

Item 10: Update on the Laguna de Santa Rosa TMDLs



November 20, 2014
David Kuszmar



Introductions

- Regional Board Staff
 - David Kuszmar, Project Lead
- Guest Speakers
 - Brittany Heck, Gold Ridge RCD
 - Michael Thompson, SCWA
 - Chuck Striplen, SFEI-ASC

Presentation Outline

1. Watershed / TMDL Overview
2. Our Unique Approach in the Laguna
3. Areas of Recent Progress
4. Project Schedule

Laguna de Santa Rosa Watershed

- Largest tributary of Russian River (254 mi²)
- Metropolitan center of the North Coast Region
- 70 mi² of “Important Farmland” (per CA Dept. of Conservation)
- Largest freshwater wetlands complex on northern CA coast
- “Wetland of International Importance” (per Ramsar)



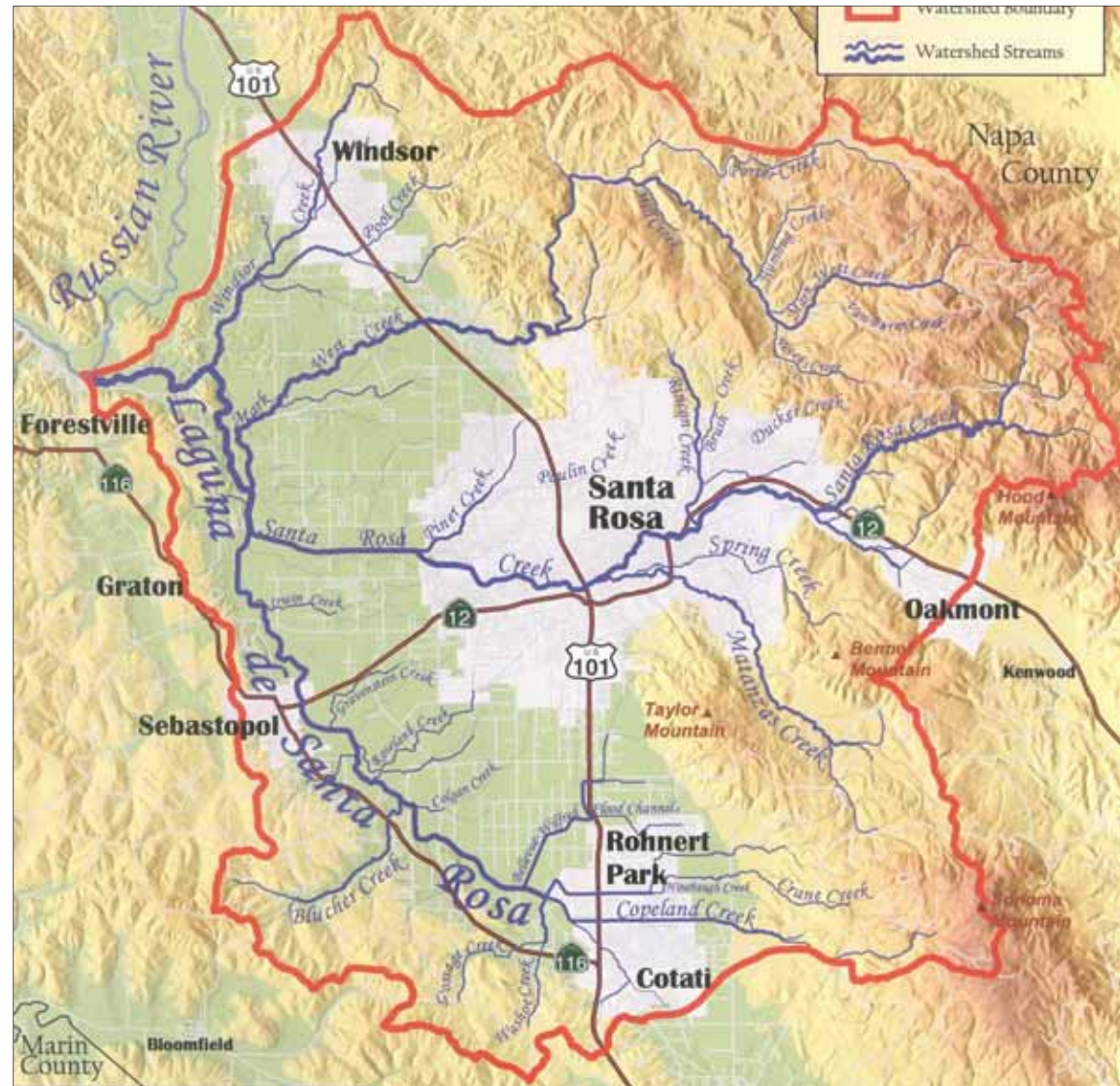
Laguna de Santa Rosa Watershed

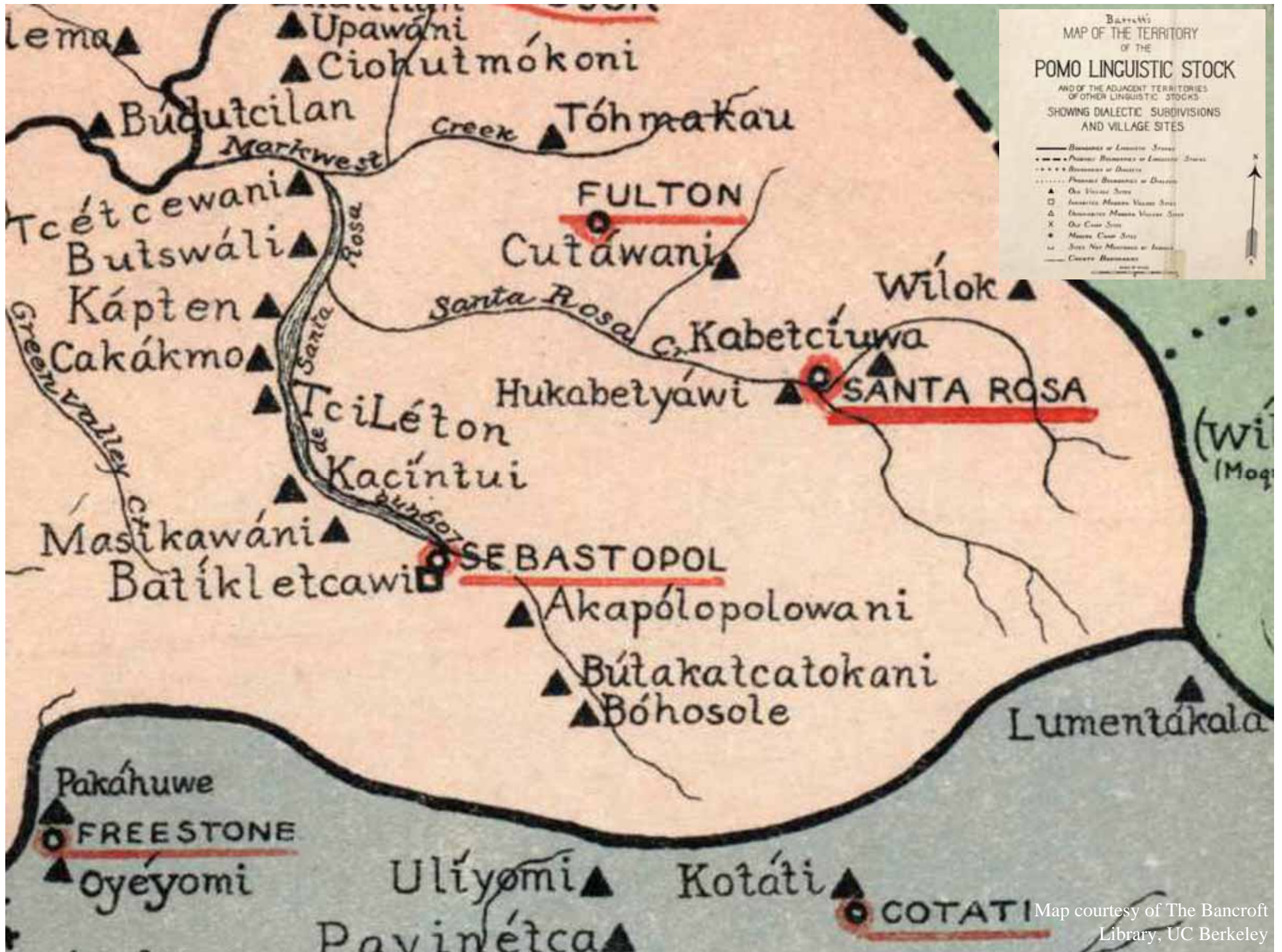
Waterbodies:

Windsor Creek
Mark West Creek
Santa Rosa Creek
Copeland Creek
Laguna de SR

Municipalities:

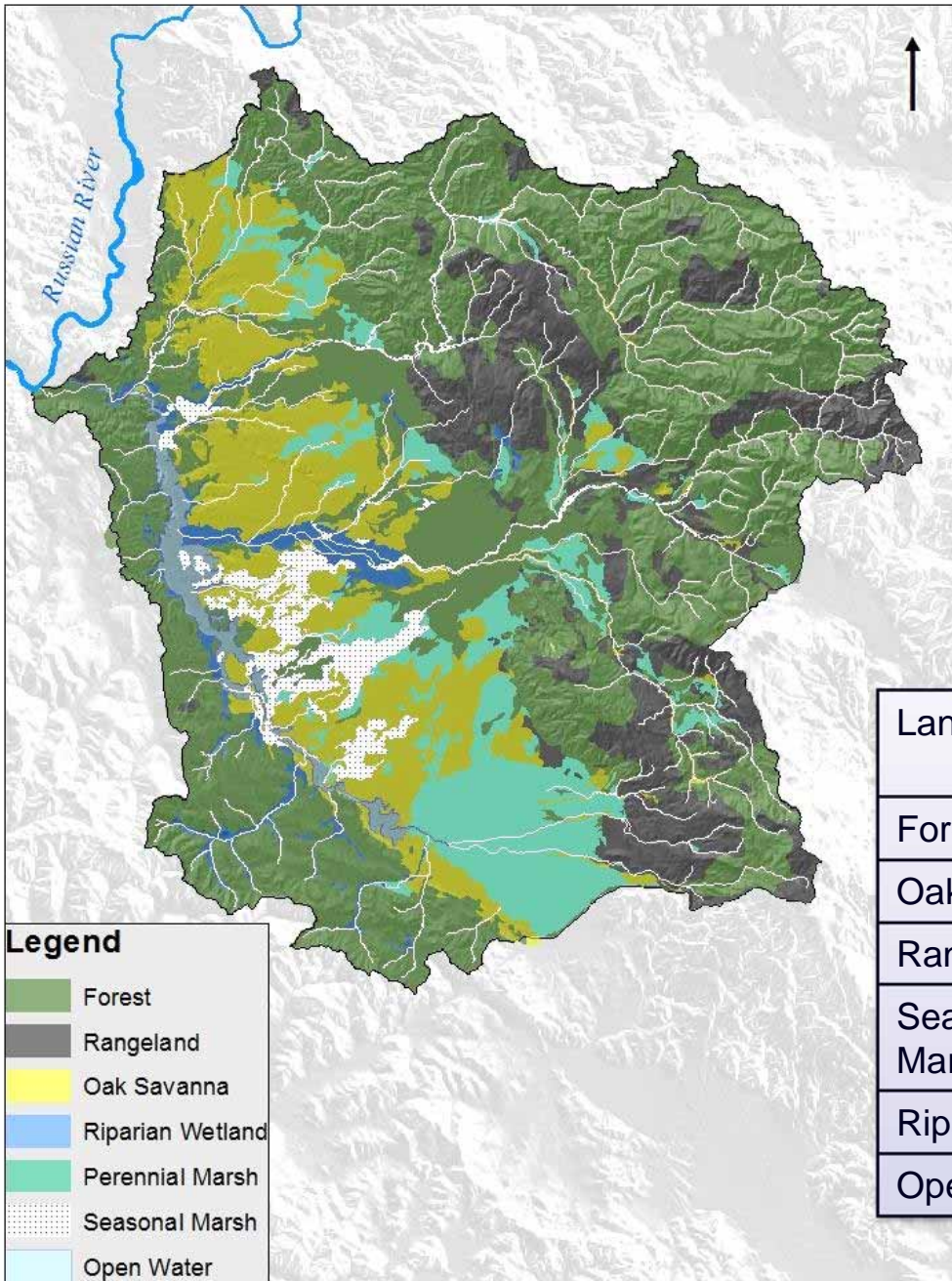
Windsor
Santa Rosa
Rohnert Park
Cotati
Sebastopol



