CALIFORNIA NATIVE PLANT SOCIETY
BULLETIN

Spatial Distribution Models

A CRITICAL TOOL IN AN ERA OF CLIMATE CHANGE

By Steve Schoenig

"Prediction is very difficult, especially if it's about the future."

—Niels Bohr, Nobel Laureate in Physics

To predict how a warming and drying climate will impact the future health and distribution of the California flora, scientists have created their own version of a crystal ball by combining existing databases of plant distribution (California Consortium of Herbaria, CalFlora, California Natural Diversity Database, etc.), large historic climate data warehouses, and future world climate predictions. The computer programs that crunch all this data are called Spatial Distribution Models (SDMs). They go by funny sounding names such as MaxEnt, Random Forest, or GLM.

Spatial Distribution Models are complex, computer-generated predictions of where plants and animals are likely to occur or can survive over a large landscape, based on:

- knowledge about what environmental factors limit a plant or animal's survival,
- exact locations where some of these organisms are known to occur, and
- values for the limiting environmental factors at these locations and over the whole landscape.

The mathematics behind them is complex and the ecological assumptions behind them are often unspecified. Like most endeavors to carefully represent the world around us with powerful statistical and geographic models, important insights can be obtained when studies are carefully done by expert researchers. However, the modeling technologies are becoming so simple to run with easily obtained data that it is getting harder and harder to know how well any given study represents the real world.

For example, a simple hypothetical distribution model for an alpine plant could be derived by looking at average winter snowfall and average summer temperature over a landscape. Researchers might record the range of snowfall and average summer temperature at 10 different occurrences of this plant. Then



Steve Schoenig

Little purple monkeyflower *(Mimulus purpureus)*, a Southern California near-endemic, is now considered extremely vulnerable to climate change.

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The California Plant Rescue

A BACKUP PLAN TO RARE PLANT CONSERVATION EFFORTS

By Danny Slakey

Public interest in conservation seed banking has surged over the past decade. The Millenium Seed Bank in the UK has banked over 10% of the earth's wild plant taxa and the new "doomsday vault" off the Arctic Coast of Norway (the Svalbard Global Seed Vault) for preservation of agricultural crop seed has garnered much attention, both positive and negative.

While the protection of California's rare and endemic plants in the wild is paramount, seed banking can serve as an important safeguard against extinction. Research done on seed collections can also provide us with valuable information on long-term seed viability, dormancy, and propagation techniques.

How do seed banking efforts measure up in California, particularly for our rare plants that are the most vulnerable to extinction? Seeds of 514 of California's rare plants have already been deposited at seed banks, mostly at Rancho Santa Ana Botanic Garden in Claremont.

(continued on page 6)



From the Executive Director

The continuing story…

In October I was flattered with an invitation to deliver the keynote address at the annual meeting of the Colorado Native Plant Society (CoNPS). Of course I accepted! They wanted to hear about CNPS: our history, our current work, and in particular how we do conservation action.

Like California's NPS, CoNPS is a great group of dedicated volunteers working to understand and save a wonderful flora. For years their rare plant committee has shared information to protect their special plants. CoNPS has recently resolved to begin engaging in conservation advocacy, and several members told me they were impressed by what our CNPS Rare Plant Treasure Hunt has accomplished. They are clearly excited to start similar citizen science work in Colorado. There is a lot we can learn from each other!

Going to Colorado also gave me a chance to visit the National Center for Genetic Resource Preservation. This high security facility stores seeds for thousands of plants and is an important partner in the ambitious Rare Plant Rescue project that CNPS and partners are undertaking (described elsewhere in this issue). It is a remarkable institution, conducting cutting edge research and preserving a unique store of genetic diversity against future catastrophe.

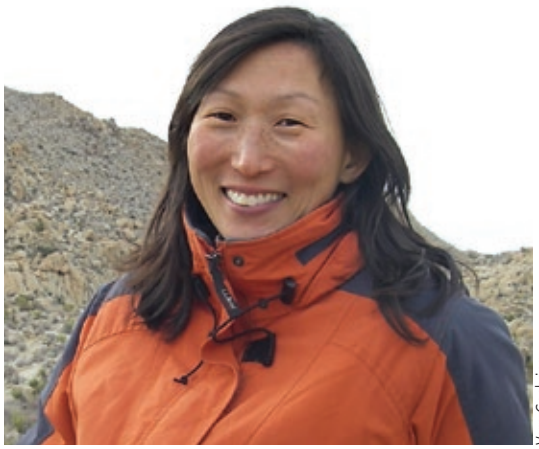
Saving seeds is an important backup plan but it's only part of the solution. We also must protect places, strengthen laws, and educate others to join the effort. In Colorado, as in California, they are hearing a decades-old refrain of "Times have changed, we can't save species, we can't afford it." This has almost no basis in fact. In truth, we can and do save species: for example, only 22 of California's 6,000+ plants have gone extinct! Saving species is cost effective: for example, protecting wildlands saves species while maintaining valuable flood protection, carbon storage, and groundwater. Most of all, saving species is terribly important. Those of us who understand these truths have a duty to speak up on behalf of the facts.

