RiversEdge West
Riparian Restoration Conference
2020

Cosumnes Floodplain Mitigation Bank – Wetland Banking in a Dynamic Riverine Floodplain
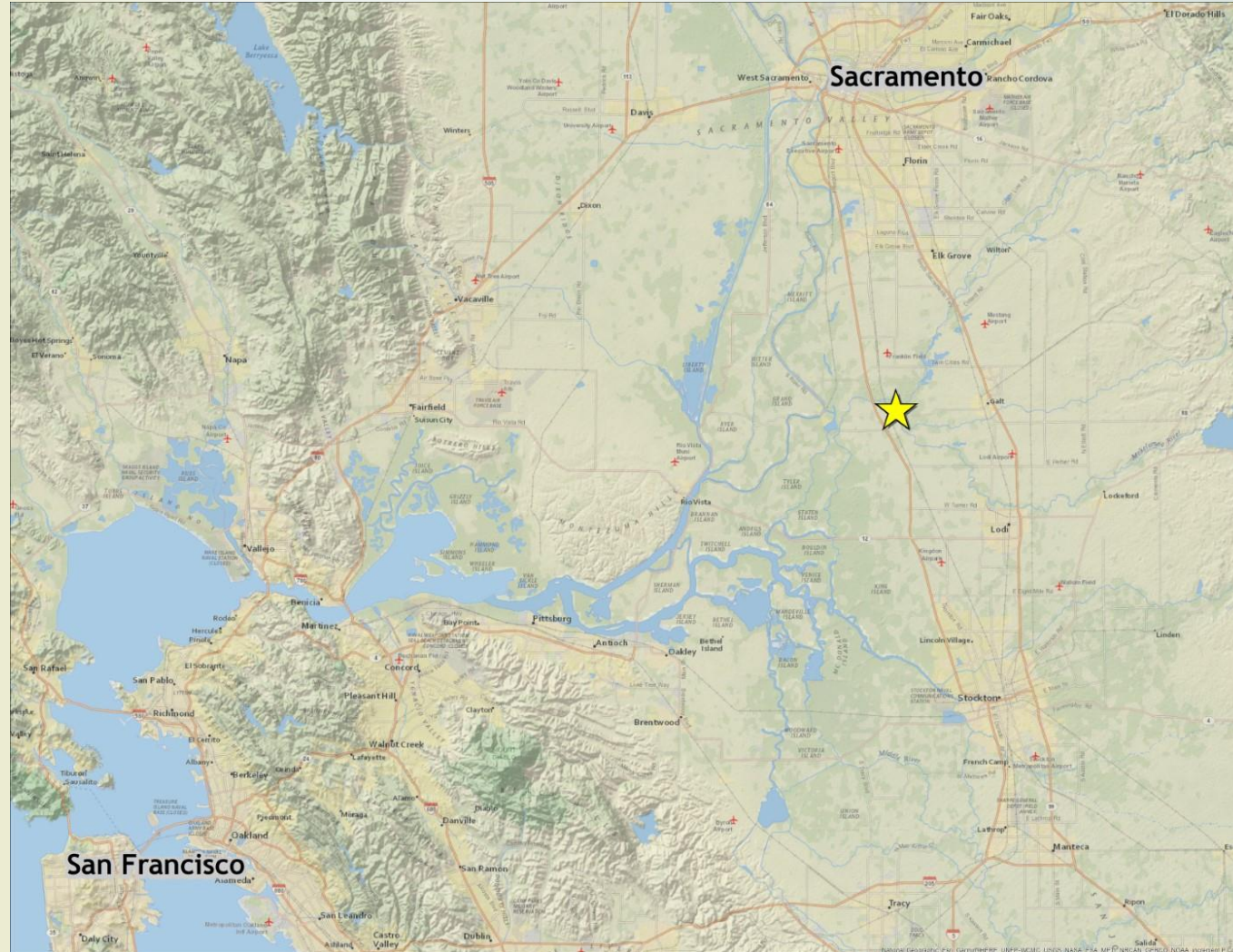
Presented by: *Matt Gause*
Director of Ecology and Land Stewardship
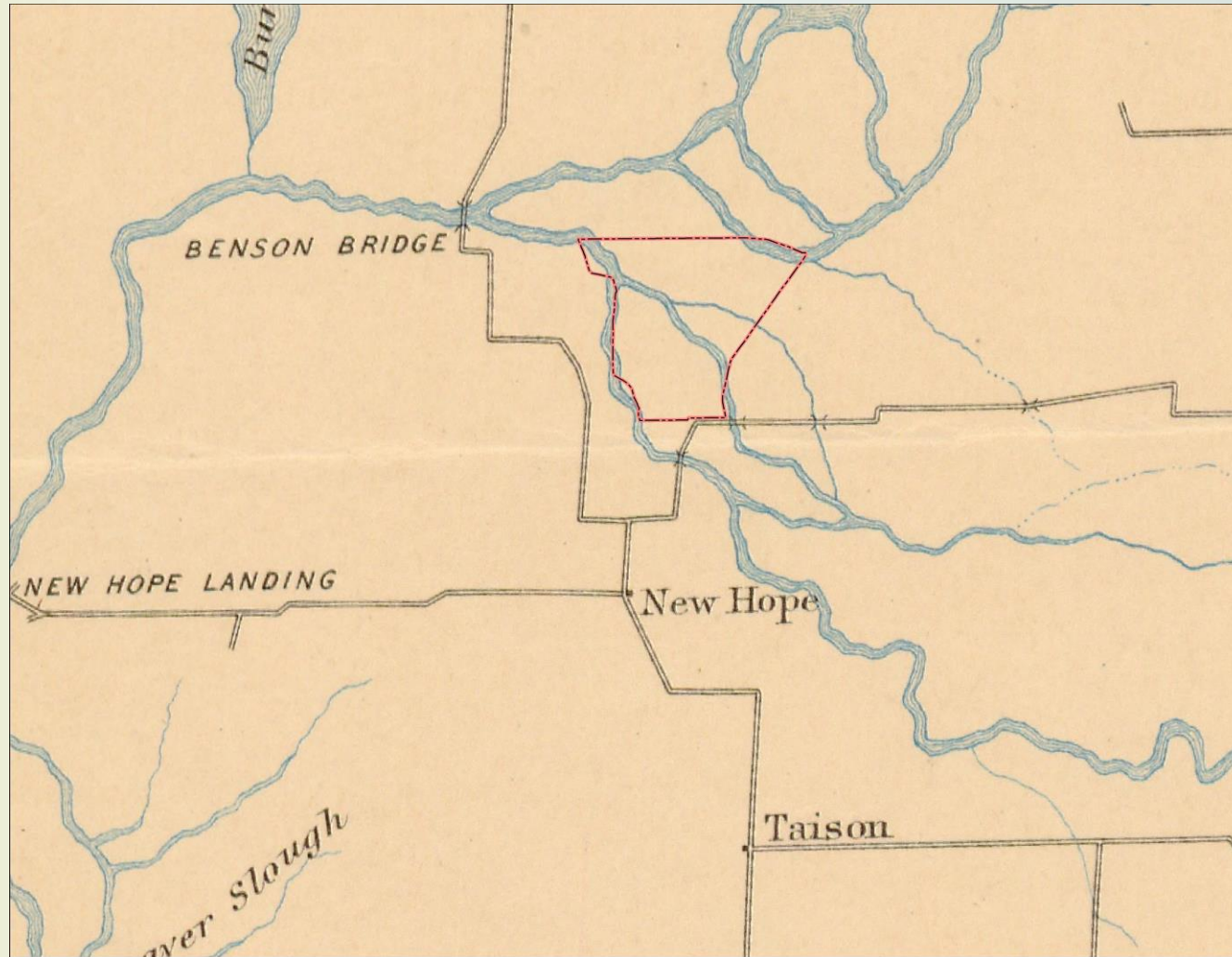mgause@Westervelt.com

