



Flooded Jellyskin



Photo: © Robert E. Lee

Scientific name

Leptogium rivulare

Taxon

Lichens

COSEWIC Status

Special Concern

Canadian range

Manitoba, Ontario, Quebec

Reason for Designation

Since this lichen was last assessed in 2004, increased search effort and a better understanding of its habitat requirements have revealed new occurrences in Manitoba, Ontario, and Quebec and the minimum number of mature individuals is now estimated at 350,000. Canada is thus the stronghold for this species which has declined or disappeared from elsewhere in its global range. Emerald Ash Borer is a major threat killing ash trees that are an important host species for this lichen where it is most abundant in southern Ontario. Up to 50% of the population may be affected within the next few decades. Another threat is climate change which is expected to create drier conditions that will reduce seasonal flooding which this lichen requires to survive. It also needs calcareous enrichment, and as a result has an even more patchy distribution in the inaccessible boreal regions of Manitoba and Ontario where the number of individuals is lower but not accurately known. The predicted impact of these two threats on this lichen results in the recommended status of Special Concern.

Wildlife Species Description and Significance

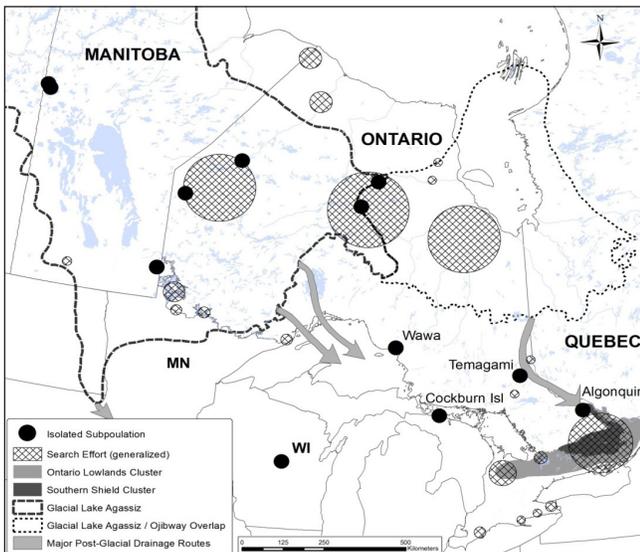
The Flooded Jellyskin (*Leptogium rivulare*) is a small, grey or bluish-grey (when dry) leafy lichen, the surface of which becomes jelly-like when wet. Thalli are up to 4 cm in diameter and on the upper surface there are numerous reddish-brown fruiting bodies (apothecia). The Flooded Jellyskin is a “cyanolichen,” in which the photosynthetic partner is a cyanobacterium in the genus *Nostoc*. Cyanolichens have been shown to contribute significant amounts of nitrogen to the ecosystems in which they occur. The Flooded Jellyskin is also special in that it is one of only a few macrolichens that can tolerate seasonal flooding by fresh water.

Distribution

The Flooded Jellyskin is a globally rare boreal-temperate lichen found in glaciated portions of eastern North America and eastern, central and western Europe. It is found mainly between the 45°N and 60°N parallels. In the USA, the Flooded Jellyskin was found historically as far south as Illinois and

Vermont (possibly in glacial refugia) but there is only one recent record from central Wisconsin.

In Canada, three subpopulations of Flooded Jellyskin have been identified. The Ontario Lowlands subpopulation is the largest, and mostly confined to forested vernal pools. The Southern Shield subpopulation is the next largest along the southern limits of the Precambrian Shield near the interface with the Paleozoic Lowlands of Ontario and Quebec, with outliers in Wawa and Temagami. The post-glacial Lake Agassiz basin subpopulation is widely scattered in the boreal forest ecoregion of northern Ontario and Manitoba. A cluster of occurrences exists near Flin Flon, Manitoba, representing the most northerly (55°N) site of the Flooded Jellyskin in Canada.



The distribution of Flooded Jellyskin (*Leptogium rivulare*) in Canada showing three clusters in (1) the Ontario Lowlands (2) the Southern Shield and (3) the area formerly covered by the glacial lakes Agassiz and Ojibway. Main areas of search efforts are represented by cross-hatched circles. The approximate area occupied by post-glacial Lake Agassiz and possible combination with post-glacial Lake Ojibway is shown (modified from Teller et al. 2002) with grey arrows indicating major drainage routes of post glacial lakes in relation to the isolated northern occurrences of Flooded Jellyskin.