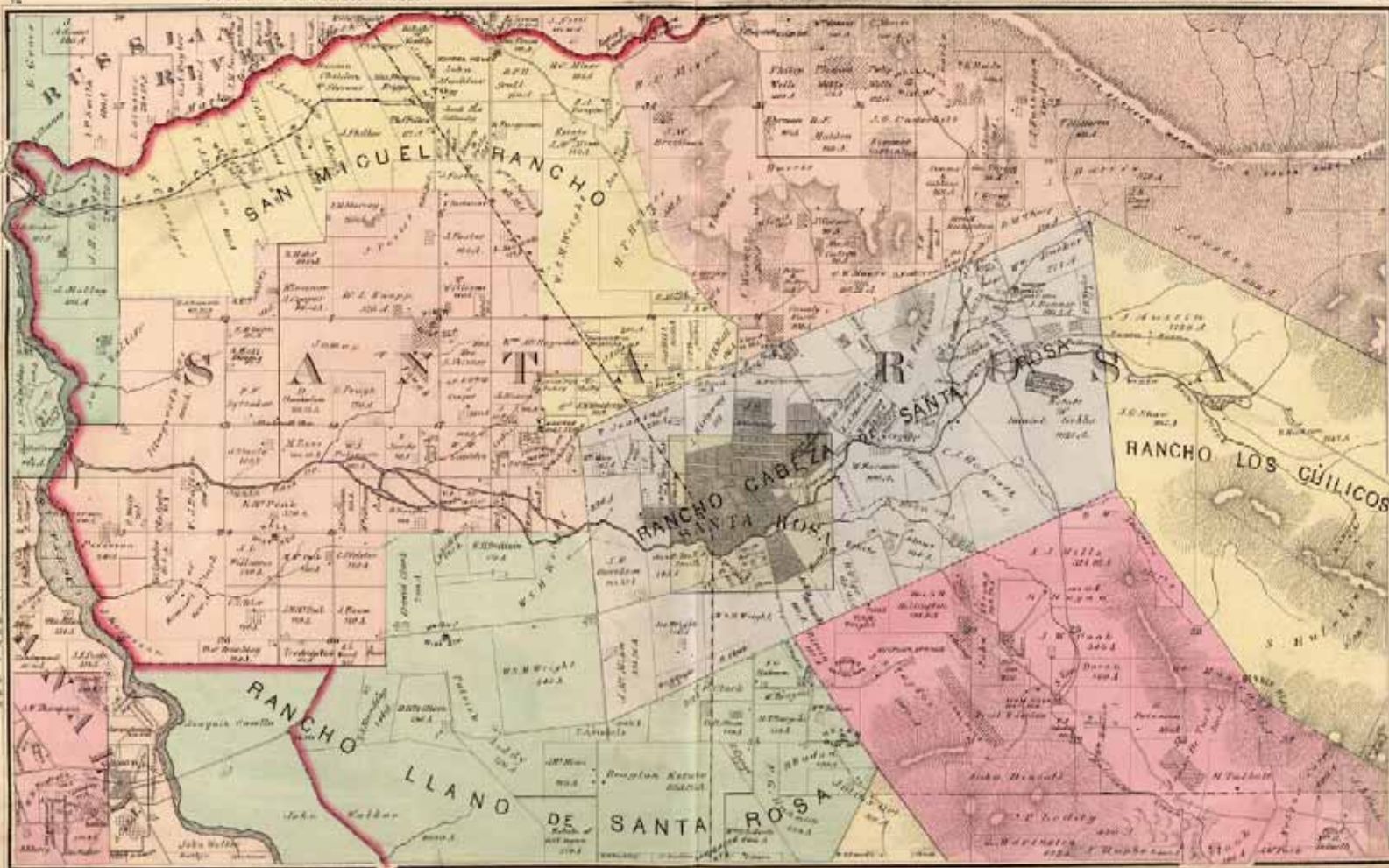


Map courtesy of The Bancroft Library, UC Berkeley

Pre-European Land Cover



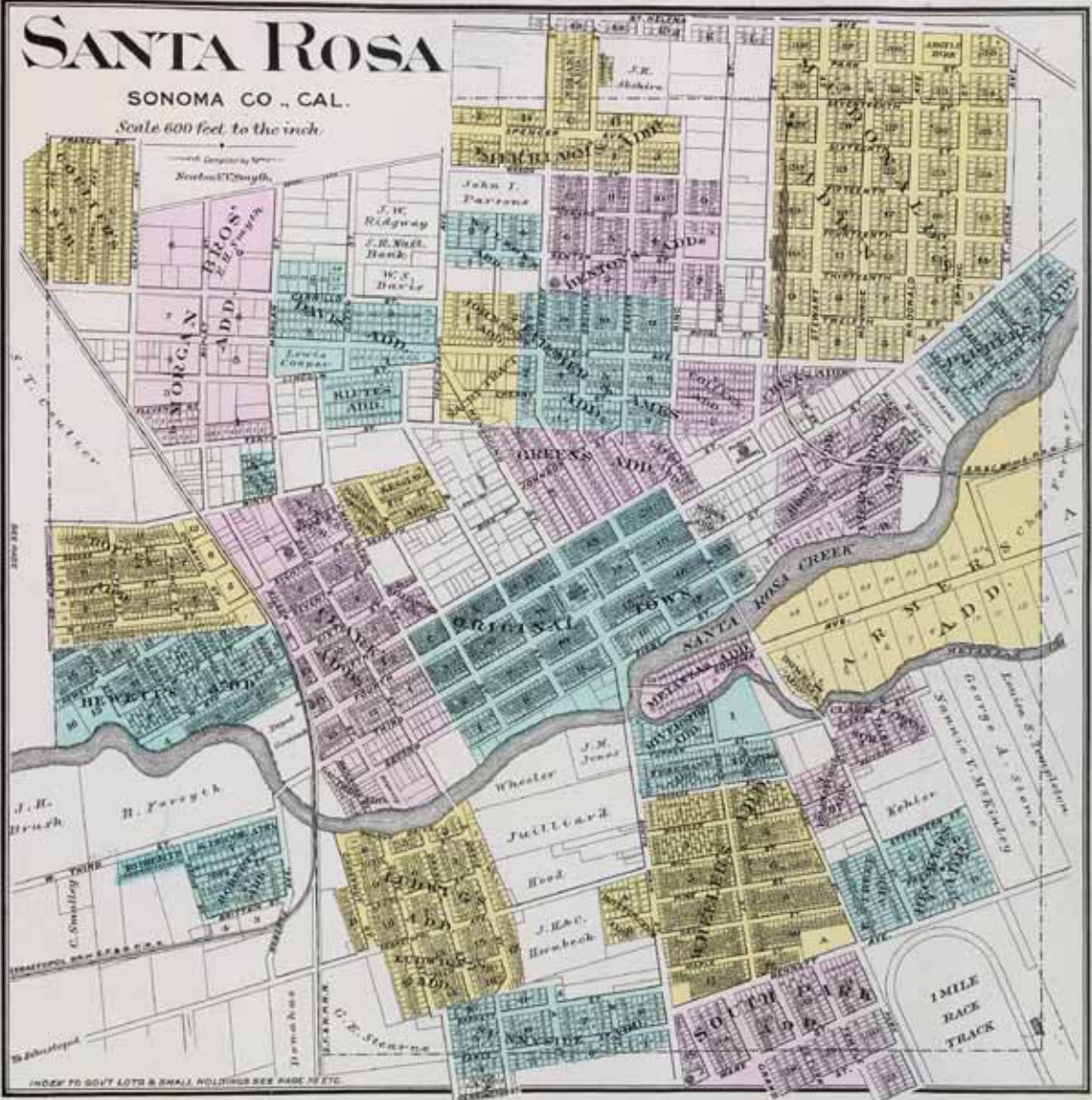
Land Cover Category	Wet Year Acreage	Percent of Watershed
Forested Land	84,515	52%
Oak Savanna	24,712	15%
Rangeland	24,290	15%
Seasonal & Perennial Marshes	22,604	14%
Riparian Wetlands	3,881	2%
Open Water	2,785	2%



SANTA ROSA

SONOMA CO., CAL.

Scale 600 feet to the inch







UNIT 3
 NO. 0-4701-6
 OPERATOR: John Egan
 LOCATION: Santa Rosa, California
 1/2 mile west
 DISTRICT: Central Sonoma Watershed
 DISTRICT OFFICE
 UNIT 3, Lower Santa Rosa
 Creek Channel

Looking downstream from end of project under construction. Shows dirt to the bottom of the channel.

PHOTO NO. C-1350-3D DATE 10-17-64
 SCD Santa Rosa STATE Calif.
 LOCATION Unit 2
 OPERATOR Chandler
 PHOTOGRAPHER H. Norton
 LEGEND State fully what, how, who and why

Unit 2

Trench excavated for 60" CMP side inlet at Willowside St. showing high water table



Fulton Road 1,000 feet north of Lone Redwood taken at bridge facing northwest 2/14/62

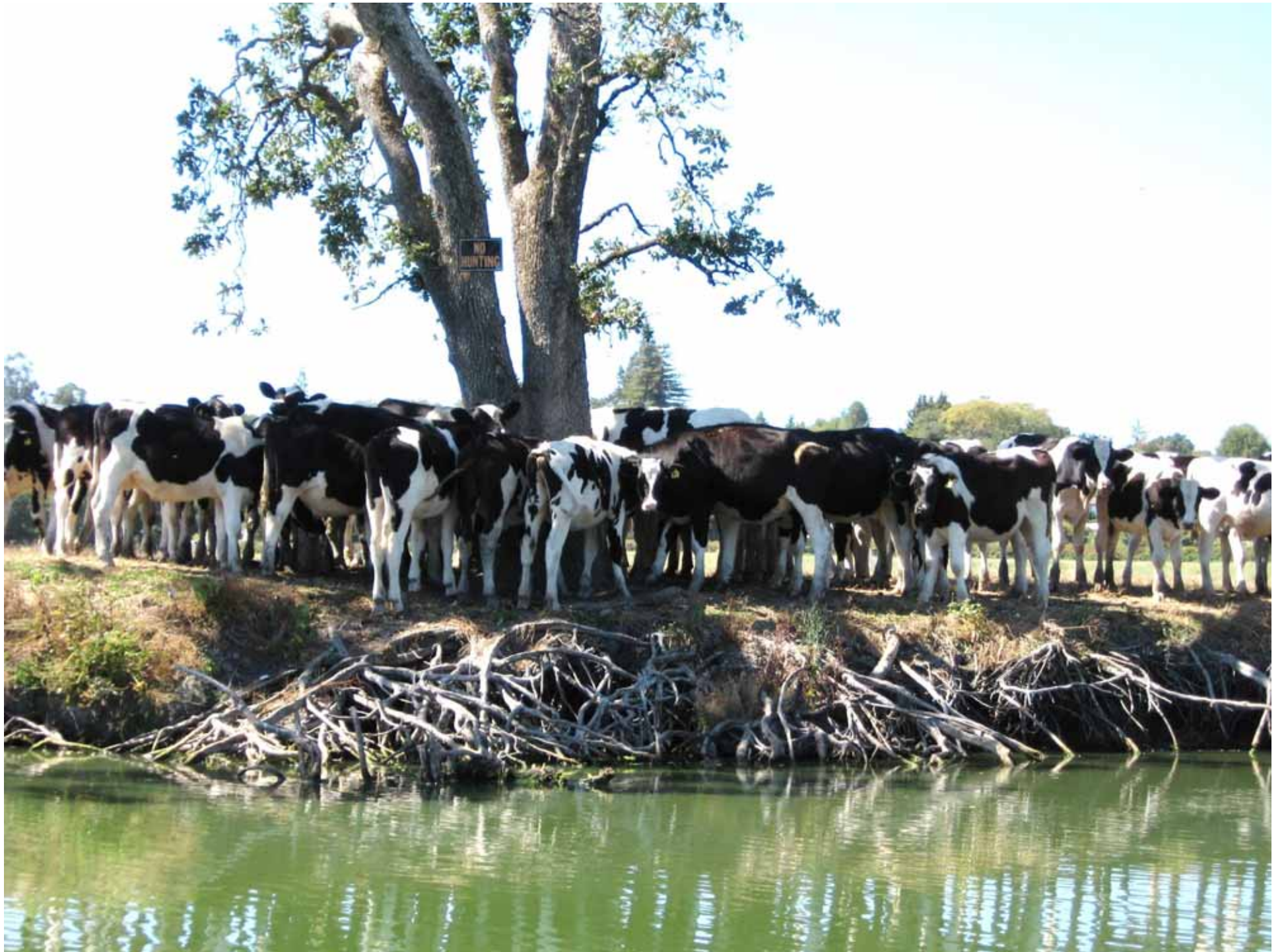


PHOTO NO. 14900-1 DATE 11-18-64
 SCD Santa Rosa STATE Calif.
 LOCATION 1/2 mi. W. of Santa Rosa
 OPERATOR Charles J. Chandler
 PHOTOGRAPHER H. Ferris
 LEGEND State fully what, how, who and why

Unit 2, Channel No. 3

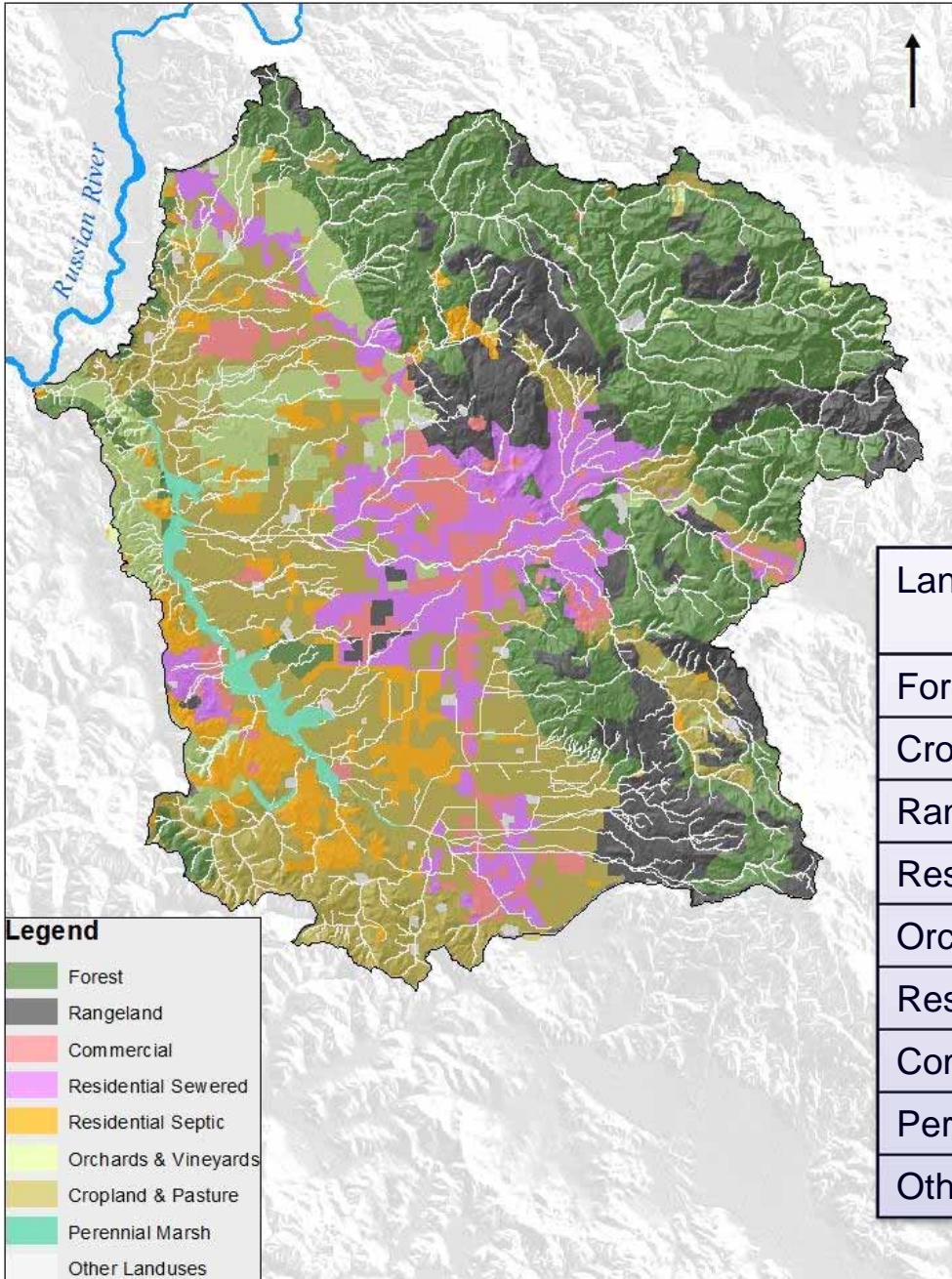
Setting on the North levee (Sta. 171+00) looking southeast at the trench being dug for the 48" CMP



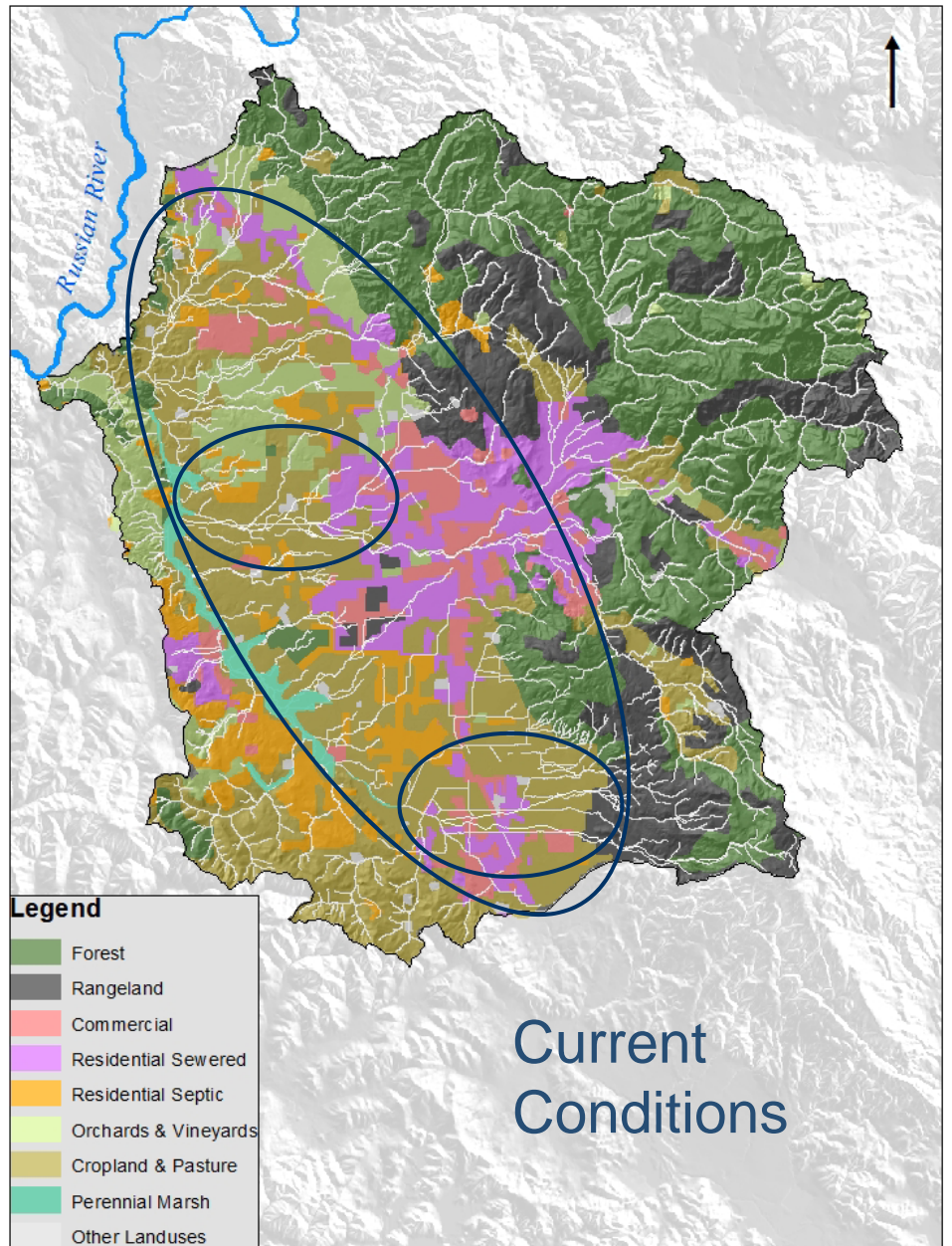
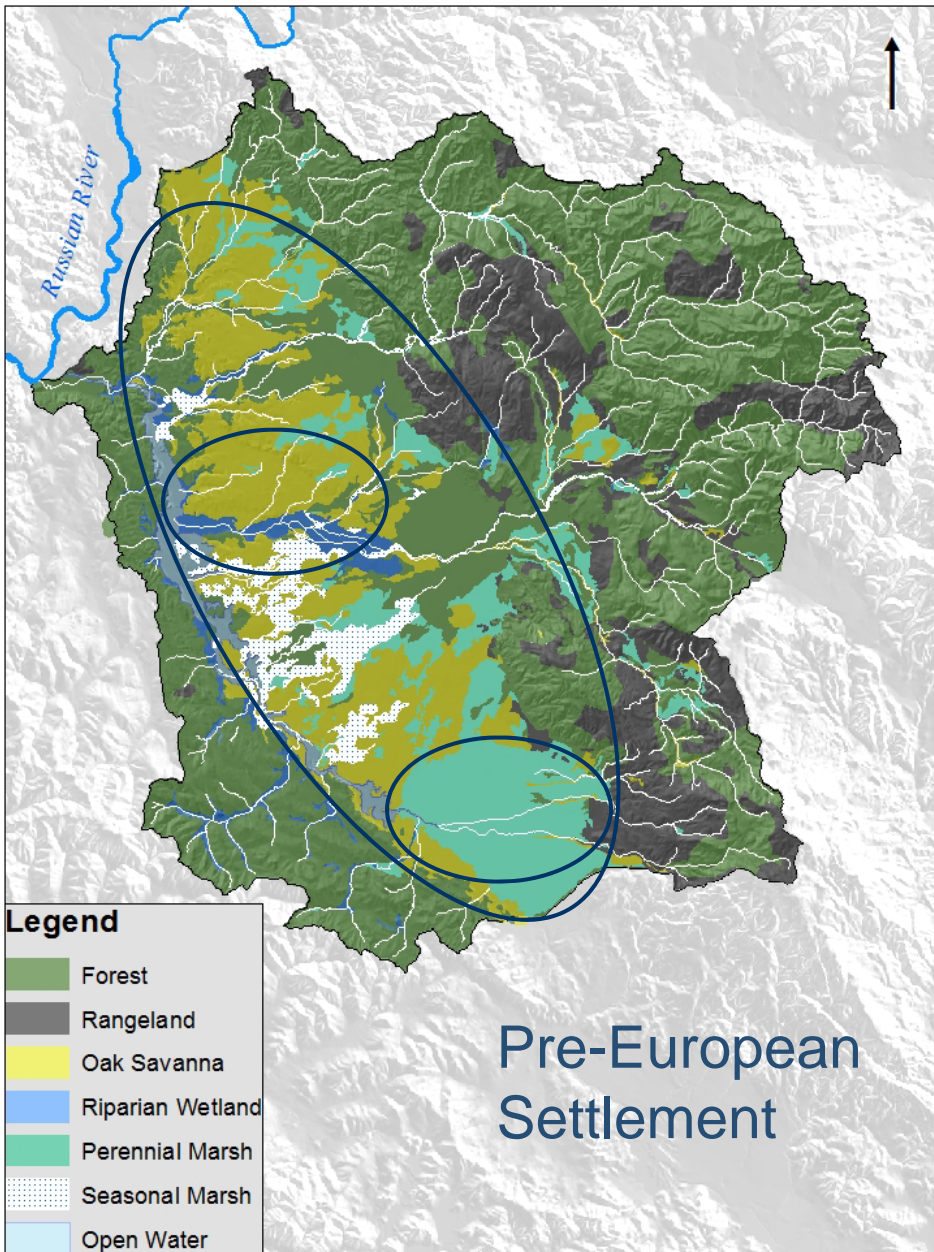




