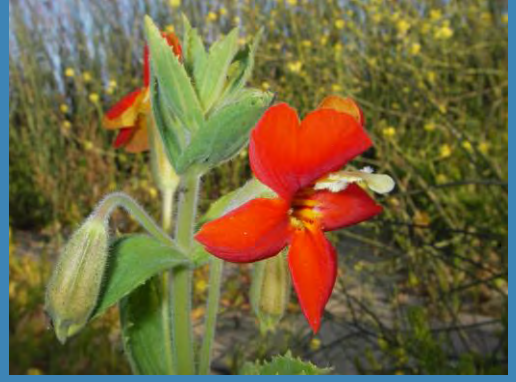


Riparian Summit 2017
18 October 2017

The Santa Clara River Parkway: An Example of Large-Scale River Corridor Restoration Planning in a Semi-Arid California Landscape

Bruce Orr
STILLWATER SCIENCES

E.J. Remson
THE NATURE CONSERVANCY

Chris Kroll
CALIFORNIA STATE COASTAL CONSERVANCY

Tom Dudley
UC SANTA BARBARA

Stillwater Sciences

Regional Overview – Southern California Watersheds

Santa Clara River and tributaries:

- Still in predominantly natural state
- Home to many disappearing animals and plants
- Some of the last major riparian wetlands in Southern California
- Home to 18 Threatened & Endangered Species

Santa Clara River Parkway Project – State Coastal Conservancy and The Nature Conservancy

Goal: acquire lower 25 miles (40 km) of the Santa Clara River

Progress to date: approx. 19 miles/3,900 acres acquired

Objectives:

- *restore and maintain hydrologic and geomorphic processes that create and maintain habitat for endangered and threatened species*
- *provide enhanced flood protection*
- *provide for public access and environmental education*

parkway.scrwatershed.org


Magic Mountain
Sespe Ck.
Santa Paula Ck.
US 101
City of Ventura
SCR
estuary
PACIFIC OCEAN

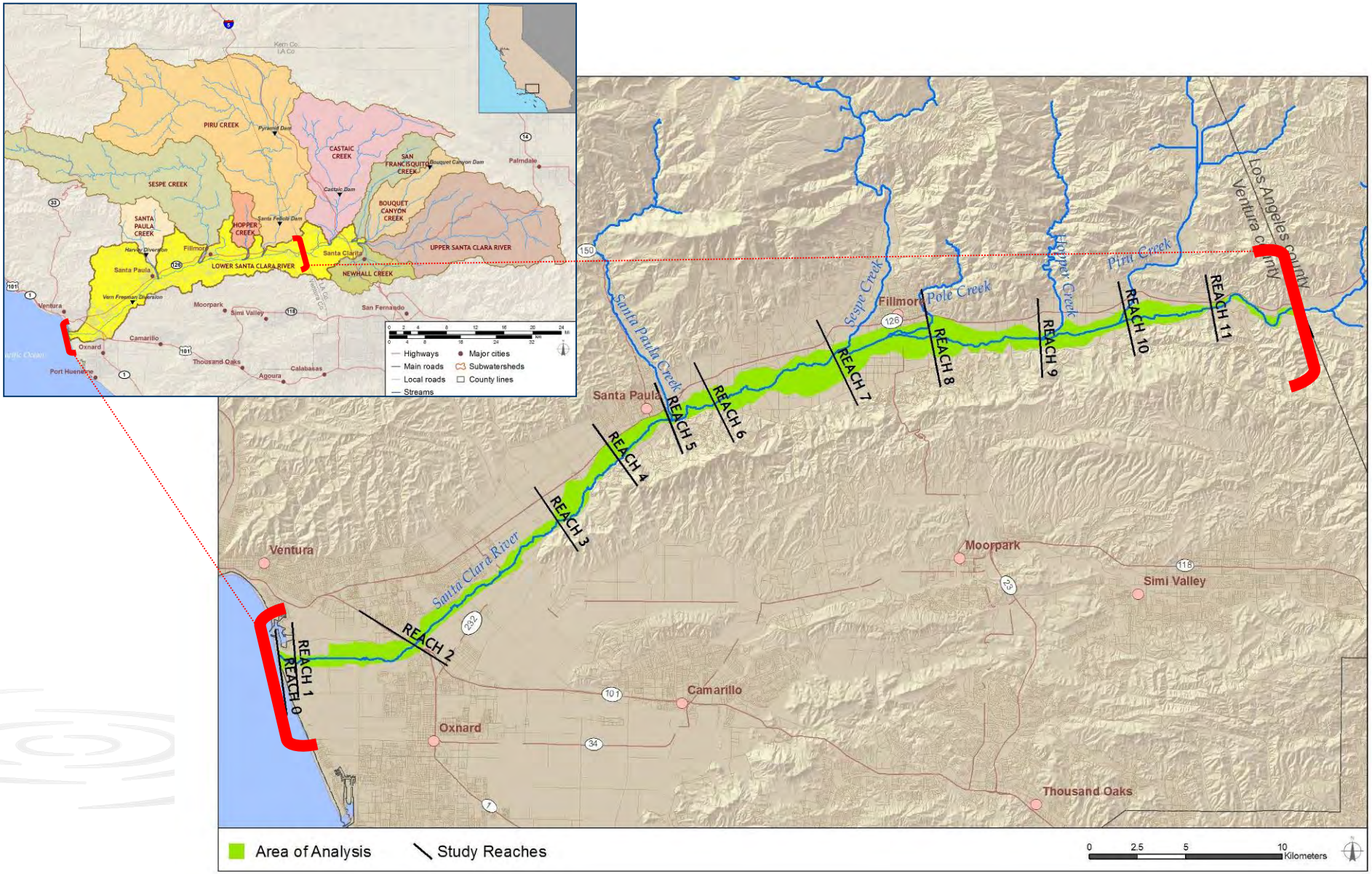
Purpose of the Parkway Restoration Feasibility Study

Inform efforts to acquire, restore, and maintain floodplain lands

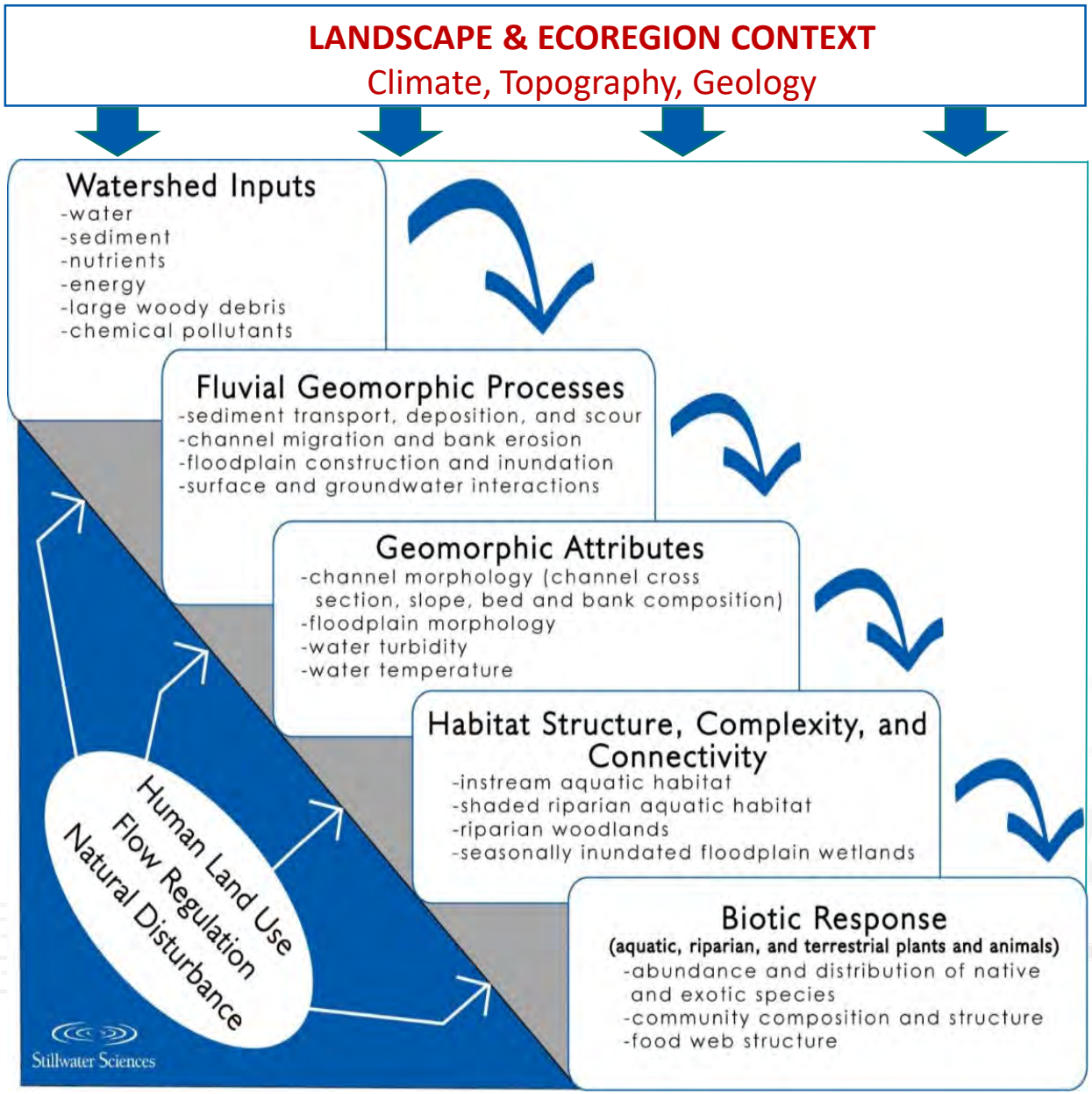
- Gather and synthesize existing information
- Understanding physical processes and biological attributes (how does it work?)
- Estimate “trajectory” (what if we do nothing?)
- Develop attributes of a “restored” condition (what do we want?)
- Develop restoration strategies and assess feasibility (how, where, and what can we reasonably achieve?)