Habitat

In Canada, the Flooded Jellyskin requires a humid habitat that is both calcareous and subject to seasonal flooding. The Ontario Lowlands subpopulation is mostly confined to forested vernal

pools. The Southern Shield subpopulation is also found in seasonally flooded swamps and pools along the southern limits of the Precambrian Shield near the interface with the Paleozoic Lowlands. The post-glacial Lake Agassiz basin subpopulation is small and widely scattered in northern Ontario and Manitoba where it colonizes exposed bedrock, or large boulders along flooded lake shorelines in areas that overlie calcareous bedrock or on the margins of seasonally flooded rivers or lakes that have deposits of calcareous materials. For the Flooded Jellyskin to thrive, the water has to have a low sediment load, there needs to be a suitable substratum (tree, shrub or rock) and appropriate temperatures. The Flooded Jellyskin is most often recorded on Ash trees and less frequently on Maple, Elm and Willow. Partial shade provided by trees and tall shrubs appears to be important for maintaining high humidity and a moderate temperature during summer months. Full shade is not generally tolerated by this lichen. The limited dispersal ability of the Flooded Jellyskin likely restricts its occurrence and abundance.

Biology

Abundant apothecia are normally produced, and sexual reproduction is important in maintaining Flooded Jellyskin. Dispersal is achieved passively by the wind-borne spores, possibly aided by water currents. No specialized vegetative organs are produced, though presumably vegetative fragmentation may occur at smaller spatial scales. Dispersal in the species is likely limited by the required habitat conditions, which are not common on the landscape, and by the fact that the germinating spores require a substratum of suitable pH, temperature, light, and moisture as well as the presence of compatible cyanobacteria that enable the re-establishment of the fungal-algal symbiosis. Biotic vectors such as birds or mammals may be an infrequent or potential means of dispersal.

Population Sizes and Trends

Trends in the Canadian range or abundance of Flooded Jellyskin cannot be assessed, owing to the scarcity of historical data. Until 2004, the only known population in Canada consisted of just four occurrences. One of these historical occurrences, Wawa, Ontario, was not re-found and is likely extirpated as a result of air pollution and habitat destruction. Since 2004, increased survey efforts

and an understanding of the Flooded Jellyskin's habitat requirements have resulted in an increase in the number of known occurrences, which is now 76 (roughly 352,000 individuals). It is likely that additional occurrences exist in northern Ontario, Manitoba, and possibly Saskatchewan and northern Quebec in areas formerly inundated by the post-glacial Agassiz and Ojibway lakes. However, only low numbers of thalli at widely scattered sites have been found in the post-glacial Lake Agassiz subpopulation, so further searches in these other areas are unlikely to increase the total population significantly.

Threats and Limiting Factors

The impact of the threats to the survival of the Flooded Jellyskin were assessed as "high" using the COSEWIC Threats Assessment Calculator. Since COSEWIC's last assessment of this lichen in 2004, the severity and scope of the threats have changed. Currently, the most important threat to this lichen is the Emerald Ash Borer beetle, which kills all native ash trees and is spreading rapidly both in Ontario and Quebec. Ash trees are important hosts for a significant portion of the Canadian range of the Flooded Jellyskin. Indeed, 99% of the known thalli are associated with plant communities where Ash is present. Twenty of the 76 known occurrences (roughly one quarter of the Canadian population) are in habitat dominated by ash, and another seven occurrences have ash recorded as a co-dominant host tree. Given the known rates of the spread of Emerald Ash Borer, the southern Flooded Jellyskin occurrences in Ontario and Quebec are likely to be affected within the next 10-20 years. Elm is another important substratum for the Flooded Jellyskin in central Ontario occurrences and Dutch Elm Disease is also continuing to kill trees in the province.

Another important threat is climate change, which may alter seasonal flooding in vernal pools and along water courses where flooding promotes the lichen and the establishment of its preferred host trees and shrubs. About 80% of Flooded Jellyskin occurrences are associated with seasonal vernal pool habitat,

which is expected to become drier and less frequent. The limited dispersal abilities of the Flooded Jellyskin also increases its vulnerability to climate change, as many of its occurrences are small and isolated in remnant forest patches with vernal pools.

Dams pose another threat to this lichen as they alter flooding regimes along rivers. Changes to hydrology may alter or eliminate Flooded Jellyskin habitat. Other activities such as forestry, mining, quarries, and urban development that alter watercourses, water quality or the protective vegetation surrounding Flooded Jellyskin sites also have the potential to degrade habitat by exposing individuals to increased solar radiation and wind, thus reducing humidity and increasing erosion and water turbidity.

Protection, Status, and Ranks

The Flooded Jellyskin was proposed for a global red list status in January 2015. It was assessed by COSEWIC as Threatened in 2004 and subsequently listed on Schedule 1 of the federal *Species at Risk Act*. A federal recovery strategy was completed in 2013. The Flooded Jellyskin is also listed as a Threatened species under the Ontario *Endangered Species Act, 2007*, receiving both species and habitat-level protection. It also receives protection by occurring in one Manitoba provincial park, and nine Ontario provincial parks or conservation reserves, which account for roughly 4 percent of the total Canadian population. There is no specific legal protection for Flooded Jellyskin in Quebec.

Source: COSEWIC. 2015. COSEWIC assessment and status report on the Flooded Jellyskin *Leptogium rivulare* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 48 pp.

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