



Unravelling the Mystery of Sycamores



State of the Alameda Creek Watershed Webinar 5
November 9, 2021



Preparing for the Storm - Grant overview

As San Francisco Bay's watersheds face the twin challenges of **urbanization** and **climate change**, comprehensive, coordinated actions are increasingly needed at both the **watershed-scale and site-scale**, immediately along stream corridors.

New **partnerships** will be necessary to systematically improve water quality and aquatic habitat while building the **resilience** to withstand greater hydrological variability in the future.

TASK 1: Planning for Climate Resiliency
science-based plans and tools to address urban hydrology and sediment management.

TASK 2: Implementation Projects
design and construction of habitat restoration projects on Arroyo de la Laguna and Arroyo Mocho.

TASK 3: Participatory outreach and collaboration

www.sfei.org/projects/preparing-storm



Preparing for the Storm: Motivation for Sycamore Alluvial Woodland

- Lots of interest locally in Sycamore Alluvial Woodlands
- Sediment management potential
- Restoration of SAW met with hesitancy due to mis-information and data gaps



Preparing for the Storm - Project Team

San Francisco Estuary Institute (SFEI)

- Sarah Pearce, GEOMORPHOLOGIST
- Alison Whipple, PhD, HYDROECOLOGIST
- Kendall Harris, ENV. SCIENTIST/ GIS SPECIALIST
- *Julie Beagle**
- *Amy Richey**
- *Gloria Desanker**

H. T. Harvey & Associates

- Ryan Hegstad, RESTORATION ECOLOGIST
- Charles McClain, SENIOR ECOLOGIST
- *Matt Quinn**
- *Will Spangler**

Zone 7 Water Agency

- Tami Church, WATER RESOURCES PLANNER



* No longer with SFEI / H.T. Harvey

Outline

1. Introduction
2. Why sycamores?
3. Sycamore alluvial woodland field study
 - a. Objectives and study area
 - b. Key results
 - c. Applications and implications of findings
4. Sycamore restoration pilot implementation
5. Other ongoing sycamore research
6. Next steps





WHY SYCAMORES?

Why We Care About Sycamores



- California sycamore (*Platanus racemosa*) is the dominant species of the rare Sycamore Alluvial Woodland (SAW) plant community
- Riparian community, associated with wide intermittent braided streams
- Supports sensitive riparian and aquatic species



Drivers of Sycamore Alluvial Woodland

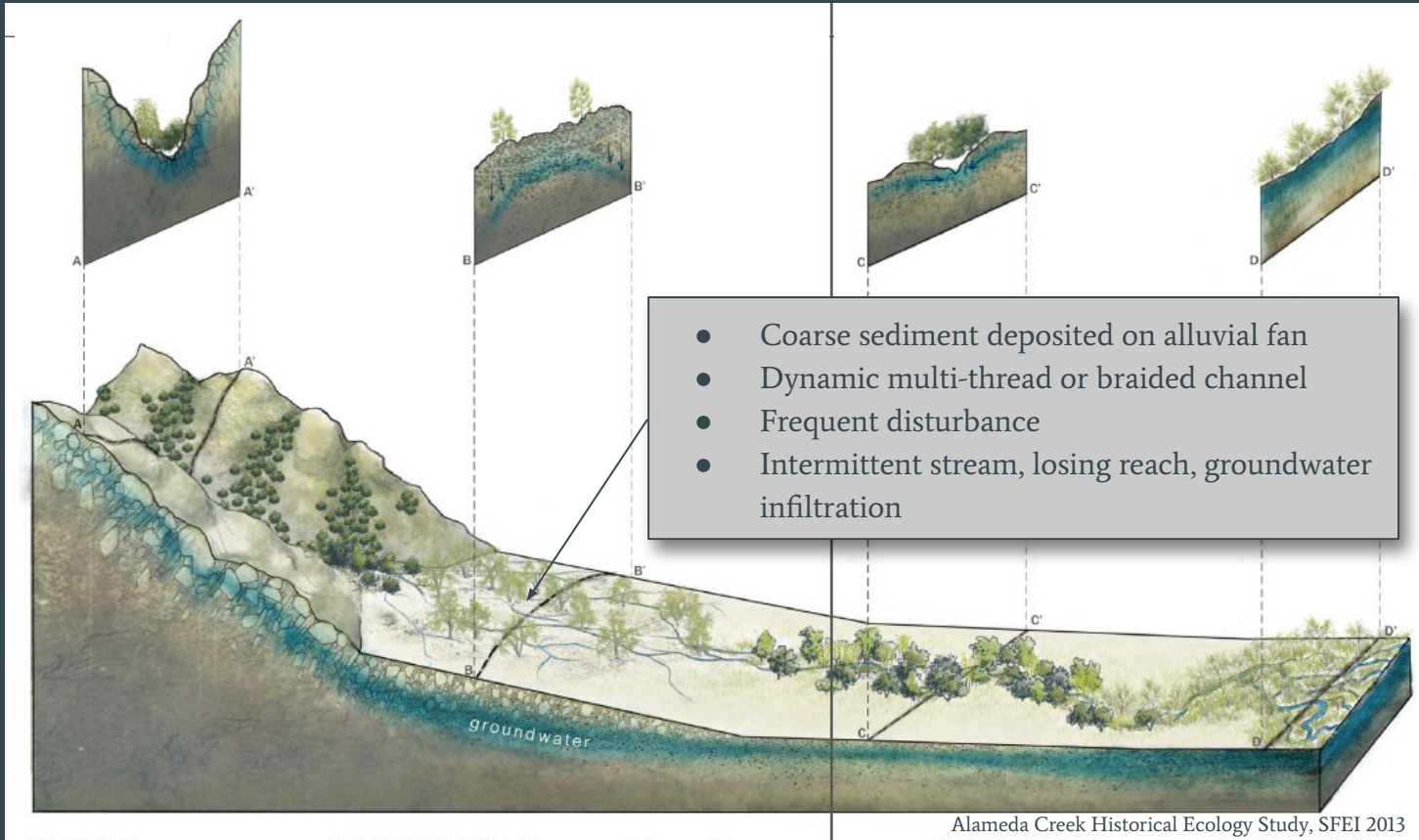
Depends on a “constellation of drivers”

RECRUITMENT → ESTABLISHMENT → MAINTENANCE

- Major flood disturbance & resetting event (~10-25 yrs)
- Suitable substrate
- Seed source & dispersal
 - Healthy seed source
 - Nearby source
 - Dispersal via wind/water
- Supportive hydrology, regular floodplain activation
- Spring flow recession & groundwater drawdown
- Intermittent flows
- Limited competition
- Limited wildlife/cattle pressure
- Land use/management
- Shallow groundwater, supportive hydrology



Longitudinal position sets physical drivers for sycamore suitability



CONFINED CANYON

MULTI-THREAD ALLUVIAL CHANNEL

SINGLE-THREAD CHANNEL

DISTRIBUTARY DELTA

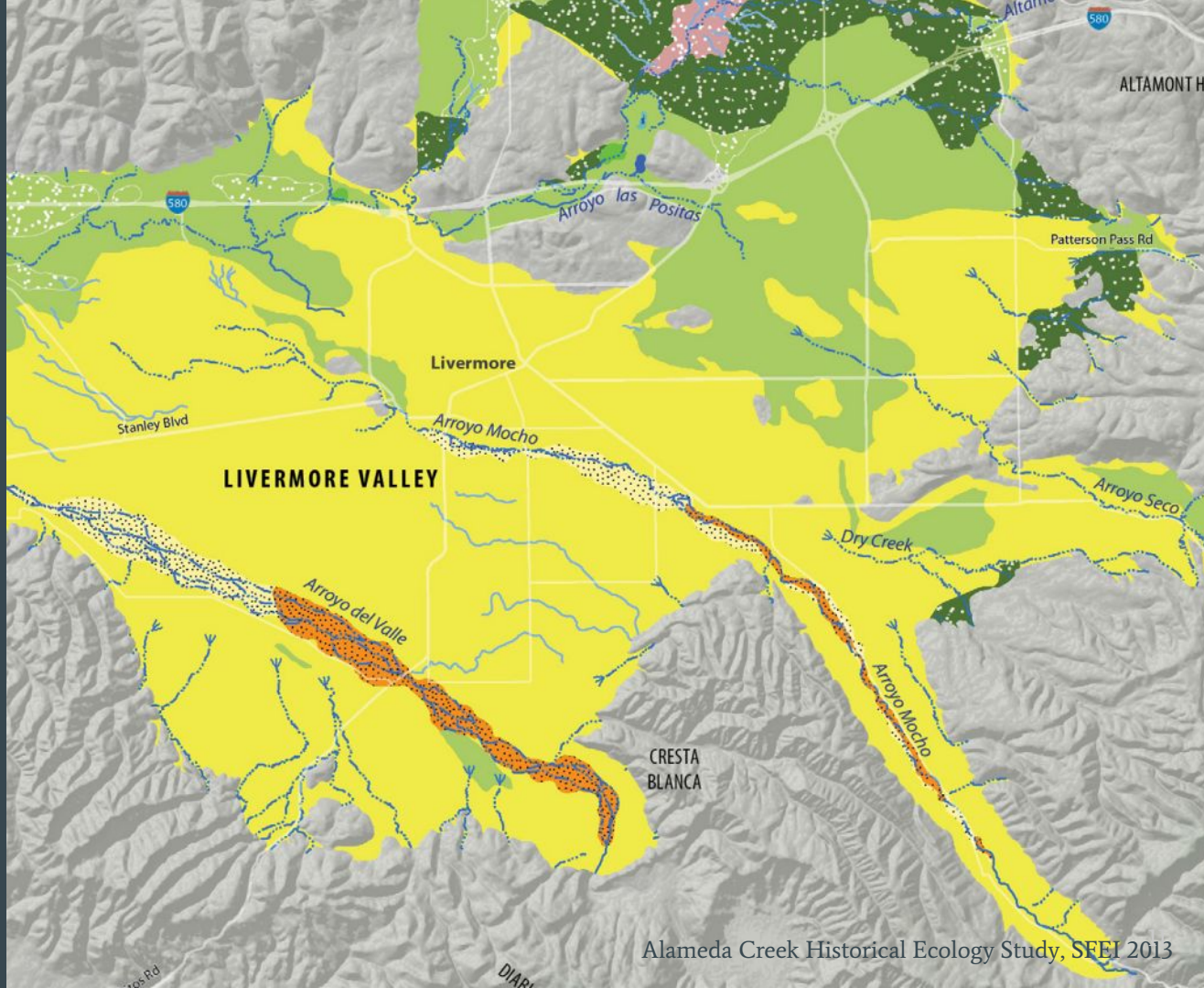
Key Factors Affecting Health and Regeneration

