



WHERE: Understanding your oak woodlands and planning restoration projects

Tom Scott

Department of Environmental Science, Policy, and Management, University of California, Berkeley and Department of Earth Sciences, University of California Riverside

Before you start: What can you do to maximize the return on your efforts?

Give some thought to

Climate and weather

How oaks grow and die

Get to know your oaks

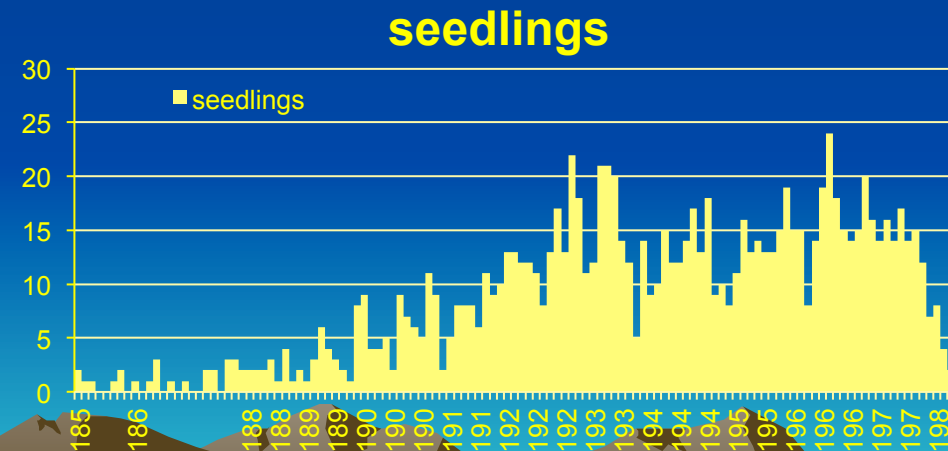
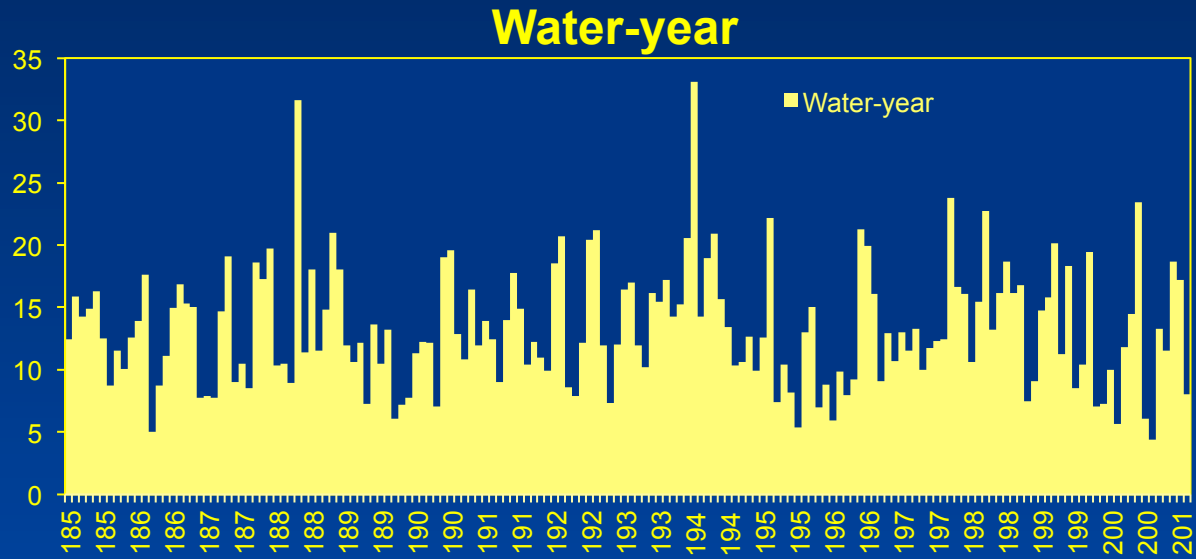
Woodland type, location, tree density

