RESILIENT SILICON VALLEY

Increasing Landscape Resilience through Interdisciplinary Science and Multi-Sector Collaboration

Bay-Delta Science Conference

11/17/16

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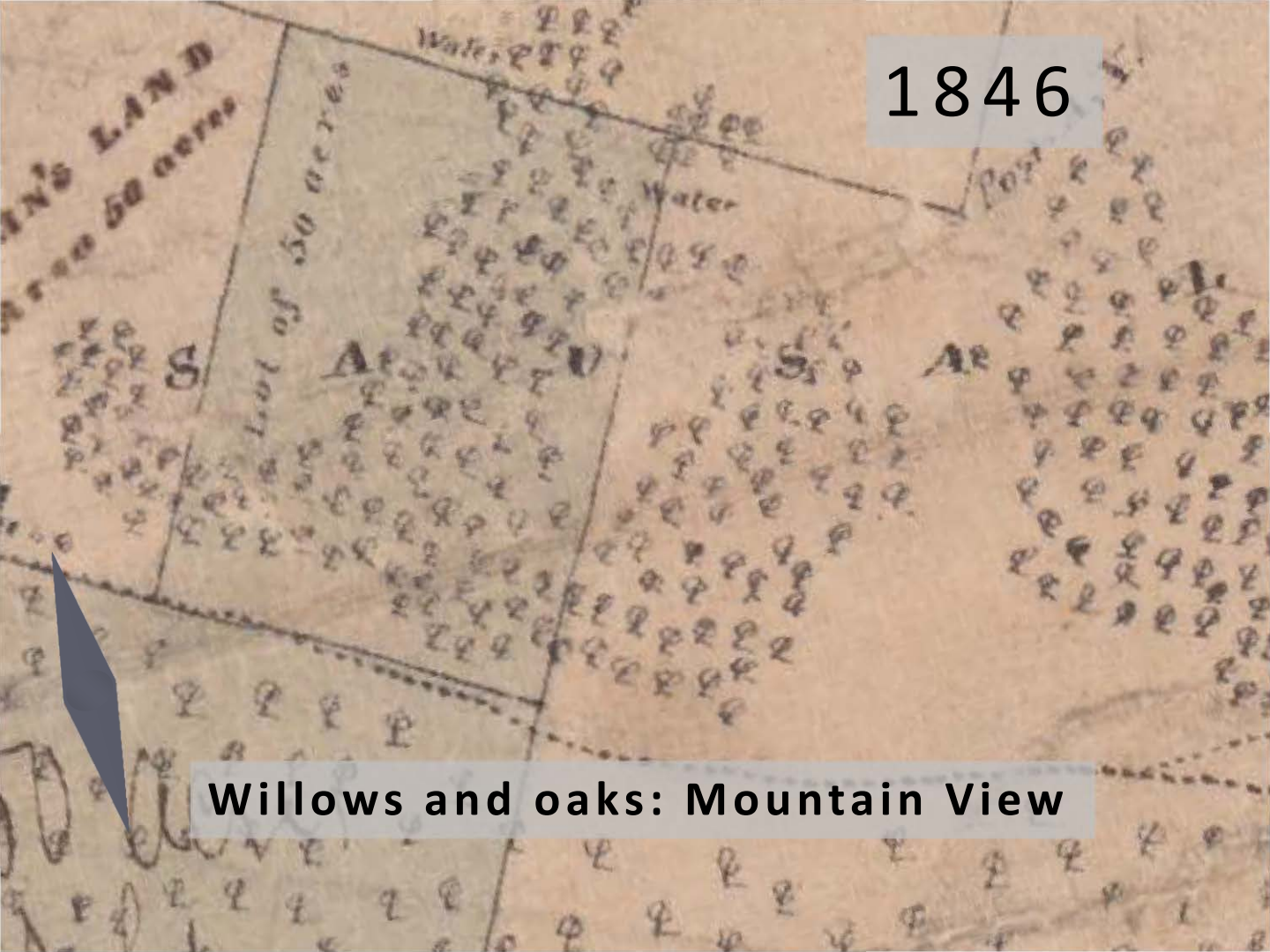
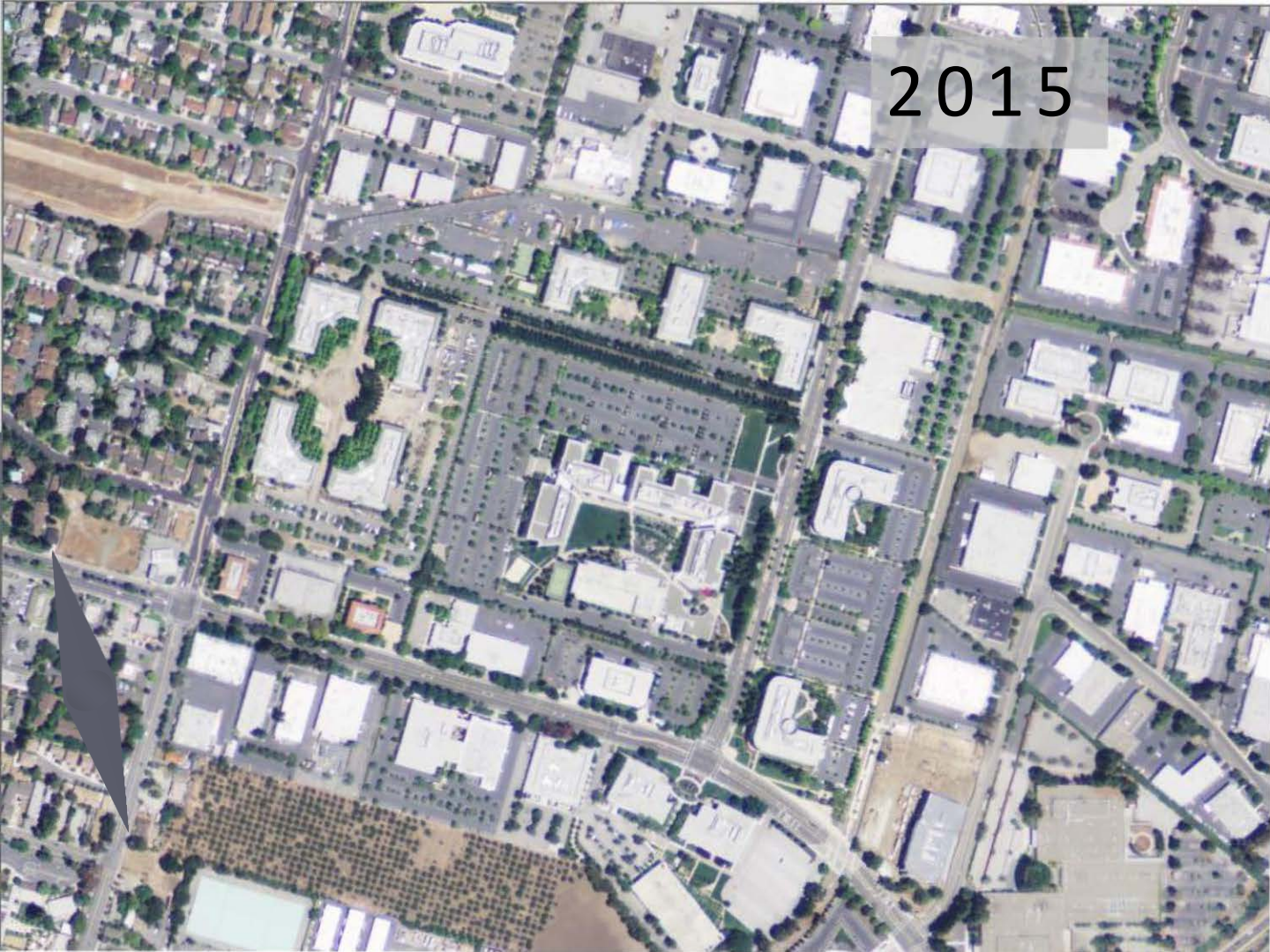
1939
orchards: San Jose

