



REIMAGINING THE  
*Cadillac Desert*

THURSDAY, SEPT. 15, 2016

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BEST BEST & KRIEGER LLP

**USING NATURE'S TECHNOLOGY  
IN RESPONSE TO DROUGHT**

*LISA NOVICK, THEODORE PAYNE FOUNDATION*



 [#BBKCadDesert](https://twitter.com/BBKCadDesert)

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# NATIVE: NATURE'S TECHNOLOGY



*Photo: Lisa Novick*

**Desert Gold, Sandverbena,** Death Valley



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# LIVING TECHNOLOGY REFINED & SELECTED BY NATURE OVER TIME



*Photo: Lisa Novick*

**Juniper, Turpentine Bush, Nolina, Mojave Desert**



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# OAKS IN CALIFORNIA

## 56 MILLION YEARS



*Photo: Lisa Novick*

**Native oaks support 5,000 species of beneficial insects & animals**



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# NATIVE: ADAPTED TO RAINFALL



Photo: Lisa Novick

Creosote, Desert Gold, Death Valley



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# ADAPTED TO SOIL



*Photo: Lisa Novick*

**Phacelia, White Tackstem,** Death Valley



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# ADAPTED TO CLIMATE



*Photo: Lisa Novick*

**Turtleback**, Death Valley



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# ADAPTED TO WILDLIFE...



*Photo: Lisa Novick*

**Cleveland Sage** & Allen's Hummingbird



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# WILDLIFE ADAPTED, TOO



*Photo: Lisa Novick*

Spring Azure butterfly on **CA Wild Lilac**  
Caterpillar forage food: **CA Wild Lilac fruit** (*Ceanothus*)  
**Dogwood** (*Cornus*)



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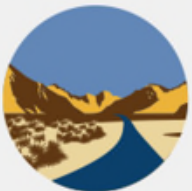
# NATIVE PLANTS AND ANIMALS ARE ADAPTED DUE TO CO-EVOLUTION



Caterpillar of the  
California Sister butterfly  
on an oak leaf



California Sister butterfly  
Caterpillar forage food: **CA Native Oaks**  
(*Quercus*)



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# CALIFORNIA'S PLANT RICHNESS

California has **6,000+ species, subspecies & varieties of native plants**, more than any other region of comparable size in the United States.

Over one-third not found outside California.

California is a **biodiversity hotspot!**

*(Introduction to California Plant Life, Robert Ornduff, Phyllis M. Faber & Todd Keeler-Wolf. California Natural History Guides, 69; U.C. Press, 2003.)*



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# CALIFORNIA'S GEOLOGIC RICHNESS



800 miles long, 250 miles wide,  
California has an incredible  
variety of landforms

These landforms vary in  
distance from the ocean and  
equator, making a **variety  
of habitats, which make  
California's variety of  
native plants**



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# CALIFORNIA NATIVE PLANTS

Use **one-seventh the water** of most non-natives

Know how to deal with drought

Do not need fertilizers, soil amendments or pesticides



*Photo: Lisa Novick*



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# NATIVE PLANTS FOR FULL SUN



Photo: TPF

## TPF Native Plant Garden Tour



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# NATIVE PLANTS FOR DRY SHADE



*Photo: Lisa Novick*

## TPF Native Plant Garden Tour



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# NATIVE PLANTS FOR CLAY SOIL



Photo: TPF

## TPF Native Plant Garden Tour



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# ... AND NO SUMMER WATER



*Photo: Lisa Novick*

## TPF Native Plant Garden Tour



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# NATIVE PLANTS FOR INSECTS



Valley Carpenter bee & **Indian Mallow**

*Photo: Lisa Novick*



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## ... AND ANIMALS



*Photo: Antonia Warner*

### Cedar Waxwings & Toyon



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# FRENCH NATIVE BOXWOOD IN THE WILD, IN BURGUNDY



*Photo: Lisa Novick*



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# FRENCH NATIVE BOXWOOD MUSÉE CARNAVALET, PARIS



Photo: Lisa Novick



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# JAPANESE NATIVE PINE & MAPLE FOREST OUTSIDE KYOTO



*Photo: Lisa Novick*



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# JAPANESE NATIVE PINES & MAPLES SILVER TEMPLE, KYOTO



*Photo: Lisa Novick*



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# CALIFORNIA NATIVE LANDSCAPE?