SANTA CLARA RIVER WATERSHED & ANALYSIS AREA

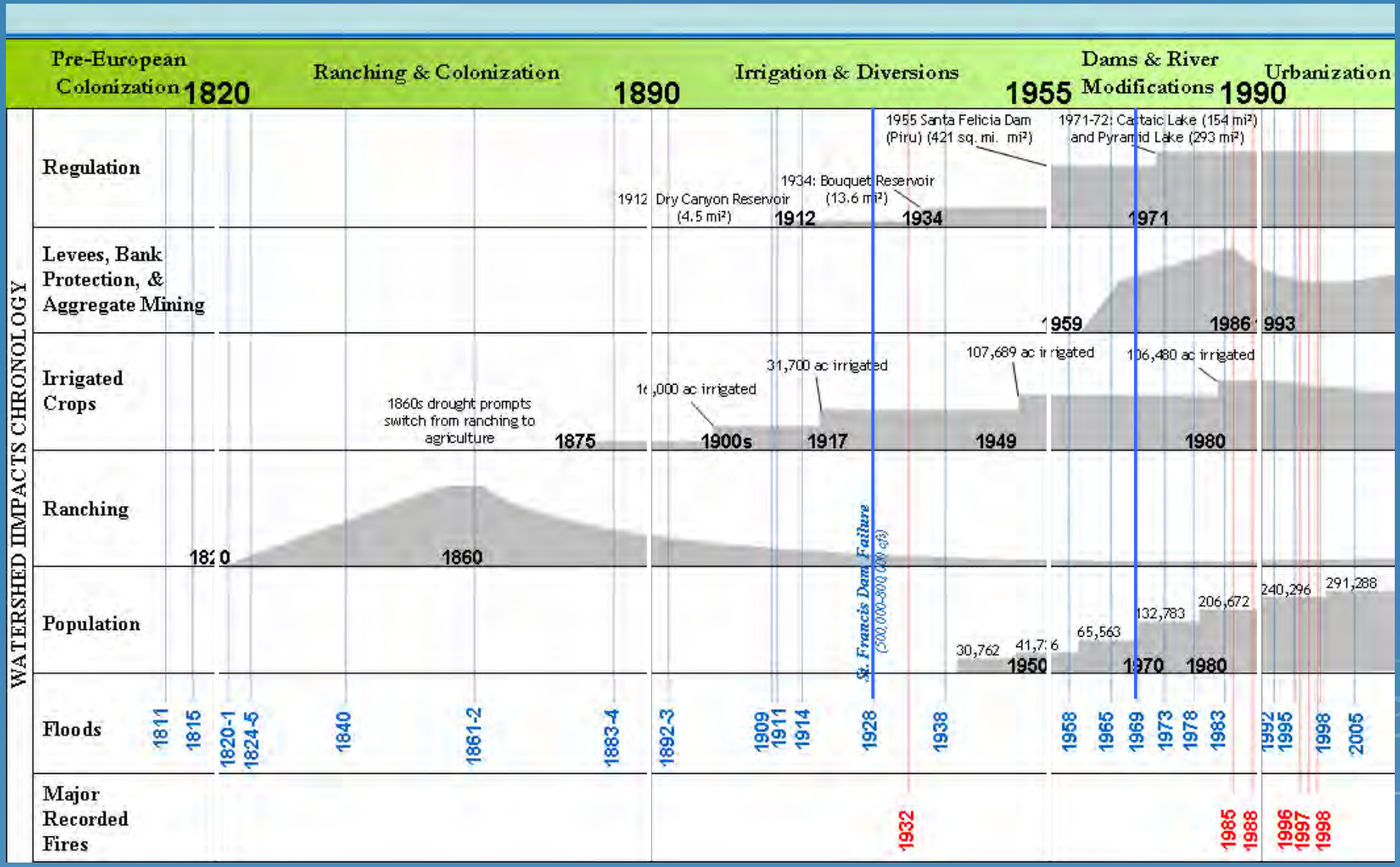


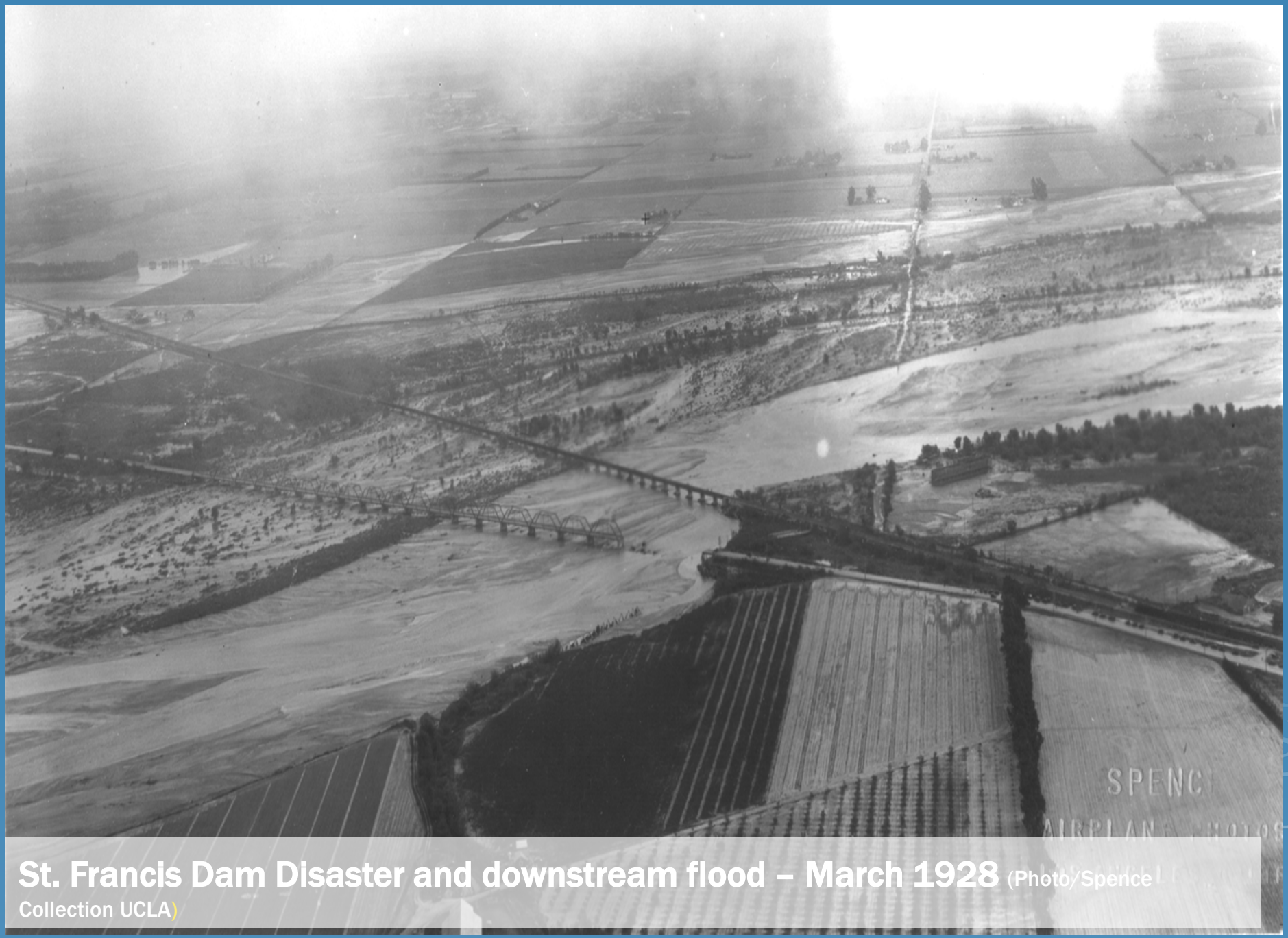
ECOLOGICAL LINKAGES CONCEPTUAL MODEL



River-Riparian Ecosystems are (interactive) products of their landscape and watershed context

The Human Dimension: Chronology of Watershed Impacts





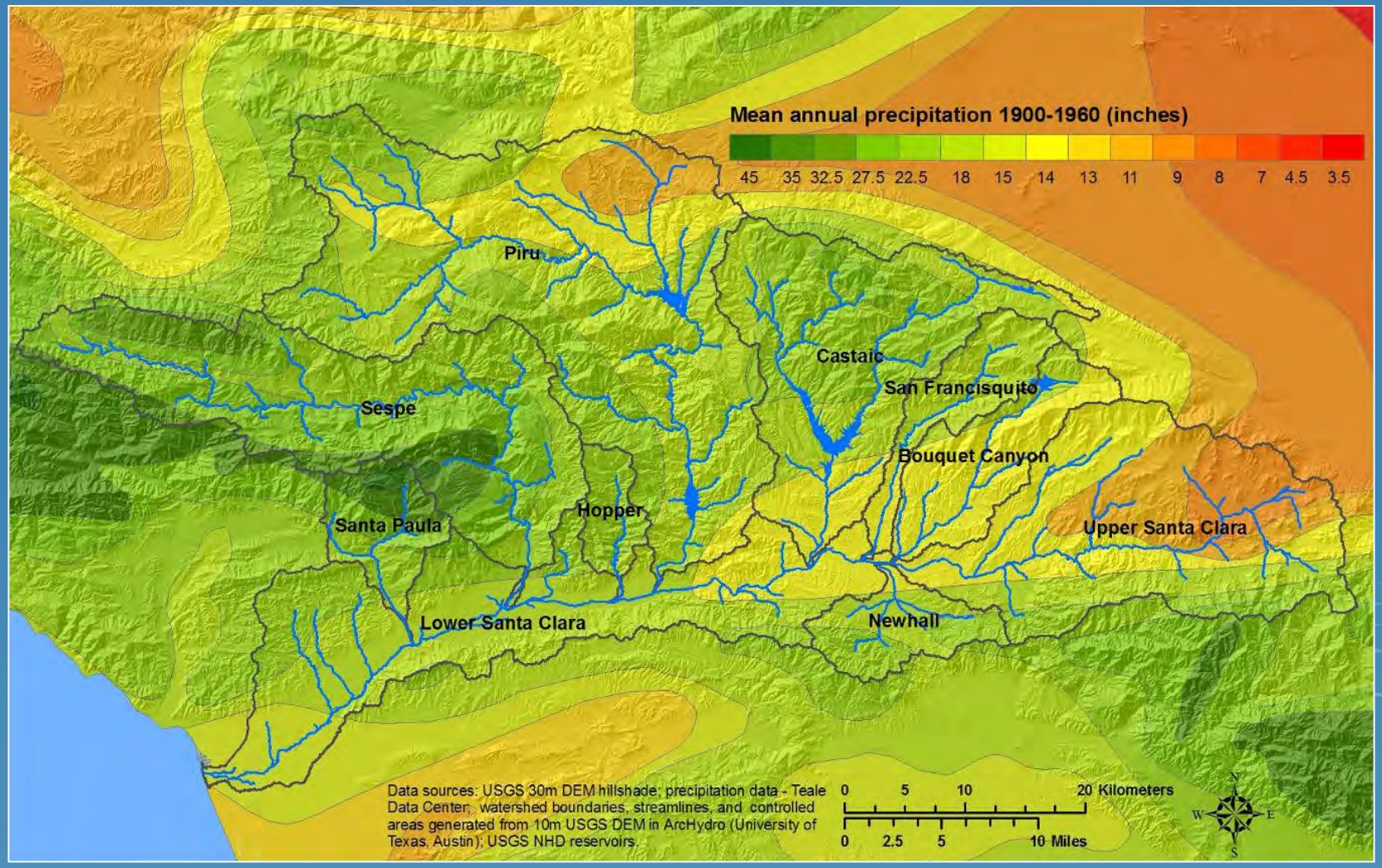
St. Francis Dam Disaster and downstream flood – March 1928 (Photo/Spence Collection UCLA)

