

Status of Waterplantain Buttercup in British Columbia

by
Jeanne M. Illingworth
and
George W. Douglas

Wildlife Bulletin No. B-95

March 1999

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

Ranunculus alismaefolius var. *alismaefolius*



by Sherri Mitchell

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, waterplantain buttercup (*Ranunculus alismaefolius* var. *alismaefolius*) has been documented from three collection sites, all restricted to southeastern Vancouver Island. Two of these sites were recorded at vague locations and are either extirpated or are earlier records of extant sites. The single extant location represents the northern range limits of *R. alismaefolius* var. *alismaefolius*, which extends southward to northern California. This taxon inhabits open moist, often muddy, sites and is limited to a lowland Garry oak-Brome (*Quercus garryana* - *Bromus*) meadow, a vegetation community unique to south eastern Vancouver Island, and limited in area. The extant location of *R. alismaefolius* var. *alismaefolius* is divided between two small groups, both of which exist alongside footpaths within a regional city park, making them vulnerable to trampling or destruction from park management activities. Other threats include limited potential habitat, fire suppression and competition from introduced species. While these populations are protected to a certain extent by their location within a regional park, there is no specific legislation for the protection of rare and endangered vascular plants in British Columbia. Given that there is only one known extant site, which is limited to 50 individuals, and given there is little knowledge of the plants biological and ecological requirements, this variety is susceptible to extirpation and should be considered Endangered in British Columbia.

ACKNOWLEDGEMENTS

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The production of this final report (extension project) was made possible through the funding support of Forest Renewal British Columbia (FRBC) and the B.C. Ministry of Environment, Lands and Parks, Wildlife Branch and Resources Inventory Branch. Publication production coordination, was provided by G.F. Harcombe.

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INTRODUCTION

The status report on waterplantain buttercup (*Ranunculus alismaefolius* var. *alismaefolius*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.

The genus *Ranunculus* comprises over 250 species, and while *R. alismaefolius* is distinct, the variation within the species has resulted in several proposed varieties by some taxonomists. Hitchcock *et al.* (1964) recognized five varieties of *R. alismaefolius* consisting of var. *alismaefolius*, var. *montanus* Wats., var. *hartwegii* (Greene) Jeps., var. *davisii* Benson and var. *alismellus* Gray. In a checklist of *Ranunculus* of the United States, Canada and Greenland, Benson (1980) recognized the preceding five varieties and an additional variety, *lemmonii*. Wilken (1993), however, also noted that the varieties tended to intergrade and chose to treat var. *hartwegii*, and var. *lemmonii* (A. Gray) L. Benson as var. *alismaefolius*. Of these varieties, only var. *alismaefolius* is reported to occur in British Columbia (BC) (Douglas *et al.* 1991).

Ranunculus alismaefolius var. *alismaefolius* is a perennial from fibrous to slightly tuberous-based, non-tomentose roots, erect, 30-60 cm tall (Hitchcock *et al.* 1964; Lackschewitz 1991; Wilken 1993). Stems are generally 3-5 from the base, somewhat hollow, and not rooting at the nodes. Leaves are simple, lanceolate, the basal ones broadly lanceolate or ovate, often toothed, 4-12 cm long, mostly 1-3 cm wide, and usually narrowed to distinct petioles. Cauline leaves are alternate or opposite, entire, linear to narrowly lanceolate, and short-petiolate to sessile in the inflorescence. Flowers are yellow, with 5 petals, 8-10 mm long, and 5 sepals. Flowers are solitary and terminal at ends of stalks. Fruits are 10-60, smooth, usually glabrous, achenes with straight, stout beaks. Each flowering head produces 30 to 50 achenes.

The basal leaves of *R. alismaefolius* superficially resemble those of ribwort plantain (*Plantago lanceolata*). If flowers are lacking, then initial recognition in a densely vegetated meadow is sometimes difficult. After flowering, however, the foliage of *R. alismaefolius* turns yellow-green and becomes distinctive.

