

# California Plants:

## Uncommon diversity, wide-ranging threats

By Tina Casagrand

Imagine a place that's unique in the world. Hemmed in by an ocean to the west and mountains to the east, filled with salt marshes and serpentine soil, ancient redwood forests and delicate grasslands. The primarily Mediterranean climate gives life: biodiversity unrivaled on the entire continent. Forests also thrive. So do deserts. This is California, pre-European contact.

Then settlers come. Their new lives include old conventions: buildings, agriculture and a tendency to expand into open space. Foreign plants take root. More people come. Pavement checkers the landscape. The biological corridors that California's native plants need to exchange genetic information — to make them stronger and happier — fragment, shrivel and disappear.

### This is California, early 2000s:

- ▶ The state's population stands at 37.3 million, up nearly 8 million new residents in just 20 years. As cities and suburbs have expanded, they've encroached on more and more native ecosystems.

- ▶ Development, mining, off-road vehicles and atmospheric pollutants destroy serpentine soil and other rare habitats. As the habitats go, so go numerous endangered species that survive only in that place.

- ▶ About 200 invasive species outcompete native plants and alter nutrient cycles in more than 20 million acres in the state. The budget crisis has severely limited weed management resources, and in some cases programs have been completely eliminated.

- ▶ Since 1990, more than 100,000 acres of native savannah woodlands have been converted into wine grape cultivation. Converting this land into row crops is "just like paving it over," says John Willoughby, who served as U.S. Bureau of Land Management's California State Botanist for 28 years. In terms of post-conversion habitat value, he says, "Nothing is going to grow there."

- ▶ And more than 30 percent of California native plant species are at risk, a percentage that ranks only behind Hawaii, the nation's extinction capital.

By these and many other measures, the plight of California native plants looks bleak. "We build our industries on top of Cali-

fornia's flora, on top of the natural habitat," says Greg Suba, Conservation Program Director of the California Native Plant Society. "By breaking up intact fabric into pieces, we impact that functioning system in many ways."

Now take a breath. California is on the cutting edge of native ecosystem protection. The state's political and scientific solutions are quickly gaining ground, promising to cast California in the role of national trend-setter yet again.

For example, the California Native Plant Society and the California Department of Fish and Game are mapping and describing the state's native plant community types — estimated at more than 2,000 in all, nearly half the known native community types in the entire country.

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-Greg Suba

Understanding the number and location of such plant community types, known as assemblages, can help conservationists decide how to commit scarce resources if an assemblage in one place is about to disappear but remains healthy in another place.

To facilitate conservation efforts, more than a dozen botanic gardens in California help research, educate about, preserve and propagate imperiled species. One, the East Bay Regional Parks Botanic Garden, in Berkeley, roughly replicates the entire state's landscape and flora within 10 acres. Small birds swoop and dive into valleys; they soar over the Sierran section. Insects buzz everywhere. It's a botanic wonderland.

The fuzzy, teardrop-shaped leaves of the Franciscan manzanita (*Arctostaphylos franciscana*) flank a walkway waist-high.

Thought to be extinct in the wild, the plant made headlines last year when a botanist discovered a lone bush growing near a construction site along a busy access highway to the Golden Gate Bridge.

Headlines. That's rare for biology, but especially for plants. Even if their stories don't get told, new discoveries, extinctions and species-saving research weave dramatic tales every day.

Botanical gardens are on the front lines of plant conservation throughout the United States, and rare and endangered plants have special lines of defense in California, including such laws as the California Environmental Quality Act.

Called CEQA, the act is a full disclosure statute that requires state and local agencies to identify significant environmental impacts of development and to avoid or mitigate problems.

"CEQA allows the public to be part of a process whereby a decision-maker and the project applicant get together, but the public is also involved because what the developer wants to do may affect the commons," says Suba. He acknowledges that the expense and time might restrict some developers, but "it's also one of the most powerful things the people of California have when it comes to conserving what they value."

CEQA, the California Endangered Species Act, and the Natural Community Conservation Planning Act, when combined, position California to protect plants better than any other state. To fulfill these laws requires resources that are as scarce as some plants.