VEGETATION-PROCESS LINKAGES AND DRIVERS

1. Climate
2. Flood Dynamics
3. Groundwater Availability
4. Floodplain Development
5. Invasion by Arundo

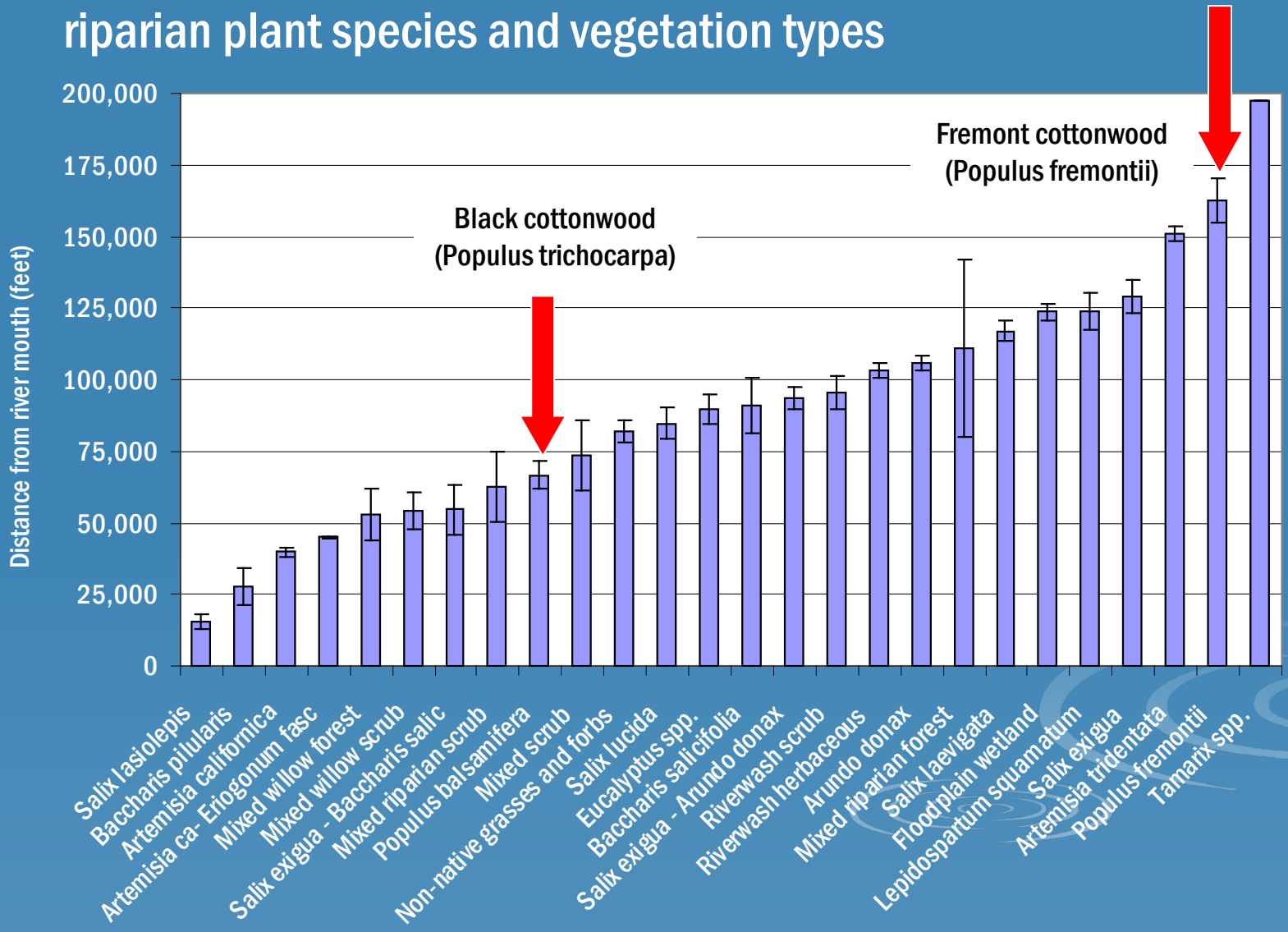
CLIMATE

- Semi-arid, Mediterranean climate
- Arid inland and moister, cooler coast



CLIMATE

- Correlation between distance from river mouth and distribution of riparian plant species and vegetation types



FLOOD DYNAMICS

- Vegetation infilling (encroachment) during drier periods between major floods

pre-high flow

FLOOD DYNAMICS

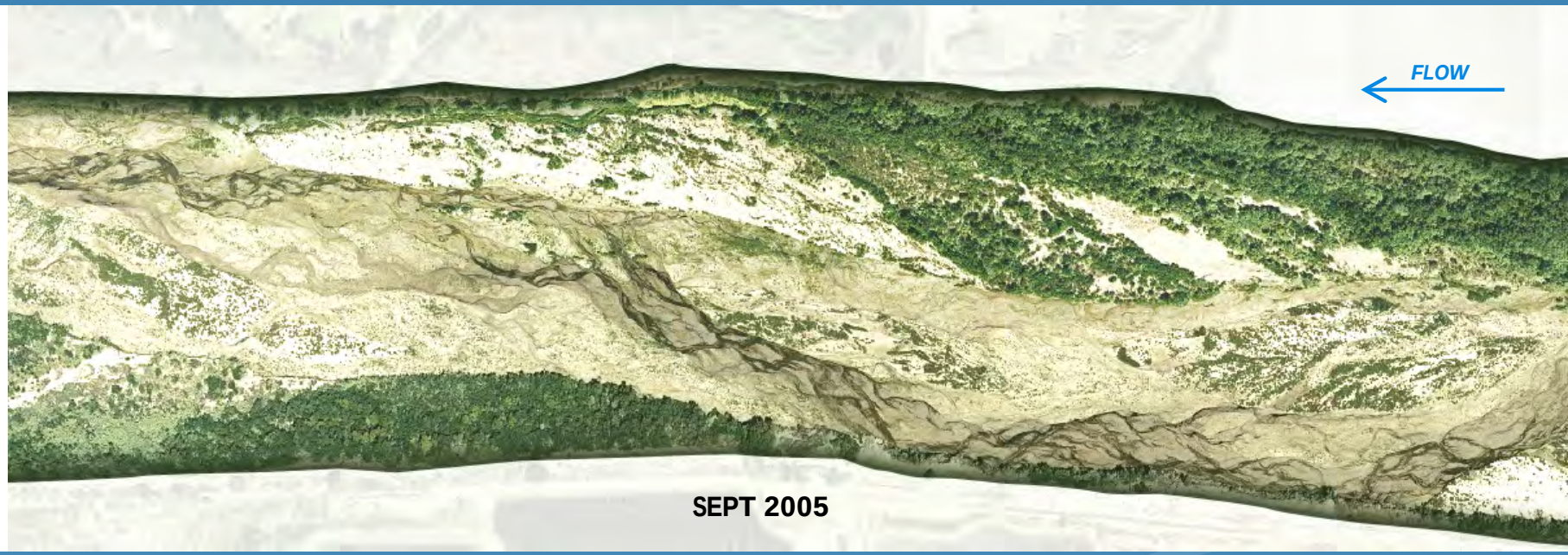
- Vegetation scour and reset after large floods, particularly in El Niño years

high flow

FLOOD DYNAMICS

- Rapid vegetation response after large resetting floods

post-high flow



FLOOD DYNAMICS

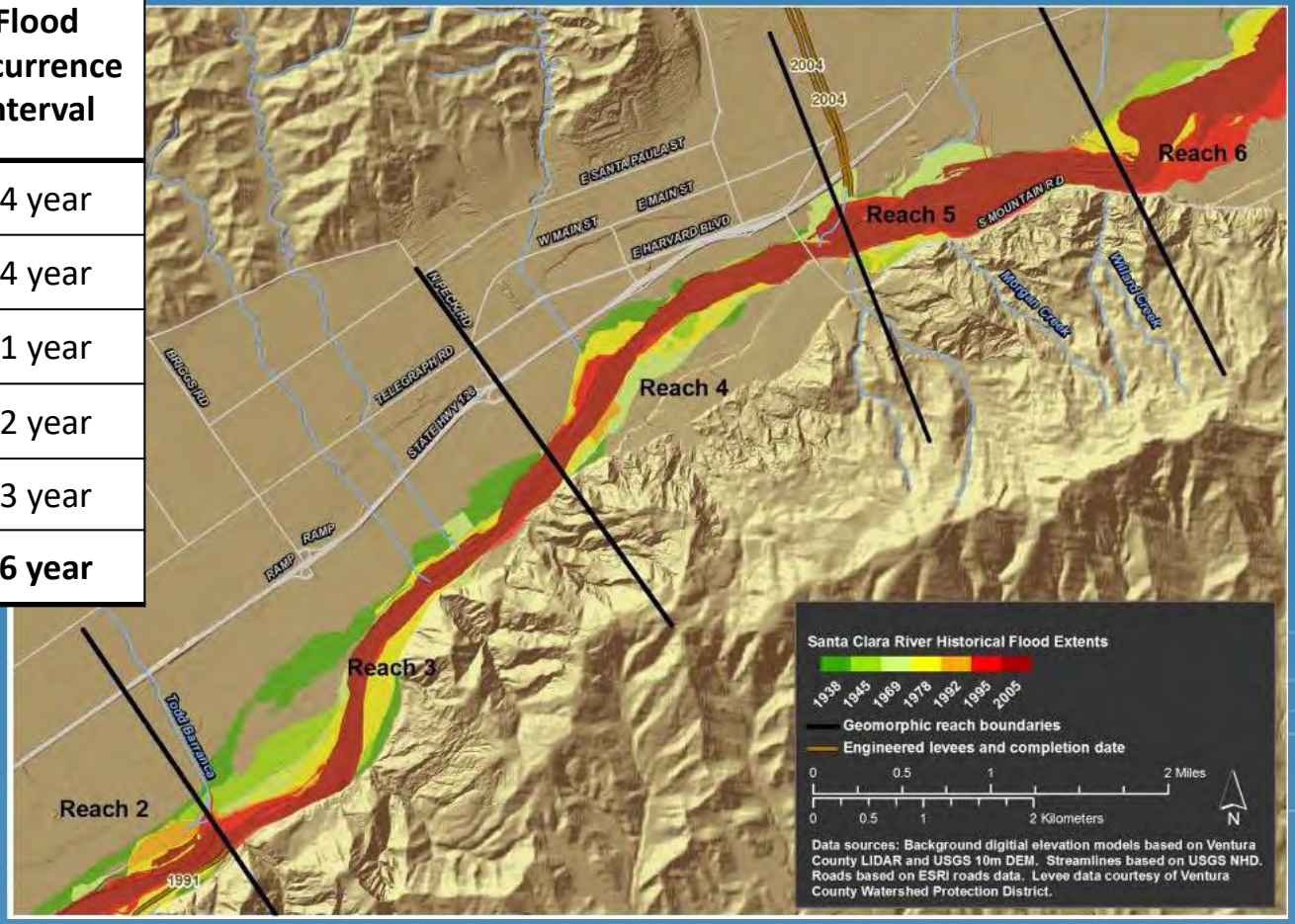
- Vegetation infilling (encroachment) continues following flood events

