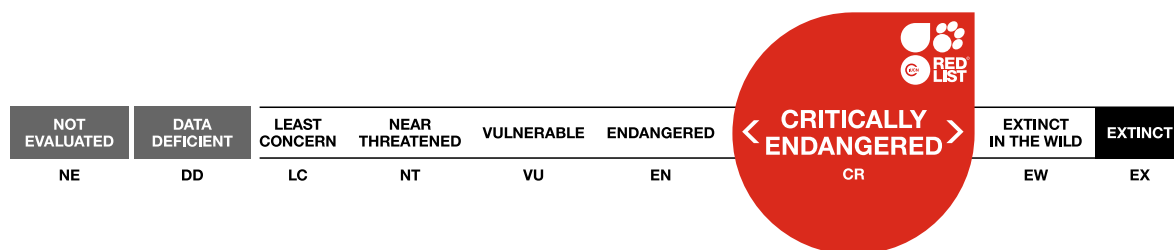


## *Cora timucua*, Timucua Heart Lichen

Assessment by: Dal Forno, M., Kaminsky, L. & Lücking, R.



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## Taxonomy

Kingdom	Phylum	Class	Order	Family
Fungi	Basidiomycota	Agaricomycetes	Agaricales	Hygrophoraceae

**Scientific Name:** *Cora timucua* Dal Forno, Kaminsky & Lücking

**Common Name(s):**

- English: Timucua Heart Lichen, Timucua Lettuce Basidiolichen

**Taxonomic Source(s):**

Lücking, R., Kaminsky, L., Perlmutter, G.B., Lawrey, J.D. and Dal Forno, M. 2020. *Cora timucua* (Hygrophoraceae), a new and potentially extinct, previously misidentified basidiolichen of Florida inland scrub documented from historical collections. *The Bryologist* 123(4): 657-673.

**Taxonomic Notes:**

*Cora timucua* (MycoBank MB836688) has previously been identified with the names *Cora glabrata*, *Cora pavonia*, *Dictyonema glabratum*, or *Dictyonema pavonium* (Fink 1935; Hale and Culberson 1956, 1970; Moore 1970; Parmasto 1978; Esslinger 2019). It is part of a species complex that is especially hyper diverse in the Neotropics.

## Assessment Information

**Red List Category & Criteria:** Critically Endangered (Possibly Extinct) A2c; B1ab(iii)+2ab(iii); D [ver 3.1](#)

**Year Published:** 2021

**Date Assessed:** June 30, 2020

**Justification:**

This species is at least Critically Endangered due to the decline of the Florida sand pine scrub vegetation in Florida (United States of America), which has been gravely affected by land conversion through urban development and citrus groves. The potential current range for this species includes only areas in Ocala National Forest, with a maximum area of occupancy and extent of occurrence of 12 km<sup>2</sup> and 73 km<sup>2</sup> respectively. However, all recent attempts to verify its existing subpopulations throughout the state have been unsuccessful in relocating this taxon, and it may now be extinct. Indeed, over the past three generations (90 years), the population size has potentially decreased by >99%. The sand pine scrub ecoregion is endemic to Florida and itself endangered with only 10–15% remaining. The scrub habitat includes 32 species federally listed and 100 at the state level; nonetheless, only approximately 35% of this scrub remnants are in protected areas (Hoekstra *et al.* 2010). Therefore, based on surveys there is a high probability that the species may be extinct, and also a relatively high chance that it may have disappeared based on the threats too. Further survey work is required to confirm that the species is no longer extant, but even if it does persist the population will be extremely small and highly restricted. Therefore, *Cora timucua* is assessed as Critically Endangered (Possibly Extinct).

**Date last seen:** 1985

## Geographic Range

### Range Description:

*Cora timucua* is endemic to Florida in the United States of America. While, historically, the range included large areas of this state, its current potential range includes only one area, the Ocala National Forest (USDA Forest Service). *Cora timucua* is the only species in the genus to have inhabited the United States and all known occurrences are from a historical 100-year timespan (1885 – 1985). Due to this species' rather showy appearance, and the fact that it has not been collected or observed in decades, it is possible that this species is already extinct.

### Country Occurrence:

**Native, Possibly Extinct:** United States (Florida)

## Population

The fact that this species has not been recorded since 1985, nor observed in citizen science platforms, such as iNaturalist and The Mushroom Observer, suggests this species is at best, Critically Endangered, and at worst, Extinct. The historically documented extent of occurrence (EOO) of *Cora timucua* is 14,059 km<sup>2</sup>; while the potential current maximum EOO is 73 km<sup>2</sup>, and the known historical, and potential current maximum, area of occupancy (AOO) values are 44 km<sup>2</sup> and 12 km<sup>2</sup>, respectively. This genus of basidiolichen, *Cora*, is generally very easily detected given their prominent thalli, so even if this species still exists in nature, it is extremely rare and its current number of mature individuals is certainly less than 50 based on field observations of experts in the genus (Dal Forno and Lücking, unpublished data).

