

# Golden-eye Lichen (Great Lakes population)

## Ontario Government Response Statement



Photo: Troy McMullin

### Protecting and Recovering Species at Risk in Ontario

Species at risk recovery is a key part of protecting Ontario's biodiversity. The *Endangered Species Act, 2007* (ESA) is the Government of Ontario's legislative commitment to protecting and recovering species at risk and their habitats.

Under the ESA, the Government of Ontario must ensure that a recovery strategy is prepared for each species that is listed as endangered or threatened. A recovery strategy provides science-based advice to government on what is required to achieve recovery of a species.

Generally, within nine months after a recovery strategy is prepared, the ESA requires the government to publish a statement summarizing the government's intended actions and priorities in response to the recovery strategy. The response statement is the government's policy response to the scientific advice provided in the recovery strategy. In addition to the strategy, the government response statement considered (where available) input from Indigenous communities and organizations, stakeholders, other jurisdictions, and members of the public. It reflects the best available local and scientific knowledge, including Traditional Ecological Knowledge where it has been shared by communities and Knowledge Holders, as appropriate and may be adapted if new information becomes available. In implementing the actions in the response statement, the ESA allows the government to determine what is feasible, taking into account social, cultural and economic factors.

The Recovery Strategy for the Golden-eye Lichen (*Teloschistes chrysophthalmus*) – Great Lakes population in Ontario was completed on July 22, 2019.

Golden-eye Lichen is a distinctive bright orange to greenish-grey lichen that typically inhabits trees. The main body of the lichen (thallus) appears shrub-like and often has upright cup-like fruiting bodies (apothecia) with hair-like projections (cilia) around the rims. The lichen attaches to surfaces via a central point referred to as a holdfast.

## Protecting and Recovering Golden-eye Lichen

Golden-eye Lichen (Great Lakes population) is listed as an endangered species under the ESA, which protects both the lichen and its habitat. The ESA prohibits harm or harassment of the species and damage or destruction of its habitat, without authorization. Such authorization would require that conditions established by the Ontario government be met.

Golden-eye Lichen has a global distribution with observations on five continents. In North America, Golden-eye Lichen has a patchy distribution which includes records on the western and eastern coasts, and throughout much of the Great Plains region. In Canada, it is located in both Manitoba and Ontario, and occurs as three distinct populations (Prairie, Boreal, and Great Lakes populations). Two of the populations occur within Ontario – the Boreal population, which occurs in northwestern Ontario and Manitoba, and the Great Lakes population, which occurs only in southern Ontario. The Prairie population is found only in Manitoba.

The Prairie and Boreal populations of Golden-eye Lichen were assessed as one unit by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) because they occur within a similar geographic area, and the same types of habitat. The Great Lakes population was considered separately from the Prairie and Boreal populations because the populations are widely separated, occupy different ecogeographic zones, and display unique habitat preferences, suggesting that they are locally adapted and ecologically significant. The two populations found within Ontario were also assessed separately by the provincial Committee on the Status of Species at Risk in Ontario (COSSARO); only the Great Lakes population is classified as at risk under Ontario's ESA.

The Great Lakes population consists of only one known colony of Golden-eye Lichen, located in Sandbanks Provincial Park on the shoreline of Lake Ontario. The size of the colony has declined since its discovery in 1994, with at least six individuals having been lost in the last 10 years. The population now consists of only two thalli (individuals), and is at very high risk of extirpation from Ontario. Although it is likely that the Great Lakes population was always rare, it occurred historically at several locations along the shorelines of Lake Erie and Ontario, as well as near Niagara Falls. Recent surveys in these areas have not detected the species. Golden-eye Lichen is considered rare, and likely to be in decline, in jurisdictions neighbouring the Great Lakes region, as well, thus reducing the likelihood that these neighbouring occurrences could rescue the Ontario's Great Lakes population.

Lichens are organisms that are composed of a fungus and a type of alga or a cyanobacterium. The alga or cyanobacterium produces food for the lichen through photosynthesis while the fungus provides structure to the lichen, absorbs nutrients from the host structure, and plays an important role in the lichen's reproduction. The green alga *Trebouxia* is believed to be the photosynthesizing component of Golden-eye Lichen.

Golden-eye Lichen is able to reproduce in two ways – vegetatively (asexually), through fragments of the hair-like projections on its fruiting bodies or pieces of the lichen itself, or sexually, through the release of spores which are distributed by air currents, and land on potential new hosts. In both circumstances, successful reproduction is entirely dependent on arrival on an appropriate host in a suitable environment (including the presence of the *Trebouxia* in the latter method). Golden-eye Lichen lacks the types of specialized structures (soredia or isidia) that are present on many other lichens, suggesting that it may have a lower capacity for vegetative reproduction compared to other species of lichen.