There is only a single extant occurrence of this taxon in British Columbia. Populations at this site face a variety of threats, therefore decreasing the chance of survival of this taxon in the province. Concern for this species resulted in the basis for this report, which was provided by a national status report submitted in 1996 to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

GENERAL BIOLOGY

Ranunculus alismaefolius var. *alismaefolius* is a perennial, and like many other herbs that occur in grass-dominated meadows, it appears to germinate and commence growth in spring due to the high light levels and the warm, moist conditions found at this time of year. In addition, surrounding vegetation, particularly the grasses, are shorter during this period, allowing the herbs full benefit of the light levels and greater space. Vegetative growth occurs in muddy areas in early spring with flowers of *R. alismaefolius* var. *alismaefolius* emerging in April and May. Seed maturation occurs in June. During July, when drought conditions are prevalent in the meadow, the plants are senescent and remain dormant until the following year.

Since *R. alismaefolius* var. *alismaefolius* does not appear to reproduce by other means, seed production is likely to be of critical importance to the maintenance and spread of this species into new habitats. Given the bright yellow appearance of the flower, and the presence of a pocket-like nectary gland, it is likely that insects are the principal pollinators. Leppik (1964) indicated that flowers of *Ranunculus* were visited by a wide variety of insects including bees, flies, butterflies, beetles and ants. The resulting seeds do not appear to be easily dispersed.

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

Although not specifically documented, the size and shape of the achenes indicate dispersal is probably achieved by birds and small animals.

HABITAT

Description

As a result of the unique climate, vegetation on the southeastern side of Vancouver Island is markedly different to that found elsewhere along the west coast and other locations in Canada. Moisture deficiencies during the summer preclude those plants not adapted to drought (McMinn *et al.* 1976). On mesic sites the vegetation is dominated by Douglas-fir (*Pseudotsuga menziesii*), a dominant fire-climax species. In drier areas, where rainfall is low or soils are shallow, the vegetation is characterized by open stands or discontinuous clumps of Garry oak (*Quercus garryana*) mixed with grass-dominated meadows or rock outcrops.

In North America, *R. alismaefolius* var. *alismaefolius* is known to inhabit open moist sites ranging from muddy ditches, pond margins and streambanks to swales and moist alpine meadows (Benson 1952; Douglas *et al.* 1991; Wilken 1993). *Ranunculus alismaefolius* var. *alismaefolius* grows in elevation from sea level to 2300 m.

In British Columbia, the only location in which this variety has been found is a lowland *Q. garryana* - *Bromus* meadow. This large meadow, characterized by deep brunisolic soils and dotted periodically by rock outcrops, is usually flooded during winter, muddy in the spring and dry during summer. The site contains open stands of *Q. garryana* with a substantial variety of forbs including fool's onion (*Triteleia hyacinthina*), western buttercup (*Ranunculus occidentalis*) and common camas (*Camassia quamash*), but tends to be dominated by grasses such as orchard grass (*Dactylis glomerata*), sweet vernalgrass (*Anthoxanthum odoratum*), and several species of *Bromus*. Some stands are dominated in the understorey by shrubs, in particular, snowberry (*Symphoricarpos albus*) and scotch broom (*Cytisus scoparius*), which effectively shade out many herbaceous species.

Ecoprovince and Biogeoclimatic Zone

Ecoprovinces — All *R. alismaefolius* var. *alismaefolius* occurrences fall in one ecoprovince and one ecosection in British Columbia, the Nanaimo Lowlands (NAL) within the Georgia Depression (GED). The ecoregions of British Columbia have been delineated by Demarchi (1995).

Biogeoclimatic zones — Likewise all occurrences of *R. alismaefolius* var. *alismaefolius* in the province fall in one biogeoclimatic zone, the Coastal Douglas-fir (CDF), delineation of which was done by the B.C. Ministry of Forests Research Branch (1992).

DISTRIBUTION

Ranunculus alismaefolius var. *alismaefolius* is known in North America from the southeast tip of Vancouver Island, southward through Washington, Idaho and western Montana to Oregon and northeastern California (Hitchcock *et al.* 1964; Douglas *et al.* 1991; Wilken 1993). Wilken (1993) has also extended the range to Wyoming although this remains unsubstantiated.