Other lines of defense include government agencies and conservation groups. The U.S. Fish and Wildlife Service lists almost 300 hundred endangered species in California, about two-thirds of them plants. But because the agency has only six botanists for the entire state, legal action by outsiders is sometimes the only way to spur enforcement. So conservation organizations constantly sue the agency for failure to establish critical habitat for endangered species or take other legally required steps to protect them.

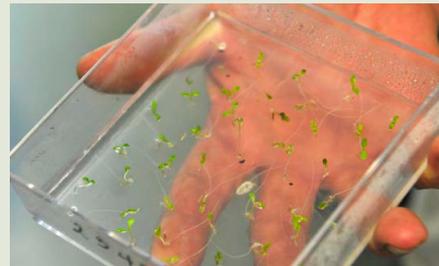
All this occurs against a backdrop of significant public apathy about plants, scientists



Clark Cowan with the National Park Service examines an invasive tree from Australia before cutting it down on Santa Cruz Island. Farmers introduced the trees so they would dry the land for agriculture. Now park officials are removing the trees as part of a project to restore a natural wetland. Photo by Benjamin Zack.



Endangered soft bird's beak (*Cordylanthus mollis* ssp. *mollis*) grows in the wetlands of Suisun Marsh near Sacramento. Naturally, brackish marshes like Suisun would move and fluctuate based on water levels, but today, the remaining marshes have little flexibility as development creates tighter boundaries and interferes with natural cycles. Photo by Benjamin Zack.



New growth of the threatened Parish's daisy (*Erigeron parishii*) at the Rancho Santa Ana Botanic Garden seed bank. The battle for plant conservation can range from large-scale ecosystem restoration to lab work with nearly microscopic seeds. Photo by Benjamin Zack.

**RIGHT:** Thousands of visitors every day pass through the towering redwood groves of Muir Woods National Monument just north of San Francisco. Public support may come relatively easy for protecting such iconic trees, but conservation becomes much trickier when dealing with a plant like Colusa grass (*Neostapfia colusana*), which grows a few inches tall and is only visible for half of the year. Photo by Benjamin Zack.





Land cleared for a housing development cuts to the edge of the Burton Mesa Ecological Reserve in Santa Barbara County. Development affects more than just the land that is cleared. Changes in wildlife, water use, invasive species and fire frequency affect all of the ecosystems surrounding development. Photo by Benjamin Zack.



ABOVE: Lech Naumovich, an independent biological consultant, points out plants growing in dwindling serpentine soil. Only plants that are tolerant of extreme soil conditions can thrive in serpentine soil. Photo by Benjamin Zack.

RIGHT: A rare lemon lily (*Lilium parryi*) blooms near a spring in San Bernardino National Forest. The California Native Plant Society classifies the fragrant flower as "fairly endangered" after years of poaching and habitat loss due to water diversion. Photo by Benjamin Zack.



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-Greg Suba



Parsley covers miles of lush land in the Salinas Valley. To support a growing demand for food, huge swaths of natural ecosystems have been cleared to create one of the most agriculturally rich regions of the country. Photo by Benjamin Zack.

say. Endangered animals tend to get more attention than plants, even though plants are responsible for making animal life on Earth possible by capturing solar energy through photosynthesis and passing food energy up the chain.

Connie Rutherford, a Listing and Recovery Coordinator for plants with the Fish and Wildlife Service, summed up a general public attitude: “How can you possibly see plants everywhere and think that they’re endangered?”

Despite that attitude, plant conservationists continue trying to educate the public about native plants, the threats that face them and the reasons why they’re worth saving. Meanwhile, new threats are appearing.

For example, the worthy goal of expanding the nation’s renewable energy sources has led to conflict in the Mojave Desert, where a project to install a giant solar-power generating station will harm native species, scientists say (see story on p. 8).

Rick Kearney of the Fish and Wildlife Service notes the need to prepare for what may be the granddaddy threat of them all: global climate change (see story on p. 11), Kearney says once again California is leading the nation in plans to conserve plants, this time in response to climate change.

“We are doing things that nobody else has done before, and it is both exciting and a little scary,” Kearney says.

This kind of attention to the future gives hope in the face of disaster. It shows how humans and plants can support one another after decades of betrayal.

