

A vibrant garden scene featuring a variety of plants. In the foreground, there's a large agave-like plant with long, pointed leaves. To its right, a bush of bright orange flowers is in full bloom. Further right, a tall, thin plant with small orange flowers stands prominently. In the background, a dense thicket of green foliage is visible, with some purple flowers peeking through. A stone border separates the garden from a sandy area on the left. A black circular overlay with a white border is positioned in the upper left quadrant, containing the text 'Nature Restoration Landscaping'.

Nature
Restoration
Landscaping



Long time mountain biker

Fell in love with the nature of California riding through wild spaces of San Diego County

15 years ago I decided I wanted my garden to be like nature

Dennis Mudd

- Founder of Calscape
- Native garden won San Diego Home and Garden of the Year award in 2014

My Starting Point





Phase 1: Not Nature

- My first contractor's "native plant" design
- Focus on Australian and South African low water plants
- Heavy use of Rock Rose, Butterfly Bush, Acacias, Kangaroo Pods, African Feather Grass



Phase 2: Beautified Nature

- Focus on beautiful flowers & form
- Year-round green
- Emphasis on cultivars
- Lots of work
- Didn't feel like nature to me
- All dead in 3-4 years after planting





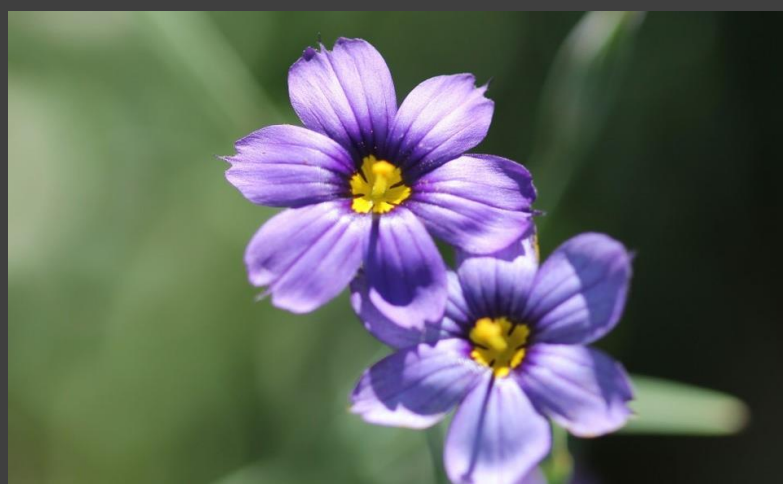
Phase 3: Real Nature

- Focused on restoring nature.
- Grew local natives
- Plants stopped dying
- Supported a huge amount of biodiversity
- Easy to manage. Nature does all the work.

Principles of Nature Restoration Landscaping

- **Mimic Nature**
- Choose plants that naturally belong where you are growing them
- Natural irrigation
- Natural weed control
- Natural mulching
- Natural pest control

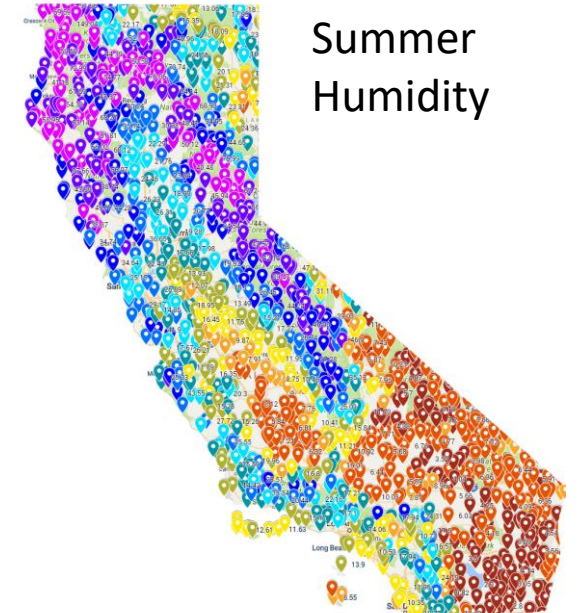
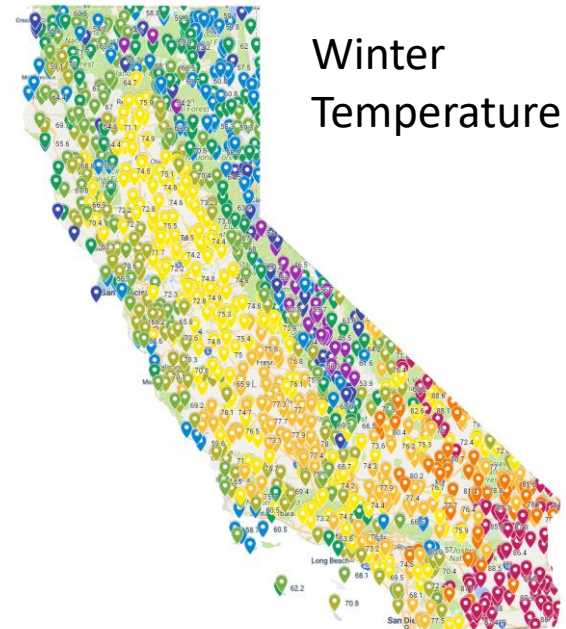
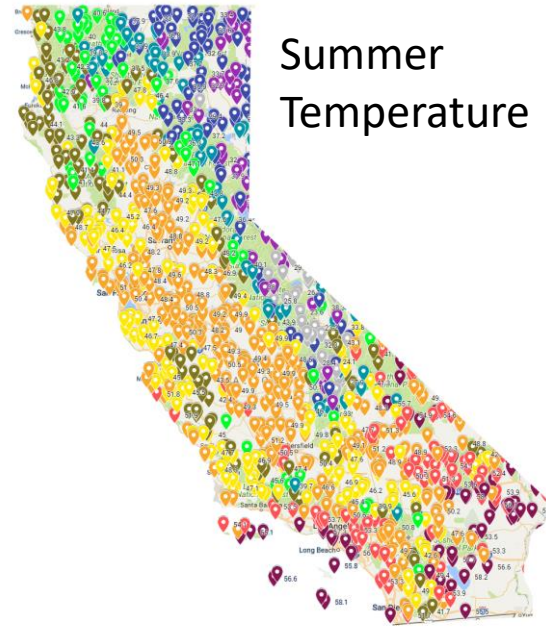
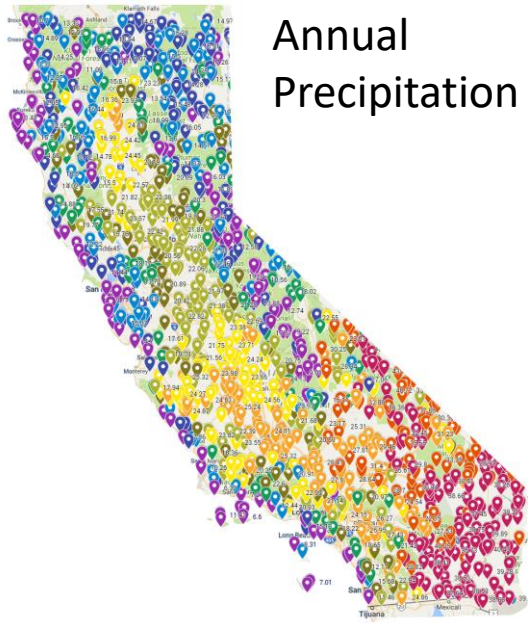




