Sustainable Practices for Beautiful Landscapes in Yolo County

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Yolo County Master Gardener Workshop
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UNIVERSITY OF CALIFORNIA
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Overview

- Climate considerations for Yolo County
  - Yolo County's climate
  - Native plant coping strategies
- Protecting existing landscapes
  - Heat
  - Smoke
- Strategies for climate-resilience & sustainable landscaping
  - Water-wise landscaping
  - Trees for cooling
  - Fire-smart landscaping
  - Plant & tree selection

Climate considerations for gardening in Yolo County

What is climate? Climate vs. Weather

Weather: The state of the atmosphere at a specific time and place.

- Short-term variations of the atmosphere (from **minutes** to **weeks**)

Climate: The prevalent long-term weather conditions in a particular place.

- The weather in a place over a long period of time (**30+ years** to **centuries)**

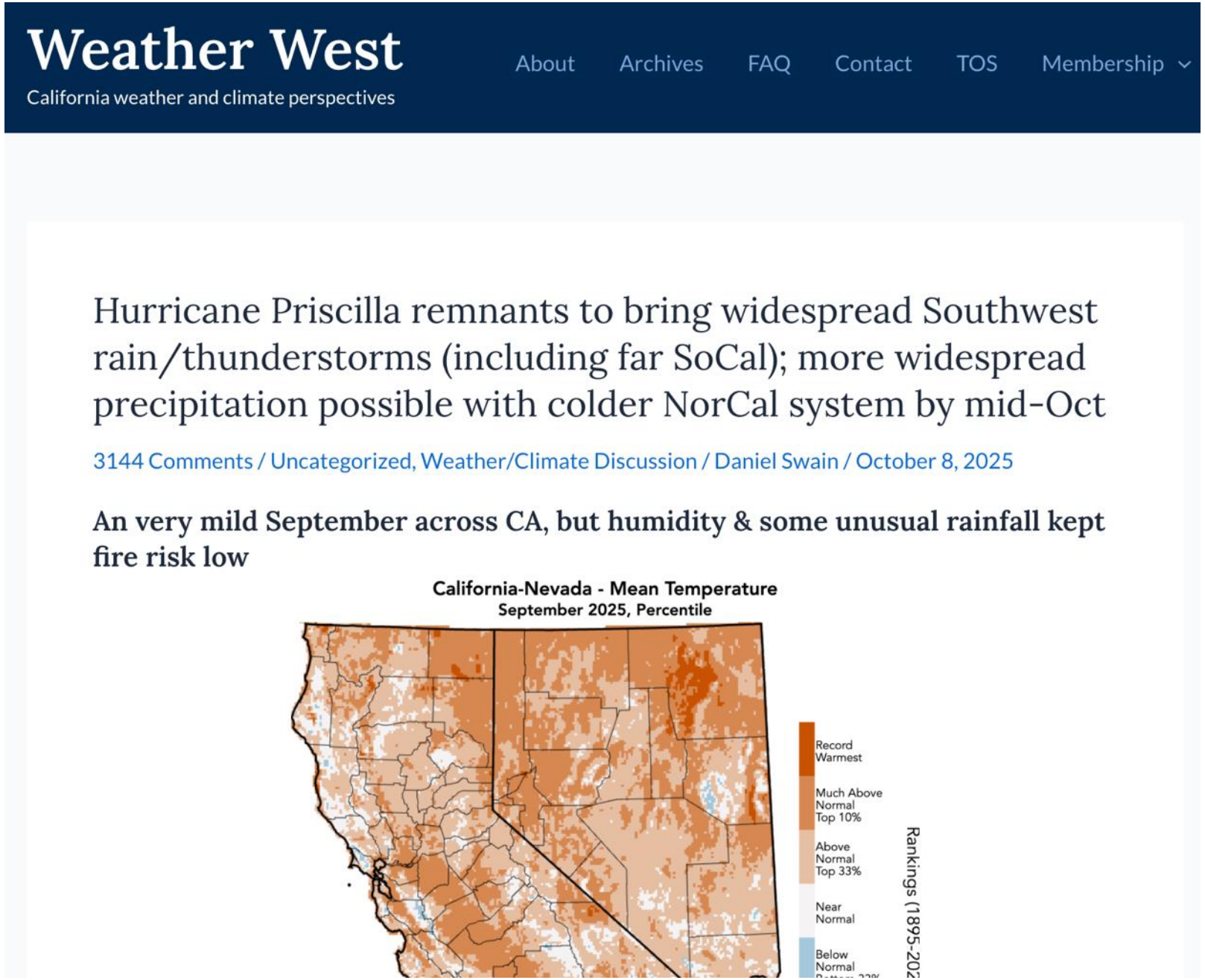
Elements include precipitation, temperature, humidity, sunshine, wind speed, fog, snow, etc.