Presentation Outline

- Site Overview

- Ecological Characteristics

- Reference Sites

- Design Concept Evolution

- Crediting

- Performance Standards

- Project Durability
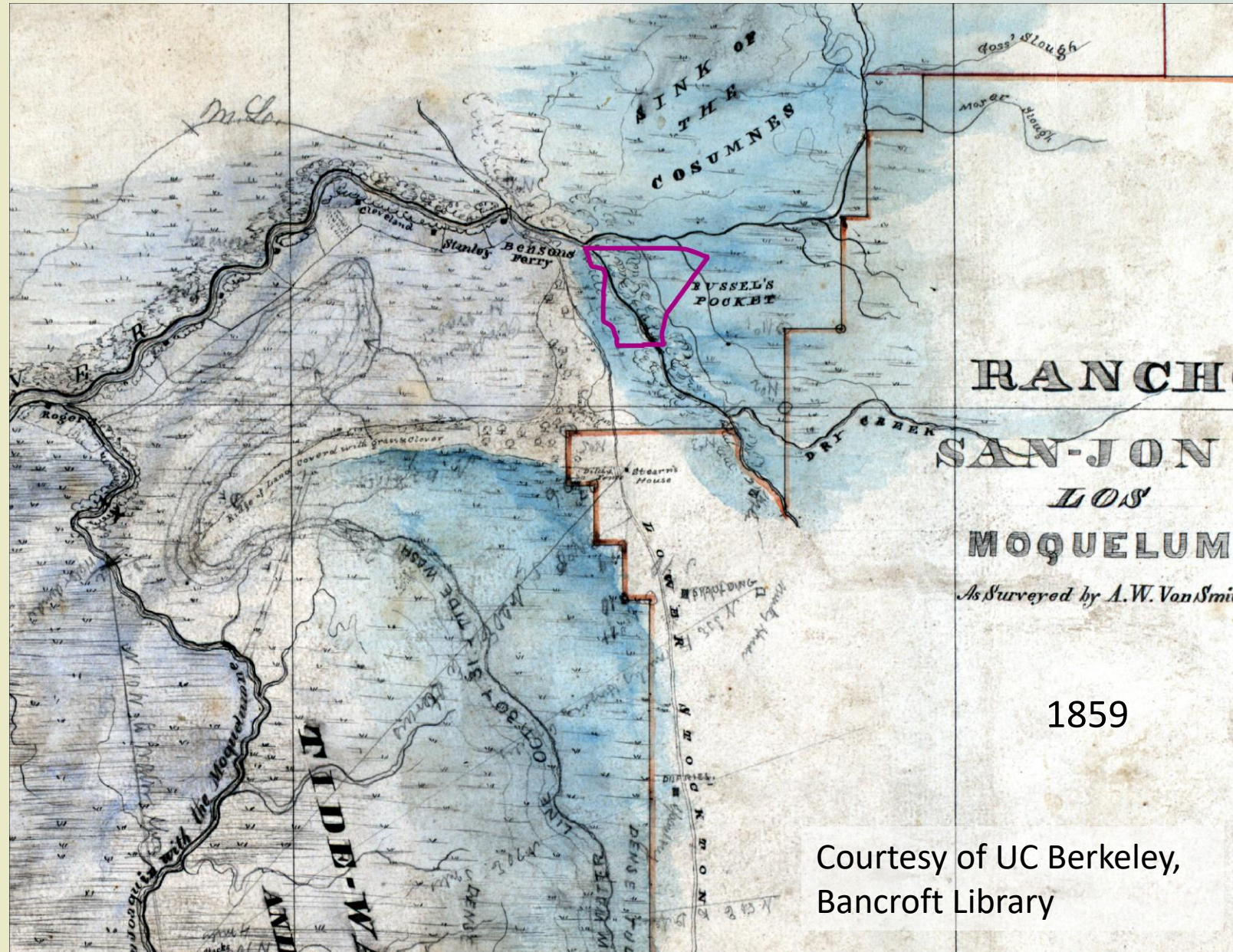

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Overview-Cosumnes Floodplain Mitigation Bank

Overview -Cosumnes Floodplain Mitigation Bank - 1849
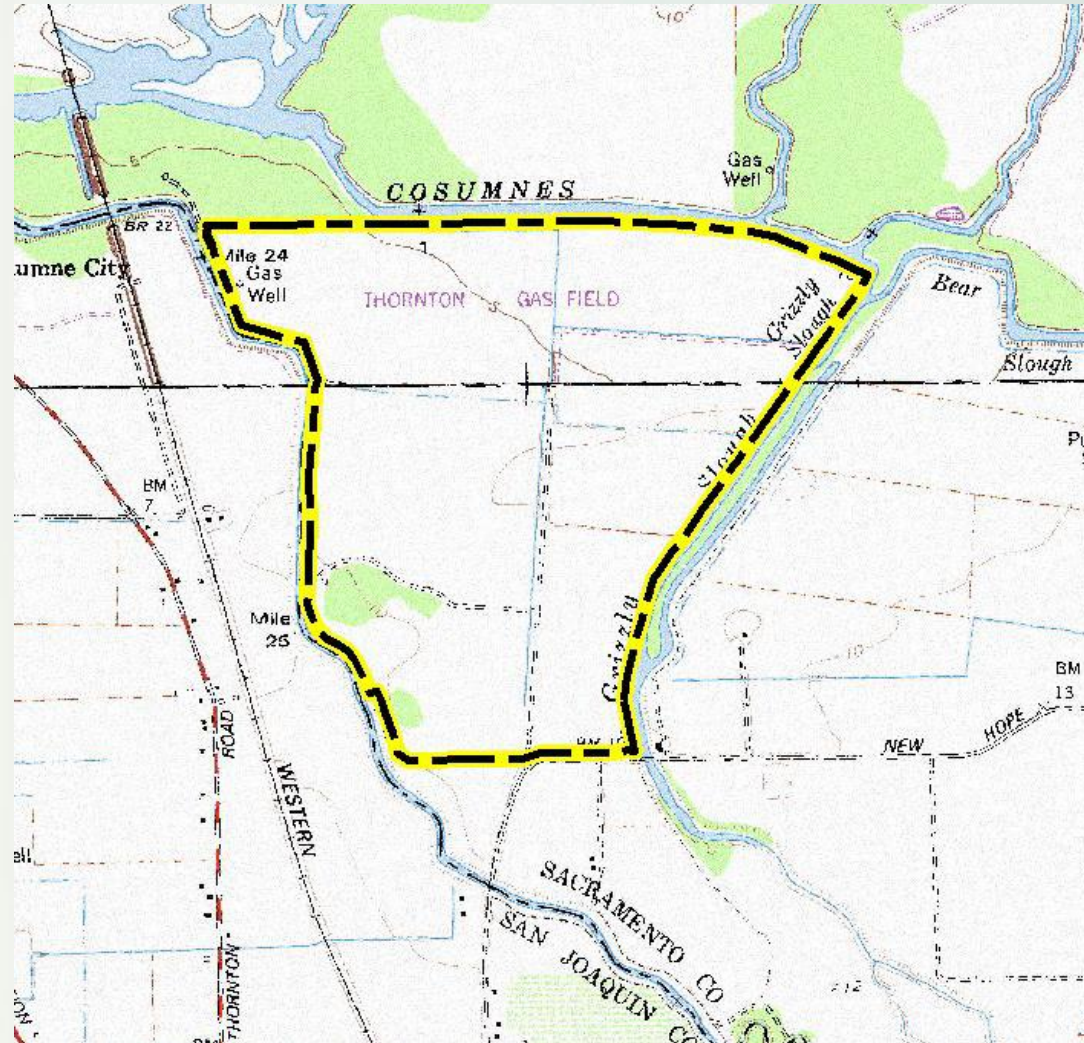
Overview - Cosumnes Floodplain

