forest vegetation cover. The majority of the wetlands will be located in the northern half of the site with the lowest existing topography. The agricultural fields will be de-leveled to vary topography and create mounds, sloughs, and flats. The greatest elevation for the wetlands will be just above the soil saturation point and expected to be 6.5 feet NGVD. Portions of the site will be planted with native trees and shrubs. The remaining areas will be managed to allow natural recruitment of native seed material. Grasses and forbs will also be planted to establish a ground cover. Channels will be developed within the wetlands that transition from SRA habitat and riparian.

Other Waters of the United States

The majority of the restored FRH will be located on the southern half of Bank. In addition, FRH areas will be located on higher mounds of excavated soil along side cut channels and berms. The Riparian areas will cover the ground on the site above 6.5 feet NGVD. Snags may be added within the site to provide nesting habitat for various bird species. Planting methodology will be the same as for the Jurisdictional Wetlands Habitat, but species will be selected by those more commonly found in floodplains. Depressions may be created in the upper extent of the Riparian area to create water "pockets" and "dry" channels cut to allow late spring flooding to reach back to the southern portions of Bank. The Other Waters of the United States (Other Waters) are these areas subject to frequent flooding, but do not have the same three parameter regulatory requirement (e.g., hydrological regime) as jurisdictional wetlands. The Other Waters are expected to be flooded from early spring runoff and are associated with the silt loam and sandy loam soils of the gently sloped floodplain landform.

F.1.b. Avoidance Measures

Construction of channels and floodplain benches on the Bank will result in the creation of roughly 295.45 acres of jurisdictional wetlands and riparian areas. Construction will be managed to ensure that the habitats are constructed as designed, and that existing wetland habitats are avoided to the maximum extent feasible. To protect the naturally occurring wetlands on the Bank during construction of mitigation habitats, the following measures will be implemented:

- A WES representative familiar with wetland restoration will observe and manage habitat restoration on a daily basis. The representative will have authority to stop construction activities if situations arise that could be detrimental to the existing wetlands. Construction will be allowed to resume only after corrective actions have alleviated the potential for detrimental activities.
- Erosion control Best Management Practices will be implemented as needed, including but not limited to: grading during the dry season, compaction of berms and upland spoils, and seeding and mulching areas of exposed soil.

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- Prior to construction, existing wetland habitat to be preserved will be marked on construction drawings. Vehicle movement corridors and haul routes will be marked on construction drawings to minimize vehicle movement across the site.
- Careful application of water to the stockpiles soils will reduce the potential for air quality contamination by fugitive dust. Watering of other exposed soils related to construction activities will be necessary for dust control and soil compaction.
- All construction staging activities will occur within a designated staging area, to be identified by the restoration ecologist. This site will be located no closer than 200 feet any existing threatened or endangered species habitat (e.g., valley elderberry longhorn beetle), and will be marked in the field and on the construction plans. All refueling and maintenance activities will occur within the staging area. Any spill of hazardous materials will be cleaned up immediately, in accordance with all federal, state and local regulations. Additional measures to minimize impacts to the site will be identified in the Storm Water Pollution Prevention Plan, which will be prepared and implemented prior to the initiation of construction.

  Additional avoidance or minimization efforts may be required by USFWS or NOAA Fisheries for federally listed plant or animal species and will be identified in the Mitigation Project Biological Opinion, if applicable. Any additional avoidance or minimization measures identified in the Biological Opinion will need to be implemented at the time of construction.

F.1.c. Soil Disposal

As this is a balanced cut and fill project, no excavated materials will be transported offsite or away from the restored wetlands.

F.1.d. Soil Treatment

No soil treatments are needed to promote wetland or riparian forest restoration at the site.

F.1.e. Pest Plant Removal

No invasive exotics occur on or immediately adjacent to the Bank. Therefore, no pre-construction treatment program will be employed to manage pest species. Post-construction, a mechanical and chemical control plan (BEI Exhibit D-4) will be implemented to manage and control the occurrence of any pest plant species that may occur on Bank.

F.1.f. Construction Monitor

A WES restoration ecologist or biologist will observe and manage habitat restoration on a daily basis. The representative will have authority to stop construction activities if situations arise that could be detrimental to the existing wetlands. Construction will be allowed to resume only after corrective actions have alleviated the potential for detrimental activities. A summary report will be prepared and submitted to the USACE following completion of project construction, including construction observations and any problems that arose during construction.

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F.2. PLANTING/SEEDING

F.2.a. Planting Plan

FMW is anticipated to readily colonize with riparian species as has been observed on the CRP. Tidal channel banks will be planted with pole cuttings of willows (*Salix lasiolepis*, *S. laevigata*, *S. lasiandra*), Fremont cottonwood, Buttonwillow, and Oregon ash to accelerate near water cover.

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FRH will be cluster planted with a selection of riparian shrubs and trees. Cluster plantings will occupy 30% (approximately 40 acres) of the total acreage of non-wetland forest. Cluster plantings will be planted on 15 foot centers and will vary in size from 0.1 to 0.5 acre in size and will be located throughout the non-wetland portions of the site. Exact locations will be determined following grading so that planting locations correspond with areas of silt loam soils and suitable slope for irrigation. Table 4 lists riparian plant species proposed for planting.