Climate is what you expect; weather is what you get

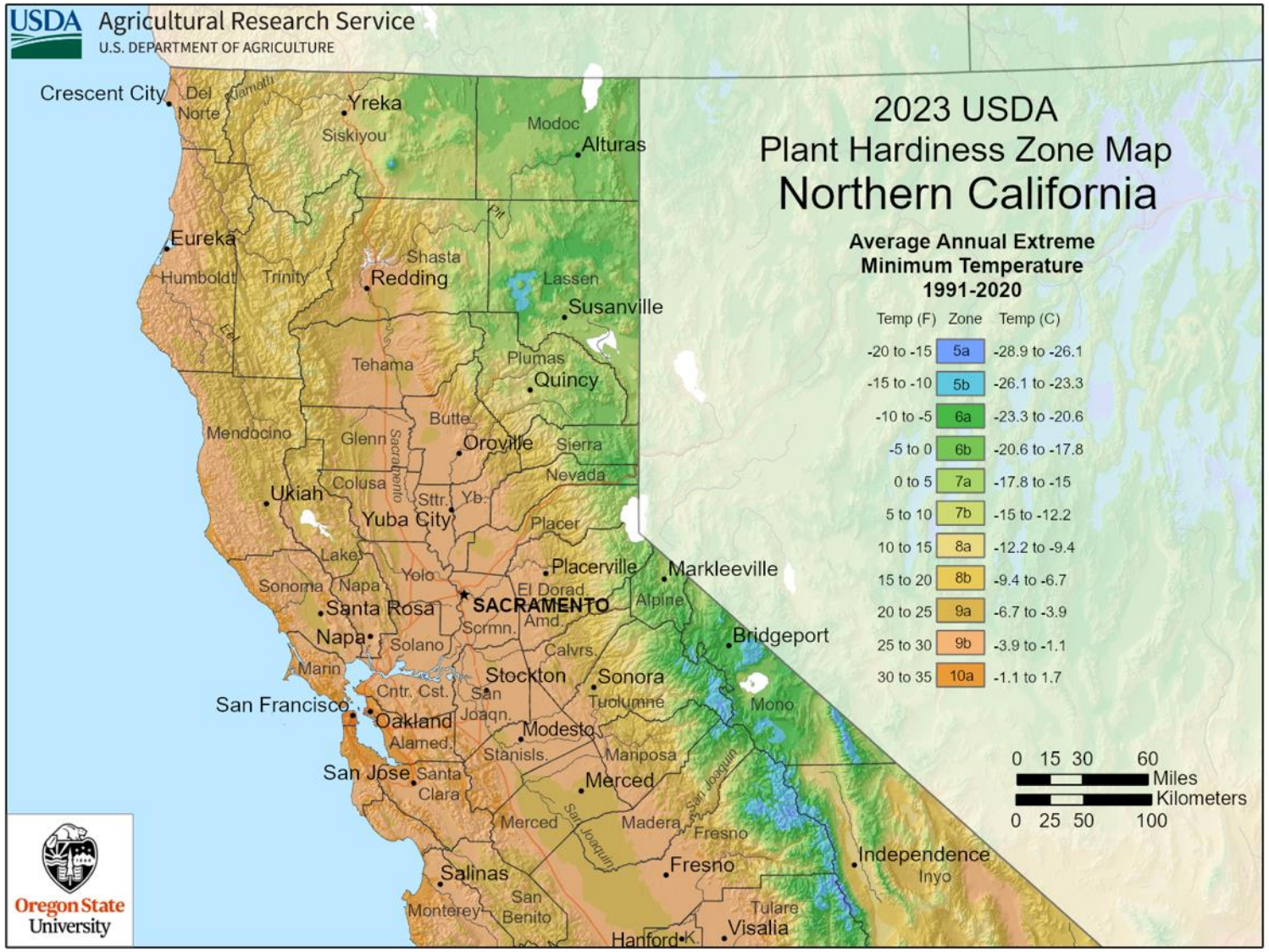
weatherwest.com

By Dr. Daniel Swain

"The Weather West niche exists at the "weather-climate" interface…my primary goal is to focus on the connections between large-scale atmospheric conditions and broader trends in weather across the entire state of California."