In British Columbia, the range of *R. alismaefolius* var. *alismaefolius* is limited to the southeastern tip of Vancouver Island (Figure 1). Considered the northern-most limit, the range consists of three possible locations, of which only one has been recently verified.

POPULATION SIZE AND TRENDS

Table 1 identifies those locations in which *R. alismaefolius* var. *alismaefolius* has been collected in British Columbia. All populations have been found within a very limited area on southeastern Vancouver

Island, on the east side of Victoria. Of the three locations, only one is extant. The locations cited on the herbarium labels for the other two areas are too general to determine if the described sites are distinct from the extant location.

Table 1. Locations of *Ranunculus alismaefolius* var. *alismaefolius* in British Columbia.

Collection Site	Last Observation	Collector	Population (no./area)
Oak Bay (Victoria)	1890	Newcombe	
Cadboro Bay Road (Victoria)	1900	Anderson	
Uplands Park (Victoria)	1994	Douglas	50/5 m ₂

Trends in Recently Verified Populations

Uplands Park — Approximately 50 plants were recently verified in 1994 from two populations within Uplands Park. The larger group, 32 plants in 4m₂, was located alongside a muddy track on the southern side of a meadow, centrally located within the park. Forty individuals were verified at this site in 1991.

The second group, 18 plants in 1 m₂, was located approximately 200 m westward, near the southwest corner of the park in a grassy swale alongside a path. This population totalled 17 individuals in 1991.

Status Unknown

Several herbarium records, dating from 1887 to 1896, indicated collections made in "Oak Bay". Two such records described the area as "swamp." An additional collection, dated 1900, recorded the site location as "Cadboro Bay Road," which is situated near the border of Uplands Park. Since both Cadboro Bay Road and Uplands Park, the site of the existing populations, are in the Municipality of Oak Bay, and since portions of the park are often flooded during the winter, it is possible that the historic records are all referring to the sites described previously in Uplands Park.

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 as *Identified Wildlife*.

Existing populations of *R. alismaefolius* var. *alismaefolius*, however, are protected to a certain extent by their location on public property.

The one extant location of *R. alismaefolius* var. *alismaefolius* is in Uplands Park, a municipal park in Oak Bay. This park also supports a number of other rare species including *Viola praemorsa* ssp. *praemorsa*, tall wooly-head (*Psilocarphus elatior*), white-top aster (*Aster curtus*) and Macoun's meadowfoam (*Limnanthes macounii*). Despite its park status, uplands park does not offer the most effective protection. The area is not actively managed due to the mandate followed by park administrators to treat the site as a "natural" habitat, and therefore, nature is allowed to take its course. Conflict over this mandate has arisen since much of the native vegetation has been eliminated, or is currently threatened, as a result of aggressive introduced species, in particular *C. scoparius*.

In addition, it is surrounded by residential development, and receives heavy pedestrian traffic. It is also well-used by mountain bikers. Efforts have been made to prevent the destructive impact of bicycles within the park by posting signs at the various entrances along the parks perimeter prohibiting the use of bicycles. Because there is little enforcement of this regulation, however, the signs appear to go unheeded.