“I have a sense of responsibility that this generation is going to make good choices for us and for the next generations,” says Suba, of the native plant society. He walks, hand in pocket, outside the Splash Education Center, a science education building in Mather surrounded by vernal pool grasslands that once were common in the Sacramento Valley. “And yeah, it’s about jobs and it’s about making money, but we have to balance that with the footprint that we’re leaving and where we’re leaving it.”

“Where’s the balance between the intrinsic value of something in nature,” — he stops walking, and his voice drops — “Versus what we get out of it?”

If California can hope to keep its ecosystems healthy, policymakers must integrate conservation into every decision. And conservationists must use their scientific and political resources to restore and protect what’s left.

“This is a dance,” Suba says, “not a war.”

## Frequently Asked Questions About California’s Native Plants

**Q: How many plant species are native to California?**

**A:** Estimates vary, but roughly 4,980 native plant species,\* which ranks first among all states. Of these species, 26.4 percent are endemic to California, meaning they exist nowhere else. This is considered by experts to be dramatic diversity for the non-tropical world.

**Q: Why are California’s native plants so diverse?**

**A:** Because the state has so many variations in its local climate, soil and geography, including an altitude range from below sea level (Death Valley) to nearly 14,500 feet (Mt. Whitney). This creates a complex array of specialized habitats — places where the conditions are just so. Many plant species have evolved to live in only one of these habitats. In short, that’s a lot of habitats — and a lot of different kinds of plants.

**Q: What are some of the habitat types that make such diversity possible?**

**A:** Vernal pools; coastal, desert and island dunes; scrublands; chaparral; coastal prairies; valley and foothill grasslands; pebble plains; bogs; marshes and swamps; forests and woodlands; and Alpine boulder and rock fields.

**Q: What are vernal pools?**

**A:** Seasonal wetlands — amphibious, if you will. They have annual plants adapted to growing under water for a time. Spring drying triggers flowering and fruit set, resulting in colorful concentric bands around the drying pools. California has one of the most extensive distributions of vernal pools in the world, yet only a small percentage of the original ones remain. To learn about other habitats, see: <http://www.rareplants.cnps.org/glossary.html>

**Q: How imperiled are California native plant species?**

**A:** More than 30 percent face some significant level of risk, a percentage that ranks only behind Hawaii, the U.S. “extinction capital.”



Invasive plants such as Veldt grass are fierce competitors with native species. Photo by Benjamin Zack.

**Q: Why are California’s native plants so imperiled?**

**A:** Loss of habitat due to development, urbanization, agriculture, logging, vehicles, horticultural collecting, illegal dumping, road construction, grazing, feral pigs and goats, recreational activities, energy development, pipeline construction, mining, flood-control projects, water diversions, military activities, Border Patrol activities, alteration of fire regimes, invasive species and more.



There is only one Presidio manzanita (*Arctostaphylos hookeri* ssp. *ravenii*) left in the wild. Photo by Ben Zack.

**Q: Why should I care about the native plants?**

**A:** The reasons include their economic and medicinal value. Scientists estimate that two-thirds of U.S. plants of conservation concern are related to such economically important species as food crops and ornamentals. The genes in rare plants can be used to develop more nutritious food crops and improve resistance to drought, disease and insects. Researchers are investigating more than 20 at-risk plants from the Center for Plant Conservation’s national collection for their potential cancer-fighting ability.

**Q: What are the non-economic reasons for concern?**

**A:** As Greg Suba of the California Native Plant Society puts it: “Plants are the foundation for 99.99 percent of all the ecosystems on Earth. ... Apart from that, (many people) have a strong-held conviction that all living things on Earth have an intrinsic value in and of themselves. Whether they’re 300-foot gigantic, majestic trees or things you have to get on your belly to see, they’re here, on Earth. And in our generation we have a responsibility to make sure they still have a place. It doesn’t have to be ‘either, or.’”

\*This number excludes subspecies and varieties. Estimate as of early 2012.

Sources: California Native Plant Society, NatureServe, California Natural Diversity Database, Santa Barbara Botanic Garden, *Atlas of the Biodiversity of California*, Center for Plant Conservation, Elizabeth Painter, Greg Suba, Dieter Wilken and John Willoughby.