



**CALIFORNIA CENTER FOR
URBAN HORTICULTURE**

UC DAVIS

COLLEGE OF AGRICULTURAL & ENVIRONMENTAL SCIENCES



WaterSmart Workshops: Strategies for Water-Efficient Landscapes

**San Diego Gas & Electric Innovation Center
San Diego**

May 13th & 14th, 2015

SERIOUS DROUGHT
HELP SAVE WATER

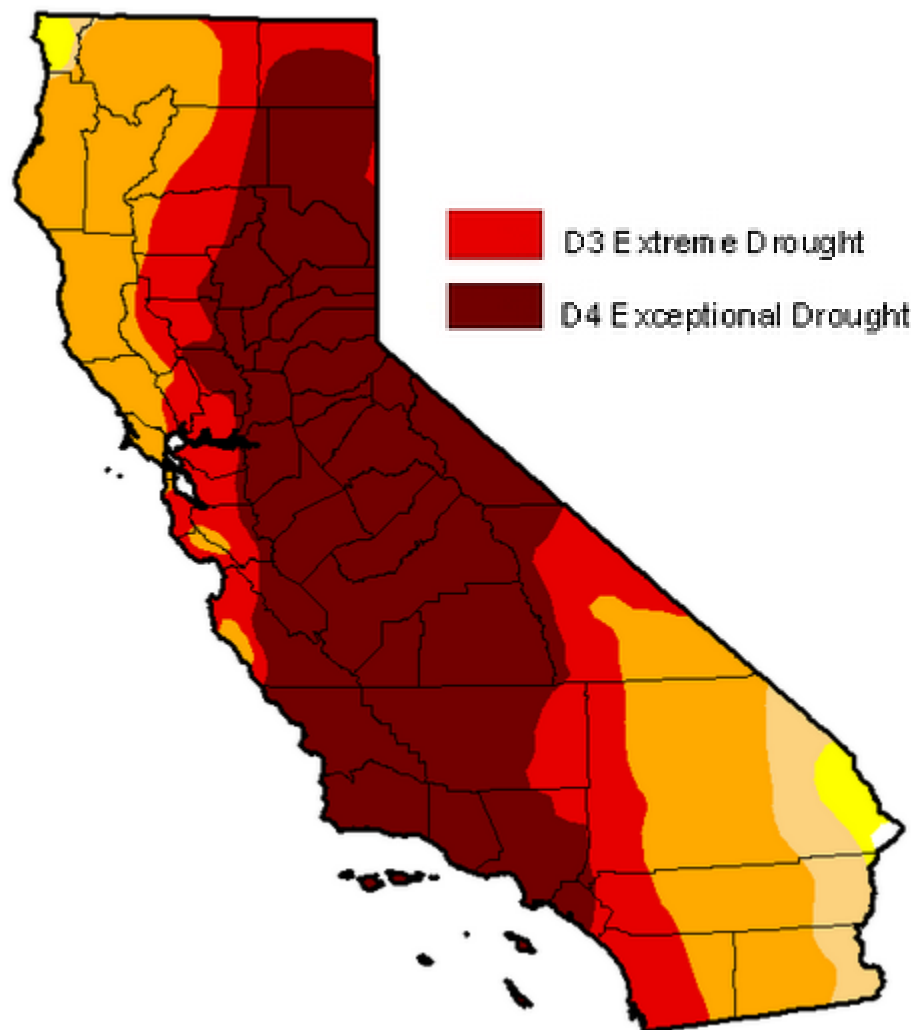


U.S. Drought Monitor California

May 5, 2015

(Released Thursday, May. 7, 2015)

Valid 7 a.m. EST



Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

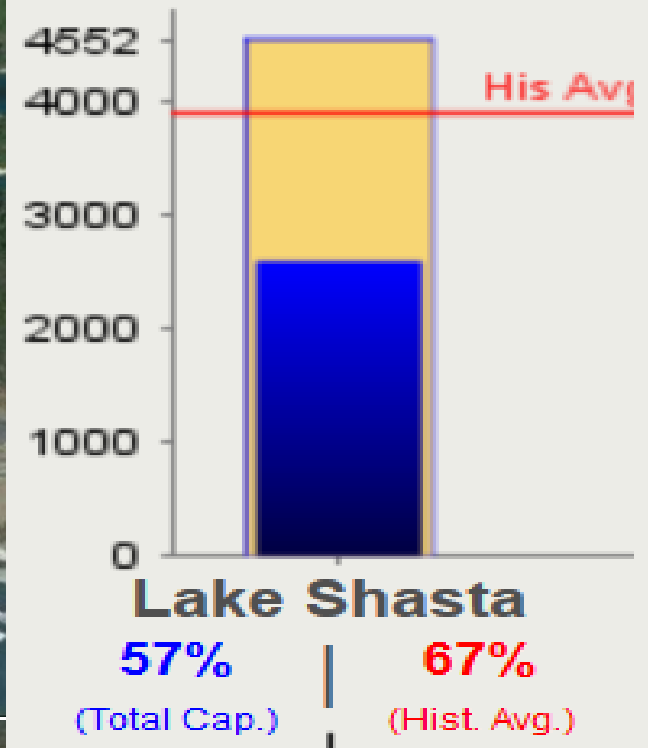
Author:

David Simera

Western Regional Climate Center



<http://droughtmonitor.unl.edu/>



California Snowpack Photos





What is currently happening in response to the drought?