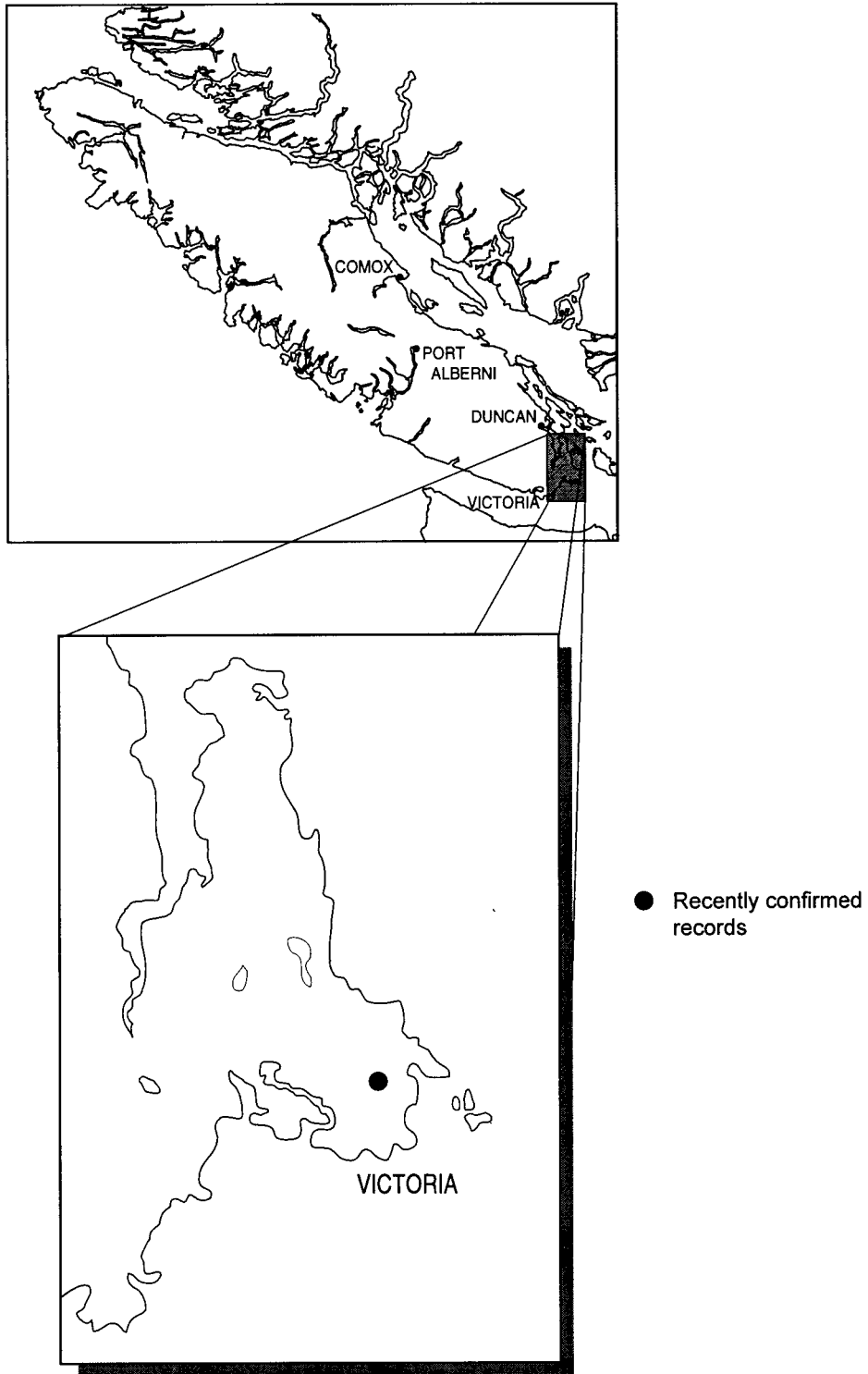


Figure 1. Distribution of *Ranunculus alismaefolius* var. *alismaefolius* in British Columbia

LIMITING FACTORS

The most direct and immediate threat to the extant populations of *R. alismaefolius* var. *alismaefolius* is habitat destruction. Park administrators treat Uplands Park as a "natural" habitat, with little active management, however, there are several examples of park maintenance resulting in the destruction of native, and sometimes rare, plant species. These include the addition of fire hydrants, the planting of exotic trees (*Pinus sylvestris*) and the deposition of gravel in areas deemed excessively muddy.

