

Status of Toothcup in British Columbia

by
George W. Douglas

Wildlife Bulletin No. B-94

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British Columbia, Canada's most westerly province, has a bounty of biological diversity. British Columbia's snowclad peaks, rain-drenched forests, arid grasslands, all sizes of rivers, lakes, and wetlands, and a long and rugged coast provide habitats for more species of living organisms than are found anywhere else in Canada. However, this very diversity means that there is much to be discovered about these organisms — their distribution, abundance, habitat requirements, and interrelationships with their environment. Increasing our knowledge of this biodiversity will help us with the complex task of sustainably managing our land and waters.

In 1992, the Provincial Government initiated a co-operative biodiversity research program with funding from the Corporate Resource Inventory Initiative, the British Columbia Ministries of Forests (Research Branch), Environment, Lands, and Parks (Wildlife and Habitat Protection Branches), and Tourism and Culture (Royal B.C. Museum); and the Forest Resource Development Agreement (FRDA II). In 1996, funding from Forest Renewal BC (FRBC) was received for a biodiversity research extension proposal. One goal of the original research program, and more recently the FRBC extension project, is to extend information to scientists, resource managers, and the public through biodiversity publications. These publications are intended to increase awareness and understanding of biodiversity, promote the concepts and importance of conserving biodiversity, and communicate provincial government initiatives related to biodiversity. We hope that they will be used as tools for the conservation of British Columbia's rich, living legacy.

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BRITISH
COLUMBIA

Ministry of Environment, Lands and Parks
Wildlife Branch
and
Resources Inventory Branch
Victoria, B.C.

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FRONTISPIECE

Rotala ramosior



by Gail F. Harcombe

FOREWORD

In cases where a Wildlife Bulletin is also a species' status report, it may contain a recommended status for the species by the author. This recommendation is the opinion of the author and may not necessarily reflect that of the Wildlife Branch.

Official designation will be made by the Wildlife Branch in consultation with experts, and the data contained in the status report will be considered during the evaluation process.

ABSTRACT

In British Columbia, Toothcup (*Rotala ramosior*) is presently known from three sites in the south-central part of the province. One other population, discovered in 1953, is considered extirpated. Existing populations represent the northern limit of this species, which extends from south-central British Columbia, through much of the central and western U.S.A. to Mexico and South America. *Rotala ramosior* inhabits moist to dried alkaline lagoons and moist lakeshores. It is most often associated with its close relative, *Ammannia coccinea*, and a number of semi-aquatic members of the Cyperaceae. Population trends and phenological patterns are known only from 2 years (1994 and 1995) and appear totally dependent on seasonal water levels in Okanagan Lake. At the present time, the continued existence of this species at two sites depends on water levels controlled by dams. Given the limited number of populations in British Columbia, and their precarious existence, it is recommended that *Rotala ramosior* be considered Endangered.

ACKNOWLEDGEMENTS

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INTRODUCTION

The status report on toothcup (*Rotala ramosior*¹) is part of an ongoing program of the British Columbia Ministry of Environment, Lands, and Parks, Wildlife Branch, designed to manage species at risk more effectively for long-term viability.

Rotala belongs to the family Lythraceae that encompasses about 21 genera and 500 species (Hitchcock and Cronquist 1961). The family is mainly tropical but has a number of temperate members.

Rotala ramosior is the only taxa in this genus occurring naturally in North America. About 39 other species of *Rotala* occur mainly in the Old World tropics. One these was introduced into the southern U.S.A. (Hitchcock and Cronquist 1961).

Rotala ramosior was first described (as *Ammannia ramosior*) in 1753 by Linnaeus from a collection made by Johannes Gronovius in Virginia. In 1875, Koehne placed this taxon in the genus *Rotala*.

Rotala ramosior is an annual with glabrous stems, which are decumbent to erect, simple or branched, and 10-40 cm tall. Leaves are lanceolate to oblanceolate, 1.0-5.0 cm long, glabrous, opposite, entire, and with usually attenuate to short, distinct petioles. Flowers are solitary, and rarely several in leaf axils. The hypanthium is campanulate becoming nearly globose and the stamens and style are included in the hypanthium. Petals are white to pinkish, about 1 mm long. Fruits are glabrous, globose, usually 4-valved, and about 3 mm long.

In British Columbia, *R. ramosior* is easily mistaken for its close relative scarlett ammannia (*Ammannia robusta*), which grows in identical habitats. Close examination of the plants will reveal that the leaves of *A. robusta* are sessile and clasping at the base while those of *R. ramosior* gradually taper to a distinct petiole. In addition, *A. robusta* has at least some leaf axils with three to five flowers. *Rotala ramosior*, on the other hand, rarely has more than a single flower per leaf axil.

