

Conservation Evaluation of Howell's *Triteleia*, *Triteleia howellii*, an Endangered Lily in Canada*

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In Canada, *Triteleia howellii* is restricted to *Quercus garryana* stands and grass-dominated meadows on southeastern Vancouver Island in southwestern British Columbia. Nine sites have been confirmed in recent years while three other sites are considered extirpated. These Canadian sites represent the northern range limits of *T. howellii*. Threats to existing populations vary in intensity. Although most populations are protected to a certain extent from direct habitat destruction, introduced species pose a serious potential threat to the continued existence of most populations. Managing sites for *T. howellii* is difficult because little information is available regarding the general biology of this species.

Key Words: Howell's *Triteleia*, *Triteleia howellii*, endangered, distribution, population size, British Columbia.

Howell's *Triteleia*, *Triteleia howellii* (S. Wats.) Greene [taxonomy and nomenclature follow Douglas et al. (1998a, b; 1999a, b; 2000, 2001a, b)], sometimes treated as *T. grandiflora* Lindl. var. *howellii* (S. Wats.) Hoover, is a member of a genus of 14 species in North America (Keator 1993). Three species occur in British Columbia and Canada (Scoggan 1979; Pojar 2001).

Triteleia howellii is a perennial herb from a deep, straw-coloured, fibrous-scaly, nearly globe-shaped, bulb-like corm (Figure 1; Pojar 2001). The erect, flowering stem is 20-50 cm tall with one or two smooth, slender, linear basal leaves. The leaves are 20-40 cm long, 3-8 mm wide, sheathed at the base and have entire margins. The flowers consist of six whitish to blue, vase-shaped to narrowly bell-shaped, fused segments forming a 1.5-2 cm long tube. The corolla lobes, which are about as long as the tube, are in two, spreading, petal-like whorls, about as long as the tube. The outer three are broadly lanceolate, the inner three are oblong-egg-shaped and all are slightly ruffled. The fruit consists of a stalked, egg-shaped capsule containing black rounded seeds.

Triteleia howellii is similar in appearance to its close relative *T. grandiflora*. It is distinguished from the latter

by its flat filaments which are attached at the same level on the perianth tube (Pojar 2001). The filaments of *T. grandiflora*, in contrast, are not flat and are attached at two levels on the perianth tube.

North American and Provincial Ranges

Triteleia howellii ranges from southwestern British Columbia, south through Washington and Oregon to northern California (Barkworth 1977a; Keator 1993). In Canada, *T. howellii* is known only from southeastern Vancouver Island (Figure 2; Pojar 2001; Douglas et al. 2002).

Habitat

In British Columbia *T. howellii* occurs on rock outcrops, in Garry Oak (*Quercus garryana*) woodlands, Garry Oak/Arbutus (*Arbutus menziesii*) stands and occasionally in highly disturbed sites dominated by weeds in private yards and on roadsides. In the highly disturbed sites, dominants include Orchard Grass (*Dactylis glomerata*), Cheat Grass (*Bromus tectorum*), Common Vetch (*Vicia sativa*), Rip-gut Brome (*Bromus rigidus*), Soft Brome (*B. hordeaceus*), Perennial Ryegrass (*Lolium perenne*), and Pacific Sanicle (*Sanicula crassicaulis* var. *crassicaulis*), all introduced except for *Sanicula*.

At the highest quality site, in the *Quercus garryana* woodland at the Cowichan Garry Oak Preserve, the habitat is classified as a *Quercus garryana/Dactylis glomerata* plant community (Douglas et al. 2002*) and is characterized by deep, dark soils up to a metre in depth. It is likely that prior to understory dominance by *D. glomerata* in this (Figure 3), and other *Quercus* stands of the region, this plant community would have fallen within the *Q. garryana*/California Brome (*Bromus carinatus*) community type (Roemer 1972). An

* The field work for the *Triteleia howellii* project was funded by the British Columbia Conservation Data Centre. The results appear in the British Columbia Conservation Data Centre database and a rare plant manual (Douglas et al. 2002). This information formed the basis for a Committee on the Status of Endangered Wildlife in Canada status report (Douglas 2003*) and the subsequent assessment of *Endangered* (COSEWIC 2003*). The present paper also includes more recent information, funded by the Nature Conservancy of Canada and the Habitat Conservation Trust Fund, that will be used in a National Recovery Strategy for *T. howellii* (Douglas and Smith 2005).