pre-high flow

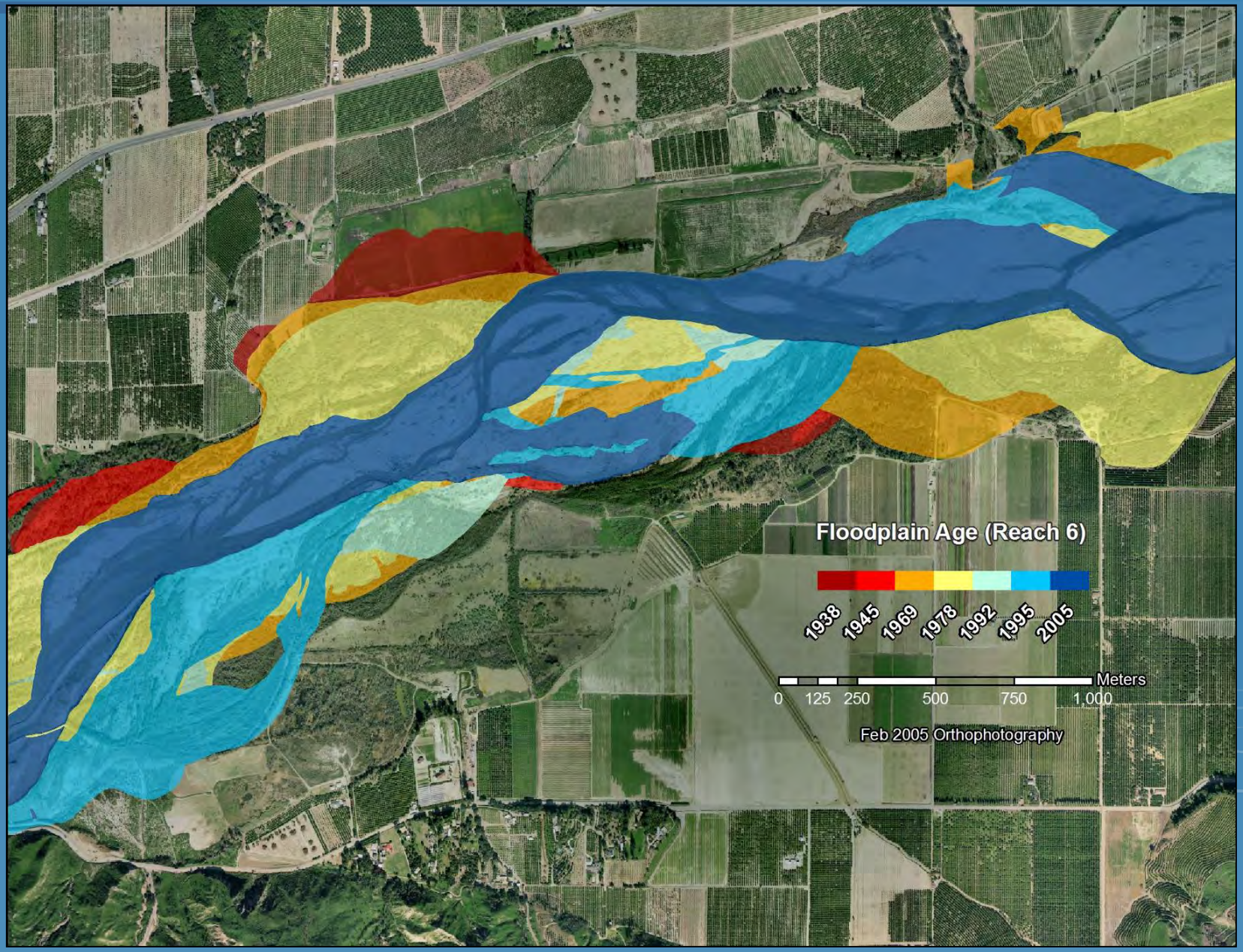
HISTORICAL CHANGES: FLOOD MAPPING

- Bare, partially- and highly-vegetated areas mapped after 6 major floods
- Define the primary "Flood Reset Zone" as a risk management tool for restoration

Year	Flow (cfs)	Flood Recurrence Interval
1938	120,000	14 year
1969	165,000	24 year
1978	102,200	11 year
1992	104,000	12 year
1995	110,000	13 year
2005	**136,000**	**16 year**