So let's keep doing it!

Dan Gluesenkamp
CNPS Executive Director

Strengthening Chapters, Engaging Members

CNPS recently welcomed Hei-ock Kim as the organization's new Special Projects Coordinator. Hei-ock is an integral part of the CNPS Communications Team that is dedicated to supporting and strengthening chapters in various ways, from events to internal communications. She creates and manages projects that support statewide and chapter efforts in native gardening and landscaping, and communications. One of her current projects is to increase support for garden tours.



Vern Goehring

Hei-ock Kim

Hei-ock comes to CNPS after 12 years in the nonprofit world, where she focused on communications, community relations, and development. Most recently she served as the director for Garden Native, a program that works to promote native California landscaping in Southern California. We are excited to have such a great addition to the CNPS team! You can contact Hei-ock at hkim@cnps.org.

Deidre Kennelly
CNPS Communications Manager

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CNPS Legislative Priorities for 2015

NEW ONLINE TOOL ALLOWS MEMBERS TO TRACK IMPORTANT STATE LEGISLATION

By Vern Goehring

By the time you read this the fall election will be over. Voters will have selected many new legislators and decided the fate of important ballot measures, and a new legislative session will be underway. Many issues of concern to CNPS members will eventually be acted on in 2015, and now there is a new tool you can use that will make it easier to keep up-to-date on bills and to let your legislators know how you feel about important legislation.

TRACKING LEGISLATION

CNPS has set up a new *free* online legislative tracking account that members can access from the Conservation pages of the CNPS website (cnps.org/cnps/conservation/) by clicking on Legislation Tracker. There you will find links to "Track Legislative Actions" and to learn "CNPS's Official Position" on different bills.

You will be asked for an email address and password. Use Greg Suba's email address, "gsuba@cnps.org," and this case-sensitive password: "CNPSTracker." This will bring up a list of all of the bills that CNPS is following at the present time.

Select "My Favorites" and then "2015–2016" to bring up the current list of bills. Clicking on a bill number will take you to a page containing all versions of the bill, committee analyses, votes, and the history and status of the bill. This information changes automatically as the bill moves through the legislative process.

This online system does not yet allow us to add a CNPS position, so learning our positions on bills requires a second step. A separate legislative report will be posted on the Conservation page of the CNPS website and will include the position we have taken for each bill. This report will be updated periodically as things change. Early in the year we frequently watch many bills because we're still studying them or their content is still evolving.

2015 LEGISLATIVE PREVIEW

While it's impossible to predict with much accuracy what environmental issues will dominate the attention of the Legislature, CNPS has developed a list of priorities. The best legislative plans and strategies can easily be upset, but we anticipate these four areas will be prominent in 2015:

- **Forestry** – CNPS has been the leading force behind the creation of Ecosystem Performance Standards as an overall tool to guide and evaluate the State's Forest Management Program (timber harvesting, etc.). Standards would define or describe the natural attributes necessary to protect the function, composition, and structure of healthy forest lands. Funds were included in the 2014/15 FY budget to the Resources Agency for this purpose, and CNPS has initiated an informal partnership with the Agency to accomplish this.

  Another possible focus would be to correct several weaknesses in the 2013 legislation (AB 904) that created the Working Forest Management Plan timber harvest option. CNPS and others identified numerous gaps in this legislation that allows indefinite timber harvesting on private lands of up to 15,000 acres with an approved management plan.

- **CEQA** – Late last year, CNPS and other environmental groups were invited to submit comments regarding the best and worst components of CEQA, the California Environmental Quality Act. Two State Senate committee chairs were gathering information, potentially to serve as the basis of another reform attempt. Regrettably, in the past "reform" often meant to weaken CEQA; we will work to ensure that doesn't happen again. CNPS submitted a letter highlighting four needed improvements to strengthen the review process and quality of analysis.

- **Off-Highway Motor Vehicles** – The Department of Parks and Recreation OHMV Program "sunsets" on January 1, 2018 (which means it goes away unless reauthorized and refunded). CNPS members and chapters have long documented serious impacts to native plant resources due to gaps in the program. Although the program's end is still three years away, CNPS will begin gathering and documenting program shortcomings, developing statutory solutions, and reaching out to partners in 2015. If the program is to be continued we will advocate for important changes to better protect native plant resources.

