

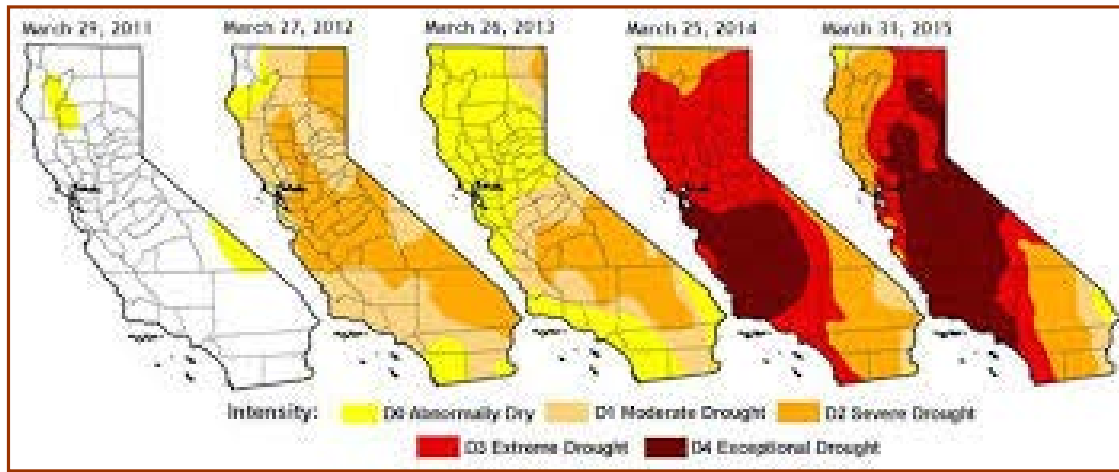
The New California Landscape

Maintaining an Existing Landscape

Davis, CA April 7, 2016

Janet Hartin

**UCCE Area Environmental Horticulture Advisor
(San Bernardino, Los Angeles, and Riverside Counties)**



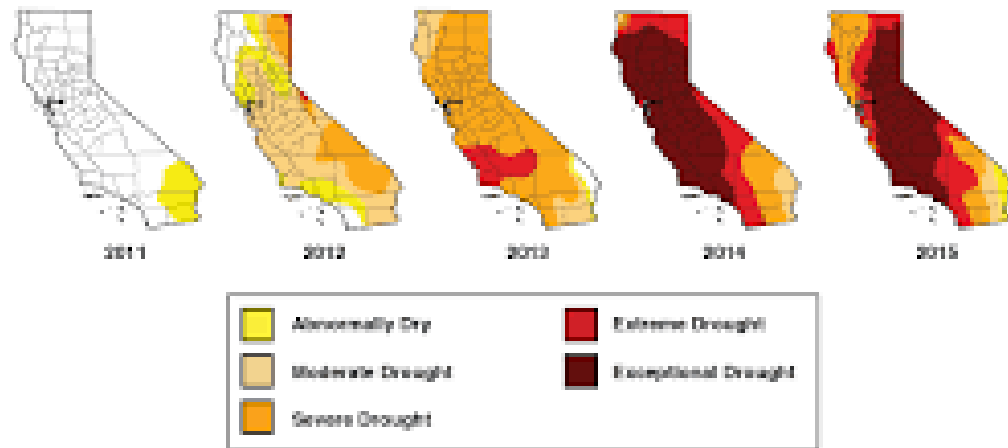
Are We Out of the Drought?



Figure 2

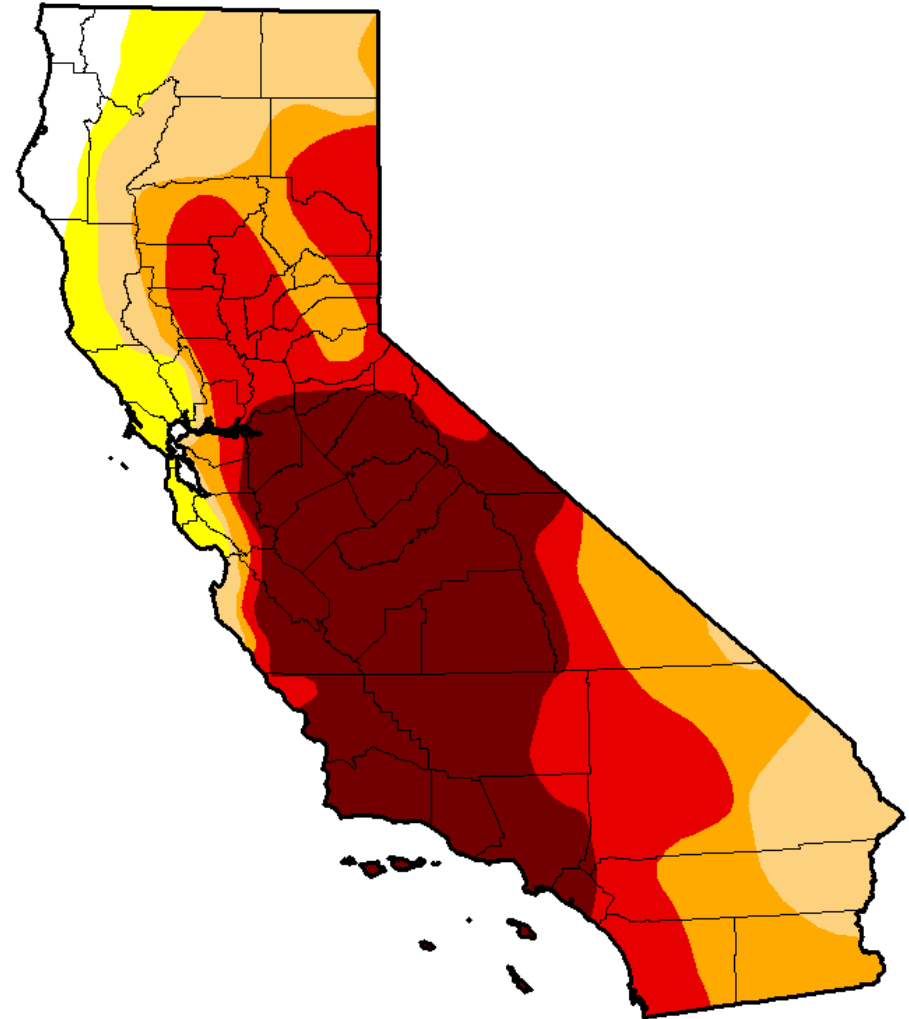
Drought Has Expanded, Intensified Across State

Statewide Drought Measurements From U.S. Drought Monitor, Taken Around October 1 Each Year*