- Hydrologic regime change
 - Reduced flooding (e.g., dams), augmented dry-season flow, groundwater management
- Sediment regime change (e.g., dams)
- Channel alteration
- Land use change, floodplain disconnection
- Biotic factors

→ need for SAW restoration



SAW in the Alameda Creek Watershed: Historical Conditions





ca. 1940



2018

Arroyo Mocho



ca. 1940



1985

Sycamore Grove Park change in channel form pre- and post-dam

Prior SAW studies

Beagle J, et al. 2014. Landscape Scale Management Strategies for Arroyo Mocho and Arroyo Las Positas. SFEI Contribution No. 714.

Beagle J, et al. 2017. Sycamore Alluvial Woodland: Habitat Mapping and Regeneration Study. SFEI Contribution No. 816.

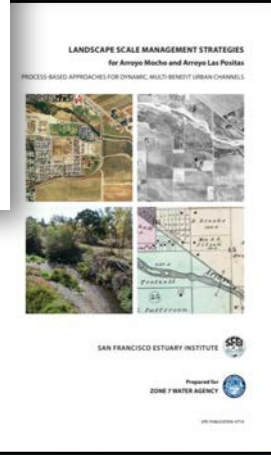
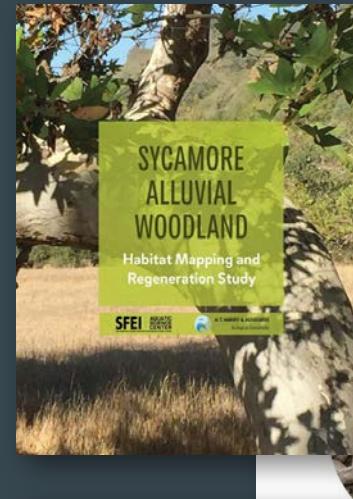
Beagle J, et al. 2018. Observational Study of Sycamore Regeneration at two sites in Santa Clara County after the 2016-2017 Water Year. SFEI Contribution No. 874.

Beagle J, et al. 2018. Sycamore Alluvial Woodland Planting Guide. SFEI Contribution No. 901.

H. T. Harvey & Associates, San Francisco Estuary Institute (SFEI). 2017. Annotated Bibliography for Sycamore Alluvial Woodland Habitat Mapping and Regeneration Studies Project.

H. T. Harvey & Associates in collaboration with The Watershed Nursery, Grassroots Ecology Nursery, and UC Davis. 2019. California Sycamore Genetics and Propagation Study.

H. T. Harvey & Associates. 2020. Pacheco Creek Restoration Project Final Feasibility Study.





SAW FIELD STUDY

Key Questions

- What conditions and processes are necessary for California sycamores to recruit and establish within SAW?
 - What is the current distribution, abundance, size, geomorphic position and condition of existing sycamores?
 - What are the linkages between sycamore distribution, health and regeneration, and geomorphic and hydrologic processes?
- What restoration and management actions are appropriate to enhance and restore SAW?

Field Data Collection

- Staff from SFEI and H. T. Harvey conducted fieldwork in Fall 2019, with assistance from Living Arroyos staff
- Geomorphic mapping:
 - Active channel
 - Inner floodplain
 - Outer floodplain
 - Side channel
- At five field sites, individual sycamore observations:
 - Location
 - Size class
 - Geomorphic zone
 - Health
 - Regeneration



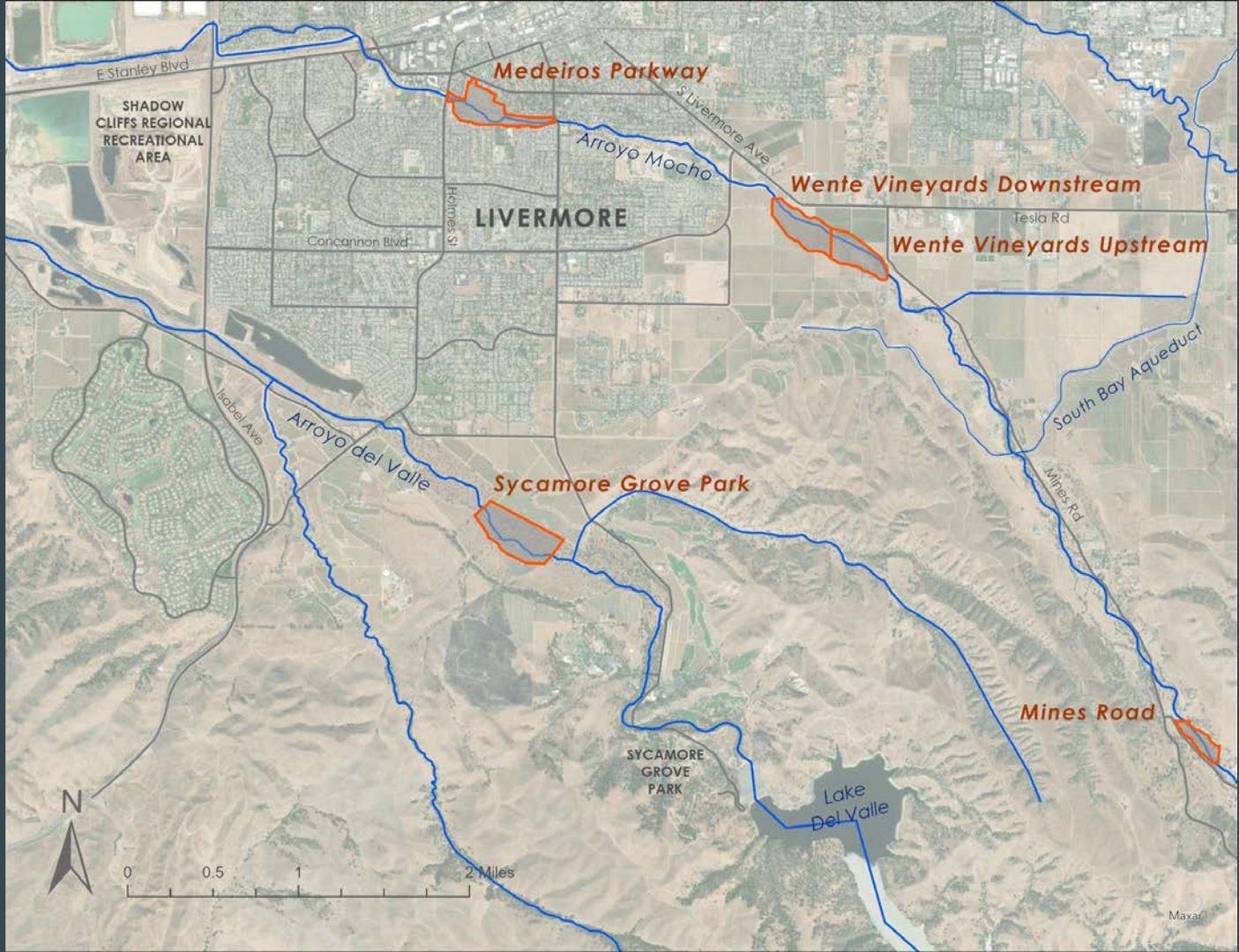


Education opportunity for Living Arroyos staff to participate in field research.