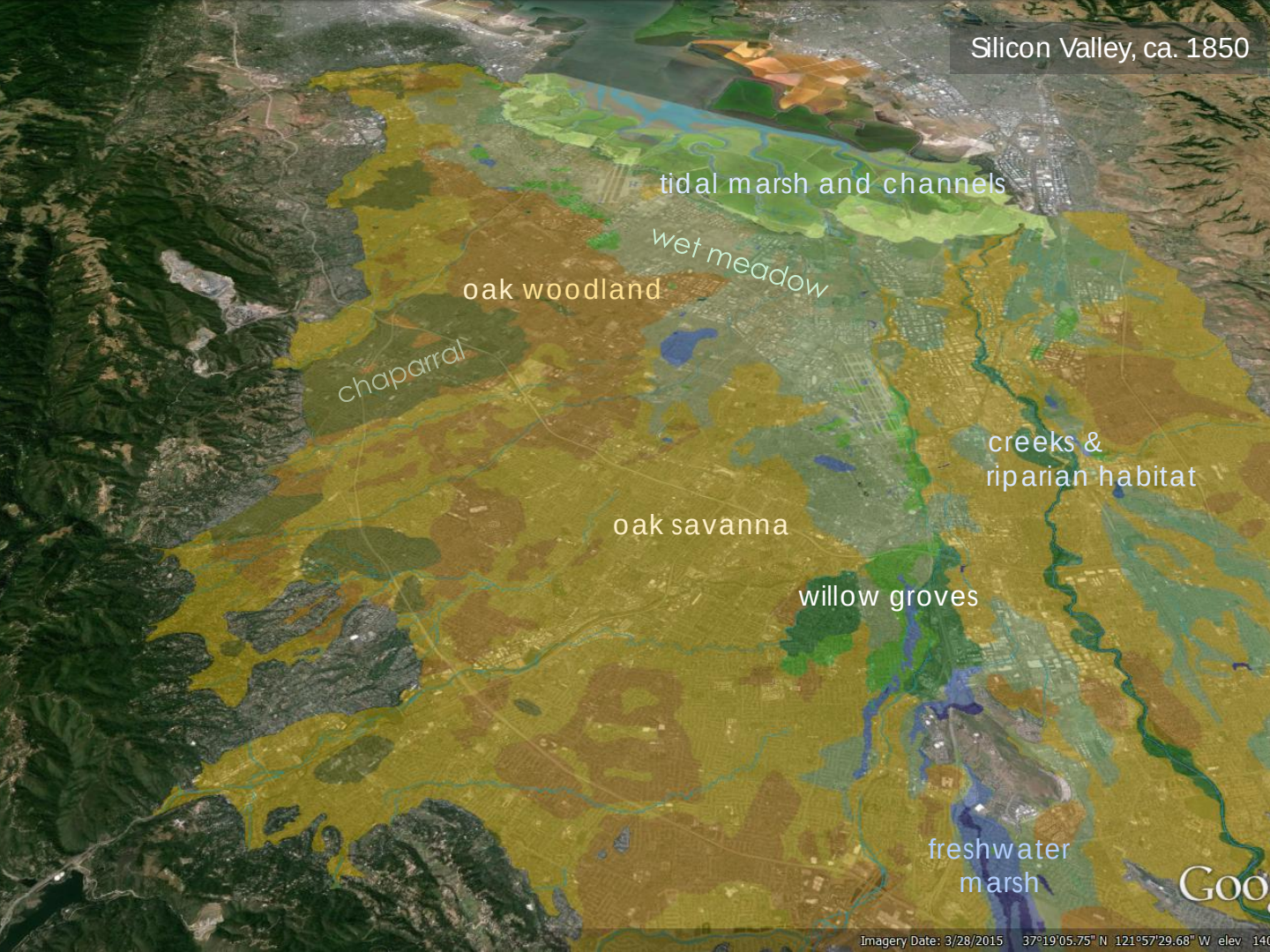

2005

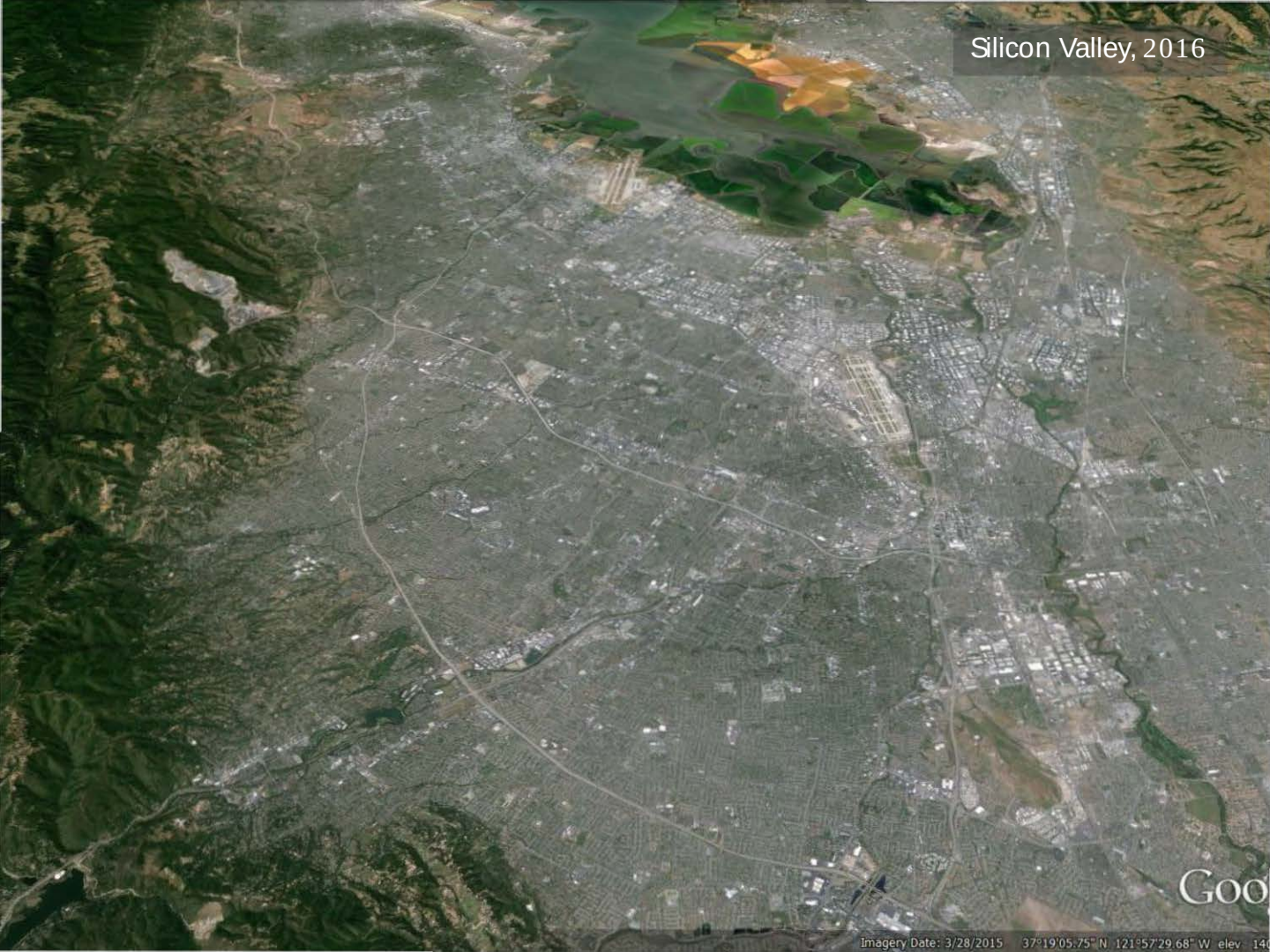

1846
Willows and oaks: Mountain View


2015


1904
Oak savanna: Palo Alto
1904 (Palo Alto Hist. Soc.)


2016
1904 (Palo Alto Hist. Soc.)
Smith and Elliott 1878


Silicon Valley, ca. 1850
tidal marsh and channels
wet meadow
oak woodland
chaparral
creeks &
riparian habitat
oak savanna
willow groves
freshwater
marsh
Goo
Imagery Date: 3/28/2015 37°19'05.75" N 121°57'29.68" W elev 140


Silicon Valley, 2016
Goo
Imagery Date: 3/28/2015 37°19'05.75" N 121°57'29.68" W elev 140


Silicon Valley, 2016
Current challenges call for re-integrating natural processes
• ecological function and resilience
->steelhead, SAW, oak savanna, marshes, riparian birds…
• shoreline adaptation
• sediment management
• groundwater recharge
• drought tolerant urban forest