Oak species, ages, size classes

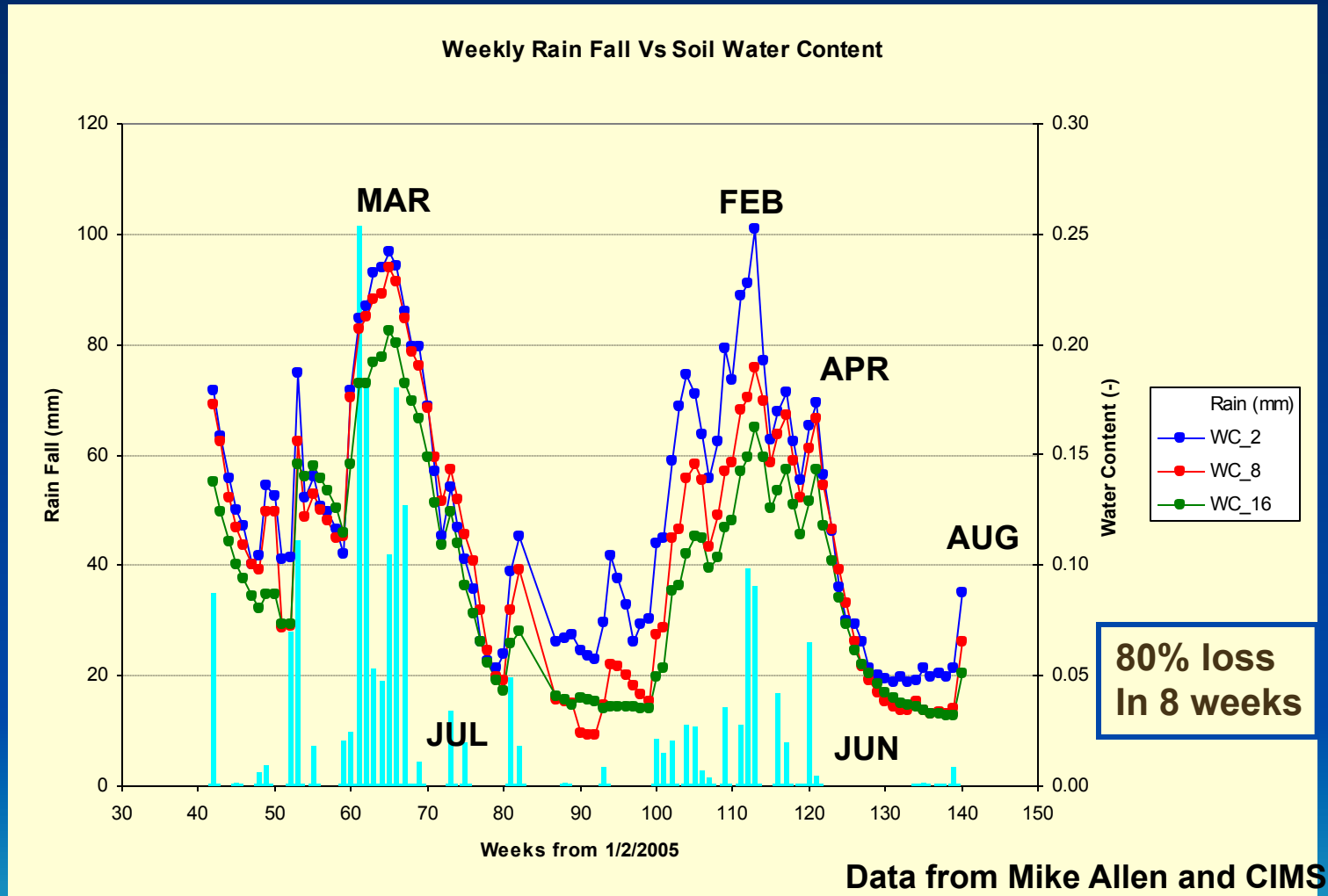
Choose the right level of action



CLIMATE: Oaks tend to get started during El niños

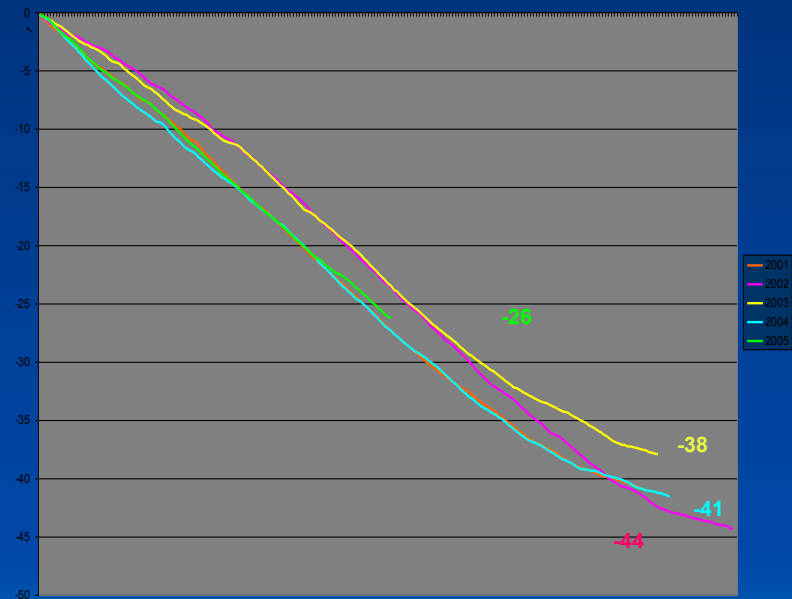
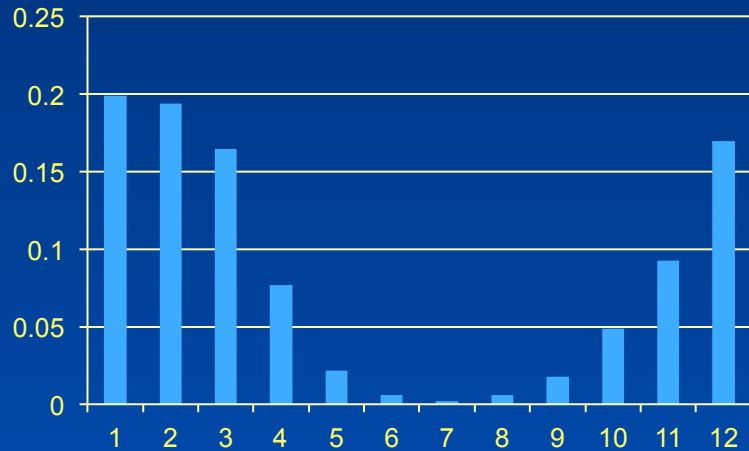