USDA Plant Hardiness Zones

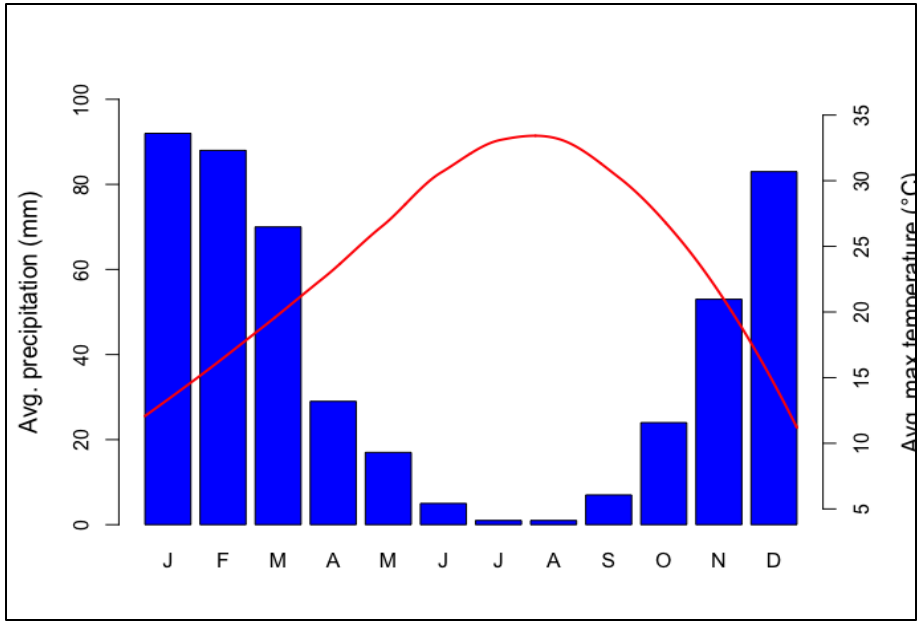


Basis:
Average annual extreme minimum temperature, past 30 years

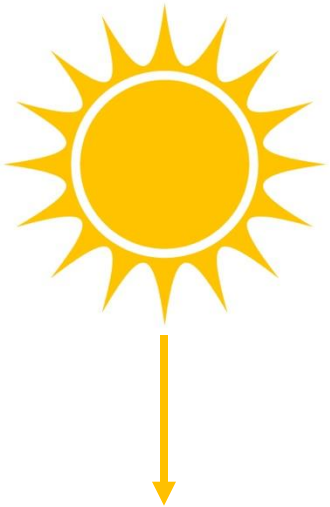
Rationale:
Lowest temperatures are a crucial factor in plant survival

Mediterranean climate

Cool, wet winters; hot, dry summers



Photosynthesis & transpiration



Carbon dioxide + water → sugars + oxygen

Water vapor is released from the leaves through pores called stomata

Water is drawn up the stem to the leaves through tissue called xylem

Roots take up water from the soil

Plant water use and heat are related

- Most plants lose several hundred molecules of H_2O for every molecule of CO_2 they gain
- Hot, dry air drives more transpiration & water loss
- Transpiration increases nutrient uptake and provides cooling
- Plants can close stomata to conserve water, but they reduce photosynthesis, cooling, and nutrient uptake
- Most plants close stomata in the dark

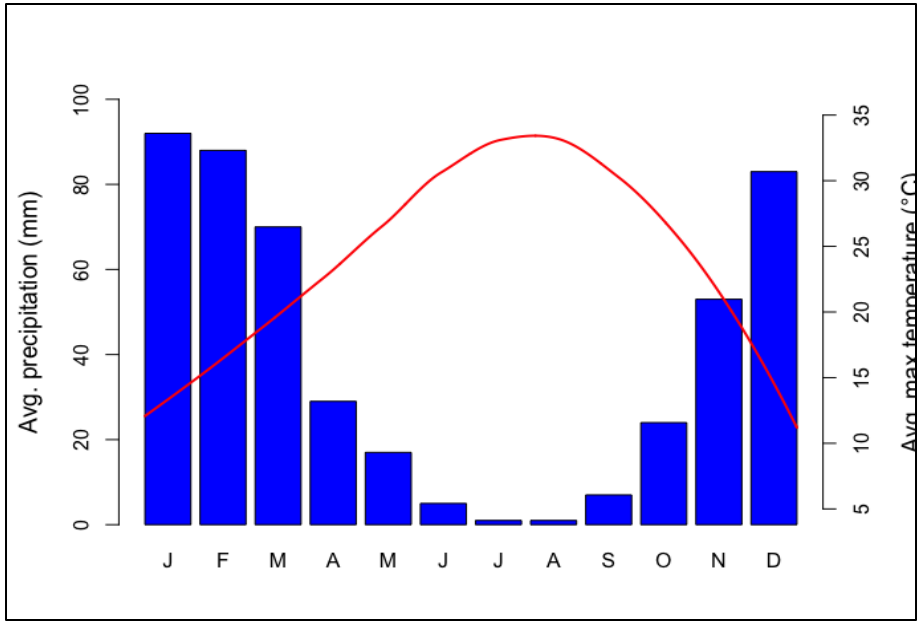
Stomata let CO_2 in and H_2O out

POWER AND SYRED/SCIENCE PHOTO LIBRARY

Mediterranean climate

Cool, wet winters; hot, dry summers

*Mismatch between water availability and plant water demand



Some plants strategies to cope in Mediterranean climates:

- Avoid summer drought:
  - Riparian (grow by a river)
  - Annual life cycle
  - Drought deciduous

- Avoid water stress:
  - Deep and extensive roots
  - Leaf characteristics that reduce water loss

- Tolerate water stress:
  - Physiological adaptations to maintain photosynthesis, cell water content, & water movement

- Recovery from desiccation or dehydration

Irrigation can overcome the summer water deficit

- Irrigation vastly expands the palette of plants that thrive here
- The precipitation element of climate has largely been ignored in urban landscape design
- In much of California, > 50% of residential water is used outdoors

Protecting existing landscapes

How will home gardens and trees be affected by climate change, and what can we do about it?

Some expected changes to the Sacramento Valley's climate:

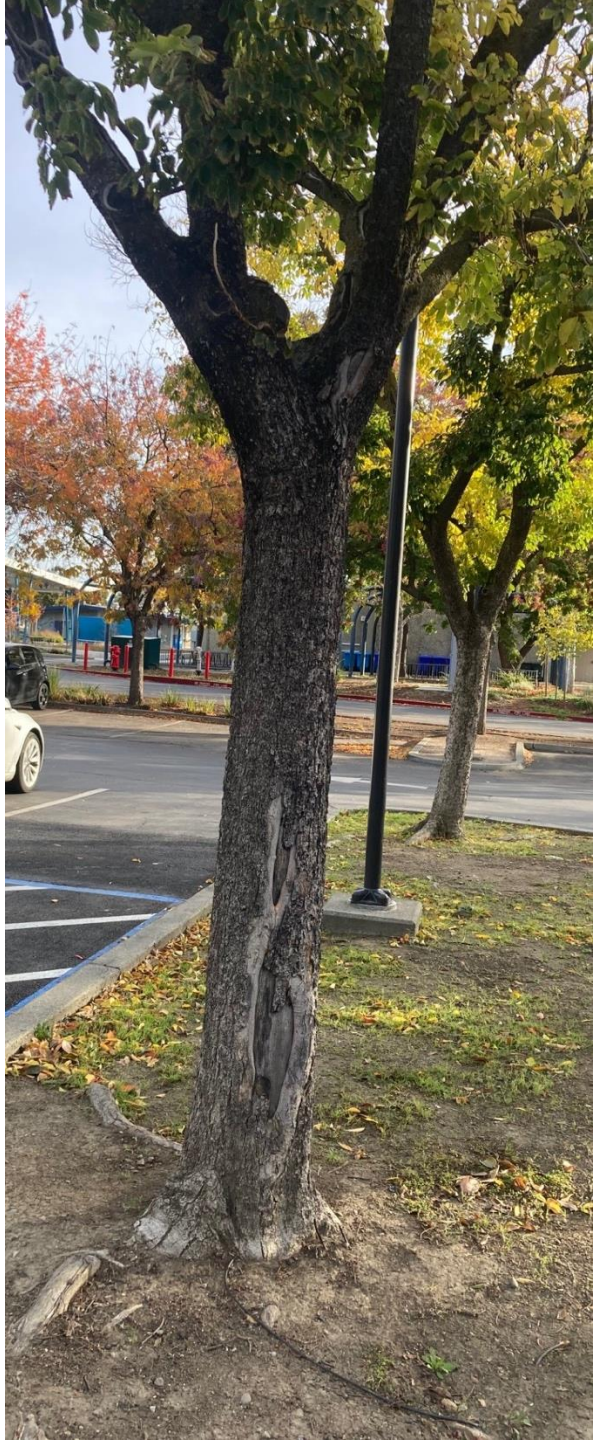
- Warmer temperatures
  - Average daily maximum could increase by 5.5°C/10°F by 2100
- More extreme heat events
- More extreme swings from wet to dry years
  - Increased storm and drought intensity
- Increased wildfires
  - Longer fire season, more large fires

Houlton & Lund. 2018. California's Fourth Climate Change Assessment.