Current Land Cover



Land Cover Category	Wet Year Acreage	Percent of Watershed
Forested Land	48,230	30%
Cropland & Pasture	42,425	26%
Rangeland	21,767	13%
Residential (Sewer)	15,348	9%
Orchards & Vineyards	12,815	8%
Residential (Septic)	9,822	6%
Commercial Areas	8,524	5%
Perennial Marsh	2,238	1%
Other Land Covers	1,438	1%



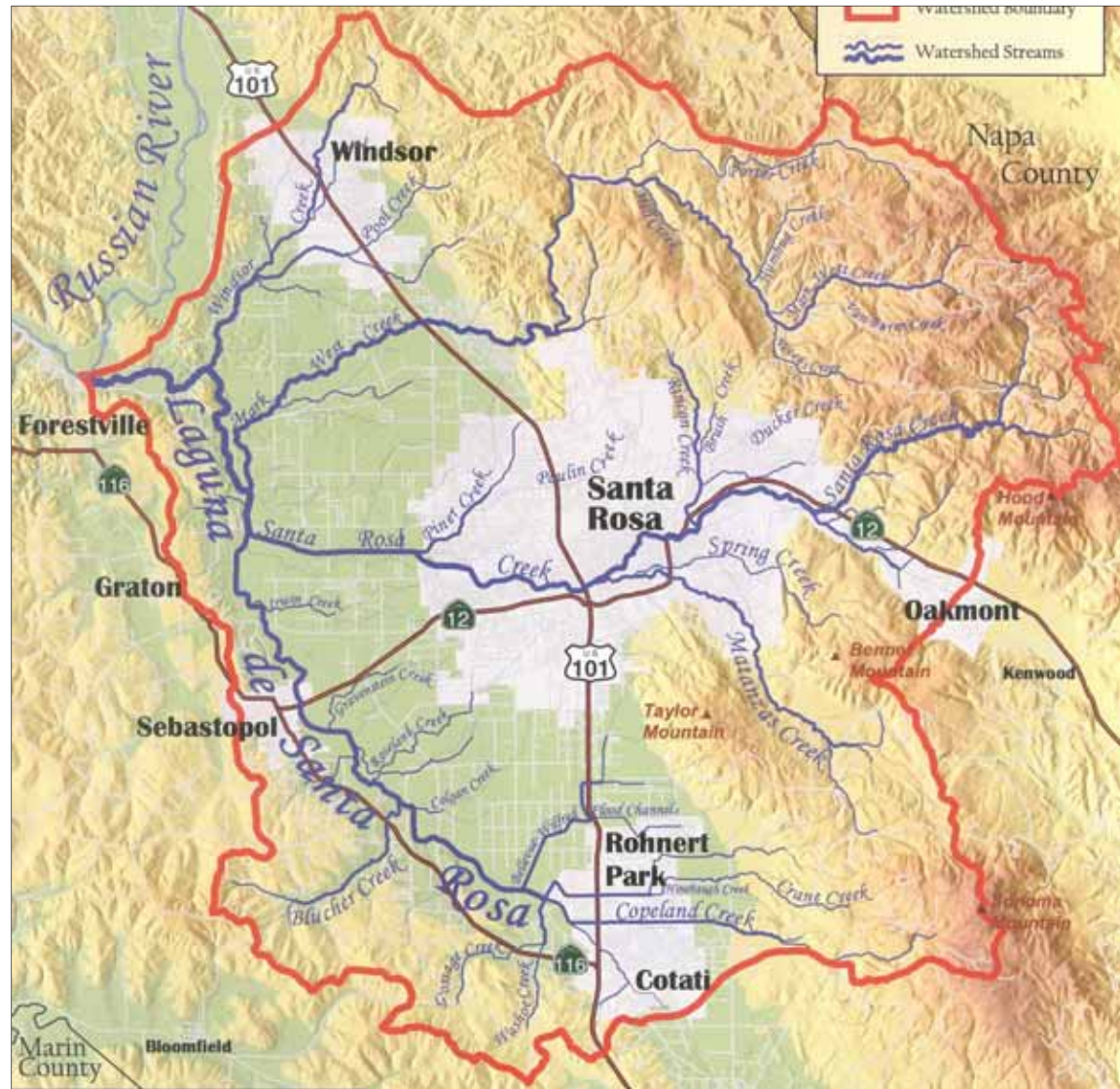
Watershed Alterations

- Widespread Urban and Agricultural Development
- Increased Channelization & Straightening of Surface Drainage Features
- Loss of Habitat and Function in Wetlands, Riparian Areas & Open Water Areas
- Changes in Sediment Transport Dynamics
- Big Increases in Nutrient Loads

Laguna de Santa Rosa Watershed

Impairments:

- Nutrients
- Dissolved Oxygen
- Sediment
- Temperature
- Pathogens
- Mercury
- + *Ludwigia!*



What is a Total Maximum Daily Load (TMDL)?

Comprehensive Pollution Control / Restoration Plan for an Impaired Water Body

1. Quantitative Assessment
 - Water Quality Problems
 - Contributing Sources
 - Load Reductions & Allocations
2. Implementation Plan
3. Monitoring Plan

Our Unique Approach in the Laguna de Santa Rosa...

Coordinated Watershed Stewardship

- Effective Partnerships
- Integrated Technical TMDLs
- Support for Innovative (i.e. market-based) Implementation Options
- Emphasis on Early Implementation

Effective Partnerships

- Municipalities & Permit Holders
- Local, State & Federal Agencies
- Agricultural Landowners and Resource Conservation Interests
- Environmental and Recreational Interests
- Scientists & Technical Experts

TMDL Development

- Sediment
 - EPA Contract Support
 - Refined Sediment Source Analysis
 - Improved Estimates of Sediment Loading and Deposition Rates
 - Updated Sediment Budget

TMDL Development

- Nutrients
 - EPA Contract Support
 - Refined Nutrient Load Estimates
 - QUAL2K and NNE Modeling
 - Examination of Surrogate Parameters for TMDL Implementation

TMDL Development

- Temperature
 - Stream Temperature Assessment
 - Sonoma Veg Map Data
 - New Tools Development
 - Temperature Policy Implementation

Initial Conclusions

Reduce
Pollutant Sources + Increase
Assimilative Capacity



Diet + Exercise!

Early TMDL Implementation

- Permit & Policy Support
- Water Quality Credit Trading Market Development
- Ecosystem Restoration Planning
- Data Gathering and Tools Development

Water Quality Credit Trading in the Laguna de Santa Rosa

Brittany Heck, Gold Ridge RCD

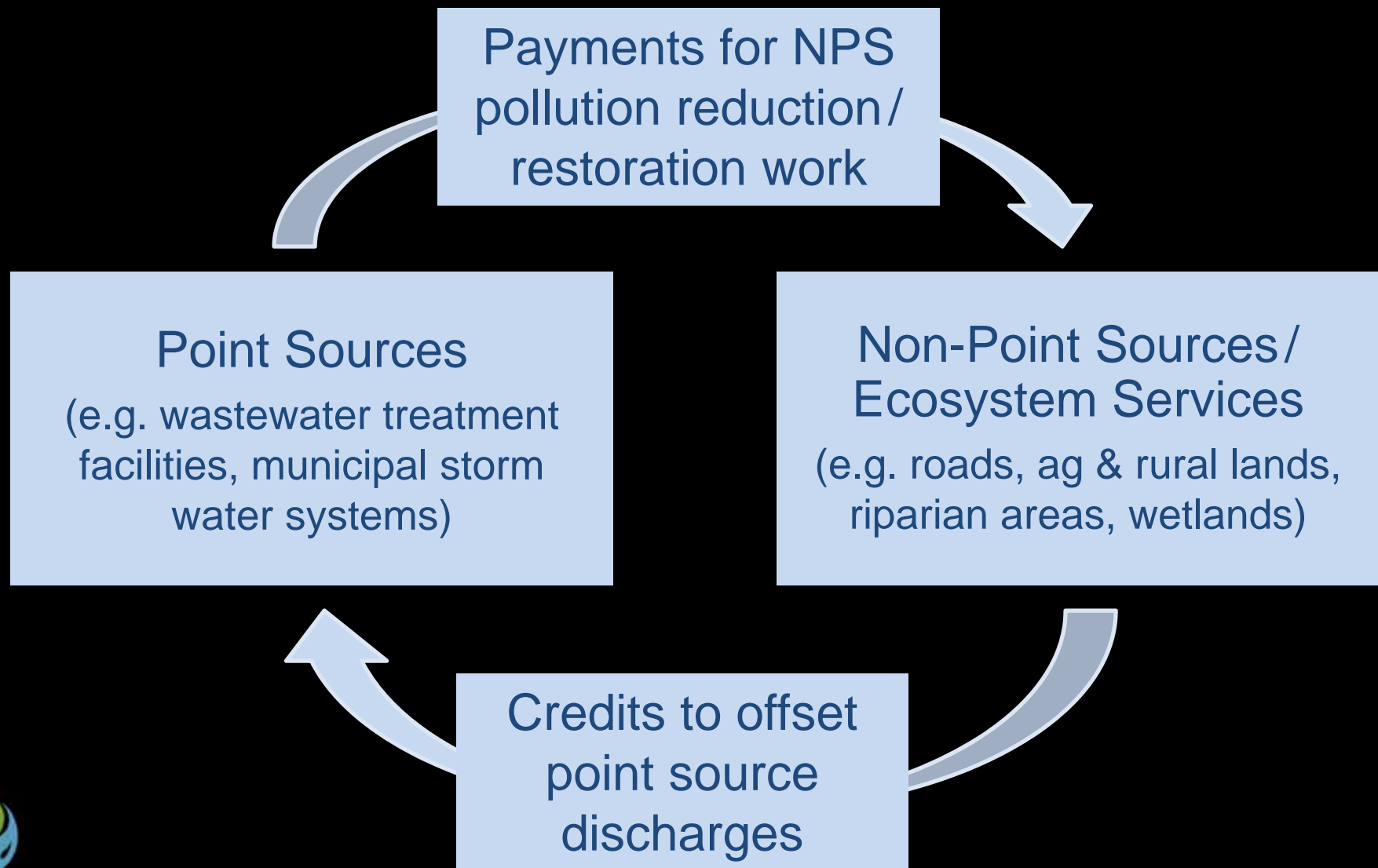
A project of Sonoma and Gold Ridge RCDs

The Laguna de Santa Rosa RCD Projects

- Dairy Water Quality Improvement Grant
- Water Quality Planning for Equine and other Livestock
- Sediment Reduction
- Riparian Restoration
- Water Quality Credit Trading



Water Quality Credit Trading



Project Participants

- Sonoma and Gold Ridge RCDs
- City of Santa Rosa
- Technical Consultants
 - Kieser and Associates
 - Merritt Smith Consulting
 - Texas Institute for Applied Environmental Research
 - Willamette Partnership
- Agencies
 - NRCS
 - Regional Water Quality Control Board
 - CA Dept of Conservation
- Local Organizations
 - UC Cooperative Extension
 - Russian River Watershed Protection Committee
 - Sonoma County Ag Preservation and Open Space District
 - Sonoma County Water Agency
 - Other cities
 - Laguna Foundation
- Ag Stakeholder Advisory Committee
 - Vineyards
 - Dairy Farms
 - Crop Farms
 - Turf Farm
 - Equine Facilities



Guiding Principles

- *Beneficial*
 - Net water quality benefits, greater and faster
 - Voluntary & economical
 - Flexible, adaptable & scalable
- *Accountable*
 - Actual pollutant reductions
 - Transparent, open & accessible
 - Clear and enforceable trading rules
- *Defensible*
 - Science-based
 - Equitable/non-biased



Developing a Formalized Market

- Currency, Credit Supply & Demand
- Market Structure, Rules, Infrastructure
- Market Participation Eligibility
- Tools for Calculating, Tracking and Accounting for Credits



Net Water Quality Benefits – Greater and Faster

Example: Santa Rosa Offset Requirements

- Improve habitat, ecosystem function
- Reduce or eliminate otherwise unregulated discharges / nutrient sources
- Actions above and beyond minimum requirements
- Actions ahead of schedule



Voluntary & Economical

Example: Rogue River, OR (Willamette Partnership)

Cooling Towers

>\$20 million

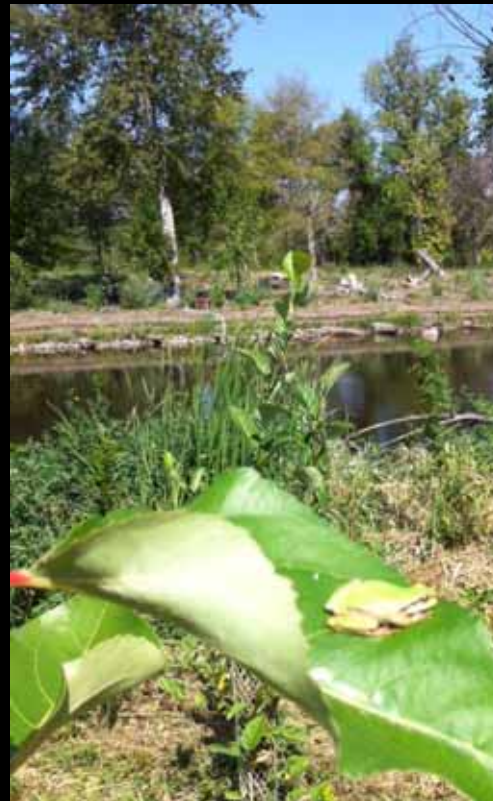
Holding Pond

\$ 16 million

30+ miles of restoration

\$8 million

FROM THIS...



