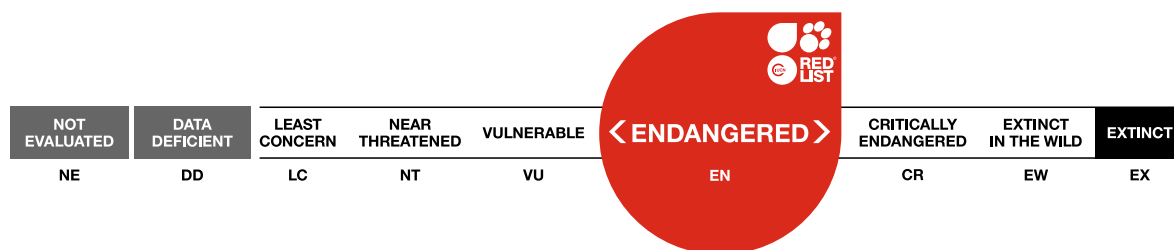


Lepraria lanata, Appalachian Dust Bunnies

Assessment by: Allen, J., Lendemer, J. & McMullin, T.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Fungi	Ascomycota	Lecanoromycetes	Lecanorales	Stereocaulaceae

Scientific Name: *Lepraria lanata* Tønsberg

Common Name(s):

- English: Appalachian Dust Bunnies

Assessment Information

Red List Category & Criteria: Endangered A2ce [ver 3.1](#)

Year Published: 2020

Date Assessed: October 9, 2019

Justification:

Lepraria lanata is a southern Appalachian endemic species with very few remaining extant subpopulations. Widespread logging in the 20th century, along with introduction of the Baslam Woolly Adelgid (*Adelges piceae*), has led to substantial reductions in the amount and quality of available habitat for this species. Therefore, it is listed as Endangered, A2ce. Climatic changes, including a rising cloud layer and hotter drier temperature pose serious threats to this species in the coming century, and so the population should be monitored carefully.

Geographic Range

Range Description:

Lepraria lanata is narrowly endemic to high-elevations of the southern Appalachian Mountains of eastern North America. It is known from the Great Smoky Mountains, Black Mountains, Roan Mountain, and Rabun Bald. It occurs in three states: Georgia, North Carolina, and Tennessee.

Country Occurrence:

Native, Extant (resident): United States (Georgia, North Carolina, Tennessee)

Population

All but one subpopulation has been recorded since 2005, so all currently recorded subpopulations are considered to be extant. Mature forest, especially mature spruce-fir forest, is essential for the maintenance of populations of *Lepraria lanata*. This species has not been found in any areas where the forest has been recently impacted by the Balsam Woolly Adelgid (*Adelges piceae*), both in forests that are dominated by standing dead firs and in forests where the firs have begun to regenerate, but grow in very dense stands. The Balsam Woolly Adelgid is an invasive pest that kills mature *Abies fraseri* throughout the southern Appalachians, ultimately leading it to be one factor in listing *A. fraseri* as Endangered (Farjon 2013). Thus the sharp decline in mature spruce-fir forest that occurred upon the introduction of the Balsam Woolly Adelgid is inferred to have drastically reduced the number of subpopulations and size of subpopulations of *Lepraria lanata*. Furthermore, clear-cut logging during the 20th century likely drastically reduced the number of populations of *L. lanata* before the Balsam Woolly Adelgid was introduced.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Lepraria lanata only grows on medium to large, shaded boulders and rock outcrops in humid, mature forests. The majority of populations grow in spruce-fir forests.

Systems: Terrestrial

Use and Trade

This species may be sensitive to over-collecting.

Threats (see Appendix for additional information)

Lepraria lanata is threatened by habitat loss because it grows almost exclusively in spruce-fir forests, a highly imperiled ecosystem (Rose and Nicholas 2008, Rollins *et al.* 2010, White *et al.* 2010). In the past the spruce-fir forest has been heavily impacted by logging, so very little old growth spruce-fir remains. Now *Abies fraseri*, one of the dominant members of this ecosystem, is being killed by the Balsam Woolly Adelgid (*Adelges piceae*). Most populations grow on national park and national forest land, and these areas continue to be protected from resource extraction and other land use changes through existing or strengthened regulation to assure that this species will persist. Climate change is also a serious threat to this species. Changes have already been documented in the habitat in which this species grows. Cloud immersion has declined significantly in recent years (Cullata and Horton 2014). Additionally, species distribution models projected to 2050 and 2070 using two different climate change models (CCSM4 and HadGEM2-AO) at the lowest and highest carbon dioxide concentration (2.6 and 8.5 rcp) were recently built in Maxent for this species (Allen and Lendemer 2016). The results of the modeling predict an average suitable habitat loss of 95.4% with a minimum loss of 79.1% and a maximum loss of 100%. This will represent a significant decrease in the Area of Occupancy and Extent of Occurrence for the species.

Conservation Actions (see Appendix for additional information)

Continued protection of all populations is essential. A species conservation plan should be developed, including actions to increase public education and awareness for the species. Further experiments

should test new methods for conservation translocations for *Lepraria lanata*.

Credits

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Reviewer(s): Yahr, R.

**Facilitator(s) and
Compiler(s):** Scheidegger, C.

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External Resources

For [Supplementary Material](#), and for [Images and External Links to Additional Information](#), please see the Red List website.

Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.4. Forest - Temperate	Resident	Suitable	Yes

Plant Growth Forms

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Plant Growth Form
L. Lithophyte
M. Fungus
LC. Lichen

Use and Trade

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

End Use	Local	National	International
Sport hunting/specimen collecting	No	No	No

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.4. Unintentional effects: (large scale) [harvest]	Past, unlikely to return	Majority (50-90%)	Rapid declines	Past impact
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Adelges piceae)	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.2. Droughts	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion		

		2. Species Stresses -> 2.1. Species mortality		
11. Climate change & severe weather -> 11.3. Temperature extremes	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
		Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality	

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: No
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: Yes, over entire range
Percentage of population protected by PAs: 81-90
Area based regional management plan: No
Occurs in at least one protected area: Yes
Invasive species control or prevention: Yes
In-place species management
Harvest management plan: No
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: No
In-place education
Subject to recent education and awareness programmes: No
Included in international legislation: No
Subject to any international management / trade controls: No

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
2. Land/water management -> 2.2. Invasive/problematic species control
3. Species management -> 3.2. Species recovery
4. Education & awareness -> 4.2. Training

Conservation Action Needed
4. Education & awareness -> 4.3. Awareness & communications

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 68
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): Unknown
Estimated extent of occurrence (EOO) (km ²): 6680
Number of Locations: 17
Continuing decline in number of locations: Unknown
Extreme fluctuations in the number of locations: Unknown
Lower elevation limit (m): 1,280
Upper elevation limit (m): 1,997
Population
Number of mature individuals: 6,500
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
No. of subpopulations: 17
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: No
No. of individuals in largest subpopulation: 500

Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 30

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