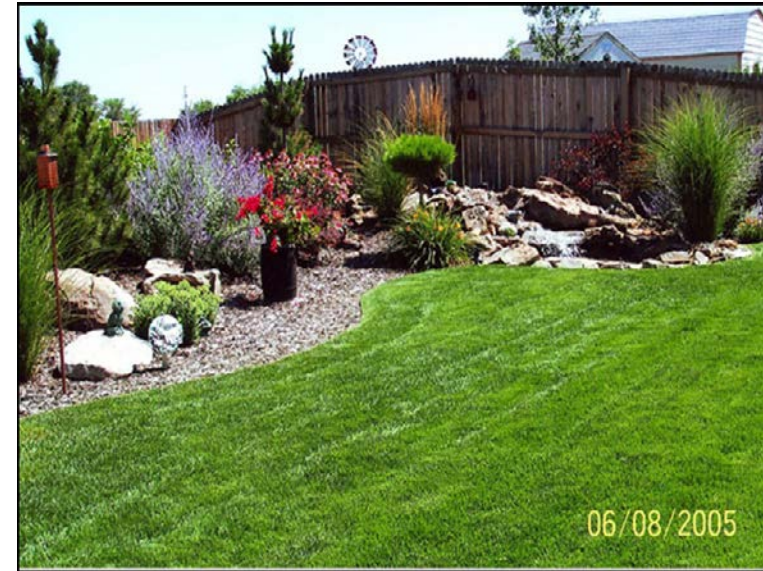


* The U.S. Drought Monitor estimates drought intensity based on several indicators, including soil moisture, streamflow, and precipitation. October 1 is the beginning of the state's "water year" for annual precipitation calculations.

The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln (NDMC-UNL), the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Maps courtesy of NDMC-UNL.



Maintaining An Existing Landscape





Can you Identify the Problems?





Hopefully Plants Were
Selected Based on the
Local Climate Zone

Sunset Zones in the Greater
Sacramento Area:
Mostly 14

Irrigation Scheduling Involves Applying the Right Amount of Water at the Right Time



What Factors are Involved in Irrigation Scheduling?

- Plant water use
- Soil water holding capacity
- Water infiltration rate
- Plant rooting depth
- Irrigation system output

Plant Water Use

- Varies Among Species
- Influenced By Microclimate
- Varies By Density



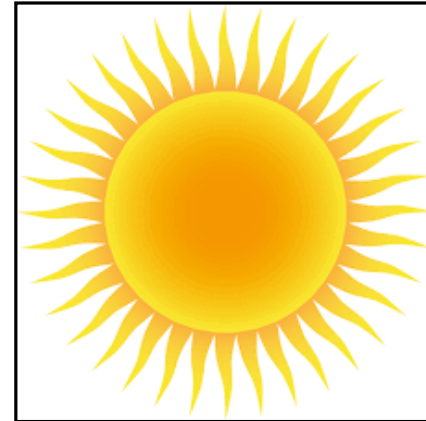
ET (Landscape Species) = ETo (Reference
Evapotranspiration) x Kc (Crop Coefficient)

Reference Evapotranspiration (ET_o)

- ET_o = The Amount Of Water Used by a Large Uniform Planting of a Cool-season Grass Growing 3-6 Inches Tall Given Unlimited Water.

Factors That Determine ETo:

- Solar Radiation
- Temperature
- Wind Speed
- Relative Humidity

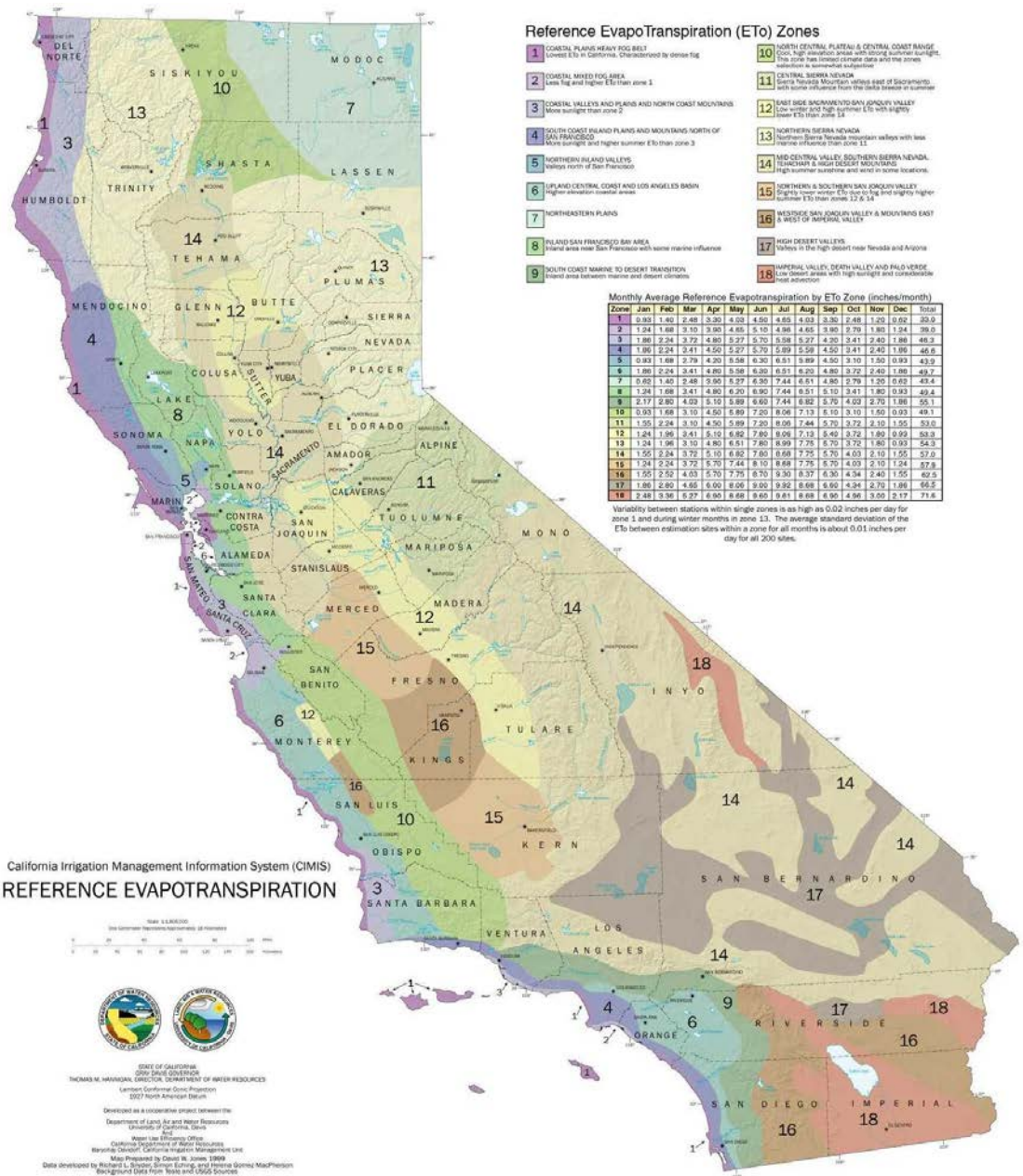


www.cimis.water.ca.gov

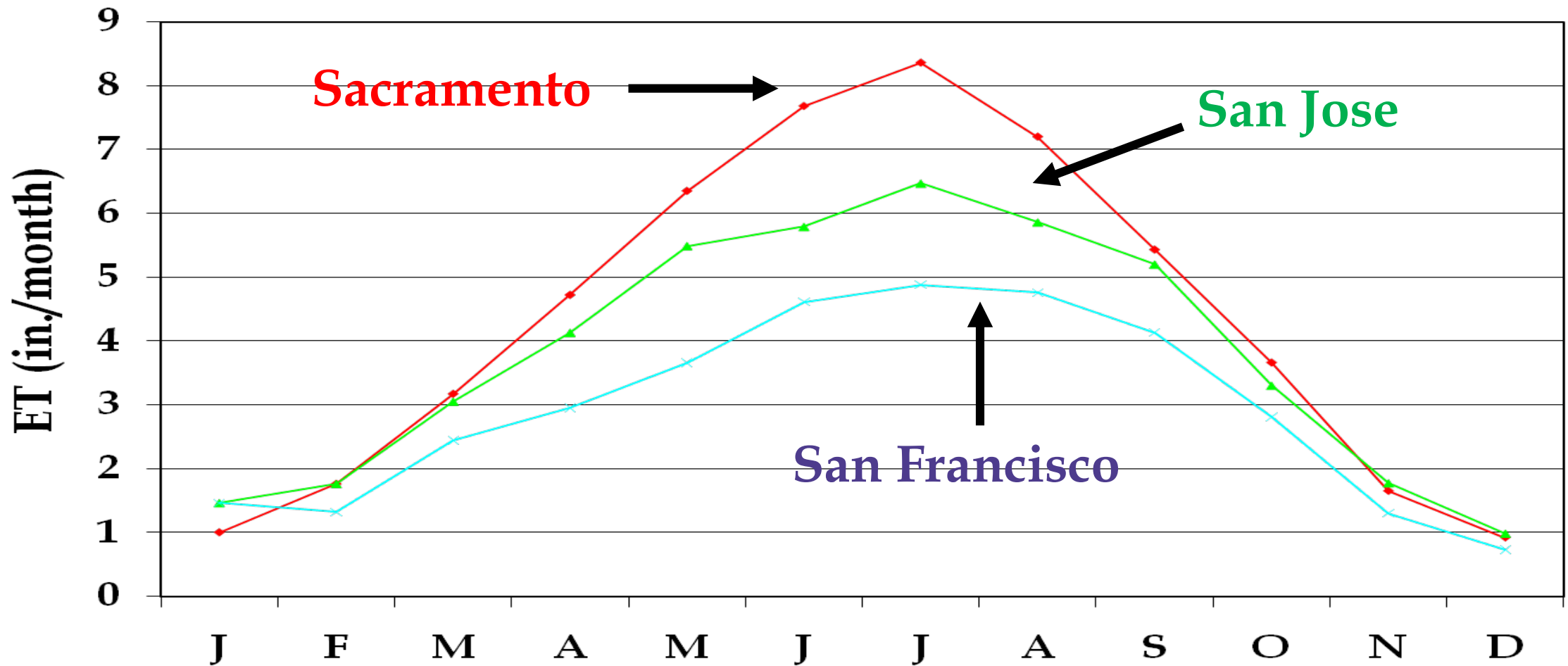
The California Irrigation Management Information System (CIMIS) measures these factors on an ongoing basis at over 100 stations throughout California



CIMIS Map



Average (Mean) ETo



Plant ET Often Higher Than Actual Water Required For Acceptable Performance (Mesquite And Ficus)



Water Needs of the Same Species Vary Depending on Microclimate

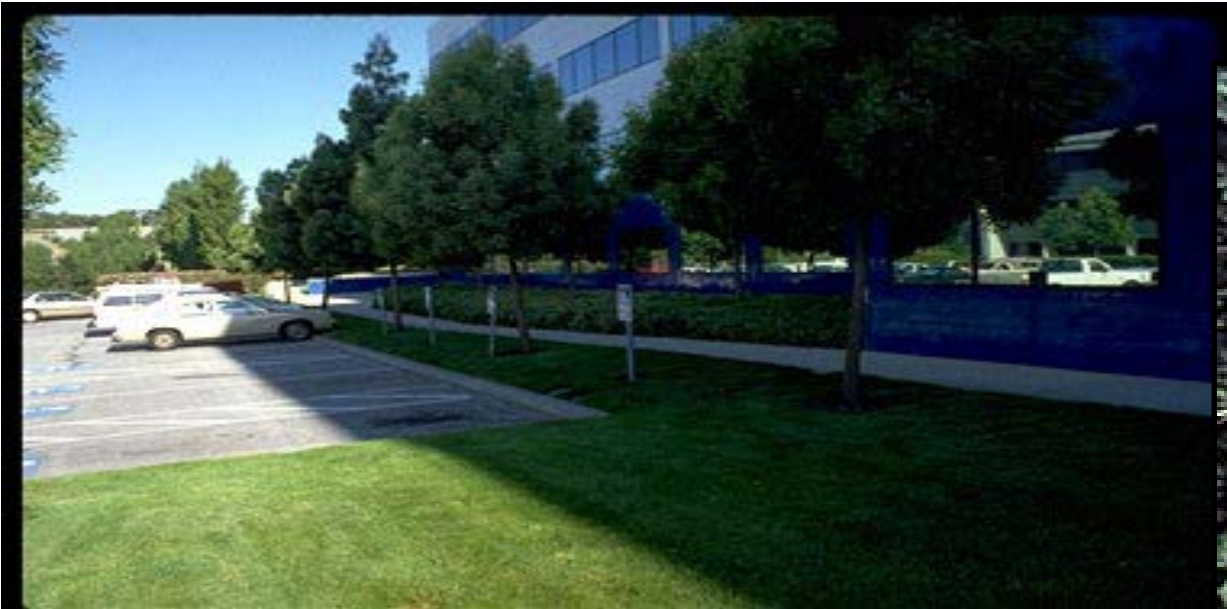
- Landscape Plants in Heat Islands
Require up to 50% More Water Than
the Same Species in a Park Setting