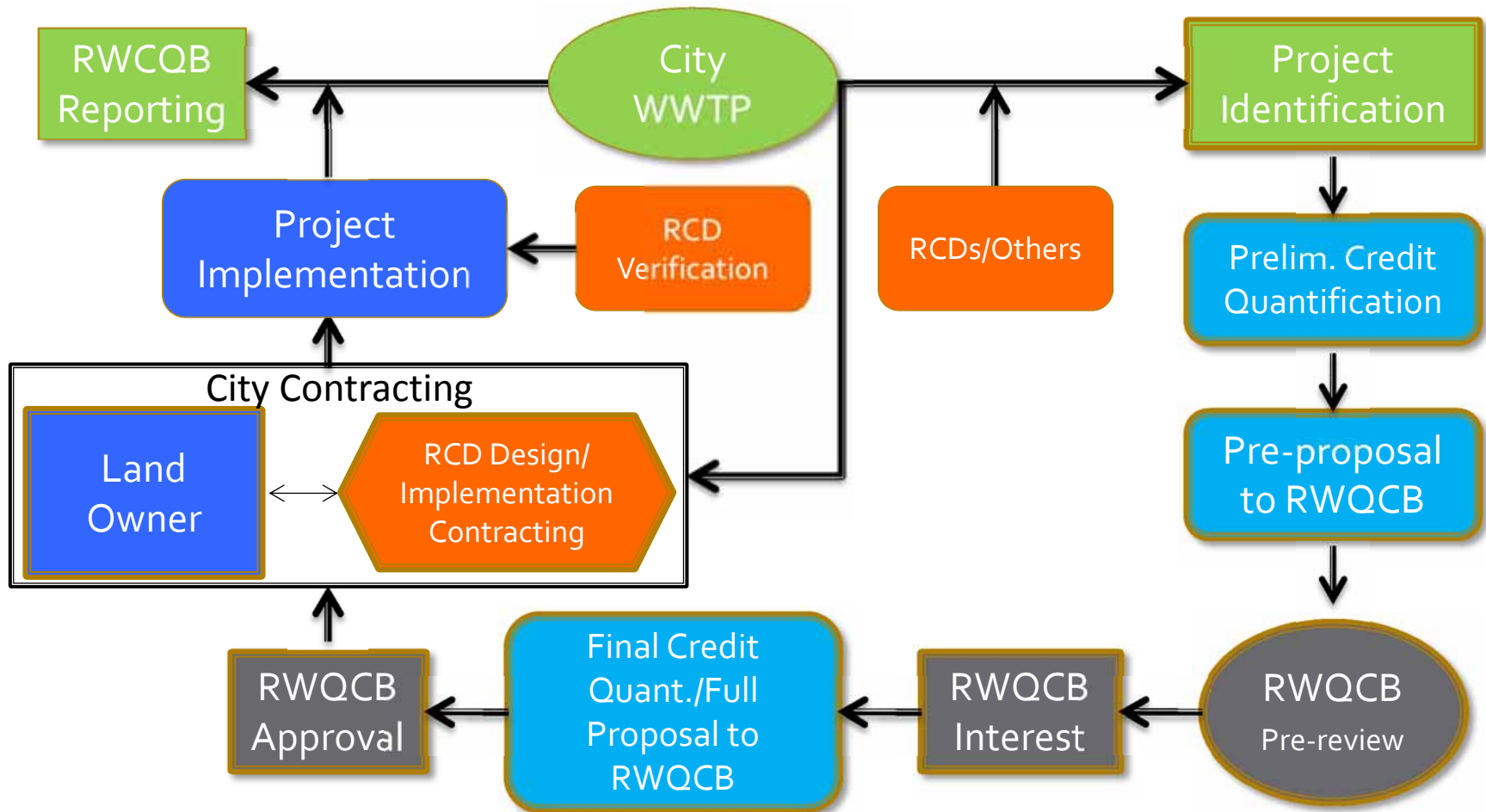
Benefits to the Watershed



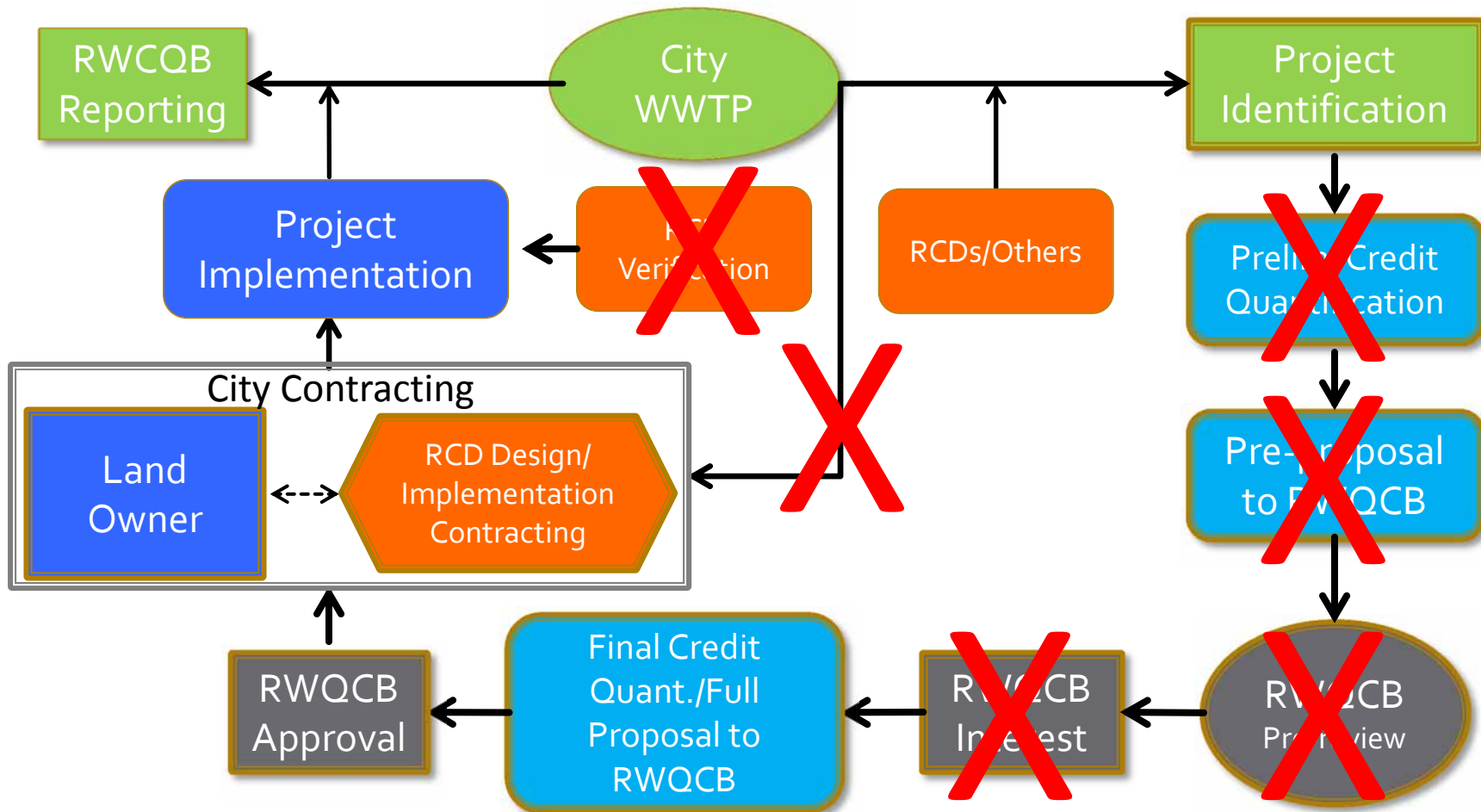
- Net water quality benefit (2:1 trade ratio)
- Non-point source projects often have ancillary benefits beyond water quality
- Potential to develop “functional restoration” credits that have impacts beyond water quality



Current Approach

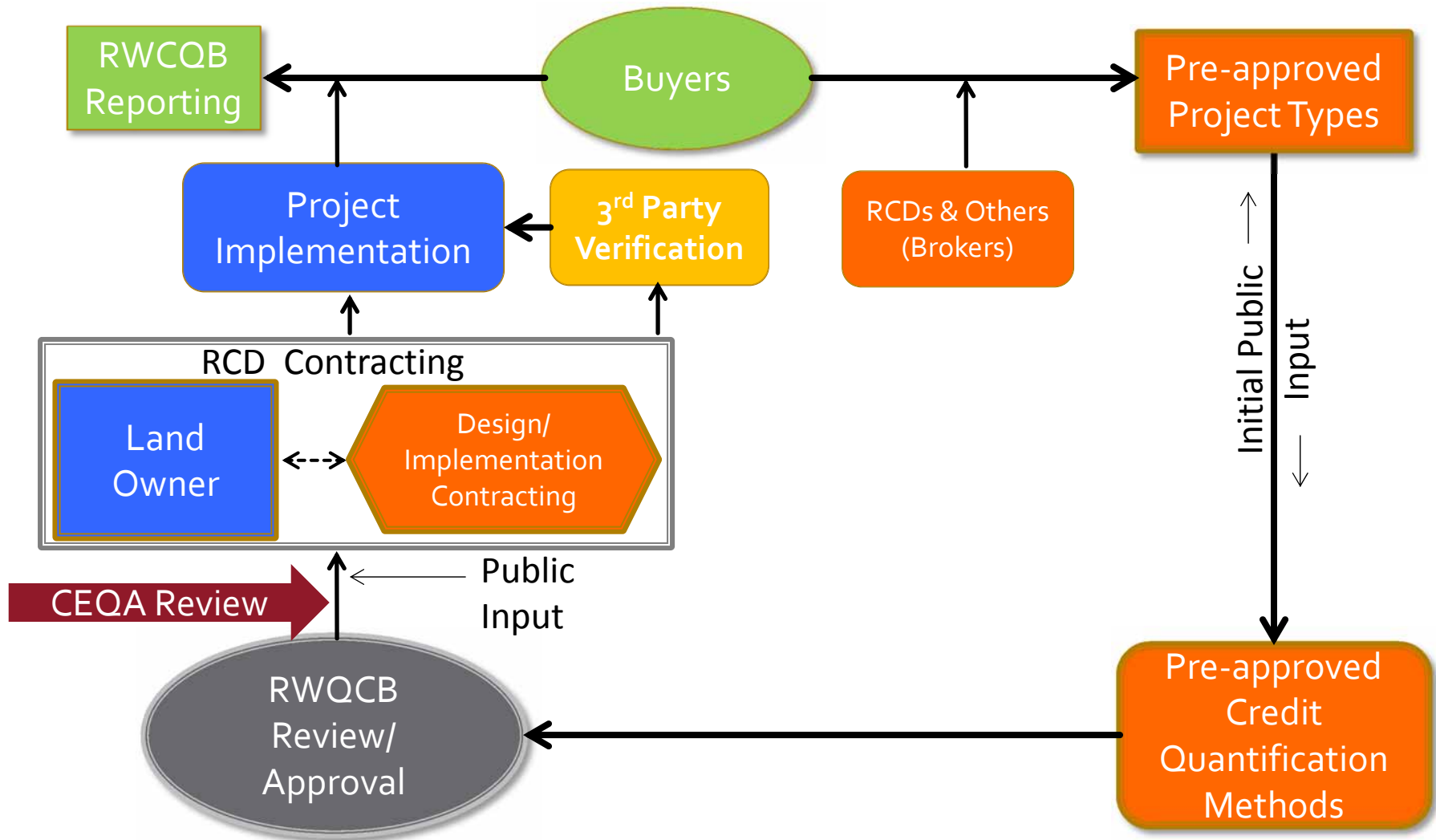


CHANGES to Approach



No consultants, Pre-approved project types and calculations, 3rd party verifier, RCD/Aggregator credit supplier/contracting

Improved Approach



Deliverables from Project

- List of pre-approved project types and credit calculation methods for select project types
- Protocol for “completeness reviews” of credit proposals for pre-approved practices
- Recommendation for CEQA coverage of credit projects
- Recommendation re: permit coverage of credit projects
- Framework/process for aggregation
- Process for verification of credits
- Mechanism for public reporting through a credit registry



www.lagunawaterquality.org



Brittany Heck

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Kara Heckert

707-569-1448 x 104

kheckert@sonomarcdd.org

Stream Maintenance & Ecosystem Restoration in the Laguna



Michael Thompson
Assistant GM
michael@scwa.ca.gov



www.sonomacountywater.org

Thank You

Promoting trust, respect and
collaboration in regulator/regulated
framework

www.sonomacountywater.org



Balance Environmental & Public Safety Needs



Hinebaugh Creek 2004 & 2014



20+ Miles Per Year



Labor Intensive



\$1,000,000
per year shortfall

Property Owner Pleas



Garbage and Debris



Denner Ranch

Blockages and Water Quality Issues



Persistent Flooding



Invasive Species - Ludwigia



Ludwigia Ecosystem





Sand & gravel input

Sand and gravel stream bed,
debris blockages from fallen trees,
Healthy riparian vegetation,
limited ludwigia

Sand & gravel input

Stagnant water, degrading
organics matter, abundant
ludwigia, very poor water quality

Google earth

Challenges

Challenge 1: No governmental entity has responsibility for maintaining the Laguna

Challenge 2: No funding source for restoring or caring for the Laguna

Challenge 3: Daunting permitting obstacles to overcome in performing restoration

Challenge Solutions

Challenge 1 Solution: Sonoma County Water Agency has the capability and desire to improve watershed conditions.

Challenge 2 Solution : Water Quality Credit Trading Markets could provide funding.

Challenge 3 Solution : Trusting, respectful and collaborative relationship between regulator and restoration implementer.

Laguna Restoration Team (NCRWCB and SCWA staff)

Goal 1: Achieve **measurable and marketable** improvements to ecosystem services and ecological functions in the Laguna de Santa Rosa.



Laguna Restoration Team

Goal 2: Increase the **productive use** of agricultural and other lands along the Laguna mainstem.



Laguna Restoration Team

Goal 3: Increase **scientific understanding** of the Laguna mainstem and create a **collaborative model** for enhancing habitat and meeting resource management goals.



Thank You

Trust

Respect

Expertise

Willingness to collaborate



We're Here To Help

Helping to create a data rich environment in the Laguna de Santa Rosa (and beyond)