Precipitation and water available for oak roots

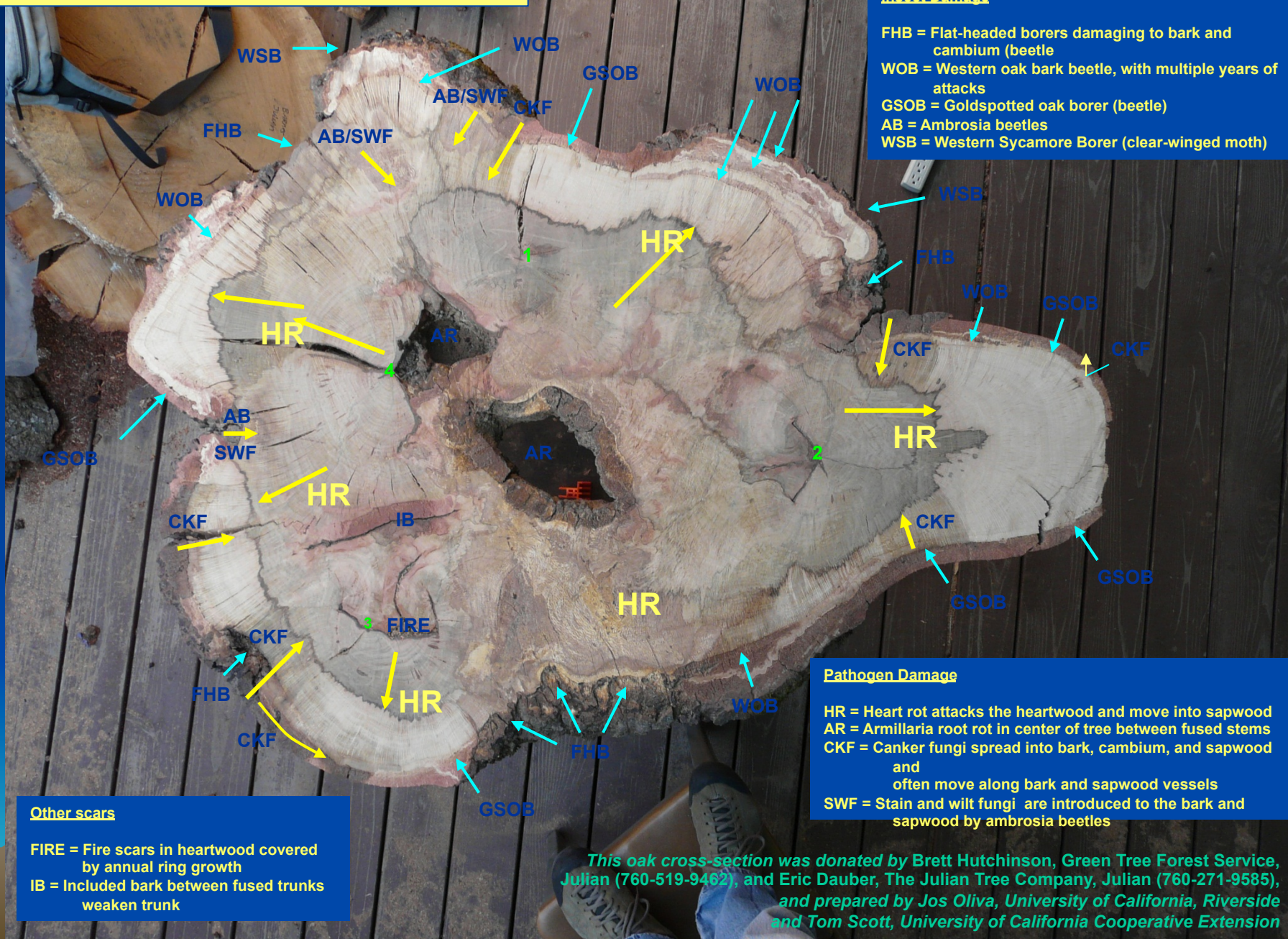


Evapotranspiration (ET) depicted as cumulative water-loss in summer droughts.

SAN DIEGO



How does an oak age and die?



Insect Damage

- FHB = Flat-headed borers damaging to bark and cambium (beetle)
- WOB = Western oak bark beetle, with multiple years of attacks
- GSOB = Goldspotted oak borer (beetle)
- AB = Ambrosia beetles
- WSB = Western Sycamore Borer (clear-winged moth)

