

# FREMONTIA

JOURNAL OF THE CALIFORNIA NATIVE PLANT SOCIETY



SPECIAL ISSUE:  
Islands of the Californias





California Native Plant Society  
2707 K Street, Suite 1  
Sacramento, CA 95816-5130

Nonprofit Org.  
U.S. Postage  
PAID  
MLP



Printed on sustainably harvested paper containing 50% recycled and 10% post-consumer content, processed chlorine-free.

## Lead Authors

**Alfonso Aguirre-Muñoz** is an oceanographer with an interdisciplinary Ph.D. in Regional Studies and Sustainable Development. He has forty years of professional trajectory in the conservation and sustainable development of coastal, marine and island ecosystems and was the former Director General of GECI (2002 to 2017).

**Matt Guilliams** is the Tucker Plant Systematist at the Santa Barbara Botanic Garden. A native Californian, Matt has worked with the plants of the state since 1998. At the Garden he focuses on biodiversity of the Central Coast and Channel Islands, as well as on studies of the Boraginaceae and Montiaceae.

**Steve Junak** has been exploring the California Islands and studying their plants for almost 50 years. He worked as a botanist at the Santa Barbara Botanic Garden for 37 years, has retired from that job, and is currently a Research Associate there. He co-authored the Flora of Santa Cruz Island (1995), wrote the Flora of San Nicolas Island (2008), and is currently working with several other authors on a flora for Catalina Island.

**Denise Knapp** has a Ph.D. in Ecology from the University of California, Santa Barbara and an M.A. degree in Geography from the University of California, Los Angeles. She has worked on vegetation, fire ecology, invasive species, rare plant, and habitat restoration projects; her current focus is plant-insect interactions, especially pollinators. She has worked as an ecologist in California, particularly the Channel Islands, for two decades.

**John Knapp's** love-affair with the California Islands started when, at two years old, his father would leave him to play on Tin Can Beach (now Bolsa Chica) while he went for a run, and John would look across the Catalina Channel at the mountain in the sea wondering what awaited him out there. What he found was great beauty and the need for dramatic conservation intervention, and after working on the islands for the past two decades he now serves as the California Islands Ecologist with The Nature Conservancy. His goal is to develop strategies, methodologies, and tools to more effectively and efficiently address the conservation challenges facing the islands, which is best summarized by Willis Linn Jepson who wrote in 1907, "*In the long run protection must come by the devices and resources of united effort, high intelligence, and careful handling.*"

**David Merzurkewicz** is a Wildlife Biologist for Channel Islands National Park focused on seabirds and habitat restoration. He has been working on the California Islands for the past decade. The scope of his work within the Park encompasses ecological restoration for seabird nesting habitat and associated plant communities as well as spearheading the Park's Inventory and Monitoring program for seabirds.

**Kathryn McEachern** is interested in exploring how changes in the environment affect populations of rare and endangered plants. She is a Research Plant Ecologist with the U.S. Geological Survey - Western Ecological Research Center's Channel Islands Field Station, in Ventura, California. She has been studying the distribution, abundance and demography of rare plants on the northern Channel Islands for nearly 20 years, providing research to inform and test restoration and recovery actions.

**Bryan Munson** is the Botany program manager for Naval Base Coronado, which includes San Clemente Island and 7 properties in San Diego County. Bryan has worked in environmental compliance for the Navy for 10 years. Bryan graduated from the University of Wisconsin-Madison with a B.S. in Biology and a minor in Environmental Studies.

**Tom Oberbauer** has had a lifelong interest in islands and has had the opportunity to visit most of the California and Baja California Pacific Coast Islands as well as many in the Sea of Cortez. He has written a number of articles describing the botany of the islands including for *Fremontia*.

**Federico Méndez-Sánchez** is an oceanographer with a MSc in Environmental Management from The University of Auckland, New Zealand. He also has twelve years of experience working on conservation, restoration, and sustainable development of the islands and has been the Director General of GECI since March 2017.

