

Landscape Oaks Under Drought Conditions



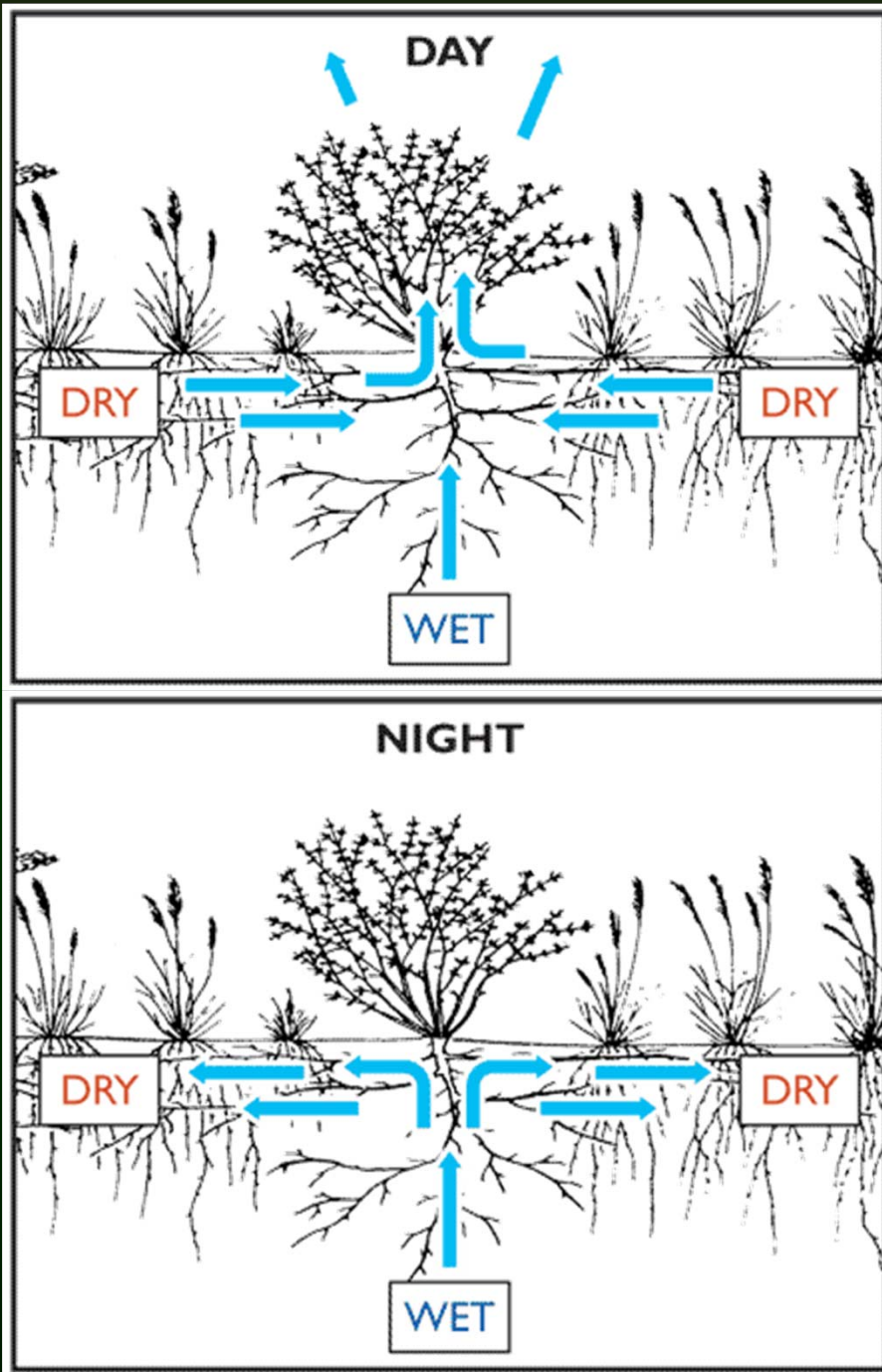
