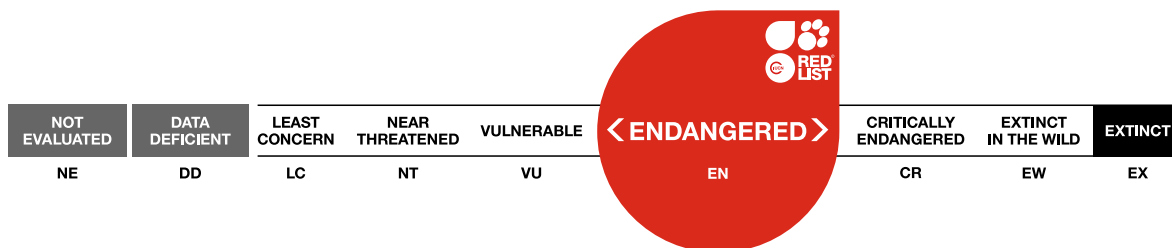


Alectoria fallacina, Bubbling Witches Hair

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



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Fungi	Ascomycota	Lecanoromycetes	Lecanorales	Parmeliaceae

Scientific Name: *Alectoria fallacina* Motyka

Common Name(s):

- English: Bubbling Witches Hair

Taxonomic Source(s):

Index Fungorum Partnership. 2021. Index Fungorum. Available at: <http://www.indexfungorum.org>.

Taxonomic Notes:

Alectoria fallacina is a chemically and morphologically distinct species that has been recognized for nearly 100 years and considered endemic to the Appalachian Mountains of eastern North America. A detailed treatment and comparison to the allopatric and widespread *A. sarmentosa*, with which it has been confused, was published by Lendemer and McMullin (2022).

Assessment Information

Red List Category & Criteria: Endangered A2ce; B2ab(i,ii,iii,v) [ver 3.1](#)

Year Published: 2022

Date Assessed: May 3, 2022

Justification:

Alectoria fallacina is endemic to the Appalachian Mountains of eastern North America. It is known from a small number of scattered occurrences in remnant old-growth forests. The majority of the extant population occurs in Great Smoky Mountains National Park in the eastern United States. The species is large and conspicuous, and has been searched for extensively in suitable habitat throughout the entire range of the taxon. In addition to being restricted to old-growth forests, the species occurs on mature trees of specific conifer host species. The rarity and spatial dispersion of the population make the species particularly susceptible to stochastic events including wildfires and storms. These events are increasing in the area where it occurs, particularly in the region that hosts the largest subpopulation. Host trees have been impacted previously by invasive species and air pollution, and continue to be impacted directly by invasive species. The southern Appalachian spruce-fir forests where much of the population occurs are considered endangered and likely to be greatly impacted by climate change in the near-term future. The species has a very restricted distribution and there are inferred continuing declines in EOO, AOO, habitat quality, and number of mature individuals. Therefore, it is assessed as Endangered under criteria A2ce and B2ab(i,ii,iii,v).

Geographic Range

Range Description:

Alectoria fallacina is endemic to the Appalachian Mountains of eastern North America where it occurs on mature conifers in remnant old-growth forest stands (Lendemer and McMullin 2022). There are five locations at which the species is currently known to be extant, and one location hosts the majority of individuals in the population.

Country Occurrence:

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

Native, Possibly Extinct: United States (New York, Virginia)

Population

The population is distributed across three spatially restricted and separated subpopulations that are strongly disjunct. The majority of extant individuals are concentrated in a single subpopulation located in Great Smoky Mountains National Park (GSMNP), in the eastern United States. Historical occurrences from New York and Virginia, U.S.A. suggest the species was more widespread and that there have been past declines in EOO, AOO, number of mature individuals, number of locations and number of subpopulations.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Alectoria fallacina occurs on the bark and branches of mature individuals of specific conifer species (Balsam Fir, *Abies balsamea*; Fraser's Fir, *Abies fraseri*; Red Spruce, *Picea rubens*; Eastern Hemlock, *Tsuga canadensis*) in remnant old-growth forests (Lendemer and McMullin 2022). It primarily occurs in the canopies of mature trees, with fragments of thalli falling and becoming established on lower branches closer to ground level.

