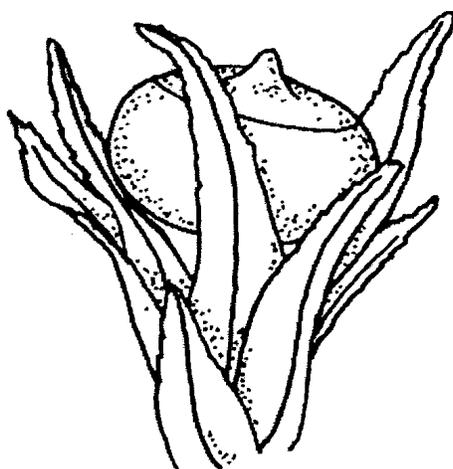


COSEWIC
Assessment and Status Report

on the

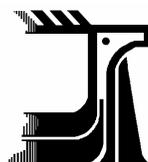
Margined Streamside Moss
Scouleria marginata

in Canada



ENDANGERED
2002

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC 2002. COSEWIC assessment and status report on the margined streamside moss *Scouleria marginata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 14 pp.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur la scoulérie à feuilles marginées (*Scouleria marginata*) au Canada

Cover illustration:

Margined streamside moss — Illustration of *Scouleria marginata* – redrawn from Lawton 1971.

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COSEWIC Assessment Summary

Assessment Summary – November 2002

Common name

Margined streamside moss

Scientific name

Scouleria marginata

Status

Endangered

Reason for designation

This moss is a large, showy species that occurs just above water's edge along small montane streams. A rare North American endemic, its northernmost and single occurrence in Canada is in southern British Columbia. Although the species was not relocated at this station in recent surveys, the species may be present in nearby watersheds.

Occurrence

British Columbia

Status history

Designated Endangered in November 2002. Assessment based on a new status report.



COSEWIC
Executive Summary

Margined Streamside Moss
Scouleria marginata

Species information

Scouleria marginata is a relatively large, acrocarpous moss in the moss family Scouleriaceae. Only one other species of *Scouleria* is found in North America, *Scouleria aquatica*. It has a broader range than *S. marginata*. Although very similar and possibly indistinguishable in the field macroscopically, the two species can be readily separated through microscopic features of the leaf and sporophyte.

Distribution

Scouleria marginata is endemic to western North America, and has been found in only one site in Canada, in southeastern British Columbia near Boundary Lake adjacent to the American border.

Habitat

The species grows on wet and often inundated rocks along watercourses, from low to high elevations. The habitat for the only known population in Canada has degraded significantly since the time of collection because of cattle usage and, possibly because of repeated flooding events, appears to be declining.

Biology

Scouleria marginata is a perennial, acrocarpous moss species that grows in tufts on exposed and wet rocks and rock outcrops along watercourses. It produces sporophytes and spores occasionally to infrequently across its range.

Population sizes and trends

There is no detailed information on the Canadian population of *S. marginata*. It was not found during a recent field survey.

Limiting factors and threats

Sedimentation, flooding, and cattle use along Boundary Lake and Boundary Creek appear to be both limiting factors and threats.

Special significance of the species

Scouleria marginata is endemic to western North America, and the single Canadian location represents the northernmost extension of this range.

Existing protection and other status designations

No legislation, regulations, customs, or conditions currently protect *Scouleria marginata*. The species is globally frequent to common, but has been Red-listed in British Columbia.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

- * Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.
- ** Formerly described as “Not In Any Category”, or “No Designation Required.”
- *** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.



Environment Canada
 Environnement Canada
 Canadian Wildlife Service
 Service canadien de la faune

Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

COSEWIC Status Report

on the

Margined Streamside Moss

Scouleria marginata

in Canada

2002

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SPECIES INFORMATION

Name and classification

Scouleria marginata Britt. is a member of the moss family Scouleriaceae (Anderson *et al.* 1990, Buck & Goffinet 2000).

One other species, *S. aquatica* Hook., is present in North America, including western Canada (Ireland *et al.* 1987, Anderson *et al.* 1990). It has a broader range than *S. marginata*, and is found in eastern Asia, Alaska, including the Aleutian Islands, the Northwest Territories, and south to California (Churchill 1985). Where the ranges of these two species overlap, *S. aquatica* is generally much more common than *S. marginata*. The English name, “marginated streamside moss”, is new, and a modification of the name used by MacKinnon *et al.* (1992) for *S. aquatica* (“streamside moss”).

