Recommendation for the Designation of
Rock Gnome Lichen
Cetradonia linearis (Evans) Wei & Ahti
as a Virginia Species of Greatest Conservation Need

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The Virginia Department of Wildlife Resources, with support from the Virginia Department of Conservation and Recreation-Division of Natural Heritage, recommends the addition of rock gnome lichen (*Cetradonia linearis* (Evans) Wei & Ahti) to Virginia's list of Species of Greatest Conservation Need as a tier II-B species (Appendix 1).

Justification

Species Summary
Cetradonia linearis (=*Gymnoderma lineare*, rock gnome lichen; G3/S1, Fed LE/State NL) (Appendix 2) was listed as Federally Endangered by the U.S. Fish and Wildlife Service in January 1995 (USFWS, 1995). In addition to its federal status, *Cetradonia linearis* is ranked G3 (vulnerable) by NatureServe and the Natural Heritage Network, meaning it is at moderate risk of extinction on a global scale. It is designated as S1 (critically imperiled) in four of the five states, including Virginia, where it occurs (NatureServe, 2022). This rock-dwelling species is a Southern Appalachian endemic, known only from the Blue Ridge mountains of Georgia, North Carolina, South Carolina, Tennessee, and Virginia. The species was discovered in Smyth County, Virginia in 1995, the northernmost known location (VA DCR, 2022). The Virginia colonies occur close together on several high elevation rock outcrops, consistent with habitat types described elsewhere. Rock gnome lichen is primarily threatened by habitat and microclimatic changes caused by the balsam wooly adelgid (*Adelges piceae*), an introduced insect pest. More generalized changes in humidity regimes at high elevations have been detected and could have negative effects for the species (Culatta and Horton, 2014). Heavy recreational use of its habitat for climbing is a concern (NatureServe, 2022; USFWS, 1995).

Trends
There is only one population of *Cetradonia linearis* in Virginia, located on the north slopes of Whitetop Mountain. The stronghold of the species is in North Carolina, with lesser population

numbers found in Tennessee, Georgia, and South Carolina (USFWS, 2013). Based on revisits in Virginia, the size of the original colony has remained stable since 1995, but these visual estimates are not backed by detailed monitoring data. Surveys for new populations in Virginia have expanded the known population area from one rock outcrop to six over a half-kilometer of mountainside. These additional discoveries will allow more opportunities for detecting trends. As of 1995, fourteen percent of the historically known populations outside of Virginia had been extirpated and many others had been severely reduced in size. In some cases, direct human impacts such as trampling and development were implicated but in others no obvious cause was known (USFWS, 1995). Detailed census techniques are needed across the range of the species to quantify these general observations.

Conservation Action

Conservation actions recommended for *Cetradonia linearis* include the protection of high elevation rock outcrops from human impacts, including impacts to microclimates from canopy gaps; surveys for additional colonies (including in popular recreation areas); and population monitoring.

Given the small size of the Virginia colonies, even small impacts could lead to their extirpation. Human traffic must be kept away from known colonies and the integrity of the forest canopy assured. Thus far (in Virginia?), no *Cetradonia* colonies have been found in areas with Fraser fir (*Abies fraseri*) and therefore no canopy trees are threatened by the effects of the balsam wooly adelgid. The forest canopy in the vicinity of *Cetradonia* occurrences should be watched for signs of other pathogens that could cause tree decline and changes to microclimate.

Surveys conducted since the discovery of the species in Virginia have been fruitful, although these discoveries are still confined to one mountainside. Additional outcrops at high elevation should be checked and rocky streams at mid-elevation should be targeted due to the occurrence of the species in such habitats in other states.

Population monitoring needs to move beyond simple visual evaluations. Methods used by other researchers should be considered and studies implemented in a subset of known populations.

Summary

Cetradonia linearis (rock gnome lichen) is proposed for inclusion in the Virginia State Wildlife Action Plan as a tier II-B species due to its restricted available habitat on high elevation outcrops, potential human impacts at these sites, sensitivity to changes in microclimate, and low population numbers.

This species occurs only in the Mount Rogers Planning District Commission.

References

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