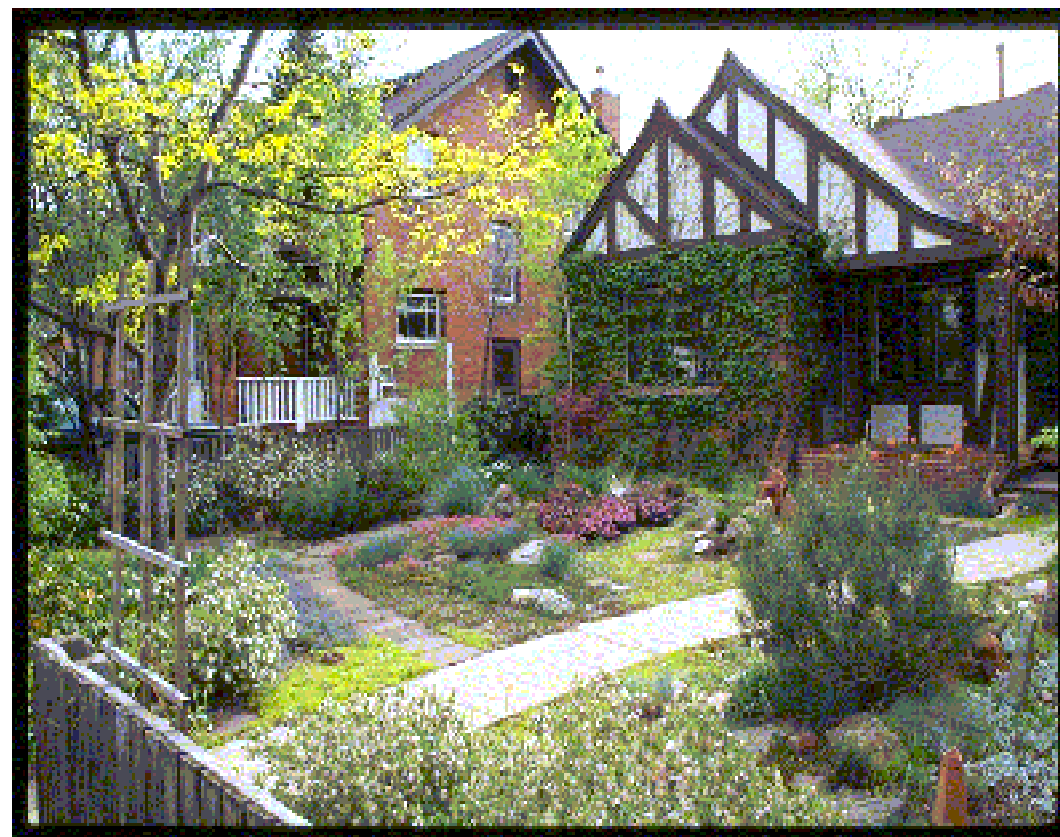






Shade Vs Full Sun





Lawns And Groundcovers More 'Crop-like' Than Mixed Species With Varying Densities And Microclimates

K_c (Warm Season Turf) = .6

K_c (Cool Season Turf) = .8

‘Crop’ Of Turf



UC ANR's ***Lawn Watering Guide*** Based On Warm
Season Grass $K_c = .6$ And Cool Season Grass
 $K_c = .8$ and a Distribution Uniformity Of 80%

<http://ucanr.org/freepubs/docs/8044.pdf>

How To Use The 'Lawn Watering Guide'

- Determine Type Of Lawn (Warm vs. Cool Season Turf)
- Conduct A 'Can Test' To Determine Sprinkler System Output And Distribution Uniformity
- Determine How Long To Irrigate (Minutes Per Week) Based On Climatic Chart Provided
- Determine Maximum Amount Of Time To Water Per Event Until Runoff Just Begins

How many minutes of irrigation does a warm season lawn need for peak performance (per week) in July in Sacramento?

- a) 41
- b) 55
- c) 82
- d) 164
- e) All could be correct

How Many Minutes (Per Week) of Water Does a Warm Season Lawn Need for Peak Performance in July in Sacramento?

- a) 41
- b) 55
- c) 82
- d) 164
- e) All could be correct



Identify And Repair Leaks, Low Heads, Broken Sprinklers, Unmatched Sprinklers And Pressure And Spacing Problems



Improve Distribution Uniformity to Improve Turf and Groundcover Health and to Reduce Water Waste