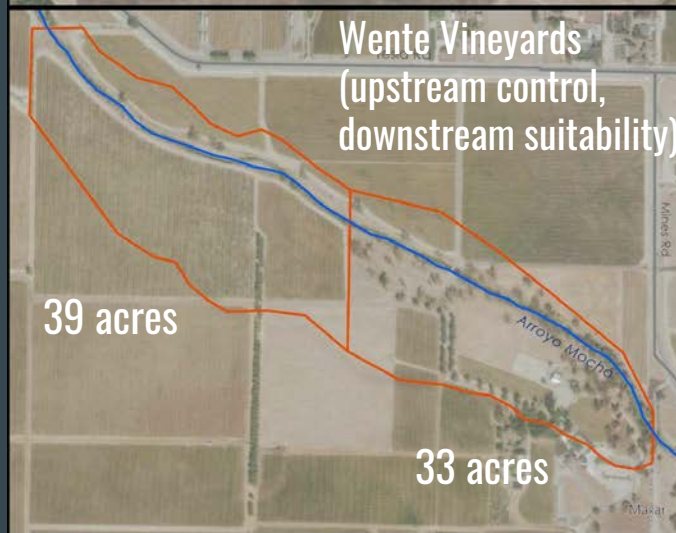
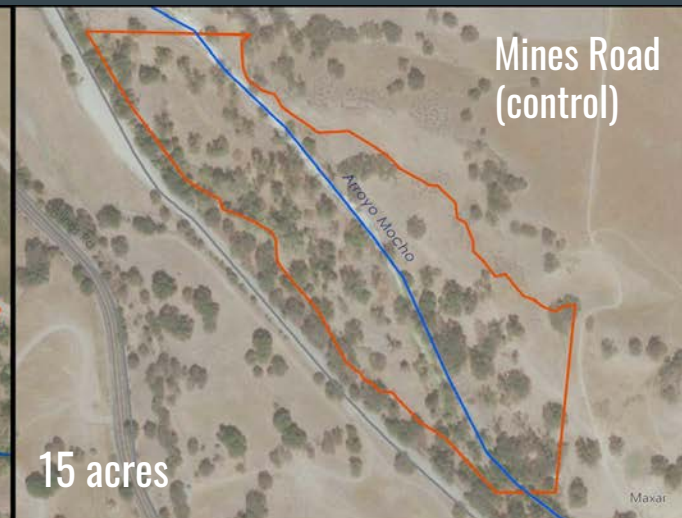
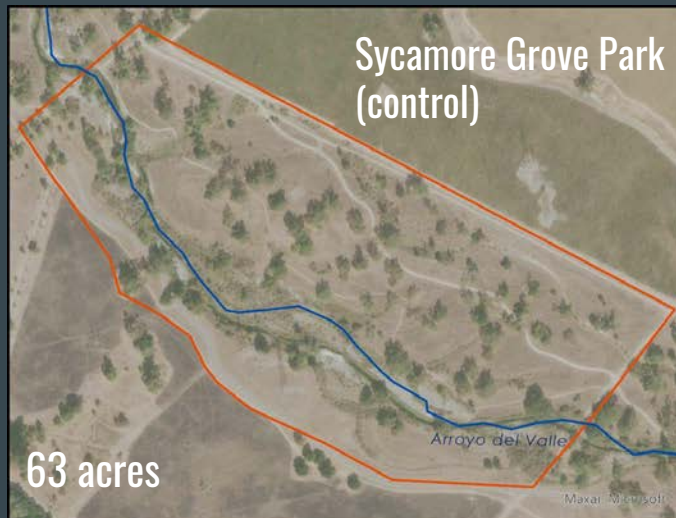
Setting

Arroyo Mocho and
Arroyo del Valle

Thank you Wente
Vineyards and LARPD!



Field Sites





FIELD RESULTS

Total number of sycamores

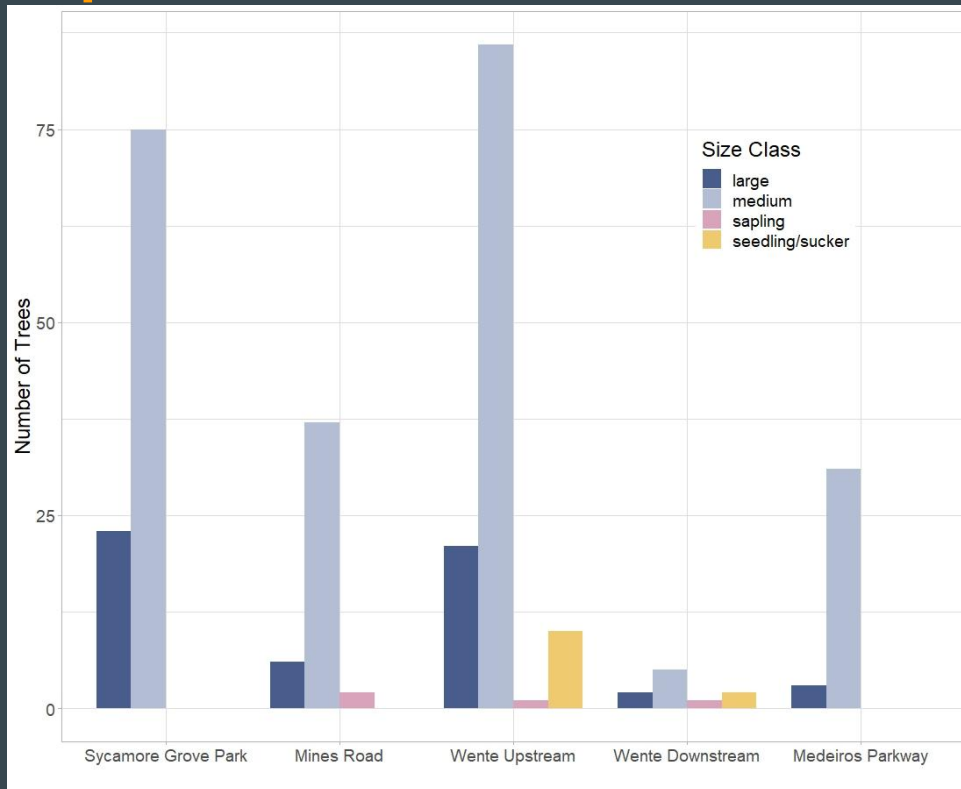
Location	Type	Site Size (acres)	Number of Sycamores	Percent of Total Sycamores
Sycamore Grove Park	Control	62.5	98	32.13%
Mines Road	Control	15.2	45	14.75%
Wente Vineyards (Upstream)	Control	33.0	118	38.69%
Wente Vineyards (Downstream)	Suitability	38.8	10	3.28%
Medeiros Parkway	Suitability	44.8	34	11.15%

What size class sycamores are present?

- Medium-sized (4-40 inches DBH) dominate
- 12 total seedling/suckers identified, and only present at the Wente Vineyards sites
- 4 total saplings identified

The size of a sycamore relates to its age, and the timing of when it was recruited and became established.

The distribution suggests less regeneration success recently.

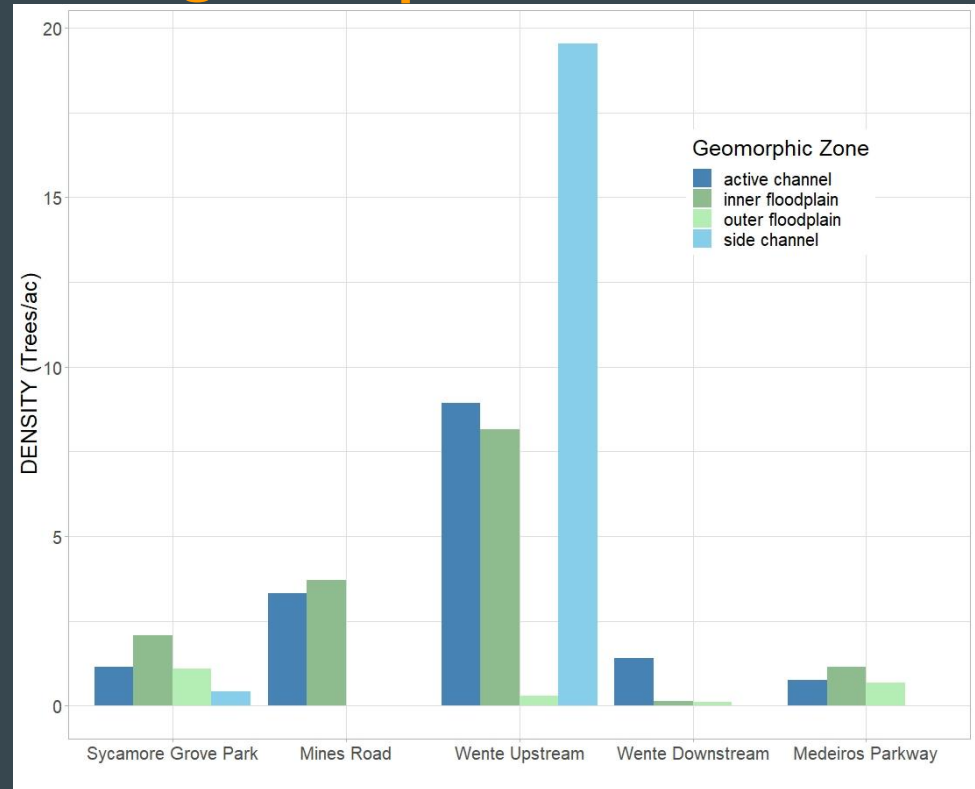


How are sycamores distributed by geomorphic zone?

The Wente Vineyards Upstream site has the highest absolute density of sycamores within a single geomorphic zone (side channel).

But overall, across all sites and all zones, the inner floodplain, followed by the active channel have the highest overall density of sycamores.

The lowest density of sycamores is found in the outer floodplain.

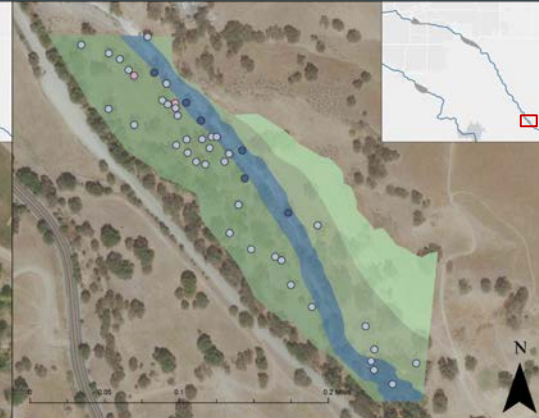


How are sycamores of various size classes distributed?