GENERAL BIOLOGY

There is no information on the biology of *R. ramosior*. It is likely, however, that some of the research conducted by Graham (1985) on *Ammannia coccinea*, a close relative of *R. ramosior* in the family Lythraceae, is applicable to the latter species. Self-pollination in *A. coccinea* starts at anthesis, with anther dehiscence and stigma receptivity beginning simultaneously when these organs are at the mouth of the floral tube opening or slightly exerted. In *A. coccinea* an abscission layer forms about 1 mm above the base of the style after fertilization, then the upper style withers and falls away. Plants of *R. ramosior*, like those of *A. coccinea*, are probably visited by skippers and small bees for nectar produced by the thickened glandular area surrounding the base of the ovary.

HABITAT

Description

In British Columbia, *R. ramosior* inhabits moist sandy shorelines or muddy, alkaline flats. These sites are submerged early in the year with the plants emerging as lake levels go down later in the summer.

The sparse vegetative cover varies slightly at each of the sites examined. Species composition includes only semi-aquatic species or species able to withstand early season flooding. At the "Veronica" Lake site major components of the vegetation included *R. ramosior*, *A. coccinea*, *Scirpus supinus* L. ssp. *saximontanus* (Fern.) T. Komama and *Euphorbia serpyllifolia* Pers. (Veronica Lake has been named by local people but has yet to receive an official gazetteered name.)

At the Osoyoos Lake Indian Reserve (#1) site, two populations were surveyed. The vegetation associated with Population #1 was dominated by *Marsilea vestita* Hook. & Grev., *R. ramosior*, *Carex sychnocephala* Carey and *Polygonum ramosissimum* Michx. The major vegetation components associated with Population #2 were *R. ramosior*, *A. coccinea*, *Eleocharis acicularis* (L.) Roem. Shult. and *Cyperus aristatus* Rottb.

¹ Nomenclature follows Douglas *et al.* (1989-1994).

Ecoprovince and Biogeoclimatic Zone

Ecoprovinces-All *R. ramosior* occurrences fall in one ecoprovince and two ecosections in British Columbia, the Southern Okanagan Basin (SOB) and the Thompson Basin (THB) within the Southern Interior (SOI). The ecoregions of British Columbia have been delineated by Demarchi (1993).

Biogeoclimatic zones-Likewise all occurrences of *R. ramosior* in the province fall in one biogeoclimatic zone, the Bunchgrass zone (BG), delineation of which was done by the B.C. Ministry of Forests Research Branch (1992).

DISTRIBUTION

Rotala ramosior ranges from south-central British Columbia south through most of the U.S.A. to Mexico and South America (Hitchcock and Cronquist 1961; Douglas et al. 1990; McClintock 1993). In British Columbia, one site is known at Kamloops Lake while three other sites are known in the Osoyoos Lake area. In the Osoyoos Lake area populations have been recorded from Haynes Point, the Osoyoos Indian Reserve (#1) and Veronica Lake (Figure 1).

POPULATION SIZE AND TRENDS

Table 1 identifies the populations found in south-central British Columbia. Of the four extant (post 1949) sites, two have recently been confirmed. Of the two other sites one has been extirpated while the other has not been observed since 1981.

Trends in Recently Verified Populations

"Veronica Lake" – This small lake (ca. 10 ha in area, Veronica Lake is a local name) is located approximately 2 km east of Osoyoos Lake and 0.5 km north of the U.S. border in the southern Okanagan Valley. On 28 July 1994, a population of 500 plants

was discovered growing about a metre above the lake level. During an earlier visit on 23 June 1995, this site was still under water and *R. ramosior* had not yet emerged. Soils at this site are sandy and plants germinate under saturated conditions.

Osoyoos Lake Indian Reserve (#1) – Two populations of *R. ramosior* are located on the eastern shoreline of Osoyoos Lake, approximately 1 km south of Mica Spit. This land is part of the Osoyoos Indian Reserve (#1).

Population #1 – This population was discovered on the dried edge of a large lagoon on 27 July 1994 by the author. A total of 200 plants were tallied in a 6m₂ area. On 15 August 1995, after an extended period of hot, dry weather, the site was revisited and 250 plants were counted over the same area.

Population #2 – This population, located approximately 100 m west of Population #1, occurs in a small pond separated from Okanagan Lake by a shallow (0.5 m) sandy ridge. The author discovered the site on 26 July 1994 and counted 50 plants over a 50m₂ area. In August 1995, the author counted a total of 2000 plants covering the same 50 m₂ area.

Populations of Unknown Status

Kamloops Lake, MacArthur Island – This population was discovered in 1981 on a moist, sandy bank on the edge of Kamloops Lake. About 1000 plants, over an area of 100 m₂, were recorded. A recent visit by the author, on 11 August 1995, failed to uncover any plants. It is possible that lake water levels were still too high at that time and emergence of this species had yet to take place.