Description

Scouleria marginata is a relatively large, acrocarpous moss that grows in dark green or yellowish-brown to blackish tufts on wet and often inundated rocks along streams and rivers.

The stems of *Scouleria marginata* are frequently branched and range in length from 6 to 10 cm. Most of the lower leaves and stems are a dark brownish or blackish colour, and the upper leaves can be a golden or yellow-brown to dark green. Leaves of the growing tips are often a contrasting light golden to pure green ranging in size from 2.5 to 4.0 mm long and from 0.8 to 1.2 mm wide, and usually with abundant rhizoids on their lower undersurfaces. They are lanceolate to ligulate and taper to a rounded-obtuse to somewhat pointed apex, and are slightly contorted when dry and spreading when wet.

The leaf margins are weakly toothed to entire and are multistratose. This is the feature that most readily separates this species from *Scouleria aquatica*, which has unistratose to occasionally bistratose areas in the margins. Lawton (1971) notes that many partially bistratose specimens had been misidentified as *S. marginata*. These errors may have resulted from the use of earlier keys by Grout (1933) who separated the species based on unistratose versus bistratose margins. The leaves of *S. aquatica* may be more contorted when dry, which may reflect the differences in the thickness of the leaf margins (Tan 1980). Multistratose leaf margins are also found in *S. patagonica* (Mitt.) Jaeg. from South America (Churchill 1985).

The broad leaf costa of *S. marginata* is up to 140 µm wide and ends near the tip of the leaf. Median and upper leaf cells are thick-walled and roughly isodiametric, ranging in size from 9 to 15 µm. The basal leaf cells adjacent to the costa are usually short-rectangular to rectangular, ranging from 12 to 17.5 µm X 7 to 10 µm, and are more thin-walled than the upper cells. The small area of differentiated alar cells is comprised of quadrate to short-rectangular, thick-walled cells. At the leaf base above the alar region, a band of distinct, very thick-walled elongate sub-marginal cells is present.

Scouleria marginata is dioicous, with female and male plants similar in appearance. The perigonial and perichaetial bracts are similar to the vegetative leaves, although the perigonial leaves are somewhat shorter, up to 2 mm in length. The seta is short, up to 2 mm long, and erect. The capsule, ranging from 2 to about 2.5 mm in diameter, is more or less spherical when wet and slightly flattened-spherical when dry, and has a short-conic operculum. At maturity, a thick columella is exerted through the capsule mouth and remains attached to the operculum. Often there is a thin membrane attached to the capsule from the upper portion of the columella. Unlike *S. aquatica* and *S. patagonica*, this species lacks peristome teeth. Spores average about 40 μm , and are lightly roughened.

Figure 1 illustrates key features of *S. marginata*.