Natural Plant Selection

Choose plants that naturally belong where you are growing them

- Same climate
- Same soil moisture
- Same drainage
- Same sun conditions
- Same ecological relationships

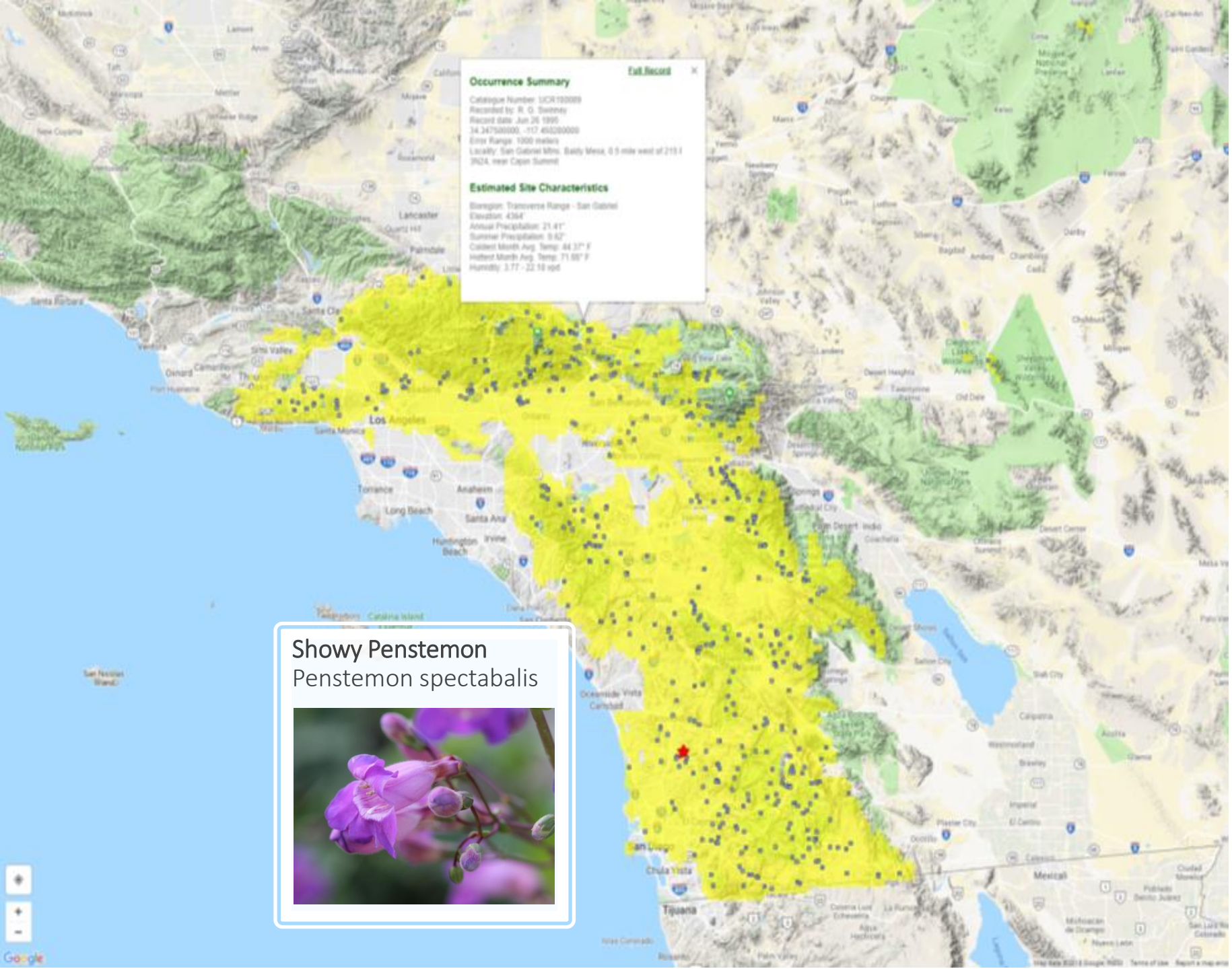


California is a State of Diverse Climates

There are over 7000 plants native to California. On average ~10% naturally grow in any given square mile.