Extirpated Populations

Osoyoos Lake, Haynes Point – *Rotala ramosior* was collected at Haynes Point in 1953. An extensive search of the area in 1991, 1994 and 1995 did not reveal the plant. Since almost all of the potential shore-line sites for this species have been cleared by BC Parks it is unlikely the species still occurs here.

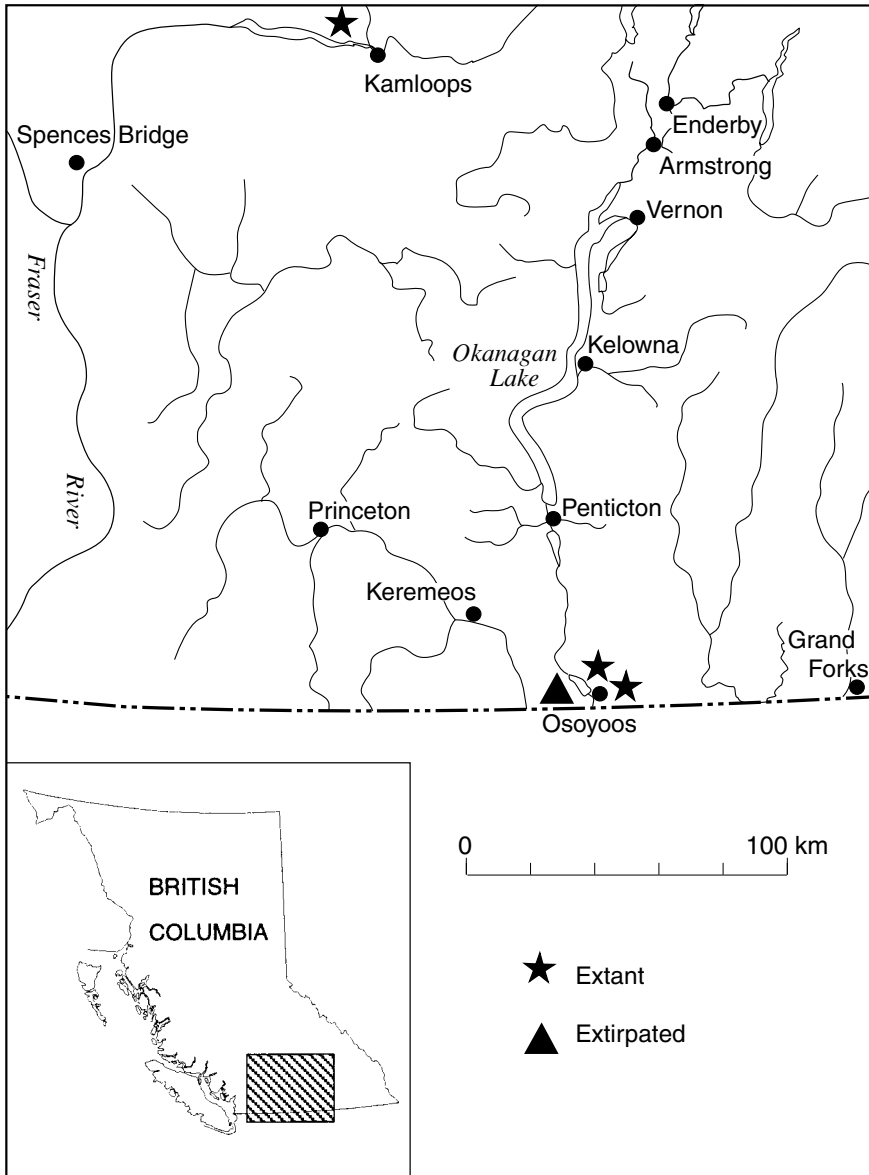


Figure 1. Distribution of *Rotala ramosior* in British Columbia.

Table 1. *Rotala ramosior* sites in British Columbia.

Collection Site	Last Observation	Collector	Population plant numbers/ area observed
Osoyoos Lake, E of Osoyoos	1953	Calder	
Kamloops Lake, MacArthur Island	1981	Ceska	1000/100 m ²
"Veronica Lake"	1994	Douglas	500/10 m ²
Osoyoos Lake Indian Reserve (#1) (Population #1)	1995	Douglas	250/6 m ²
Osoyoos Lake Indian Reserve (#1) (Population #2)	1995	Douglas	2000/50 m ²

PROTECTION

Currently there is no specific legislation for the protection of rare and endangered vascular plants in British Columbia. Pending federal endangered species legislation may eventually protect a few special cases. However, most rare vascular plants would not be conserved under this legislation, whereas pending under the *Forest Practices Code Act of British Columbia*, more species could be protected; red-listed vascular plants may be protected when they become designated as *Identified Wildlife*.