1859

Courtesy of UC Berkeley, Bancroft Library

Overview -Cosumnes Floodplain Mitigation Bank
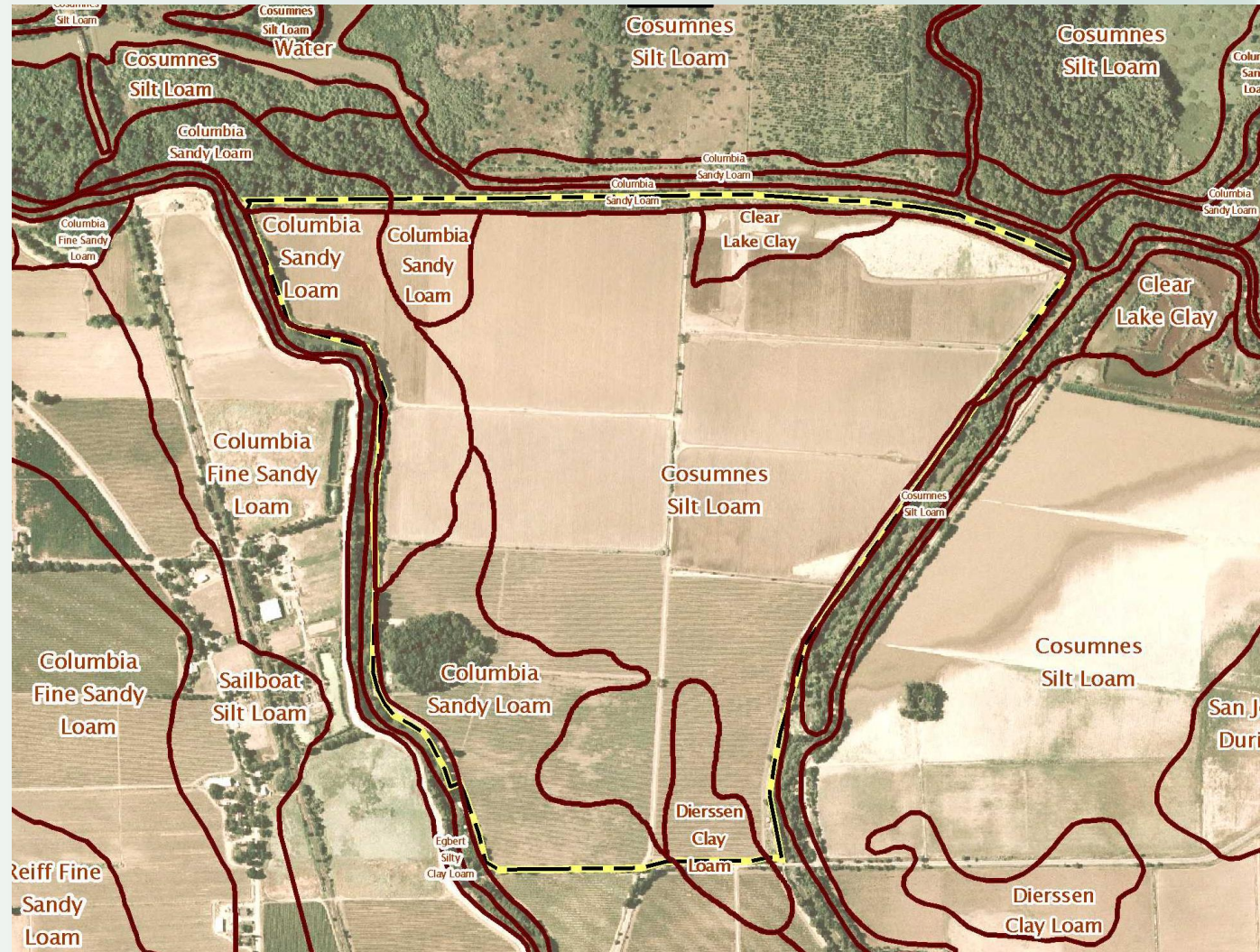
Overview-Cosumnes Floodplain Mitigation Bank: pre-project 2008

Ecological Characteristics and Processes

Geology and Soils –

- Holocene alluvium on surface

- Pleistocene alluvial terrace remnants-interspersed and buried

- Pliocene basement clay

Ecological Characteristics and Processes

Hydrology and Hydraulics–

- Drought

- Storm water flood pulses
  - Short duration
  - Winter/early spring

- Atmospheric river event
  - "Rain on snow"
  - Long duration
  - Mid – spring
  - The "Ecological" flood

- Regional influences

Figure 6. CFMB E1 Logger Water Surface Data vs. Benson's Ferry Data
(December 12, 2014 - April 16, 2015)

Figure 5
New Hope Mitigation Bank
Reference Wetland Locations

Reference Domain
Reference Wetland
New Hope M.B. Boundary

0   1,000   2,000
Feet

RW 1
RW 2
RW 3
RW 4

Franklin Blvd.
New Hope Rd.