Photo: Lisa Novick



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# CALIFORNIA NATIVE?



Photo: TPF

**Carpinteria, Coral Bells, Fescue, Wild CA Lilac**



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# YES!



Photo: TPF

**Coral Bells, Fairy Duster, Manzanita, Penstemon, Sage**



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# YES!



*Photo: Lisa Novick*

Swale with **Fescue, Manzanita, Sedge, Wild Rye**



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# YES!



Photo: TPF

**Blazing Star, Coyote Brush, Monkeyflower, Sage, Verbena**



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**We need to  
EMBRACE  
NATURE'S TECHNOLOGY  
TO  
CONSERVE WATER  
& SUPPORT BIODIVERSITY**



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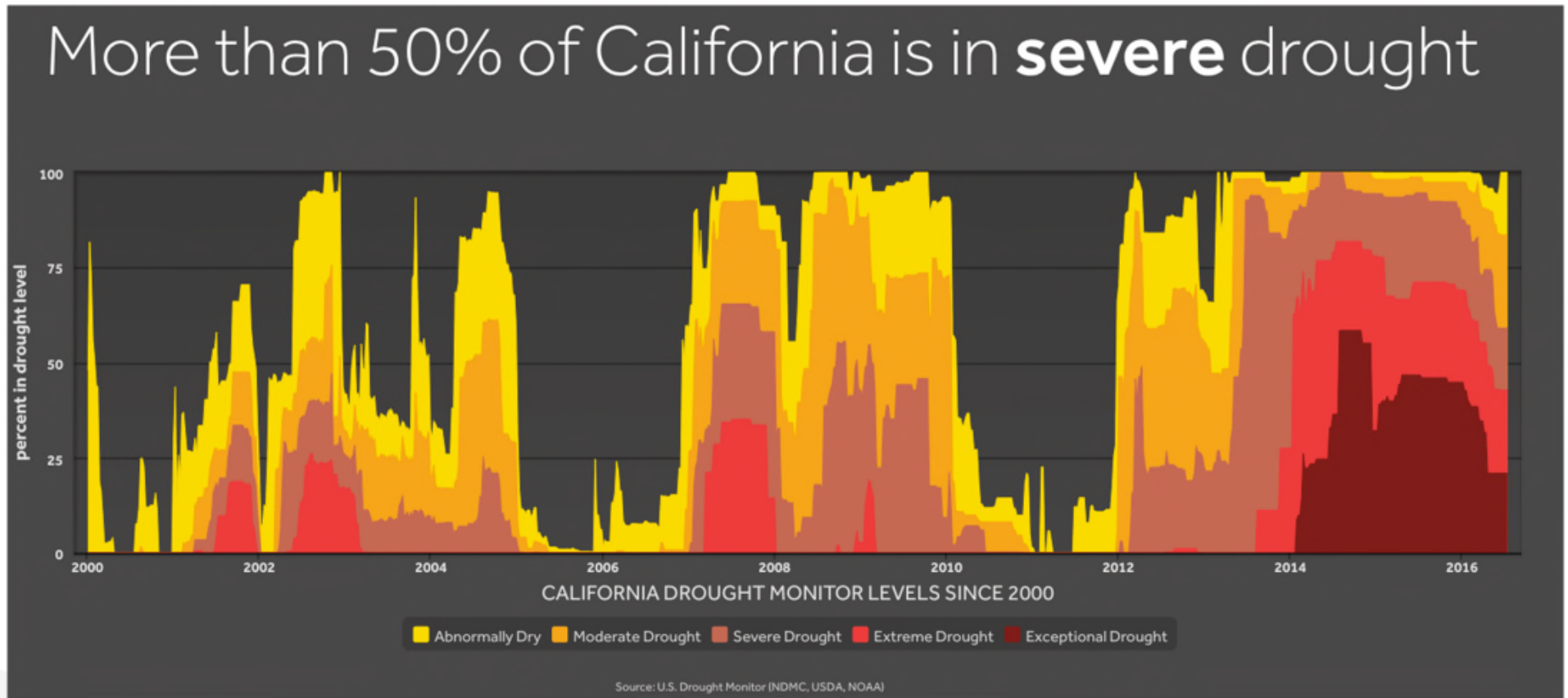
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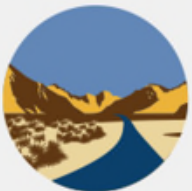
# WORST DROUGHT IN CALIFORNIA'S RECORDED HISTORY