Calscape Plant Maps

- Based on over 2 million field occurrences of all ~8000 plants native to California
- Each plant's estimated range includes:
 - Square miles where the given plant has been observed in nature,
 - and nearby square miles with the same:
 - Annual precipitation
 - Summer precipitation
 - Average winter temp
 - Average summer temp
 - Winter humidity
 - Summer humidity



Occurrence Summary
Exit Record X
Catalogue Number: UCR100009
Recorded by: R. O. Sweeney
Record date: Jun 26 1996
34.34750000, -117.46520000
Elev Range: 1000 meters
Locality: San Gabriel Mtns, Baldy Mesa, 0.5 mile west of 2191
3924, near Cape Summit

Estimated Site Characteristics
Bioregion: Transverse Range - San Gabriel
Elevation: 4364'
Annual Precipitation: 21.41"
Summer Precipitation: 0.52"
Coldest Month Avg. Temp: 44.37° F
Warmest Month Avg. Temp: 71.00° F
Humidity: 3.77 - 22.16 spd



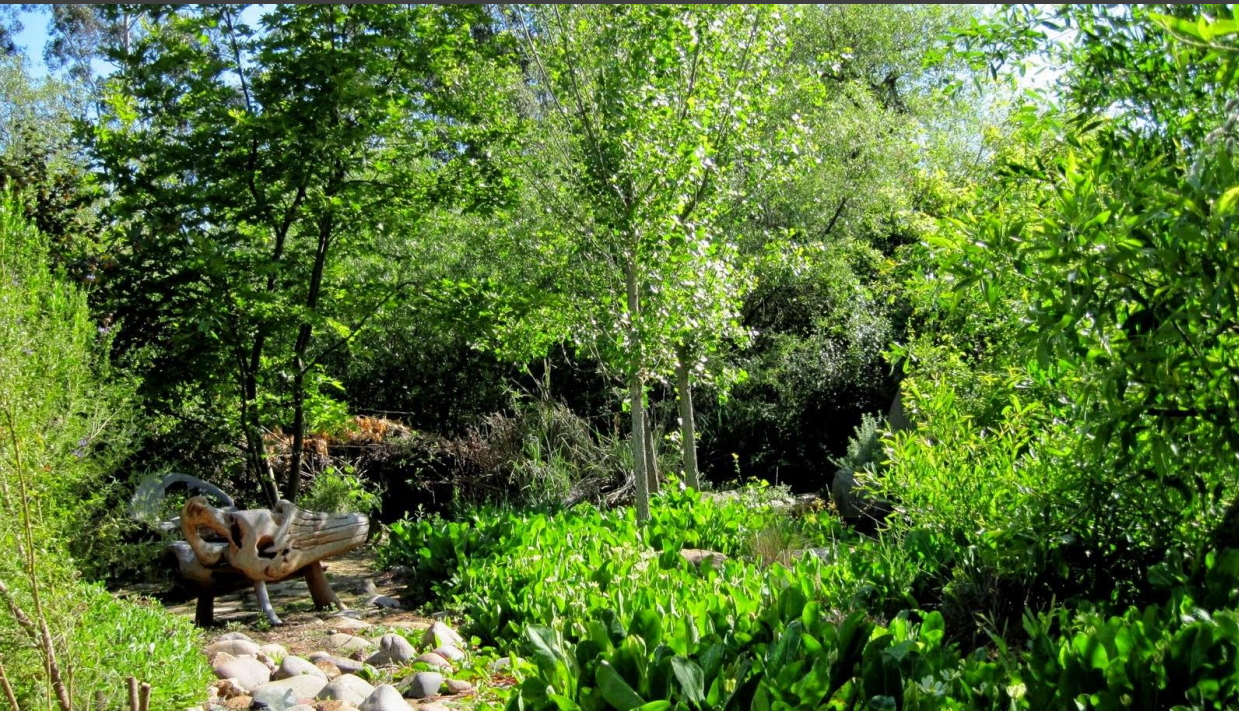


Finding the plants likely to grow in your area is only half of the battle

You also need plants suitable for the exact spot you are planting them.

Key factors:

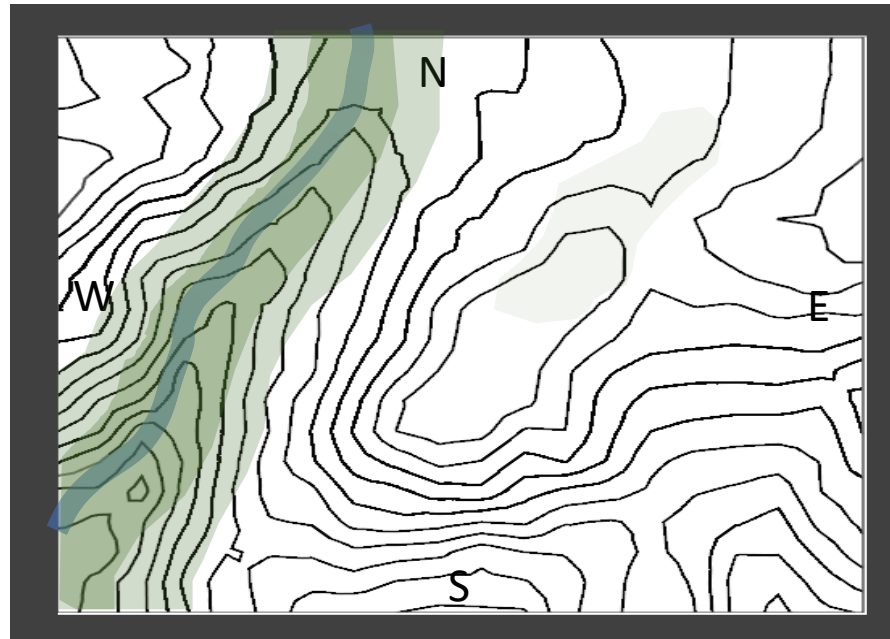
- Sun exposure
- Soil drainage
- Dry season soil moisture





Riparian zones

Choose the right plants for specific soil moisture conditions



North facing slopes



South facing slopes






























East facing slopes

Advanced Search Results

Options

Edit Search

27 Plants. Native to: **Poway, Ca.** Type: **Shrub.** Sun: **Sun.** Drainage: **Fast.** Water Requirement: **Low.** Ease of Care: **Very Easy.**
 Nurseries: **Moosa Creek Nursery.**