M. Lozano July 22, 2008 C:_GIS_Projects_0702\New_Hope\MXD_0607\HMMP\Fig 5 Design Reference Sites.mxd

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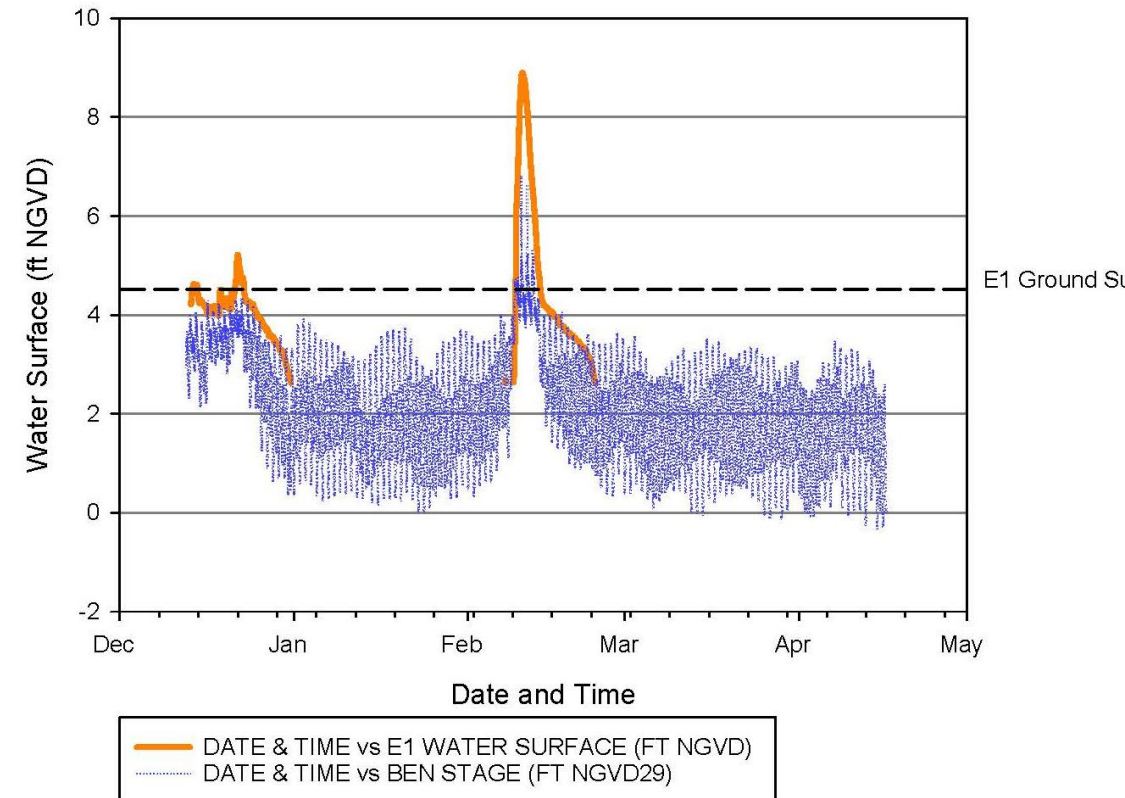