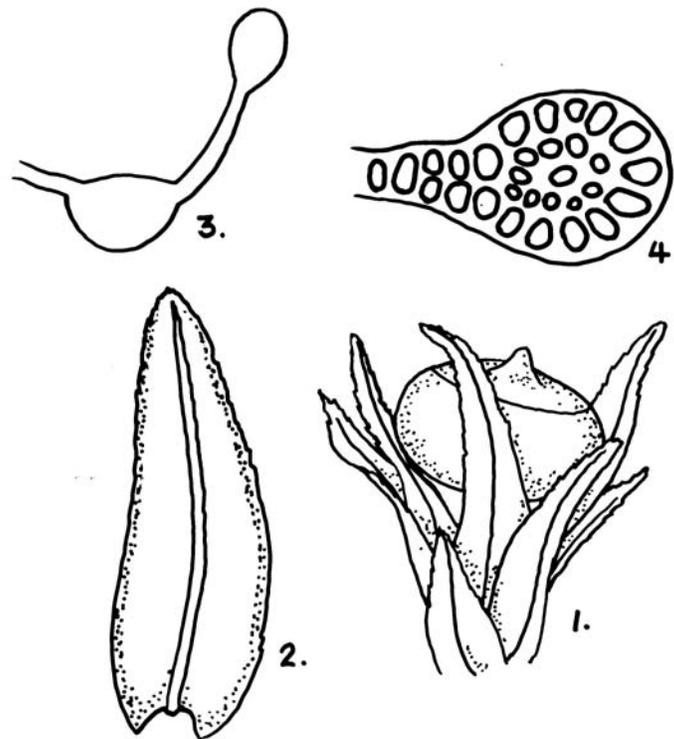


Figure 1. Illustrations of *Scouleria marginata* (redrawn from Lawton 1971): 1. illustrates the capsule, leaves and bracts, 2. is a typical leaf, 3. is an outline of a leaf cross-section, and 4. shows cellular details of the leaf margin.

Additional illustrations of *S. marginata* are found in Grout (1933), Lawton (1971), and Churchill (1985). Lawton (1971), Tan (1980), and Churchill (1985) provide useful keys. Churchill (1985) provides a recent revision and thorough review of distributions and the differences between the species of *Scouleria* in North America.

W.B. Schofield (pers. comm. 2002) considers that *S. marginata* is indistinguishable from *S. aquatica* in the field. Therefore, he notes that in order to confirm identification examination with a field microscope is necessary, or the collection of all specimens of *Scouleria* that are encountered is required so that they can be examined with a microscope later. R.R. Ireland (pers. comm. 2002) has a contrasting view and notes, at least with younger, non-eroded leaves, that distinctly thickened and rounded leaf borders on *S. marginata* are readily evident with a 20X hand lens. He also considers that the leaves of *S. marginata* are blacker and narrower than those of *S. aquatica*, at least most of the time. *Scouleria marginata* also exhibits a tendency to develop yellowish or golden hues not seen in *S. aquatica*.

Nationally significant populations

At present, the only known Canadian population of *S. marginata* is along Boundary Creek in the Kootenay Region near the Canadian-American border (Tan 1980). The moss was not found during a recent survey (2001).

DISTRIBUTION

Global range

Scouleria marginata is endemic to North America, found from southernmost British Columbia south to California, and east to Idaho (southeastern British Columbia, Idaho, Washington, Oregon, and California). In California, it is fairly common along all of the major river systems in the Sierra Nevada (J. Shevock, pers. comm.). Figure 2 is a map of its North American distribution.

Canadian range

Scouleria marginata appears restricted to southern British Columbia where it has been found only once at a location near Boundary Lake and Boundary Creek in the Kootenay Region near the Canadian-American border in the southeastern part of the province (Tan 1980). The species was reported and collected from this site in August 1977. A detailed location with UTM coordinates was not given.

Its total range of occurrence may be under 0.1 square kilometers, judging from a survey of the site during a recent visit to the area by the author in 2001.



Figure 2. North American distribution of *Scouleria marginata* (from Churchill 1985).

HABITAT

Habitat Requirements

In British Columbia, *Scouleria marginata* was found along streams on wet rocks at about 4300 feet elevation (Tan 1980). Elsewhere it has been found on rocks and rock outcrops, particularly those of granitic nature. The species may grow exposed or submerged along streams, and occurs throughout a range of elevations, from low to high (Churchill 1985).

Trends

The area around Boundary Lake appears to have undergone a number of events that have markedly impacted the habitat of *Scouleria marginata* since Tan's collection in 1977. At one point in the late 1980s or early 1990s, a forest fire occurred across the site, and, at some time following this fire, there has been considerable flooding from the lake and along Boundary Creek that flows east from the lake. There is a deep layer of fairly recent sediment around the lake that extends into Boundary Creek for at least one kilometer. Furthermore, a number of fairly recently fallen trees are present in the creek, and cattle have been allowed to graze in the area, including along the lake and stream margins. These factors appear to have significantly altered the character of the site and the potential habitat of *S. marginata*.

No rocks or boulders were found around the lake and very few are now exposed along Boundary Creek; these are mostly bare of mosses (Fig. 3). The rock and boulders are a micro-habitat that is necessary for the presence of *Scouleria marginata*. B.C. Tan (pers. comm. 2001) did not clearly remember the site, but did recall that in 1977 there were many rocks present, at least along Boundary Creek and in the lake near the mouth of the creek. It appears, therefore, that, because of continued cattle usage and the possibility of repeated flooding events, there is only a small likelihood of improvement to this habitat.