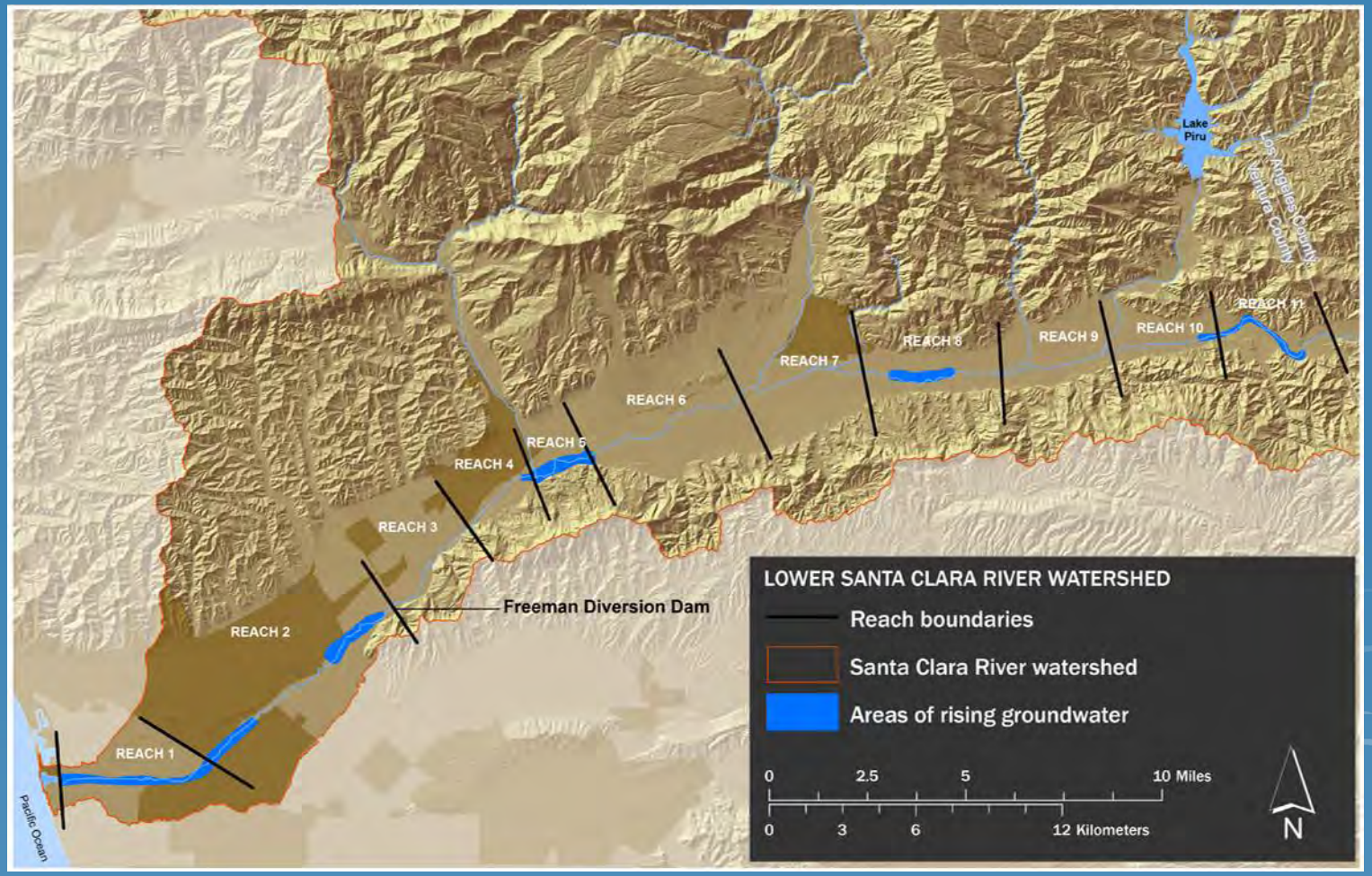


Re-setting riparian vegetation: time since disturbance 1938-2005



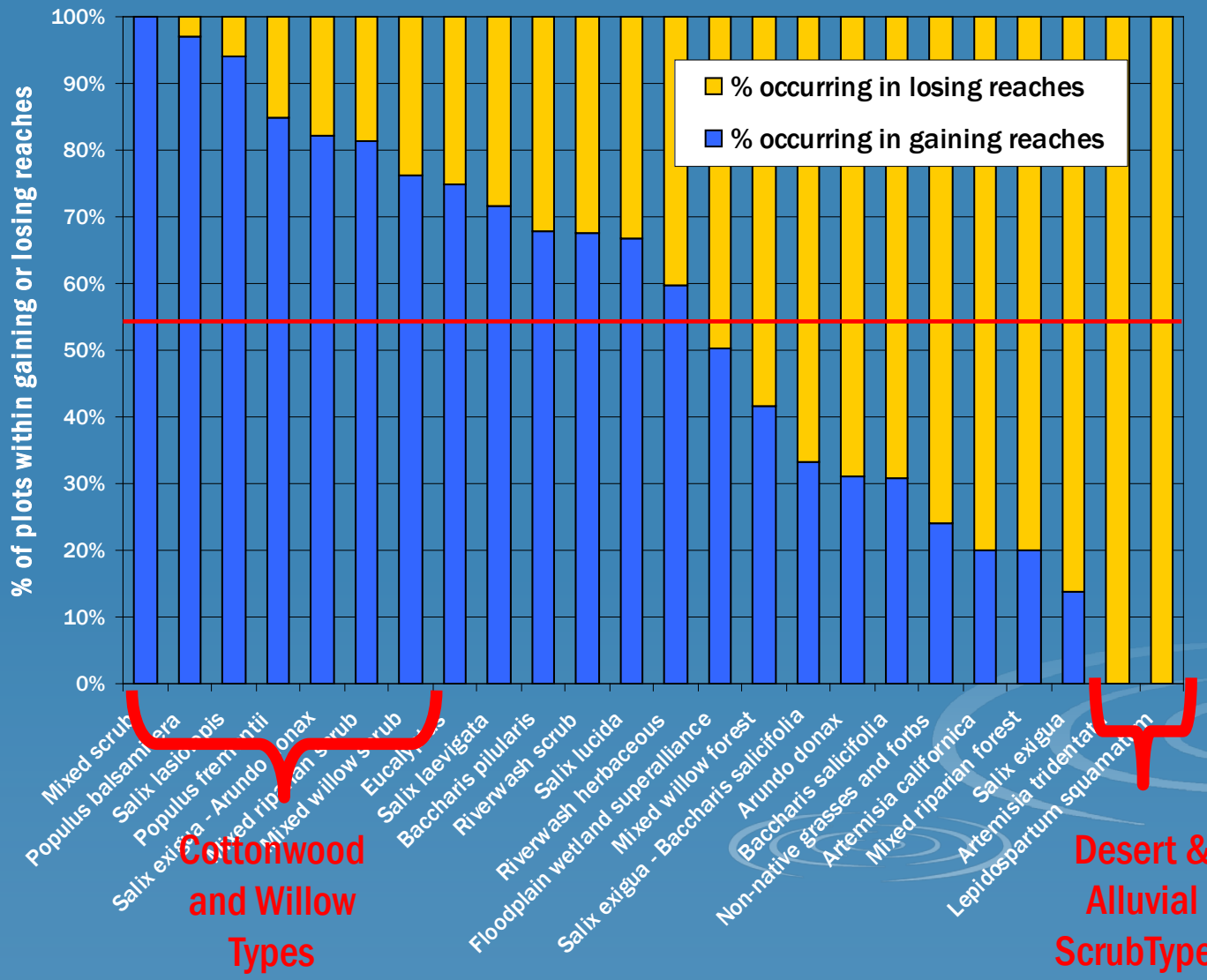
GROUNDWATER AVAILABILITY

- Gaining vs. losing reaches



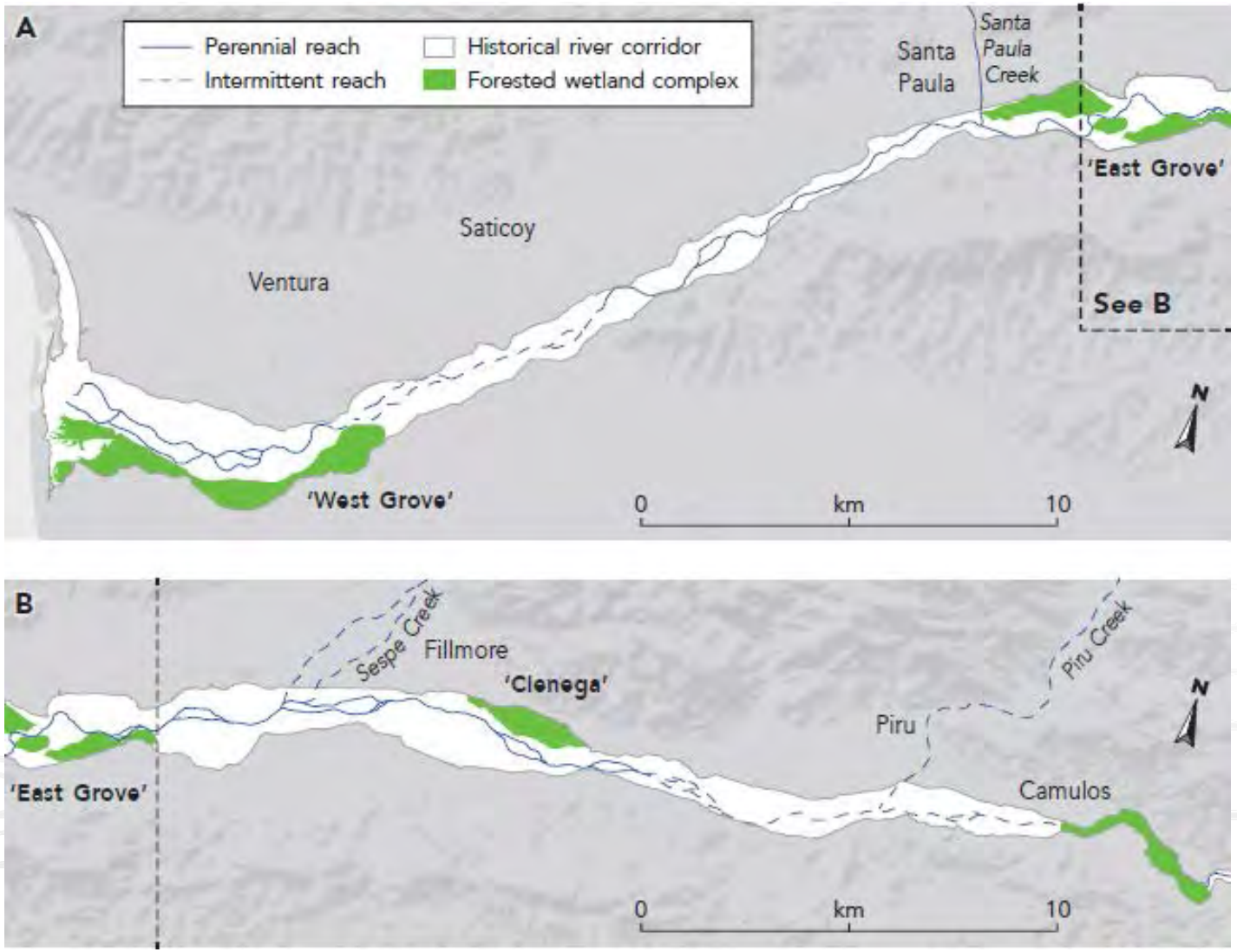
GROUNDWATER AVAILABILITY

- Vegetation alliances in gaining vs. losing groundwater reaches



HISTORICAL ANALYSIS

- Dry Season Flow and Historical Forested Wetlands



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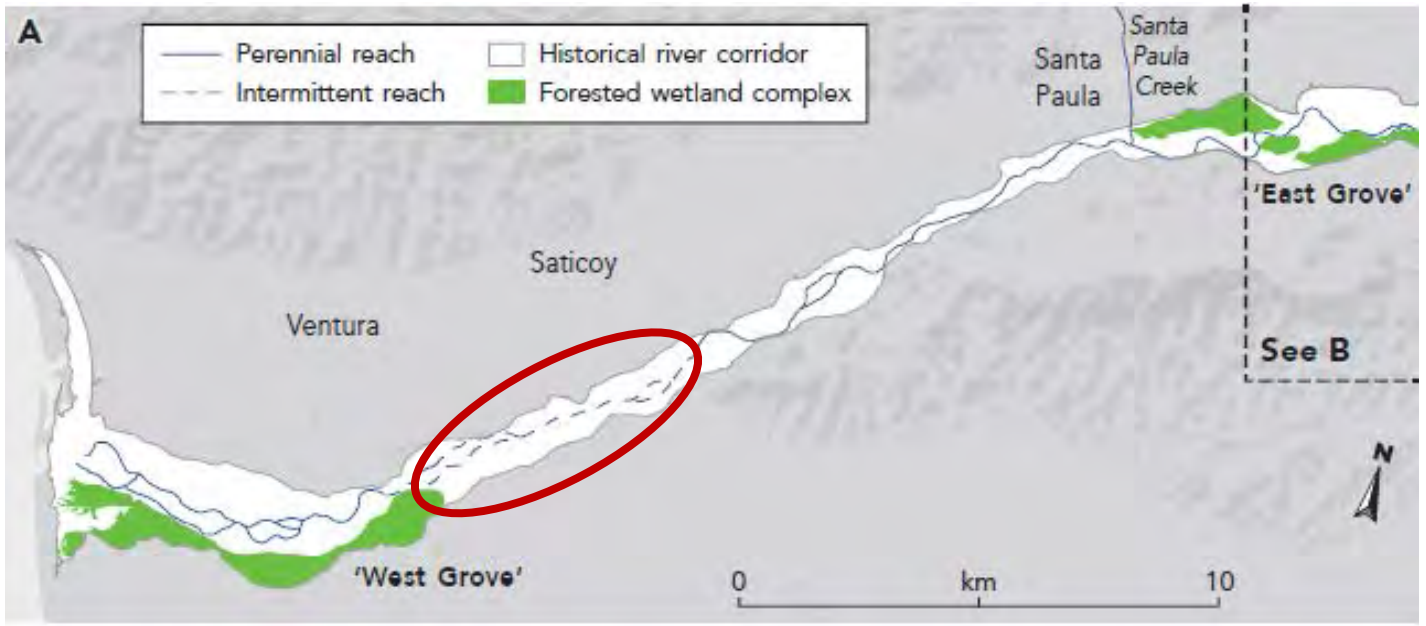
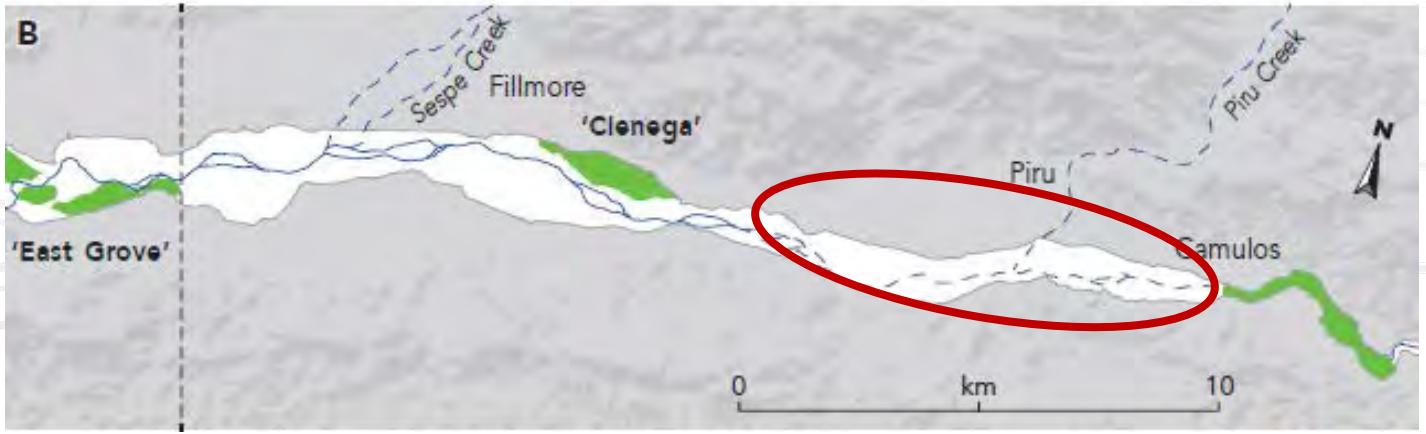