- How many have you heard of “cash for grass” programs?
- Who is promoting “cash for grass” programs?
- Why are they doing this?



[WATER HOME](#) | [GENERAL INFO](#) | [LAKES AND RECREATION](#) | [WATER & SEWER BILL/RATES](#) | [WATER CONSERVATION](#) | [RECYCLED WATER](#) | [WATER QUALITY](#) | [INFRASTRUCTURE IMPROVEMENTS](#) | [PURE WATER SAN DIEGO PROGRAM](#)

[Water Home](#) • [Water Conservation](#) • [Rebate Programs](#)

Water Conservation

- [Water Conservation Home](#)
- [Waste No Water Information and Resources](#)
- [Plumbing Retrofit Upon Re-Sale Ordinance](#)
- [Water Survey Programs](#)
- [Rebate Programs](#)
 - [Rain Barrel Rebates](#)
 - [Grass Replacement Rebates](#)
 - [Micro-Irrigation Rebates](#)
 - [Mulch from Miramar Greenery](#)
 - [SoCal WaterSmart Rebates](#)
- [Kids Water Conservation Corner](#)
- [Contests](#)

Rebate Programs

UPDATED APRIL 22, 2015: As of noon on April 22, 2015, funding for the City's Grass Replacement and Micro-Irrigation Rebate Programs was exhausted and the City is no longer accepting applications for this program.

San Diegans' response to our rebate program was overwhelming and encouraging as our City works to strengthen its water conservation efforts. More than 350 residents and businesses will receive rebates to replace more than 500,000 square feet of water-thirsty grass.

We are expecting to relaunch the program beginning July 1, 2015 pending approval of funding for the next fiscal year. Beginning July 1, 2015, we will once again be taking applications on a first-come, first served basis. Applications will not be accepted prior to July 1, 2015 (i.e. no waiting list will be established).



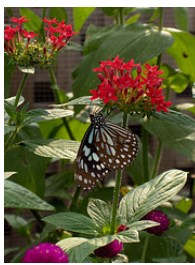
Rebates Available From Other Agencies

If you live in the County (are not a City of San Diego customer) you should check with your own water agency's web site for rebate information or find details on the [San Diego County Water Authority's Turf Replacement Program](#).

Also, you may be eligible for a rebate through the Metropolitan Water District of Southern California's [SoCal Water Smart Program](#).

Rebates from City of San Diego

Rebate	Description
Rain Barrel	Rebates for barrels that catch and store rain water. For residential customers only.
Grass Replacement (out of funding)	Receive rebates for removal of grass (lawn) that is replaced with water wise plant material (artificial turf does not qualify). Rebates available for residential and commercial customers.
Micro-Irrigation (out of funding)	Rebates for converting an overhead spray sprinkler system to low application rate micro-irrigation (i.e. drip, micro-spray, etc.). For residential and commercial customers.
Mulch from Miramar Greenery	City of San Diego residents may load up to two cubic yards or mulch for free with proof of residency. For residential and commercial customers.



San Diego County Water Authority Turf Replacement Program = \$1.50 sq. ft.



Photos courtesy of JoEllen Jacoby, City of San Diego



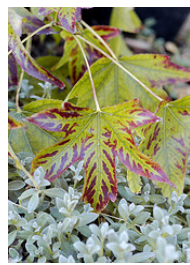
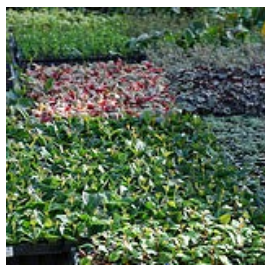
AFTER: Photo from the same vantage point after the project is completed. Turf has been replaced with California Friendly plants.

Photos courtesy of Los Angeles Department of Water and Power



Los Angeles Department of Water & Power: “Cash for Grass”

1. Reimbursement @ \$3.75 per square foot (first 1,500 square feet; @\$2.00)
2. 2009 – 2014 = 11 million square feet converted
3. 2013 - 2014 = 1.6 million square feet converted in one year
4. 2014 – 2015 YTD = 1.7 million “+” square foot requested

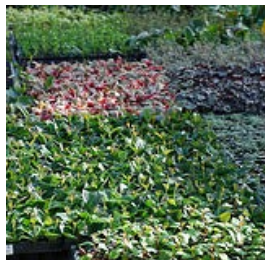


What is the opportunity?