Protection/ownership

The single site is Crown land under the jurisdiction of the British Columbia Ministry of Forests (Boundary Lake Recreation Site).

BIOLOGY

General

Scouleria marginata is a perennial, acrocarpous moss species that grows on exposed and wet rocks and rock outcrops along watercourses.



Figure 3. Rock near mouth of Boundary Creek with a limited cover of the closely related species *Scouleria aquatica*.

Reproduction and dispersal

This species produces sporophytes and spores occasionally to infrequently across its range. This probably reflects its dioicous condition (male and female reproductive units on separate plants), which appears to restrict sporophyte production in many moss species. The British Columbia collection has sporophytes. Spores are probably dispersed by water or, possibly, wind. There is no information on spore dispersal distances, viability, or germination success with regard to this species. Also, there is no evidence of asexual reproduction by specialized propagules or fragmentation by *Scouleria marginata*, although the lower leaves are often stripped or greatly eroded in habitat, and these fragments may act as sources for vegetative reproduction.

The closely related species, *Scouleria aquatica*, also produces sporophytes occasionally and lacks obvious vegetative propagules. *S. aquatica* also appears to have the same ecological preferences as *S. marginata* and may out-compete it for habitat space, thus partly accounting for the restricted range of *S. marginata*.

POPULATION SIZES AND TRENDS

There is no detailed information on the size and trends of the Canadian population of *Scouleria marginata*. Tan (1980) did not gather any information about the population when in the field. At the time he collected it, Tan considered the specimen to be *S. aquatica*, and did not recognize it as *S. marginata* until after he returned from the field, and had begun identifying his collections at the University of British Columbia. It has not been found subsequent to the original discovery, and, as the area has since been heavily disturbed, it is possible that this species is now extirpated from this location.

There is no detailed population information available about the adjacent American populations in Idaho and Washington.

LIMITING FACTORS AND THREATS

Sedimentation, flooding, and cattle use along Boundary Lake and Boundary Creek appear to be both limiting factors and threats. In particular, the deposition of silt on boulders limits the establishment of the species.

SPECIAL SIGNIFICANCE OF THE SPECIES

Scouleria marginata is endemic to western North America, having a rather discontinuous distribution from California, where it is most common, northward to southernmost British Columbia (Churchill 1985). The Canadian location would represent the northernmost extension of this range and the only location for this species in Canada.

EXISTING PROTECTION OR OTHER STATUS

No legislation, regulations, customs, or conditions protect *S. marginata*. Globally this species is tentatively listed as frequent to common (G4; although G3 may be a better ranking here) and is Red-listed (S1) in British Columbia (Conservation Data Center 2001, Ryan 1996). In Oregon, J. Christy has ranked this species as S1 (critically imperiled sub-nationally).

SUMMARY OF THE STATUS REPORT

Scouleria marginata appears to have been extirpated from its original collection site. The area around Boundary Lake and portions of Boundary Creek near its outflow from the lake were surveyed using information in Tan (1980) and provided by the collector of the original specimen (B.C. Tan, pers. comm. 2001). Other potential and

accessible sites of similar habitat within an approximately 20 km radius were also sampled. This included small creeks that feed into Boundary Lake. In most cases these had an abundance of moss-covered rocks in and beside the water where patches of *Scouleria* were present. Vouchers of the latter were all identified as *S. aquatica*. Other waterways were sampled along Highway 3, north of Boundary Lake. These included Monk Creek, Buckworth Creek, Maryland Creek, Summit Creek, and Blazed Creek. In all cases, only *S. aquatica* was found on wet rocks in these locations, where it was found only occasionally and never in great abundance.

It is possible that the species has a poorly known distribution in Canada because of its similarity to the common *Scouleria aquatica* and to the fact that positive identification is best done using microscopic characters. However, Churchill (1985) revised the genus for North America in which he examined many hundreds of *Scouleria* specimens, including all the holdings from the University of British Columbia cryptogamic herbarium (the major repository for *Scouleria* material in Canada). In the course of his examinations, Churchill did not discover any additional Canadian records of *S. marginata* that might have been misidentified as *S. aquatica*. If *S. marginata* was common then the species would have been represented more frequently among the specimens that Churchill examined.

