



REMARKABLE RECOVERIES AND FANTASTIC DISCOVERIES

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Across 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 greenii*) 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.

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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
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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 enclosure. Finding this plant outside of the enclosure 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 dissanthelium (*Poa thomasii*) 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 dissanthelium 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.

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