FIGURE 1. Illustration of *Triteleia howellii* (Line drawing in Pojar 2001).

extremely rich low shrub and herb stratum is present during the spring. The most prominent species in the Cowichan Garry Oak Preserve Garry Oak stand are *Sanicula crassicaulis* var. *crassicaulis* and *Dactylis glomerata* (Douglas et al. 2002*). Other species with

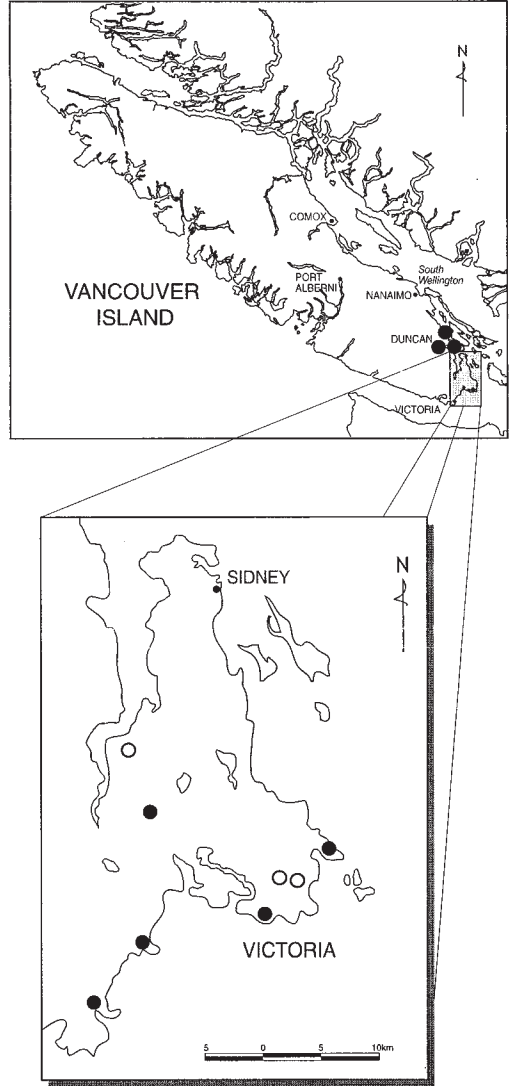


FIGURE 2. Distribution of *Triteleia howellii* in British Columbia (○ – extirpated sites, ● – recently confirmed sites).

moderate to high constancies associated with *T. howellii* include Common Camas (*Camassia quamash*), *Bromus* spp., Broad-leaved Shooting-star (*Dodecatheon hendersonii* ssp. *hendersonii*), Cleavers (*Galium aparine*), and Common Snowberry (*Symphoricarpos albus*). A marked change in composition takes place by mid-summer. Many of the conspicuous native plants (e.g., Great Camas (*Camassia leichtlinii*), *C. quamash*, *Dodecatheon hendersonii*, and Yellow Montane Violet (*Viola praeorsa* ssp. *praeorsa*)) have completed their yearly life cycle and have essentially disappeared. Perennial grasses that were not recognizable or had not initiated growth in the spring and numerous intro-

TABLE 1. Locations and population sizes for *Triteleia howellii* in Canada

Collection Site	Last Observation	Collector/Observer	Population (no./area)
Oak Bay (Victoria)	1912	Beaven	Extirpated
Saanich Arm (Victoria)	1919	Newcombe	Extirpated
Witty's Lagoon Regional Park (Metchosin)	1999	Douglas & Penny	43/200 m ²
Gordon Head (Saanich)	1999	Fontaine	51/5 m ²
Cowichan Garry Oak Preserve (Duncan)	1999	Douglas	430/3-4 ha
Cowichan River Estuary (Duncan)	2001	Douglas	62/3 m ²
Thetis Lake Regional Park (View Royal)	2002	Ceska	1/1 m ²
Uplands Park (Victoria)	2003	Penny & Fairbarns	Not seen since 1917, 2003 search unsuccessful, probably extirpated
Mt. Tzuhalem, base of (along Khenipsen Road)	2003	Janszen	6/.05 m ²
Albert Head Lagoon Regional Park (Metchosin)	2003	Roemer	8/2 m ²
Horth Hill Regional Park (North Saanich)	2003	Janszen	3/1 m ²
Beacon Hill Park (Victoria)	2004	Fairbarns	ca 200/12 m ²
Somenos Lake (Duncan)	2004	Douglas & Richards	90/140 m ²
Williams Head Road (Metchosin)	2004	Milne	14/?m ²

duced annuals, well adapted to the drier soils, dominate the understory. At this time, *Dactylis glomerata* and *Vicia* species are the most prominent species with greatly increased mean covers. Other prominent species in mid-summer include the native grasses, *Bromus carinatus* and Alaska Oniongrass (*Melica subulata*), and the introduced grasses, Barren Brome (*Bromus sterilis*) and Kentucky Bluegrass (*Poa pratensis*).

Triteleia howellii also occurs in a *Quercus garryana* – *Arbutus menziesii* stand. The shrub layer is more prominent at this site and is dominated by Tall Oregon-grape (*Mahonia aquifolium*) and Oceanspray (*Holodiscus discolor*). Major associates include Hairy Honeysuckle (*Lonicera hispidula*), *Bromus rigidus*, *Galium aparine*, Small-flowered Nemophila (*Nemophila parviflora*) and Hedgehog Dogtail (*Cynosurus echinatus*).

Biology

There is little information known about the biology or ecology of *Triteleia howellii* throughout its range. Reproduction is by division of the corm, by production of numerous cormlets, and by seed (Barkworth 1977b).