- What is replacing the turf in these landscapes?

WATER CONSERVING PLANTS

- Landscape water conservation strategy
 - Improve irrigation efficiency
 - Match water supply to plant needs (maintain landscape health and appearance)
 - Requires knowledge of plant water needs
- Where do I find a list of low water ornamental plants for my city?
- How can I create my own local plant list?

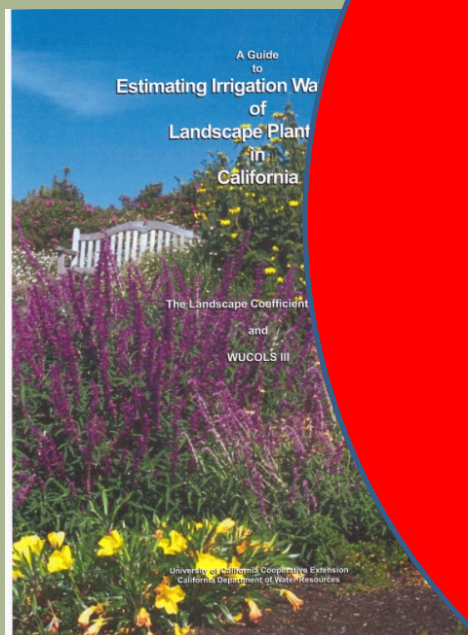


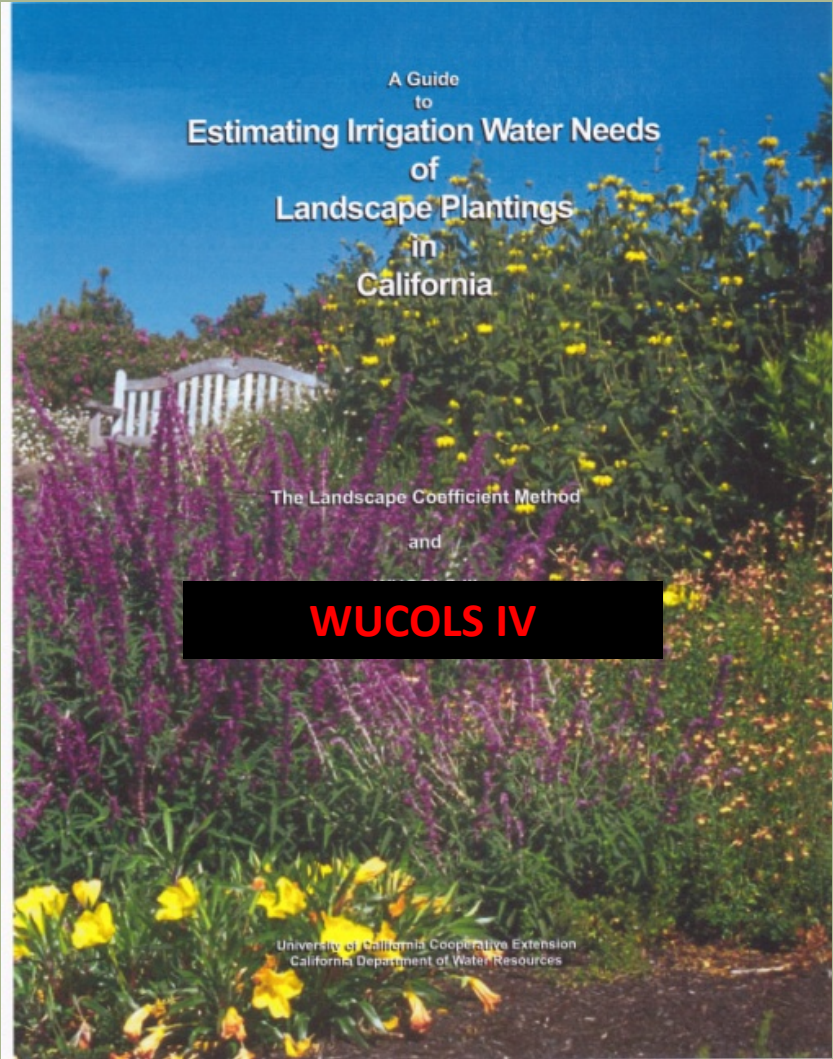
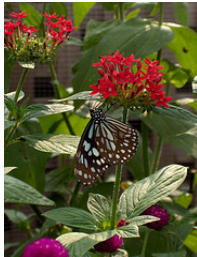
Water Use Climate Species