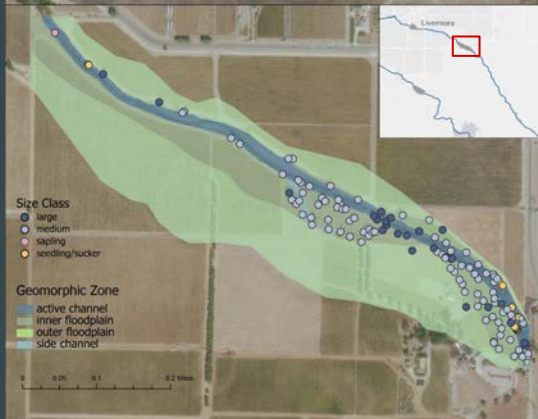
Sycamore Grove Park



Mines Road



Wente Vineyards

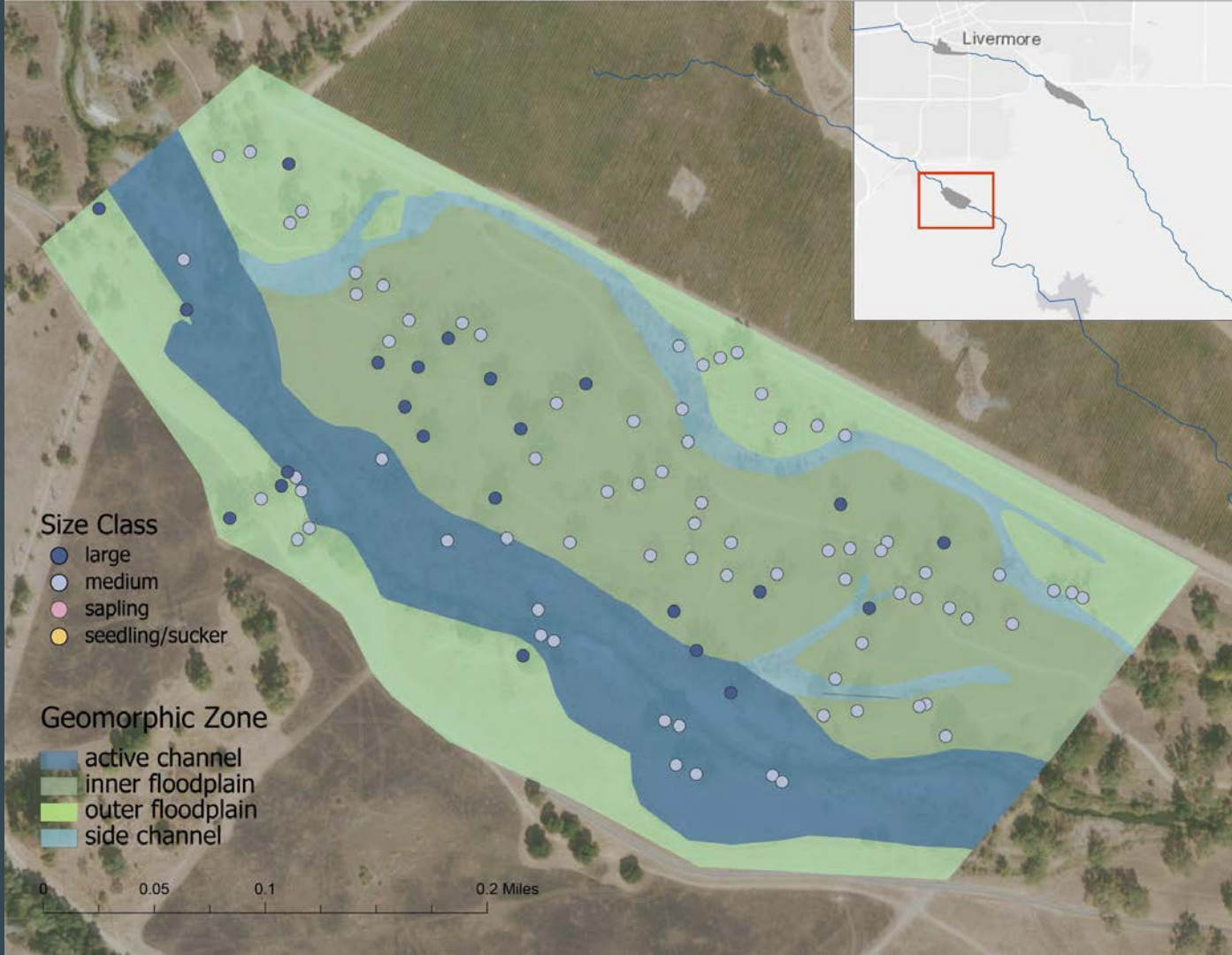


Medeiros Parkway

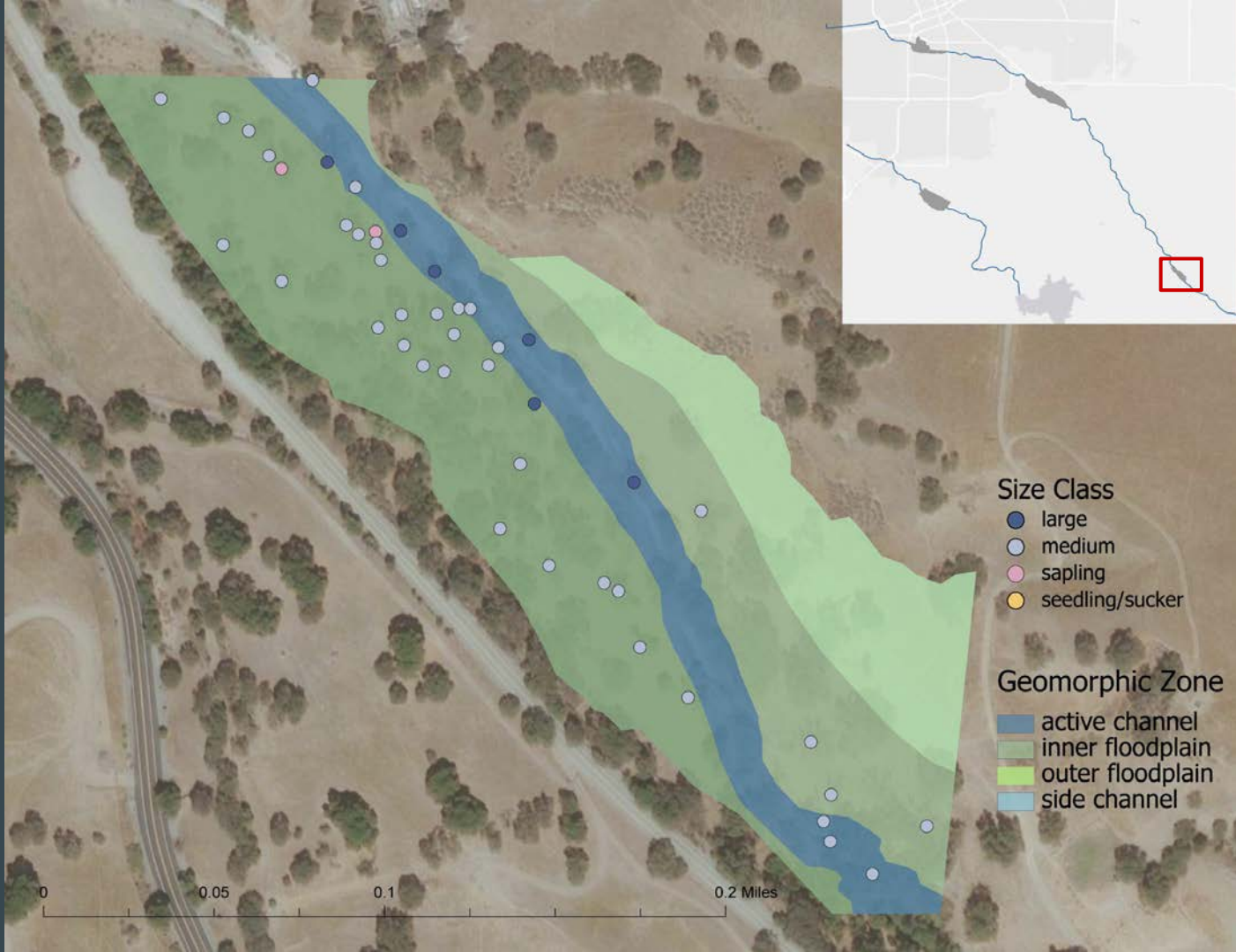


- Size Class
- large
 - medium
 - sapling
 - seedling/sucker
- Geomorphic Zone
- active channel
 - inner floodplain
 - outer floodplain
 - side channel