As a species, Golden-eye Lichen lives in well-lit, humid environments, and is typically found along shorelines, on the branches and twigs of tree species, including White Spruce (*Picea glauca*), Trembling Aspen (*Populus tremuloides*), Jack Pine (*Pinus banksiana*), Balsam Fir (*Abies balsamea*), Bur Oak (*Quercus macrocarpa*), and Red Oak (*Quercus rubra*). The Great Lakes population is located within a mature coastal deciduous forest, on the bark of a single Red Oak.

The extremely small size of the Great Lakes population makes it highly susceptible to threats such as severe weather events, physical damage or becoming dislodged, and intentional collection. The species is highly vulnerable to being dislodged from its host due to pressure or abrasion because it attaches to its host via a single central point. The lichen could be dislodged during human recreational activities (such as the use of a nearby trail) or due to natural causes (such as abrasion caused by branches of nearby vegetation or wildlife use of the host tree). The species may also be impacted by plant pathogens (e.g., Oak Wilt *Ceratocystis fagacearum*) which affect the health of its host tree. Other threats to the species may include declines in air quality, and changes in habitat suitability resulting from the growth of invasive woody plants, such as Common Buckthorn (*Rhamnus cathartica*).

In the absence of additional colonies within the Great Lakes population, the vulnerability of the known colony suggests that the risk of extirpation for Golden-eye Lichen will remain high, for the foreseeable future. Surveys, to determine whether additional colonies are present in Ontario, are needed. Given the extreme rarity of the Great Lakes population, the rarity of the species in the larger Great Lakes region, and the uniqueness

of this population relative to other Golden-eye Lichen occurrences in Canada, protection and recovery efforts will be focused on supporting the persistence of this population in Ontario. In the event that research indicates that population management actions such as augmentation or reintroduction are likely to be successful, appropriate implementation of these types of efforts may be the best approach to minimize the risk of extirpation of Golden-eye Lichen from Ontario.

### **Government's Recovery Goal**

**The government's goal for the recovery of Golden-eye Lichen (Great Lakes population) is to support the persistence of the Great Lakes population in Ontario. The government supports investigating the feasibility and appropriateness of reintroduction and/or augmentation of the Great Lakes population in Ontario.**

### **Actions**

Protecting and recovering species at risk is a shared responsibility. No single agency or organization has the knowledge, authority or financial resources to protect and recover all of Ontario's species at risk. Successful recovery requires inter-governmental co-operation and the involvement of many individuals, organizations and communities. In developing the government response statement, the government considered what actions are feasible for the government to lead directly and what actions are feasible for the government to support its conservation partners to undertake.

### **Government-led Actions**

To help protect and recover Golden-eye Lichen (Great Lakes population), the government will directly undertake the following actions:

- Continue to protect Golden-eye Lichen (Great Lakes population) and its habitat through the ESA.
- Undertake communications and outreach to increase public awareness of species at risk in Ontario.
- Consistent with the *Sandbanks Provincial Park Management Plan* (1993) and the *Sandbanks Vegetation Management Plan* (2009), continue to protect provincially significant ecosystems (including rare and endangered species) at Sandbanks Provincial Park while offering compatible opportunities for visitors to participate in recreational activities.
- Educate other agencies and authorities involved in planning and environmental assessment processes on the protection requirements under the ESA.
- Encourage the submission of Golden-eye Lichen data to Ontario's central repository through the NHIC (Rare species of Ontario) project in iNaturalist or directly through the Natural Heritage Information Centre.

- Continue to support conservation, agency, municipal and industry partners, and Indigenous communities and organizations to undertake activities to protect and recover Golden-eye Lichen (Great Lakes population). Support will be provided where appropriate through funding, agreements, permits (including conditions) and/or advisory services.
- Continue to implement the Ontario Invasive Species Strategic Plan (2012) to address the invasive species (e.g. Common Buckthorn) that threaten Golden-eye Lichen.
- Conduct a review of progress toward the protection and recovery of Golden-eye Lichen (Great Lakes population) within five years of the publication of this document.

### Government-supported Actions

The government endorses the following actions as being necessary for the protection and recovery of Golden-eye Lichen (Great Lakes population). Actions identified as “high” may be given priority consideration for funding under the Species at Risk Stewardship Program. Where reasonable, the government will also consider the priority assigned to these actions, when reviewing and issuing authorizations under the ESA. Other organizations are encouraged to consider these priorities when developing projects or mitigation plans related to species at risk.

**Focus Area: Research**

**Objective:** Improve understanding of potential population management techniques and mechanisms for dispersal for Golden-eye Lichen.

Given that the Great Lakes population is anticipated to remain at high risk of extirpation, it is important to explore the feasibility of population management actions (i.e., augmentation or reintroduction) that may support its persistence. Other species of lichens have successfully been propagated in controlled laboratory environments and in natural settings, but the ability to propagate Golden-eye Lichen has not yet been evaluated. It is important to understand whether, if an individual lichen or piece of lichen is dislodged from the existing colony, or the host tree’s health fails, the lichen (or a part of it) may be feasibly relocated to another suitable environment. All actions undertaken to assess the feasibility of augmentation, reintroduction, or relocation must consider potential impacts on existing populations; collections from Ontario’s Great Lakes population are not recommended to support these efforts.