• low water use landscaping
Goo
Imagery Date: 3/28/2015 37°19'05.75" N 121°57'29.68" W elev 140

1. We can make our landscapes more resilient.
   (Design amplifies or dampen climate change impacts)
2. Integrated approaches are the great challenge but also the best hope.
   (very complex: sediment, flood, water, stormwater, land-use)
3. A systematic framework can help.
   (but we need strong links to impact decisions)

RESILIENT SILICON VALLEY

- **Project of SFEI**
- **Steering Committee: SCVWD, SCVOSA, Google**
- **Build science-based tools to guide investments in SCV ecosystem health and resilience**
- **Initial funding Google; next phase EPA, POST, others**

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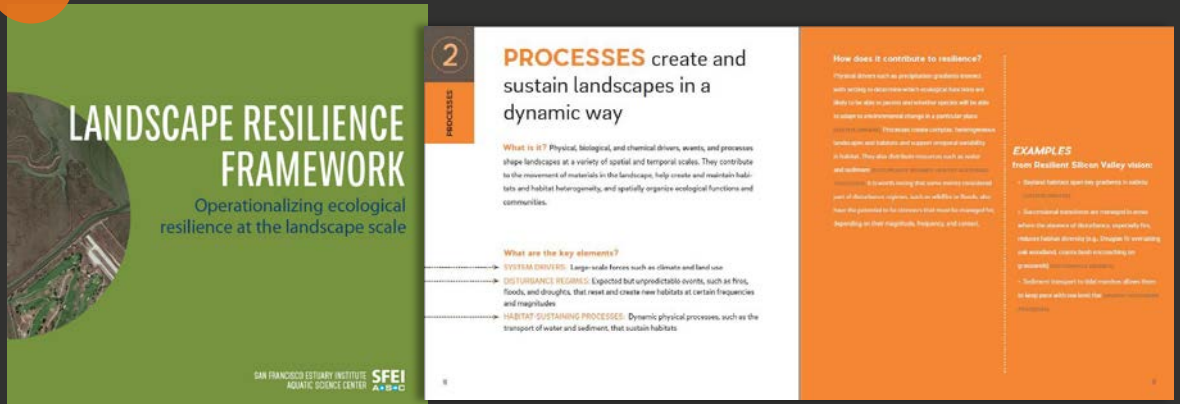
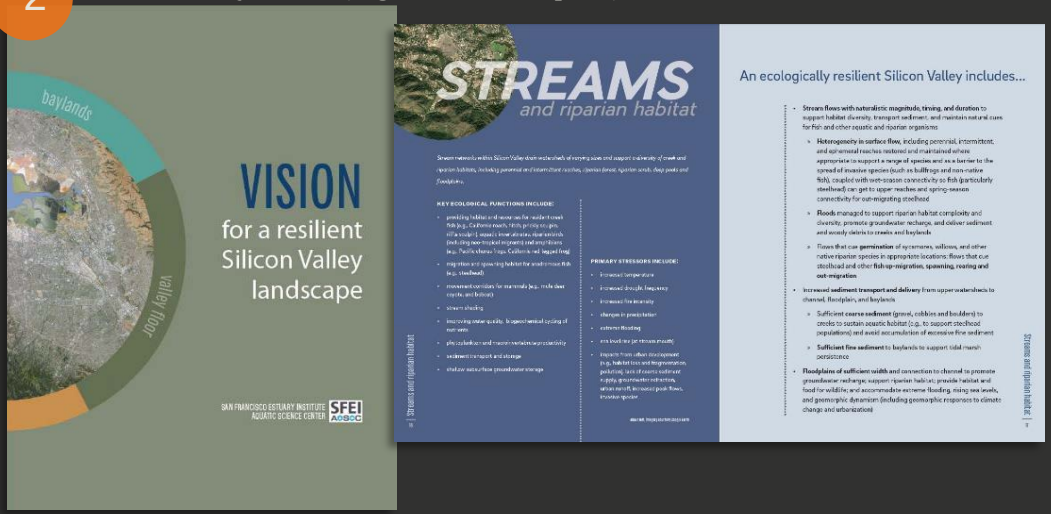
1 Landscape Resilience Framework



