Golden-eye Lichen (Great Lakes population)

Photo: © Sam Brinker

Scientific name
Teloschistes chrysophthalmus

Taxon
Lichens

COSEWIC Status
Endangered

Canadian range
Ontario

Reason for Designation

This population now consists of a single individual on a single Red Oak tree found in Sandbanks Provincial Park on Lake Ontario. Trend data are limited, but suggest that this population, which is associated with deciduous host trees, was likely always rare in this province. The number of mature individuals of this lichen has declined due to a combination of threats, which include air pollution, human disturbance, invasive species and severe weather. A single natural or human-induced event could lead to the loss of the entire population.

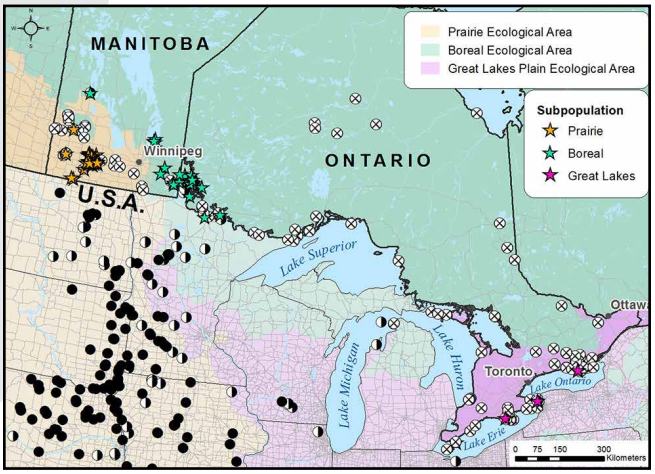
Wildlife Species Description and Significance

The Golden-eye Lichen, *Teloschistes chrysophthalmus*, is a distinctive bright orange to greenish-grey, tree-inhabiting macrolichen. The thallus has a tufted, shrubby habit often with flattened branches held to surfaces by a central holdfast. The abundant orange fruiting bodies (apothecia) with ciliate margins and the lack of vegetative propagules such as isidia or soredia, distinguish this species within the genus.

Distribution

In Canada, the Golden-eye Lichen occurs in localized areas of south-central Manitoba, northwestern Ontario, and the southern portion of the Great Lakes region of Ontario. In the USA, the Golden-eye Lichen is known from the interior Midwest, the Great Plains south to Texas, and from coastal California and Mexico. On the east coast of the USA, there are historical records from Maine south to New Jersey with recent sightings only in North Carolina.

The Golden-eye Lichen occurs in the Northern and Southern Hemisphere on five continents (except for Asia and Antarctica). Records include southern portions of Australia and New Zealand, North Africa, the Canary and Cape Verde Islands as well as western, central and southern Europe. There are also scattered occurrences in South America, especially Argentina and Chile.



Search effort and occurrence of the Golden-eye Lichen in each COSEWIC National Ecological Area. Stars (☆) indicate Canadian occurrences of the Golden-eye lichen: yellow and green stars indicate the Prairie/boreal population and red stars the Great Lakes population. White circles with an x (⊗) represent unsuccessful searches for the Golden-eye Lichen in Canada over the period 2013-2015. Black circles (●) represent recent Golden-eye Lichen records in the USA from literature sources. Half black and half white circles (◑) represent historical USA records (>20 yrs).

Habitat

The Golden-eye Lichen requires well-lit, humid environments in temperate to Mediterranean climates, and is often found near shorelines and coastal areas. In Canada, it is most common on the branches and twigs of several host tree species. In south-central Manitoba, numerous thalli are found on mature White Spruce that grow loosely clustered in "islands" within mixed-grass prairie in the Assiniboine Delta region over calcareous sands. In southeastern Manitoba and northwestern Ontario, the Golden-eye Lichen grows at very low density in relatively open, conifer-dominated woods and rocky barrens on White Spruce, Trembling Aspen, Jack Pine, Balsam Fir and Bur Oak. In the southern Great Lakes region of Ontario, the only extant site for the Golden-eye Lichen is in a remnant old-growth coastal deciduous forest of Sugar Maple, Eastern Hop-hornbeam and Red Oak along Lake Ontario growing over limestone bedrock. Here, it grows on well-lit bark of Red Oak.