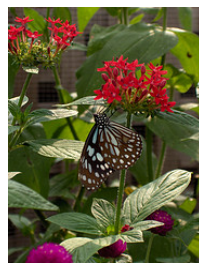
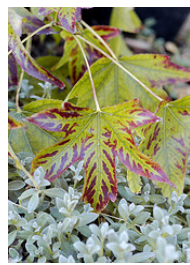
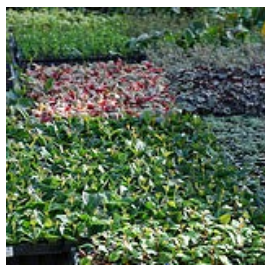
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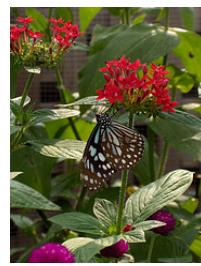
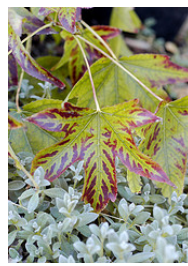
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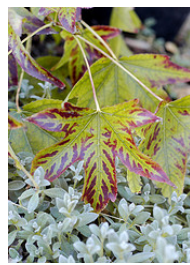
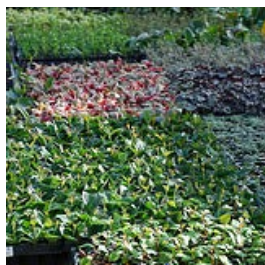
WUCOLS IV “Key” Points

1. A **guide** to plant water needs and is **not** a method for estimating landscape water needs.
2. WUCOLS IV evaluations were made by leading horticultural professionals representing 6 different climatic regions in California.
3. Plant water use designation was based on the collective field experience and observations of evaluators. Although limited, available field research was included as well.
4. Plant water use assignments were made by **consensus agreement** of the evaluators. If a committee did not know a plant, it was not evaluated. If the plant was not appropriate for a region, it was so noted.



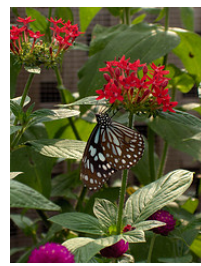
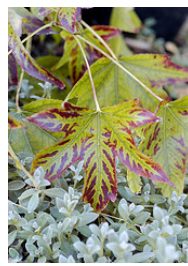
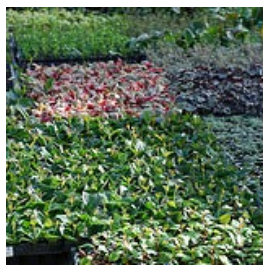
WUCOLS IV Key Points (cont.)

5. Reviewed and updated to 3,546 taxa. Less than 2% of species have been evaluated through field research.
6. The plant factor for MWELo water budget calculation shall be from WUCOLS.
7. Evaluations serve as an important guide in the selection of species for hydrozones and are used by academic, professionals, municipalities and water agencies.
8. Is not perfect and it is based on “horticultural experience & wisdom”, and it serves as a “bridge” to meet a critical need until a “science-based tool or methodology is developed.



Water Use Field Study Projections

- Assumptions
 - 3,546 plant taxa listed (WUCOLS) minus 170 plant taxa (north and south) = 3,376 plant taxa requiring research
 - For N. Calif. study, current research capacity = 30 species researched per 2 years on 1 acre
- Therefore, it would take **112.5 acres** and 2 years to complete the balance of the WUCOLS plant list (N. Calif. only)
- Or, it would take **225 years** to complete WUCOLS list at 30 plants every 2 years



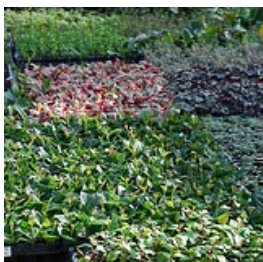
Role of the CCUH in the WUCOLS Update Process

- Gain DWR approval to shift contract funds for WUCOLS III review & update
- Confirm and solicit support from outside stakeholders (landscape architects & designers, contractors, city planners, retailers, irrigation consultants and wholesale nursery growers)
- Hire former WUCOLS authors as consultants, Larry Costello and Katherine Jones
- CCUH began the sponsorship process in 2012 and completed procurement of funds in 2013
- Six regional meetings began in October 2012 and ended one year later
- Provide project oversight and leadership.



WUCOLS IV Sponsors

- ***Regional Water Authority (Northern California)***
- ***American Society of Landscape Architects (CCASLA)***
- ***Association of Professional Landscape Designers (APLD)***
- ***American Society of Irrigation Consultants (ASIC; north and south)***
- ***Cagwin & Dorward (N. Calif. landscape construction & maintenance)***
- ***California Association of Nurseries and Garden Centers (CANGC)***
- ***California Landscape Contractors Association (CLCA State)***
- ***California Landscape Contractors Association (San Diego Chapter)***
- ***San Diego County Water Authority***
- ***Glenn Schmidt Landscaping, Inc.***
- ***Water Forum***
- ***Department of Water Resources, Water Use Efficiency***



WUCOLS IV Regions

North Central

Members	Affiliation
Barrie Coate	Coate and Associates
Nelda Matheny	HortScience
Don Mahoney	Strybing Arboretum
Dick Turner	Pacific Horticulture
Nevin Smith	Suncrest Nursery
Lori Palmquist	Irrigation and Design Consultation
James MacNair	MacNair & Assoc.