2 Silicon Valley vision (regional + local pilot)



LANDSCAPE RESILIENCE FRAMEWORK

Operationalizing ecological resilience at the landscape scale

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1
SETTING
Unique geophysical, biological, and cultural aspects of a landscape that determine potential constraints and opportunities for resilience
2
PROCESS
Physical, biological, and chemical drivers, events, and processes that create and sustain landscapes over time
3
CONNECTIVITY
Linkages between habitats, processes, and populations that enable movement of materials and organisms
4
DIVERSITY & COMPLEXITY
Richness in the variety, distribution, and spatial configuration of landscape features that provide a range of options for species
5
REDUNDANCY
Multiple similar or overlapping elements or functions within a landscape that promote diversity and provide insurance against loss
6
SCALE
The spatial extent and time frame at which landscapes operate that allows species, processes, and functions to persist
7
PEOPLE
The individuals, communities, and institutions that shape and steward landscapes

VISION

for a resilient Silicon Valley landscape

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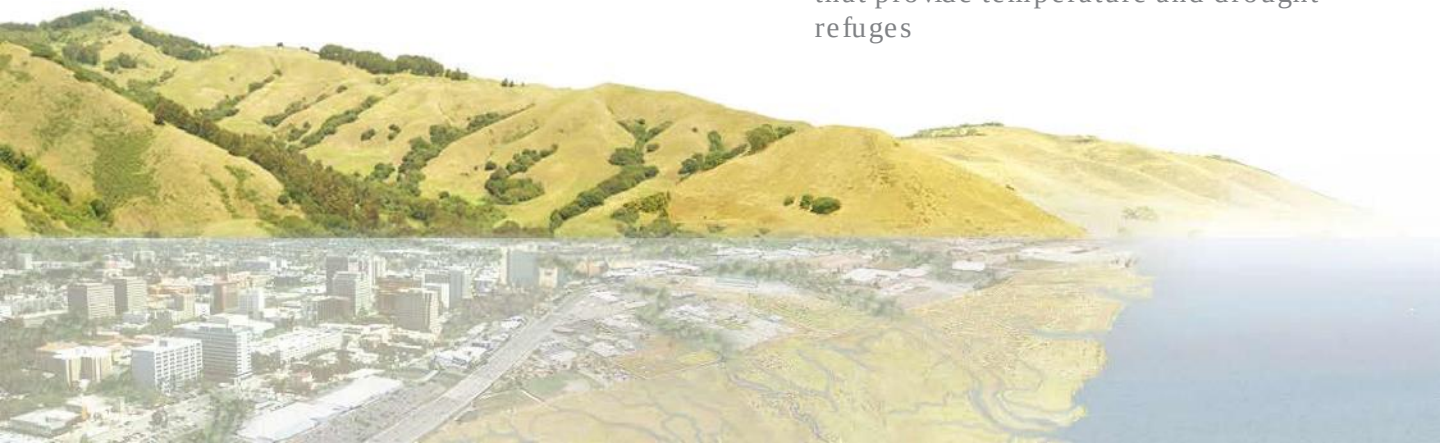
Hills

An ecologically resilient Silicon Valley includes…

Redundancy, Scale	• **Multiple large areas** of protected open space
Connectivity	• **Connectivity between ranges** for large mammal movement
Connectivity, Scale	• **Connectivity up and down ranges** for habitat shifts
Setting, Scale	• **Drought-tolerant vegetation** that could serve as future seed sources
Setting, Complexity/Diversity	• **Microtopography and microclimates** that provide temperature and drought refuges



Valley

An ecologically resilient Silicon Valley includes…

Setting, Process, Complexity/Diversity	• A diversity of **wetland habitats** where supported by appropriate soils, topography, and groundwater levels
Setting, Scale, People	• **Native landscaping** that includes species likely to tolerate heat and drought stresses
People	• **Buffers** between wildlands and developed areas
Connectivity, Scale, People	• **Coordinated planting efforts** across parks, backyards, greenways, medians, office parks, etc. to provide habitat and permeability

Baylands

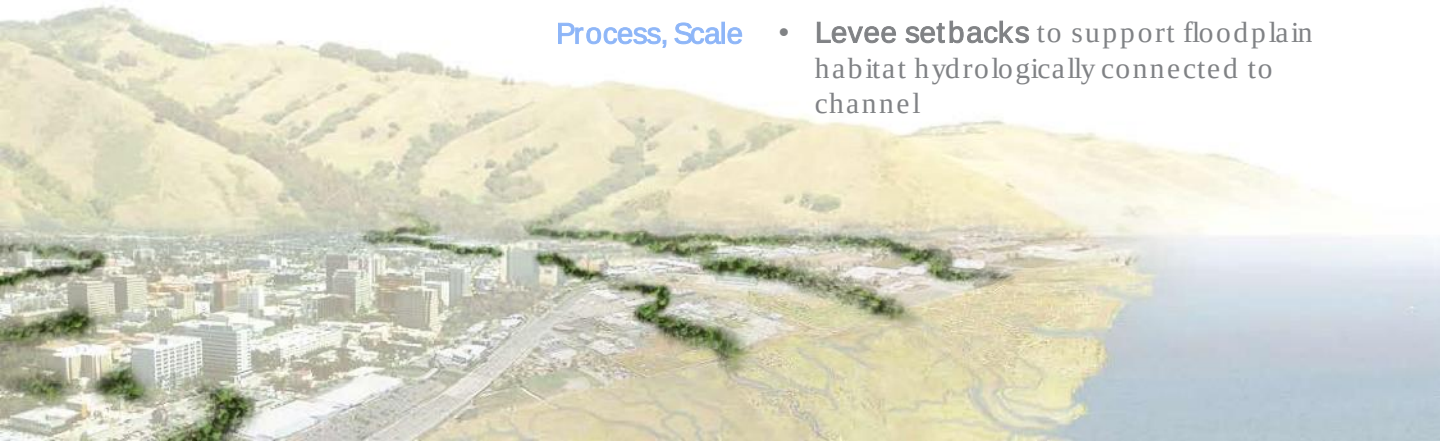
An ecologically resilient Silicon Valley includes…

Connectivity	• **Connectivity between bayland and upland habitats** for wildlife movement around Bay perimeter
Process, Scale	• **Sufficient sediment** from local watersheds to support tidal marsh persistence
Complexity/Diversity	• **Channel and marsh plain complexity** to support diverse species