- **Native Plant Horticulture and the Drought** – Whether or not the current drought ends soon, there are important lessons regarding the value of native plants for this and the next drought. CNPS will explore opportunities to profile the great benefits of using native plants in state and local programs and in legislation.



Vern Goehring

The drought comes to the State Capitol. Looks like it could use some native plant landscaping.

Vern Goehring is CNPS Legislative Consultant, and has served in that role since 1997.

CHAPTER NEWS

BAJA CHAPTER:
First cycle around the sun

Following the January 2012 CNPS Conservation Conference in San Diego, California, scientists Jon Rebman and Sula Vanderplank led an international group of botanists, environmentalists, and lovers of native habitat on an extended field trip to the Cataviña desert in northwestern Baja California. A large number of people participated, and at some point we randomly came up with the idea of creating something like CNPS in Baja California.



Ignacio Martinez Luna

Sula Vanderplank, Josue Campos, and Alejandro Rodriguez confirming a sighting of blue blossom ceanothus (*Ceanothus thyrsiflorus)* in Cañon Hediondo, which was originally reported by California botanist Reid Moran, a famed explorer of Baja California.

Being staunch supporters of CNPS, the idea made sense, yet the many differences between our two countries made it seem like a pipe dream. But after a few months, things started to fall into place. The next thing we knew, we were applying for CNPS chapter membership in the spring of 2013. By summer we had become CNPS's newest chapter, and the only one outside California.

Looking back, our Baja California Chapter has accomplished a great deal in its first year. We've built partnerships with recognized academics and advocates, and have led field trips averaging about 70 people each. Our Rare Plant Treasure Hunt reconfirmed a disjunct population of blue blossom ceanothus (*Ceanothus thyrsiflorus)* that had previously been sighted by legendary botanist Reid Moran. On the conservation front, we've submitted eight new species to the Mexican protected species list, and have developed a pilot program to conserve habitat in areas where new vineyards are being planted.

The future holds great promise. We are planning an ambitious propagation workshop to promote a native nursery culture, and will start lobbying to protect priority conservation sites in the Mediterranean region of Baja California. It is an exciting time here for conservation work. Should you have occasion to be in Baja, we invite you to witness our continuing adventure south of the border.

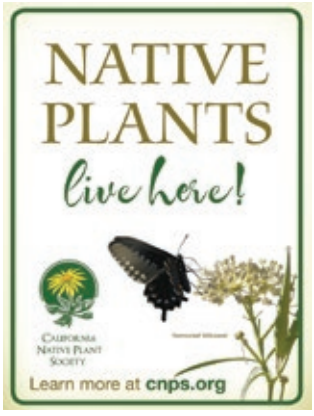
César García Valderrama
President, Baja California Chapter

Generate Gardening Interest With "Natives Here!" Signs

We are excited to report that CNPS is now offering garden signs that proclaim to passersby that the garden they are admiring contains native plants. The new signs can be posted prominently in your garden and are available for purchase not only by CNPS members, but by anyone with a garden that includes natives.

The purpose of the signs is to generate neighborhood interest in gardens that reflect responsible gardening practices: low water use, creation of habitat for pollinators and wildlife, reliance on integrated pest management instead of chemicals, and use of native plants that conserve water and help to restore native vegetation throughout California and Baja.

People who buy the signs are not being "certified," nor are the gardens inspected. This less formal approach means more of the growing number of gardeners who are consciously choosing to add native plants to their gardens will feel able to participate. We're encouraging as many people as possible to get a sign, and to encourage their friends and neighbors to join in.



The new CNPS garden signs.

In addition, we have provided CNPS chapters with a "Garden Signs Toolkit" prepared by a diverse group of experts in horticulture, soil biology, plant communities, biology, wildlife, and conservation. It contains information to help you publicize the availability of the signs to CNPS members, provides ideas on marketing the signs to your local community, and includes strategies for educating others about the benefits of having a sign in one's garden.

The Garden Signs Toolkit can be downloaded at cnps.org/gardening/chaptertools.

Susan Krzywicki
CNPS Horticulture Program Director

Volunteer Recognition Award

CNPS regularly recognizes members who have made outstanding contributions to the preservation and appreciation of California's native flora through its Volunteer Recognition Award. CNPS is grateful for all these volunteers have accomplished. The latest CNPS members to receive this award are Steve McLaughlin and Joan Stewart.