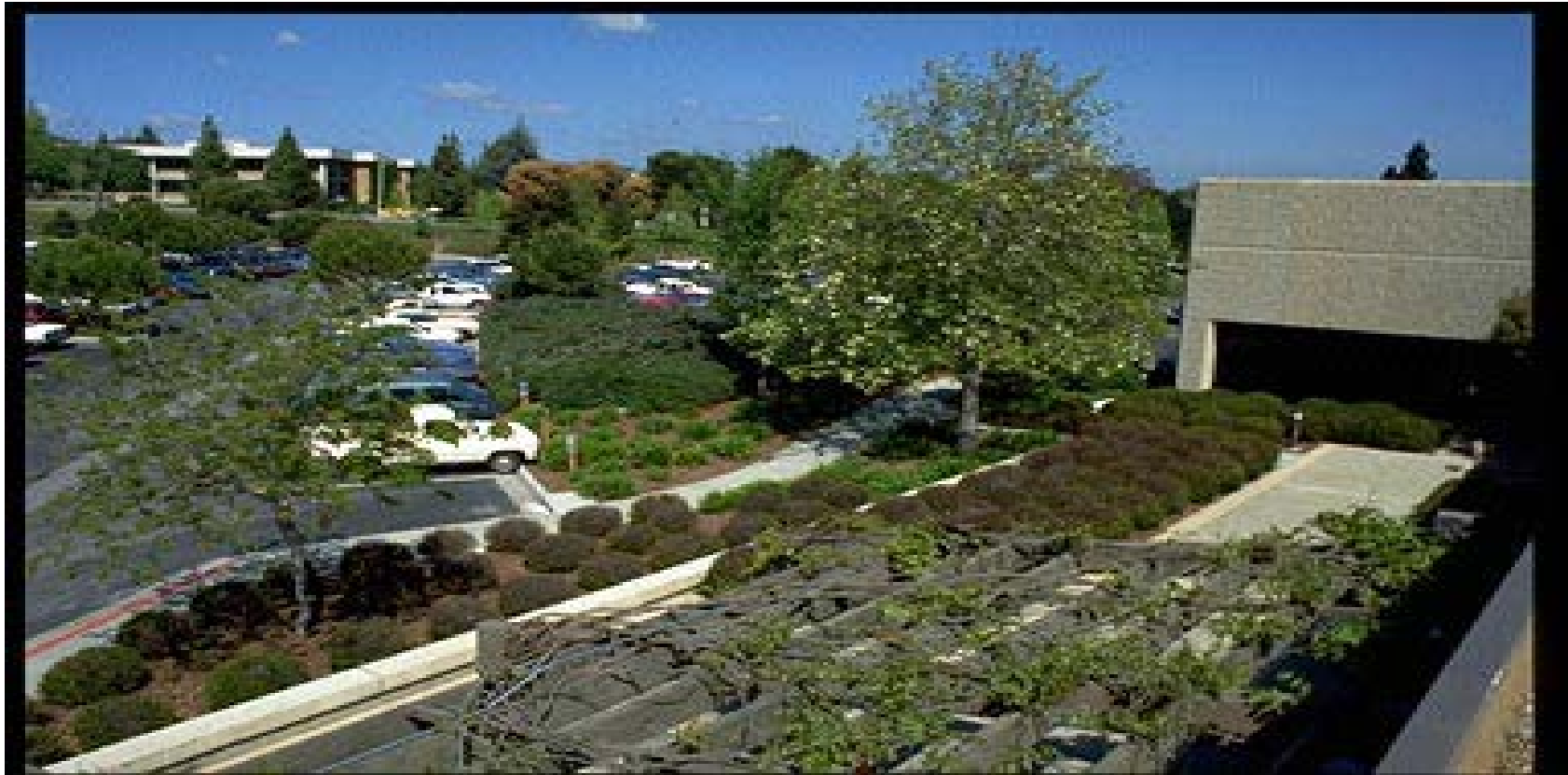
**Good (top) and Poor (bottom)
Distribution Uniformity**



Water Cycling May Be Necessary to Avoid Run-off.
Divide the Total Amount of Water Required Per
Day into 2-4 Cycles. Apply Water as Close to
Initial Event as Possible Before Soil Dries Out.



Planting Density Affects Water Requirement



Multi-tiered Canopy Uses More Water Than Single Tier Canopy





Low Density Plantings



STATE WATER BUDGET LAWS

(Allows for only 70% of ETo and is being reduced to 55% ETo in Dec. 2015 for new and refurbished landscapes)

$$*MAWA = (ET_o) (0.7) (LA) (0.62)$$

ET_o = Reference Evapotranspiration (cool season turf): inches per year

0.7 = ET Adjustment Factor

LA = Landscaped Area (Square Feet)

0.62 = Conversion Factor (To Gallons)

***Maximum Applied Water Allowance = _____ Gallons/Year**

Example of Maximum Applied Water Allowance (MAWA) (70% ETo)

- Greater Sacramento Metropolitan Area (Annual Historical ETo = 57 In)
- Hypothetical Landscape Area = 5,000 Sq Ft
- $MAWA = (ETo) (0.7)^* (LA) (0.62)^{**}$
- $MAWA = (57) (0.7) (5,000 \text{ Sq Ft}) (0.62)$
- **MAWA = 123,690 Gallons Per Year**

*ET Adjustment Factor

** Conversion Factor From Inches To Gallons

Example of Maximum Applied Water Allowance (MAWA) (55% ETo)

- Greater Sacramento Metropolitan Area (Annual Historical ETo = 57 In)
- Hypothetical Landscape Area = 5,000 Sq Ft
- $MAWA = (ETo) (0.55)^* (LA) (0.62)^{**}$
- $MAWA = (57) (0.55) (5,000 \text{ Sq Ft}) (0.62)$
- **MAWA = 97,185 Gallons Per Year**

*ET Adjustment Factor

** Conversion Factor From Inches To Gallons

Will your Current Landscape Survive the Drought and Water Restrictions?

Yes.....if

- Less Than ½ Is Turf (preferably warm season)
- ½ Or More Is Drip or Hand Watered Trees And Shrubs
- Mulch Has Been Applied

External Resources for Plant Water Use Lists

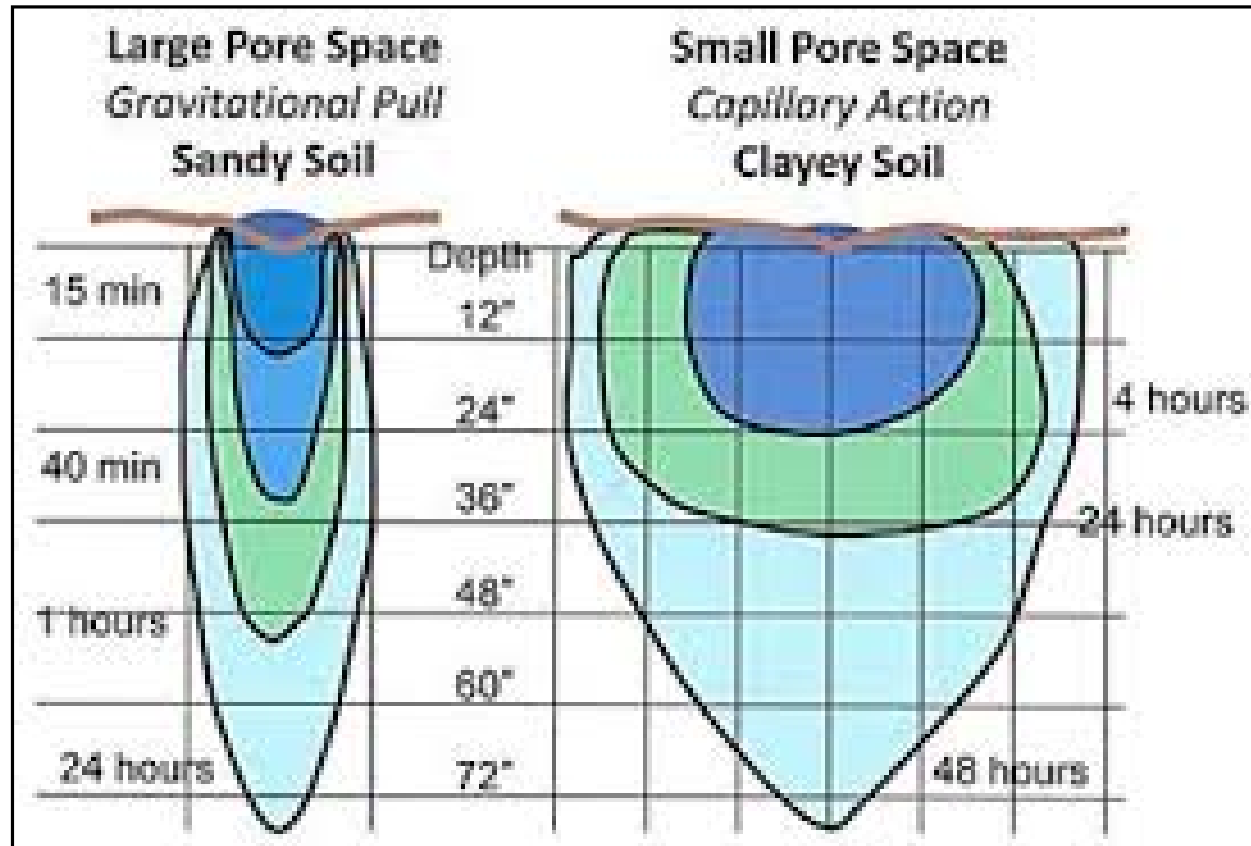
(additional tools to combine with your own local knowledge as Master Gardeners)