Effects of increasing temperatures & extreme heat

- Increased water demand
  - Higher temperatures = more water lost through transpiration
  - *Transpiration is a plant's primary cooling mechanism

- Heat/water stress and damage
  - Leaf curling
  - Leaf wilt/browning
  - Sunburn/sunscald
  - Embolism/cavitation



Protecting existing plants from extreme heat

- Water thoroughly in the morning on days when high temperatures are expected
  - Water early when possible; also water if you see signs of wilting
  - Water deeply; ensure water penetrates the rooting zone
  - Pay special attention to plants next to walkways, patios, etc., which radiate heat
- Add mulch around plants
  - Reduces moisture loss
  - Reduces soil temperature fluctuation

Protecting existing plants from extreme heat

- Provide shade & bark protection
  - Use shade cloth or other material to provide direct sun protection
  - Don't prune protective branches or foliage (even if damaged)
  - Paint exposed trunks of sensitive trees
- Avoid applying fertilizers during high-heat periods
  - Fertilizers stimulate growth, adding to plant stress

Fires – impacts of smoke

Introduces particulate matter & harmful chemicals

- Coating on leaves can interfere with photosynthesis
  - blocks light
  - introduces damaging compounds
- Clogged stomata
  - interferes with gas exchange
  - can increase water loss if pores cannot close

Source: snappygoat.com

Protecting existing plants during wildfires

- Wash smoke residue off plants with a gentle spray from a hose
  - Don’t use a leaf blower – increases inhalation risk
- Keep plants hydrated
- Don’t fertilize until the air clears and plants fully recover

Source: FANHAO

Strategies for climate resilience & sustainable landscaping

We can enhance benefits from urban landscaping in the process!

Landscape water conservation

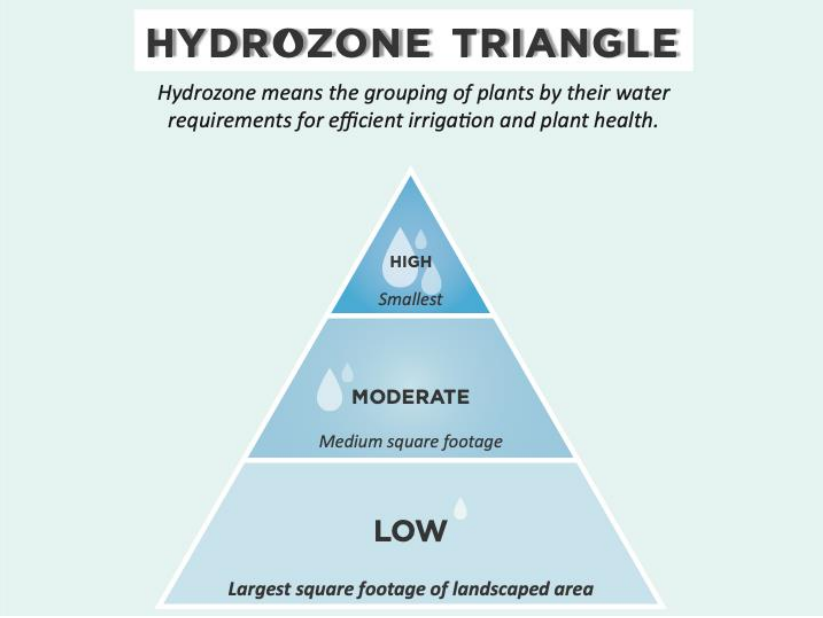
- Increased drought severity
- Reduced snowpack
- Local and statewide regulations
- Save $ on water bills

Improve irrigation efficiency

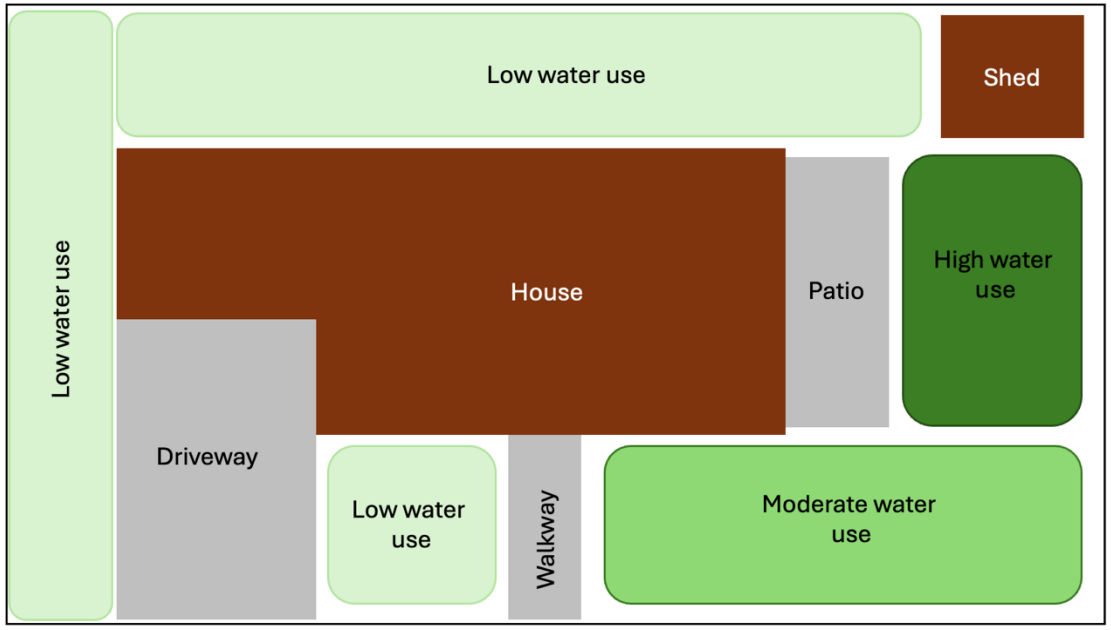
- Check your system regularly
  - Fix leaks
  - Check uniformity
  - Replace broken sprinklers
  - Ensure spray is properly directed
  - Flush clogged sprinklers or emitters
- Adjust irrigation with the seasons and weather
  - Consider a weather-based irrigation controller (rebates!)
- Cycle and soak irrigation