Pathogen Damage

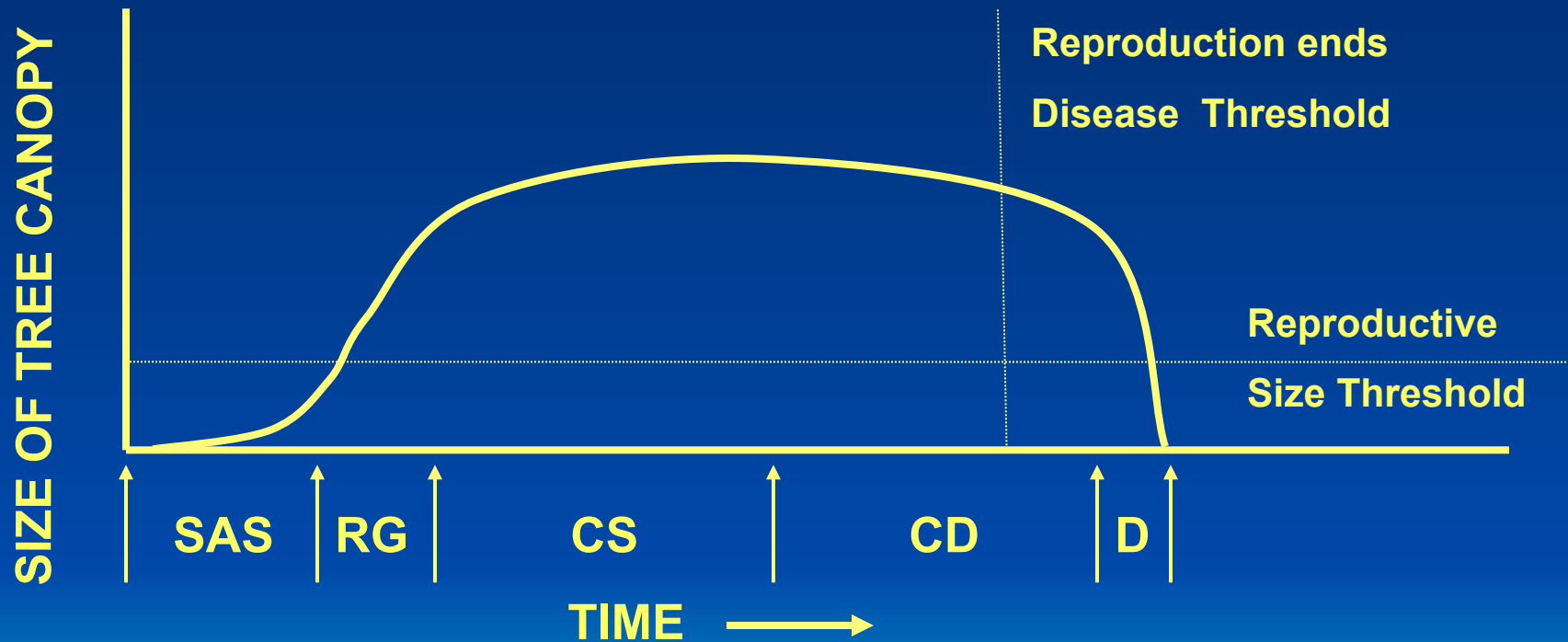
- HR = Heart rot attacks the heartwood and move into sapwood
- AR = Armillaria root rot in center of tree between fused stems
- CKF = Canker fungi spread into bark, cambium, and sapwood and often move along bark and sapwood vessels
- SWF = Stain and wilt fungi are introduced to the bark and sapwood by ambrosia beetles

Other scars

- FIRE = Fire scars in heartwood covered by annual ring growth
- IB = Included bark between fused trunks weaken trunk

This oak cross-section was donated by Brett Hutchinson, Green Tree Forest Service, Julian (760-519-9462), and Eric Dauber, The Julian Tree Company, Julian (760-271-9585), and prepared by Jos Oliva, University of California, Riverside and Tom Scott, University of California Cooperative Extension

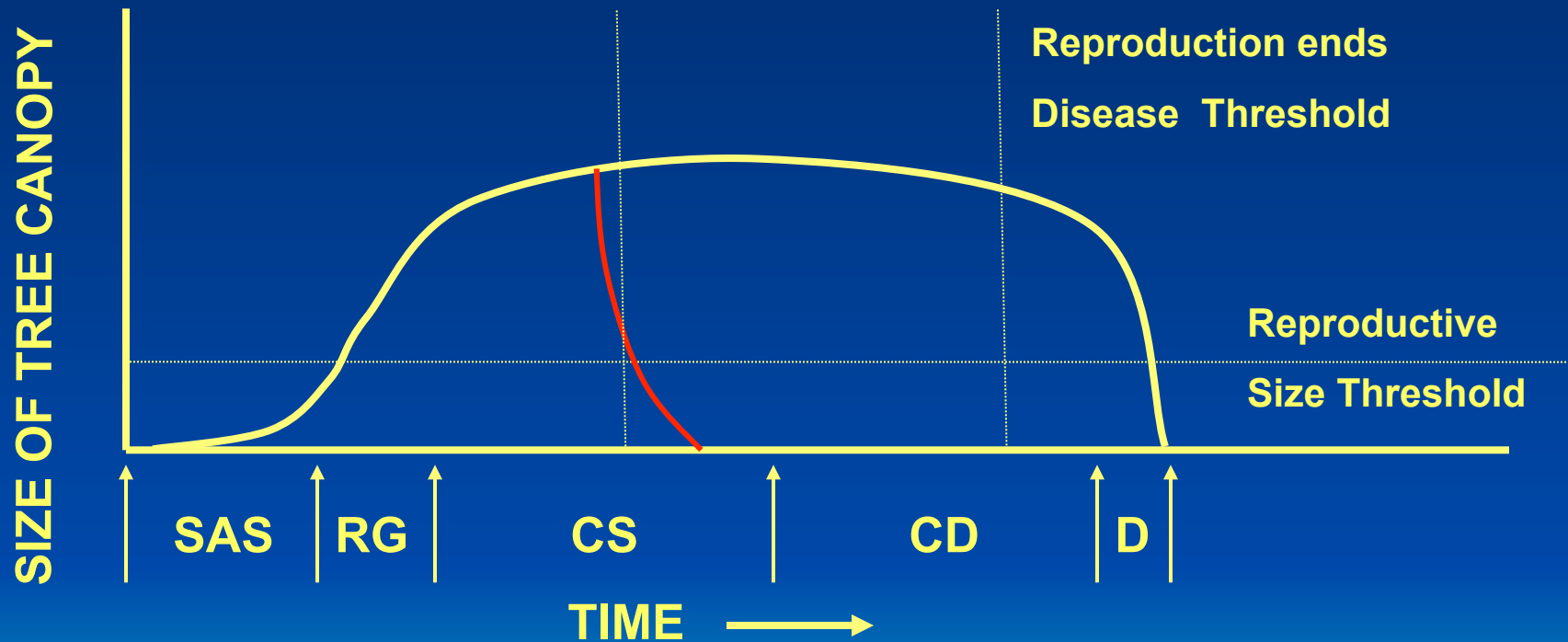
Oak Biomass is plastic, and their population dynamics are easier to model with stage-based, rather than age-based, classes