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Table 4. Floodplain Riparian Habitat Plant Pallette

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Common Name (*Scientific Name*)	Growth Form	Material	Percent Composition
Valley oak (*Quercus lobata*)	lg. tree	acorn	40%
Box elder (*Acer negundo* ssp. *californicum*)	small tree/shrub	container	15%
Oregon ash (*Fraxinus latifolia*)	med. tree	container	10%
Fremont cottonwood (*Populus fremontii*)	lg, tree	cutting	13%
Black willow (*Salix goodingii*)	med. tree	cutting	5%
Arroyo willow (*Salix lasiolepis*)	shrub	cutting	5%
Red willow (*Salix laevigata*)	shrub/tree	container	5%
Sandbar willow (*Salix exigua*)	shrub	cutting	3%
Coyote brush (*Baccharis pilularis*)	shrub	container	3%
Blue elderberry (*Sambucus mexicana*)	shrub	container	1%

F.2.b. Nature and Source of Propagules

All propagules (i.e., acorns, cuttings, and pole cuttings) will be collected onsite or from the CRP. All container stock will also be grown from onsite materials. All valley oak plantings will be from acorns.

To the extent feasible native grass seed will be secured from commercial growers with local ecotypes; however, in the event that local ecotypes are not available, seed from other Central Valley riparian ecotypes will be substituted.

F.3. IRRIGATION

FRH will likely be the only restored habitat type requiring irrigation. FMW and SRA habitats will receive regular inundation by reintroduction of tidal action to the site. Because the site will be routinely flooded, drip irrigation systems cannot be used; therefore all irrigation will be performed using border, furrow, or flood irrigation

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Deleted: Floodplain Wetlands

Deleted: Shaded Riverine Aquatic

methods. The irrigation pipes currently in place stem from a 24 inch main line, which provides sufficient water to filfull the irrigation needs for the planting on the Bank. The existing agricultural irrigation system will be adequate to provide water for any of these irrigation methods.

F.4. IMPLEMENTATION SCHEDULE

Grading activities for the restored channels and floodplain benches will begin in Summer 2009, and barring any weather delays, will be completed prior to the end of Fall 2009. Planting will be conducted in Fall 2009. Levee breach construction will occur in summer 2010 and any followup planting will occur in fall 2010.

G. MAINTENANCE DURING MONITORING PERIOD

G.1. MAINTENANCE ACTIVITIES

G.1.a. Overall

Responsibility for maintaining the Bank will reside with Westervelt Ecological Services. Should deficiencies in infrastructure or changes in the biotic communities be noticed, maintenance activities will be implemented to rectify the situation. The site will be kept free of trash and necessary repairs to the facilities will be conducted on an as-needed basis. Maintenance activities conducted during the year will be described in the annual management report, as described in Section IV of the Cosumnes River Mitigation Bank Long-Term Management Plan (BEI Exhibit D-5).

Fencing and Gates

Existing fences and gates will be repaired and replaced as needed in their existing locations. Additional fencing and gates may be added to control trespass as long as there is no impact to existing or created habitats as the result of its construction.

Signs

In order to discourage unauthorized entry to the Mitigation Site, "No Trespassing" signs will be posted on external fences on the perimeter of the Bank. These signs will be repaired and replaced on an as-needed basis.

Grazing

Grazing may be useful as a ground cover management tool after the establishment period, but will not be used during the establishment period due to the potential to impact plantings and young riparian vegetation. The Long-Term Management Plan allows from some limited, prescribed grazing, either by sheep, goats, or cattle in order to reduce annual vegetation biomass, which will lessen but not eliminate the risk of undesired grass fires. Grazing may also be used to control certain invasive or undesirable plant species.

Fire Hazard Reduction

The primary risk from fire comes from contact with New Hope Road on the south border of the property. Westervelt Ecological Services will mow or graze the portion of the Bank within 30 feet of New Hope Road, per the CalFire requirements to reduce vegetation for fire control. Every effort will be made to manage the site as required for fire control while limiting impacts to biological values.

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G.1.b. Pest Species Control

Although grazing may be the preferred weed control strategy to reduce the cover of exotic, invasive species on mature landscapes, they are not appropriate to use during the establishment period of the Bank. Through the monitoring program, if invasive species are identified as decreasing the function or value of restored habitat, the use of mechanical or chemical control methods would be triggered. Localized measures to control populations of yellow star thistle (*Centaurea solstitialis*), perennial pepperweed (*Lepidium latifolium*), and other invasive species may include mowing, use of power tools, or chemical removal with herbicides as necessary.

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G.2. MAINTENANCE SCHEDULE

The site will be inspected at a minimum on a monthly basis to assess whether fencing, signage, or any general site maintenance needs to be performed (**Table 5**).