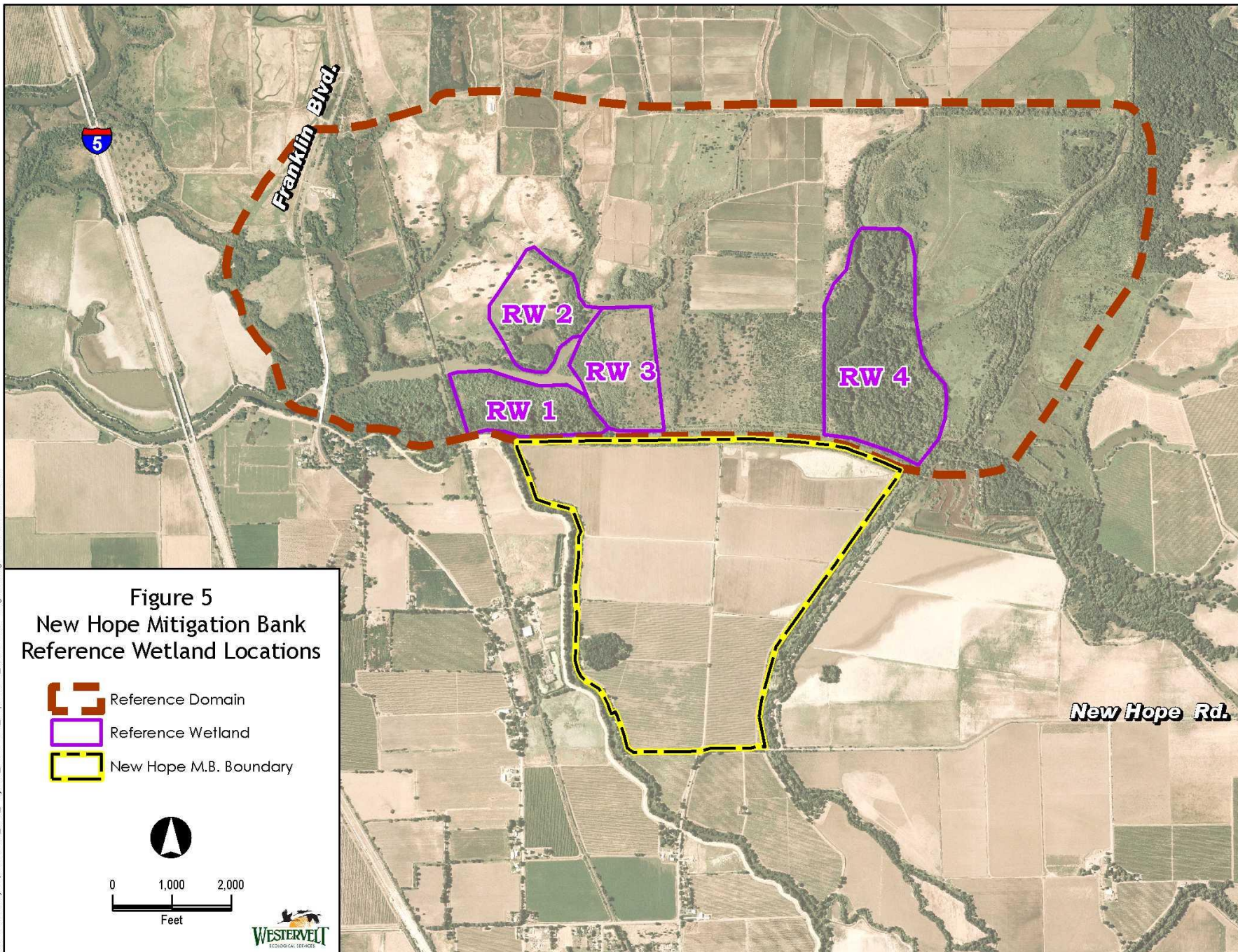
Cosumnes FloodPlain Mitigation Bank Reference Vegetation Elevations
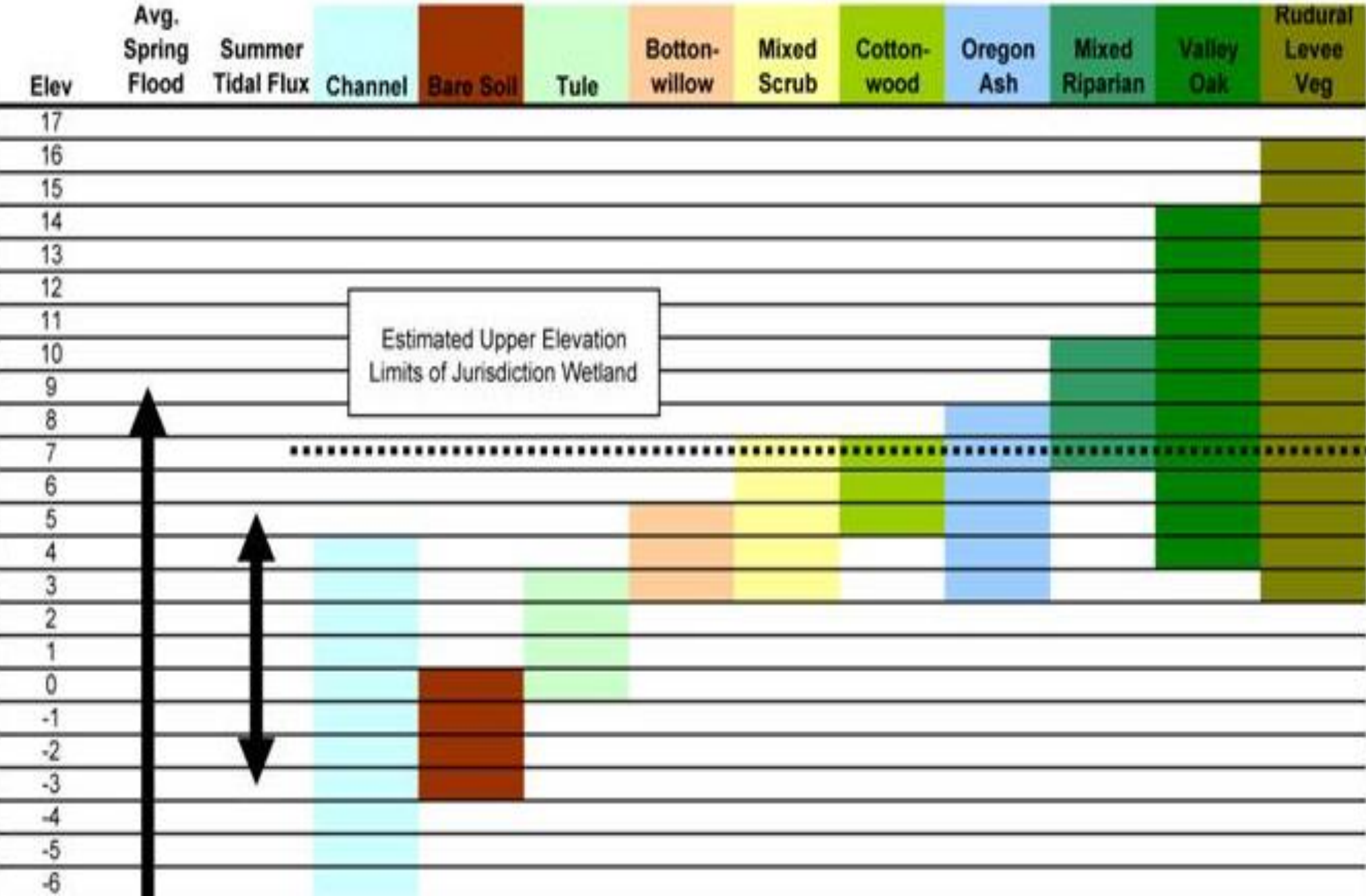
Concept Design Development