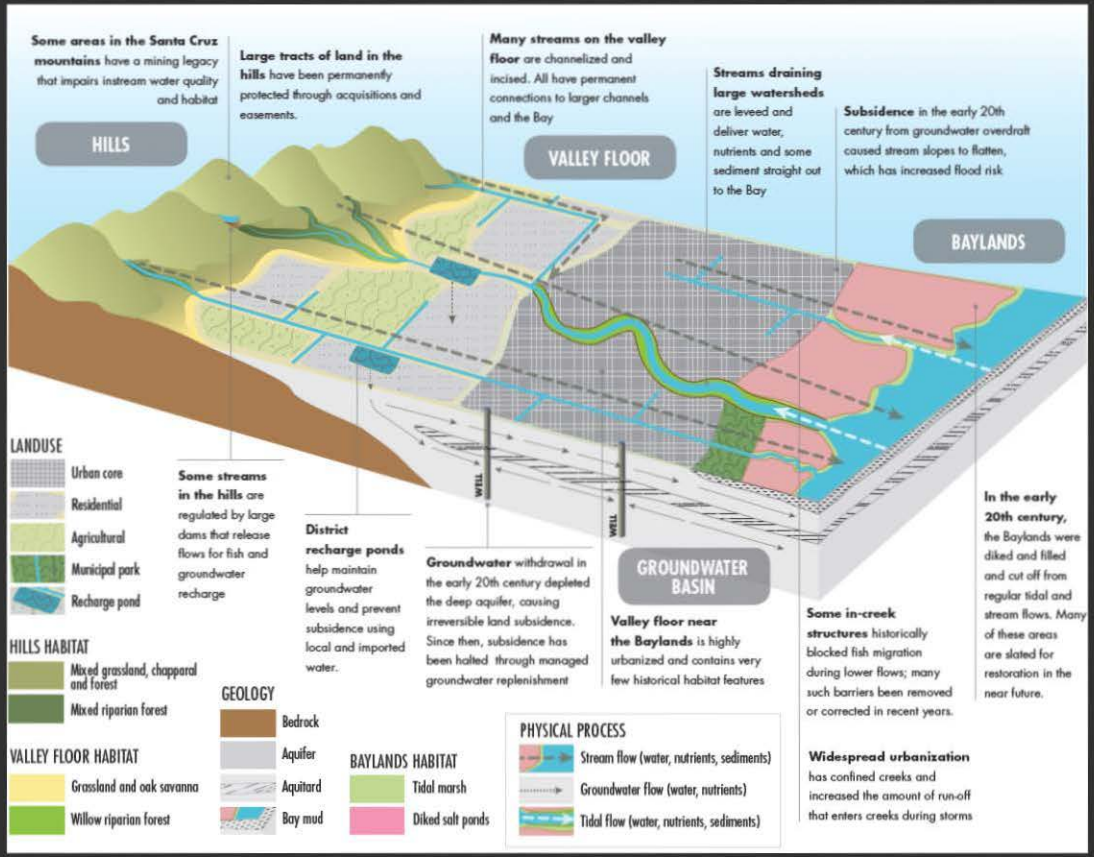
Streams

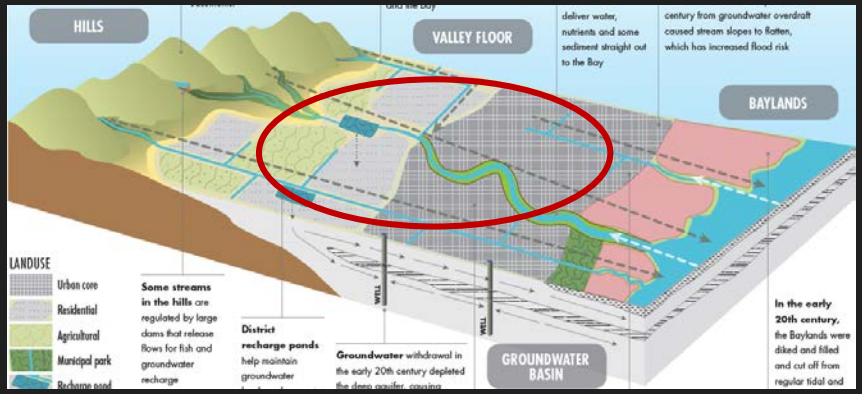
An ecologically resilient Silicon Valley includes…

Connectivity, Complexity/Diversity	• **Surface flow heterogeneity** to support a range of species and as a barrier to spread of invasives
Process	• **Flows** that cue the germination of native trees and steelhead migration, spawning, and rearing
Process	• **Sediment delivery** from upper watersheds to channel, floodplain, and baylands
Connectivity	• **Continuous riparian corridors** for wildlife movement from hills to bay
Process, Scale	• **Levee setbacks** to support floodplain habitat hydrologically connected to channel