SAS = Acorn/Seedling stasis
RG = Rapid growth
CS = Canopy Stasis

CD = Canopy decline
D = Death

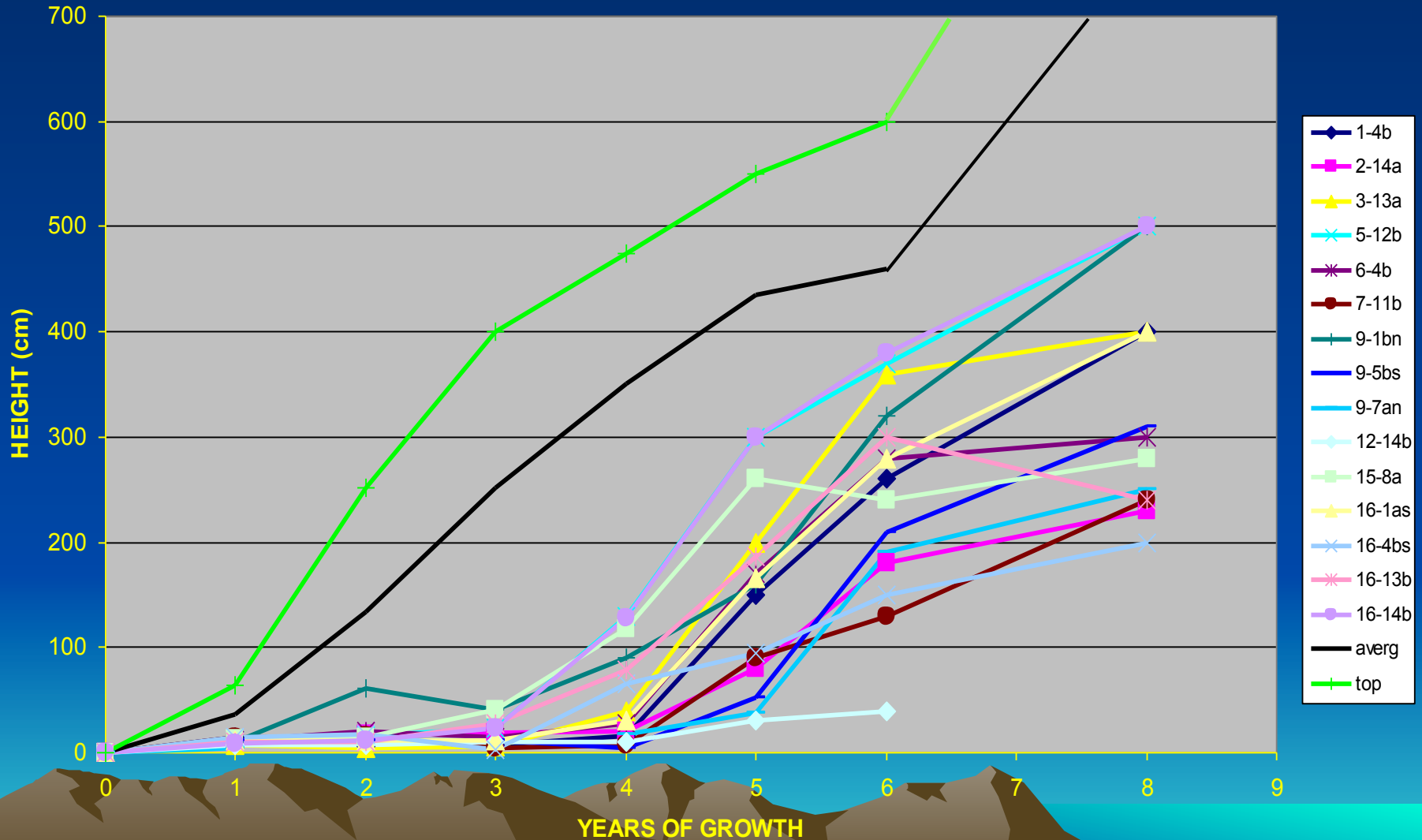
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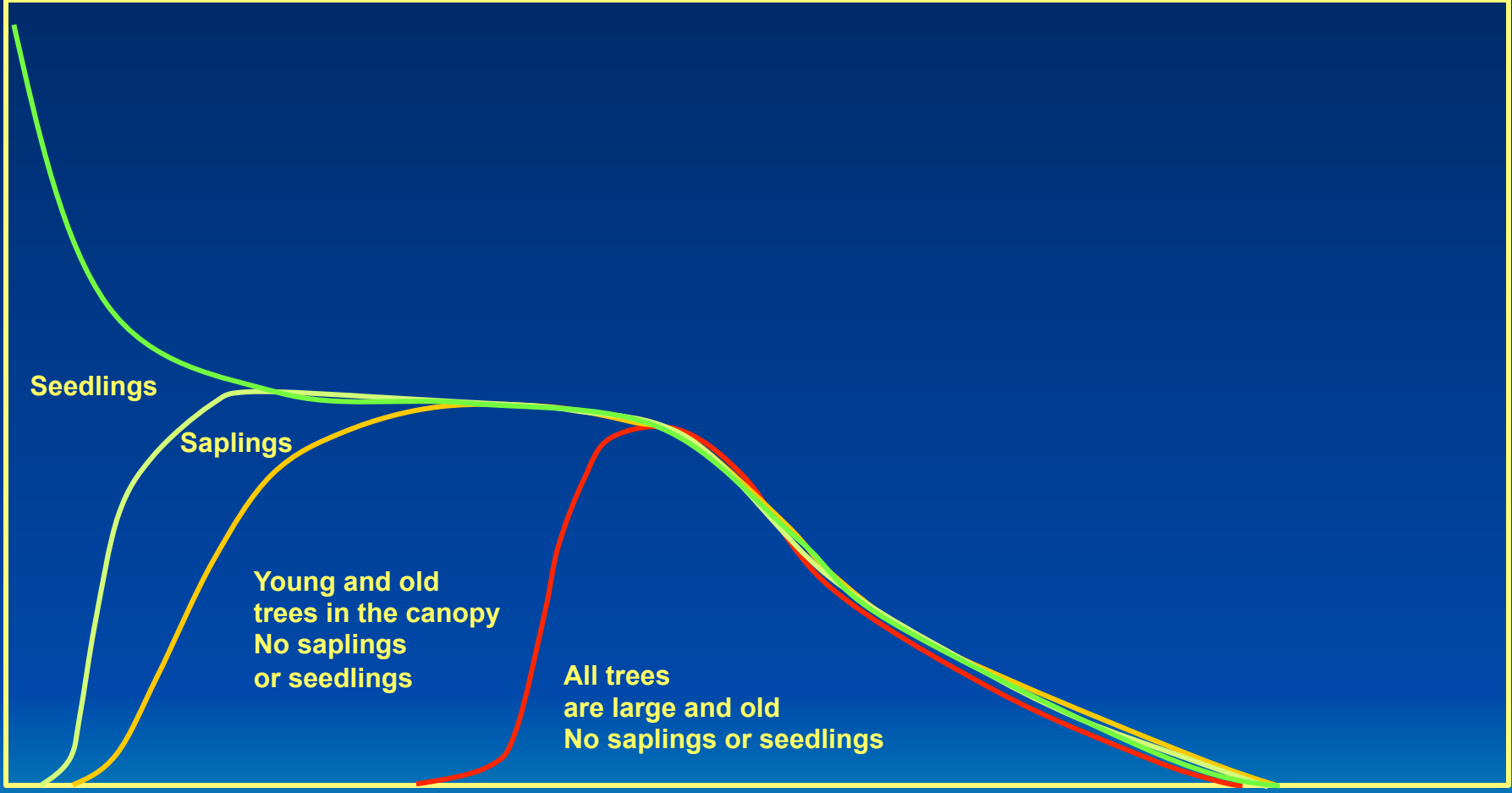
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Stasis in oak seedlings: Rates of growth in slowest growing trees in plots at South Coast Field Station