Chuck Striplen, PhD

San Francisco Estuary Institute – Aquatic Science
Center



SFEI | AQUATIC SCIENCE CENTER

Clean Water

Environmental Informatics

Resilient Landscapes

Green Infrastructure

Green Chemistry

Bay-Delta RMPs

EcoAtlas

Scenario Planning

GIS

Data Management

Historical Ecology

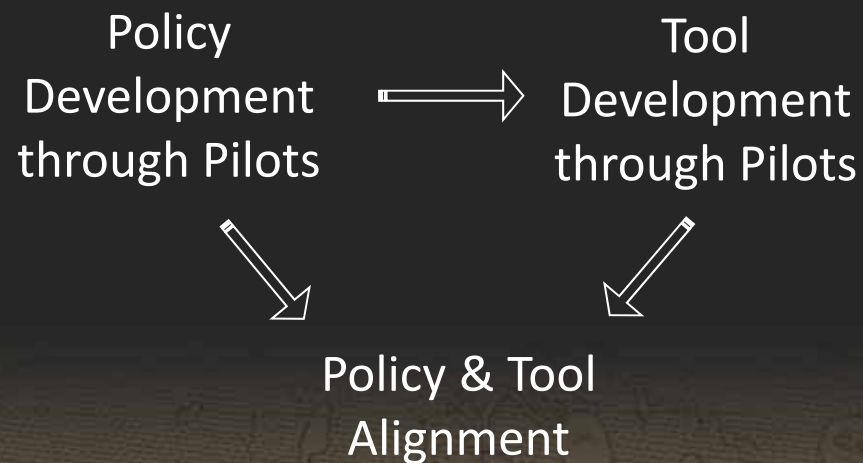
Geomorphology

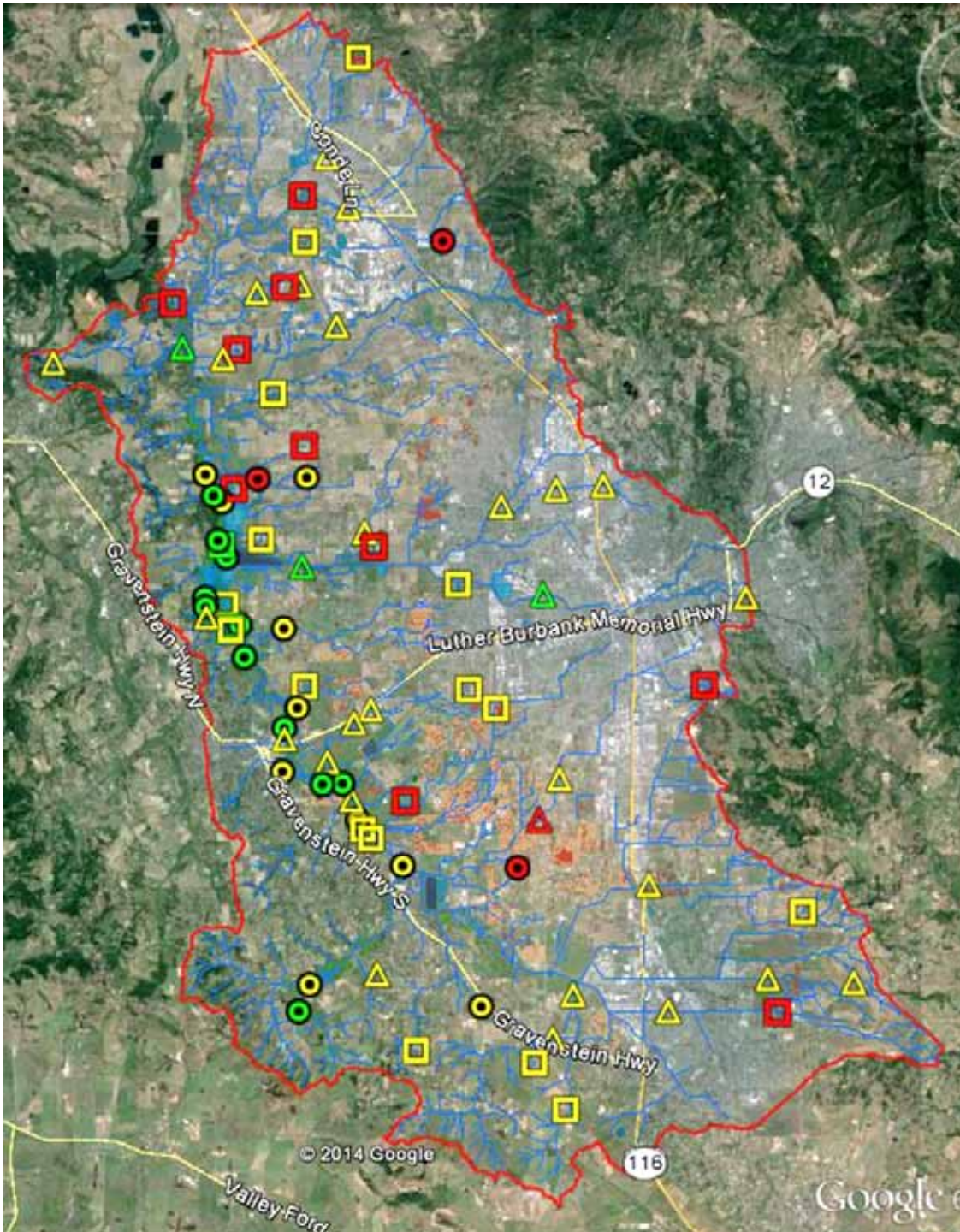
Cultural Landscapes

Landscape Ecology

Santa Rosa Plain Wetland and Stream Condition Survey

Results & Interpretations





Probabilistic Survey Based on Level 1 Map (CARI)

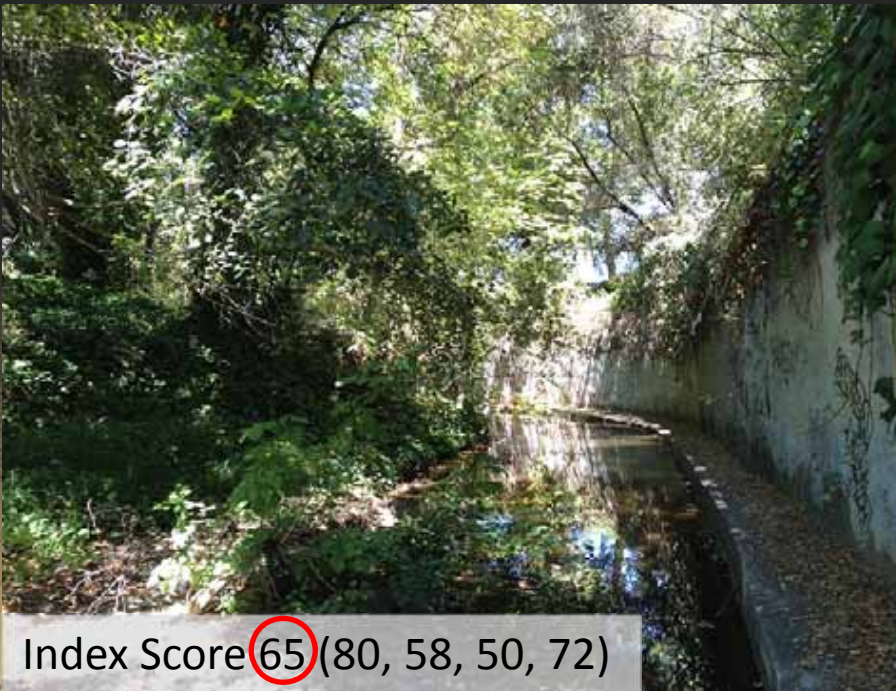
- Depressions
- Slopes
- △ Streams



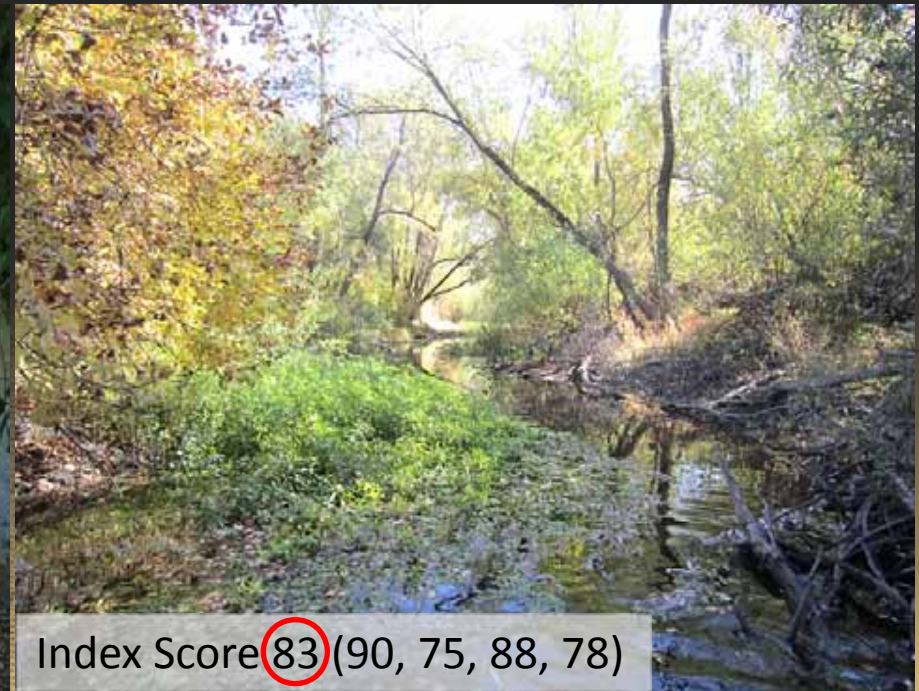
Index Score **45** (75, 50, 25, 31)



Index Score **60** (83, 67, 25, 64)



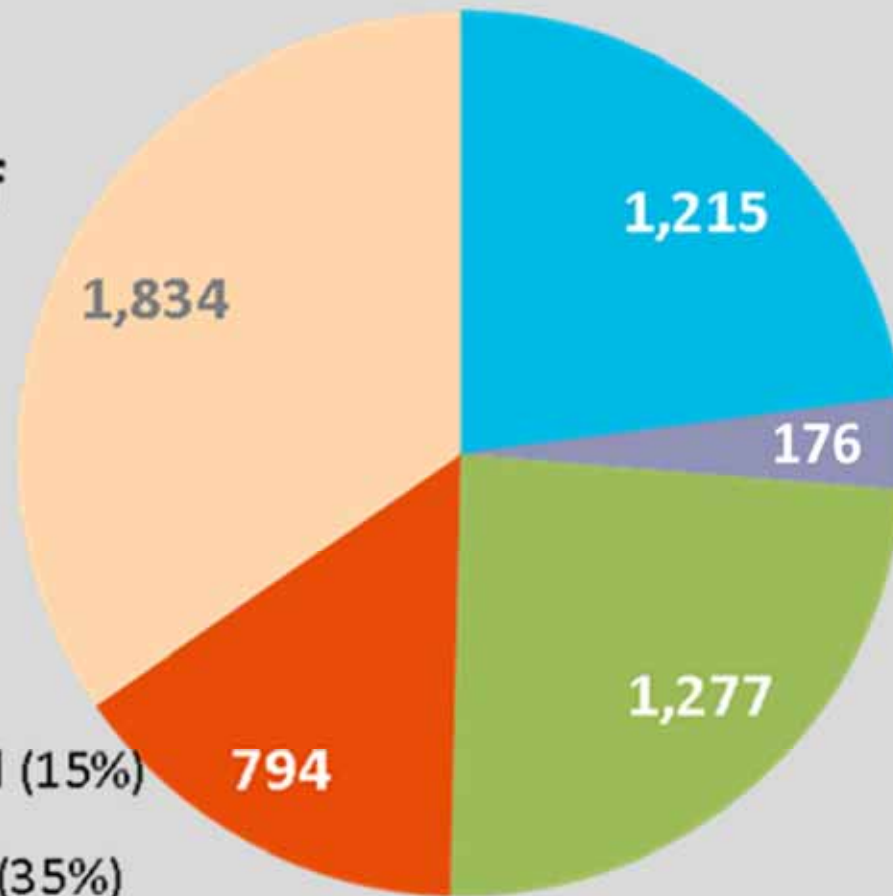
Index Score **65** (80, 58, 50, 72)



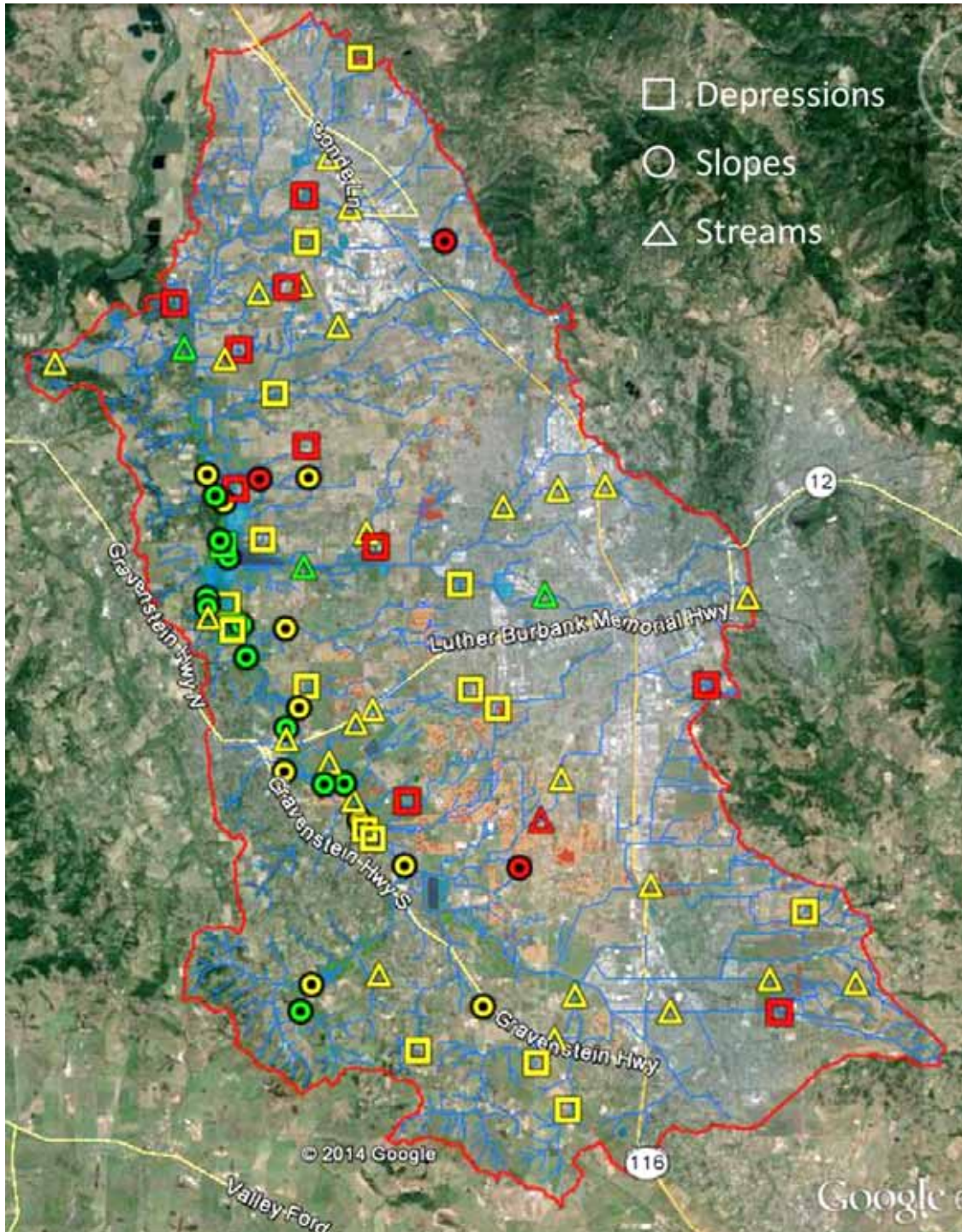
Index Score **83** (90, 75, 88, 78)

Acres & Percent of Wetlands by Type

- Depressional (23%)
- Lucustrine (3%)
- Slope (24%)
- Individual Vernal Pool (15%)
- Vernal Pool Complex (35%)



- Most depressions are man-made & embedded in slope wetlands and vernal pool complexes.
- Slope wetlands were probably historically dominant.