- Multiple Design Iterations (6)
- Extensive stakeholder outreach (non-IRT agency)
- Five Iterations modeled prior to engaging IRT

Key Lesson – Know your "biogeopolitical" landscape

Figure 10
Cosumnes Floodplain
Mitigation Bank
Bank Habitat Plan

KEY
- Shaded Riverine Aquatic (SRA) Habitat
- Floodplain Riparian Habitat
- Floodplain Mosaic Wetland
- Riparian Preservation
- Mineral Pads and Access Roads
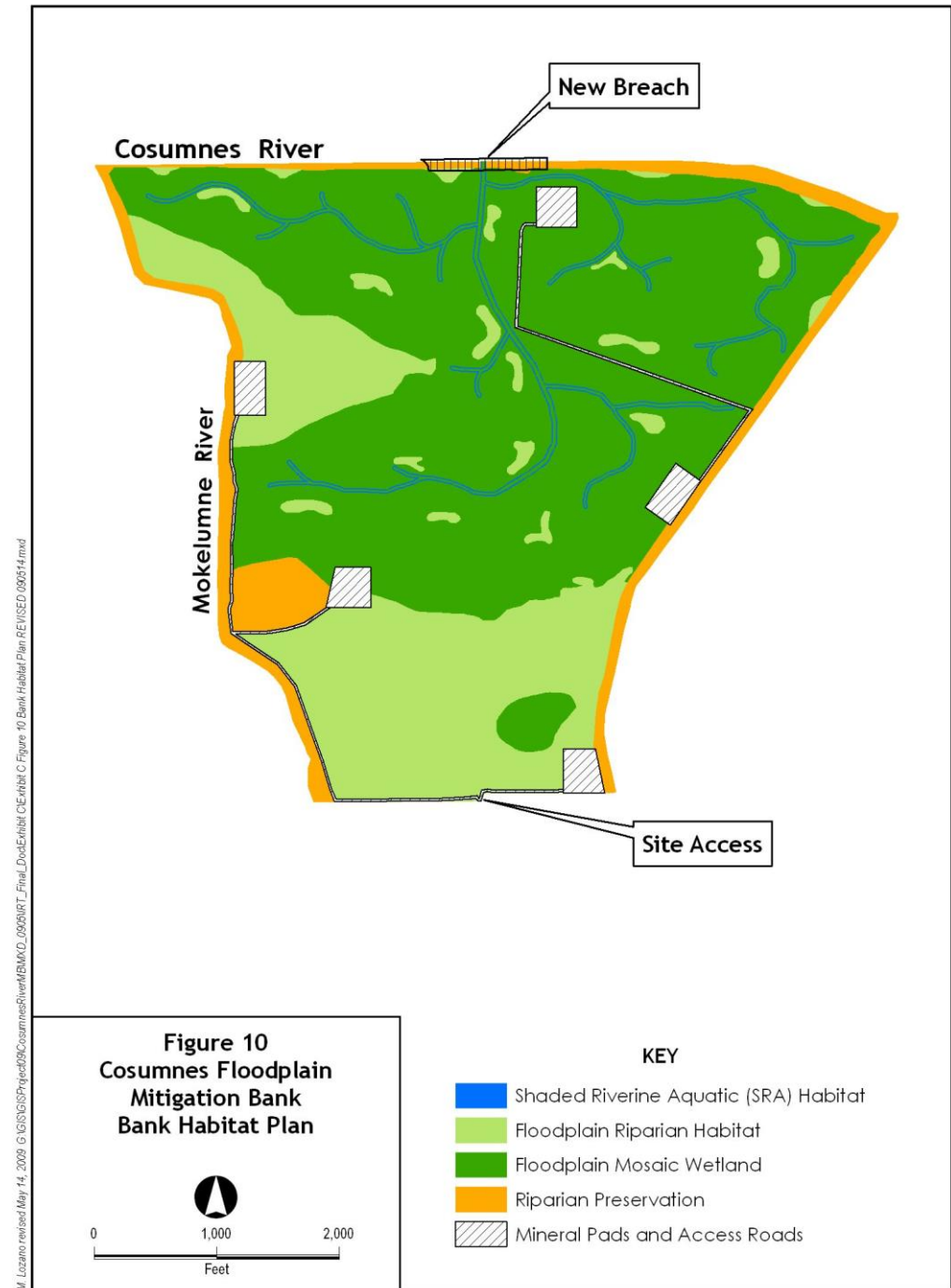
Crediting – IRT collaboration

"How dare you bring us a mitigation project that utilizes natural processes as a restoration approach"

-Eric Raffini, USEPA (retired)

Crediting –

- **Shaded Riverine Aquatic (SRA) Habitat** – (linear credit deducted from FMW area)
- **Floodplain Riparian Habitat (FRH)**– Waters of US (non-wetland)
- **Floodplain Mosaic Wetland (FMW) (wetland)**
- **Riparian Enhancement** (preservation) (non-wetland)

