



## Lichens in Yosemite

### What are lichens?

Lichens are fungi that live in intimate association with alga and/or species of cyanobacteria (a kind of bacteria that photosynthesizes). While these algal or cyanobacterial partners may sometimes be found free-living, the fungus cannot live without its partners. Hundreds of different lichen species adorn the Sierra Nevada. They can be found in almost any habitat, from trees and shrubs at the lowest elevation, to the exposed rock over 13,000 feet high at the summit of Mt. Lyell, Yosemite's highest peak.



### Why are we interested in lichens?

The diversity and distribution of lichens tell us a great deal about air quality and the level of certain types of pollution in the park. Lichens are intimately connected to their environment. They lack roots and rely upon the atmosphere for their water and nutrients. Since they do not have an outer epidermal layer, they cannot discriminate between nutrients and pollutants. As a result, both pollutants and nutrients are absorbed. When pollutants accumulate above certain levels, lichen growth and health are impaired. Since individual species differ in their tolerance levels, air quality readily influences the composition of lichen communities. Because there is almost no seasonal variation in lichen communities, monitoring lichen community composition and composition changes has become one of the best biological measures of nitrogen and sulfur-based pollution in forests.



The present levels of nitrogen deposition are nearly ten times higher than natural levels in the southern Sierra Nevada. Combined with ongoing regional climate change, there is great concern that the lichen diversity will decline. Presently very little is known about lichen diversity and distribution in Yosemite and some of the natural diversity could be lost before it is cataloged.

### What is currently being done to study lichens in the park?

There has never been a comprehensive survey of Yosemite's lichens. This year a survey will focus on microhabitats containing high biodiversity of lichens and other bryophytes. The National Park Service is partnering with the climbing community to obtain crustose forms of lichen, which are thought to be the most likely specimens to represent lichens new to the Park, region and science. Experienced lichenologists from Oregon State University and the International Association of Lichenologists will assist in collection and identification in 2008 and 2009. Sampling methods and protocols will tie in with other work being done in California and elsewhere by other government agencies that use lichen species diversity and abundance to measure air quality potential impacts. The long term goal of this project is to develop a comprehensive Lichen Flora for Yosemite National Park as well as outreach information for use to a variety of audiences both inside and outside the Park.

This project is funded by the Yosemite Fund and the Centennial Challenge. Much of the sampling is being done by volunteers from the American Alpine Club.

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## What have the results shown thus far?

Lichen communities in Yosemite are diverse, but several pollution intolerant species such as *Alectoria sarmentosa*, *Bryoria fremontii*, and *Usnea* spp. are uncommon and may be in decline. Nitrogen-loving species such as *Candelaria concolor*, *Physcia*, *Physconia* and *Xanthoria* species appear to be increasing in abundance, particularly along the Merced River corridor. Yosemite is a large and rugged national park and many habitats are still unexplored for lichens. Scientists record new lichens to the park with each field trip. In 2008 special efforts are being made to catalog lichens restricted to calcareous substrates. Several rare taxa new to the park were recorded, including *Solorina spongiosa*. This lichen was previously known from only a single site in California.



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## Public Participation

Public participation is essential for the success of this and all other park projects. Here are some ways to stay involved in the park:

- **Attend a National Park Service public open house** to talk with project specialists and obtain more information on this topic. Visit the park's planning website (listed below) for upcoming dates.
- **Add your name to the park's planning mailing list** and receive the *Planning Update* newsletter as well as other planning-related notices. You can also submit your e-mail address to receive the park's periodic electronic newsletter.
- **Additionally, you can submit comments with your thoughts about this topic or any other project in the park by any of the following means:**

**Mail:** Superintendent  
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Yosemite, CA 95389

**Phone:** 209/379-1365    **Fax:** 209/379-1294

**E-mail:** [Yose\\_Planning@nps.gov](mailto:Yose_Planning@nps.gov)

- **Visit online:** [www.nps.gov/yose/parkmemt/planning.htm](http://www.nps.gov/yose/parkmemt/planning.htm) to find out about plans and projects or [www.nps.gov/yose/naturescience/index.htm](http://www.nps.gov/yose/naturescience/index.htm) to find out about science and nature in Yosemite National Park.