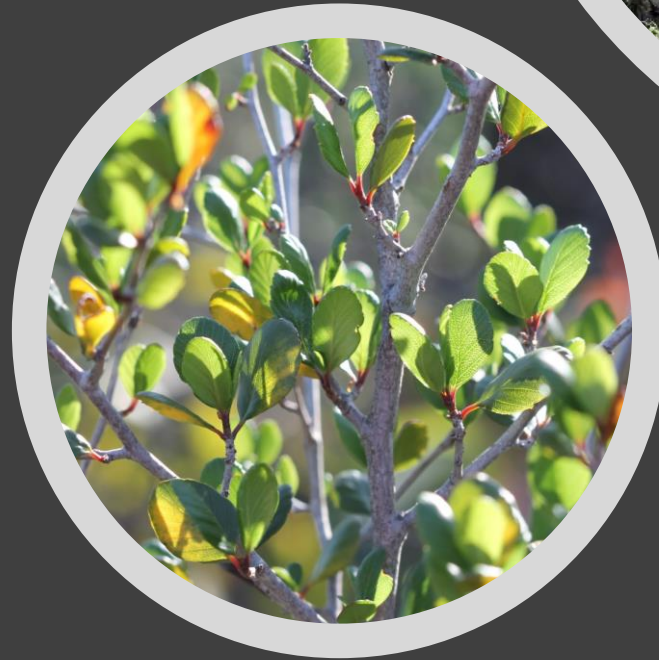
- | | | | | |
|--|---|---|---|--|
| 1  Toyon
Heteromeles
arbutifolia | 2  Sugar Sumac
Rhus ovata | 3  White Sage
Salvia apiana | 4  Lemonade Sumac
Rhus integrifolia | 5  Silver Lupine
Lupinus
albifrons |
| 6  Coffee Berry
Frangula
californica | 7  White Coast Ceanothus
Ceanothus
verrucosus | 8  Coyote Bush
Baccharis
pilularis | 9  Black Sage
Salvia mellifera | 10  Thickleaf Yerba Santa
Eriodictyon
crassifolium |
| 11  California Buckwheat
Eriogonum
fasciculatum | 12  Hollyleaf Redberry
Rhamnus
ilicifolia | 13  Bladder Pod
Peritoma
arborea | 14  Scrub Oak
Quercus
berberidifolia | 15  Mulefat
Baccharis
salicifolia |
| 16  Bush Sunflower
Encelia
californica | 17  California Sagebrush
Artemisia
californica | 18  Broom Baccharis
Baccharis
sarothroides | 19  San Diego County Vigiera
Bahiopsis
laciniata | 20  Menzies' Goldenbush
Isocoma
menziesii |
| 21  Laurel Sumac
Malosma
laurina | 22  Island Morning Glory
Calystegia
macrostegia | 23  San Diego Barrelcactus
Ferocactus
viridescens | 24  Coast Prickly Pear
Opuntia
littoralis | 25  Interior Live Oak
Quercus
wislizeni |
| 26  Coastal Cholla
Cylindropuntia
prolifera | 27  Emory's Baccharis
Baccharis
salicina | | | |

Use Calscape
 Advanced Search to
 Select the Right Plants

- General Location
- Sun Conditions
- Soil Moisture
- Drainage
- Water Requirement
- East of Care
- Nurseries

Irrigating Local Natives

- Normal rainfall is enough for plants that evolved in dry sites.
 - Normal rainfall may not be enough for plants that evolved in moister sites (especially near drainages).
 - Most natural drainages have been paved over in the developed part of the state
-
- Even 1x/month direct watering in summer also sometimes kill mature local natives
 - Why don't regular irrigation techniques work with CA natives?





Mycorrhiza

Nearly all California natives need healthy mycorrhiza to survive

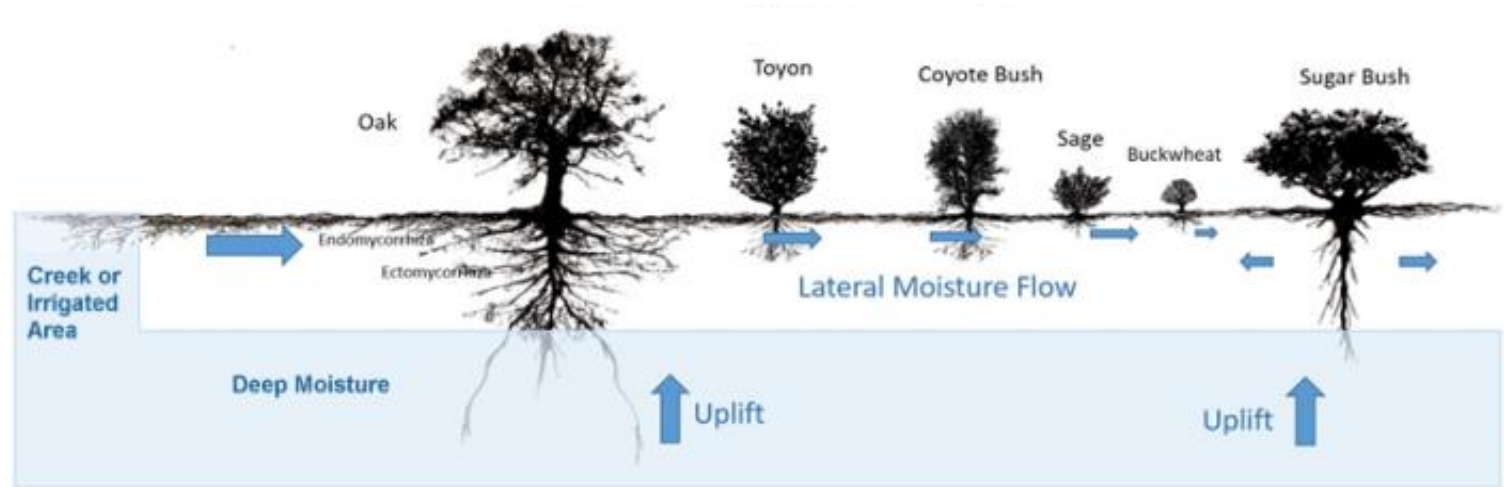
- Provides critical micronutrients to its plant hosts
- Increases absorptive capabilities of root systems by up to 1000x
- Stores water and makes it available to plants in dry periods
- Represses weeds and soil pathogens
- Attracts predators when plant hosts under attack

Mycorrhiza species that are symbiotic with drought-tolerant California natives often die in warm wet conditions