Table 5. Maintenance Schedule

Maintenance Activity	Maintenance Period			
	Spring	Summer	Fall	Winter
Weed Management	X		X	
Replanting			X	
Herbivory Control	X	X	X	X
Fence Maintenance	X			X
Trash Collection	X	X	X	X
Fire Hazard Reduction	X			X

H. PROPOSED MONITORING REPORTS

H.1. DUE DATES

Monitoring reports will be submitted by August 15th in all monitoring years.

H.2. AS-BUILTS

As-built drawings will be prepared using sub-meter accurate Global Positioning System (GPS) data points collected around the edges of the restored channels and floodplain benches overlaid on the original topographical grading plans. The as-built drawings will be submitted with an as-built report to the Agencies within 60 days after the mitigation implementation is completed. Changes from the original plans will be indicated in red. A notice of completion will be provided with the as-built drawings.

H.3. ANNUAL REPORTS

Monitoring reports will be submitted by August 15th on an annual basis. Any changes to recommendations regarding site management will be included in the monitoring reports. If the recommendations of these reports are endorsed by the Agencies, then WES will implement the necessary changes to site management. If further recommendations are requested by the Agencies, these recommendations will be implemented provided that the changes are within the endowment account budget or that supplemental funding can be

found. Each monitoring report will contain a synopsis of management practices over the previous period, making note of any changes in those practices initiated as a result of the monitoring data.

H.3.a. File Number

Annual reports will be submitted with the Agencies; the reports will include the Bank name and any applicable permit numbers on the cover and title page.

H.3.b. Contents

Monitoring data, analysis, conclusions, and recommendations, if any, will be compiled in a report for submission to the Agencies, per the USACE formatting requirements (Appendix C).

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I. POTENTIAL CONTINGENCY MEASURES

I.1. INITIATING PROCEDURES

A variety of natural, design, or construction variables can affect the rate at which habitats establish. Mitigation habitats that do not meet one of the performance standards in the early phase of monitoring may still functional and achieve the performance standard at a later point in the 5-year monitoring period. In scenarios where success criteria are not trending towards being met, yet progressive improvement in habitat conditions is evident (e.g., yearly increase in vegetative cover by native riparian plant species), an appropriate alternative to remediation could include an extension of the Initial Monitoring Period. In the event that a design or construction flaw has rendered remedial actions necessary, WES staff will develop a detailed contingency plan in coordination with the Agencies. Upon achieving consensus on the specific contingency actions, WES will implement the appropriate remedial actions within the time period agreed upon.

Although contingency planning is not possible for unforeseen challenges or environmental conditions, general contingency measures are proposed for foreseeable shortcomings related to hydrology and vegetation establishment on the Bank (Figures 16, 17, & 18). Likely obstacles to achieving Performance Standards include: 1) insufficient or excessive hydrology; 2) inadequate plant recruitment; or 3) invasive species colonization.

Hydrology is primarily driven by surface flows from the Cosumnes River. The design of the breach and the depth/length of the channels are anticipated to allow sufficient flows to both enter and exit the site under natural conditions. However, post-construction observation of hydrologic regime may indicated the need to modify the breach dimensions or channel bathymetry. Should medication of these features be required, work would be done in the summer months following observation to avoid in-water work. As part of the permitting process for the Bank, WES will request coverage of this potential remedial action as part of the Nationwide Permit, 1602 permit, and 401 Water Quality Certification.

This development plan anticipates a majority of the vegetation will naturally colonize the site. Seeds and propagules are expected to be deposited from naturally occurring flood events or wind disbursement. Should colonization rates fall below anticipated levels, supplemental planting or seeding may occur. Planting rates and species would follow the planting plan described in Section F.2

Hydrology Remediation Scenario

Implement when onsite hydrology fails to meet performance standards (e.g., when stream gauge data at Bensons Ferry (BEN) is not well correlated with onsite data)