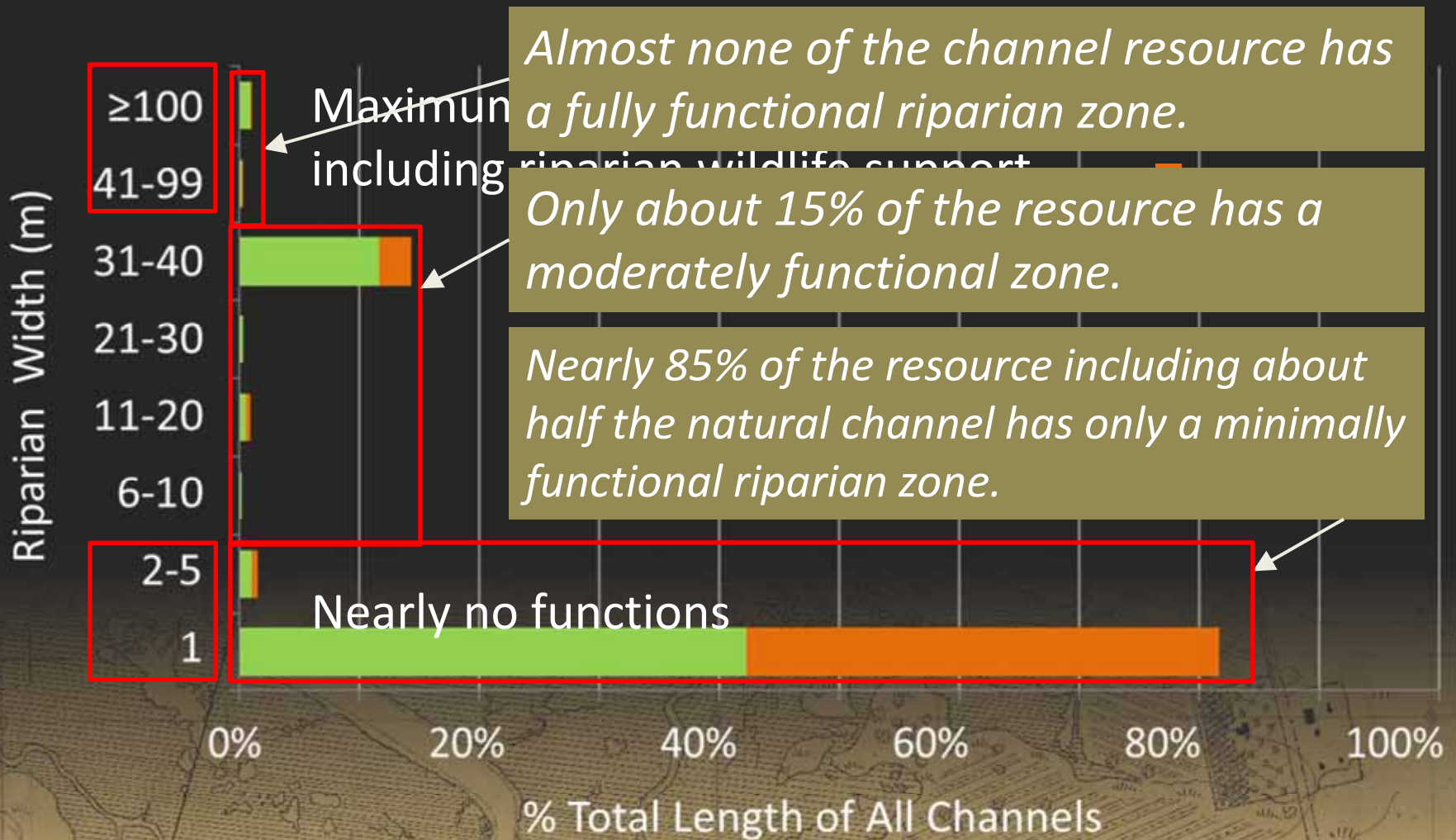


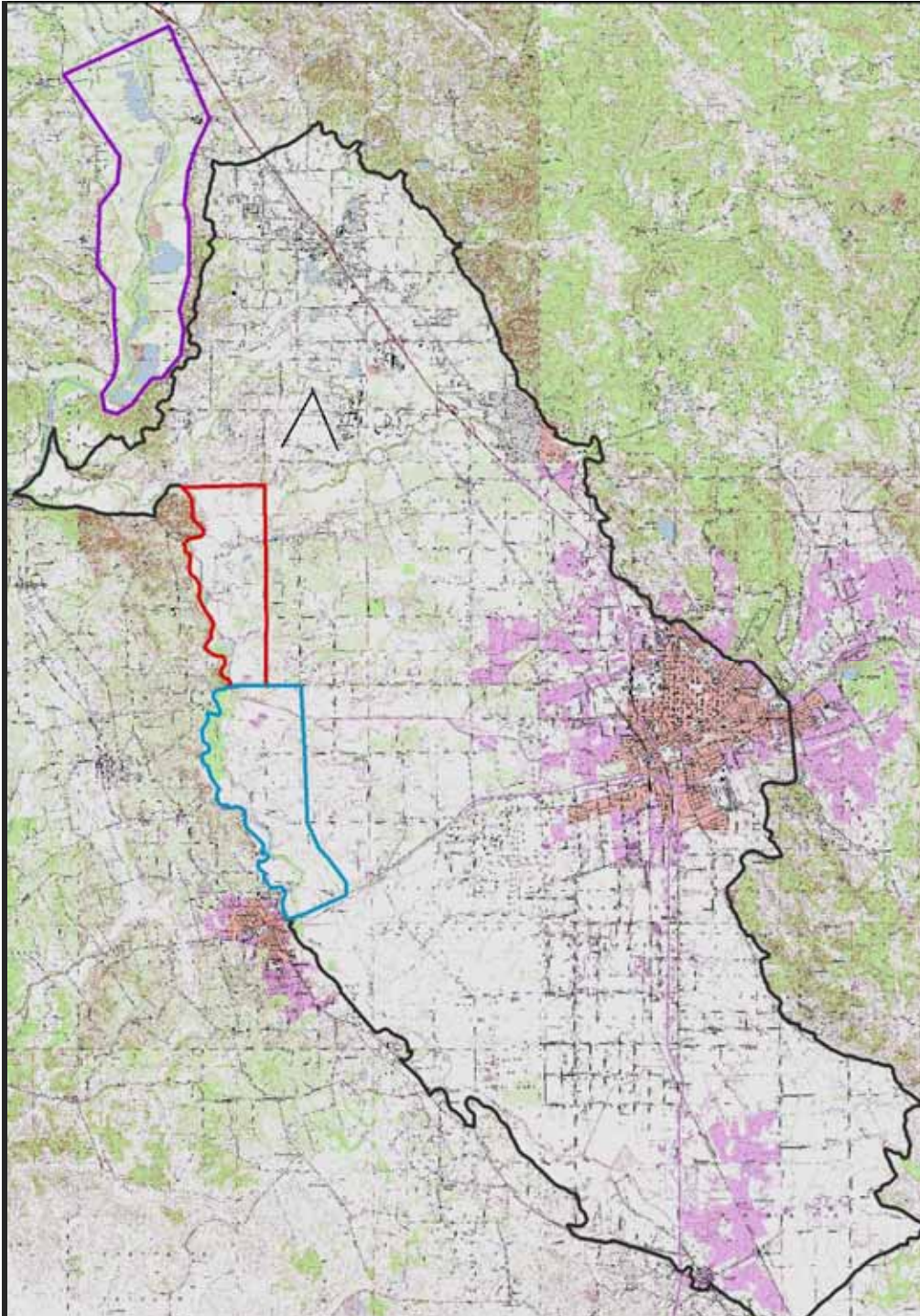
Probabilistic Survey Based on CARI

In general, wetland and stream condition improves with distance downslope across the alluvial fan.

The overall condition of the (remaining) depressions and natural channels of the Laguna are generally **fair** to **good**.

Relative Abundance of Riparian Widths





Laguna de Santa Rosa Historical Ecology Initiative



Historical ecology

What is historical ecology?

- The use of historical data to study past ecosystem characteristics
- Not just the “way things were,” but the “way things work”
(Safford et al. 2012)

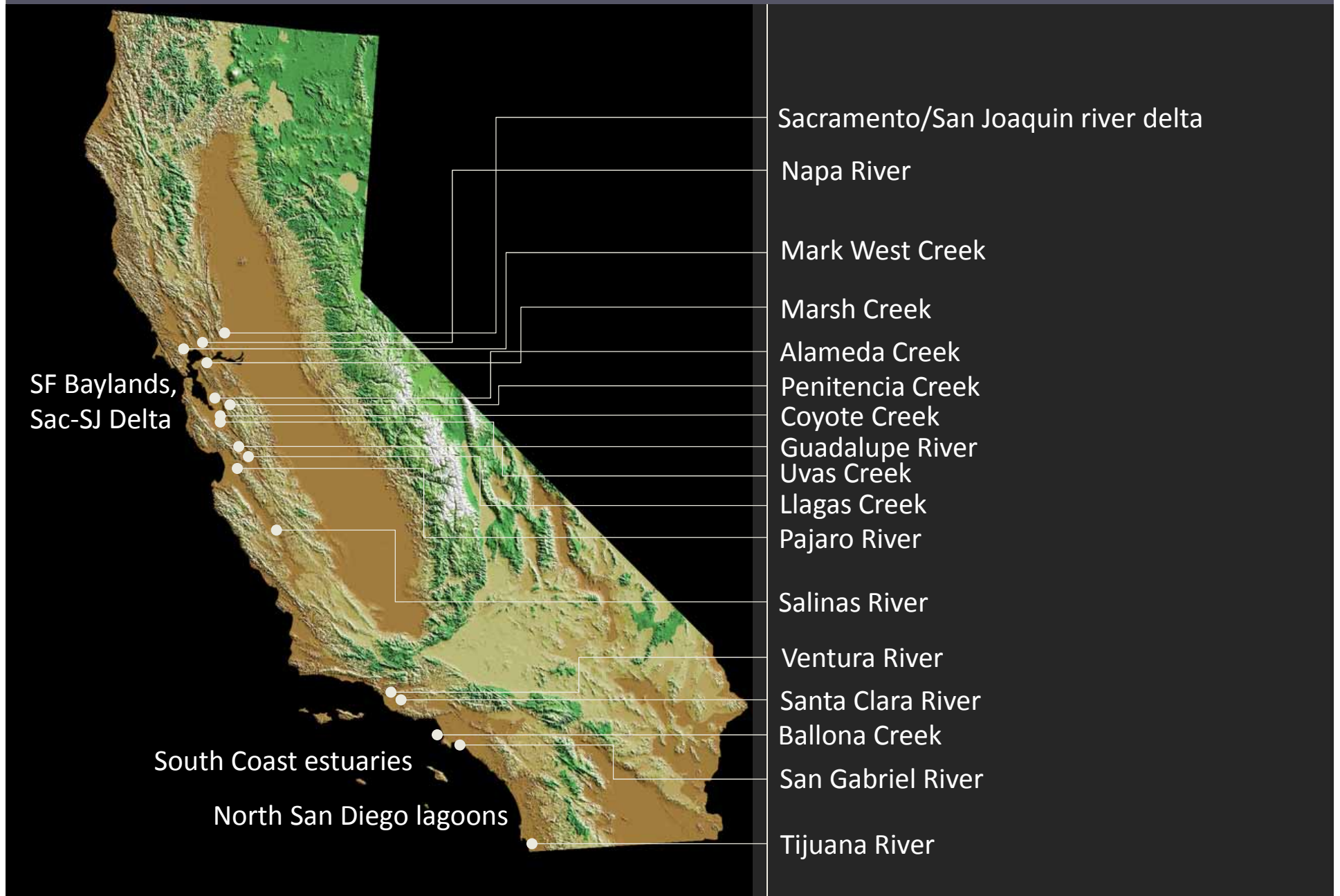
Why is historical ecology useful?

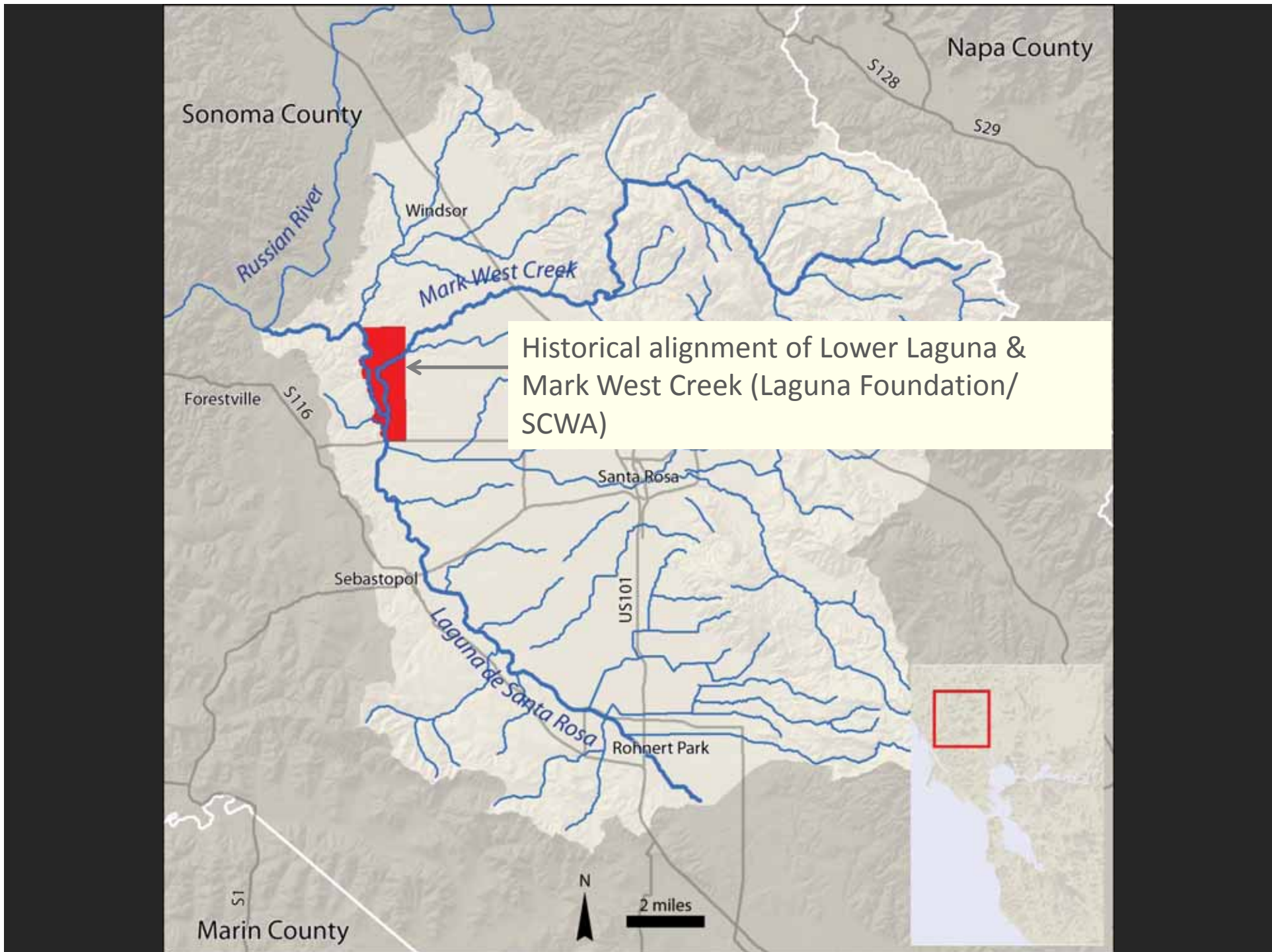
- Understand landscape patterns and processes at broad temporal and spatial scales
- Identify locally-appropriate restoration targets

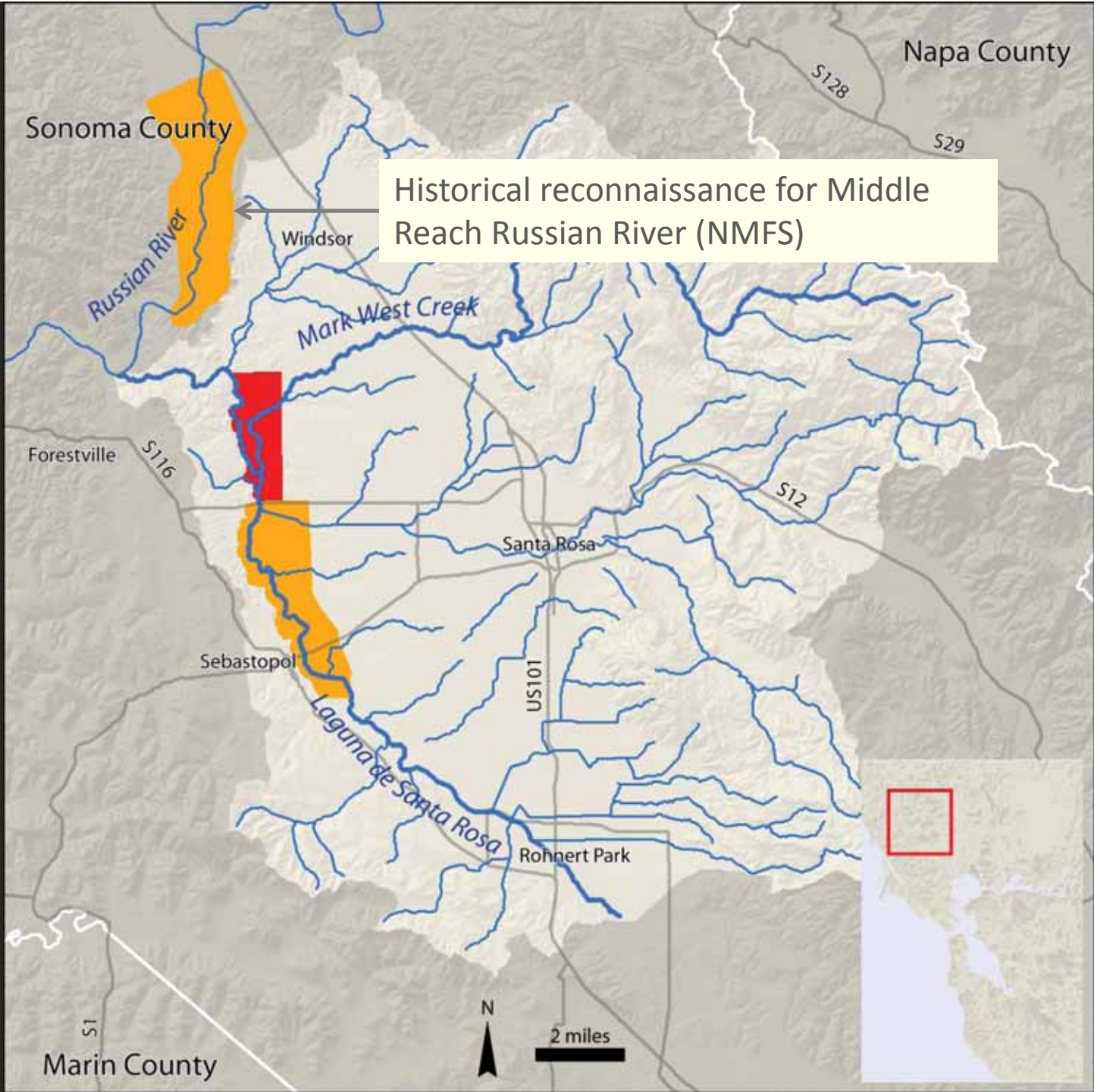
Historical ecology is not...