**John Randall** is a Lead Scientist for The Nature Conservancy's California Chapter. He supervises a team of four other scientists working to conserve and manage protected areas and corridors with the aim of linking them into a statewide network. His own work is currently focused on the conservation and management of the biodiversity of the Islands of the Californias, and on contributing to an urban conservation program for Greater Los Angeles by assessing the distribution of biodiversity and opportunities for enhancing it across the region.





## REMARKABLE RECOVERIES AND FANTASTIC DISCOVERIES

Bryan Munson<sup>1</sup>, Peter Dixon<sup>2</sup>, Emma Havstad<sup>3</sup>, Emily Howe<sup>4</sup>, William Hoyer<sup>5</sup>, Steve Junak<sup>6</sup>, Denise Knapp<sup>6</sup>, Luciana Luna-Mendoza<sup>7</sup>, Kathryn McEachern<sup>8</sup>, Sarah Ratay<sup>4</sup>, Jon Rebman<sup>9</sup>, Dirk Rodriguez<sup>10</sup>, Peter Schuyler<sup>6</sup>, Sula Vanderplank<sup>11</sup>, and Dieter Wilken<sup>6</sup>

**A**cross much of California, sensitive species are declining as habitats disappear. Many California Islands plants buck this general trend and show a proclivity for being different. After surviving years of onslaught from non-native herbivores, many of the California Island plants once in trouble are recovering and increasing in number and acreage—possibly more rapidly than anywhere else in California or Mexico.

Introduced vertebrates nearly obliterated the plants of the Channel Islands. Eating almost every bit of reachable vegetation and eroding the topsoil upon which the native plants depend, introduced vertebrates significantly reduced both the numbers of native plants and the locations where they could be found. Botanists often risked their lives and scaled steep slopes to glimpse native plants. Plants such as Channel Island bedstraw (*Galium buxifolium*) and giant coreopsis (*Leptosyne gigantea*) were once believed to be only cliff-dwelling species. Today, thousands of individuals have spread into a variety of habitats where the

species were not previously known.

Another example is the Santa Cruz Island lotus (*Acmispon argophyllus* var. *niveus*) that was known from only a few locations and individuals several decades ago. By the 1880s, this Santa Cruz Island endemic had been eaten to the verge of extinction but the species survived and today it is found in hundreds of small populations across the island thanks to the eradication of introduced vertebrates.

The live-forevers (*Dudleya* spp.), with spineless, succulent foliage, were a particularly susceptible target. Greene's liveforever (*Dudleya greenei*) had been almost extirpated from San Miguel Island in the 20th century. The Santa Barbara Island live-forever (*Dudleya traskiae*), endemic to Santa Barbara Island, was almost wiped out

Above: Sunrise over Hoffman Point on San Miguel Island. Photo by Morgan Ball.

- 
1. U.S. Navy, Naval Facilities Engineering Command Southwest
  2. Catalina Island Conservancy
  3. Soil Ecology and Restoration Group, San Diego State University
  4. Wildlands Conservation Science
  5. US Navy
  6. Santa Barbara Botanic Garden
  7. Grupo de Ecología y Conservación de Islas
  8. U.S. Geological Survey, Western Ecological Research Center
  9. San Diego Museum of Natural History
  10. Channel Islands National Park
  11. Botanical Research Institute of Texas



The Santa Cruz Island lotus (*Acmispon argophyllus* subsp. *niveus*) almost went extinct, but a few plants survived the introduced vertebrates for decades by growing on rocky cliffs and steep slopes—unreachable by the invaders. Now this plant is common across the island. Photo by Steve Junak.



by feral rabbits. Despite its common name, it was not found during a 1970 survey. Off the Baja Peninsula, on Isla San Benito Oeste, the rabbits and burros targeted an endemic dudleya (*Dudleya linearis*) and nearly extirpated it from the island. Since the introduced vertebrates were removed on many islands all of these species are again returning to the landscape. In fact, a new *Dudleya* taxon was recently discovered on Santa Cruz Island. This plant survived the non-native herbivores and avoided botanist's detection for decades by clinging to vertical cliffs that are now guarded by peregrine falcons. This new taxon is currently only known as "white star," based on the shape and color of its foliage. It will receive an official name once it is published (McCabe personal communication).