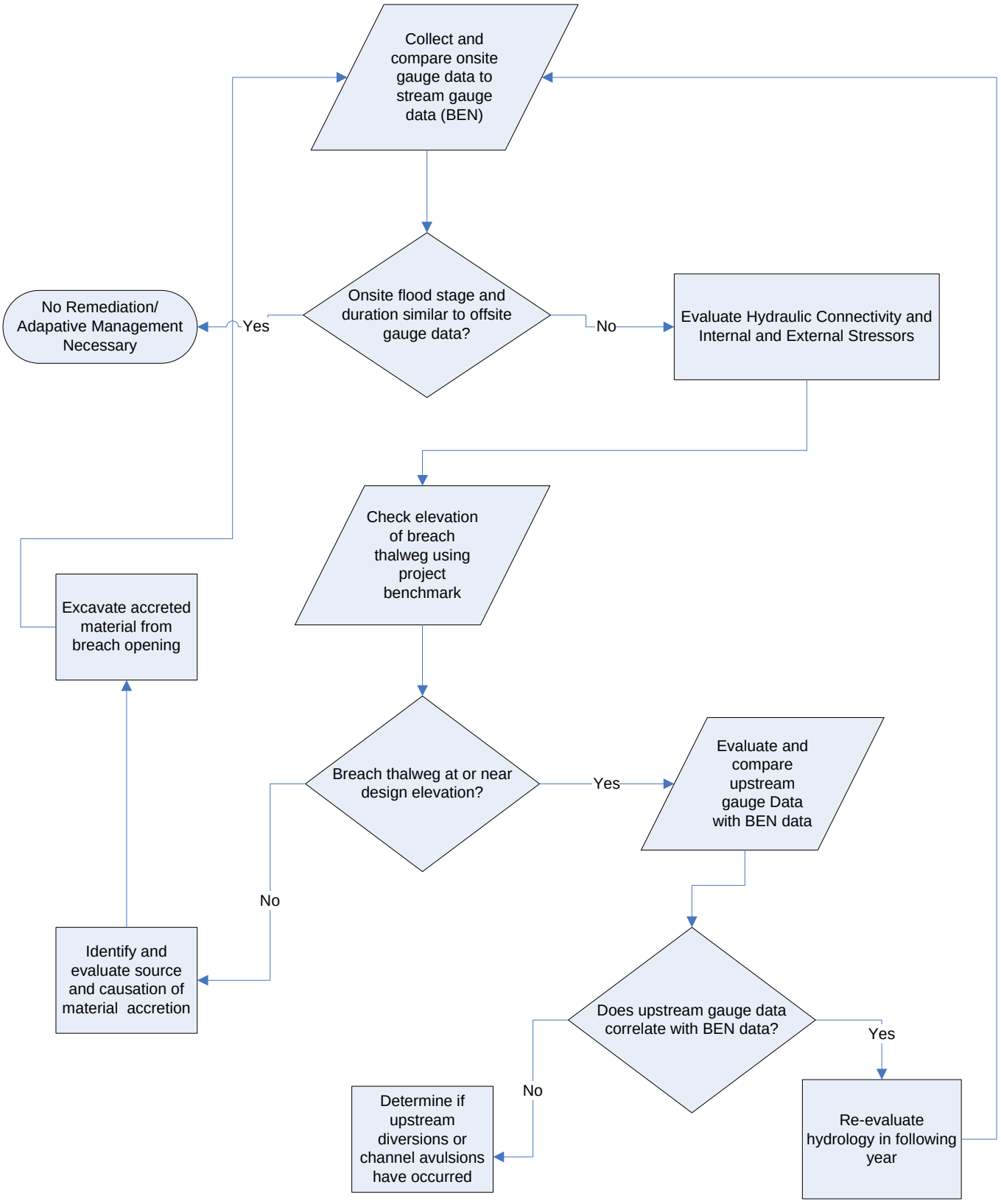

Figure 16

Vegetation Establishment Remediation (Installed Plantings)

Implement if installed vegetation establishment fails to meet performance standards.