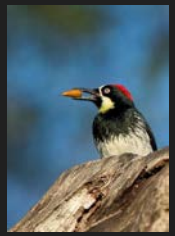


Resilience Strategies

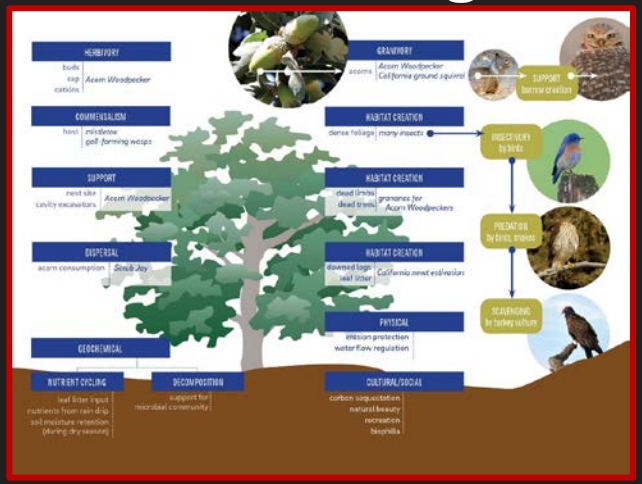


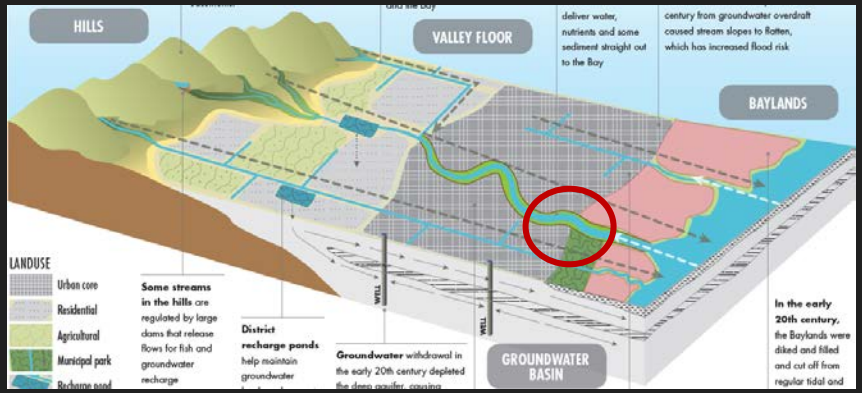


- Canopy
- Google



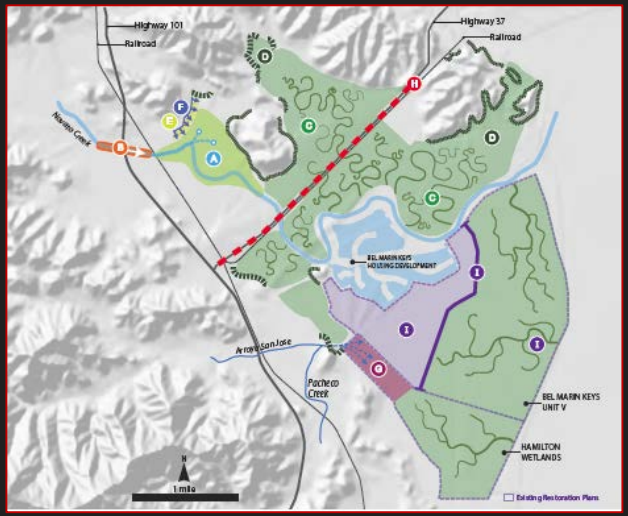
Re-Oaking

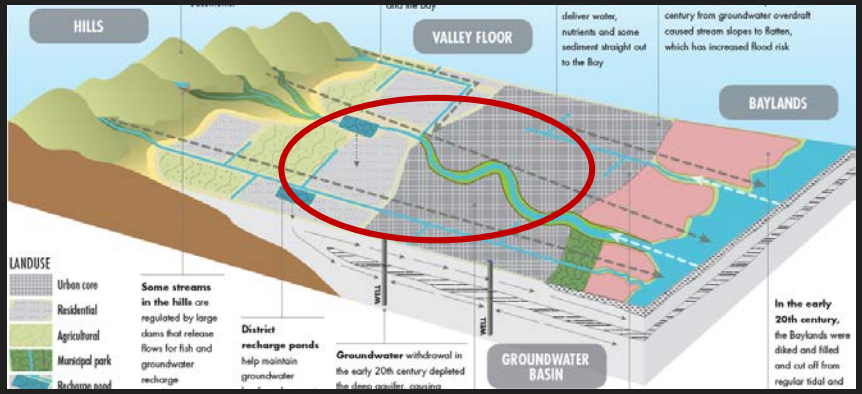




Flood Control 2.0

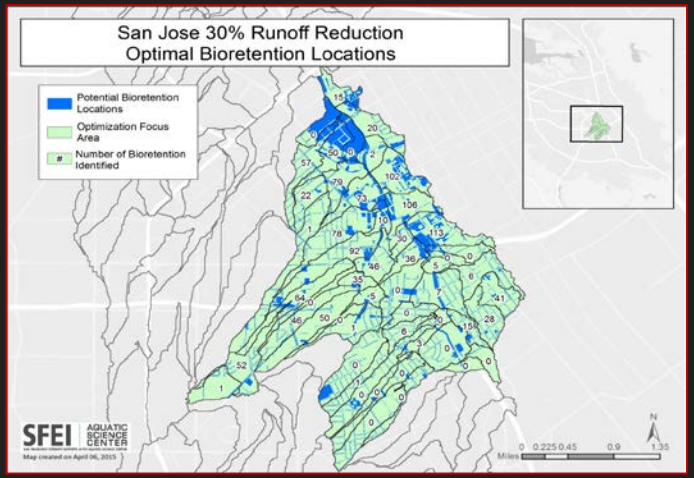
- SCVWD





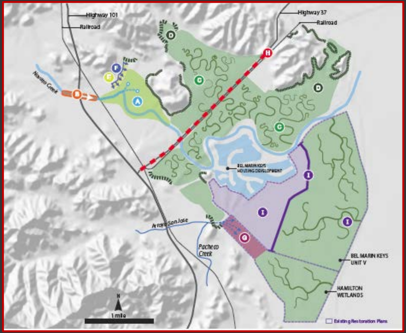
GreenPlan-IT

- City of San Jose
- City of Sunnyvale
- SCVWD

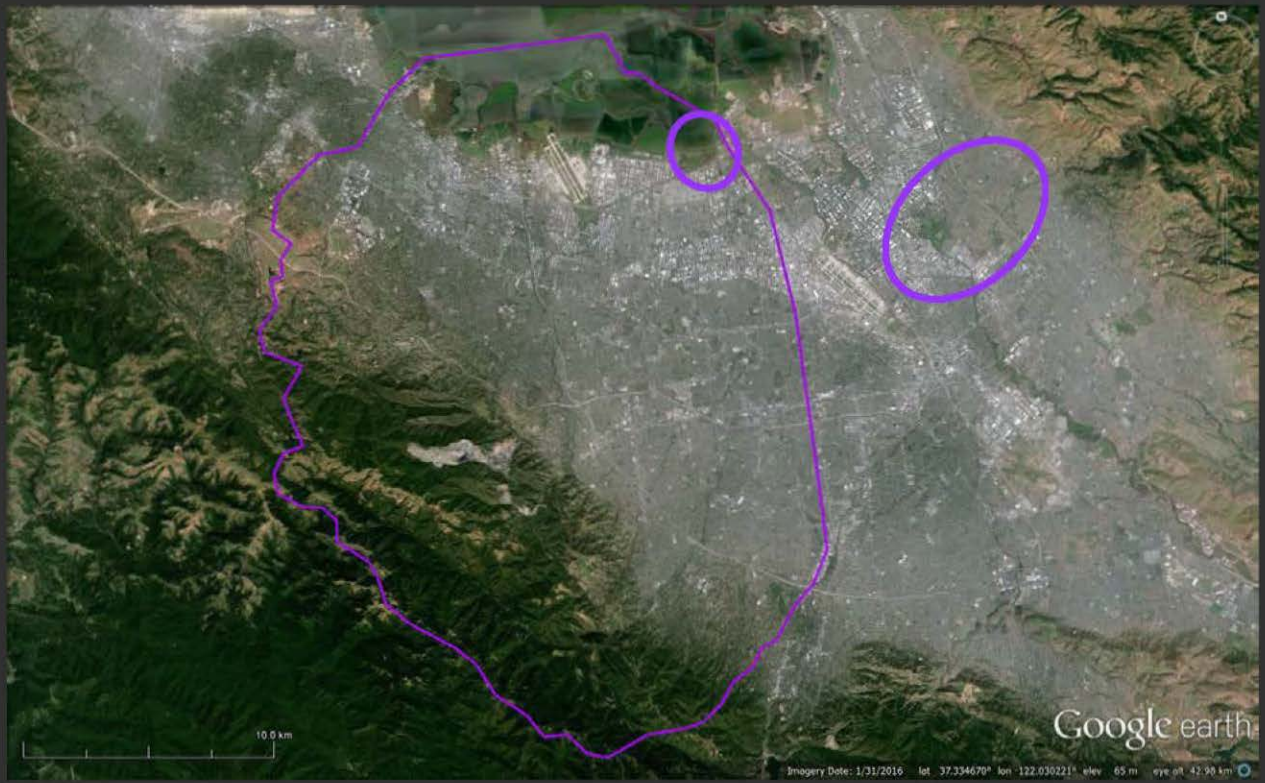


Integrated Visions for Future Landscapes

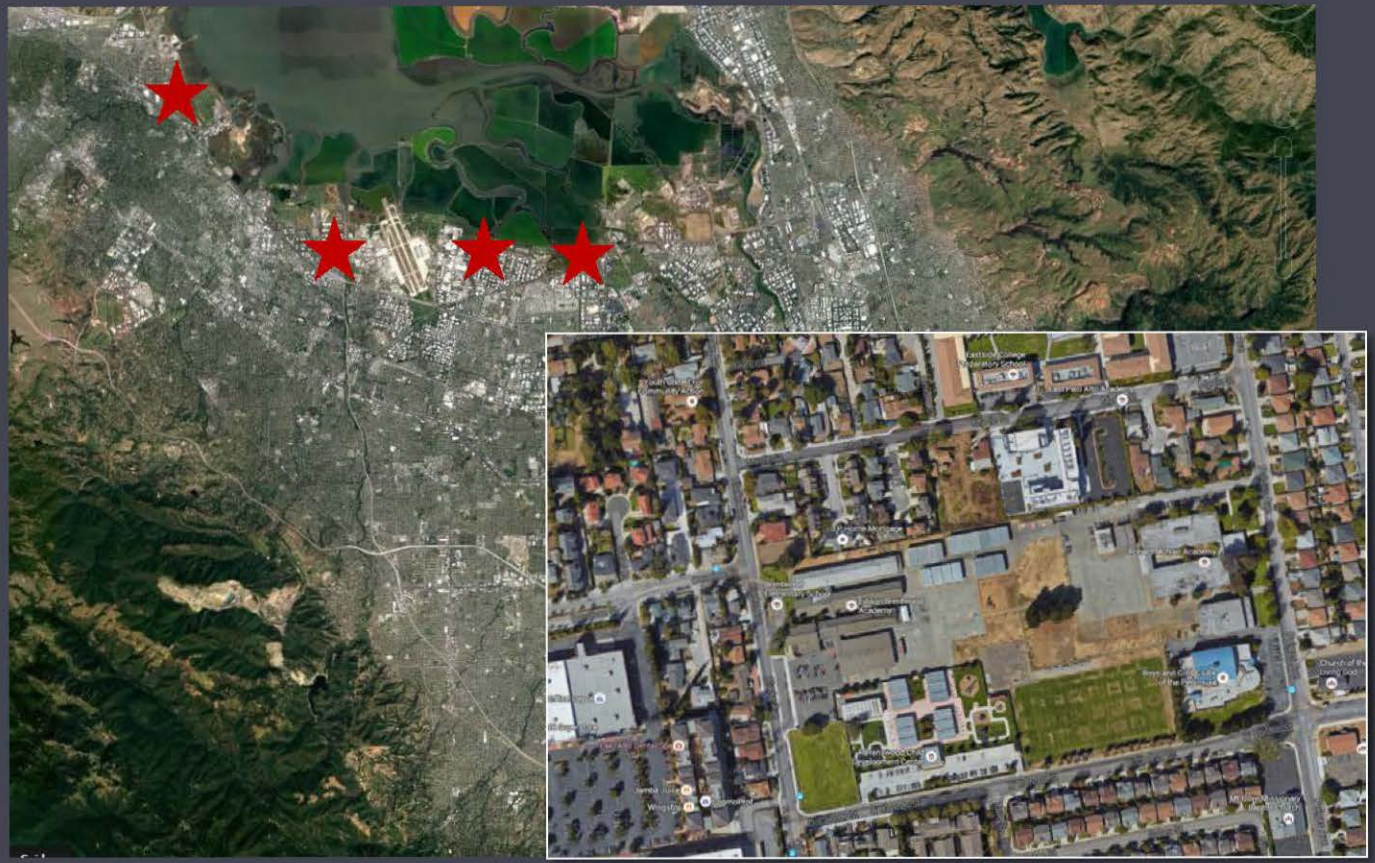
- Multi-benefit, integrated solutions
  – Ecological health
  – Flood protection
  – Temperature modulation and carbon storage
  – Water quality and sustainability
  – Human Health and well-being
- Large-scale; multiple projects
- Long-time frame
- Resilient



Local Visions (varying scales)



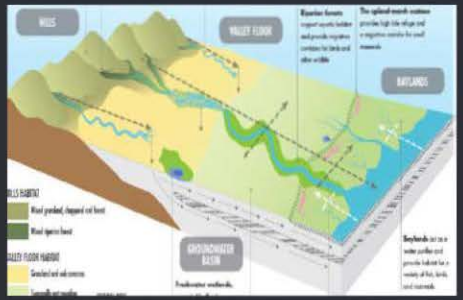
Demonstration Projects



Next Steps

- Translating with partners into Visions and Plans
- Local demo projects
- More integration and collaborations –RSV
- Encouragement/facilitation for staff to integrate

How do we create the healthy, resilient Silicon Valley of the future?



California Native Plant Society, SCV Chapter
Canopy
City of East Palo Alto
City of Sunnyvale
Committee for Green Foothills
Environmental Protection Agency
Grassroots Ecology
Peninsula Open Space Trust
San Francisco Estuary Partnership
San Francisco Public Utilities Commission
Santa Clara Valley Audubon Society
SF Bay Regional Water Quality Control Board
Sierra Club, Loma Prieta Chapter
South Bay Salt Pond Restoration Project
State Coastal Conservancy