On Isla Guadalupe, island ceanothus (*Ceanothus arboreus*), a species never documented on the island, was found within a goat enclosure designed to protect cypress trees. After a recent fire in a cypress grove on Guadalupe, more *Ceanothus* were discovered as well as an undescribed *Arctostaphylos*. The new plants that emerged after this particular burn did not appear to belong to one of the previously reported species (*Ceanothus crassifolius* and *Ceanothus cuneatus*). *Ceanothus* experts are currently analyzing this plant for classification as a new species. Because many *Ceanothus* taxa are fire-obligate, fertile seeds lie dormant in the seedbank and germinate when proper conditions break their dormancy.

Santa Cruz Island rock cress (*Sibara filifolia*), was col-

One lone San Clemente Island bush mallow (*Malacothamnus clementinus*) was known in the 1970s. This lone individual survived the introduced vertebrates in a canyon dump, inadvertently protected by a large debris pile. Underground root structures across the island survived the onslaught of the introduced vertebrates, and today there are dozens of colonies spread over much of San Clemente Island Photo by John Game.







Botanists often had to climb or rappel to find native plants that were out of reach of the introduced vertebrates, such as the San Clemente Island Indian paintbrush (*Castilleja grisea*). In 1973, there were only a few hundred individuals of this plant remaining on San Clemente Island, and it was one of the first plants protected by the then-newly-created Endangered Species Act. Today, there are tens of thousands of individuals of this plant across much of San Clemente Island and it was recently down-listed to "threatened." Photo courtesy of San Diego State University SERG database.

lected on Santa Cruz and Santa Catalina Islands at the turn of the 19th century but has not been seen on Santa Cruz Island since 1932 or Santa Catalina since 1973. This small, pink-flowered member of the mustard family was believed extinct until 1986, when two plants were discovered on an exposed sea terrace on the southern part of San Clemente Island—where it was not previously documented. Now thousands of plants are found on the dry, open south-facing slopes of that Island due to restoration efforts. Additionally, the species was rediscovered on Santa Catalina Island's Wild Boar Gully in 2001. This area was fenced to exclude introduced vertebrates in 1999.

Botanists on Santa Catalina Island and San Clemente Island developed a spatial distribution model that predicted potential habitat where new populations might be found. In 2015 the model helped locate approximately 500 more individuals in several new populations outside of the Wild Boar Gully exclosure. Finding this plant outside of the exclosure gave botanists evidence that *Sibara* and other extirpated taxa are persisting undetected on the Channel Islands. Botanists will continue to hone spatial models to assist in finding new populations. On Santa Cruz Island, they are using the model in hope of rediscovering locations where this beautiful crucifer may survive, so that the rock cress might live true to its name.

California dissantheium (*Poa thomasi*) is another example of the rediscovery of a plant that had been presumed extinct. It is an annual known only from Santa Catalina, San Clemente, and Guadalupe islands. Not recorded since Blanche Trask collected it in 1903 on San Clemente Island, it was presumed extinct. During monitoring in 2005, California dissantheium was discovered growing in seven diverse locations on Santa Catalina Island. Since no one living had ever seen the plant, specimens were sent to the Santa Barbara Botanic Garden for comparison

with a specimen collected on Guadalupe Island in 1875—which indeed confirmed the discovery. In 2010, it was discovered on San Clemente Island as well. While not yet relocated on Guadalupe Island, botanists from the three islands are working to identify locations where this grass species might persist.

By surviving and now thriving after decades of damage from the introduced vertebrates, many native plants of the California Islands have withstood one of the most destructive forces imaginable. To accomplish this feat, plants persisted in spatially restricted microsites like cliff faces or amongst cactus patches. Seeds and underground root structures remained protected from introduced vertebrates and at the same time were hidden from human's view. With introduced vertebrates removed, the most imminent threat to the plants' survival was eliminated and plants are now successfully colonizing adjacent areas. The seedlings and shoots are now emerging, once again, to successfully reestablish for native fauna that depend upon them—as well as for botanists' enjoyment. Plants of the California Islands are truly remarkable and only time will tell if these unique species can continue to surprise us and survive the future challenges all Earth's species will face.

---

Bryan Munson: [bryan.munson@navy.mil](mailto:bryan.munson@navy.mil)