Biology

Sexual reproduction in the Golden-eye Lichen occurs via the dispersal of fungal ascospores that must germinate and encounter a compatible green alga of the genus *Trebouxia*. Short distance dispersal by asexual reproduction as a result of thallus fragmentation is common in lichens and is assumed to occur in the Golden-eye Lichen. This species is a mesotrophic lichen that tolerates moderate amounts of nitrogen but not the high levels tolerated by nitrophytic lichens such as the related Maritime Sunburst Lichen. Growth rates of the Golden-eye Lichen are quite rapid, likely because of its preference for well-lit, nutrient-enriched substrata resulting in a shorter generation time than many other species of lichen. However, the Golden-eye Lichen is sensitive to acid rain and sulphur dioxide, partially because of its shrubby nature that gives it a high surface area to volume ratio.

Population Sizes and Trends

Twenty-five Golden-eye Lichen occurrences have been documented in Canada representing three subpopulations: Prairie, Boreal, and Great Lakes. Six occurrences comprise the Prairie subpopulation; 14 occurrences form the Boreal subpopulation (one of which is historical); and five occurrences comprise the Great Lakes subpopulation (four of which are historical and likely extirpated). The Great Lakes subpopulation is considered to be a separate designatable unit because it is geographically isolated and ecologically distinct, growing on deciduous trees.

The total abundance in 2013 of the Golden-eye Lichen in Canada was estimated to be greater than 15 million individuals. The number of lichen colonies on White Spuce trees was estimated by counting colonies on individual branches. Then the number of branches occupied by the lichen on each tree was counted. Using these data, it was estimated that individual trees were each host to between 10,000-20,000 lichen colonies. Thus, while the number of individuals in the total population of the Golden-eye Lichen is very high, they could be accommodated by as few as 7,000 to 15,000 White Spruce trees.

Approximately 99% of the known Golden-eye Lichen population occurs in the Prairie subpopulation, more specifically within 15 km of Spruce Woods Provincial Forest in south-central Manitoba. Outside this core area, the occurrences are few, small and fragmented, and likely represent a former more continuous range. The Boreal subpopulation contains approximately 0.03-0.05% of the total population (estimated at 5,000-7,000 individuals) and occurs from southern Lake Winnipeg through Lake of the Woods to Rainy Lake in northwestern Ontario. The Great Lakes subpopulation, is a separate DU and now consists of a single individual found in Sandbanks Provincial Park along Lake Ontario. Trend data from this region, while scant, suggests that the species was likely always rare in this area, but has declined due to human-induced factors.

Threats and Limiting Factors

The results of the threats calculator assessment indicate that the impacts of the threats to the Golden-eye Lichen in Canada are considered to be "medium to high." The main threats to the very large Prairie subpopulation are fire and fire suppression, climate change, recreational activities and livestock grazing. The Boreal subpopulation may be affected by cottage development while the very small Great Lakes subpopulation, now reduced to a single host tree, could be affected by several threats including severe weather, human disturbance, air pollution, and invasive species.

Protection, Status, and Ranks

Currently, the Golden-eye Lichen has no formal legal protection or status in Canada or the United States. It has a global rank of G4G5 (Apparently Secure to secure) and a Canadian national rank of N3N4 (Vulnerable to Apparently Secure). However, its provincial conservation status in Ontario is S2S3 (Imperiled to Vulnerable), and S3S4 (Apparently Secure to Vulnerable) in Manitoba.

The largest Canadian subpopulation occurs in the Prairie Ecological Area of south-central Manitoba where much of the suitable habitat is found in the Spruce Woods Provincial Park and adjacent Provincial Forest where it is afforded some protection. A portion of this subpopulation is also found in the adjacent federally managed Canadian Forces Base Shilo. The Boreal subpopulation mainly occurs on Crown land along lake shores and has no formal protection. The only extant occurrence in the Great Lakes subpopulation, a separate DU located in Sandbanks Provincial Park, is afforded some protection through the *Provincial Parks and Conservation Reserves Act*, although no formal monitoring program is in place to assess the impact of threats or the persistence of the Golden-eye Lichen here.

Source: COSEWIC. 2016. COSEWIC assessment and status report on the Golden-eye Lichen *Teloschistes chrysophthalmus*, Prairie / Boreal population and Great Lakes population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xv + 50 pp.

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