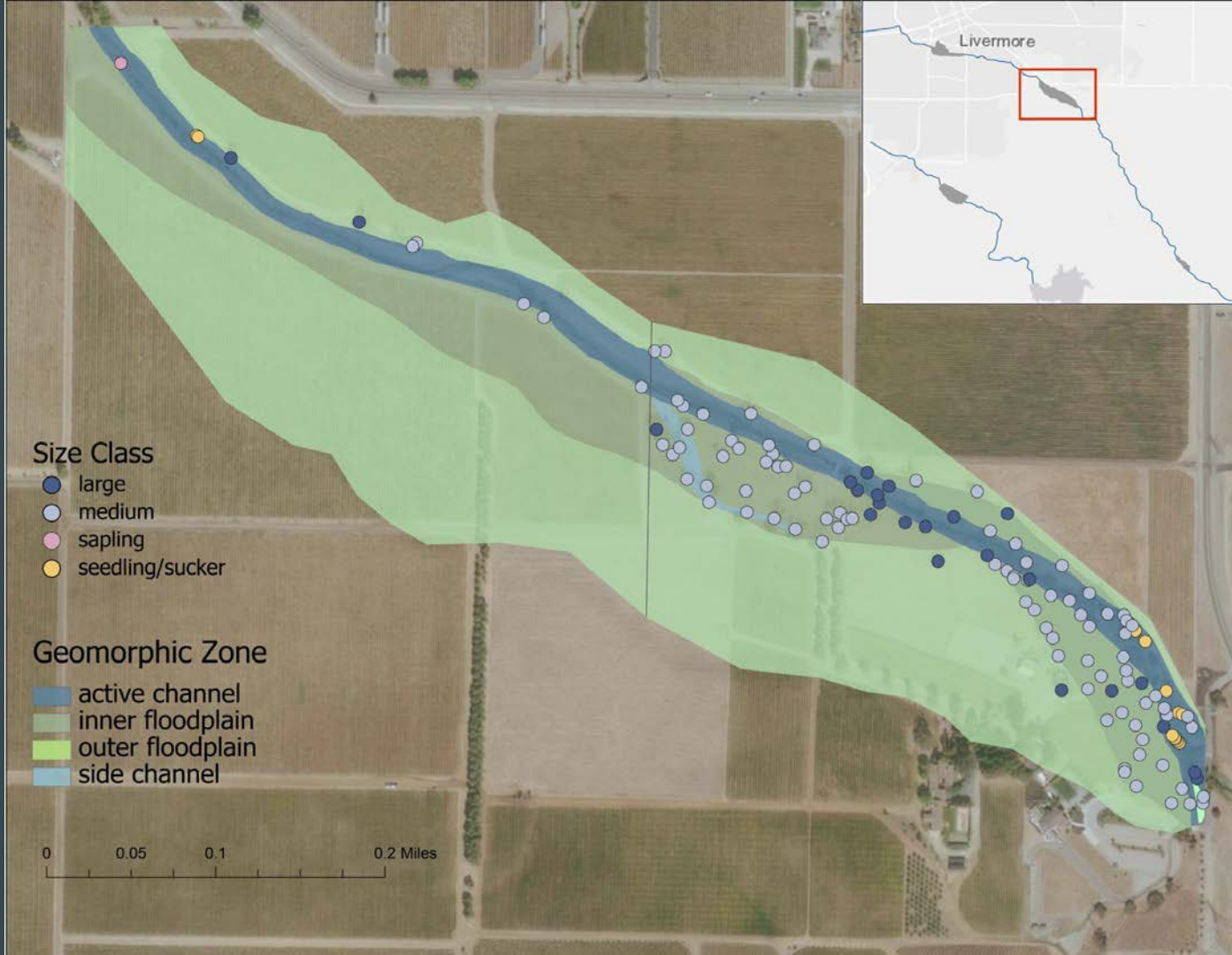
Sycamore Grove Park



Mines Road



Wente Vineyards



Medeiros Parkway

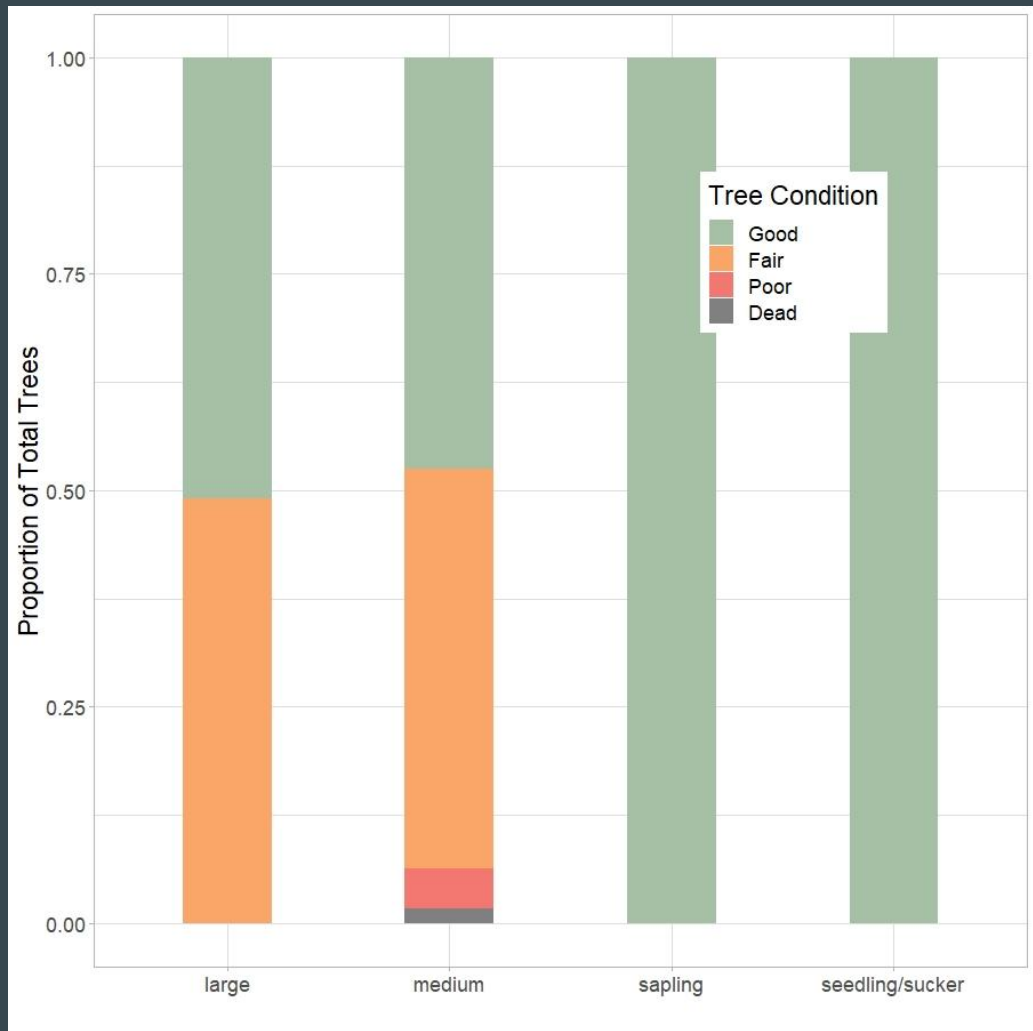


How healthy are the sycamores?

Overall, about 75% of the sycamores are in the good health class.

All seedlings/suckers, and saplings are healthy.

The medium size class is the only class with dead sycamores (n=4). These are all located in Sycamore Grove Park.

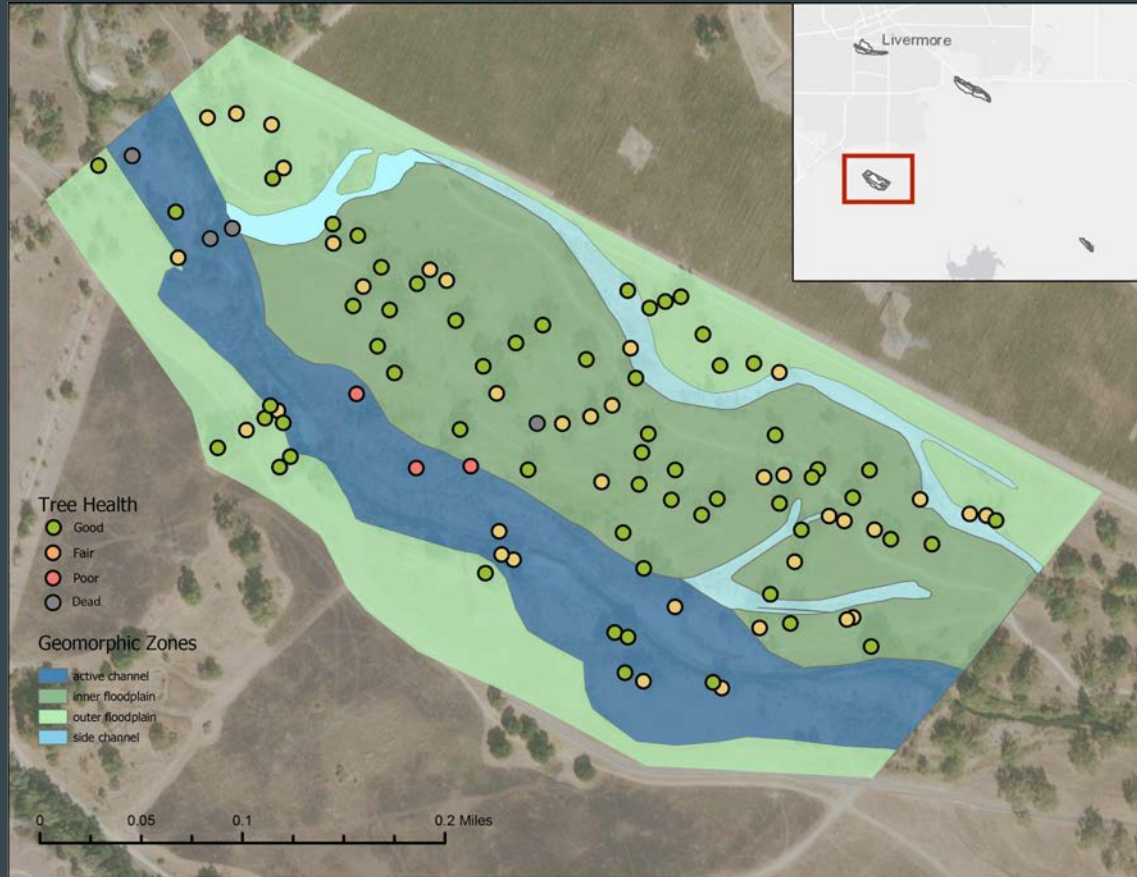


Degraded condition in Sycamore Grove Park?

Sycamores within Sycamore Grove Park are showing signs of reduced health for those located in the active channel.

- 4 are dead
- 3 are in poor condition
- 8 are in fair condition

This possibly relates to perennialization of the reach, which increases both surface water, and maintains the groundwater table elevation throughout the year.