While populations located on public property are usually protected to a certain extent, (although not in all cases) the extant *R. ramosior* populations located on the Okanagan Indian Reserve (#1) or on private property are highly vulnerable to development or alteration.

"Veronica" Lake – At this site, the small population of *R. ramosior*, leads a precarious existence. The water in this small, dammed lake likely represents a highly valuable irrigation resource for the

ranch below. If large amounts of water were taken early in the season, or the dam raised, then *R. ramosior* would be negatively affected.

Osoyoos Lake, Okanagan Indian Reserve (#1) – The populations at this site are presently in good condition. Their continued existence depends, in part, on the maintenance of the present lake levels by the U.S.A. Potential development at the site, especially the proposal to build a hotel/casino, could easily destroy the populations. Currently, however, the populations are now being conserved by the Indian Band who have erected a sturdy fence across the neck of the spit. This has kept cattle, ranging on nearby grasslands, from trampling or browsing the unique habitats of the spit. This is an extremely important conservation plan since 12 Red list taxa and two Blue list taxa from the British Columbia Conservation Data Centre's (British Columbia Ministry of Environment, Lands and Parks) rare native vascular plant tracking list occur at this site. Three of these species, *Aster frondosus* (Nutt.) T. & G., *Eleocharis atropurpurea* (Retz.) Kunth. and *Lipocarpus micrantha* (Vahl) G. Tucker, are known only from this unique enclave in British Columbia.

LIMITING FACTORS

Potential Threats

Habitat destruction and rising lake levels are the greatest threat to the existing populations of *R. ramosior*. Beach enhancement, shoreline housing and commercial development has led to the destruction of almost all of the potential habitat on Osoyoos Lake. The present populations, although currently protected by the Osoyoos Lake Indian Band, are under potential threat of rising lake levels. The present lake levels are controlled by a dam at the south end of the lake in the U.S.A. The population at "Veronica" Lake, which is on private property, also depends on lake levels controlled by a dam at the west end of the lake.

Changes in Populations

"Veronica" Lake – Information on population changes at this site are not available. This small population has been observed only once in 1994.

Osoyoos Lake, Indian Reserve – The only data on population changes were recorded in 1994 and 1995 at the Osoyoos Lake Indian Reserve (#1) site. Population #1 increased in numbers from 200 to 250 plants in the 6m_ area while Population #2 increased in numbers from 50 to 2000 plants in the 50m_ in area, in 1994 and 1995, respectively. Population changes for this annual species are probably due mainly to potential seed bank areas that are exposed and depend on lake level changes that vary greatly from year to year.

SPECIAL SIGNIFICANCE OF THE TAXON

Rotala ramosior is the only taxa in this genus occurring naturally in North America. The populations in British Columbia represent the northernmost extension of the distribution of the species. This species is only found around Osoyoos Lake in south-central British Columbia. Like its close relative, *A. coccinea*, it is a semi-aquatic, annual species whose germination depends on lake levels, as is the case with a host of other rare plants that also occur in the same habitat. Populations widely fluctuate from year to year resulting in interesting population trends.

RECOMMENDATIONS AND MANAGEMENT OPTIONS

Rehabilitation or Reintroduction Efforts

No attempts have been made to reintroduce *R. ramosior* to suitable habitats. Since the habitat of this species, especially the moist, sandy, lakeshore habitat, is quite uniform and readily available in the southern Okanagan Valley it would probably not be that difficult to establish new populations.

EVALUATION

Globally, *R. ramosior* is ranked as G5 by The Nature Conservancy (U.S.). This ranking indicates that, on a global scale, the plant is considered "frequent to common to very common; demonstrably secure and essentially ineradicable under present conditions."

Provincially, *R. ramosior* is ranked by the British Columbia Conservation Data Centre (British Columbia Ministry of Environment, Lands and Parks) as S1 (Douglas *et al.* 1998), which indicates this species to be "critically imperiled because of extreme rarity (5 or fewer extant occurrences or very few remaining individuals) or because of some factor(s) making it especially vulnerable to extirpation or extinction." This taxon has also been placed on the Ministry of Environment, Lands and Parks Red list. This is the most critical status that can be applied to a species at the provincial level.

Status Recommendation

Rotala ramosior should be ranked as *Endangered* in British Columbia for the following reasons:

1. *Rotala ramosior* populations in British Columbia are few in number and only one population has a substantial number of individuals.
2. *Rotala ramosior* is limited to south-central British Columbia. All sites are at risk either by lake level changes or potential development.
3. *Rotala ramosior* in British Columbia represents the northern limits of this taxon and may represent populations that are genetically distinct to those found elsewhere.

Prognosis

The prognosis for this species is only fair. At both known extant sites, there is no assurance for the long-term viability of this species. The limited number of individuals could also reduce the potential for genetic variation that may be necessary to respond to environmental changes in the future.

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