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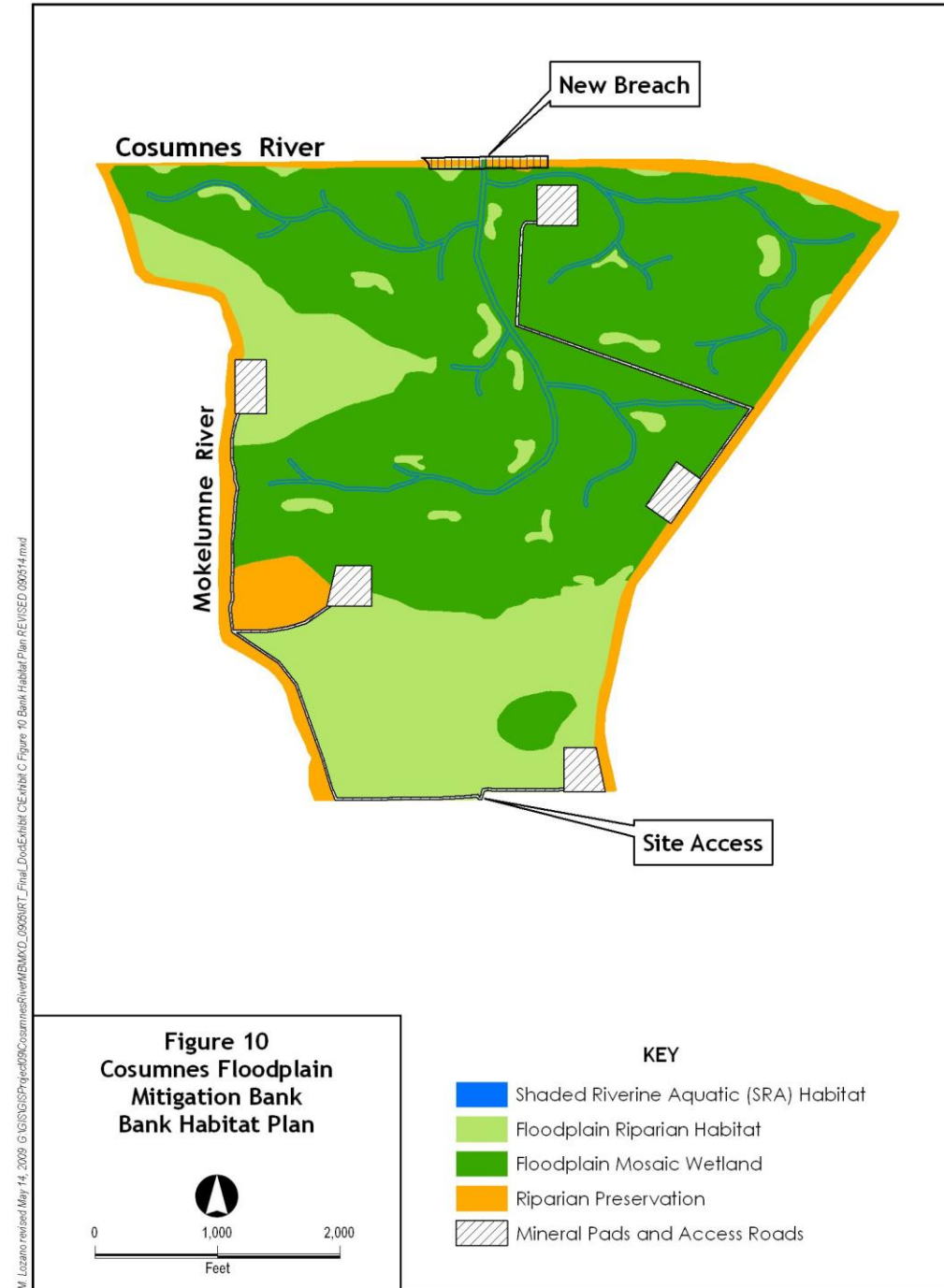
Crediting – Accommodating Natural Processes

- Hydrogeomorphic Approach (HGM)
- Scaled to Reference Wetland condition
- **Focus on ecological process and wetland function**

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Hydrogeomorphic Approach

Five Functional Capacity Indices:

- Dynamic Surface Water Storage (FCI = $[V_{FREQ} * (V_{INUND} + V_{ROUGH})/2]^{1/2}$)

- Nutrient Cycling (FCI = $[(V_{BTREE} + V_{SHRUB} + V_{HERB})/3 + (V_{CWD} + V_{OHOR})/2]/2)$

- Retention of Particulates (FCI = $(V_{FREQ} * V_{ROUGH})^{1/2})$

- Organic Carbon Export (FCI = $\{(V_{FREQ} * V_{SURFCON})^{1/2} * [(V_{OHOR} + V_{CWD)})/2]\}^{1/2})$

- Maintain Plant Community (FCI = $\{[(V_{BTREE} + V_{SHRUB} + V_{HERB} + V_{COMP})/4] \times V_{FREQ}\}^{1/2})$

GISProject\09\CosumnesRiverMBMXD_1210\Monitoring 2012\Figure 3 CFMB HGM Sample Plots 121023 v1.mxd

Figure 3
Cosumnes Flooplain
HGM Sample Plots

Located wtih GPS, M. Bibbo, Sept 14, 2011, except where noted.

* Located on Aerial Photo, Not With GPS

0   350   700
Feet

Crediting - Crosswalk

Cosumnes Floodplain Mitigation Bank Habitat Development Plan

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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)

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Performance Standards

Based on increases in Functional Capacities (FCI) over baseline during <u>performance monitoring period</u>

- Dynamic Surface Water Storage (FCI = $[V_{FREQ} * (V_{INUND} + V_{ROUGH})/2]^{1/2}$)

- Nutrient Cycling (FCI = $[(V_{BTREE} + V_{SHRUB} + V_{HERB})/3 + (V_{CWD} + V_{OHOR})/2]/2$)

- Retention of Particulates (FCI = $(V_{FREQ} * V_{ROUGH})^{1/2}$)

- Organic Carbon Export (FCI = $\{(V_{FREQ} * V_{SURFCON})^{1/2} * [(V_{OHOR} + V_{CWD)})/2]\}^{1/2}$)

- Maintain Plant Community (FCI = $\{[(V_{BTREE} + V_{SHRUB} + V_{HERB} + V_{COMP})/4] \times V_{FREQ}\}^{1/2}$)

Yr 2- 2012

Yr 6- 2016

Durability – Perpetuity is a Long Time

"All human plans [are] subject to ruthless revision by Nature, or Fate, or whatever one preferred to call the powers behind the Universe."
— **Arthur C. Clarke**

Durability – Perpetuity is a Long Time

- Conservation Easement
- Long-Term Management Plan
- Perpetual Monitoring, Management, and reporting
- Long-Term Stewardship Fund

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Key Lessons for Banking in Dynamic Systems

- Thoroughly understand site ecology and have a good narrative
- Don't forget "biogeopolitics"
- Find an IRT champion
- Focus design on accommodating ecological process rather than a pre-determined outcome
- Performance (success) criteria should be process based
- Plan for Durability

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Thank You

9 years after levee breach

mgause@westervelt.com