- About recreating the past
- About prescriptive management

California systems reconstructed







Historical reconnaissance for Middle Reach Russian River (NMFS)

Sonoma County

Napa County

Forestville

Sebastopol

Santa Rosa

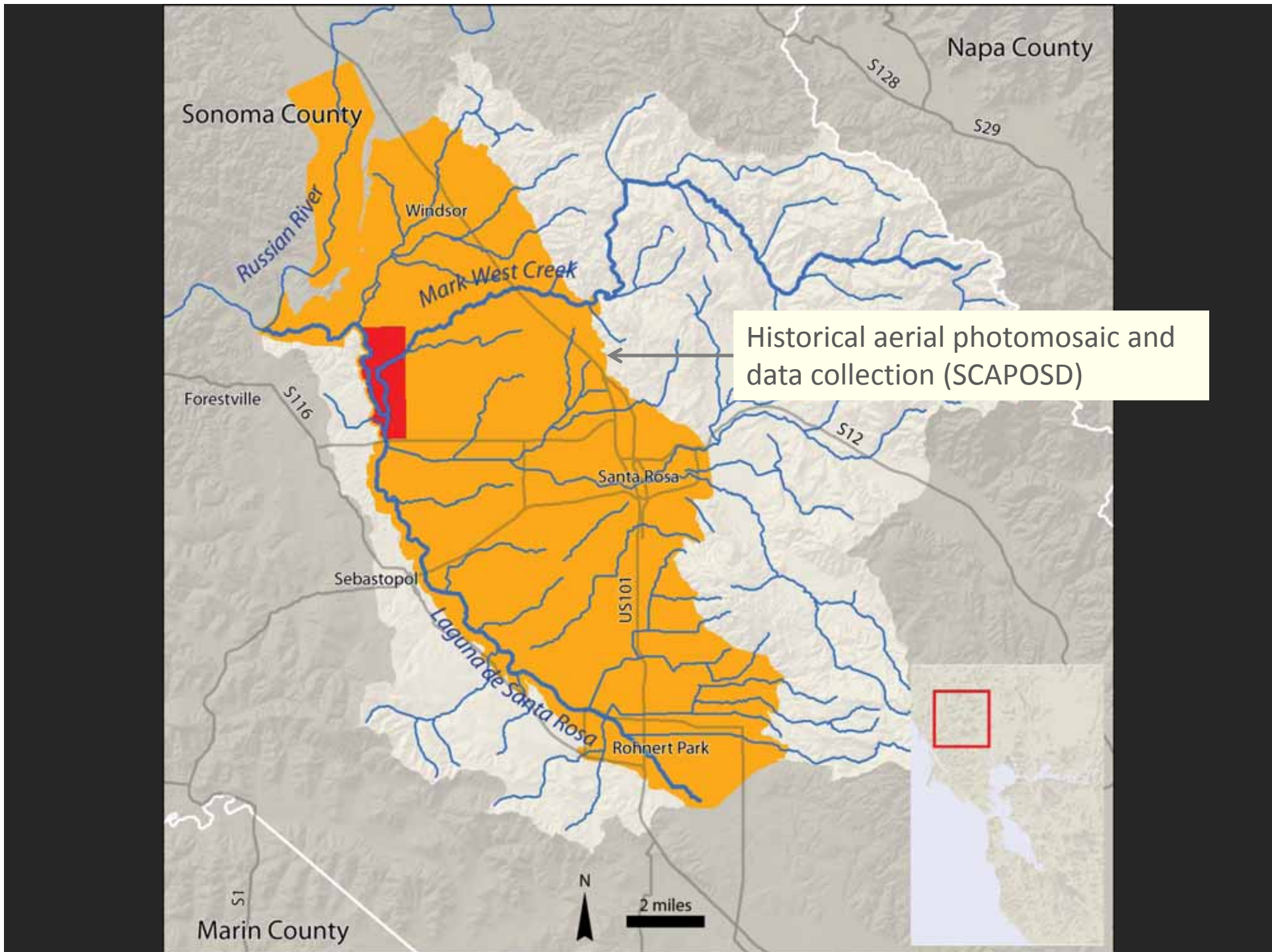
Rohnert Park

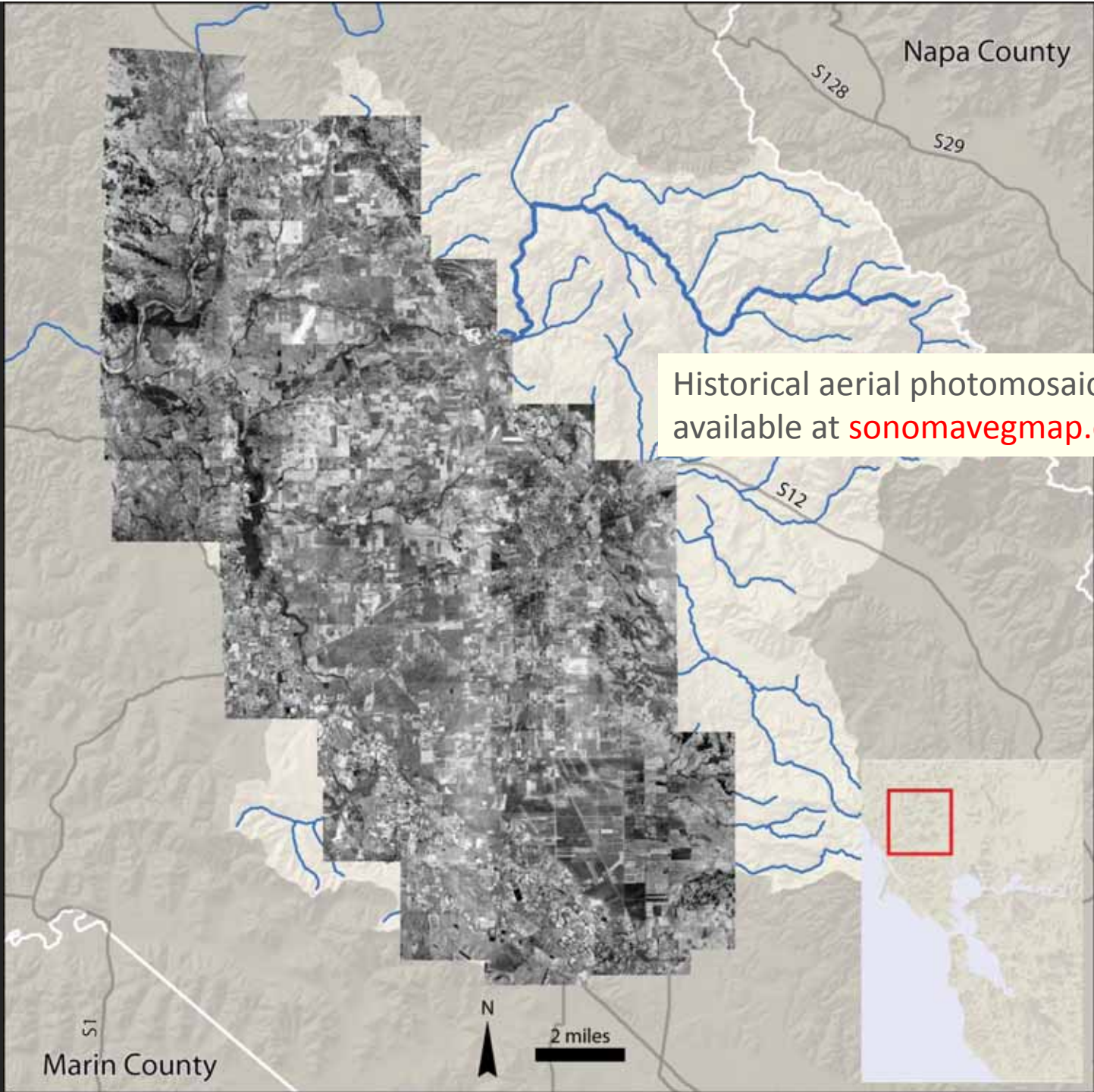
Marin County



2 miles







Napa County

S128

S29

Historical aerial photomosaic available at sonomavegmap.org

S12

15
Marin County



2 miles

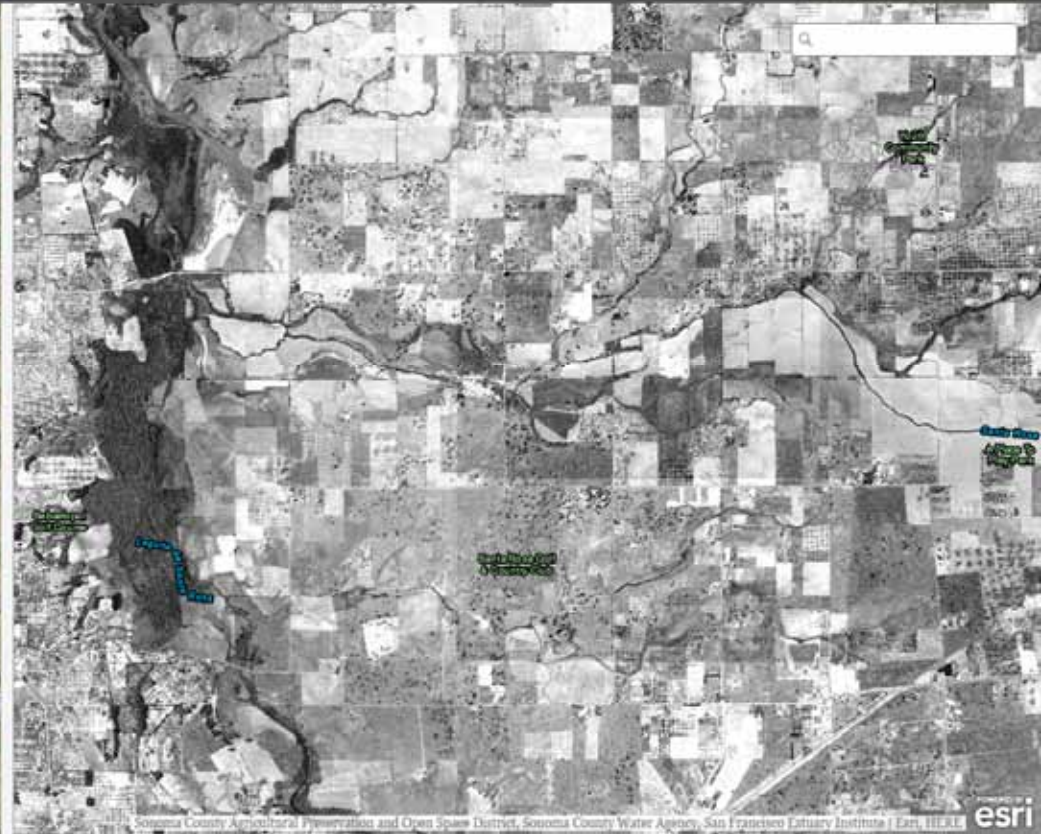


1942 and 2011 Aerials of the Santa Rosa Plain

50 years of land use/land cover change in Sonoma County



In 1942, the Department of War collected air photos in anticipation of a possible strike. These photos are the earliest complete image set for Sonoma County and give us an unprecedented look at Sonoma County's agriculture and open space prior to the post World War II baby boom.



1942 and 2011 Aerials of the Santa Rosa Plain

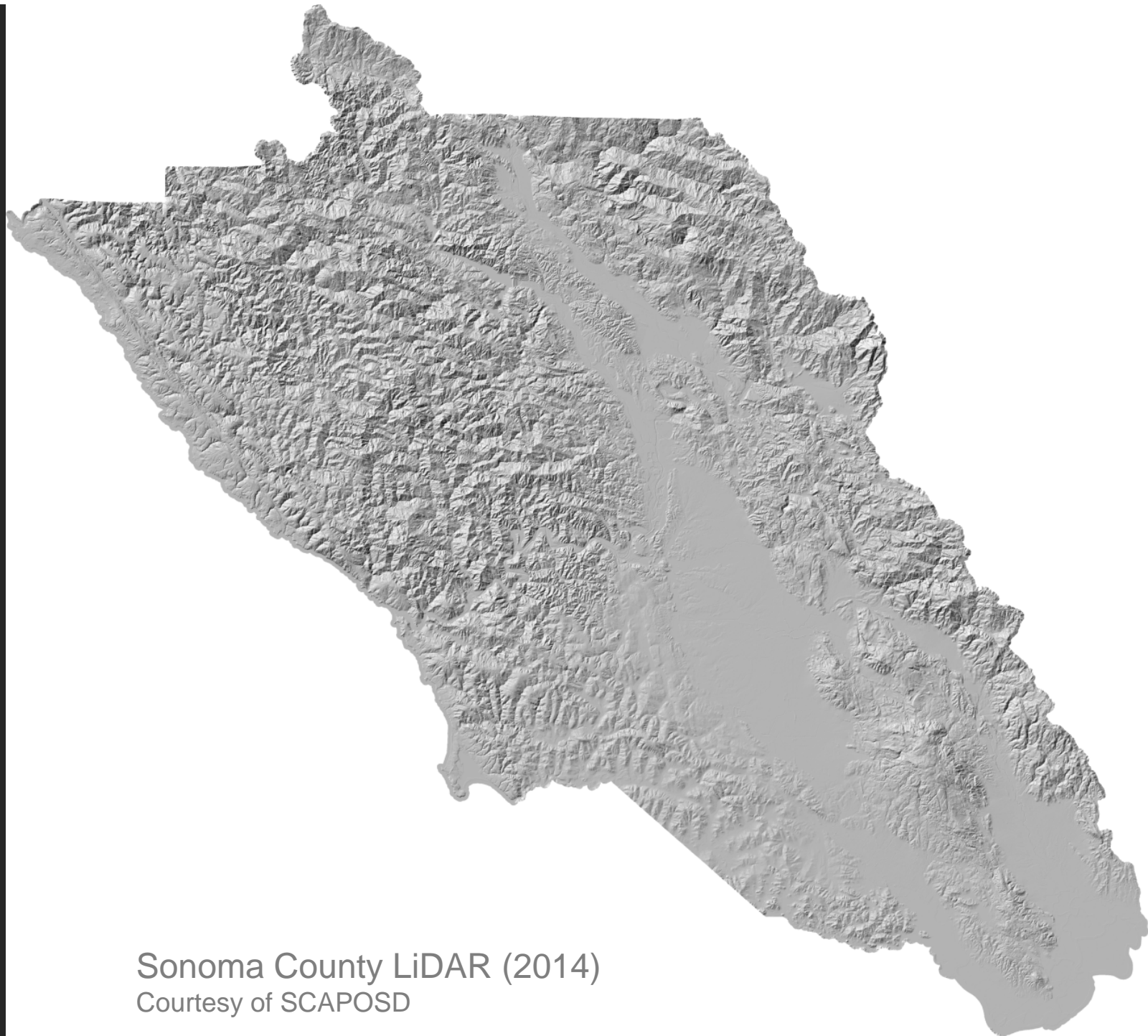
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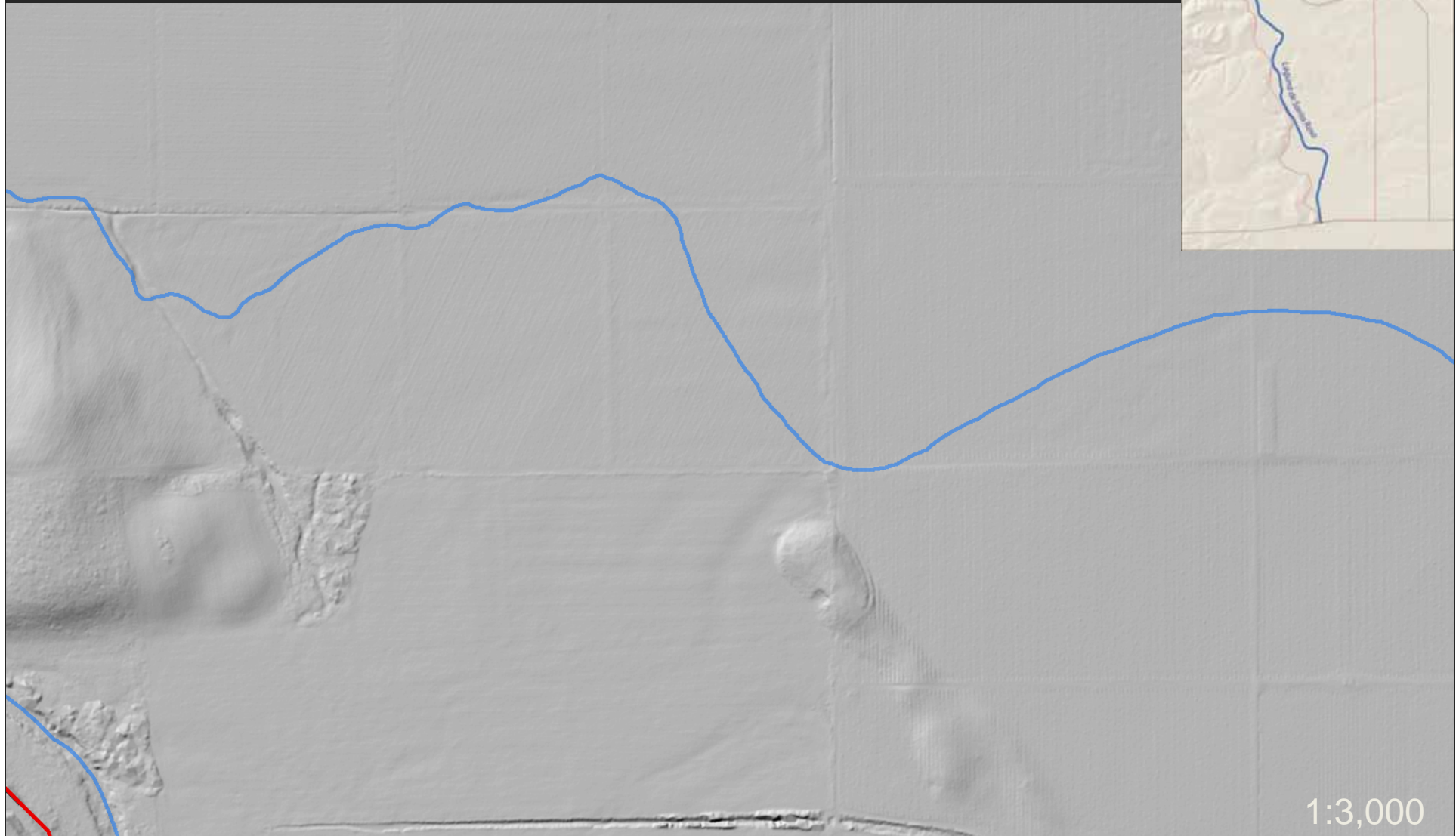