Frequency distribution in population



Sizes of Trees in you woodland



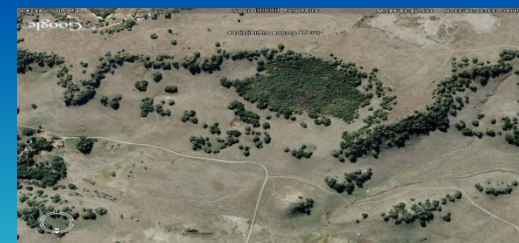
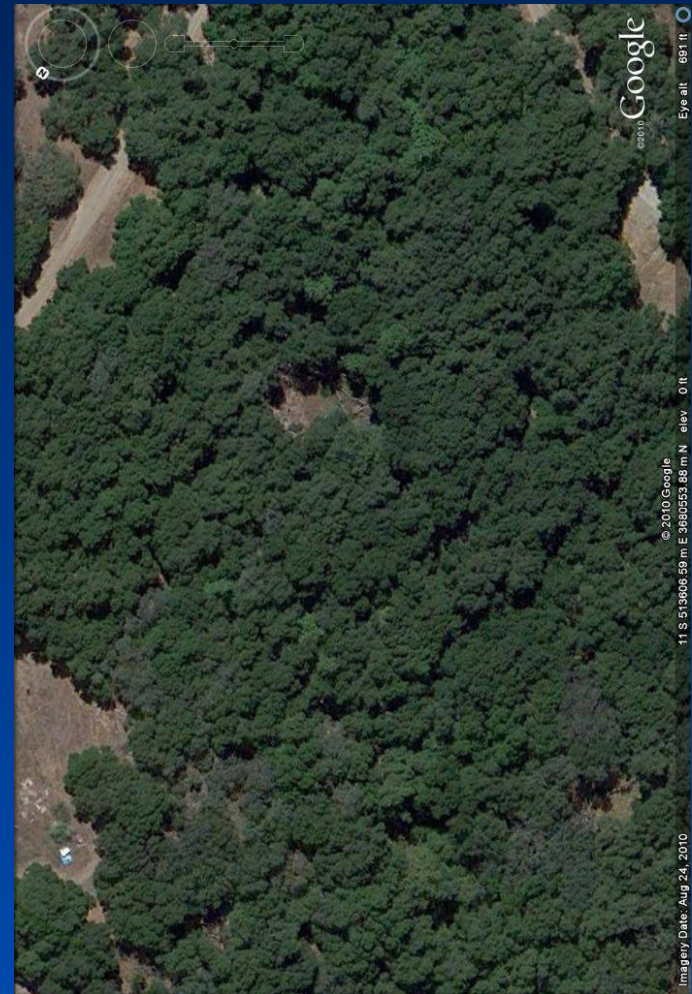
Building Blocks: OAK SPECIES IN SOUTHERN CALIFORNIA