The survey of several of small streams near the lake did not reveal any additional populations. However, given that there are dozens of streams in the area (many are fairly inaccessible), it is possible that it is still extant in the region.

TECHNICAL SUMMARY

Scouleria aquatica

Common name: Margined Streamside Moss

French common name: Scoulérie à feuilles marginées

Range of occurrence in Canada: BC

Extent and Area information	
• extent of occurrence (EO)(km ²)	0.1 km ²
• specify trend (decline, stable, increasing, unknown)	unknown
• are there extreme fluctuations in EO (> 1 order of magnitude)?	unknown
• area of occupancy (AO) (km ²)	< 0.1 km ²
• specify trend (decline, stable, increasing, unknown)	unknown
• are there extreme fluctuations in AO (> 1 order magnitude)?	unknown
• number of extant locations	?1
• specify trend in # locations (decline, stable, increasing, unknown)	unknown
• are there extreme fluctuations in # locations (>1 order of magnitude)?	unknown
• habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat	unknown, but habitat quality at extant location has been significantly degraded in the last 20 years
Population information	
• generation time (average age of parents in the population) (indicate years, months, days, etc.)	unknown
• number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)	unknown
• total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals	unknown
• if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)	unknown
• are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?	unknown
• is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?	unknown
• list each population and the number of mature individuals in each	unknown
• specify trend in number of populations (decline, stable, increasing, unknown)	decline
• are there extreme fluctuations in number of populations (>1 order of magnitude)?	unknown
Threats (actual or imminent threats to populations or habitats)	
- cattle grazing, siltation and flooding	
Rescue Effect (immigration from an outside source)	
• does species exist elsewhere (in Canada or outside)?	yes
• status of the outside population(s)?	secure
• is immigration known or possible?	possible
• would immigrants be adapted to survive here?	yes
• is there sufficient habitat for immigrants here?	yes

ACKNOWLEDGEMENTS

We thank Larry Hope of the Yale First Nations for excellent assistance in the field. We also thank W.B. Schofield and John Christy for helpful comments on the manuscript. Funding provided by the Canadian Wildlife Service, Environment Canada.

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BIOGRAPHICAL SUMMARY OF CONTRACTOR

Dr. Terry McIntosh completed his Ph.D. in 1985 following a study of dry grassland and steppe bryophytes in the interior portions of British Columbia. He has been active since then collecting bryophytes from many parts of the province. He has been a primary identifier of bryophyte collections from various government and private surveys in the province. He has recently completed sixteen rare species accounts on bryophytes for the Wildlife Branch of the Province of British Columbia.

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COLLECTIONS EXAMINED

One collection of *Scouleria marginata* from British Columbia as well as other representative specimens from western North America were examined at the herbarium at the University of British Columbia (UBC). The information for the Canadian collection is as follows:

1.

Scouleria marginata Britt.
on rock, creek margin
Boundary Lake, headwater of Boundary Creek
Adjacent to the Canada – US International Border
4300', ca. 49°N 116° 56'W
Coll.: B.C. Tan & J. Ensing, August 8, 1977
Det.: B.C. Tan
Coll. # 77-2041
UBC Acc# B14753

Appendix 1. Record of Fieldwork

The author and assistant visited the site on October 28 and 29, 2001, and walked the margins of Boundary Lake, and about 1 km. along Boundary Creek, as well as seven smaller rivulets and feeder streams flowing into the lake. We found numerous small patches of *Scouleria aquatica*, but no populations of *S. marginata*. Because of road conditions, we could not access more of Boundary Creek towards the American border.

Other potential and accessible sites of similar habitat within an approximately 20 km radius were also sampled. Other waterways were sampled along Highway 3, north of Boundary Lake. These included Monk Creek, Buckworth Creek, Maryland Creek, Summit Creek, and Blazed Creek. In all cases, only *S. aquatica* was found on wet rocks in these locations, and it was found only occasionally and never in great abundance.