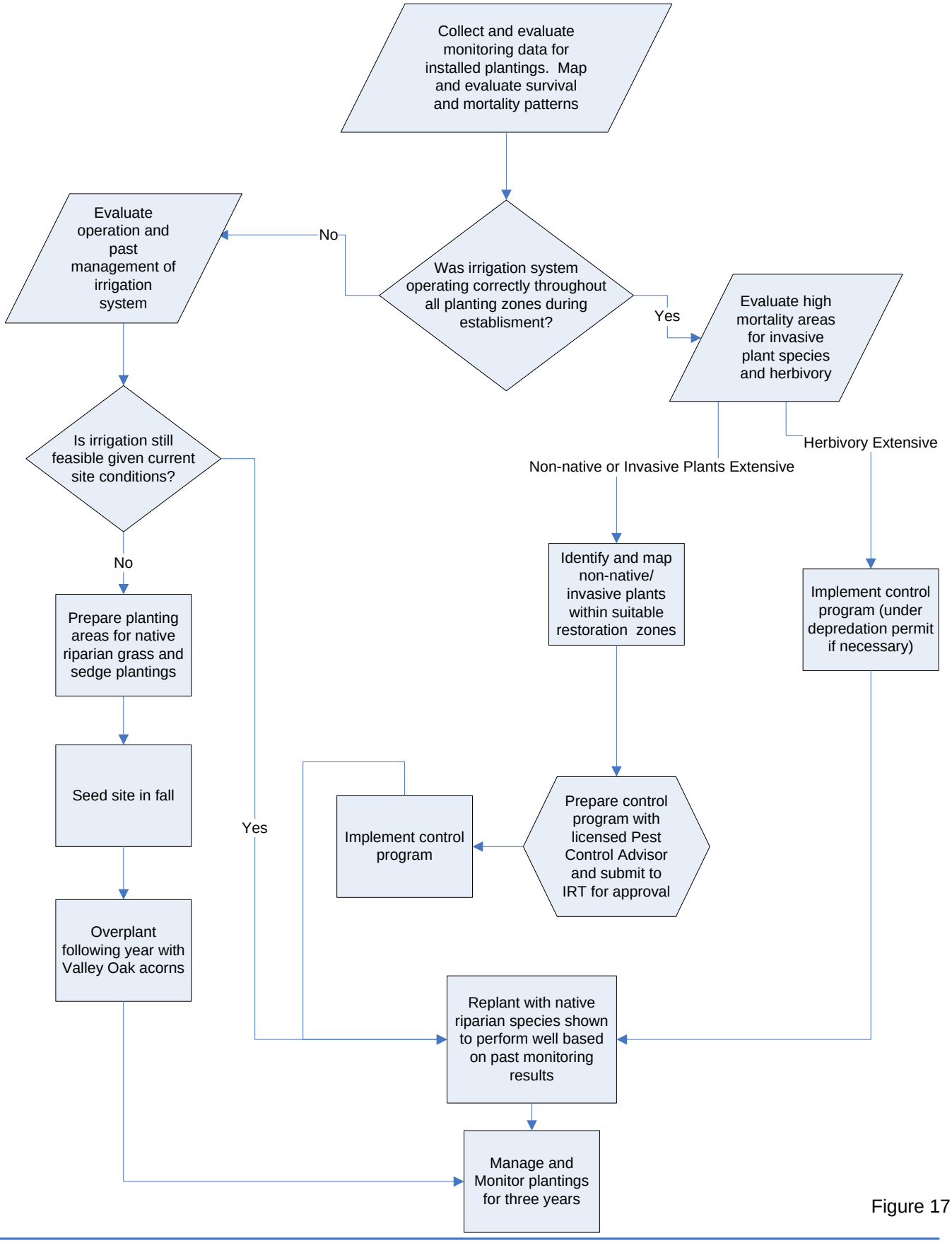

Figure 17

Vegetation Establishment Remediation (Natural Process)

Implement if vegetation establishment through natural processes fails to meet performance standards.

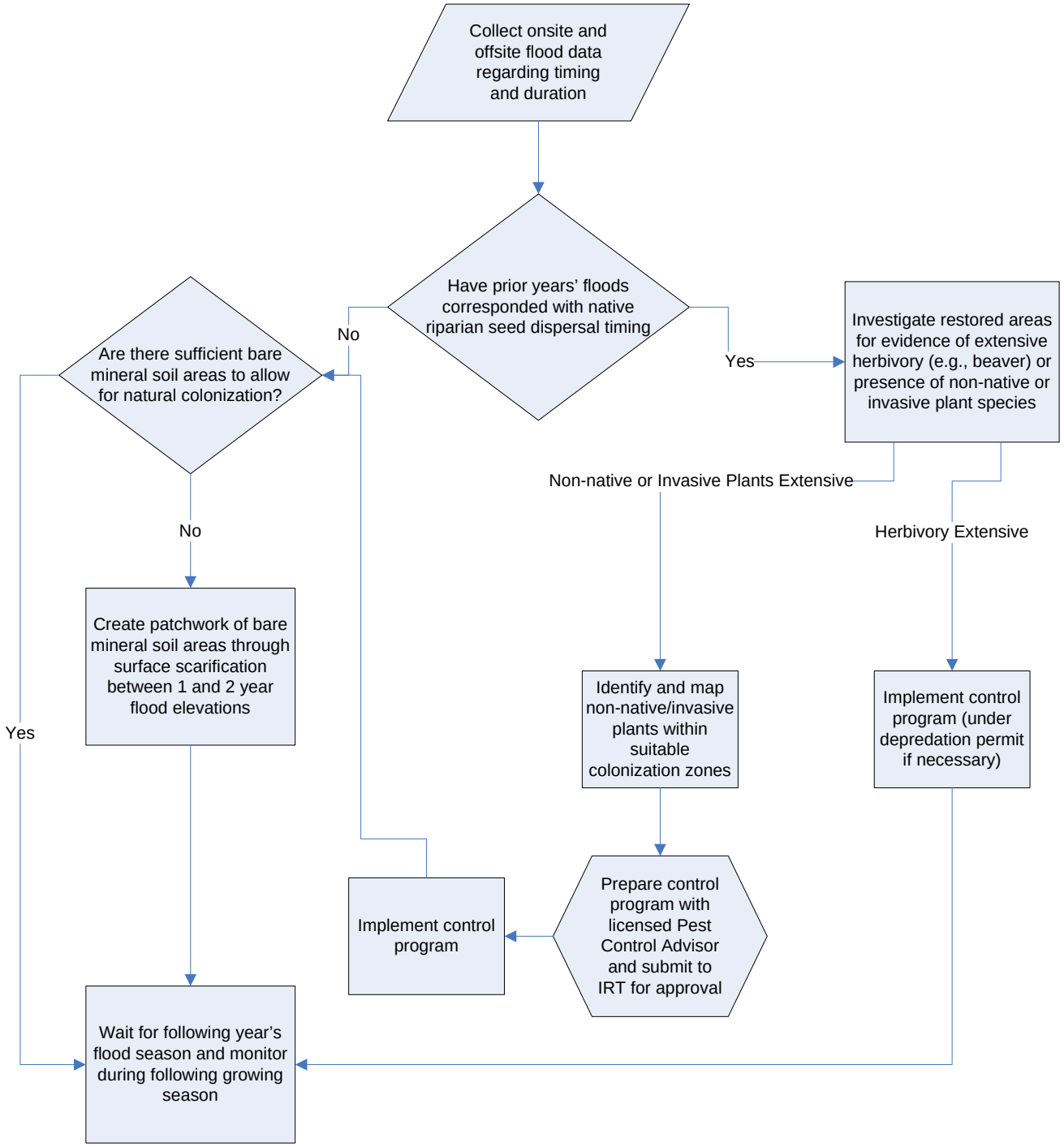

Figure 18

Invasive species have the potential to displace natives and disrupt natural succession. Colonization of sufficient numbers of invasive species to diminish wetland function will require increasing levels of management as described in Section G.1.b. Should extensive use of chemical herbicides be required to control invasive species populations, the Agencies will be notified and a action plan will be developed by a licensed pest control advisor.