Growth form	RED OAKS (<u>Lobatae</u>)	Golden-cup Oaks (<u>Protobalanus</u>)	WHITE OAKS (<u>Quercus</u>)
Single Stem Trees	Coast Live Oak Black Oak		Engelmann Oak Valley Oak (LA VEN) Blue Oak (VEN)
Multiple Stem Trees	Interior Live Oak Shreve Oak (SBAR)	Canyon Live Oak Island oak	
Shrubs	Pacific oak	Huckleberry Oak	Tucker, Muller, Nuttall, Sadler oak, California, Leather, Shrub Live Oak

Easiest to collect acorns from adjacent trees (within a mile)

	Sea Level to 4500 ft	4500 to 5500 ft	5500 to 6500 ft	Above 6500 ft	Regional constraints
Coast Live Oak	yes	rare	absent	absent	Not in Sierras
Engelmann Oak	yes	rare	absent	absent	Mostly in SD and RIV COs
Black Oak	rare	yes	yes	rare	
Valley Oak	yes	rare	absent	absent	LA and Ventura COs
Canyon Live Oak	rare	yes	yes	yes	
Interior Live	rare	rare	yes	yes	Trees in Sierra - North Coast
Blue Oak	yes	yes	absent	absent	north of VEN CO
Scrub Oak Species	yes	yes	rare	rare	North from Santa BAR CO

EXISTING CONDITIONS: the spatial pattern of your woodland and its location



Oaks occur in an exceptionally broad range of densities



Plan for the appropriate level of intervention

Low: Protect natural processes

Enhance natural processes

Overcome barriers (natural or man-made)

Correct historical problems

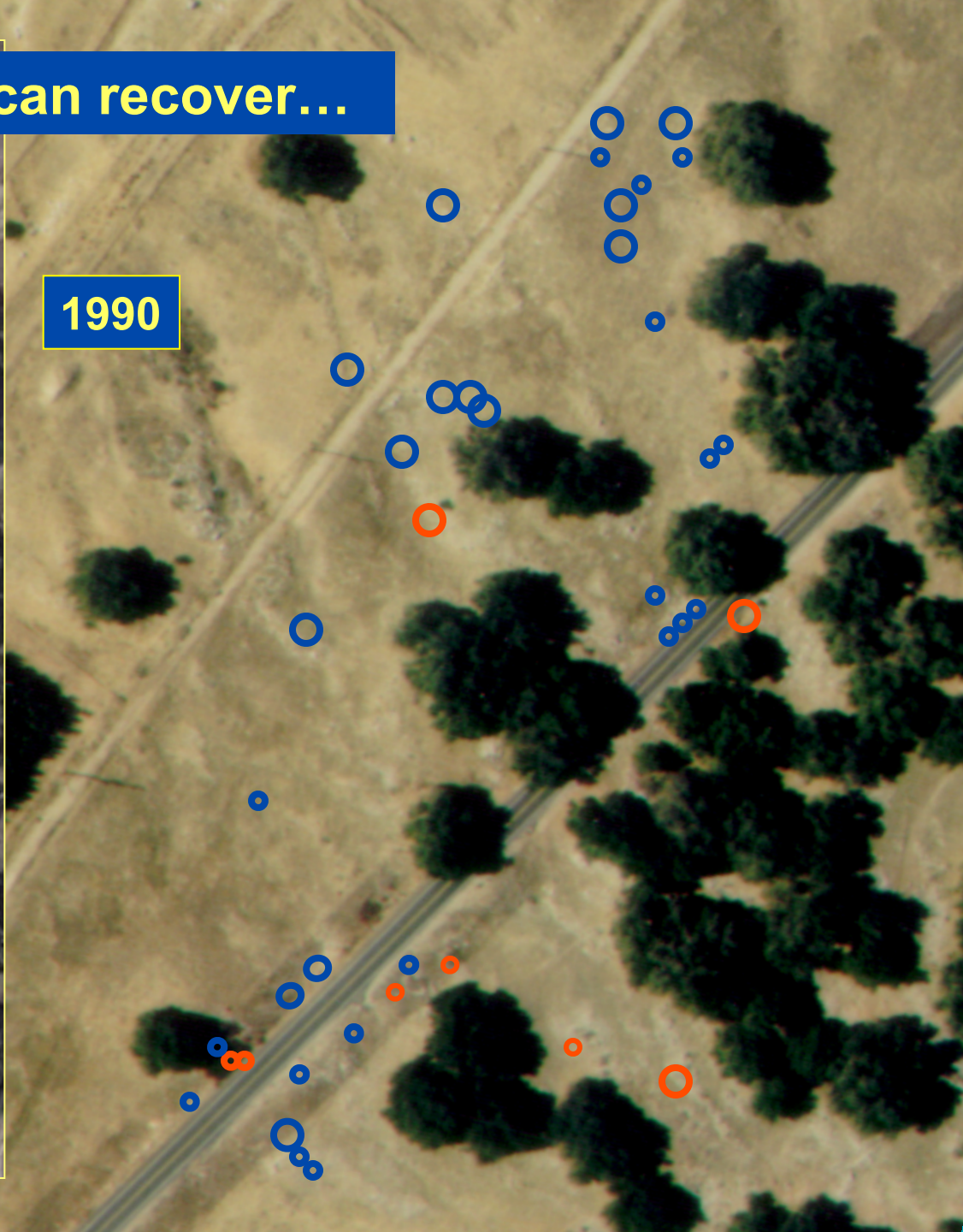
High: Try to recreate an ecosystem

First do no harm: Oak can recover...