**Current Population Trend:** Decreasing

## Habitat and Ecology (see Appendix for additional information)

According to label information, which frequently mentions "white sand scrub" as the habitat, the reported phorophytes, and the reconstructed distribution of known specimens, the species chiefly grows epiphytically on shrubs in the Florida (sand pine) scrub vegetation, specifically Florida peninsula inland scrub and oak-dominated hardwood forest, at an elevation range of 90–120 ft (about 25–35 m) with sandy soils. The lowest reported locality is at 7 m. The species appears to mostly grow on *Lyonia ferruginea* (Walter) Nutt. (Rusty Staggerbush) and *Quercus virginiana* Mill. (Southern Live Oak), and is associated with bryophytes and other lichens, including *Coccocarpia erythroxyli* (Spreng.) Swinscow & Krog, *Dictyonema* spp., *Leptogium* spp., *Normandina pulchella* (Borrer) Nyl., *Sticta beauvoisii* Delise, and various parmelioid taxa including *Parmotrema reticulatum* (Taylor) M.Choisy. Given the number of historical collections, it is difficult to ascertain whether this species was (or is) genuinely rare and was relatively frequently collected due to its unique morphology, or once was more common. Epiphytic species of *Cora* are usually confined to undisturbed habitats (Dal Forno and Lücking, unpublished data).

**Systems:** Terrestrial

## Use and Trade

Specimen collecting may be a threat to this species.

## Threats (see Appendix for additional information)

The main threat to this species has been land conversion for urban development. Together with other forms of land conversion, such as tree plantations (especially citrus groves), pasture, and agriculture, over 50% of the state area has been converted, whereas only about 5% remain as mixed hardwood-coniferous and upland hardwood forest and hammock (Volk *et al.* 2017). The Florida scrub ecosystem as a whole is listed as Critical/Endangered, with 85–90% of its original extension converted into citrus groves and urban areas (<https://www.worldwildlife.org/ecoregions/na0513>; Myers 1990). Logging practices and silviculture with tree species not native to the ecosystem represent another threat, particularly if implemented as surrogate of natural fire succession (Greenberg *et al.* 1994, 1995, Means *et al.* 1996, Menges 2007, Weekley *et al.* 2008, 2013). Specimen collecting may also be a threat to this species.

## Conservation Actions (see Appendix for additional information)

No specific conservation actions are currently in place, but the Florida scrub ecosystem is listed as Critical/Endangered (WWF, available at <https://www.worldwildlife.org/ecoregions/na0513>). The sand pine scrub ecoregion is endemic to Florida and itself endangered with only 10–15% remaining. The scrub habitat includes 32 species federally listed and 100 at the state level; nonetheless, only approximately 35% of this scrub remnants are in protected areas (Hoekstra *et al.* 2010).

There is evidence of conservation and management efforts from multiple sources, especially by acquisition of Florida scrub remnants state-wide. However, the last location where *Cora timucua* was reported, Ocala National Forest is only partially protected. The Ocala National Forest has four areas under the National Wilderness Preservation System, with one, Juniper Prairie Wilderness (IUCN category Ib), covering different habitats area of Florida scrub. Extensive searches are needed in all locations where Florida (sand pine) scrub is still existing. The main efforts needed at this point are to thoroughly check if this species still occurs in Ocala National Forest, where it was last reported. Another location to be visited is the Lake Wales Ridge National Wildlife Refuge, which holds the second largest remaining of scrub habitat behind Ocala National Forest. This Refuge is administered by the Everglades Headwaters NWR Complex and was established in 1990 with the objective of protecting, restoring and managing ancient Florida scrub. Experts have checked multiple sites throughout Florida and unfortunately have not observed any *Cora timucua*.

## Credits

**Assessor(s):** Dal Forno, M., Kaminsky, L. & Lücking, R.

**Reviewer(s):** Lendemer, J.

**Facilitator(s) and  
Compiler(s):** Bishop, G., Allen, J. & Chandler, A.

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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 -> 1.6. Forest - Subtropical/Tropical Moist Lowland	Resident	Suitable	Yes

## Plant Growth Forms

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

Plant Growth Form
LC. Lichen
M. Fungus
E. Epiphyte

## Use and Trade

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

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

## Threats

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

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
	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		



2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.4. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	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		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.4. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
5. Biological resource use -> 5.2. Gathering terrestrial plants -> 5.2.1. Intentional use (species is the target)	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		

## Conservation Actions in Place

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

<b>Conservation Action in Place</b>
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
In-place species management
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>)

<b>Conservation Action Needed</b>
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.1. Site/area management
4. Education & awareness -> 4.3. Awareness & communications

## Research Needed

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

<b>Research Needed</b>
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology

## Additional Data Fields

<b>Distribution</b>
Estimated area of occupancy (AOO) (km <sup>2</sup> ): 0-12
Continuing decline in area of occupancy (AOO): Unknown
Estimated extent of occurrence (EOO) (km <sup>2</sup> ): 0-73
Continuing decline in extent of occurrence (EOO): Unknown
Number of Locations: 0-3
Continuing decline in number of locations: Unknown
Lower elevation limit (m): 7
Upper elevation limit (m): 35
<b>Population</b>
Number of mature individuals: 0-49
Continuing decline of mature individuals: Unknown
<b>Habitats and Ecology</b>
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 30

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