Central Valley

Members	Affiliation
Lance Walheim	L. Walheim Assoc.
Ellen Zagory	UCD Arboretum
Karrie Reid	UCCE
Cheryl Buckwalter	Landscape Liasons
Taylor Lewis	Cornflower Farms
Missy Gable	CCUH

South Inland

Members	Affiliation
Bob Perry	B. Perry Assoc.
Bart O'Brien	Rancho Santa Ana BG
Ken Kammeyer	KK Associates
Pam Pavela	Western Municipal Water District
Ron Kammeyer	KK Associates
Marilee Kuhlman	Comfort Zones Garden Design
Dave Giddens	Giddens Irrig. Design



WUCOLS IV Regions

South Coastal

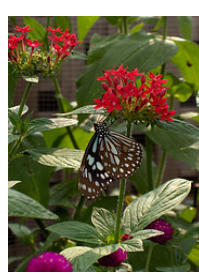
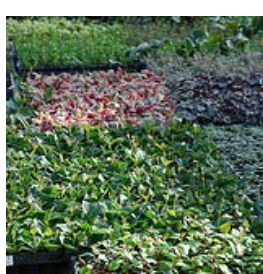
Members	Affiliation
Randy Baldwin	San Marcos Growers
Carol Bornstein	LA Nat'l History Museum
Kathy Musial	Huntington BG
Don Hodel	UC Cooperative Ext.
Mike Evans	Tree of Life Nursery
Kathy Copley	Lightfoot Planning Planning Group

South Coastal (San Diego)

Members	Affiliation
Paul Redeker	Cuyamaca College
Megan Allison	Mira Costa College
Nan Sterman	Garden Writer
Dave Ehrlinger	San Diego BG
Jim Bishop	SD Hort Soc.
David Reed	ASLA

High/Low Desert

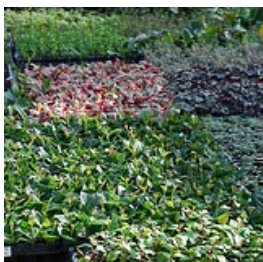
Members	Affiliation
Spencer Knight	Palm Desert
Diane Hollinger	Palm Desert
Randy Meyers	RG Meyers & Nurseries
Ray Lopez	Ray Lopez and Associates
Jeff Place	College of the Desert
Hudson Hale	Horttech Landscape Construction
Bob Perry	B. Perry Associates



Selection Criteria



- Professional diversity (disciplines including nursery professionals, landscape contractors, landscape architects, botanical garden/arboreta staff members, consultants, and academics)
- “Must have” is that we select only the very best "plants people" --- this is crucial to the success of this work
- Availability to meet in person (flexible)
- Team size = 6 – 9 reviewers

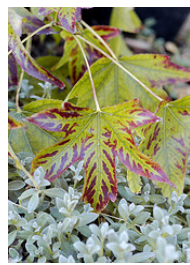
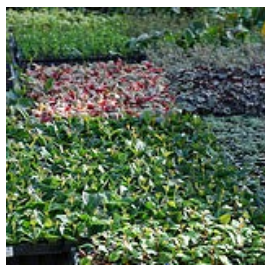


WUCOLS IV Sample Work Sheet

Additions	TYPE	Botanical Name	Common Name	1	2	3	4	5	6
X	B	Albuca juncifolia	rush leaved albuca						
X	B	Albuca nelsonii	natal albuca						
X	B	Albuca shawii							
	B	Alstroemeria spp.	Peruvian lily	M	M	M	M	?	M
X	B	Amarcrinum memoria-corsii	crinodonna						
X	B	Amarygia hybrids	amarygia						
	B	Amaryllis belladonna	naked lady	VL	VL	VL	L	L	L
X	B	Anemone coronaria	poppy-flowered anemone				VL		
	B	Arthropodium cirrhatum	star lily	M	?	M	?	/	/
X	B	Babiana spp.							
	B	Babiana stricta hybrids	baboon flower	L	L	L	?	/	/
X	B	Baeometra uniflora	beetle lily						
X	B	Bloomeraia crocea	golden stars						
X	B	Boophone disticha	oxbane						
	B	Bravoa geminiflora (See Polyanthes geminiflora)							
	B	Bulbinella robusta	bulbinella	L	?	?	L	?	?
X	B	Calochortus spp.	Mariposa lily						
	B	Calostemma purpureum	garland lily	M	?	?	?	?	?
X	B	Camassia cusickii	Cusick's Quamash						
X	B	Camassia quamash	camas						
	B	Canna spp.	canna	M	M	M	H	M	M
X	B	Chlorogalum pomeridianum	soap plant						
X	B	Clintonia andrewiana	red clintonia						
	B	Colchicum agrippium	autumn crocus	VL	VL	M	M	M	M
	B	Crinum spp.	crinum lily, spider lily	M	M	M	M	M	?