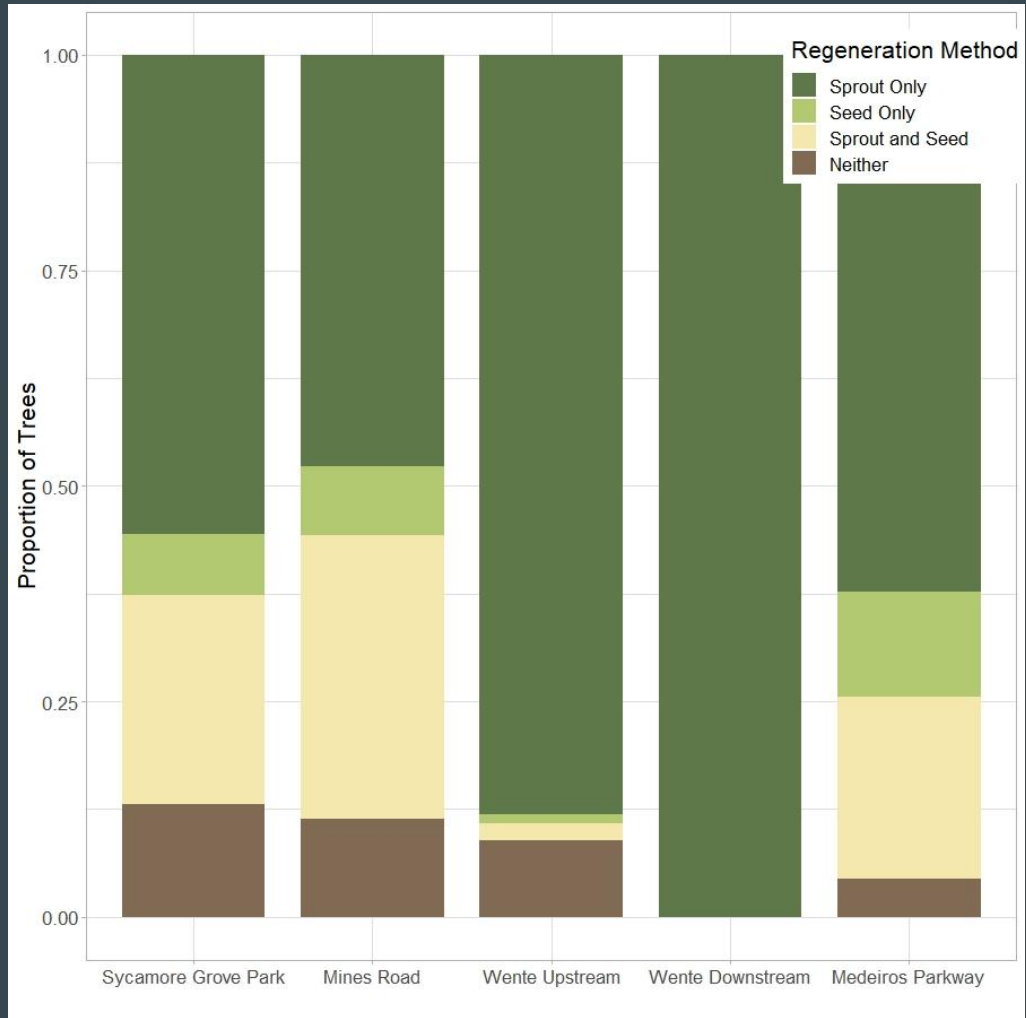
How are sycamores regenerating?

Only ~30% of the sycamores are producing seed. This decreases to 5% of all trees at the two Wente Vineyards sites.

The vast majority of sycamores (82%) are stump sprouting.

Very few trees in or near the active channel are producing seed; most are on floodplain surfaces.

Transport will require flooding on those surfaces.





APPLICATIONS AND IMPLICATIONS

Process-based versus Planting-based restoration

Process-based restoration can occur in locations where space is available to restore stream processes. Must be supported by adequate hydrology and sediment supply.

Planting-based restoration can occur in locations where process-based restoration is infeasible due to limitations on the channel network.

Both ideally occur in appropriate reaches- e.g. reaches that historically supported sycamores.



Process-based restoration

Focus on restoring a dynamic channel that is able to scour and deposit coarse sediment.

- Provide space for a complex main channel, with pools, bars, islands, mounds
- Address any past channel incision
- Encourage frequent overbank flooding onto the floodplain
 - Excavate a wide, low elevation floodplain surface
- Create a more complex channel corridor by the addition of side channels
- Manage water flows to mimic historic hydrographs as much as possible

Planting-based restoration

Focus upon restoring sycamores in locations where they can thrive

- Plant along the edges of the active channel, in side channels, or in low locations within the floodplain to ensure the trees have access to groundwater
- Reduce competition from other riparian species
- Protect from browsing/grazing