Natural Irrigation

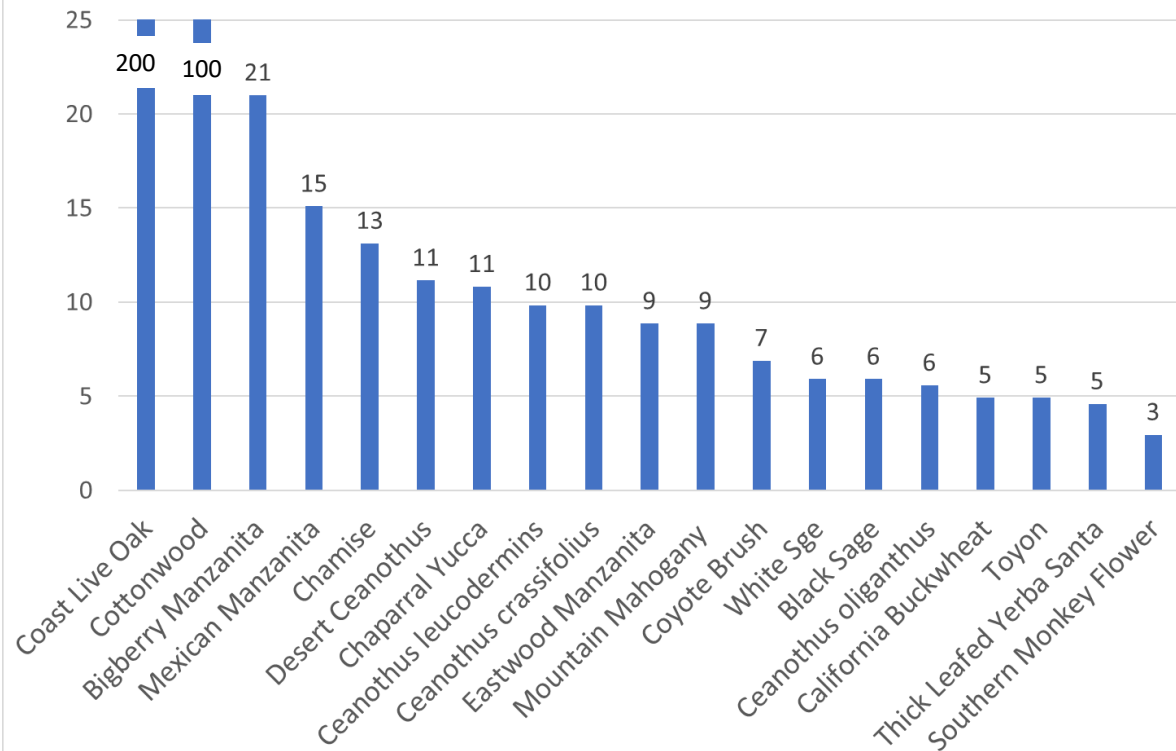
Relies on plant roots and mycorrhiza to move water from moist soils to dry soils

Lateral water transfer - pulling moisture outward from surface water sources



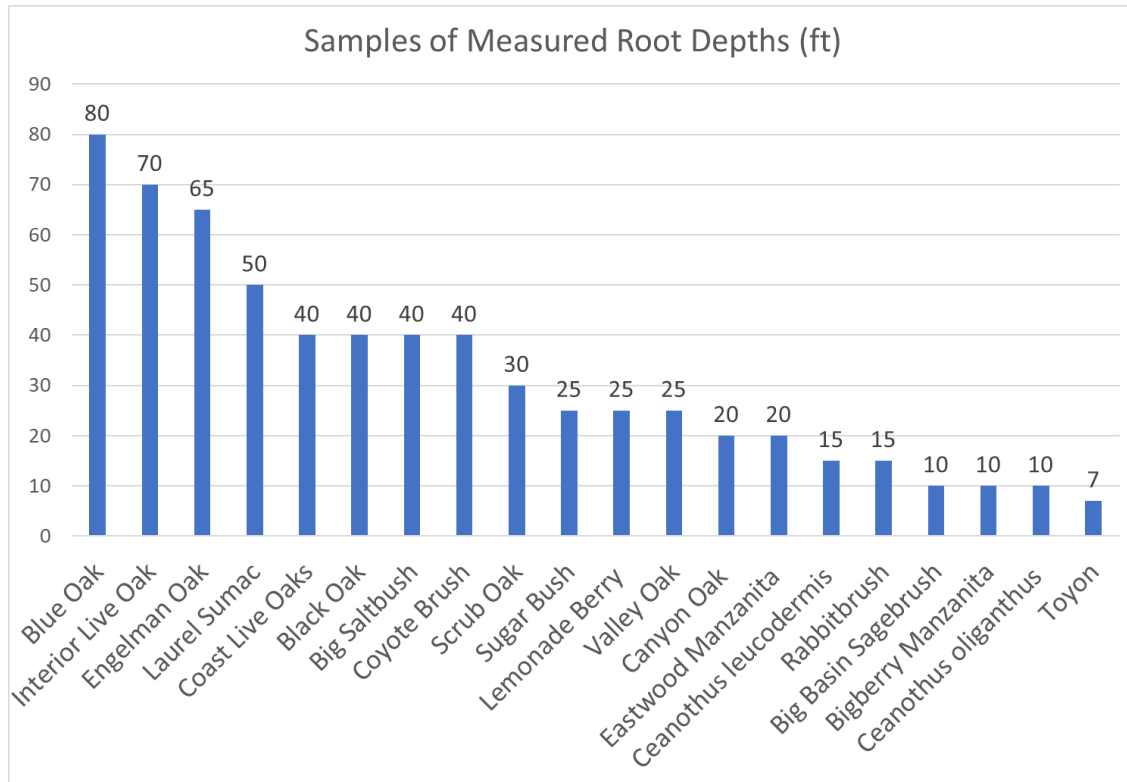
Water uplift - pulling moisture up from deeper groundwater sources

Sample of Measured Root Reach (ft. from Trunk)



Wide rooted plants reach out to riparian zones and share water with dry soil plants

- Riparian plants stretch their roots down to the water source and pull it up the bank.
- Semi-riparian plants then pull water up from the riparian plants
- Dry soil plants pull moisture up-hill from semi-riparian plants