Although some evidence suggests that Golden-eye Lichen may be transported to new areas through the movement of nursery trees, this method of dispersal warrants further investigation.

**Actions:**

1. **(High)** Investigate the feasibility of relocating thalli at risk of being lost (e.g., due to failing host tree health) to substrate in appropriate natural environments. Related actions may include:
  - reviewing and summarizing current scientific literature;
  - identifying and documenting techniques and best practices;
  - identifying suitable locations and host trees or surfaces; and,
  - undertaking experimental transplants under appropriate circumstances, and using appropriate stock.
2. **(High)** Undertake appropriate actions to investigate the feasibility of population management actions for the Great Lakes population of Golden-eye Lichen. Potential actions may include assessing the feasibility of:
  - propagating new thalli in controlled environments; and,
  - propagating new thalli via vegetative reproduction (e.g., from fragments) in suitable natural environments.
3. Investigate habitat requirements (e.g., moisture, light and canopy conditions) in order to inform stewardship actions to maintain or enhance habitat.
4. Examine lichen communities on woody plants at nurseries and evaluate how nursery stock is moved across the landscape, to better understand whether its movement may play a role in the dispersal of Golden-eye Lichen.

**Focus Area: Inventory and Monitoring**

**Objective:** Increase knowledge of the status and distribution of Golden-eye Lichen (Great Lakes population) in Ontario.

While habitats with high suitability have been surveyed in recent years, survey effort has been relatively limited at many sites. Additional intensive survey effort is needed to confirm whether Golden-eye Lichen is present at other locations. The results of these surveys are critical because the discovery of additional occurrences will help to determine where recovery efforts would be best focused. It is important to monitor and assess the status of the existing colony, and any additional colonies discovered, over time, to track the effectiveness of protection and recovery efforts, and inform future efforts.

**Actions:**

5. **(High)** Conduct intensive surveys of apparently suitable habitat in the Great Lakes region in Ontario, to determine whether additional colonies are present, and document site conditions as well as the characteristics of any new colonies. Potential survey areas include:
  - Sandbanks Provincial Park;
  - Presqu'île Provincial Park;

- the western shoreline of Lake Ontario in Prince Edward County; and,
  - mature open woodlands along the shorelines of lakes Ontario, Erie, Huron, and Georgian Bay.
6. For the known colony, as well as any additional colonies identified via the action above, develop and implement a monitoring and assessment protocol to track colony status (including number of thalli, thalli size, and fertility), habitat conditions, and potential or confirmed site-specific threats.

**Focus Area: Stewardship**

**Objective:** Increase stewardship efforts for the species and its habitat, and minimize threats.

Undertaking appropriate actions to maintain or enhance Golden-eye Lichen habitat will assist in supporting the species' persistence in the province. A collaborative approach to these activities will share responsibilities, improve efficiency, ensure suitable habitat is maintained, and encourage communication about lessons learned.

**Actions:**

7. In collaboration with landowners, land managers, municipalities, and interested Indigenous communities and organizations, and where appropriate, undertake habitat stewardship actions to maintain or enhance habitat conditions at locations where the species is likely to disperse, or at new locations where the species is discovered. Actions should be undertaken in a manner that does not negatively impact Golden-eye Lichen and may include the control of invasive vegetation (e.g., Common Buckthorn).

**Implementing Actions**

Financial support for the implementation of actions may be available through the Species at Risk Stewardship Program. Conservation partners are encouraged to discuss project proposals related to the actions in this response statement with Ministry of the Environment, Conservation and Parks staff. The Ontario government can also advise if any authorizations under the ESA or other legislation may be required to undertake the project.

Implementation of the actions may be subject to changing priorities across the multitude of species at risk, available resources and the capacity of partners to undertake recovery activities. Where appropriate, the implementation of actions for multiple species will be co-ordinated across government response statements.

## **Reviewing Progress**

The ESA requires the Ontario government to conduct a review of progress towards protecting and recovering a species no later than the time specified in the species' government response statement, or not later than five years after the government response statement is published. The review will help identify if adjustments are needed to achieve the protection and recovery of Golden-eye Lichen (Great Lakes population).

## **Acknowledgement**

We would like to thank all those who participated in the development of the Recovery Strategy and Government Response Statement for the Golden-eye Lichen (*Teloschistes chrysophthalmus*) – Great Lakes population in Ontario for their dedication to protecting and recovering species at risk.

### **For additional information:**

Visit the species at risk website at [ontario.ca/speciesatrisk](http://ontario.ca/speciesatrisk)

Contact the Ministry of the Environment, Conservation and Parks

1-800-565-4923

TTY 1-855-515-2759

[www.ontario.ca/environment](http://www.ontario.ca/environment)