Systems: Terrestrial

Use and Trade

This species is collected for scientific research.

Threats (see Appendix for additional information)

This species was historically impacted by large-scale logging throughout its range in the Appalachian Mountains as is now restricted to remnant old-growth conifer forests. Old-growth forest habitats have been greatly reduced from their historical extent throughout the Appalachian Mountains where the species occurs and the habitat is now highly fragmented. The population is currently being impacted by an invasive species that causes mortality of several host tree there (e.g. Hemlock Woolly Adelgid, *Adelges tsugae* and Eastern hemlock, *Tsuga canadensis*; Ellison *et al.* 2018). The population has also likely been impacted by air pollution, including acid rain and fog in the past (Noss *et al.* 2015).

Now, the spruce and spruce-fir ecosystems where the species occurs is also imperilled by invasive species and climate change (Noss 2015, Allen and Lendemer 2016, Lendemer *et al.* 2017). All of the subpopulations are subject to minor impacts from recreation and maintenance of recreation infrastructure, as well as ongoing maintenance of roads and utility corridors. The majority of the population, occurs in Great Smoky Mountains National Park, U.S.A. and occurrences within this subpopulation were likely extirpated thorough direct and indirect effects of the 2016 Gatlinburg wildfire.

Conservation Actions (see Appendix for additional information)

The entire location in Great Smoky Mountains National Park is well-protected, and this represents the majority of the entire population (>90%).

Monitoring of all extant sites is required to determine the degree, rate and time-frame of decline. Detailed surveys and increased protections for suitable habitat is also needed. The species is not

currently included on lists of threatened taxa. A species-based management plan needs to be developed, and the species needs to be incorporated into existing management plans for suitable habitat and extant sites. Study of the potential reintroduction into formerly occupied areas should be considered. Increased education about the species, its ecology, and how it could be conserved would also be highly beneficial.

Credits

Assessor(s): Lendemer, J. & McMullin, T.

Reviewer(s): Allen, J.

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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 -> 1.1. Forest - Boreal	Resident	Suitable	No
1. Forest -> 1.4. Forest - Temperate	Resident	Suitable	Yes

Plant Growth Forms

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

Plant Growth Form
M. Fungus
LC. Lichen

Use and Trade

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

End Use	Local	National	International
14. Research	No	Yes	No

Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.3. Unintentional effects: (subsistence/small scale) [harvest]	Past, unlikely to return	Minority (50%)	Slow, significant declines	Past impact
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.4. Unintentional effects: (large scale) [harvest]	Past, unlikely to return	Whole (>90%)	Very rapid declines	Past impact
7. Natural system modifications -> 7.1. Fire & fire suppression -> 7.1.1. Increase in fire frequency/intensity	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9

8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Adelges piceae)	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
9. Pollution -> 9.5. Air-borne pollutants -> 9.5.1. Acid rain	Ongoing	Whole (>90%)	Negligible declines	Medium impact: 6
9. Pollution -> 9.5. Air-borne pollutants -> 9.5.4. Type Unknown/Unrecorded	Ongoing	Whole (>90%)	Negligible declines	Medium impact: 6
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
11. Climate change & severe weather -> 11.3. Temperature extremes	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
11. Climate change & severe weather -> 11.4. Storms & flooding	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9

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: No
Percentage of population protected by PAs: 91-100
Area based regional management plan: No
Occurs in at least one protected area: Yes
Invasive species control or prevention: No
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: Yes
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
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.2. Invasive/problematic species control
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.2. Species recovery
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
4. Education & awareness -> 4.1. Formal education
4. Education & awareness -> 4.2. Training
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.2. Policies and regulations
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level

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 -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 44
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km ²): 15779

Distribution
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): No
Number of Locations: 5
Continuing decline in number of locations: Unknown
Extreme fluctuations in the number of locations: No
Population
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
No. of subpopulations: 3
Continuing decline in subpopulations: No
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 30

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