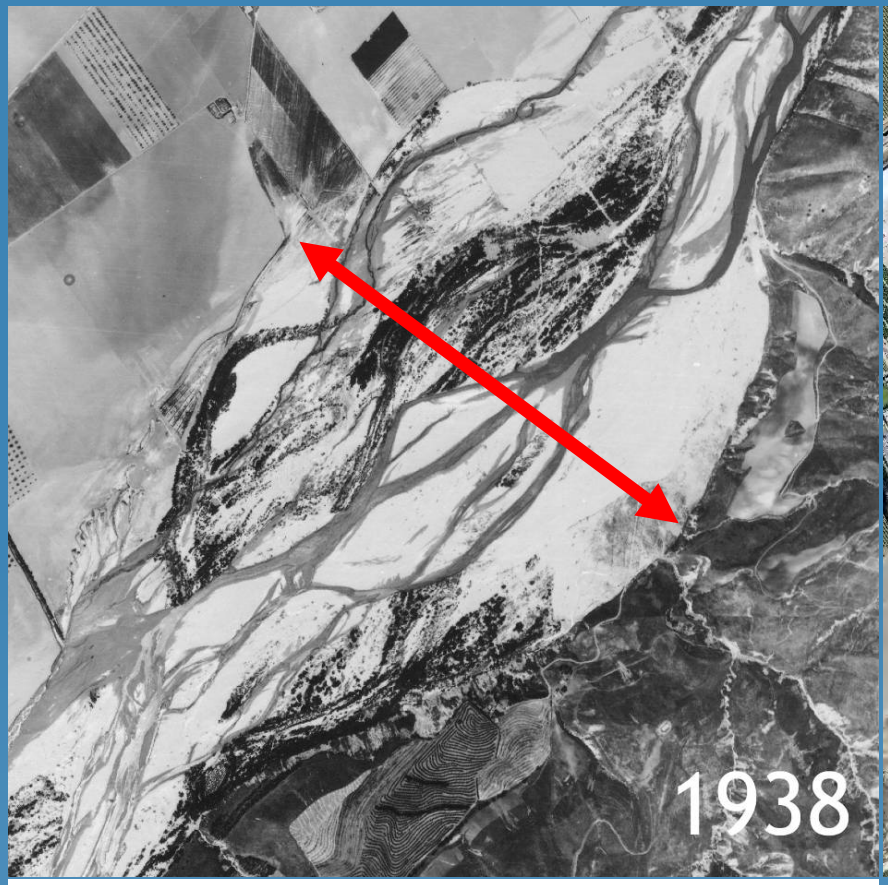


FLOODPLAIN DEVELOPMENT

- Agriculture
- Levees and urban development

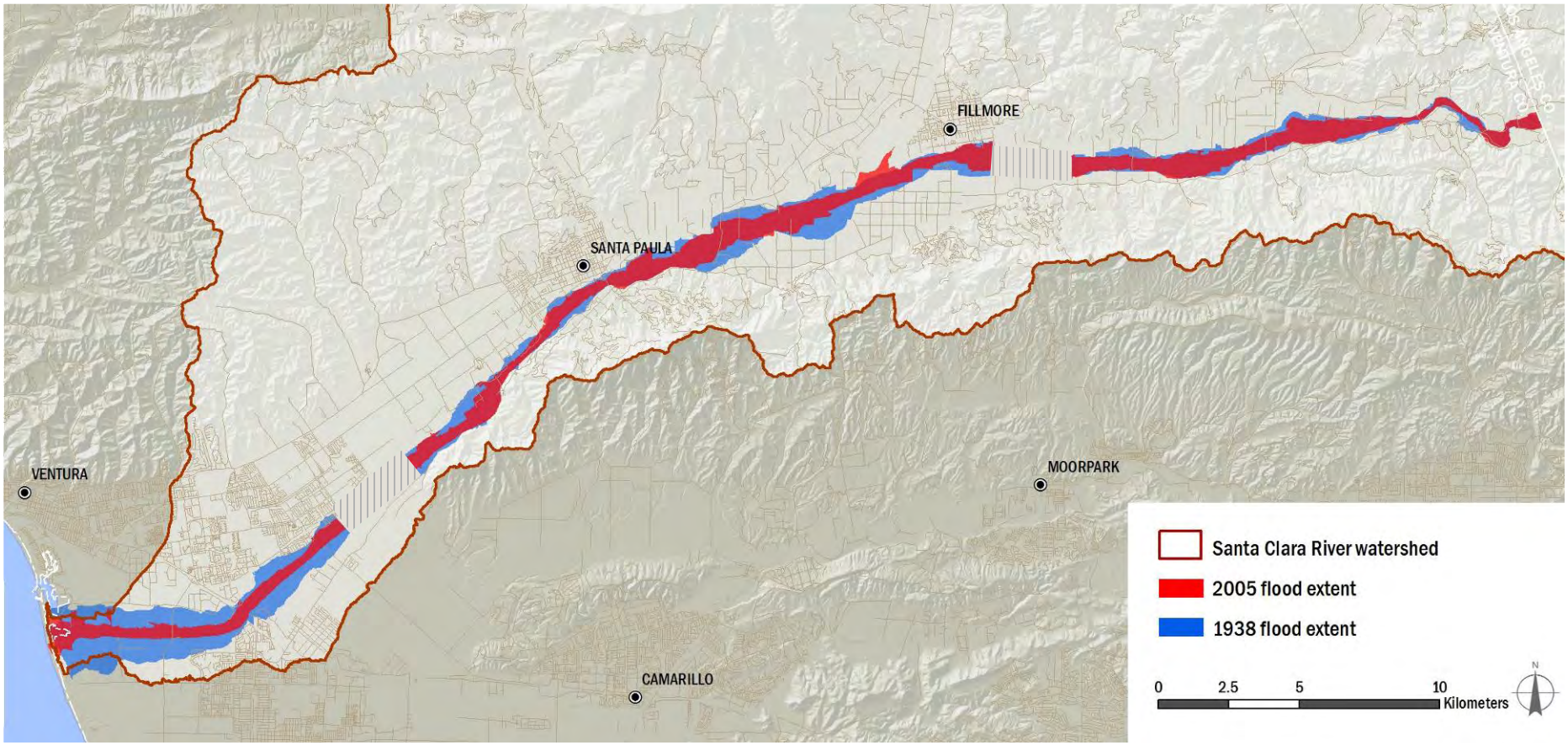
Example of Floodplain Development

- Severely constrained floodplain and limited extent of riparian vegetation

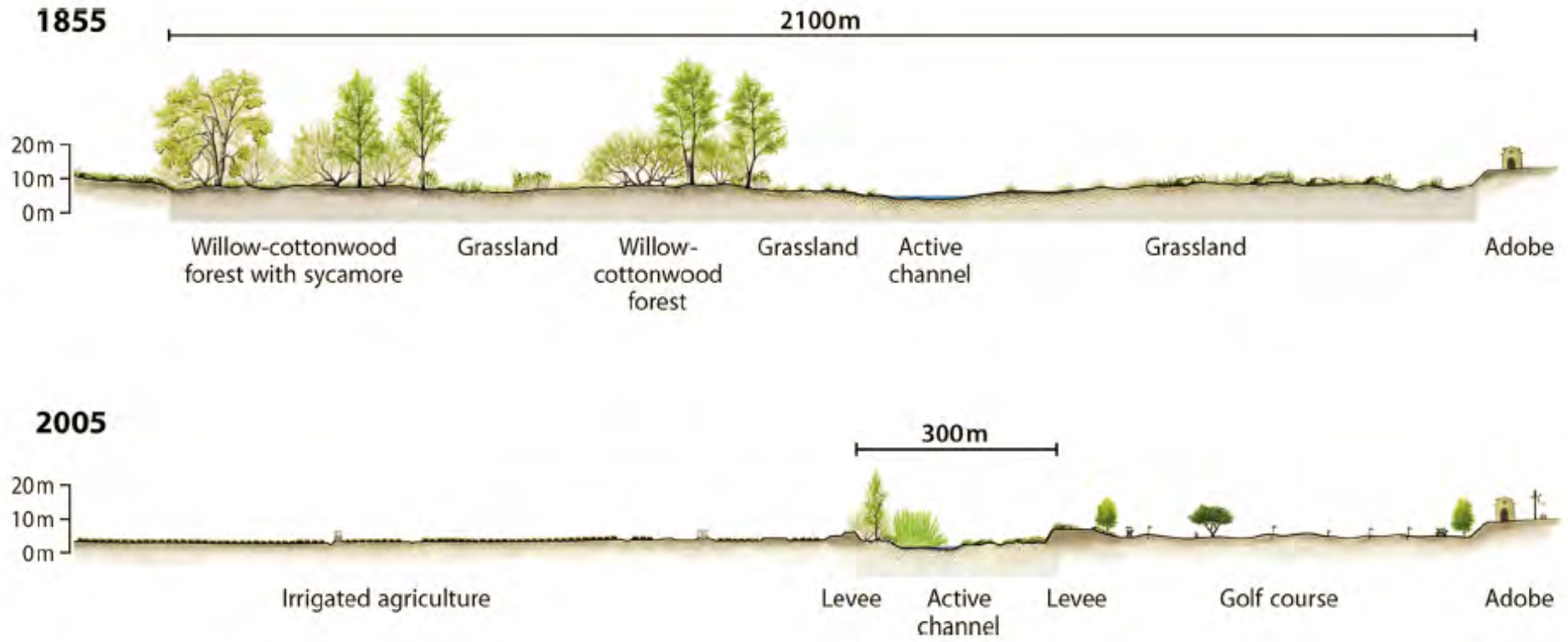


FLOODPLAIN DEVELOPMENT

- 60 percent reduction in historical floodplain extent

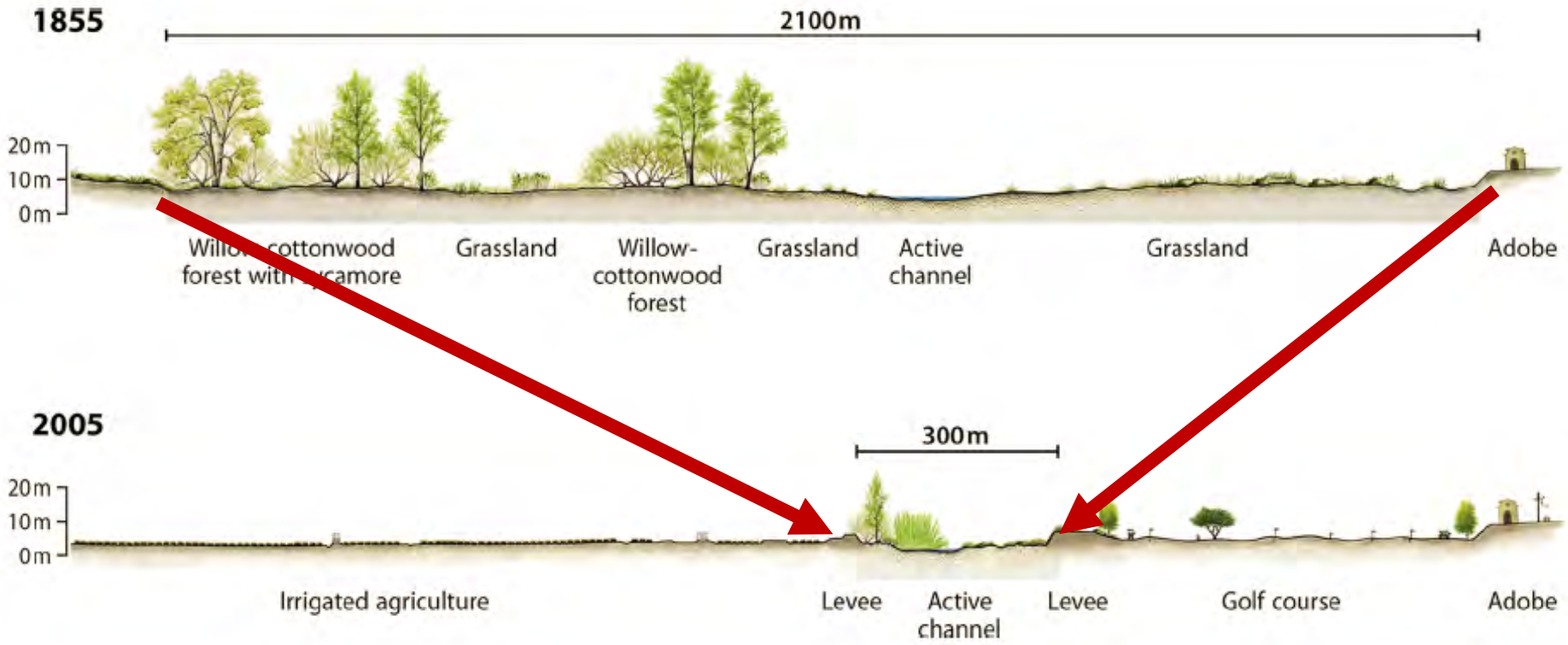


CHANGES IN FLOODPLAIN WIDTH



