Mountain Crab-eye

Photo: © Paula Bartemucci

Scientific name
Acroscyphus sphaerophoroides

Taxon
Lichens

COSEWIC Status
Special Concern

Canadian range
British Columbia

Reason for Designation

This charismatic lichen forms pale gray to yellow gray coral-like cushions. It is globally rare and there are only eight known occurrences in Canada. All are within British Columbia in a very restricted climatic zone, which lies between the hyper-maritime conditions found on the outer coast and the continental climate of the interior. There is a low IAO of 32 km2 and the total estimated population for this lichen is less than 250 colonies. However, this lichen occurs in remote, inaccessible sites within the rugged Coast Mountains, and additional new occurrences are likely to be discovered. In Canada, it is found primarily on dead Mountain Hemlock snags in patterned fen or bog complexes. Development pressures (roads, pipeline, hydroelectricity, mining and forestry) and climate change threaten hydrological regime and microclimatic conditions required by this species at many of the known sites.

Wildlife Species Description and Significance

Mountain Crab-eye is a medium-sized, yellowish to pale grey cushion-forming lichen. The lichen consists of dense tufts of cylindrical, stout, coral-like erect to semi-erect branches. The interior of the lichen is yellow to bright orange and solid. Fertile branches have immersed black fruiting bodies, giving the branches the appearance of stalked crab eyes. Non-fertile branches are smaller in diameter and height. The passively dispersed spores are dark brown, peanut-shell shaped, unornamented, and not well adapted for wind dispersal. The photosynthetic partner is believed to be the green alga, *Trebouxia*, though there is uncertainty. Mountain Crab-eye has a complex secondary chemistry and contains substances not found in other genera of pin lichens (Family Caliciaceae).

Mountain Crab-eye is the only species of the genus *Acroscyphus*. It is noteworthy that the Mountain Crab-eye in Canada occupies peatland habitats that are very different from the habitats of Mountain Crab-eye elsewhere in the world. There could be genetic or chemical differences between the Canadian subpopulations and other subpopulations.

Photo: © Paula Bartemucci

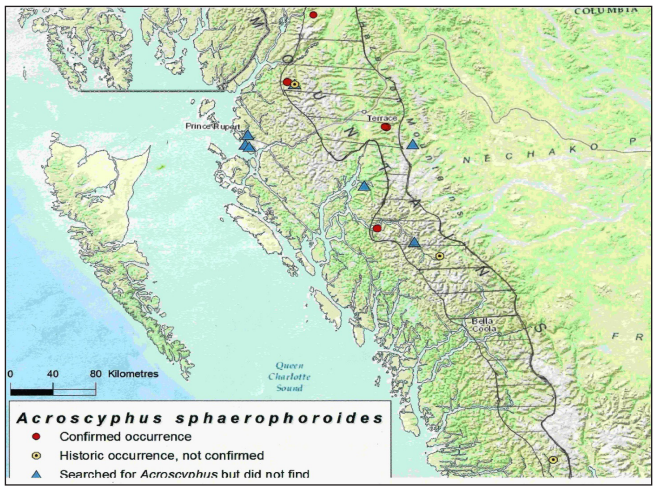
a) Fertile podetia with black spore masses extruding from apothecia

Photo: © Paula Bartemucci

b) Younger apothecia with infertile, branched podetia

Distribution

Mountain Crab-eye has a widely disjunct global distribution. It is reported from high-altitude (> 3000 m), exposed alpine environments of China, Tibet, India, Bhutan, Japan, South Africa, Peru, Patagonia, and Mexico. The last is not confirmed. In Canada and USA, it is found at lower elevations: in Alaska (948 m), Washington (1300 m) and British Columbia (420 to 1000 m). There are currently eight known occurrences in Canada, all within the Coast Mountains of British Columbia, ranging from Kingcome River in the south, to Kitsault in the north. Despite a widespread distribution, there are few national and global occurrences.



Distribution of Mountain Crab-eye (*Acroscyphus sphaerophoroides*) in Canada showing confirmed occurrences (2014, 2015), habitats where the species was not detected, and the restricted zone between the hypermaritime zone and the continental climatic zone of interior British Columbia where the habitat and climatic conditions appear to favour the occurrence of this lichen.

Habitat

In Canada, Mountain Crab-eye is almost exclusively found on trees within the coastal mountains, in a very restricted climatic zone which lies between the hypermaritime conditions found on the outer coast, such as Haida Gwaii and around Prince Rupert, and the continental climate of the interior of the province. This zone appears to be neither too wet or too dry and hence suitable for Mountain Crab-eye, which colonizes the stems and branches of standing snags or the dead, spiked tops of live trees. The trees may be Mountain Hemlock, Yellow-cedar or Sitka Spruce. This lichen is not found in the hypermaritime climates of the outer coast or in the continental climates of the interior of British Columbia.