Imagery courtesy of National Aeronautics and Space Administration, Sonoma County Water Agency, San Francisco Estuary Institute | 2011 | 12 | 14 | esri



Sonoma County LiDAR (2014)
Courtesy of SCAPOSD

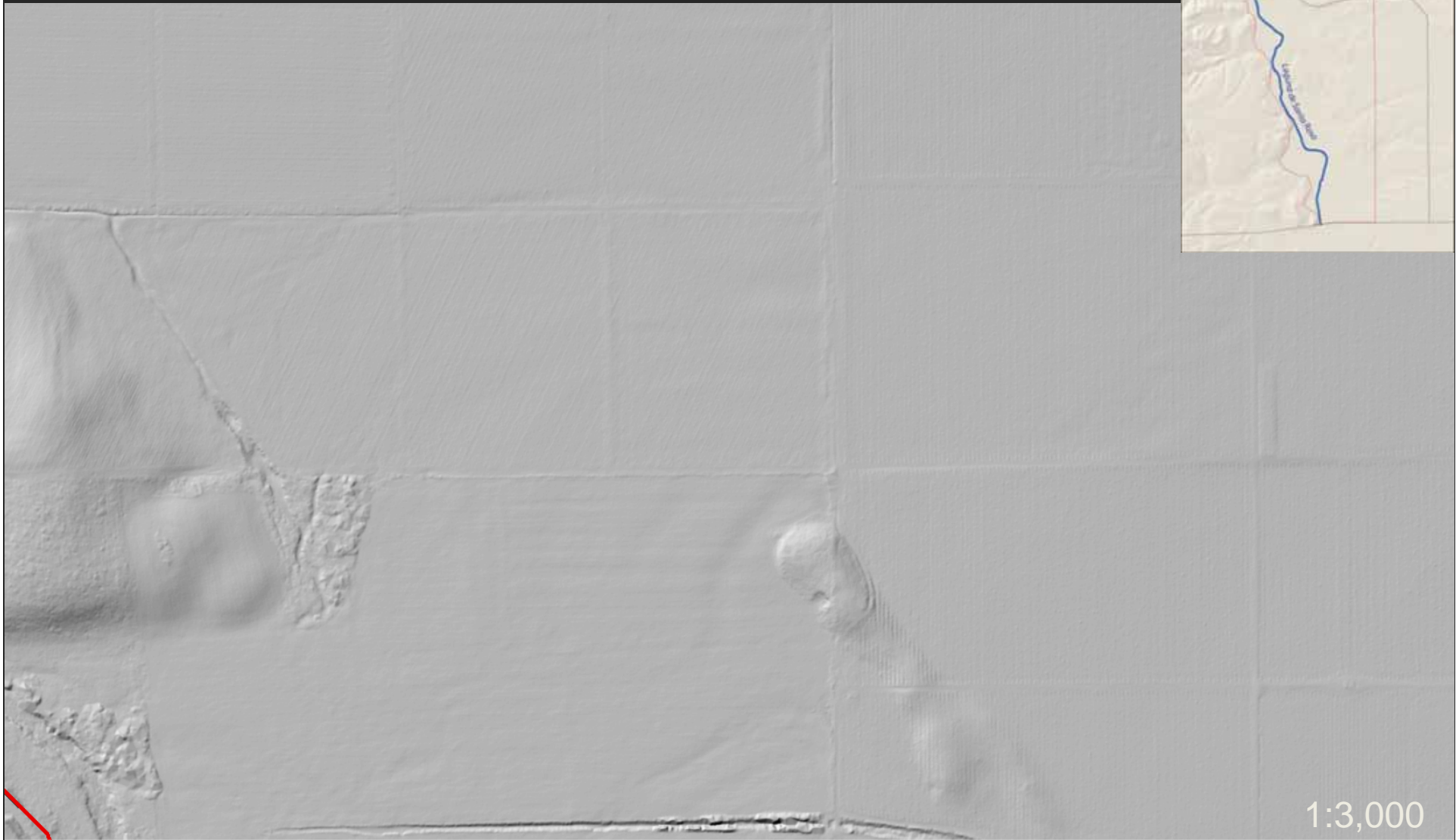
ca. 1850-70



1:3,000

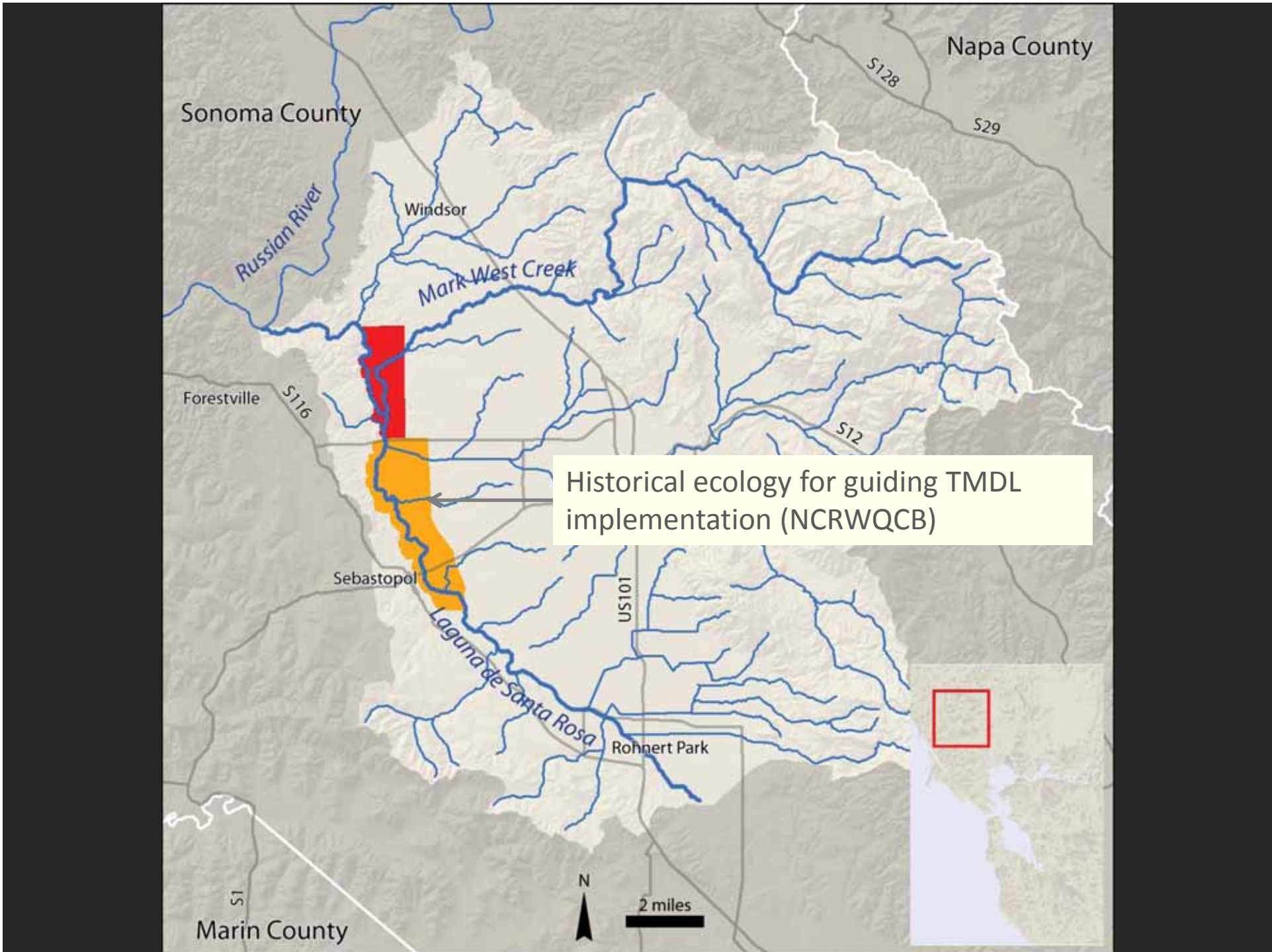
Sonoma County LiDAR (2014)
Courtesy of SCAPOSD

ca. 1850-70



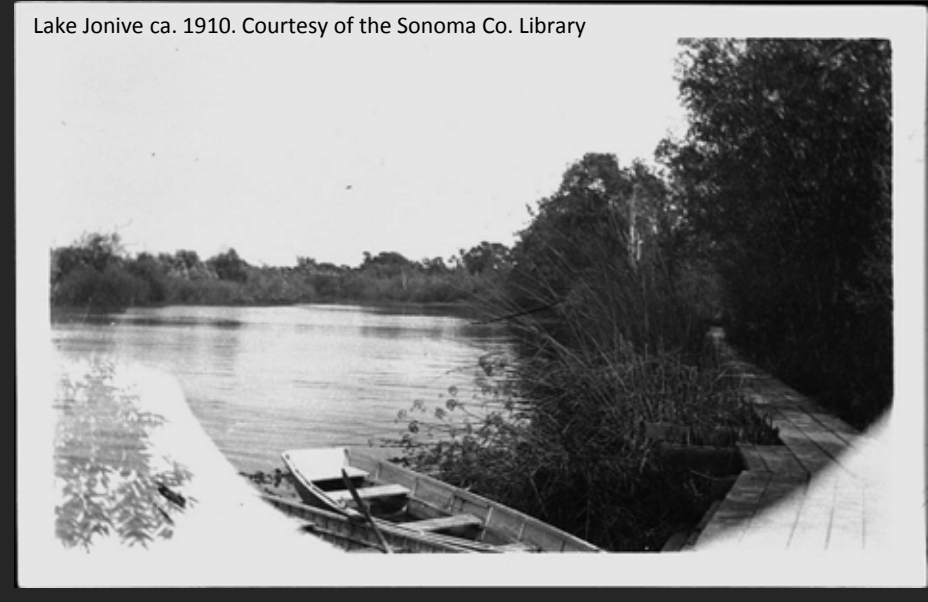
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Sonoma County LiDAR (2014)
Courtesy of SCAPOSD

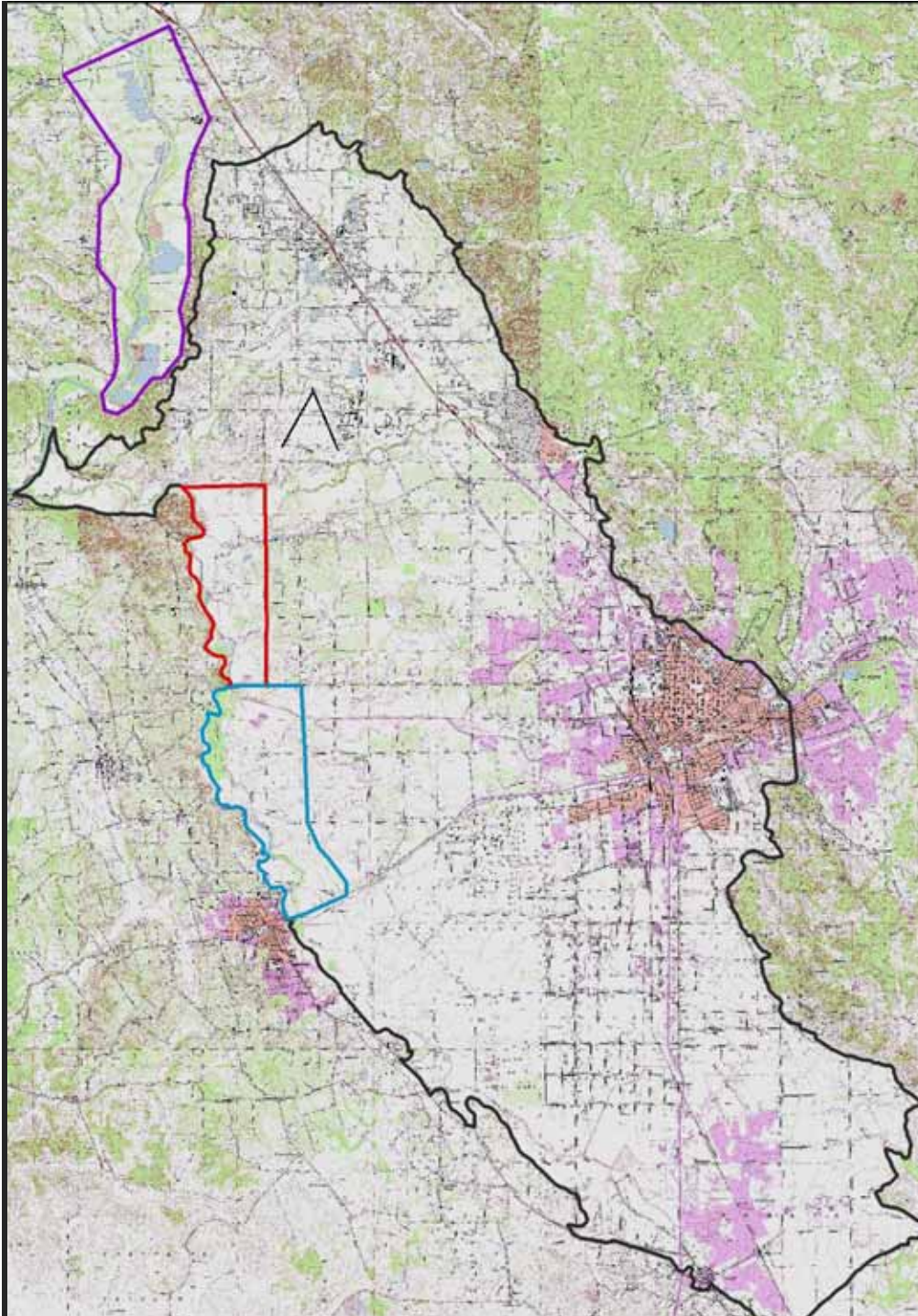




Lake Jonive ca. 1910. Courtesy of the Sonoma Co. Library



Molino Rancho 1857. Courtesy of Curtis & Assoc.



Next Steps for Initiative

- Execute 2014/16 319h HE study to inform TMDL implementation
- Continue inter-agency/org consultation toward full study completion: RB1, SCWA, SCAPOSD, Laguna Foundation, RCDs, NMFS, DFW, others...
- Develop priority project elements with partners
- Continue “concept marketing” with potential funders
- Develop stronger services/linkages to pollution credit trading programs

Initiative specific goals (i.e.)

- Map historical channels for entire SR Plain
- Map historical wetland and terrestrial habitats
- Model sediment transport based on historical creek alignments
- Document land use changes
- Evaluate potential alternatives for restoration to achieve multiple benefits
- Develop conceptual models of landscape change and desired future conditions
- Utilize new tools (i.e. LiDAR) to improve mapping precision

Many Thanks to Our Guest Speakers

Brittany Heck

Gold Ridge Resource Conservation District

Michael Thompson

Sonoma County Water Agency

Chuck Striplen

San Francisco Estuary Institute

What's Next?

- Next Phase of TMDL Development Work
- Public Release of Draft Technical Products
- Continued Support for WQCT and Related Initiatives
- Continued Coordination and Partnership-Building

Schedule for Laguna TMDLs

Activity	Timeframe
Stakeholder Outreach	Ongoing
Technical Analysis	Ongoing thru Winter 2016
Draft Ready for Peer Review	Spring 2016
Implementation Planning	Ongoing thru Spring 2018
Draft Ready for Public Review	Summer 2018
Regional Board Consideration	Fall 2018
State Board Consideration	Winter 2019
EPA Consideration	Summer 2019

Thank You!
Questions?