2003



1990



Let the oaks tell you where they belong

2002



2004



2006



2009



2002



2009



Oaks mining water mining in weathered bedrock

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M.A. Borneyasz et al. / *Geoderma* 126 (2005) 141–160

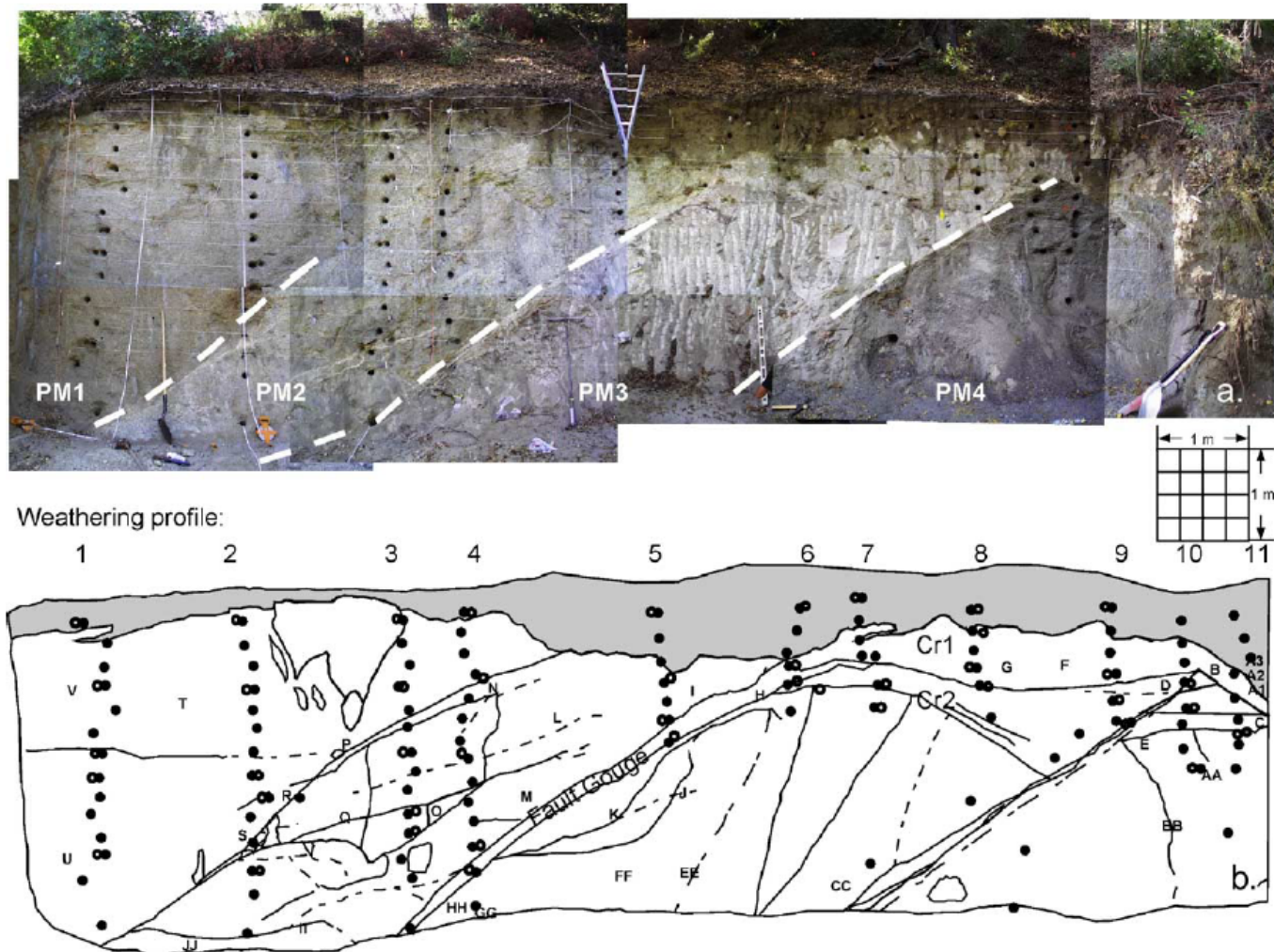


Fig. 2. (a) Photomosaic of the study profile and (b) scaled diagram showing the soil (grey) and weathered bedrock (white) areas with major fracture-features (solid lines), selected faint fracture-features (dashed lines), sampled weathering profiles (1–11), and sample locations for soil moisture and CEC (solid circles), sample locations for intact cores (open circles), and roots (capital letters). Dashed white lines in photomosaic (a) delineate parent material boundaries.

What can you expect? Lots of variation

Engelmann oak growth rates

