



Rock Gnome Lichen Conservation in GRSM

What Is Rock Gnome Lichen?

Rock gnome lichen (*Gymnoderma lineare*) is endemic to the southern Appalachian Mountains. It grows in mid-to-high elevations in Great Smoky Mountains National Park (GRSM) on moist, vertical rock faces in streams or on cliffs that are consistently moistened by fog or seepage.

The US Fish and Wildlife Service [federally listed](#) rock gnome lichen as endangered in 1995 and created a [recovery plan](#) for it in 1997. The International Union for Conservation of Nature and Natural Resources (IUCN) added rock gnome to its [Red List of Threatened Species](#) in 2015. It is one of only two lichen species listed as endangered in the United States. Threats to rock gnome lichen include climate change, decline of adjacent forests, air and water pollution, recreation, trampling, and overcollection.

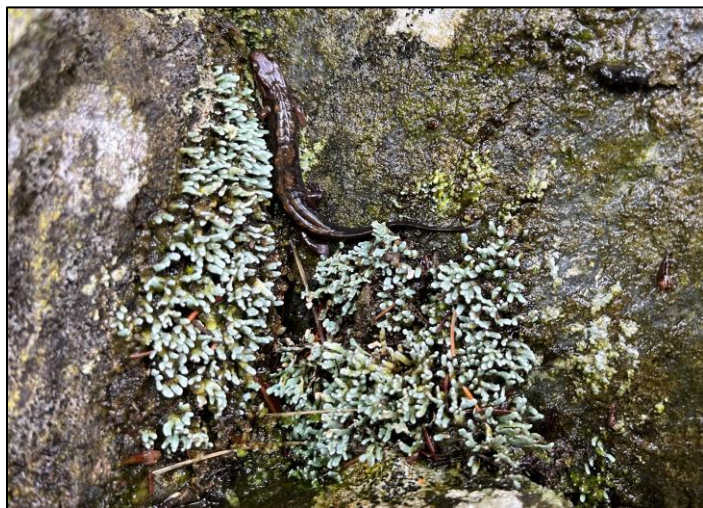


Figure 1. A patch of rock gnome lichen growing on a seepy rock face near Clingmans Dome. Environmental conditions that favor rock gnome lichen tend to be where salamanders like to live, too!

GRSM is one of the largest fully protected reserves for rock gnome lichen throughout its range. Though it has been listed as endangered for over two decades, the park has not engaged in systematic surveying and monitoring of rock gnome...until now!

Inventory & Monitoring

The Inventory & Monitoring branch at GRSM has begun a 3-year project dedicated to surveying and monitoring populations of rock gnome lichen in the park.

Inventory & Monitoring Objectives:

- 1) Map rock gnome lichen occurrences throughout the park to better understand its distribution and overall number of populations.
- 2) Repeat monitoring to understand long-term trends in the size and health of rock gnome lichen populations in the park.
- 3) Identify and clarify threats to populations and/or specific monitoring sites.
- 4) Identify population loss thresholds that will facilitate more thorough assessments, discussions, and management actions, including site-specific mitigations or restoration actions.

The rock gnome lichen team is currently focusing on scouting areas of the park that are likely to support rock gnome populations or where populations have been reported in the past. In the next two years, efforts will shift toward monitoring the populations discovered earlier in the project. In the first year of this project, the team scouted over 180 miles of trails and streams and found 92 new occurrences of rock gnome! They also established 5 monitoring sites, among which there is an average of 45 patches of rock gnome per site with an average patch health of 93%.



Figure 2. An intern photographing a newly discovered patch of rock gnome lichen on a scouting excursion.

Why Should We Care?

Why does lichen conservation matter? The extinction of a lichen may not seem consequential given their small size. However, lichens play important roles in their ecosystems:

- 1) Lichens are indicator species of air and water quality. Because they get their nutrients directly from the air and water around them, they are sensitive to airborne and waterborne pollutants. Thus, we can evaluate the quality of the air and water around us based on the health of the lichens nearby!
- 2) In addition to indicating air and water quality, lichens also *improve* air and water quality by trapping particles and pollutants, filtering them from the air and water around them.
- 3) Lichens host unique microecosystems of small insects, bacteria, and fungi.
- 4) Lichens provide food and nesting materials for many birds, mammals, and invertebrates.
- 5) Lichens contribute to ecosystem nutrient cycles by capturing nitrogen and other nutrients from air and water, transforming them into useable forms, and releasing them into their environments.

Despite their ecological importance, lichens are often overlooked—not just by the public, but also by conservationists. The rock gnome team hopes that the GRSM rock gnome monitoring project can help set a standard for lichen conservation protocols and inspire interest in lichens in the conservation community and park visitors alike.

More Information

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Figure 3. A large population of rock gnome lichen growing on a boulder in Ramsey Prong.