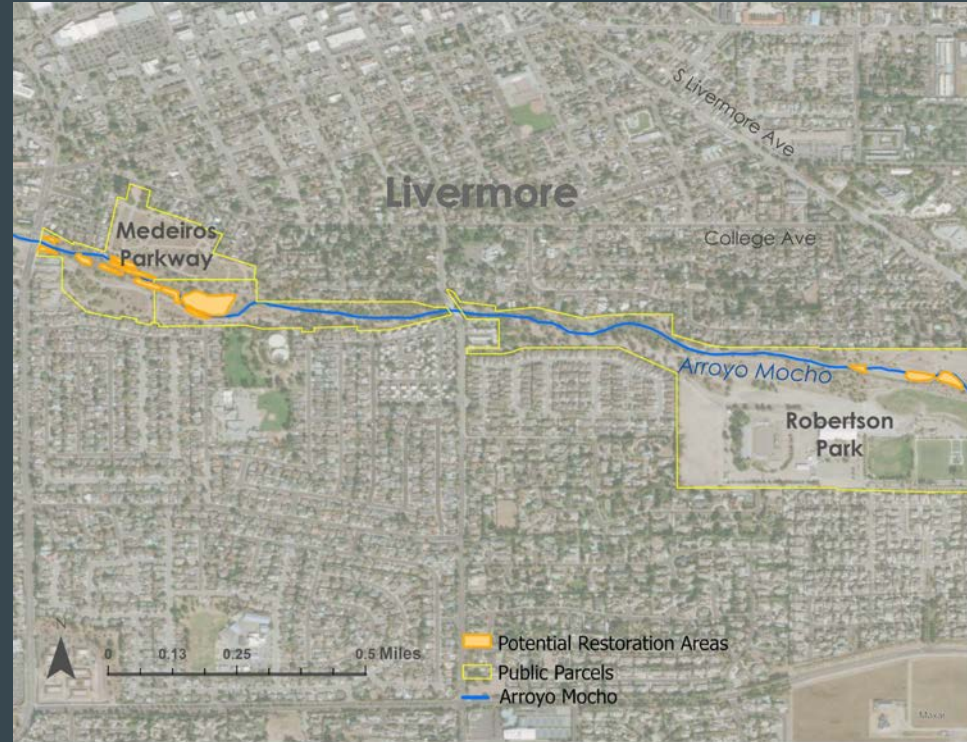


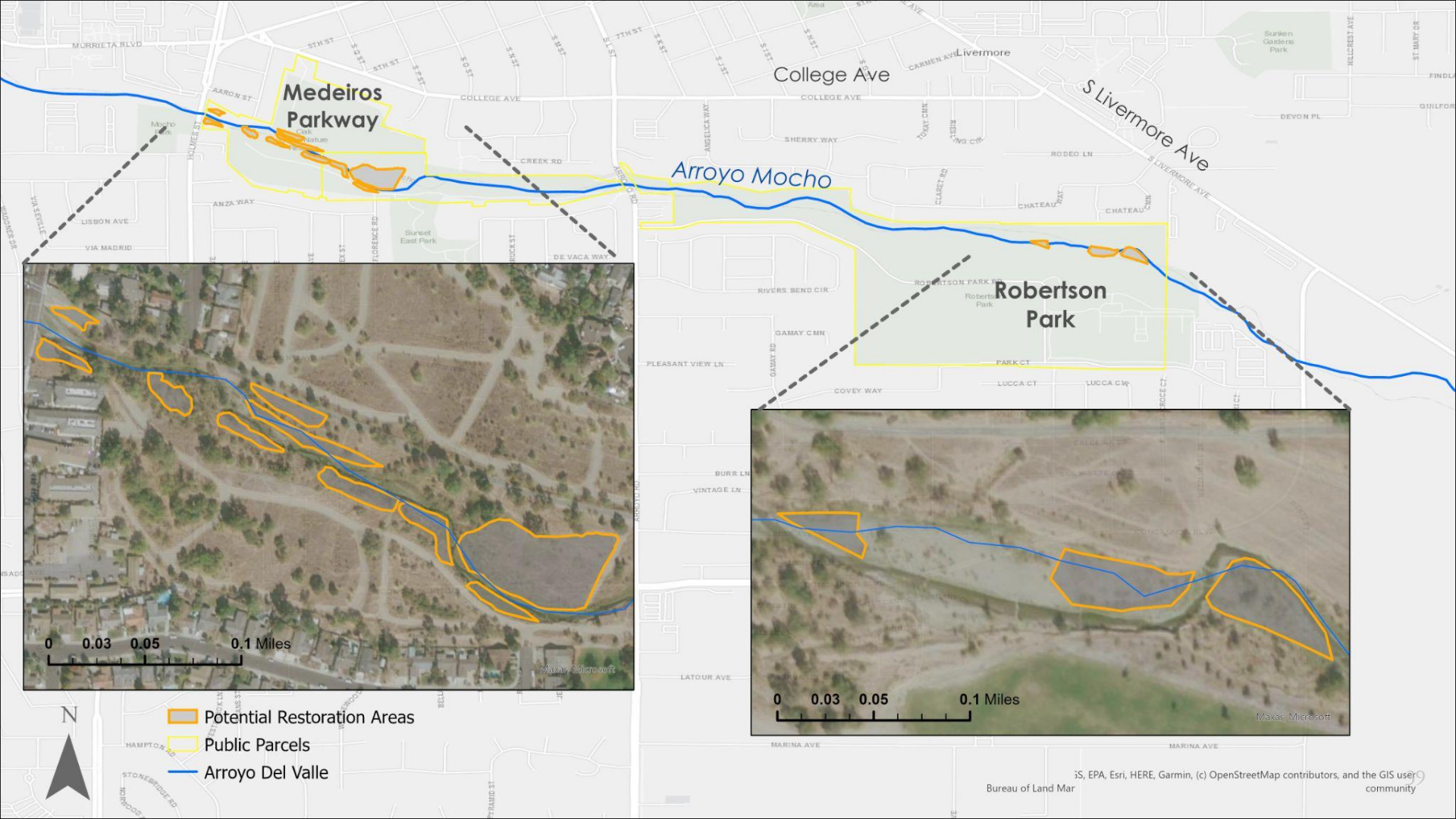
SYCAMORE RESTORATION PILOT PROJECT

Implementation Project

Project Goals

- Field test findings from the SAW study
- Develop site-specific planting guidelines
- Actively plant California sycamores
- Expand riparian woodland habitat
- Collaborate with planning and implementing partners
 - Zone 7, SFEI, H. T. Harvey, Living Arroyos, LARPD
- Example for future California sycamore and SAW restoration projects





Medeiros Parkway

College Ave

Arroyo Mocho

Robertson Park

- Potential Restoration Areas
- Public Parcels
- Arroyo Del Valle

Implementation Project

Site Assessment

- Landscape considerations
 - Hydrology (dams, water input)
- Distance from active surface flows
- Depth to groundwater
- Soil characteristics
- Existing plant species
- General health and vigor of surrounding vegetation and sycamores



Implementation Project

- Source Material
 - Genetics
 - Nursery stock

THE HYBRIDIZATION OF CALIFORNIA SYCAMORE (*Platanus racemosa*) AND THE LONDON PLANE TREE (*Platanus x acerifolia*) IN CALIFORNIA'S RIPARIAN WOODLAND

Whitlock 2003



Implementation Project

- Planting Techniques
 - Individual planting basins for nursery stock
- Living Arroyos



SYCAMORE ALLUVIAL WOODLAND Planting Guide

AUGUST 2018



Prepared for
Loma Prieta Resource
Conservation District

Prepared by
San Francisco Estuary Institute
and
H. T. Harvey

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Implementation Project

Maintenance Plan

- Irrigation
- Plant protection
 - Temporary electric fencing during grazing
- Herbaceous vegetation control
 - Reduce competition
 - Reduce cover for small herbivores



Implementation Project

Monitoring Plan

- Biological As-built Report
- Survival
- Health and vigor
- Maintenance activities
- Photo Documentation
 - Drone Imagery



Ongoing Sycamore Research: Santa Clara County Sycamore Hybridization Study



H. T. HARVEY & ASSOCIATES
Ecological Consultants

California Sycamore Genetics and Propagation Study
Project #3141-03 and #3754-02

Prepared for:

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Ecology Nursery, and UC Davis

February 2019

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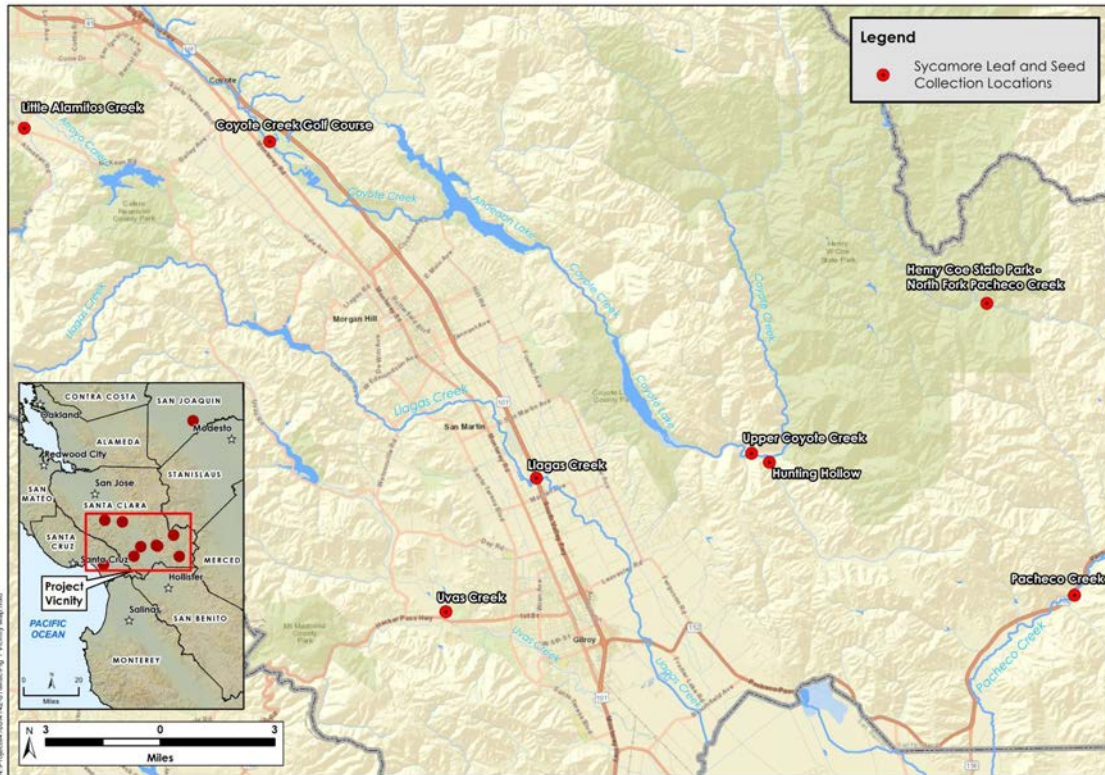


Figure 1. Vicinity Map

California Sycamore Alluvial Woodland Suitability (4124-01)
November 2021



H. T. HARVEY & ASSOCIATES
Ecological Consultants

Ongoing Sycamore Research: Santa Clara County Sycamore Hybridization Study



California Society for Ecological Restoration Quarterly Newsletter

Lessons from the California Sycamore

by Will Spangler

Thank you for reading SERCAL's Ecesis journal and for being a member of California's ecological restoration community. We just wrapped up our second virtual conference and even across disparate screens it was a powerful reminder of the depth, breadth, the vitality of our field of practice. I hope you enjoy these timely articles about applying native seed post-fire, field-based learning in a beautiful North Coast watershed, and the challenges facing an iconic California riparian tree, the California sycamore, and an encouraging set of recommendations to propagate them vegetatively. A colleague once encouraged me to view California sycamores as living on a longer time scale than we're typically used to; there are often many more years between the ideal conditions for their regeneration and establishment than for the willows and other riparian species we often work with. And in this way, they're a window into another time, one that spans the drastic interannual variability of California's climate, which itself is changing to bring even more dramatic interannual variability. As we face that new climate, may California sycamores show us a way to be resilient?

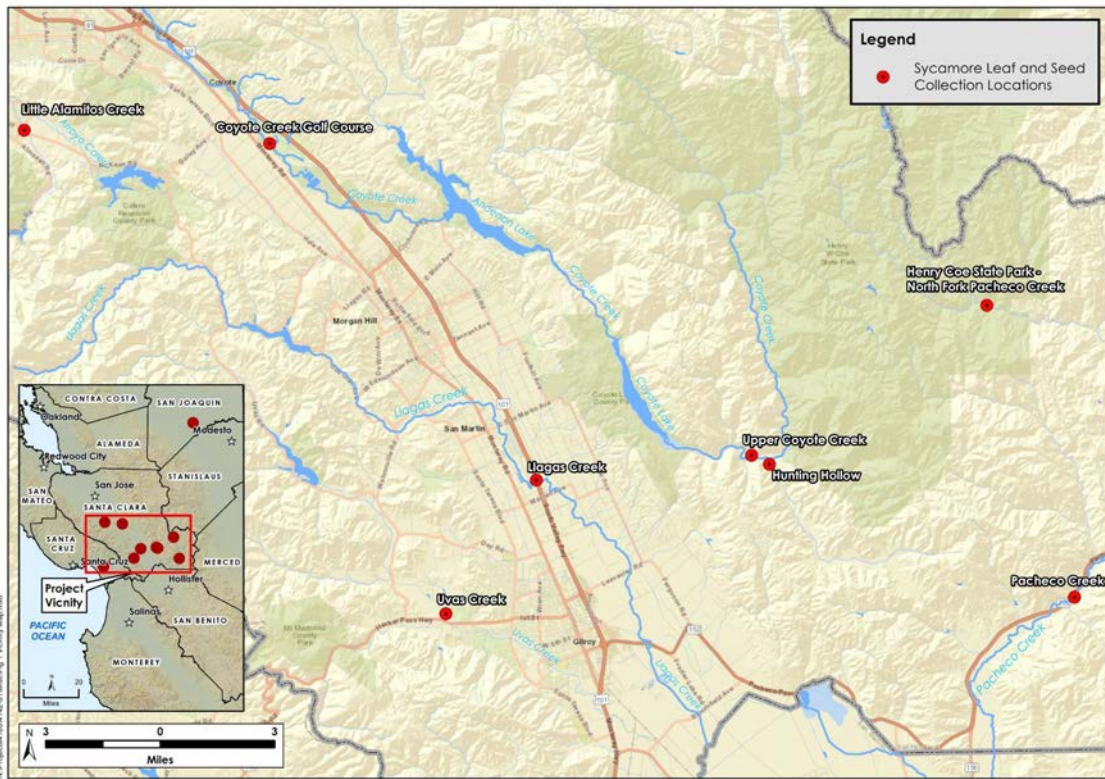
* Senior Conservation Biologist, Santa Clara Valley Habitat Agency
Photo: Sycamore tree, Upper Coyote Creek, Courtesy H. T. Harvey & Associates.