Six of the eight occurrences in Canada are located in sparsely treed peatlands—fens or bog complexes. The seventh occurrence is located in a Mountain Hemlock subalpine forest and the last occurrence is in an open, wet subalpine parkland. Though alpine rocks are common substrata for Mountain Crab-eye in other regions of the world, only two colonies have been recorded on rock in Canada.

Biology

Mountain Crab-eye commonly produces black fruiting bodies. Spores are smooth (lacking ornamentation), large, and not actively ejected into the air like most lichen spores and so are not dispersed effectively by wind, but are probably spread by animals or carried on bird's feet. Under suitable conditions, spores germinate and produce fungal strands, or hyphae. In order for a new lichen to regenerate, the fungal strands must encounter a compatible algal partner. Mountain Crab-eye does not reproduce asexually via vegetative propagules containing both fungal and algal partners, nor does it appear to reproduce by fragmentation. However, Mountain Crab-eye does produce spores called conidia, in flask-shaped structures called pycnidia, but it is uncertain if these are a means of asexual reproduction or are involved in fruiting body formation. Longevity, generation time and many other biological parameters of Mountain Crab-eye are currently unknown.

Population Sizes and Trends

Since 1989, when Mountain Crab-eye was first collected in Canada, the number of occurrences has gradually increased with time and search effort. Early collections of Mountain Crab-eye did not provide information about the size or number of individuals. Currently, there are eight known occurrences (6 locations) of Mountain Crab-eye in Canada, ranging in size from at least one colony to as many as 100 colonies. A colony is equivalent to a mature individual of other plants and usually arises from a tiny initial which grows into a clump upon which the reproductive structures develop. In the case of the Mountain Crab-eye, the colonies often grow together, sometimes densely and sometimes on top of one another so it is difficult to estimate the number of individuals. The number of currently known colonies in Canada is estimated to be less than 250, with most of these occurring at one site. This lichen occurs in remote, inaccessible sites within the rugged Coast Mountains of British Columbia. Searching of more peatlands in this region may result in further discoveries of this lichen. However, this lichen is rare across its global range. Lichenologists have searched for it on trees in many of the coastal B.C. peatlands without success so the total population in Canada is likely less than 1000.

Threats and Limiting Factors

Most of Canada's Mountain Crab-eye (100 colonies of the estimated 250 colonies) are found at one single site that faces multiple current and potential threats which make it especially prone to the effects of human activities or stochastic events within a very short time period.

In Canada, Mountain Crab-eye exhibits narrow habitat specificity, small population, and poor dispersal capabilities, which make it particularly vulnerable to climate change as it may not be able to respond quickly to climate-related habitat changes or shifts in ecosystems. Warmer temperatures and higher precipitation could lead to shifts in the assemblages of non-vascular species that occupy snags and spike-tops. Mountain Crab-eye might be outcompeted by species well-adapted to new or changing climate regimes. The functioning and integrity of the wetland systems may be altered or degraded due to severe weather events caused by climate change.

Mountain Crab-eye is also threatened by current and potential industrial development projects such as road construction, logging, gas pipeline corridors, mining (expansion of a molybdenum mine), dams and a run-of-the-river hydroelectric project, all of which may cause habitat loss and degradation, and may indirectly cause alterations to the hydrological regime and microclimate where the species grows.

Protection, Status and Ranks

Mountain Crab-eye is ranked GNR (Globally not yet assessed).

In Canada, it is currently ranked N1 (Critically Imperilled) and has been assigned the same status in British Columbia where it is red-listed.

In the United States, it is NNR (Unranked). In Alaska and Washington, it is currently ranked SNR (Not Yet Assessed) but S1 (Critically Imperilled) has been proposed in both states.

Three of the eight occurrences of Mountain Crab-eye are in designated protected areas (provincial parks and ecological reserves), including the one with the largest number of mature individuals, which affords some measure of protection through legislation. However, permits may be granted for rights-of-way, mineral leasing and other developments. The remaining five occurrences are on provincial Crown land and are not currently protected.

Source: COSEWIC. 2016. COSEWIC assessment and status report on the Mountain Crab-eye *Acroscyphus sphaerophoroides* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 47 pp.

For more information, please visit www.sararegistry.gc.ca.

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