While introduced species may pose an immediate threat to *R. alismaefolius* var. *alismaefolius*, it is difficult to judge since nothing is known of the competitive interactions of this taxon with others. The continued existence of both populations of *R. alismaefolius* var. *alismaefolius* alongside pathways, where other plants are reduced in size and unable to utilize the habitat fully, indicates that this species is a poor competitor. The herbaceous vegetation observed today in *Q. garryana*-*Bromus* stands and grass-dominated meadows has been drastically altered with the introduction of European species. Although a number of native species persist, much of the vegetation is composed of introduced grasses that likely make up > 90% of the biomass of the herb layer. These species include *Anthoxanthum odoratum*, *Dactylis glomerata*, hedgehog dogtail (*Cynosurus echinatus*), early hairgrass (*Aira praecox*), and several species of *Bromus*. As noted by Roemer (1972) regarding *Quercus garryana* vegetation, it is not possible to know which native species and to what extent they have been displaced because all sites are now composed primarily of introduced species and there are no longer any examples of "pre-European" vegetation. What impact these species may have on the growth and establishment of *R. alismaefolius* var. *alismaefolius* remains unclear, but it is likely that the dense turf formed by grasses prevents the establishment of this herb from buried viable seed.

Habitat destruction of the grass-dominated meadows often associated with *Q. garryana*-*Bromus* stands that are limited to the southeastern side of Vancouver Island and some of the adjacent Gulf Islands is a general threat. Both types of vegetation are believed to have been much more common before colonization by European settlers. Although few records indicate the extent of these communities prior to, and during, colonization by European settlers, it is likely they

once encompassed much of the area now occupied by the city of Victoria (see map pp. 9-10 in McMinn et al. 1976). The BC Conservation Data Centre (B.C. Ministry of Environment, Lands, and Parks) considers *Q. garryana*-*Bromus* vegetation critically imperiled because of extreme rarity, and although grass-dominated meadows have not been ranked, they may be even more limited in area and just as much at risk as *Q. garryana*-*Bromus* vegetation.

At this time, pressures to develop unprotected *Q. garryana* stands and meadows for the expansion of the urban infrastructure of Victoria, and other population centres on Vancouver Island, are intense. Loss of these habitats severely limits the availability of suitable sites for the establishment of *R. alismaefolius* var. *alismaefolius*. Historically, *Q. garryana* communities and grass-dominated meadows have always been heavily influenced by human activity. Aboriginal peoples set fire to these stands to maintain them as an important habitat for wildlife and for harvesting *Camassia*, a member of the Liliaceae whose bulbs were an important source of starch in the diet of aboriginal people (Turner and Bell 1971; Roemer 1972,). Roemer (1972) believed that without human interference some of these stands would have eventually been replaced by *P. menziesii* forests.

The suppression of fire within the past century may have contributed to the demise of *R. alismaefolius* var. *alismaefolius* populations. All of the sites where this species have been collected were likely maintained in the past as a result of periodic episodes of fire. This would have destroyed much of the competing vegetation resulting in newly-created habitats where *R. alismaefolius* var. *alismaefolius* might have become established. However, since that time, these sites have experienced little disturbance, resulting in the invasion and expansion of other species at these sites including the shrubs *S. albus* and *C. scoparius*. High cover of shrubs in potential habitats for *R. alismaefolius* var. *alismaefolius* likely prevents this species from invading new sites.

Ranunculus alismaefolius var. *alismaefolius* in British Columbia represent the northern range limit of the taxon, thus it is possible that climatic factors, such as frost hardiness, or drought tolerance, combined with the limited availability of meadow habitats, may severely limit the ability of this variety to grow in British Columbia. It is also possible that the two sites in which this forb is currently found represents marginal habitats.

SPECIAL SIGNIFICANCE OF THE TAXON

Ranunculus alismaefolius var. *alismaefolius* is a member of a relatively small group of species with a restricted Pacific Coast range that have their northern limits in southern British Columbia. The significance of these peripheral populations, especially with respect to their genetic characteristics, has yet to be studied adequately. This species may prove to be a good subject for genetic research.

There is no economic significance for this variety. Information gathered by the Horticultural Advisory Council in California indicated use as a horticultural species may be difficult given the need for special care. A cursory study by this Council showed the plant to have complex requirements but felt the testing was insufficient and worth pursuing further (Hickman 1993).