Should remedial actions become necessary, the proposed location for these would be within the boundaries of the Bank. No alternative locations are proposed.

Should disputes occur between the members of the Agencies about application of this Plan or proposed remedial actions, adjustments shall only occur once the Agencies have reached consensus on the actions to be taken.

I.2. CONTINGENCY FUNDING MECHANISM

During the habitat establishment period, WES will fund the maintenance, monitoring, and management of Bank. To ensure these measures are fulfilled, WES will furnish the USACE and CDFG with securities to assure performance of the maintenance obligations (Exhibit C.3 of the BEI). The Construction Security and Performance Security will be provided as Letters of Credit (LOC) to USACE, prior bank establishment and concurrent with the first credit transfer, respectively. The Construction Security will cover the full value of the construction contract and vegetation planting. The Construction Security will be released within 30 days following submittal of the as-built drawings to the Agencies, unless notified by the Agencies of a requirement for remediation. The Performance Security will be for twenty percent of the construction cost, and will be released once Performance Standards have been met.

The Interim Management Account, based upon one year of management and monitoring costs, will be established with CDFG upon approval of the Bank by the Agencies.

Should WES default on the monitoring, maintenance, or management of the Bank during the establishment period, the Agencies may authorize a withdrawal of a portion or all of the Interim Management Security to remedy the defaulted action. All funds removed from the Interim Management Account shall be replaced, plus interest, by WES within ninety (90) days of written notice from the IRT of the withdrawal of funds.

The Interim Management Account shall be released one year after the Endowment Fund has been fully funded and all performance standards in this plan have been met.

J. COMPLETION OF MITIGATION RESPONSIBILITIES

J.1. NOTIFICATION

If final success criteria have been met, WES staff will include in that year's monitoring report a notification that the Initial Monitoring Period has been completed.

J.2. USACE CONFIRMATION

A site visit will be scheduled with Resource Agency staff as necessary to confirm achievement of the success criteria.

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Deleted: closed upon the successful achievement of the performance criteria or as soon thereafter as there are no unresolved corrective measures previously requested by the Agencies. However, if remedial actions are required to meet the performance objectives set forth in this Plan, then the funds in the Interim Management Account shall not be released until the third anniversary of the date the last such remedial action was taken. Upon release of the Interim Management Account, the funds in the account, including interest, shall be rolled into the long-term stewardship account to cover the first year's management and monitoring costs.

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K. LONG TERM MANAGEMENT

K.1. PROPERTY OWNERSHIP

Westervelt Ecological Services will continue to own and manage the Property Parcels, including the Bank, for the foreseeable future.

K.2. MANAGEMENT PLAN

K.2.a. Resource Manager

Westervelt Ecological Services , will continue to manage the Bank in accordance with the terms of the management plan and recorded conservation easement.

K.2.b. Management Approach

Recreation

Compatible uses of the Mitigation Site include passive recreation activities such as nature walks. As an exception to private site uses, field trips or other educational opportunities may be arranged to provide educational opportunities and promote environmental awareness to local groups. Visitors will require supervision or authorization by Westervelt Ecological Services for each visit.

Prohibited Uses

Unless otherwise specified, unrestricted public access, collection of plants or animals, or dumping of refuse is prohibited. To prevent such actions, which could conflict with habitat management goals, gates, fences and signs will be maintained to restrict unauthorized access. Westervelt Ecological Services will monitor for unauthorized use of the site during monthly site visits.

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Fencing and Signage

Fencing will enclose the Bank to discourage prohibited uses. The external fences of the Bank will be posted with "No Trespassing" signs indicating the property is a habitat preserve.

K.3. SITE PROTECTION

Westervelt Ecological Services is responsible for the long-term operations and management of the Bank. The primary management objective for the Bank is protecting the habitat value of the existing and restored habitats. To ensure protection and management of the site, a conservation easement will be recorded on the Bank. An endowment fund (Exhibit D.2 of the BEI) will be established to finance the perpetual protection and management of the site. This fund will be established with Center for Natural Lands Management or another Agency approved 501(c)(3) non-profit organization, acting as Trustee.