WUCOLS list divided into plant categories:

Bamboo
Bulb
Grass
Groundcover
Perennial
Palm and Cycad
Shrub
Succulent
Tree
Vine
California native



Searchable Database Requirements

1. WUCOLS IV designated website (<http://ucanr.edu/sites/WUCOLS>)
2. Print entire plant list (all regions)
3. Search by region by selected city
4. Search:
 - a. Botanical name
 - b. Common name
 - c. Plant Type
 - d. Water Use
5. Create “your own” list
6. Save to an Excel file



wucols iv



Web

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Search tools

About 1,630 results (0.36 seconds)

WUCOLS IV - University of California Cooperative Extension

ucanr.edu/sites/WUCOLS ▾

Water Use Classification of Landscape Species (**WUCOLS IV**) - Home Page.

Plant Search Database

... Species (WUCOLS IV) - Plant
Search Database. ... Plant ...

Download WUCOLS IV Use...

... of Landscape Species (WUCOLS IV)
- Download ...

Download WUCOLS IV Plan...

Click to download the WUCOLS IV
Plant List Adobe ...

Dr Dave Fujino

Water Use Classification of Landscape
Species (WUCOLS ...

User Manual

User Manual. cover page. Page Last
Updated: January 2, ...

Using WUCOLS Evaluations

WUCOLS Evaluations and Plant
Cultural Requirements.

[More results from ucanr.edu »](#)

WUCOLS IV

Water Use Classification of Landscape Species

Home Page

[User Manual](#)[Plant Search Instructions](#)[Plant Search Database](#)[Download WUCOLS IV Plant List](#)[Download WUCOLS IV User Manual](#)[Water Requirements for Turfgrasses](#)[Partners](#)[Acknowledgements](#)

Home Page

GETTING STARTED

If you are using the WUCOLS list for the first time, it is essential that you read the *User Manual*. The manual contains very important information regarding the evaluation process, categories of water needs, plant types, and climatic regions. It is necessary to know this information to use WUCOLS evaluations and the plant search tool appropriately. To access the *User Manual*, click on the tab (on left) and view specific topics.

Water conservation is an essential consideration in the design and management of California landscapes. Effective strategies that increase water use efficiency must be identified and implemented. One key strategy to increase efficiency is matching water supply to plant needs. By supplying only the amount of water needed to maintain landscape health and appearance, unnecessary applications that exceed plant needs can be avoided. Doing so, however, requires some knowledge of plant water needs.

WUCOLS IV provides evaluations of the irrigation water needs for over 3,500 taxa (taxonomic plant groups) used in California landscapes. It is based on the observations and extensive field experience of thirty-six landscape horticulturists (see the section "Regional Committees") and provides guidance in the selection and care of landscape plants relative to their water needs.



WUCOLS IV provides an assessment of irrigation water needs for over 3,500 taxa. Photo by Ellen Zagory.

Plant Search Database

Step 1: Select a City

North Central Coastal



Submit

Central Valley



Submit

South Coastal



Submit

South Inland Valley



Submit

High and Intermediate Desert



Submit

Low Desert



Submit

See WUCOLS List for All 6 Regions

Plant Search Database

Step 1: Select a City

North Central Coastal



Submit

Central Valley



Submit

San Diego



Submit

South Inland Valley



Submit

High and Intermediate Desert



Submit

Low Desert



Submit

See WUCOLS List for All 6 Regions

Plant Search Database

Step 2: Plant Search

San Diego, CA ([Select a New City](#))

Botanical Name

Search

Common Name

Search

Plant Type

- ☒ **Gc** Ground Cover
- ☒ **P** Perennial
- ☒ **S** Shrub
- ☒ **T** Tree
- ☒ **V** Vine
- ☐ **Ba** Bamboo
- ☐ **Bu** Bulb
- ☒ **G** Grass
- ☐ **Pm** Palm and Cycad
- ☐ **Su** Succulent
- ☒ **N** California Native
- ☒ **A** Arboretum All-star

Water Use

- ☐ Very Low
- ☒ Low
- ☐ Moderate
- ☐ High
- ☐ Unknown
- ☐ Not Appropriate for this Region