Steve McLaughlin joined the Bristlecone Chapter seven years ago after moving to Inyo County following his retirement from a 35-year career as a professor of botany at the University of Arizona. He quickly became an integral member of many of the environmental organizations in the county including Friends of the Inyo, Audubon, and CNPS, and has been a champion for native plants in the Eastern Sierra.



Vici McLaughlin

Steve McLaughlin and wife Jan Bowers.

Steve started as the chapter's conservation chair, and later became chapter president and Chapter Council delegate. His quiet yet persistent voice of reason has been instrumental in keeping native plants and their habitats on the table during the development of the Owens Dry Lake Master Plan. His ability and willingness to read through copious volumes of documents and sit through hours of meetings has made him a very valuable and respected member of the environmental community in Inyo County.

Joan Stewart, who was named a CNPS Fellow in 1999, has served California's native flora in many capacities for *four* decades. She continues to lead at the organizational level, serving on the Chapter Support and Volunteer Recognition Committees. As chair of the Educational Grants Subcommittee, she has significantly helped many aspiring botanists. Her numerous roles in the Alta Peak Chapter including president, conservation chair, and newsletter editor, have been instrumental in maintaining the chapter's viability throughout its broad geographical area.



Catherine CaponeCallahan

Joan Stewart

Charles Blair, Chair
Volunteer Recognition Committee

In Appreciation:

For 50 Years, members and volunteers have been the heart of CNPS

According to G. Ledyard Stebbins, the founders of CNPS were not professional botanists, but "lovers of wild plants"—local plant enthusiasts who felt that native plants have intrinsic cultural, aesthetic, and scientific value. These "plant lovers" not only led a successful grassroots campaign to save Tilden Park's Native Plant Botanic Garden in Berkeley, but used the ensuing momentum to create a permanent vehicle to promote the conservation of California's native plant heritage. Concerned citizens donating their time and expertise formed the bedrock of CNPS. Just one year later, CNPS was a robust, energetic organization of five chapters leading field trips and driving proposals that would eventually result in the protection of now-iconic botanical areas such as Butterfly Valley and the Jepson Preserve.

Though times, technology, and scientific nomenclature may have changed, 50 years later members and volunteers continue to be the lifeblood of CNPS. Now 34 chapters strong including Baja California, CNPS is fortunate to have such a dependable base of support. Chapter volunteers have organized programs, plant sales, hikes, restoration projects, local campaigns, and more, and in doing so have contributed over 102,000 hours in 2013—equal to over 53 full-time employees!

To our members and volunteers, we thank you for your indefatigable efforts in providing public education, beautifying neighborhoods, preserving natural resources, and promoting the appreciation of California's native plants. Thank you for making CNPS what it is today.

> *"We never cease to wonder at the competence and enthusiasm of CNPS members. The things that need to be done produce the people who can do them."*
> —CNPS Newsletter, Vol. II: No. 1, Jan. 1966

Stacey Flowerdew, CNPS Membership and Development Coordinator

Spatial Distribution Models

(from page 1)

they might predict that areas with an average snowfall and high temperature within that range are "suitable" for that plant, and areas outside that range are "not suitable."

If snowfall and summer average temperature are actually the two determining factors that allow growth of this plant, then this simple model might be a good predictor of site suitability over the entire area. However, if other factors such as soil type that help determine success of this plant are not included in the model, these predictions would be less useful.

Here are some questions that may help you determine how accurate the predictions of these models are for a given plant:

- How well-known are the exact climatic requirements of a plant and the risks of extinction due to climatic factors?
- Were all factors that determine plant distribution included in the model?
- Is the spatial resolution (raster or pixel size) appropriate for capturing the topographic complexity and heterogeneity surrounding the occurrences? Larger raster size can mask the true range of available climatic niches.
- Is the plant currently growing everywhere it can across the landscape (its true climatic niche), or is it still moving into new areas?
- Can all populations of the plant be viewed as having the same environmental requirements, or are populations at the edges of the plant's range locally adapted to more extreme conditions?
- Is the modeler or research team experienced, and have they clearly specified their modeling methods and settings so that these can be evaluated?

Understanding how these tools work can help us accurately predict and lessen the inevitable impacts of climate change.

Steve Schoenig is chief of the Biogeographic Data Branch, California Department of Fish and Wildlife.

California Plant Rescue

(from page 1)

That's just under 25% of the more than 2,300 plants included in the *CNPS Inventory*, so we still have a long way to go before we can capture the full diversity of the rare taxa in our native flora.

CNPS has joined with the Center for Plant Conservation and its member botanical gardens and arboretums in California to form California Plant Rescue, a new effort to collect seeds of representative populations of all of California's rare plants. In 2015 this initiative will ramp up efforts to collect and store seeds of rare plants. We have been awarded a $20K challenge grant, and so are seeking grant funding for more extensive seed collecting efforts.