While *R. alismaefolius* var. *alismaefolius* does not appear to have been specifically tested, Taylor and MacBryde (1977) indicated that this variety was known to cause dermatitis in humans, and that it was also considered toxic to livestock. It is thought that all *Ranunculus* species contain the same toxic principle, although the amount depends on the stage of growth and on the particular species (Kingsbury 1964). The presence of a blistering irritant, protoanemonin can cause reactions of varying intensities including redness and blistering of the skin, or if swallowed, inflammation of the mouth, throat and digestive tract (Brayshaw 1989; Pojar and MacKinnon 1994). While severe cases in livestock have reported convulsions and death, this type of poisoning is rare since *Ranunculus* are strongly distasteful to most grazing animals (Kingsbury 1964). This harmful chemical is also unstable, and is rendered harmless when the hay is cured (Kingsbury 1964; Pojar and MacKinnon 1994).

RECOMMENDATIONS AND MANAGEMENT OPTIONS

Rehabilitation Efforts

No attempts have been made to introduce *R. alismaefolius* var. *alismaefolius* to suitable habitats or to increase the numbers of individuals at the current locations. Since it appears that specific requirements are needed for the successful establishment of this variety within a site, biological and ecological research is necessary. To date, there are no records of such studies being done.

Quercus garryana-*Bromus* habitats are typically dry, and possibly too dry, in this region for the establishment of new *R. alismaefolius* var. *alismaefolius* populations. It is also possible that because of difficult seed dispersal, or very specific requirements for germination and plant growth, few seeds land in areas acceptable to the plant.

Fire, as it was used by native people before European settlers arrived in coastal British Columbia, may have benefited the habitats in which *R. alismaefolius* var. *alismaefolius* occurred by reducing, or eliminating, dense shrub thickets, and thus maintaining the herb-rich meadows. Today, because of the close proximity to residential areas, and the likelihood of uncontrolled burning due to the buildup of potential fuels, fire does not appear to be a viable management option.

EVALUATION

Comments on Status

Globally, *R. alismaefolius* var. *alismaefolius* is currently ranked as G5T? by The Nature Conservancy (U.S.). This ranking indicates that, at the species level, the plant is considered "common to very common; demonstrably secure and essentially ineradicable under present conditions" but that limited information is available for this particular variety.

In British Columbia, *R. alismaefolius* var. *alismaefolius* is ranked by the Conservation Data Centre (B.C. Ministry of Environment, Lands and

Parks; Douglas et al. 1998) as S1, which indicates this variety 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 is the most critical status that can be applied to a species at the provincial level.

Status Recommendations

Ranunculus alismaefolius var. *alismaefolius* should be ranked as Endangered in British Columbia for the following reasons:

1. Only one extant site is known in British Columbia, and comprises 50 individuals divided between two populations.
2. Suitable habitats for *R. alismaefolius* var. *alismaefolius* are extremely rare and limited to southeastern Vancouver Island and adjacent islands. The potential of this species to become established at other sites is therefore extremely limited and seriously limits its long-term survival.
3. *Ranunculus alismaefolius* var. *alismaefolius* 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 poor. With only one known extant location in British Columbia, limited to 50 individuals, and with little knowledge of the plants biological and ecological requirements, this variety is vulnerable to extirpation. Without research on the growth requirements, and further demographic information, the stability of the present populations will remain unknown. The limited number of individuals also reduces the potential for genetic variation which may be necessary to respond to environmental changes in the future.

The site at which *R. alismaefolius* var. *alismaefolius* is presently found is also in jeopardy. The composition and structure of the meadow is changing, largely due to the encroachment of introduced shrubs and grasses. With no form of active management, the risk of *R. alismaefolius* var. *alismaefolius* being out-competed is high.

Bordering footpaths, both groups run a much higher risk of being trampled by pedestrians and bicycles, or of being unwittingly destroyed during path improvements by park staff. Current attempts to protect the park's fragile ecosystems from human use are ineffectual due to the absence of enforcement through legislation.

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