Hydrozoning

- Group plants with similar water needs
  - Overwatering can be just as harmful as underwatering
  - Consider other factors like light & soil requirements when grouping
- Design an irrigation system with multiple independent zones & schedule irrigation according to each area's watering needs



Source: City of Roseville



Lawns

- Most turfgrass uses a lot of water, and is often overwatered
  - Typical residential lawn can use hundreds of gallons of water per week
  - Lawns in LA received 40% more water on avg. than recommended
- If keeping existing turf:
  - Improve irrigation efficiency
  - Provide shade
    - Shading turf reduces water use up to 50% in the summer
    - Trees + shaded turf use less water than unshaded turf alone
- https://ucanr.edu/sites/UrbanHort/Turfgrass_Management

Turf and lawn alternatives

- When possible, replace high-water-use turfgrass with
  - Low-water turfgrass
  - Alternative, low-water groundcover plants
  - Water-wise landscaping

- Turf replacement rebates available in some places (not so much in Yolo)

Kurapia (*Lippia nodiflora*)

Source: UC Davis California Center for Urban Horticulture

Water-wise landscaping

Landscaping that uses water efficiently and reduces runoff

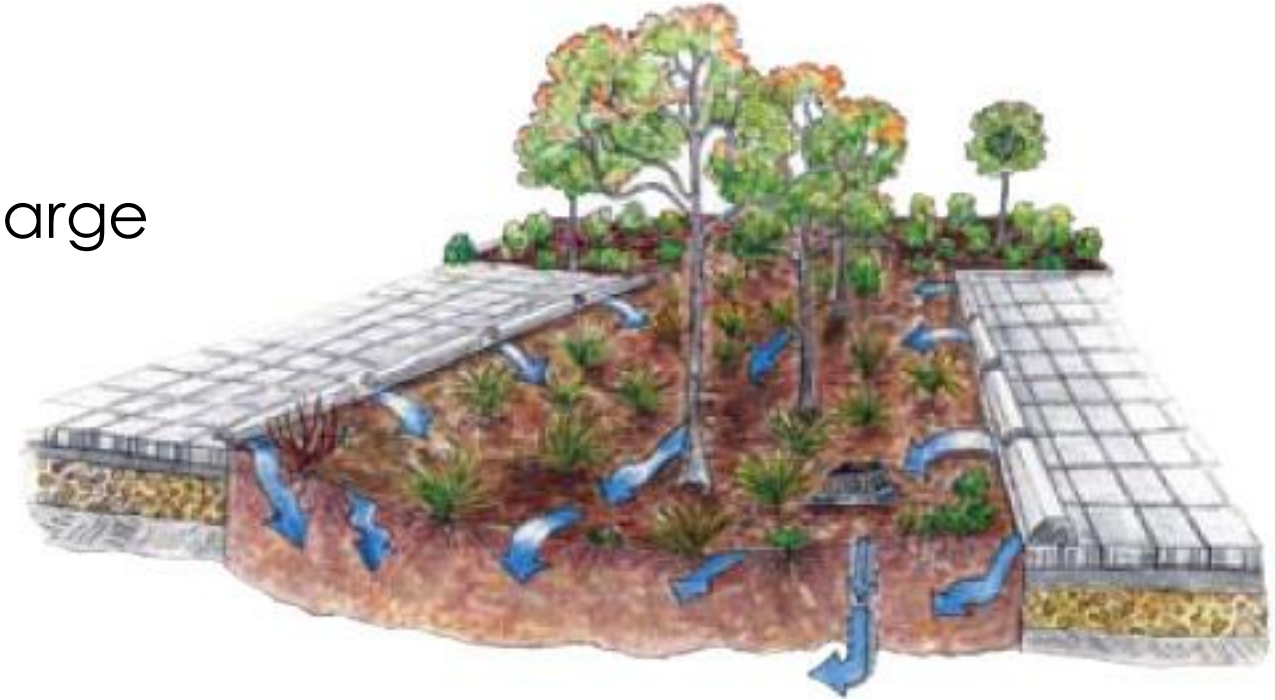
- Climate-adapted/low-water plants

- Efficient irrigation
  - Drip irrigation or hand watering
  - Smart controllers
  - Hydrozoning
  - Adjust irrigation as plants mature