Search

All Plants for this Region

Plant Search Database

Results

San Diego, CA

869 results

Start Over

Search Again

Export List

Check All

Type	Botanical Name	Common Name	Water Use	Export
T	Abies pinsapo	Spanish fir	Low	<input type="checkbox"/>
S N	Abutilon palmeri	Indian mallow	Low	<input type="checkbox"/>
S	Acacia aneura	mulga	Low	<input type="checkbox"/>
T	Acacia baileyana	Bailey acacia	Low	<input type="checkbox"/>
S T	Acacia berlandieri	guajillo	Low	<input type="checkbox"/>
S A	Acacia boormanii	Snowy River wattle	Low	<input type="checkbox"/>
S T	Acacia constricta	whitethorn acacia	Low	<input type="checkbox"/>
S	Acacia covenyi	blue bush	Low	<input type="checkbox"/>
S T	Acacia craspedocarpa	leatherleaf acacia	Low	<input type="checkbox"/>
S	Acacia cultriformis	knife acacia	Low	<input type="checkbox"/>
T	Acacia dealbata	silver wattle	Low	<input type="checkbox"/>
T	Acacia decurrens	green wattle	Low	<input type="checkbox"/>
T	Acacia erioloba	camel thorn	Low	<input type="checkbox"/>

Plant Search Database

Results

San Diego, CA

869 results

[Start Over](#)[Search Again](#)[Export List](#)

Type	Botanical Name	Common Name	Water Use	Export
T	Abies pinsapo	Spanish fir	Low	<input type="checkbox"/>
S N	Abutilon palmeri	Indian mallow	Low	<input type="checkbox"/>
S	Acacia aneura	mulga	Low	<input type="checkbox"/>
T	Acacia baileyana	Bailey acacia	Low	<input type="checkbox"/>
S T	Acacia berlandieri	guajillo	Low	<input type="checkbox"/>
S A	Acacia boormanii	Snowy River wattle	Low	<input type="checkbox"/>
S T	Acacia constricta	whitethorn acacia	Low	<input type="checkbox"/>
S	Acacia covenyi	blue bush	Low	<input type="checkbox"/>
S T	Acacia craspedocarpa	leatherleaf acacia	Low	<input type="checkbox"/>
S	Acacia cultriformis	knife acacia	Low	<input type="checkbox"/>
T	Acacia dealbata	silver wattle	Low	<input type="checkbox"/>
T	Acacia decurrens	green wattle	Low	<input type="checkbox"/>

Plant Search Database

Export List

San Diego, CA

19 result

Start Over

Search Again

Export List

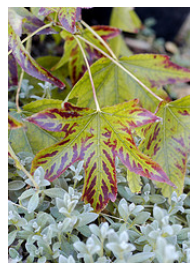
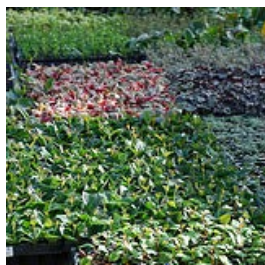
Type	Botanical Name	Common Name	Water Use	
S A	Acacia boormanii	Snowy River wattle	Low	<input checked="" type="checkbox"/>
Gc S N	Arctostaphylos 'Pacific Mist'	Pacific Mist manzanita	Low	<input checked="" type="checkbox"/>
S	Banksia menziesii	firewood banksia	Low	<input checked="" type="checkbox"/>
S	Berberis thunbergii & cvs.	Japanese barberry	Low	<input checked="" type="checkbox"/>
P A	Bulbine frutescens	stalked bulbine	Low	<input checked="" type="checkbox"/>
P	Carex flacca (C. glauca)	blue sedge	Low	<input checked="" type="checkbox"/>
Gc N A	Ceanothus maritimus 'Valley Violet'	Valley Violet ceanothus	Low	<input checked="" type="checkbox"/>
Gc S	Cistus spp. and cvs.	rockrose	Low	<input checked="" type="checkbox"/>
Gc	Cotoneaster dammeri 'Coral Beauty'	bearberry cotoneaster	Low	<input checked="" type="checkbox"/>
S	Dodonaea viscosa 'Purpurea'	purple hopseed bush	Low	<input checked="" type="checkbox"/>
P N A	Erigeron 'Wayne Roderick'	Wayne Roderick daisy	Low	<input checked="" type="checkbox"/>
G N A	Festuca californica and cvs.	California fescue	Low	<input checked="" type="checkbox"/>
S V A	Hardenbergia violacea	lilac vine	Low	<input checked="" type="checkbox"/>
P N A	Iris Pacific Coast hybrids	Pacific Coast hybrids	Low	<input checked="" type="checkbox"/>