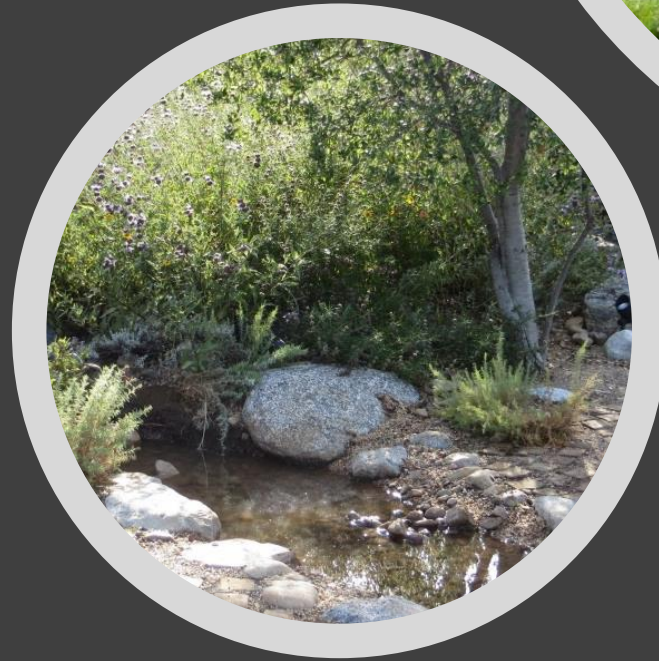


Deep rooted plants pull up ground water and share with shallow rooted plants

- Large trees can deliver up to 40-60 gallons of water to upper soil layers every night.
- Smaller shrubs can deliver up to a quart of water to surface soils each night.
- Shallow root plants can get 20-60% of their moisture from water uplift.

Mimic Natural Irrigation

- Avoid direct irrigation of established non-riparian plants
- Create basins to catch rainwater in the winter and irrigate them in the dry season (~1x / week)
- Grow non-riparian plants 3-30 feet away from moist basins. Plant roots will stretch to find and share moisture.
- Plant deep rooted trees and shrubs to lift groundwater to the surface and share with shallow rooted plants.



My Biomimicry Irrigation System



No direct irrigation of non-riparian plants

Natural Mulching



- Add rocks
- Once established, let the plants create their own organic mulch
- Native plants and native mycorrhiza naturally evolved to grow in their own organic mulch.
- Plant closely, let branches shade soil



Natural Weed Control

- Keep surface of the ground dry in summer except for a few designated riparian areas and seeps
- Plant natives closely enough so mycorrhizal roots finish off weeds in dry areas
- Pull any weeds in riparian areas
- Avoid Roundup. It will kill your mycorrhiza.





Natural Rodent Control

- Rodents seldom kill local natives, provide nitrogen in exchange for leaves
- One adult owl or hawk will eat 100 pounds of rodents each year
- Roadrunners, coyotes and snakes also keep the ecology in balance



Plentiful wood rats and rabbits in my garden supporting a family Great Horned Owls

Red Tail Hawk in
the living room

Sometimes you
can attract birds
too well.



Natural Insect Control

- Don't poison
- Plant a broad range of native plants to attract many native insect herbivores.
- When plants under stress from insect herbivores, they send out chemical signals to attract insect predators
- A broad range predatory insects will build over time.



Spiders alone eat more insect biomass than all bird species combined

Birds and bats also help keep insects under control

- One hummingbird can eat over 1000 insects per day
- One bat can eat over 6000 insects per night
- One swallow can eat over 700 insects per day

A close-up photograph of a mother hummingbird sitting on a nest. She is regurgitating insects into the beak of her chick. The nest is built on a branch and is surrounded by green leaves. The background is blurred, showing more foliage and a tree trunk.

Mother hummingbird regurgitating insects for her chicks



Countless species of insects now in my garden, but the herbivores and predators are in balance.

- Plants are not under serious stress from insect herbivores
- Fewer gnats, mosquitos and flies than ever before



I gradually shifted from seeing insects as a pests to seeing them as a critical part of the ecosystem

The larvae of 90% of insect herbivores can eat only a small number of native plant species with which they co-evolved!



Much of the rest of the food chain depends on insects

96% of terrestrial bird species depend on insects to feed their young

Without our native plants and their co-evolved insect herbivores, our natural ecology will collapse





50+ bird species
visited the Mudd
Nature Preserve
in last 2 years



- Ana's Hummingbird
- Allen's Hummingbird
- American Kestrel
- Barn Owl
- Barn Swallow
- Belted Kingfisher
- Bewick's Wren
- Black-headed Grosbeak
- Blue Heron
- California Gnatcatcher
- California Quail
- California Thrasher
- Cooper's Hawk
- Crow
- Dark-eyed Junco
- Golden Crowned Kinglet
- Golden Crowned Sparrow
- Great Horned Owl
- Greater Roadrunner
- Green Heron
- Hooded Oriole
- House Finch
- House Sparrow
- Hutton's Vireo
- Lawrence's Goldfinch
- Least Bittern
- Lesser Goldfinch
- Mallard
- Merlin
- Mourning Dove
- Night Heron
- Northern Mockingbird
- Nuttall's Woodpecker
- Olive Sided Flycatcher
- Pacific Slope Flycatcher
- Pygmy Nuthatch
- Red Tailed Hawk
- Ruby Crowned Kinglet
- Snowy Egret
- Song Sparrow
- Spotted Towhee
- Turkey Vulture
- Western Bluebird
- Western Kingbird
- Western Screech Owl
- Western Scrub Jay
- Western Tanager
- Western Wood Pewee
- Wilson's Warbler
- Yellow-Rumped Warbler