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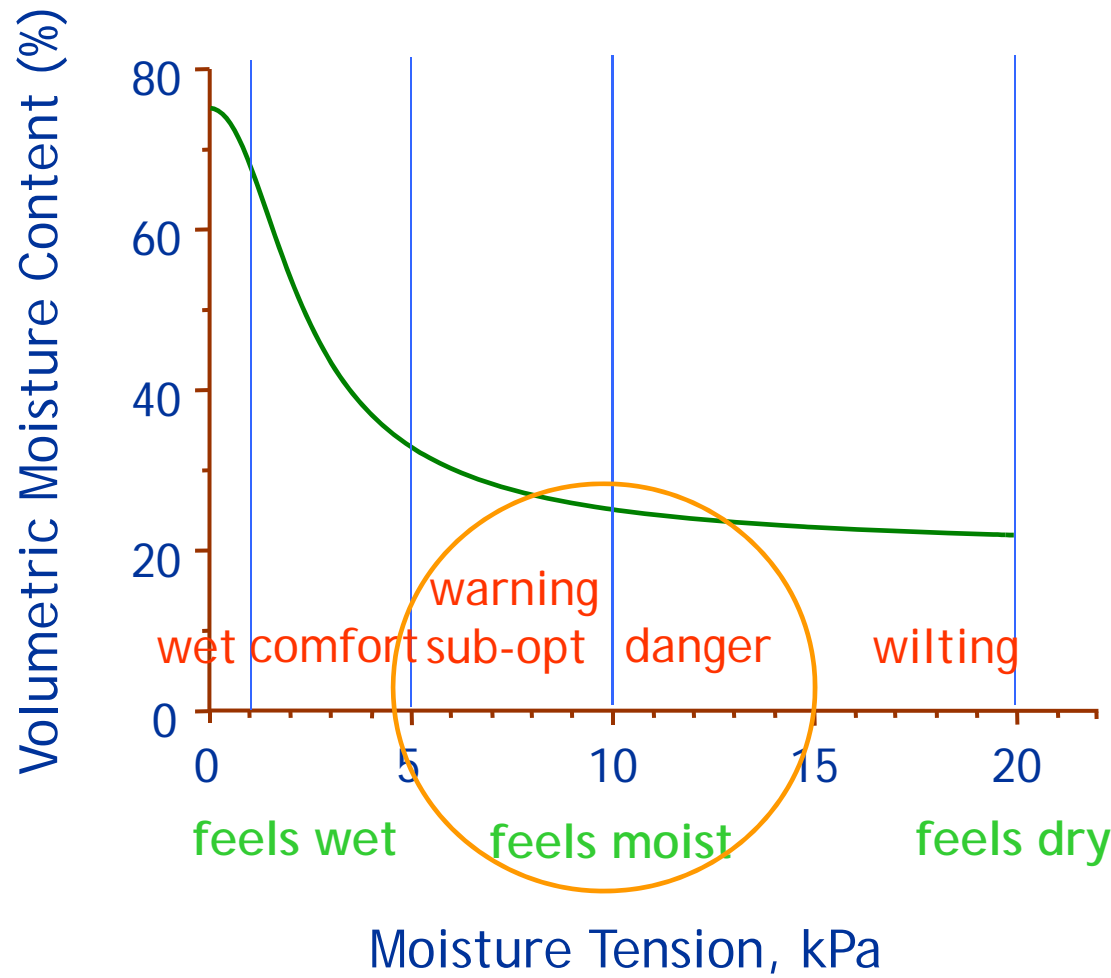
UCCE Marin & Sonoma Counties