- Sunset Garden Collection <http://sunsetwesterngardencollection.com/>
- California Native Plant Society: <http://www.cnps.org/cnps/grownative/lists.php>
- Local Water Districts
- WUCOLS IV (Water Use Classification of Landscape Species):
<http://ucanr.edu/sites/WUCOLS>

Determining When to Irrigate is as Important as Knowing How Much Water to Apply



Determine Soil Water Holding Capacity





Use the 'Feel' Test



Depths to Irrigate

Turf - 8 To 12 In.

Shrubs - Small: 1 Ft.
- Large: 2 Ft.

Trees - Small: 2 Ft.
- Large: 3 Ft.

Monitor Soil Moisture



Keeping Plants Alive During Drought

Prioritize Valued Fruit Trees and
landscape Trees over Annuals



- Recently Transplanted Plants are at Greatest Risk of Drought Damage Due To Root Loss.
- Established Plants are Less at Risk.



Recognizing Early Signs of Drought Stress is Important Because:

- Irreversible damage can occur that no amount of watering will correct
- Mature fruit trees and landscape trees are worth saving.



Common Symptoms of Drought Include:

- Wilting or drooping leaves that do not return to normal by evening
- Curled or chlorotic (yellow) leaves that may fold or drop
- Foliage that becomes grayish and loses its green luster
- New leaves that are smaller than normal
- Lawns that retain a footprint for several minutes





Maintaining Various Types of Plants During Water Restrictions and Severe Drought

Ornamental Trees

- Most homeowners wisely choose to use whatever water is available to save their mature landscape ornamentals and fruit trees.
- One or two deep irrigations with a garden hose several weeks apart in spring and summer will often keep these valued plants alive, especially if roots are relatively deep.

(Con'd)

- Two seasons without enough water can result in severe drought stress and even death.
- Drought-stressed trees are more prone to damage from diseases and insects than non-stressed trees.



Engraver Beetles





UC Statewide IPM Project
© 2000 Regents, University of California.



(Con'd)

- Watering with a garden hose slowly and deeply will help water reach the root zone. Soaker hoses work well, too.
- Water mature trees several feet out from the trunk and make sure water is moving through the soil several inches deep into the root zone.



Fruit and Nut Trees

- Keeping fruit and nut trees alive during severe water shortages is also possible, although crop production will be reduced or stop.
- To produce a good crop, deciduous fruit and nut trees need adequate water in their root zones continuously from bloom until harvest.



Peaches, Plums, and Nectarines

- Adequate irrigation during the final 4 – 6 weeks before harvest is important to produce fruit. If necessary, reducing water just prior to this period and after harvest are viable strategies.
- If little or no irrigation water is available throughout the season, trees may be kept alive by severely cutting scaffolds back to the trunk (dehorning).

Citrus

- Citrus trees need adequate soil moisture during spring to set fruit and steady water in summer and fall to produce acceptable size, numbers, and quality of fruit.



Vegetables

- Vegetables are difficult to maintain during a drought.
- As a rule of thumb, water is most critical during the first few weeks of development, immediately after transplanting, and during flowering and fruit production.



(Con'd)

- Tomatoes, beans, and root crops such as carrots require regular watering and are not tolerant to long, dry periods. Vine crops such as squash and zucchini often fare better and can be kept alive with a few waterings once or twice a week through the season.



Shrubs

- Most established shrubs can survive long periods of dry soil. Thorough spring watering and one or two thorough waterings in the summer keeps most well-established shrubs alive for at least one season.



Groundcovers

- Groundcovers often survive on about half the amount of water received under optimal conditions, although some dieback may occur.
- To avoid serious drought stress groundcovers require waterings every 3-6 weeks from spring through fall depending on species and soil type and microclimate.



Lawns

- Warm-season lawns such as bermudagrass and buffalograss are more drought-resistant than cool season grasses such as tall fescue and ryegrass and may come back after several weeks of dryness. Cool season grasses may die within a month or two of receiving no water.
- Cutting the length of irrigation down to $\frac{1}{2}$ of that recommended in the UC lawn watering guide (<http://anrcatalog.ucdavis.edu/pdf8044.pdf>) and watering only once or twice a week may help lawns survive drought.

(Con'd)

- Once a lawn stops receiving adequate moisture, it will gradually turn brown and go dormant over time. A lawn that recently turned brown from drought can often be revived with regular, thorough watering.