THANK YOU

Audrey Davenport, Google Ecology Program

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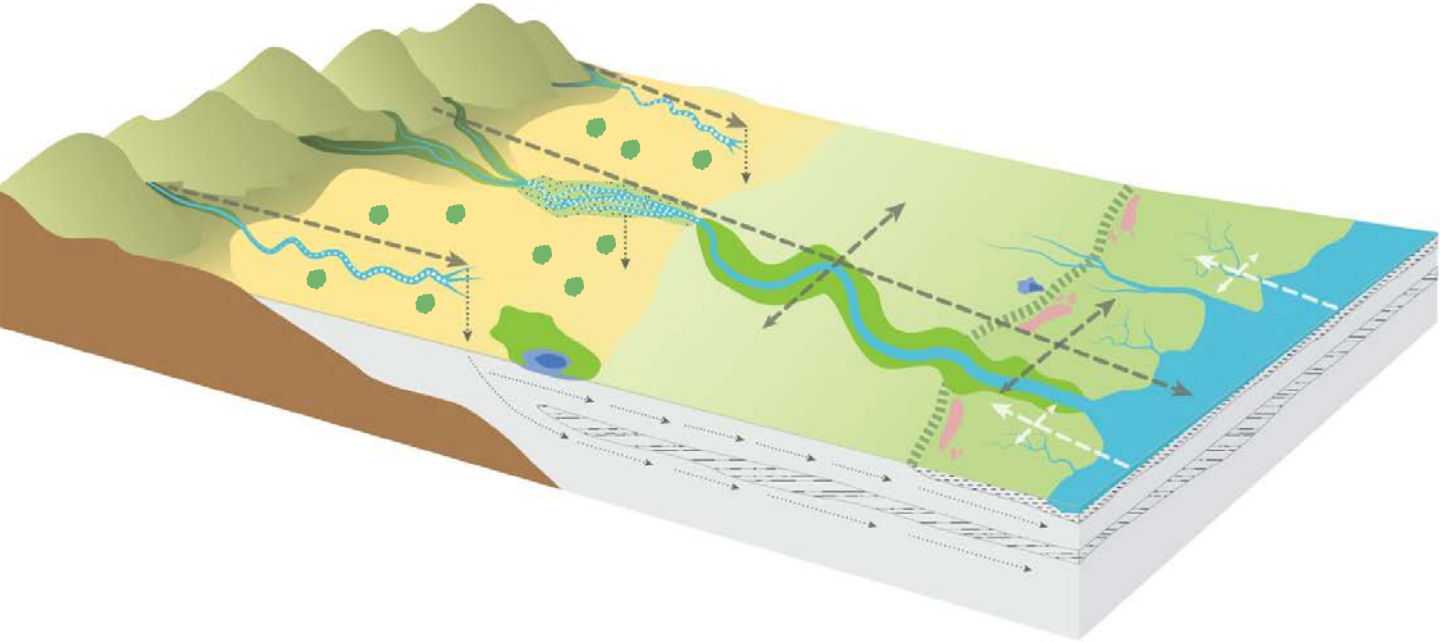
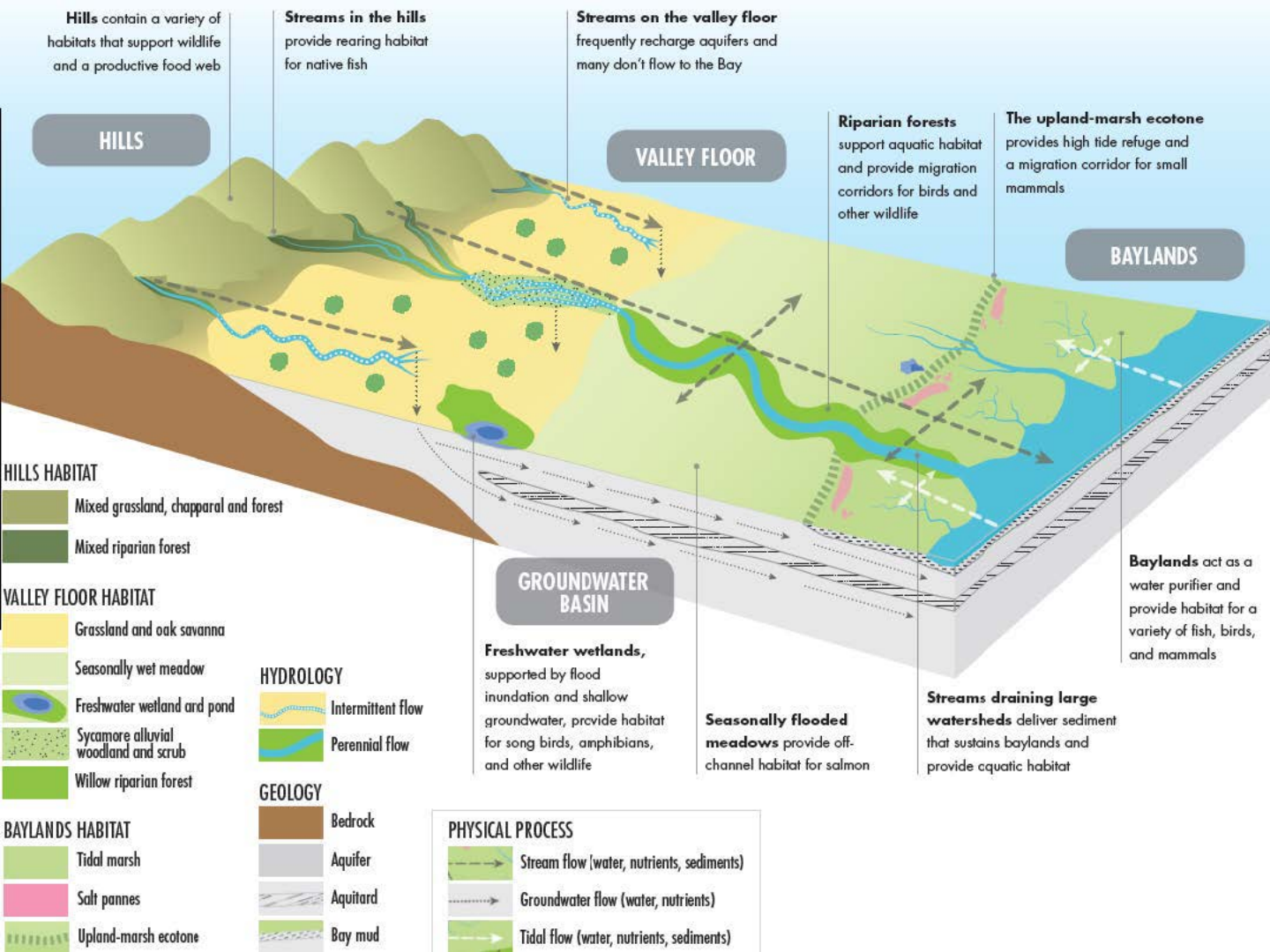
One Water – Watershed Conceptual Model (courtesy SCVWD)



Historical Landscape
(1850s)


Hills contain a variey of habitats that support wildlife and a productive food web
Streams in the hills provide rearing habitat for native fish
Streams on the valley floor frequently recharge aquifers and many don't flow to the Bay
HILLS
VALLEY FLOOR
Riparian forests support aquatic habitat and provide migration corridors for birds and other wildlife
The upland-marsh ecotone provides high tide refuge and a migration corridor for small mammals
BAYLANDS
HILLS HABITAT
Mixed grassland, chapparal and forest
Mixed riparian forest
VALLEY FLOOR HABITAT
Grassland and oak savanna
Seasonally wet meadow
Freshwater wetland and pond
Sycamore alluvial woodland and scrub
Willow riparian forest
BAYLANDS HABITAT
Tidal marsh
Salt pannes
Upland-marsh ecotone
HYDROLOGY
Intermittent flow
Perennial flow
GEOLOGY
Bedrock
Aquifer
Aquitard
Bay mud
GROUNDWATER BASIN
Freshwater wetlands, supported by flood inundation and shallow groundwater, provide habitat for song birds, amphibians, and other wildlife
Seasonally flooded meadows provide off-channel habitat for salmon
Streams draining large watersheds deliver sediment that sustains baylands and provide equatic habitat
Baylands act as a water purifier and provide habitat for a variety of fish, birds, and mammals
PHYSICAL PROCESS
Stream flow (water, nutrients, sediments)
Groundwater flow (water, nutrients)
Tidal flow (water, nutrients, sediments)