Trees as water managers

- Hydraulic lift
- Uptake from sinker roots during day
- Redistribution via mycorrhizae at night
- Soils 12" down stay moist
- Trees are usually the most valuable plants in landscapes



Moisture Retention Curve



- How people are able to sense moisture levels
- Note that although the soil feels moist, it is already suboptimal or dangerously low in water!



Photo: David Ackerly, UCB

Oak Drought Response

- Feedback loops between
 - genes & environment
 - metabolism
 - production of:
 - drought specific metabolites
 - chemical defenses
 - may affect tree for life
- Different oaks respond to drought in different ways
 - Blue oaks drought deciduous
- Ultimately, oaks can (and do) die of thirst

Irrigation

- “Don’t Irrigate Oaks” campaign successful
 - Native oaks victims of our success during drought
- Irrigation essential for some trees to survive
 - ... especially where they’ve grown to depend on it
- Must be done carefully



Irrigation

- Lots of misinformation.
e.g.:
 - Colorado State: tree dia @ knee height x 10 = gallons of water needed per watering, 3x / month, five minutes / 10 gallon rate
 - CUFC picked up on this and featured it prominently on their web page in 2014
- This has gotten better over the last year

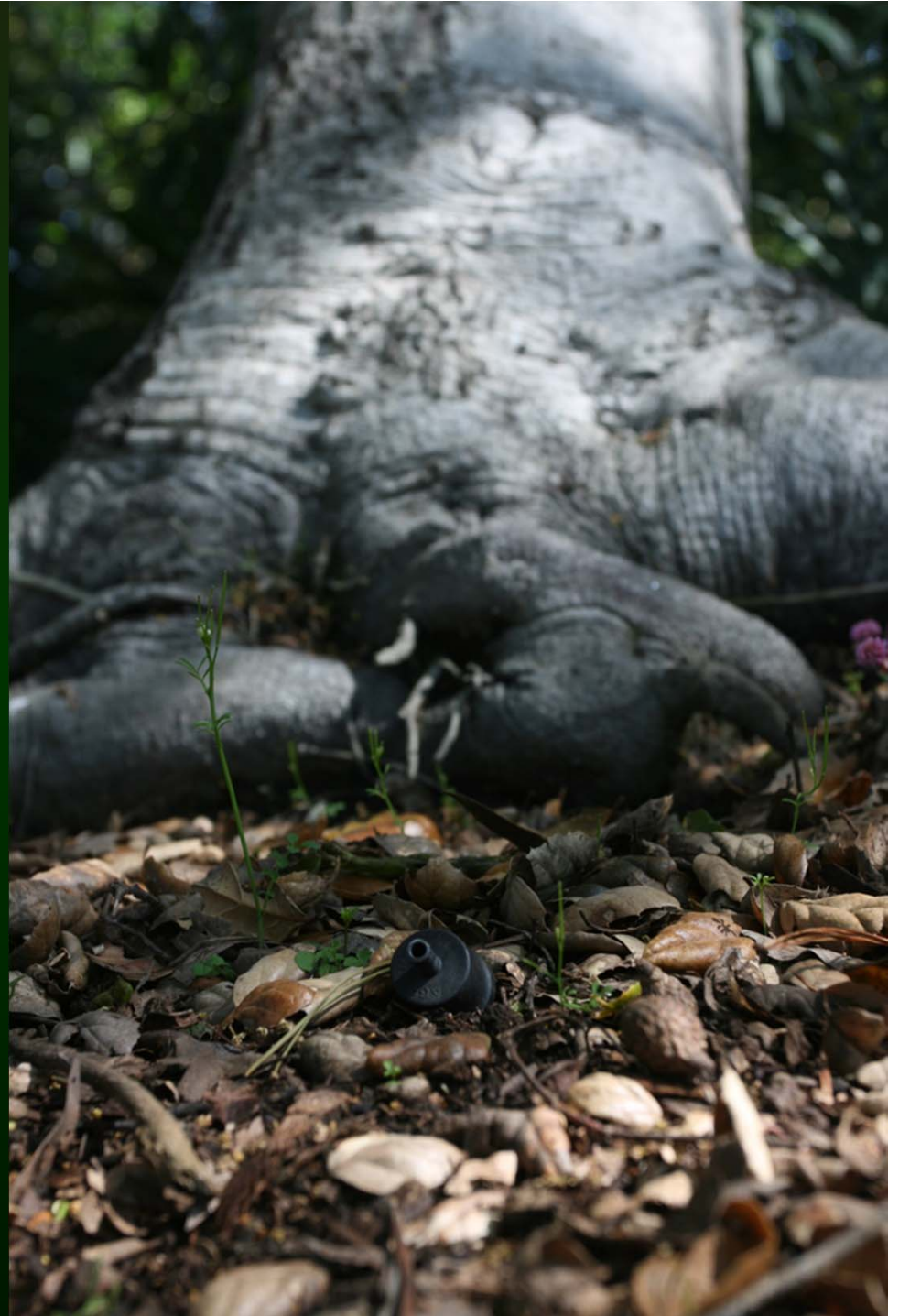




Photo: Loren Oki?

Irrigation

- Formulas can't see the soil or the tree. Get your hands dirty.
- Check to be sure the soil is dry 12" down.
- If it's dry (or damp, if clay) then water enough to wet the soil 12" down.
 - Soaker hose at dripline
- Wait until the soil is dry at depth before watering again



Photo: Loren Oki?

Irrigation

- Don't water close to the trunk (small trees obviously excepted)
- Tree Ring Irrigation Contraption
 - Nice irrigation *estimation* tool
- Mulch!