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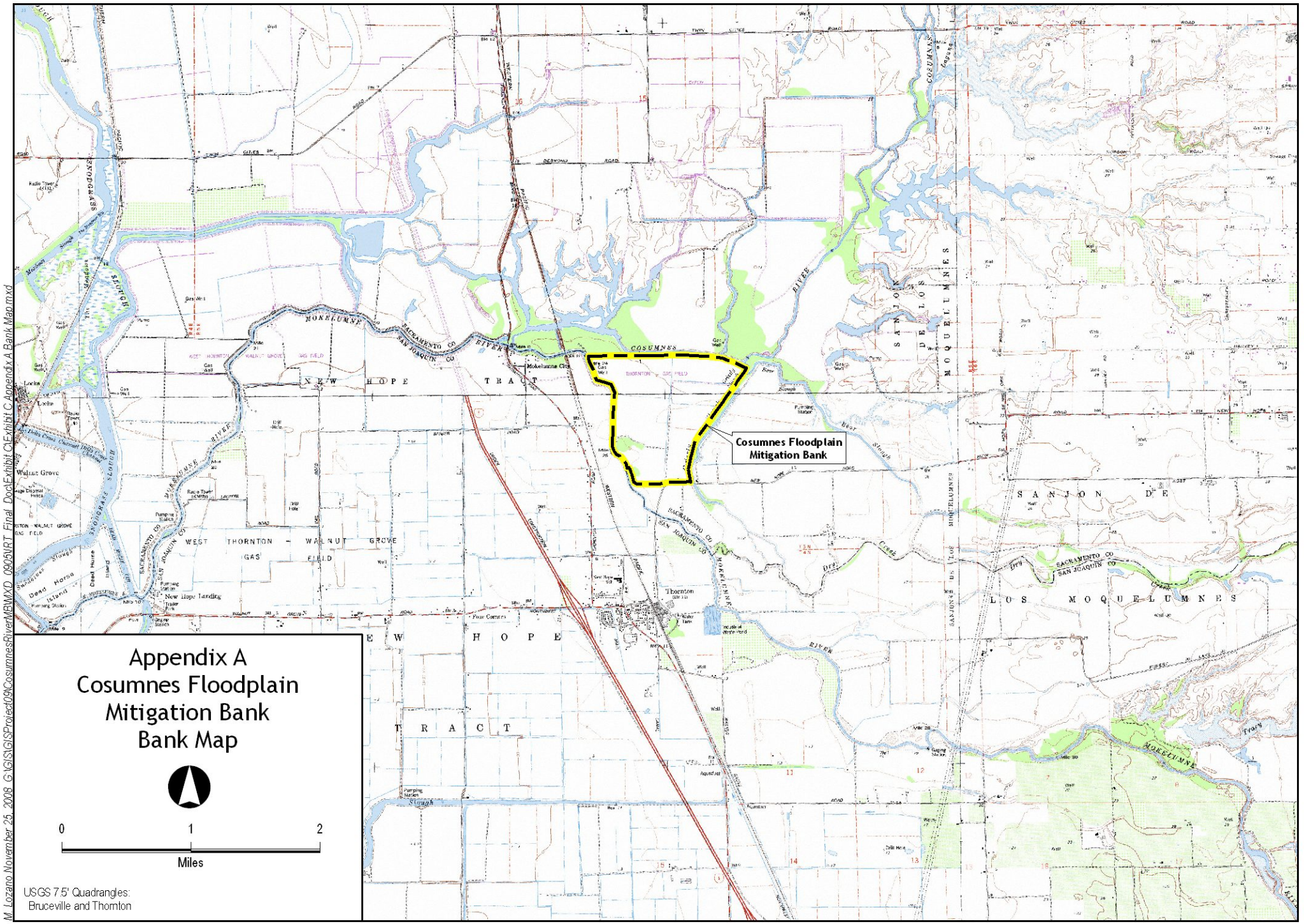
Personal Communications

Whitener, Keith. Fisheries Biologist, Robertson Bryan Incorporated. Former manager Cosumnes River Preserve. Various meetings and telephone conversations September 2007 to October 2008.

Appendix A

Bank Map on
USGS Quad


Cosumnes Floodplain Mitigation Bank
NEW HOPE TRACT
WEST THORNTON - WALNUT GROVE GAS FIELD
SAN JOAQUIN DELTA LOS MOQUELUMNES
Thornton
Walnut Grove
Locke
New Hope Landing
Dead Horse Island
Appendix A
Cosumnes Floodplain
Mitigation Bank
Bank Map
0
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Miles
USGS 7.5' Quadrangles:
Bruceville and Thornton
M. Lozano November 25, 2008 G:\GIS\GISProject09\CosumnesRiverMB\MXD\0905NRT Final Doc\Exhibit C\Exhibit C Appendix A Bank Map.mxd

Appendix B
List of Native Plants

Table 1. Plant species observed at New Hope Mitigation Bank site 15-17 July, 2008