Pool to pond conversion dramatically increased biodiversity



If you can't add a pond, add a plant-filtered fountain



Hummingbird Pool Party



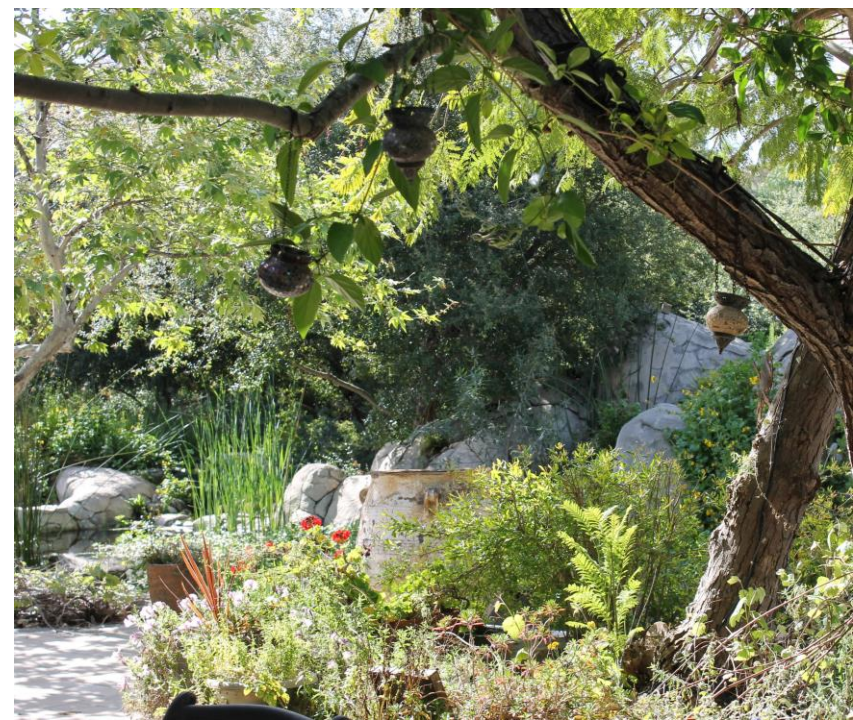
A vibrant natural garden scene. In the foreground, there are various green plants and flowers, including a prominent cluster of purple flowers on the right. The middle ground is filled with dense green foliage and trees. In the background, a rocky hillside rises, covered in sparse vegetation and large boulders. The sky is bright and clear. The text "Spectacular beauty of a natural garden" is overlaid in the center of the image.

Spectacular beauty of a natural
garden

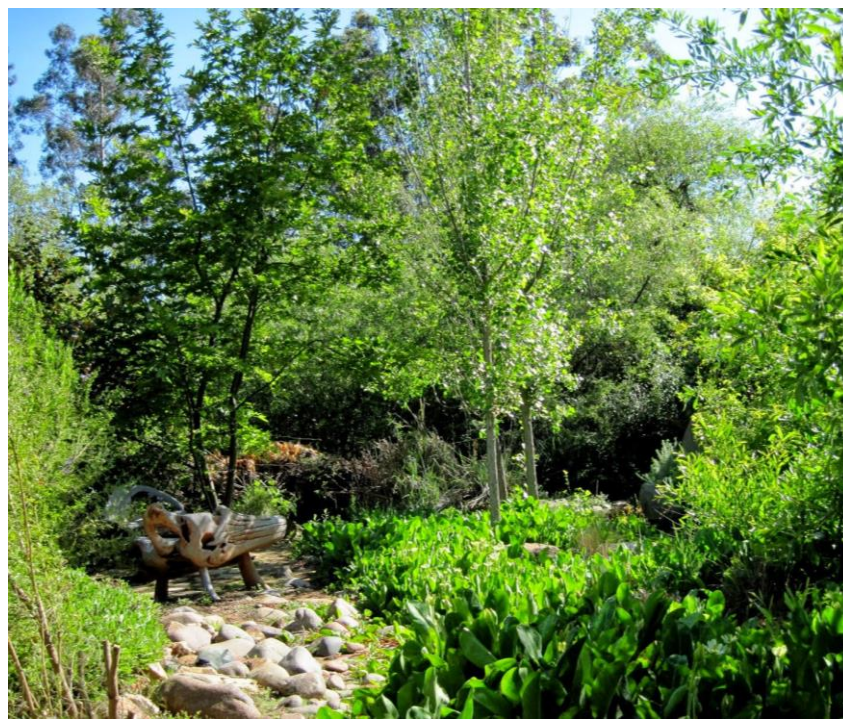
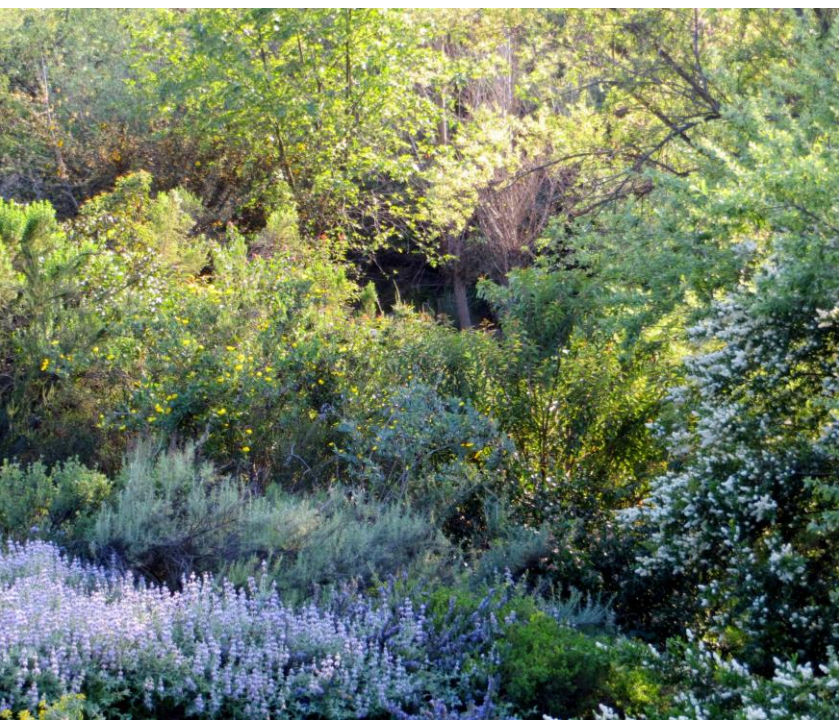
Front Yard