Fall 2021, Volume 31, Issue 3
Guest Editor: Will Spangler, Santa Clara Valley Habitat Agency
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Managing Editor: Julie St John
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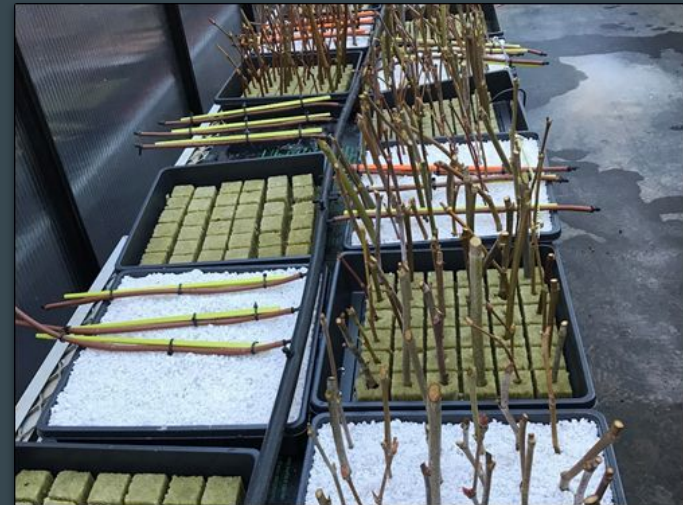
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Ecological Consultants

Figure 1. Vicinity Map
California Sycamore Alluvial Woodland Suitability (4124-01)
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Ongoing Sycamore Research: Propagation studies with The Watershed Nursery and Grassroots Ecology Nursery

Tested collection and propagation techniques to increase success propagating sycamore cuttings

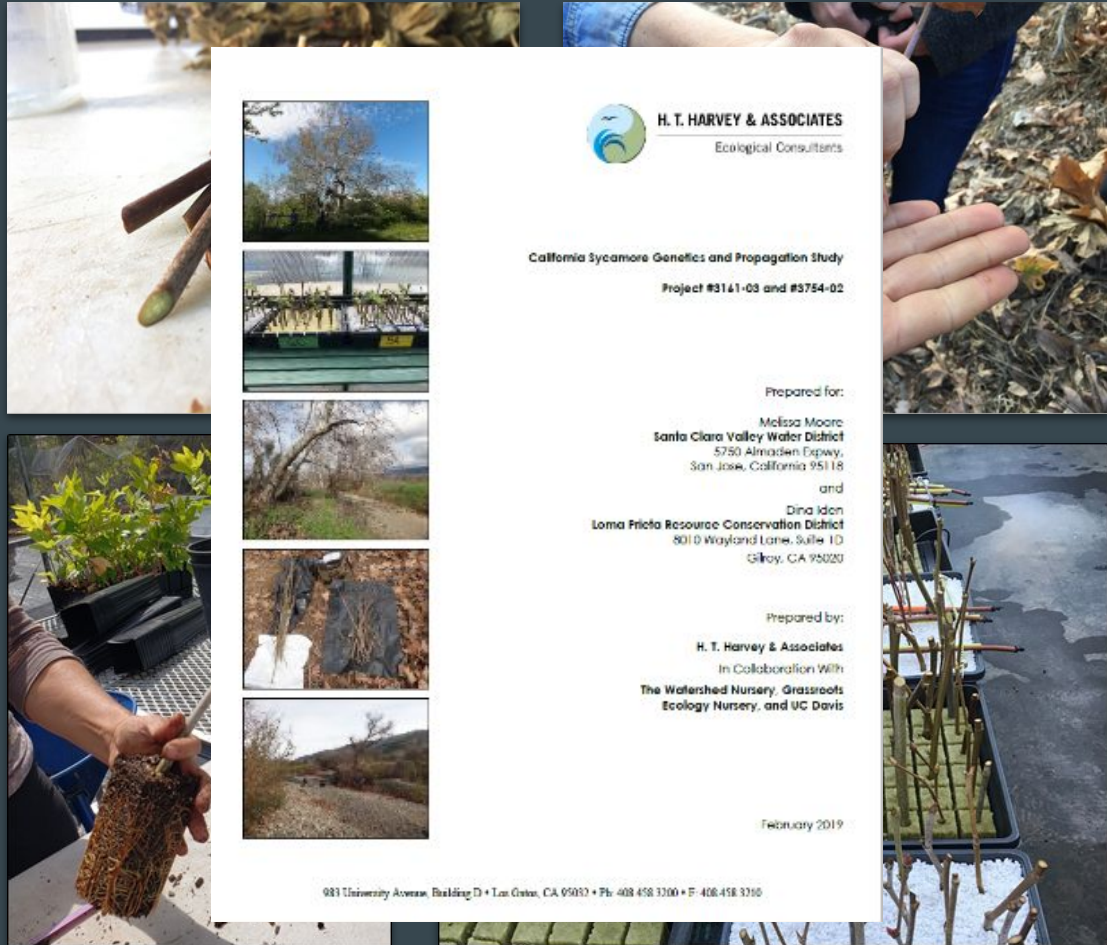
- Timing of collection was extremely important (best when dormant)
- Achieved ~30% success and are continuing to improve



Ongoing Sycamore Research: Propagation studies with The Watershed Nursery and Grassroots Ecology Nursery

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Ongoing Sycamore Research: Pacheco Creek Process and Planting Based Restoration

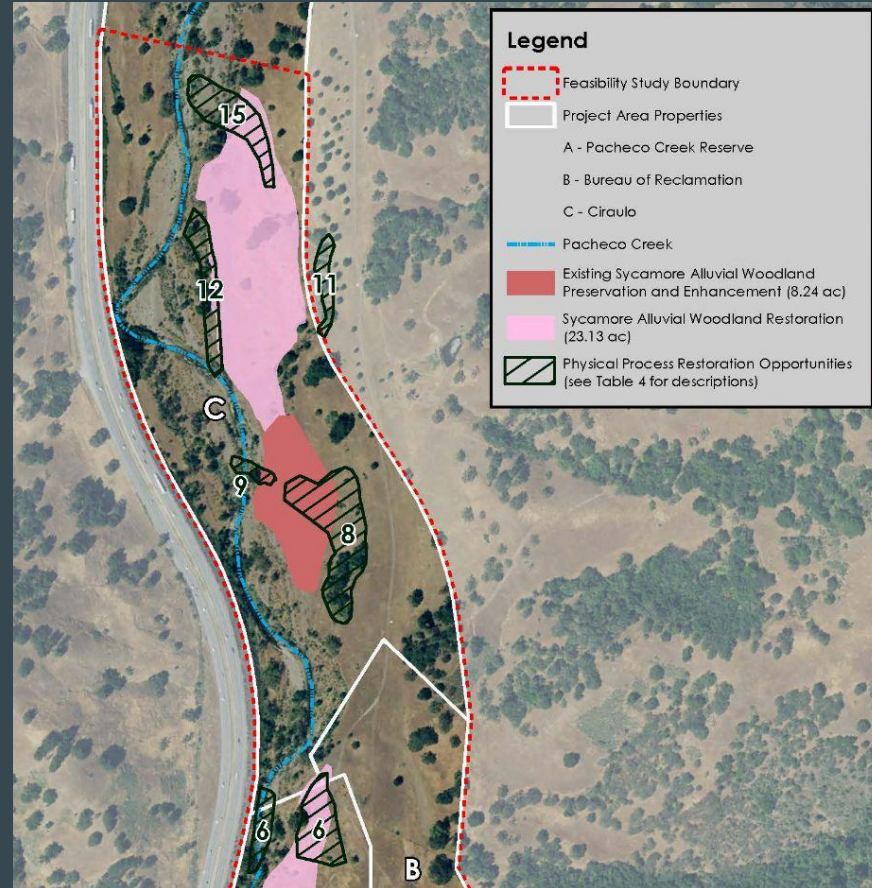
Santa Clara Valley Habitat Agency Project: Pacheco Creek Reserve

Process based restoration:

- increasing floodplain dynamism through more frequent activation of secondary channels
- increasing topographic complexity and scour
- lowering channel inlets
- constructed riffle to raise ground water

Planting based restoration:

- planting California sycamores
- cattle exclusion





NEXT STEPS

Timeline

Task	Completion/Implementation Date
Final Suitability Analysis Report	End of Q1 2022
Pilot Implementation Project Documents	End of Q2 2022
Pilot Project Implementation	Q4 2022 and Q4 2023 (replacement planting)
Pilot Project As-Built, Monitoring and Maintenance	After completion of implementation

Thank you to our funders, land owners, and Living Arroyos, as well as Julie Beagle, Amy Richey, Gloria Desanker, Will Spangler, and Matt Quinn who were crucial to this project!



CONCLUSION

Project website:

<https://www.sfei.org/projects/preparing-storm>

Link to our sycamore studies:

<https://www.sfei.org/projects/saw>

<https://www.harveyecology.com/california-sycamore-publications-and-reports>





Questions?