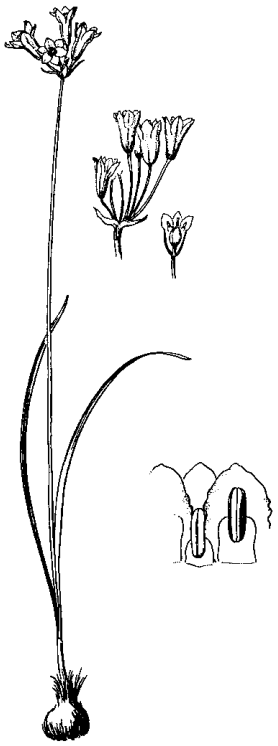
COSEWIC
Assessment and Status Report

on the

Howell's Triteleia
Triteleia howellii

in Canada



ENDANGERED
2003

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, ON
K1A 0H3

Tel.: (819) 997-4991 / (819) 953-3215
Fax: (819) 994-3684
E-mail: COSEWIC/COSEPAC@ec.gc.ca
http://www.cosewic.gc.ca

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Howell's triteleia — Line drawing from J. Pojar 2001.

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COSEWIC
Assessment Summary

Assessment summary – May 2003

Common name
Howell's triteleia

Scientific name
Triteleia howellii

Status
Endangered

Reason for designation
This is a geographically highly restricted species with a small population occurring at a few scattered sites within remnant Garry oak habitats. It is located within a highly urbanized region with ongoing risks to the species from such factors as habitat loss, competition with invasive species, habitat fragmentation and competition with invasive species.

Occurrence
British Columbia

Status history
Designated Endangered in May 2003. Assessment based on a new status report.

COSEWIC
Executive Summary

Howell's Triteleia
Triteleia howellii

Species information

Howell's triteleia, *Triteleia howellii* (S. Wats.) Greene, is a member of a genus of 14 species in the Liliaceae in North America. Three species occur in British Columbia and Canada. *Triteleia howellii* is a perennial herb from a deep, straw-coloured, fibrous-scaly, nearly globe-shaped, bulb-like corm. 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. 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.

Distribution

Triteleia howellii ranges from southwestern British Columbia, south through Washington and Oregon to northern California. In Canada, *T. howellii* is only known from southeastern Vancouver Island in southwestern British Columbia.

Habitat

Triteleia howellii sites are restricted to southeastern Vancouver Island in British Columbia in the *Quercus garryana* (Garry oak) ecosystem, which is within the Coastal *Pseudotsuga menziesii* (Douglas-fir) Zone of southeastern Vancouver Island, islands in the Gulf of Georgia, and a narrow strip of the adjacent mainland. This zone is in a rainshadow belt created by the Olympic and Vancouver Island mountains, resulting in a Mediterranean climate with warm, dry summers and mild, wet winters. More specifically, *T. howellii* occurs in *Quercus garryana* woodlands and in highly disturbed sites dominated by weeds in private yards and on roadsides. The *Quercus garryana* woodland in the Cowichan Garry Oaks Preserve is classified as a *Quercus garryana/Dactylis glomerata* (orchard grass) plant community and is characterized by deep, dark soils up to a metre in depth. *Triteleia howellii* also occurs in a *Quercus garryana-Arbutus menziesii* (Arbutus) stand at the base of rock outcrops, where the shrub layer is more prominent with high cover of *Mahonia aquifolium* (tall Oregon-grape) and *Holodiscus discolor* (oceanspray).

Biology

There is little known about *Triteleia howellii* in terms of biology throughout its range. Reproduction is through division of the corm, by the production of numerous cormlets, and by seed.

Population sizes and trends

Triteleia howellii has been collected at 12 sites in Canada, all of which are located on southeastern Vancouver Island. Nine of the twelve sites have been confirmed since 1997, while the status of the plants at the remaining three sites is unknown and the populations are likely extirpated. Population areas range from small (1 m^2) to over three or four hectares, while plant numbers range from a single plant to over 450 plants.

Limiting factors and threats

The most direct and immediate threat to *Triteleia howellii* is habitat destruction. The *Quercus garryana* communities that are limited to the southeastern side of Vancouver Island and some of the Gulf Islands have been heavily urbanized. The suppression of fire and the spread of introductions has also been a limiting factor. One of the most devastating introduced species is *Cytisus scoparius* (Scotch broom), which has become a dominant shrub on xeric, exposed sites throughout much of southeastern Vancouver Island and the Gulf Islands. Furthermore, dispersal into new sites is likely limited and some of the populations of *T. howellii* contain very few plants and could be at risk of inbreeding depression, genetic drift and loss of fitness.

Special significance of the species

Triteleia howellii occurs in a unique ecosystem in Canada, the Garry oak woodland, which itself occurs within a limited habitat type, the Coastal Douglas-fir zone of southeastern Vancouver Island, several islands in the Gulf of Georgia and a narrow strip of adjacent mainland in British Columbia. The Garry oak ecosystem is a unique habitat for Canada and is at the northern limit of the vegetation type that occurs more commonly to the south. The northern limit of the species also occurs in this region. The importance of these peripheral populations, especially with respect to their genetic characteristics, has yet to be studied adequately. The bulb-like corms of this species are edible and like other related species may have been used by native peoples as a food source.