Beller et al. 2015. Landscape Ecology

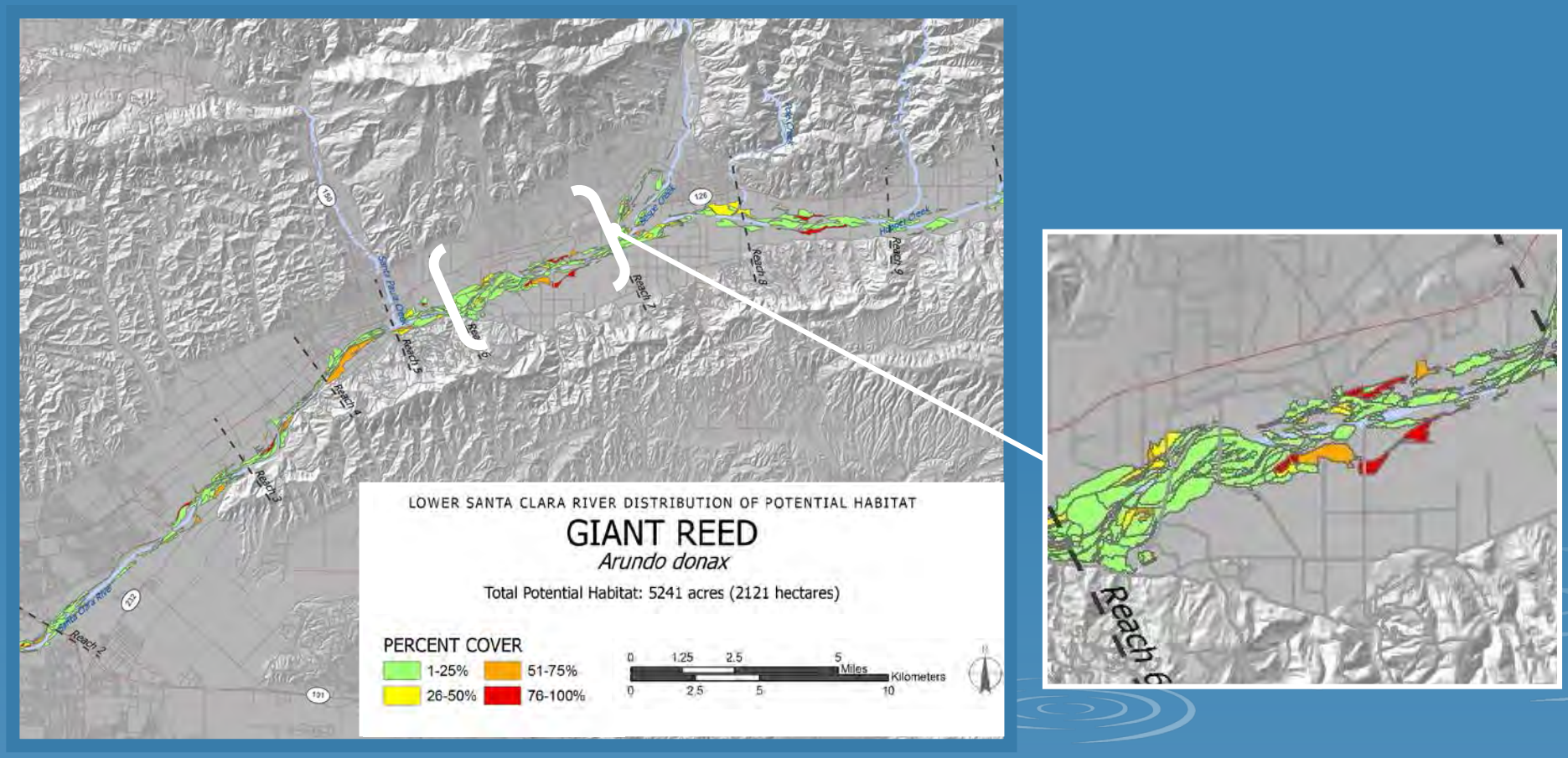
CHANGES IN FLOODPLAIN WIDTH



Beller et al. 2015. Landscape Ecology

INVASION BY GIANT REED *(ARUNDO DONAX)*

- Replaces native vegetation
- Alters ecosystem processes



So what? Challenges in managing the Santa Clara River

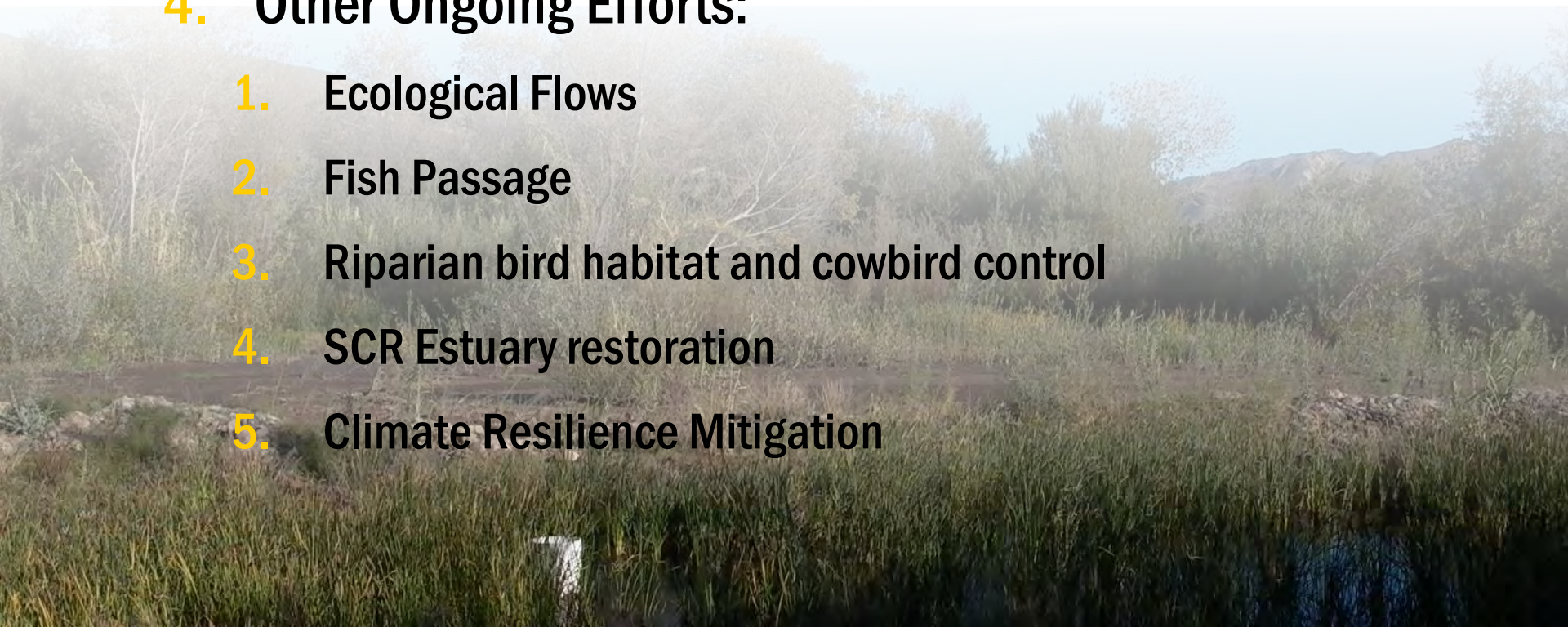
1. Dynamic mainstem morphology of a compound channel
2. Major, frequent channel-resetting floods
3. And responding to numerous legacy factors