↑  
2000

↑  
2008

↑  
2016



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# WATER FACTS

In California, **37 of the last 40 centuries were dry.**

The 20th century was one of **3 wet centuries in the last 4,000 years.**

California's growth was predicated on the expectation of an uncharacteristic amount of water.

*(Introduction to Water in California, David Carle.  
California Natural History Guides, 76; U.C. Press, 2004.)*

## ***DROUGHT IS NORMAL***



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**20% of California's  
energy use  
is for pumping and  
treating water.**

**Households use from  
50 to 70%  
of their water on  
landscaping.**



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# WE ARE IN A SIXTH MASS EXTINCTION

**The world has lost 52%  
of its wild vertebrate animals since 1970.**  
*(Living Planet Report, 10<sup>th</sup> Edition. World Wildlife Fund, 2014)*

**There is direct evidence of insect and animal  
pollinator species decline in North America.**  
*(Status of Pollinators in North America. The National Academies, 2006)*

**Two-thirds of North American bird species  
at moderate to high risk of extinction; in  
California, two-thirds of our arid-land species.**  
*(State of North America's Birds, 2016; North American Bird  
Conservation Initiative)*



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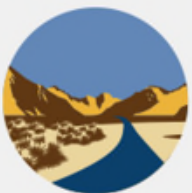
# WE NEED POLLINATORS

**Native bees are  
more efficient  
pollinators than  
European honey  
bees – up to  
250x more  
efficient**



*Photo: Lisa Novick*

Female Valley Carpenter bee  
with **Indian Mallow** flower



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# WE NEED BIRDS

**Birds contribute  
over \$3 billion of  
natural pest control  
to California farmers,  
& \$17 trillion of  
ecosystem services  
to the world economy.  
(United Nations report)**



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# WE NEED LIZARDS

**Lyme disease  
is rare in  
California due to  
Western Fence lizards,  
whose blood has  
a protein that  
kills Lyme disease.**  
*(California Agriculture,  
Volume 52, Number 2)*



Photo: Lisa Novick



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**Extinction rate 1,000 times faster  
than normal background rate**

**Plus:**

**Increased drought**

**Increased temperature extremes**

**WE NEED TO CREATE SUSTAINABLE,  
RESILIENT CITIES THAT DELIVER  
ECOSYSTEM SERVICES.**



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**We should not squander  
California's resources on  
ornamental non-native plants  
that use six times more water  
than natives  
but feed neither people  
nor wildlife.**



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# THE SCIENCE OF CO-EVOLUTION

As the California landscape evolved, its plants and animals evolved together with it.

Evolution has made **90% of leaf-eating insect species** able to eat **only** native plants.



*Charles Darwin*



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# INSECTS ARE ESSENTIAL



Photo: Lisa Novick

Sweat Bee on **Buckwheat**



Photo: Lisa Novick

Crab Spider on **Gum Plant** flower

***Insects are:***  
**Pollinators**

**Food for other insects and animals**

**Decomposers of organic waste**

**Population regulators of other organisms**



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