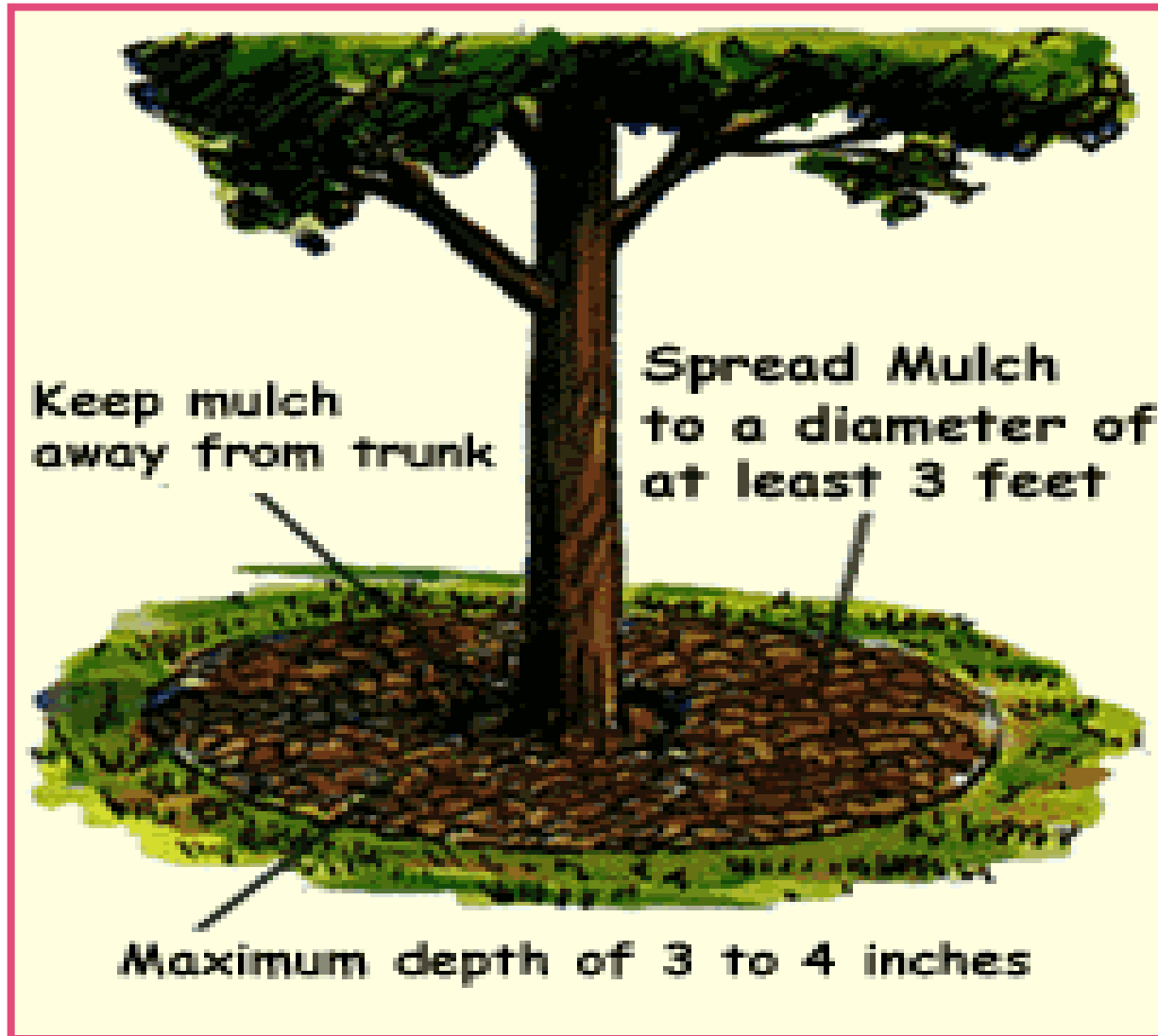


What Else Can You Do Right Now Without Starting Over?

Mulch

- Apply 2-3” of mulch around garden plants and trees to hold water in and reduce soil evaporation.
- Keep it several inches away from tree trunks!
- Make sure to water beneath the mulch.





**What
Mistake Do
You See?**



Mulch
Volcano!

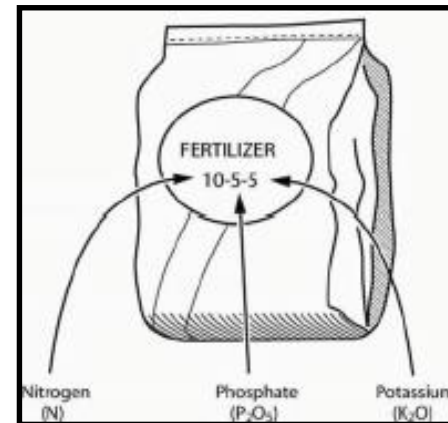
Avoid Planting New Plants

- Young plants require frequent irrigation until established and should not be planted during a drought or under water restrictions.
- Even native plants require continually moist root zones during establishment.



Avoid Overfertilizing

- Too much nitrogen results in lush, weak new growth, and increases the need for even more water.
- Too much fertilizer can lead to pollution of waterways.





Iron Chlorosis

Keep Weeds Out

- Weeds often outcompete garden plants and trees for water.
- Avoid using chemical herbicides; hand-weed instead. Overuse of pesticides can lead to waterways pollution.



Use a Broom Instead of a Hose to Clean up After Gardening/Pruning

- Save water and avoid polluting waterways.
- Get some exercise.



UC ANR Drought Resources

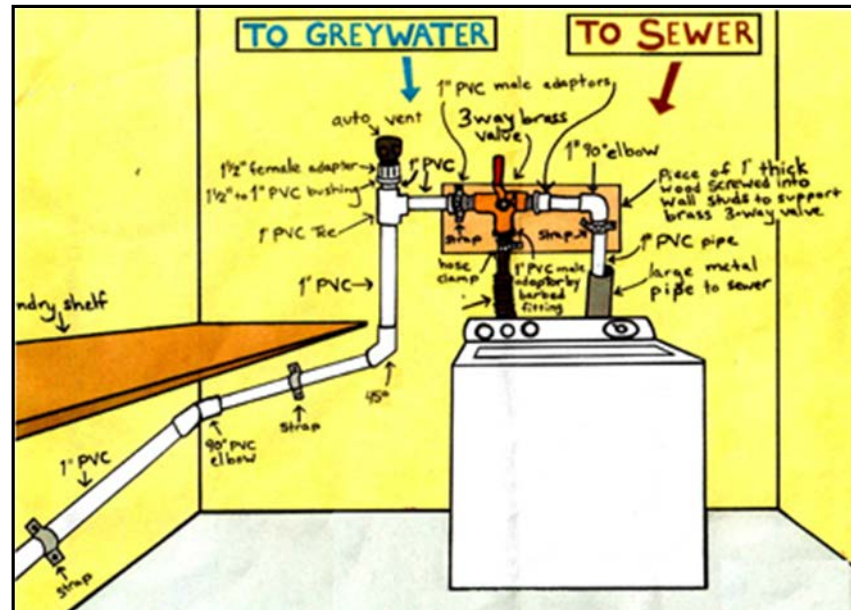
- Keeping Plants Alive Under Drought or Water Restrictions (publication):
<http://anrcatalog.ucanr.edu/pdf/8553.pdf>
- UC ANR Graywater Use (publication):
<http://anrcatalog.ucdavis.edu/pdf/8536.pdf>
- UC ANR Sustainable Landscaping in California (publication):
<http://anrcatalog.ucanr.edu/pdf/8504.pdf>
- UC ANR Lawn Watering Guide (publication):
<http://anrcatalog.ucanr.edu/pdf/8044.pdf>

Use of Graywater to Irrigate California Landscapes



The use of graywater (also spelled greywater, grey water and gray water) to irrigate landscape plants is increasing throughout the united states, particularly in California and other arid states. Municipalities are rapidly amending their codes to encourage the use of home graywater systems.