Export to Excel

Uncheck All

Example of low water use plant list for San Diego

2	WUCOLS - San Diego			
3				
4	Type	Botanical Name	Common Name	Water Use
5	S A	Acacia boormanii	Snowy River wattle	Low
6	Gc S N	Arctostaphylos "Pacific Mist"	Pacific Mist manzanita	Low
7	S	Banksia menziesii	firewood banksia	Low
8	S	Berberis thunbergii & cvs.	Japanese barberry	Low
9	P A	Bulbine frutescens	stalked bulbine	Low
10	P	Carex flacca (C. glauca)	blue sedge	Low
11	Gc N A	Ceanothus maritimus "Valley Violet"	Valley Violet ceanothus	Low
12	Gc S	Cistus spp. and cvs.	rockrose	Low
13	Gc	Cotoneaster dammeri "Coral Beauty"	bearberry cotoneaster	Low
14	S	Dodonaea viscosa "Purpurea"	purple hopseed bush	Low
15	P N A	Erigeron "Wayne Roderick"	Wayne Roderick daisy	Low
16	G N A	Festuca californica and cvs.	California fescue	Low
17	S V A	Hardenbergia violacea	lilac vine	Low
18	P N A	Iris Pacific Coast hybrids	Pacific Coast hybrids	Low
19	P	Kniphofia uvaria hybrids and cvs.	red hot poker	Low
20	Gc N A	Lessingia filaginifolia "Silver Carpet" (Corethrogyne)	California beach aster	Low
21	S	Nandina domestica	heavenly bamboo	Low
22	S A	Phlomis purpurea (P. caballeroi)	purple Jerusalem sage	Low
23	P S	Protea spp. & cvs.	protea	Low



[WUCOLS IV \(http://ucanr.edu/sites/WUCOLS\)](http://ucanr.edu/sites/WUCOLS)

1. Print entire plant list (all regions)
2. Search by region by selected city (San Diego)
3. Search:
 - a. Botanical name
 - b. Common name
 - c. Plant Type
 - d. Water Use
4. Create “your own” low water use plant list for San Diego
5. Save “your list” to an Excel file

WUCOLS IV

Water Use Classification of Landscape Species

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GETTING STARTED

If you are using the WUCOLS list for the first time, it is essential that you read the *User Manual*. The manual contains very important information regarding the evaluation process, categories of water needs, plant types, and climatic regions. It is necessary to know this information to use WUCOLS evaluations and the plant search tool appropriately. To access the *User Manual*, click on the tab (on left) and view specific topics.

Water conservation is an essential consideration in the design and management of California landscapes. Effective strategies that increase water use efficiency must be identified and implemented. One key strategy to increase efficiency is matching water supply to plant needs. By supplying only the amount of water needed to maintain landscape health and appearance, unnecessary applications that exceed plant needs can be avoided. Doing so, however, requires some knowledge of plant water needs.

WUCOLS IV provides evaluations of the irrigation water needs for over 3,500 taxa (taxonomic plant groups) used in California landscapes. It is based on the observations and extensive field experience of thirty-six landscape horticulturists (see the section "Regional Committees") and provides guidance in the selection and care of landscape plants relative to their water needs.



WUCOLS IV provides an assessment of irrigation water needs for over 3,500 taxa. Photo by Ellen Zagory.



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Division of Agriculture and Natural Resources

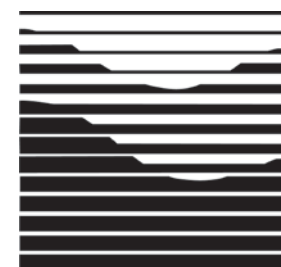
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PUBLICATION 8395 / AUGUST 2009

Managing Turfgrasses during Drought

M. ALI HARIVANDI, University of California Cooperative Extension Advisor, San Francisco Bay Area; **JAMES BAIRD**, Turfgrass Specialist, University of California, Riverside; **JANET HARTIN**, University of California Cooperative Extension Advisor, San Bernardino County; **MICHAEL HENRY**, University of California Cooperative Extension Advisor, Riverside County; **DAVID SHAW**, University of California Cooperative Extension Advisor, San Diego County



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Dave Fujino, Ph.D.

Executive Director

California Center for Urban Horticulture

UC Davis

(530) 754-7739

dwfujino@ucdavis.edu

<http://ccuh.ucdavis.edu>

Water Requirements for Turfgrasses

Warm-season and cool-season turfgrasses were not reviewed by the WUCOLS IV regional committees. Data here is from Harivandi, et. al., 2009 publication, *Managing Turfgrasses During Drought*. The complete publication is cited below.

Water requirements for Warm-season and Cool-season Turfgrasses

Type	Common name	Optimal Irrigation* (% ET ₀)	Deficit Irrigation** (% ET ₀)
Warm season	Common bermudagrass	60	40
	Hybrid bermudagrass	60	40
	St. Augustinegrass	60	40
	Seashore paspalum	60	40
	Zoysiagrass	60	40
	Buffalograss	60	40
	Kikuyugrass	60	40
Cool Season	Tall fescue	80	60
	Perennial ryegrass	80	60
	Kentucky bluegrass	80	60
	Fineleaf fescues	80	60
	Creeping bentgrass	80	60
	Rough bluegrass	80	60

* Optimum irrigation is the amount of water needed for most efficient growth, maximum quality, and best appearance.

** Deficit irrigation provides sufficient water to maintain adequate appearance with less growth