RESTORATION OPPORTUNITIES & CONSTRAINTS

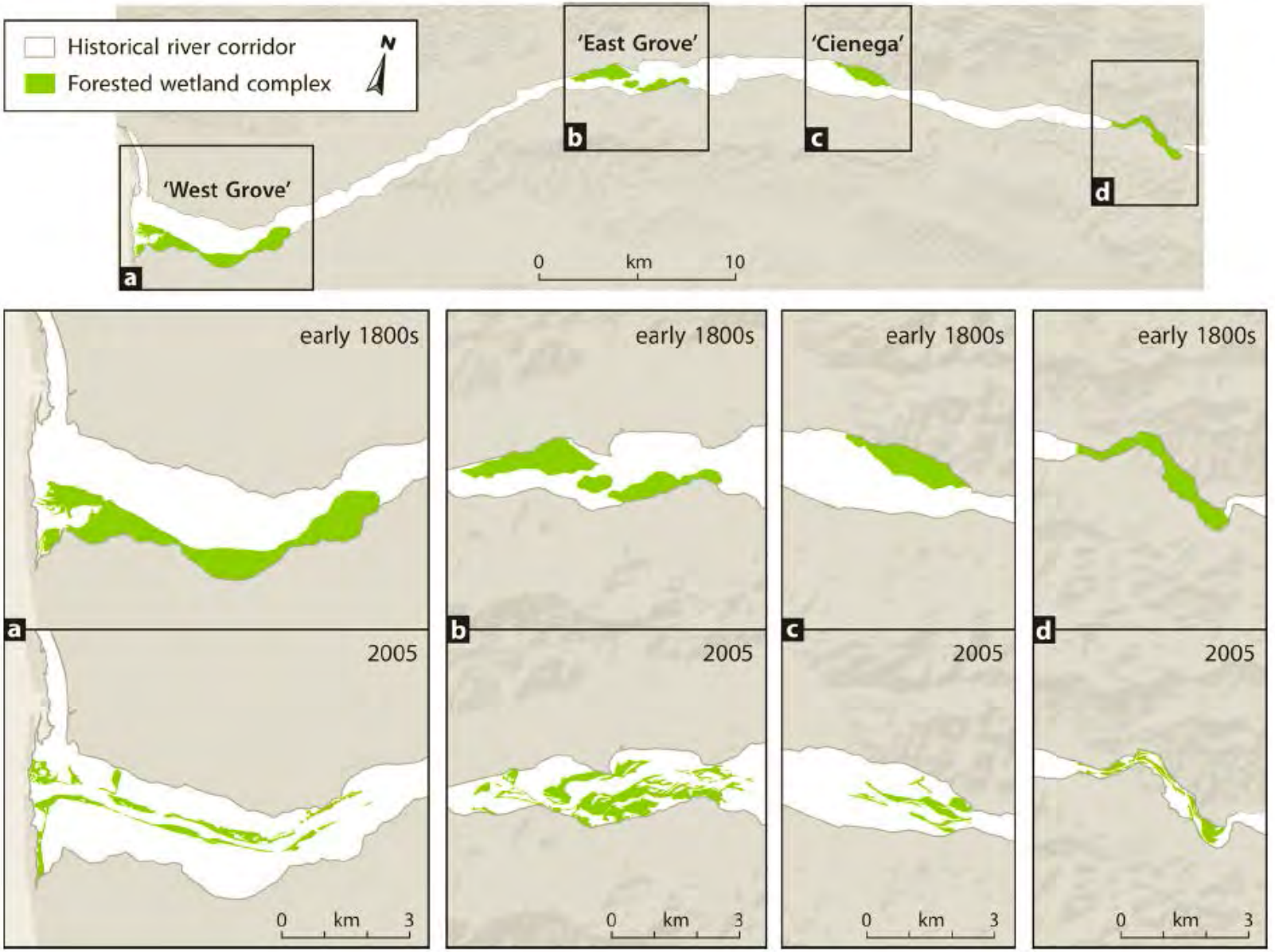
- Floods and dynamic channel and vegetation are both the asset and the hazard

RESTORATION & CONSERVATION STRATEGIES

1. Increase & Improve Floodplain Connectivity
2. Promote Revegetation via Natural Recruitment & Active Planting
3. Implement Strategic Actions to Control Arundo
4. Other Ongoing Efforts:
    1. Ecological Flows
    2. Fish Passage
    3. Riparian bird habitat and cowbird control
    4. SCR Estuary restoration
    5. Climate Resilience Mitigation



FROM PAST PATTERNS TO FUTURE POTENTIAL



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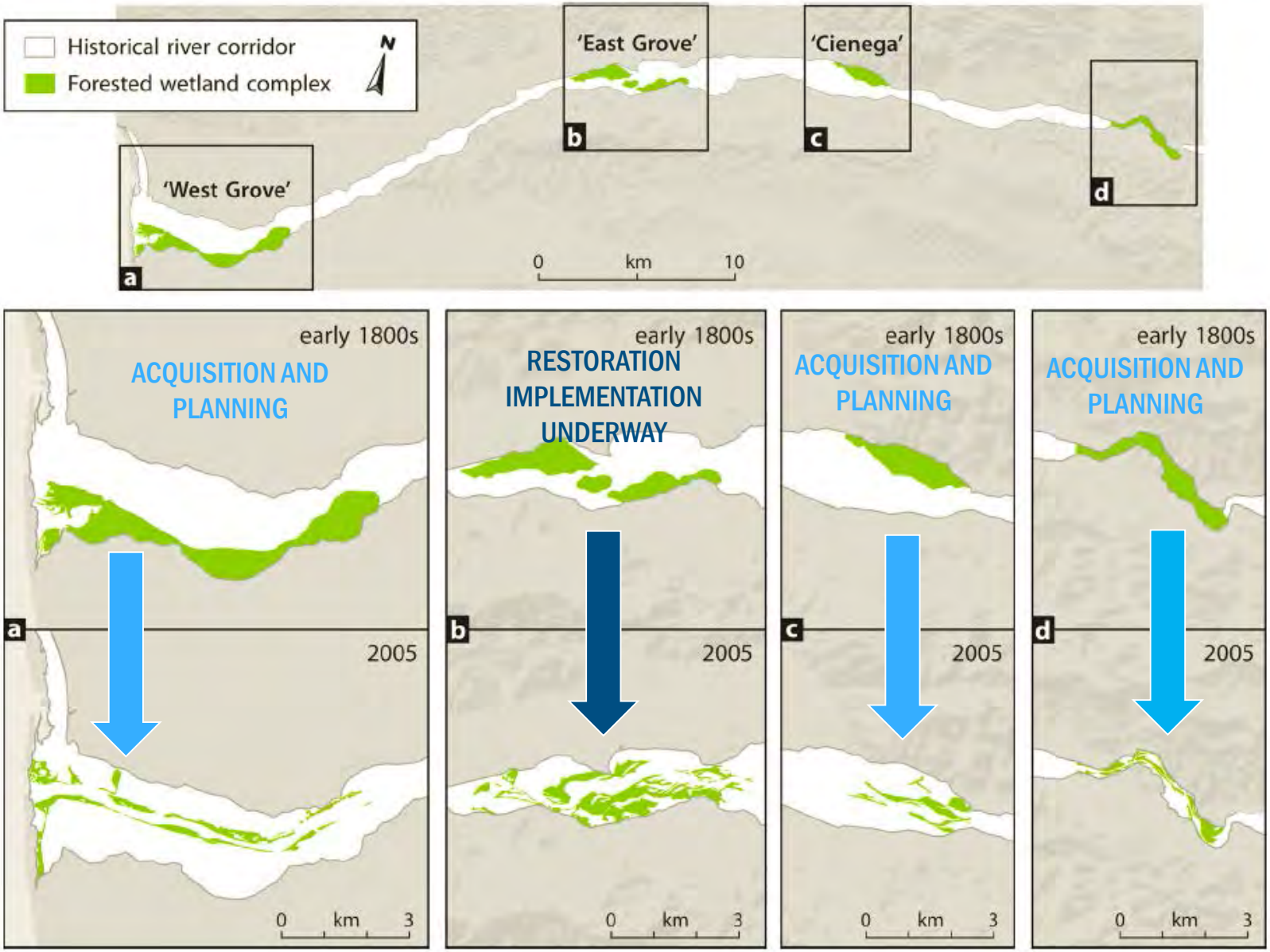
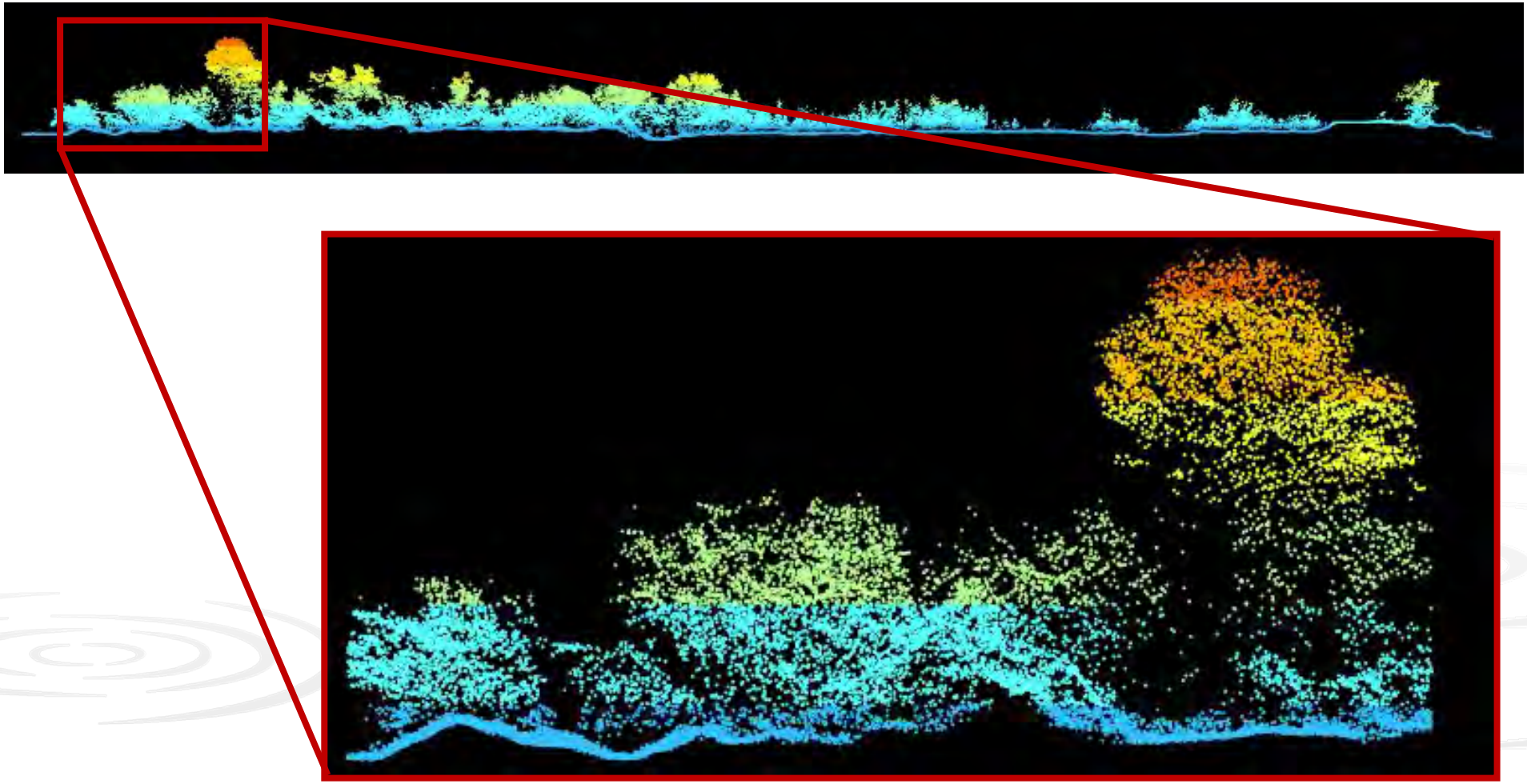


Beller et al. 2015. Landscape Ecology

VEGETATION & HABITAT STRUCTURE

- NCALM LiDAR data collected in October 2015
- Habitat Modeling for Least Bell's Vireo, Southwestern Willow Flycatcher, and Yellow-billed Cuckoo



FOR MORE INFORMATION

- Santa Clara River Parkway Website (includes project reports plus vegetation layers viewable with Google Earth):
  - parkway.scrwatershed.org
- Stillwater Sciences Website
  - www.stillwatersci.com
- Email: bruce@stillwatersci.com