- Water retention
  - Mulch
  - Improve soil for water holding capacity
  - Contours/swales

Stormwater garden features

- Rain gardens capture and filter water
  - Improve water quality
  - Reduce flooding
  - Encourage groundwater recharge
  - Provide habitat & biodiversity
- Require plants that can tolerate wet & dry
  - CA riparian natives



Source: Center for Urban Waters

Pervious surfaces

- Reduce stormwater runoff by allowing precipitation to soak into the ground
  - Improve water quality
  - Reduce flooding
  - Encourage groundwater recharge

- For hardscapes, either:
  - Porous materials that allow water to flow through (e.g., pervious asphalt)
  - Nonporous blocks spaced for water to sink in through gaps

Photo credit: Nanda Sluijsmans - grass pavers used for a permeable driveway in the Netherlands

Benefits of water-wise landscaping can go beyond water:

- Habitat and increased biodiversity
- Improved soil fertility
- Reduced energy/fuel use
- Fewer pesticides/fertilizers
- Aesthetic interest

*How does water conservation affect urban heat?

Cooling benefits of plants

- Plants cool cities through shading and transpiration
- Trees provide the most cooling
  - Surface temperature
  - Air temperature
  - Thermal comfort
- Reduced energy use
- Encourage walking, biking, public transit use

When converting your landscaping, don't forget that your trees need water!

- Many mature shade trees need a lot of water
  - Species from wetter climates
  - Used to lawn irrigation

- Street trees rely on front-yard irrigation too

Protect existing trees

- During droughts and water restrictions, trees come first!
- Water trees appropriately
  - Deep, infrequent watering encourages deeper root growth
  - Water close to the dripline
  - Drip irrigation, soaker hose, or a garden hose at a trickle in 4 quadrants around the tree

Source: California ReLeaf

Prune trees properly

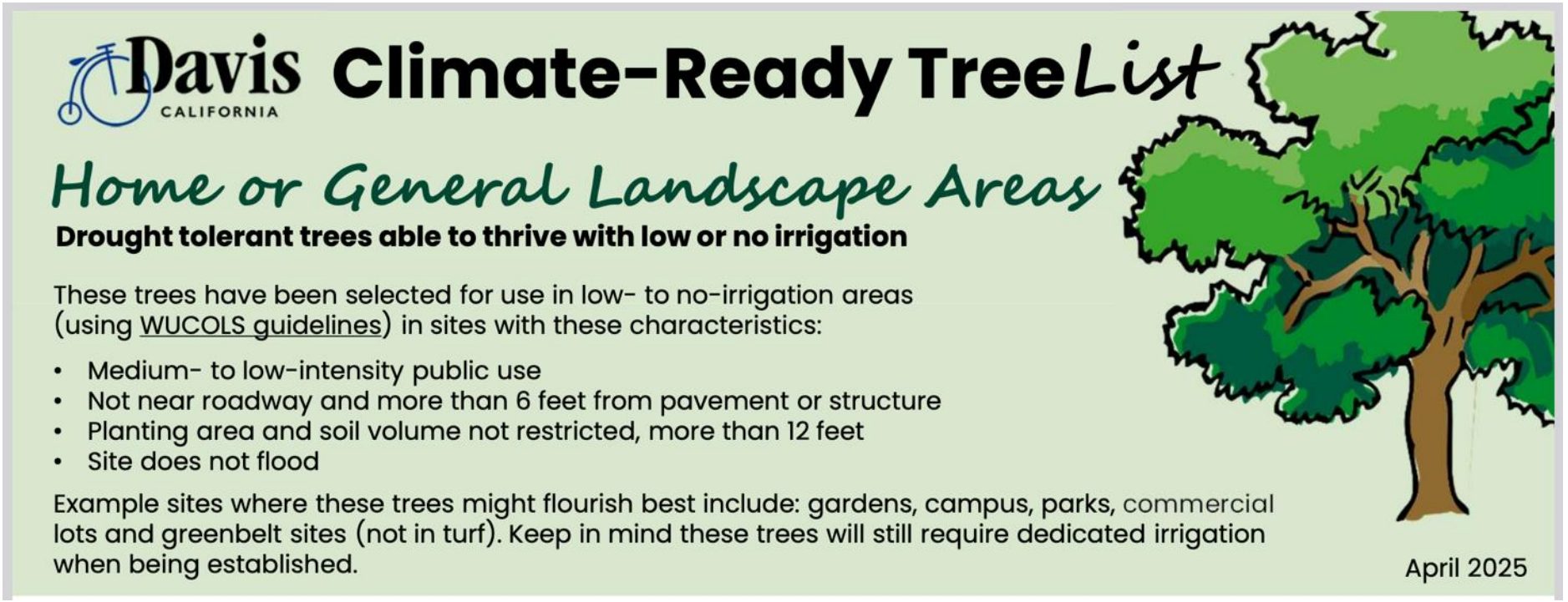
- Maintain canopy shading
- Limit reduction of photosynthetic capacity
- Maintain healthy branch attachments
- Minimize opportunities for pests and pathogens