Population Attributes

Triteleia howellii has been collected at 14 sites in Canada, all of which are located on southeastern Vancouver Island (Table 1). Of the 14 sites, 11 have been confirmed since 1999 while the status of the remaining three sites is unknown and are likely extirpated. Population areas range from small (one m²) to over three or four hectares, while plant numbers range from a single plant to over 430 plants (Table 1). Little information is available on population trends. The sites that have recently been examined show the populations

are apparently stable although numbers of flowering plants may vary.

Provincial, National and Global Ranks

The British Columbia Conservation Data Centre has ranked this species S2 and placed it on the British Columbia Ministry of Sustainable Resource Management red-list (Douglas et al. 2002). This is the most critical category for imperilled rare native vascular plants in British Columbia. A rank of S2 is considered "critically imperilled because of rarity (typically 6-20 extant occurrences or few remaining individuals) or because of some factor(s) making it vulnerable to extirpation or extinction." Since the species is restricted to British Columbia, the National rank is N2. Globally, *Triteleia howellii* is ranked G3G4, indicating that, although the presently known sites are less than 100, it is more likely that this species is frequent to common in its range and apparently secure.

Threats and Protection

The most direct and immediate threat to *Triteleia howellii* is habitat destruction. This is of particular concern in the grass-dominated meadows often associated with the *Quercus garryana* communities that are restricted to the southeastern side of Vancouver Island and some of the Gulf Islands. This type of vegetation was much more common before colonization by European settlers. This destruction has continued to the present resulting in the elimination of almost all sites occurring outside parks or ecological reserves. Historically, *Q. garryana* communities and grass-dominated meadows have always been heavily influenced by human activity, especially fires. Roemer (1972) believed that without human interference some of these stands would have eventually been replaced by Douglas-fir forests.



FIGURE 3. Habitat of *Triteleia howellii* in a *Quercus garryana* stand in the Cowichan Garry Oak Preserve near Quamichan Lake. *Dactylis glomerata* is the dominant grass in this late summer photo.

The suppression of fire within the past century may also have contributed to the decrease of *Triteleia howellii* populations. Most of the sites in which *T. howellii* has been collected were likely maintained in the past as a result of periodic fires, both natural and unnatural. In the past, aboriginal peoples probably set fire to these stands to maintain them as an important habitat for wildlife (Roemer 1972). Since that time, these sites have experienced little disturbance, resulting in the invasion and expansion of many other species, especially introduced grasses.

The introduction of European species has resulted in substantial, and probably irreversible, changes not only to the grass-dominated meadows associated with *Quercus garryana*, but also to the rocky xeric sites north and west of Victoria where *Triteleia howellii* has been collected in the past. One of the most devastating species is Scotch Broom (*Cytisus scoparius*), which has become a dominant shrub on xeric, exposed sites throughout much of southeastern Vancouver Island and the Gulf Islands. Much of the vegetation is now dominated by introduced grasses. These species include Early Hairgrass (*Aira praecox*), Sweet Vernalgrass (*Anthoxanthum odoratum*), *Cynosurus echinatus* and *Dactylis glomerata*.

Some of the populations contain very few plants. Once a population becomes small, it becomes more

vulnerable to demographic and environmental variation and loss of genetic variability. In some cases, small populations are at risk of inbreeding depression, genetic drift and loss of fitness (Primack 1998).

The population with the best protection is located at the Cowichan Garry Oak Preserve where the general public is excluded. This five-hectare stand near Quamichan Lake on Vancouver Island represents the best example of a *Quercus garryana* woodland in the province and probably one of the best in the Pacific Northwest. The stand contains a relatively low number of exotic species and has active management plans in place. This site also contains the largest known population of *T. howellii* in the province (Douglas et al. 2002*).

A number of *Triteleia howellii* populations are also in small regional parks in the Greater Victoria area. These include populations at Beacon Hill, Witty's Lagoon, Thetis Lake, and Horth Hill. Most of these parks receive little active management at the present time, at least with respect to their rare plants. Park enhancement projects, road and trail developments and heavy recreational use by humans often result in the destruction of the native vegetation and rare plant species.

Triteleia howellii could be a candidate species for protection under the provincial *Wildlife Amendment*

Act as it is currently red-listed by the British Columbia Conservation Data Centre. One of the populations (Somenos Lake) of *T. howellii* is protected by the *Park Act* since it is currently administered by Parks BC.

Evaluation

The British Columbia Conservation Data Centre considers *Triteleia howellii* to be threatened/endangered in British Columbia (Douglas et al. 2002a) and the Committee on the Status of Endangered Wildlife in Canada has assessed the species as endangered (COSEWIC 2003). About 1000 flowering plants have been recorded in recent years from 11 locations. Only four of these populations can be considered viable since the remaining populations cover areas of less than 5 m². The prognosis for this species may not be good since, since only one population, at the Cowichan Garry Oak Preserve, is included in an active management plan.

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