Pete Veilleux

Seed collections of crucifixion thorn *(Castela emoryi),* California Rare Plant Rank 2B from the deserts of California, Arizona, and Mexico. The seeds are grouped by separate maternal lines, allowing for maximum preservation of genetic diversity in long-term storage. Photograph provided by Michael Wall and Rancho Santa Ana Botanic Garden.

As this project unfolds, CNPS members and chapters will have opportunities to participate in seed collecting and other parts of the seed banking process. Volunteers at Rancho Santa Ana have also been immensely helpful in the processing and cleaning of seed prior to long-term storage, and Bristlecone Chapter members have been particularly helpful in scouting out sites prior to seed collection efforts. Volunteers in other chapters can gather on-the-ground information on rare plant phenology to help seed collectors time their site visits to target these rare plants. CNPS may even develop a program that trains CNPS members how to collect seed for conservation seed banks.

To stay abreast of developments with the California Plant Rescue, go to cnps.org/rare or contact treasurehunt@cnps.org.

Danny Slakey is coordinator of the CNPS Rare Plant Treasure Hunt and Rare Plant Program Assistant.

Native Plant Gardens

CNPS Member: Gloria McClain, San Jose

My transitional garden began in the 1980s after I heard a talk about monarch butterflies at an Earth Day Celebration at the Don Edwards Wildlife Refuge in Fremont. I learned that monarchs needed milkweed to survive. So I bought two plants and planted them in my front yard where they're still growing. Then I found a copy of *Growing Native Newsletter* that contained an article titled "Native Larval Food Plants for Most California Butterflies."

Late in the summer of that first year the Monarchs managed to find those two milkweeds. Their eggs hatched and the caterpillars ate every leaf! Eventually I realized that, although every leaf was gone, it didn't matter because the seed pods had already matured and the plant's work was done for the year. Nature had planned very well.

At that time the Internet was in its infancy and definitely not at my fingertips. I had little time for gardening or researching host plants for butterflies. So milkweed was the only native in my badly overgrown and untended front yard. From that chance beginning, I've always emphasized providing habitat for "critters" that are trying hard to survive in their shrinking habitat. My garden is now registered with the North American Butterfly Association and with the National Wildlife Federation. I display signs from each organization in my front yard with the hope that they will increase people's interest in habitat gardens.



Gloria McClain

In 2010 I added to my habitat garden a raised bed for dudleyas, two solar fountains, and my first attempt at a butterfly puddle. Salvias were added to shade the dudleyas, which were getting too much sun. Gardening is always a work-in-progress, informed by learning what works and what doesn't.

Over time I have realized that my butterfly garden is really a pollinator garden, visited by many bees and birds that are attracted to the same native plants. My garden now contains numerous natives. Some of them include:

Common Name	Botanical Name	Attracts (butterflies, other)
American wintercress	*Barbarea orthoceras*	Sara orangetip
black sage	*Salvia mellifera*	hummingbirds, native bees
brown dogwood	*Cornus glabrata*	echo blue
California yampah	*Perideridia californica*	anise swallowtail
common lippia	*Phyla nodiflora*	buckeye, many insects
Greene milk maids	*Cardamine californica*	Sara orangetip, gray-veined white
hound's tongue	*Cynoglossum grande*	Sara orangetip, hummingbirds
narrow-leaf milkweed	*Asclepias fascicularis*	monarch
salt heliotrope	*Heliotropium curassavicum*	nectar plant for many butterflies
seep monkeyflower	*Mimulus guttatus*	buckeye

In the 1980s the Xerces Society's book, *Butterfly Gardening*, listed the non-native butterfly bush (*Buddleja* spp.) as a good nectar plant, so I planted three. Recently I discovered there is a California native Buddleja, but the three large, well-established bushes I already have are very popular with pollinators. If the non-natives should die, I will replace them with the native version. But for now, as long as the butterflies enjoy them, who am I to object?

Some of my non-native plants will always remain. Some very large plants are now almost a half century old, and others are from starts given to me by friends or relatives who are long gone. These plants are a living memory of them.

Once I have found a suitable spot in my small yard, it's again time to go native plant hunting. Before I look for new plants I ask myself these questions: Is this a native host and/or nectar plant for butterflies or other pollinators that live in my area? What growing conditions are needed (soil, water, light)? How large does it grow? This approach usually works for me. If you are a habitat gardener, I encourage you to try it.

CALIFORNIA NATIVE PLANT SOCIETY
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