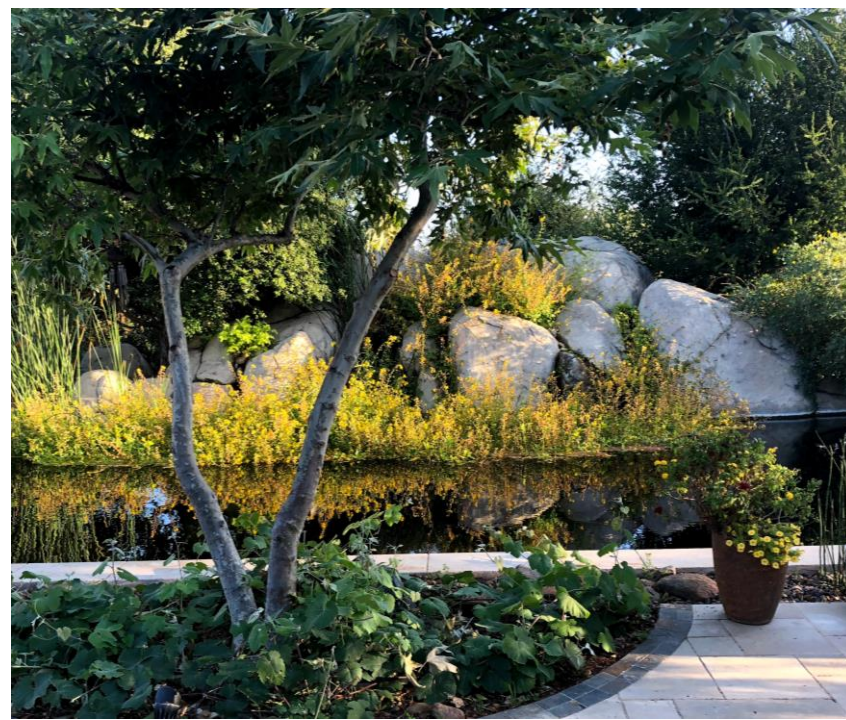
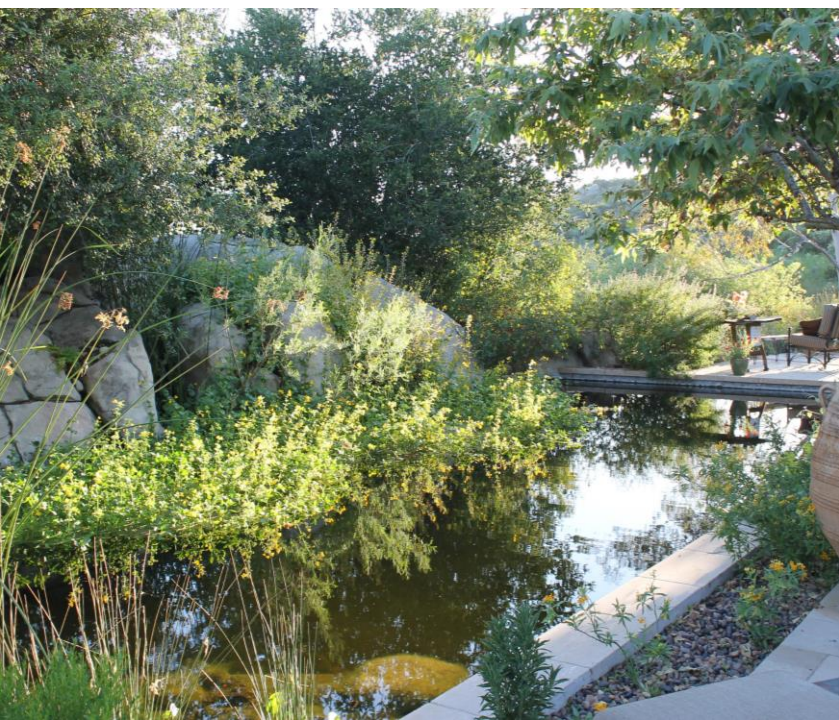
Patio Area



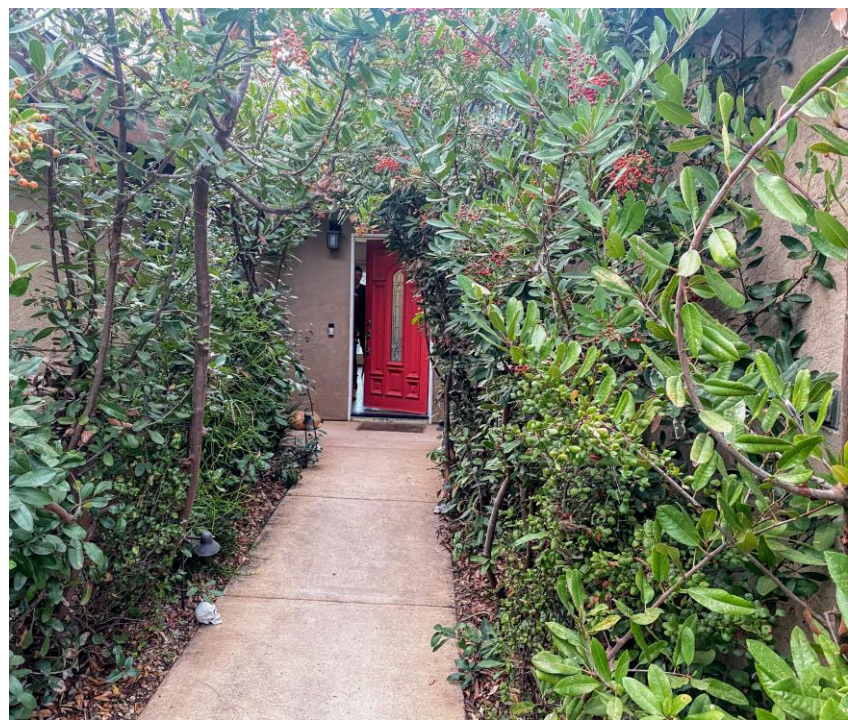
Lower Back



Pool Converted To Pond



My son Jake's garden



US Geological Service
2000 – 2100 Land Use
Projection

California's natural habitat is being rapidly destroyed by development

We can mitigate this by restoring pieces of nature in developed lands

- Water
- Snow/Ice
- Wetland
- Barren
- Forest
- Grassland
- Shrubland
- Developed
- Transportation
- Agriculture (Annual)
- Agriculture (Perennial)



A photograph of a garden restoration project. The scene is dominated by a rocky stream bed or path that winds through a lush, green landscape. The rocks are of various sizes and colors, including grey, tan, and reddish-brown. Several plants are growing along the stream, including tall, thin, light-colored stalks and dense green shrubs. In the background, there are more trees and a large, light-colored tree trunk on the left. The overall atmosphere is natural and serene.

Restore Nature One Garden at a Time