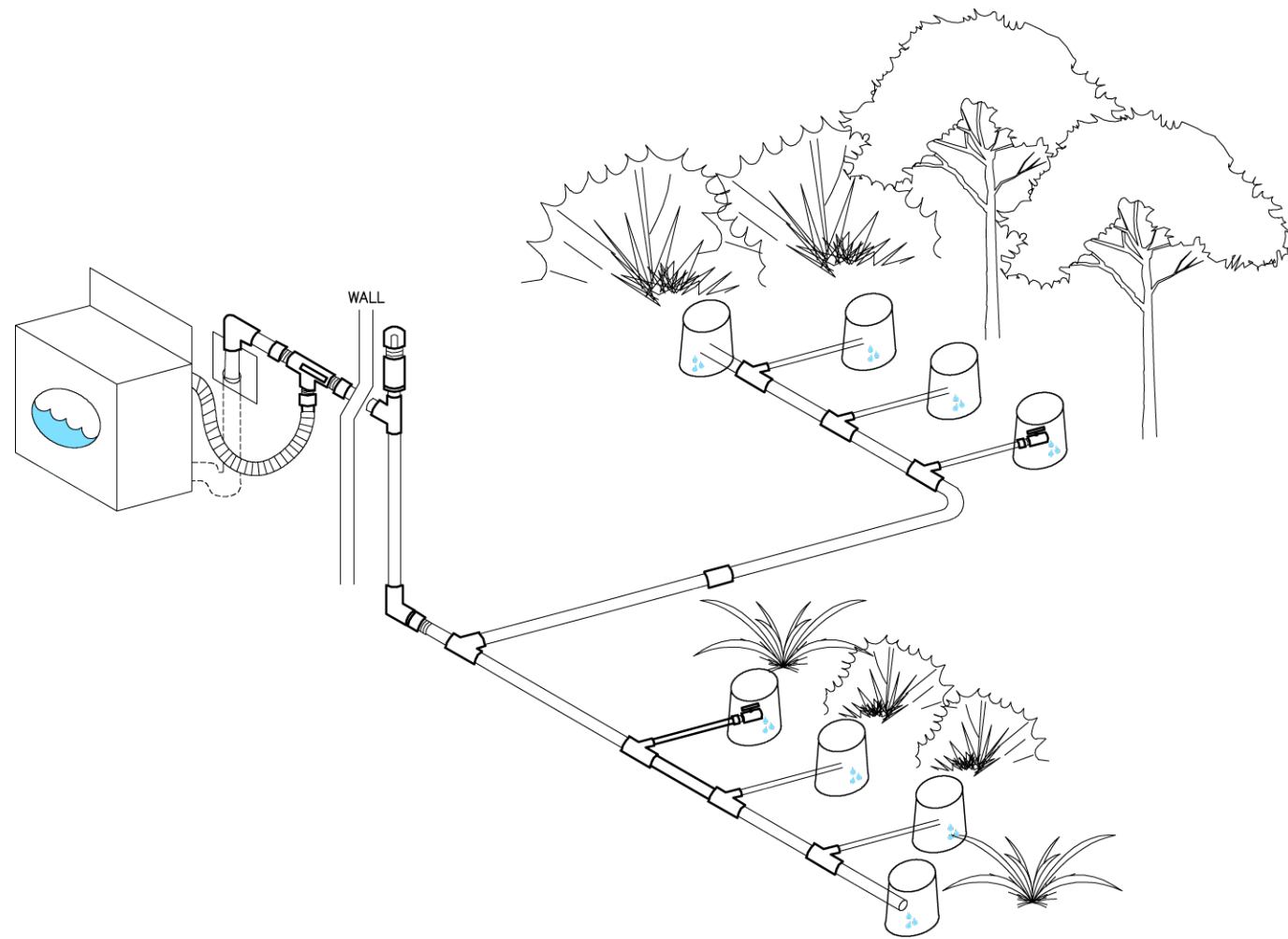
A construction permit is no longer required for the installation of a single-family or two-family residential graywater irrigation system from a washing machine to an outdoor irrigation or disposal field as long as it does not alter the household plumbing.



How Much Graywater Can be Generated?

- Between 10 And 25 Gallons Per Washing Machine Load Is Generated From A Horizontal Drum Machine (Side Loader)
- About 40 Gallons Per Washer Load Is Generated From A Top Loader.





Due to low but potential health risks, graywater should not be used to irrigate - or come into contact with - edible plants



Affordable housing project in Los Angeles (Casa Domingues) irrigated with a large, complex graywater system



- Graywater is often directed to mulch basins constructed by replacing several inches of soil with coarse organic mulch
- They work well for irrigating flower beds and small ornamentals
- However, basins constructed within the drip line of mature trees are not recommended and can result in injury to established roots and unstable and unsafe trees



Know Your Soil (Type) Texture

(graywater regulations require no puddling!)

Table 16A-2 Design Criteria of Six Typical Soils

Type of Soil	Square Feet	Gallons	Square Meters	Liters
	<i>Minimum square feet of irrigation/leaching area per 100 gallons of estimated graywater discharge per day</i>	<i>Maximum absorption capacity in gallons per square foot of irrigation/leaching area for a 24-hour period</i>	<i>Minimum square meters of irrigation/leaching area per liter of estimated graywater discharge per day</i>	<i>Maximum absorption capacity in liters per square meter of irrigation/leaching area for a 24-hour period</i>
<i>Coarse sand or gravel</i>	20	5.0	0.005	203.7
<i>Fine sand</i>	25	4.0	0.006	162.9
<i>Sandy loam</i>	40	2.5	0.010	101.8
<i>Sandy clay</i>	60	1.7	0.015	69.2
<i>Clay with considerable sand or gravel</i>	90	1.1	0.022	44.8
<i>Clay with small amounts of sand or gravel</i>	120	0.8	0.030	32.6

Graywater Can Keep 4-8 Landscape Trees Alive

Download the new free UC ANR 'Graywater Use in California'

Publication: <http://anrcatalog.ucdavis.edu/details.aspx?itemno=8536>

Thank You for Your Service as a UCCE Master Gardener



Janet Hartin, jshartin@ucanr.edu
951.313.2023