Family	Scientific Name	Common Name
Aceraceae	*Acer negundo*	box elder
Amaranthaceae	*Amaranthus sp.*	amaranth
Anacardiaceae	*Toxicodendron diversiloba*	poison oak
Apiaceae	*Cicuta maculata*	water hemlock
Apiaceae	*Conium maculatum*	poison hemlock
Apiaceae	*Foeniculum vulgare*	sweet fennel
Asteraceae	*Anthemis cotula*	mayweed
Asteraceae	*Artemisia douglasiana*	mugwort
Asteraceae	*Baccharis pilularis*	coyote brush
Asteraceae	*Bidens laevis*	bur marigold
Asteraceae	*Carduus pycnocephalus*	Italian thistle
Asteraceae	*Conyza canadensis*	horseweed
Asteraceae	*Cynara cardunculus*	artichoke thistle
Asteraceae	*Gnaphalium sp.*	cudweed
Asteraceae	*Helenium sp.*	sneezeweed
Asteraceae	*Lactuca seriola*	prickly lettuce
Asteraceae	*Picris echioides*	bristly ox tongue
Betulaceae	*Alnus rubra*	red alder
Brassicaceae	*Brassica nigra*	black mustard
Brassicaceae	*Hirschfeldia incana*	mustard
Brassicaceae	*Lepidium latifolium*	perennial pepperweed
Caprifoliaceae	*Sambucus mexicana*	blue elderberry
Convolvulaceae	*Convolvulus arvensis*	bindweed
Cornaceae	*Cornus sericea*	American dogwood
Cuscutaceae	*Cuscuta sp.*	on Cicuta
Cyperaceae	*Carex sp.*	sedge
Cyperaceae	*Cyperus*	nutgrass
Cyperaceae	*Schoenoplectus sp.*	rush
Equisetaceae	*Equisetum sp.*	horsetail
Fabaceae	*Lotus pusshianus*	pink flowers
Fabaceae	*Lotus sp.*	yellow flower
Fabaceae	*Melilotus alba*	white sweetclover
Fabaceae	*Viccia sp.*	vetch
Fagaceae	*Quercus agrifolia*	coast live oak
Fagaceae	*Quercus lobata*	valley oak
Fagaceae	*Quercus wizlizenii*	interior live oak
Juglandaceae	*Juglans regia*	English walnut
Juncaceae	*Juncus sp.*	rush
Lamiaceae	*Marrubium vulgare*	hoarhound
Liliaceae	*Asparagus sp.*	asparagus
Malvaceae	*Abutilon theophrasti*	velvet leaf

Table 1. Plant species observed at New Hope Mitigation Bank site 15-17 July, 2008

Family	Scientific Name	Common Name
Malvaceae	*Malvella leprosa*	alkali mallow
Oleaceae	*Fraxinus latifolia*	Oregon ash
Onagraceae	*Epilobium sp.*	willow herb
Onagraceae	*Oenothera hookeri*	Hooker's evening primrose
Plantaginaceae	*Plantago major*	common plantain
Poaceae	*Avena fatua*	wild oat
Poaceae	*Bromus diandrus*	ripgut
Poaceae	*Cynodon dactylon*	Bermuda grass
Poaceae	*Leymus triticoides*	creeping wildrye
Poaceae	*Paspalum distichum*	
Poaceae	*Phalaris sp.*	
Poaceae	*Polypogon monspeliensis*	rabbit's foot grass
Poaceae	*Sorghum halepense*	Johnson grass
Polygonaceae	*Polygonum sp.*	smartweed
Polygonaceae	*Rumex crispus*	curled dock
Primulaceae	*Anagallis arvensis*	scarlet pimpernel
Rosaceae	*Prunus sp.*	introduced
Rosaceae	*Rosa californica*	California rose
Rosaceae	*Rubus discolor*	Himalayan blackberry
Rosaceae	*Rubus ursinus*	California blackberry
Rubiaceae	*Cephalanthus occidentalis var. californicus*	California button willow
Salicaceae	*Populus fremontii*	Fremont's cottonwood
Salicaceae	*Salix exigua*	narrow-leaved willow
Salicaceae	*Salix lasiolepis*	arroyo willow
Solanaceae	*Solanum sp.*	nightshade
Typhaceae	*Typha latifolia*	broad-leaved cattail
Verbenaceae	*Verbena bonariensis*	verbena
Viscaceae	*Phoradendron macrophyllum*	mistletoe; on Juglans and Fraxinus
Vitaceae	*Vitis californica*	California wild grape
Vitaceae	*Vitis vinifera*	cultivated grape

Appendix C
Format for Reports

A. Text Format for Reports

All reports submitted shall include the USFWS BO and USACE file number and date of the report in the title page heading, as required. Reports shall be submitted by August 15th of the Monitoring Year pursuant to the schedule indicated in section E.2.b of this plan. In addition to the USACE, reports shall be submitted to:

Field Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

Department of Fish and Game
Region 2 Office
1701 Nimbus Road
Rancho Cordova, CA 95670
Attn: Regional Manager

B. Figure Format Notes

All figures submitted shall include the components required in the Corps Habitat Mitigation and Monitoring Proposal Guidelines.

Deleted: All reports submitted shall include the Service BO and Corps file number and date of the report in the title page heading, as required. Reports shall be submitted by October 1st of the Monitoring Year pursuant to the schedule indicated in section VI (F). In addition to the Corps, reports shall be submitted to:¶
¶
Field Supervisor¶
U.S. Fish and Wildlife Service¶
2800 Cottage Way, W-2605¶
Sacramento, CA 95825 ¶

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