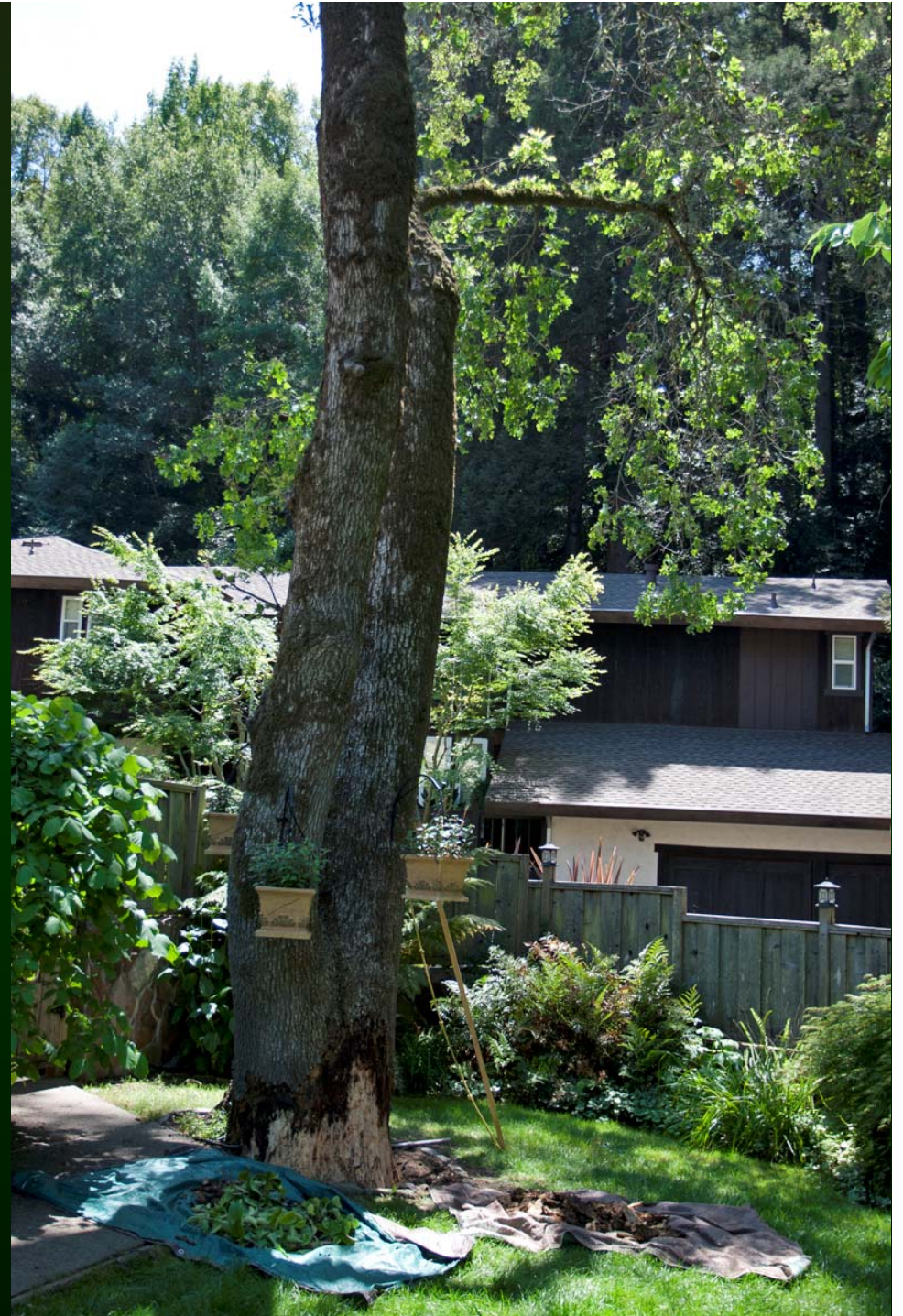


Irrigation

- Timing
 - Ideally, provide lots of water during rainy season
 - Predicting the future is tricky
 - Practically, June and July are the critical months
 - Day length is the single biggest factor in water use
 - Don't irrigate oaks that are dormant, or have shed > half their canopy

More water isn't better

- Root rots thrive in warm, consistently moist soil
 - e.g., *Phytophthora* spp.
 - *Armillaria* spp.
 - Many of these will attack almost any tree under the right conditions
- Know your plants
- Monitor your soil
- Don't injure roots
- Let things dry without stressing the plant





Mulch

- No legal definition
- Much misinformation here too
 - Allelopathy
 - Herbicides
 - Pathogens
 - Worried? Compost!
- Oak leaf litter best (?)
- Practically any organic material is better than nothing

Oaks are not passive

- Actively manage:
 - Water
 - Nutrient collection (mycorrhizal symbioses)
 - Pests
- Give oaks the resources they need
 - Without messing up their ability to manage their environment





Management Recommendations

- Assess water status 12" below grade
 - Hydraulic lift
 - NOT 2' below grade
- Let the tree tell you how it's doing
 - Look at current growth
 - Effects occur over years

Thanks!

- Presentation on-line at:
 - <http://ucanr.edu/NorthBayWater>
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