Plant trees thoughtfully

- Species suited for the projected future climate
- Size and characteristics appropriate for planting location
  - Water needs/tolerance
  - Planting space
  - Utilities/infrastructure
  - Shading
  - Fruit or leaf litter
  - Branch strength
- Consider existing and emerging pest threats
- Maintain urban forest diversity

New recommended tree lists for Yolo County

https://www.cityofdavis.org/city-hall/urban-forestry/what-is-a-city-tree/climate-ready-trees



Fire-smart landscaping

Combines plant selection, placement, and upkeep in a *defensible space* around a home to reduce fire danger

See CAL FIRE's
https://readyforwildfire.org/

Source: snappygoat.com

Fire-smart plant selection

- *A plant's maintenance and environment typically matter more than the species*
  - Well-hydrated plants are more resistant
  - Dead material and thatch are flammable

- Choose species based on traits, not labels:
  - Leaves that retain moisture
  - Low in resins, waxes, and oils
  - Open structure
  - Slower growth
  - Low shedding

Quercus kelloggii (black oak)
Source: Calscape

Fire-smart maintenance

- Regularly remove fallen leaves and branches, especially near structures
- Don't let plants touch a home's siding, windows, eaves, vents, or decks
- Water sufficiently (but efficiently) to maintain plant health
- Prune for open structure and health
- Remove thatch
- Use non-combustible mulches near structures – compost is a safer alternative to woodchip mulch

Climate-smart plant selection

- Select plants that will thrive in our changing climate
  - Heat tolerance
  - Low water requirements
  - Resistance to pests
- Right plant, right place – consider microclimates!

Drought-tolerant vs. low-water plants

- **Drought-tolerant:** Once established, can *survive* through periods of water scarcity (e.g., seasonal rainfall)
  - Don't necessarily look good doing it
  - Recover from wilting or dormancy
- **Low-water:** A classification for plants adapted to water scarcity (use water efficiently)
  - Can maintain appearance with little water
  - "Low-water lush" – the new standard for CA gardens

Lomandra longifolia '*Lomlon*'

Source: WUCOLS Database

CA native plants

- Some native plants can be great choices
  - Adapted to our (historical) climate
  - Habitat value
  - Cultural significance

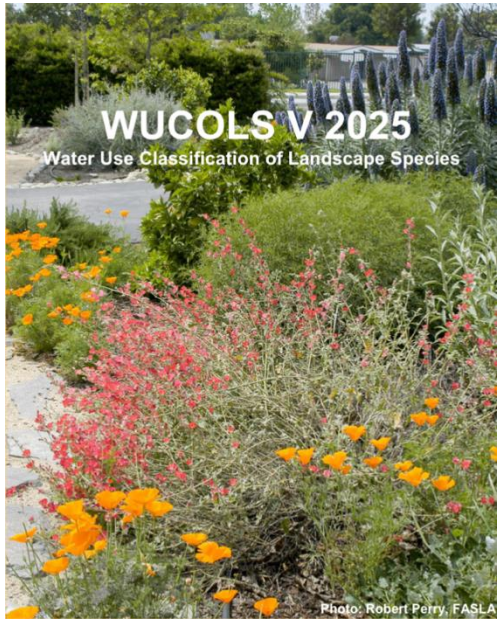
- Consider the context & plant coping strategies
  - Not all natives are low-water plants
  - Annual vs. perennial
  - Urban environments are highly altered
  - Changing climate may not favor locally native species

Credit: Neal Kramer

Plant selection resources:

- UC Davis Arboretum All-Stars
  https://arboretum.ucdavis.edu/arboretum-all-stars
- WUCOLS
  https://ccuh.ucdavis.edu/wucols
- SelecTree
  https://selectree.calpoly.edu/
- Calscape
  https://calscape.org
- California Native Plant Society planting guides
  https://www.cnps.org/gardening/choosing-your-plants/native-planting-guides

UC DAVIS ARBORETUM All-Stars



Final thoughts:

Creating resilient landscapes is a community service – plants keep us healthy!

- Positive environment for physical activity
- Increased longevity; decreased mortality, heart rate, weight
- Reduced stress & better ability to cope with major life issues
- Improved outcomes for those with depression, dementia, cancer, and more
- Can be effective at small spatial scales

Thank you!

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