



Lichen Diversity in Southern California's Coastal Parks

The Question:

Lichens are pioneers in rugged environments, symbiotic organisms that grow where nothing else can, often setting the stage for plant and animal life to follow. Lichens can also serve as indicators of air pollution and environmental change.

But how much do we know about lichen diversity and distribution along California's south coast? And how can a greater understanding of these unique organisms help us better manage our parks?

Some of the best remaining examples of California's Mediterranean ecosystem can be found in the three units of the National Park System: Channel Islands National Park, Cabrillo National Monument, and the Santa Monica Mountains National Recreation Area, which make up the Mediterranean Coast Network of parks. Many of the habitats found in this region are rich in lichen diversity, with 125 taxa estimates around Cabrillo National Monument, 200-300 taxa in the Santa Monica Mountains and up to 500 on the Channel Islands.

Lichens are composite organisms from two or more kingdoms. Fungus, the dominant party, cannot make its own food and cultivates colonies of algae or blue-green algae (or both). The algae produce food through photosynthesis, while fungus provides shelter and water.



Teloschistes chrysophthalmus established on tree bark

As lichenologist Trevor Goward has described it, lichens are fungi that have discovered agriculture.

Lichens grow in areas that are too harsh for most organisms, including bare rock, sandy soils, and tree bark. Because they can generate their own food, lichens have few requirements other than light, moisture, and clean air.

In nearly all ecosystems, lichens play a key role in recycling soil nutrients, retaining moisture and preventing erosion. In soil crusts lichens can also promote nutrient contributions to plants and support water-plant interactions



Niebla ceruchoides grows alongside federally threatened *Dudleya* plants. Lichens have been directly related to reproductive success of *Dudleya*

The Project: *Conduct lichen surveys within the Mediterranean Network of national parks to expand current knowledge of lichen distribution and diversity*

While important historic records exist, large areas of southern California's coastal parks remain unsurveyed, and there is little information about the current occurrence and distribution of lichens across this region. University of California Riverside researcher Kerry Knudsen is collaborating with National Park Service staff to conduct lichen surveys within the Mediterranean Coast Network of national parks to expand current knowledge of lichen distribution and diversity, and to identify the occurrence of rare species.

In the Santa Monica Mountains, visits are underway to sites surveyed nearly a hundred years ago in an effort to evaluate changes in diversity and abundance of lichens over time. University of California researchers are using the data from these sites to clarify and update historic records in light of advances in lichen taxonomy.

Preliminary Results: *In the Santa Monica Mountains, scientists have located 5 lichen species new to science and over a hundred species new to the mountains*

An annotated checklist of the lichens of Santa Monica Mountains is now available which includes a number of globally rare species. Some new species follow from taxonomic updates of Hermann Hasse's historic collection while others are new discoveries, particularly from the western end of the mountains. Work currently underway at Cabrillo NM and Channel Islands NP will likely yield new findings as well.

The project has also identified conservation concerns related to increased urbanization in the region. As many as 50 lichen species have not been seen since 1915, and some may have been lost to land development and other human impacts. Some endemic lichen species that were once common in older chaparral are now rare due to increased frequency of wildfires in the region. Human-caused wildfires have become more common with rapid population growth across southern California.

Air pollution is another factor known to decrease lichen diversity. While air quality is generally good in Ventura County, increased air pollution from neighboring Los Angeles, or from across the Pacific Ocean, could limit the growth of acid-sensitive species.

Through his work, Mr. Knudsen has identified several lichen-rich habitats in Ventura County. Greater knowledge of lichen diversity and distribution helps park managers set priorities for habitat and biodiversity conservation. Data from this study will also provide a 21st century baseline that can be incorporated into future monitoring and management plans designed to protect the region's unique natural resources.

Additional Resources:

Knudsen, K. 2007. An annotated checklist of the lichens of Santa Monica Mountains, in [Flora and Ecology of the Santa Monica Mountains](#), Edited by D.A. Knapp, Southern California Botanists, Fullerton CA.