Existing protection or other status designations

Globally *T. howellii* is ranked "G3G4", indicating, it is "apparently secure." *Triteleia howellii* is considered "imperiled" in California. Nationally, *T. howellii* is “N2” and provincially, it is considered by the BC Conservation Data Centre of the BC Ministry of Sustainable Resource Management to be “red-listed” and “S2” or imperiled, the second most critical rank. However, there is currently no specific endangered species legislation

in place for the protection of vascular plants in British Columbia that have been given this critical rank.

Summary of status report

Triteleia howellii is known from only nine extant populations in British Columbia, some of which have very few individuals, putting them at risk of inbreeding depression, genetic drift and loss of fitness. Aggressive exotic species and the degradation of the ecosystems that *T. howellii* occur in, as well as direct habitat destruction, threaten its long-term persistence in British Columbia; consequently, dispersal into new sites is very limited. There is currently no specific legislation in place for the protection of rare and endangered vascular plants in British Columbia. The populations of *T. howellii* in British Columbia are at the northern extent of their range and may represent populations that are genetically distinct and important for the long-term survival and evolution of the species.

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
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Canada

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

COSEWIC Status Report

on

Howell's Triteleia

Triteleia howellii

in Canada

George W. Douglas[1]
Jenifer L. Penny[1]

2003

[1]PO Box 9993 Stn. Prov. Govt
Victoria BC
V8W 9R7

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SPECIES INFORMATION

Name and classification

Triteleia howellii (S. Wats.) Greene
Brodiaea howellii S. Wats
Triteleia grandiflora Lindl. var *howellii* [S. Wats.] Hoover
Howell's triteleia
Liliaceae: Lily family
Angiosperm

Description

Howell's Triteleia, *Triteleia howellii* (S. Wats.) Greene, 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 has a similar appearance to its close relative *T. grandiflora* Lindl (large-flowered triteleia). 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.

DISTRIBUTION

Global range

Triteleia howellii ranges from southwestern British Columbia, south through Washington and Oregon to northern California. (Keator 1993; Barkworth 1977a).

Canadian range

In Canada, *T. howellii* is known from only southeastern Vancouver Island in southwestern British Columbia (Figure 3; Pojar 2001; Douglas *et al*. 2002a, b).

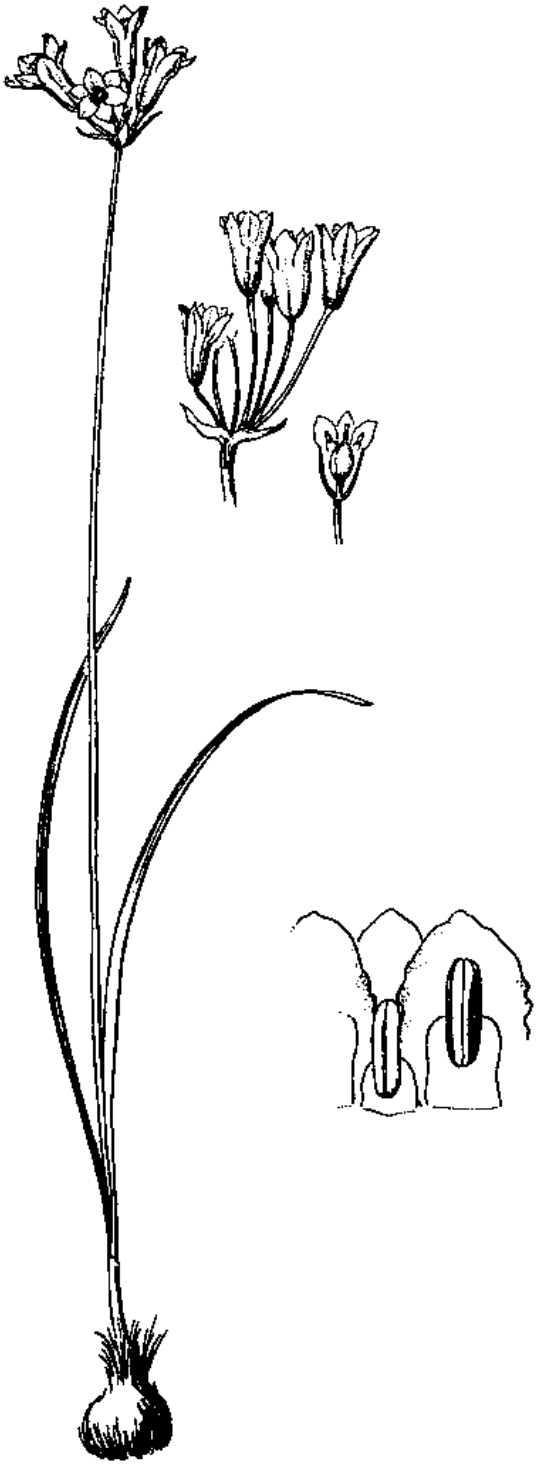

Figure 1. Illustration of *Triteleia howellii* (Line drawing from Pojar 2001).

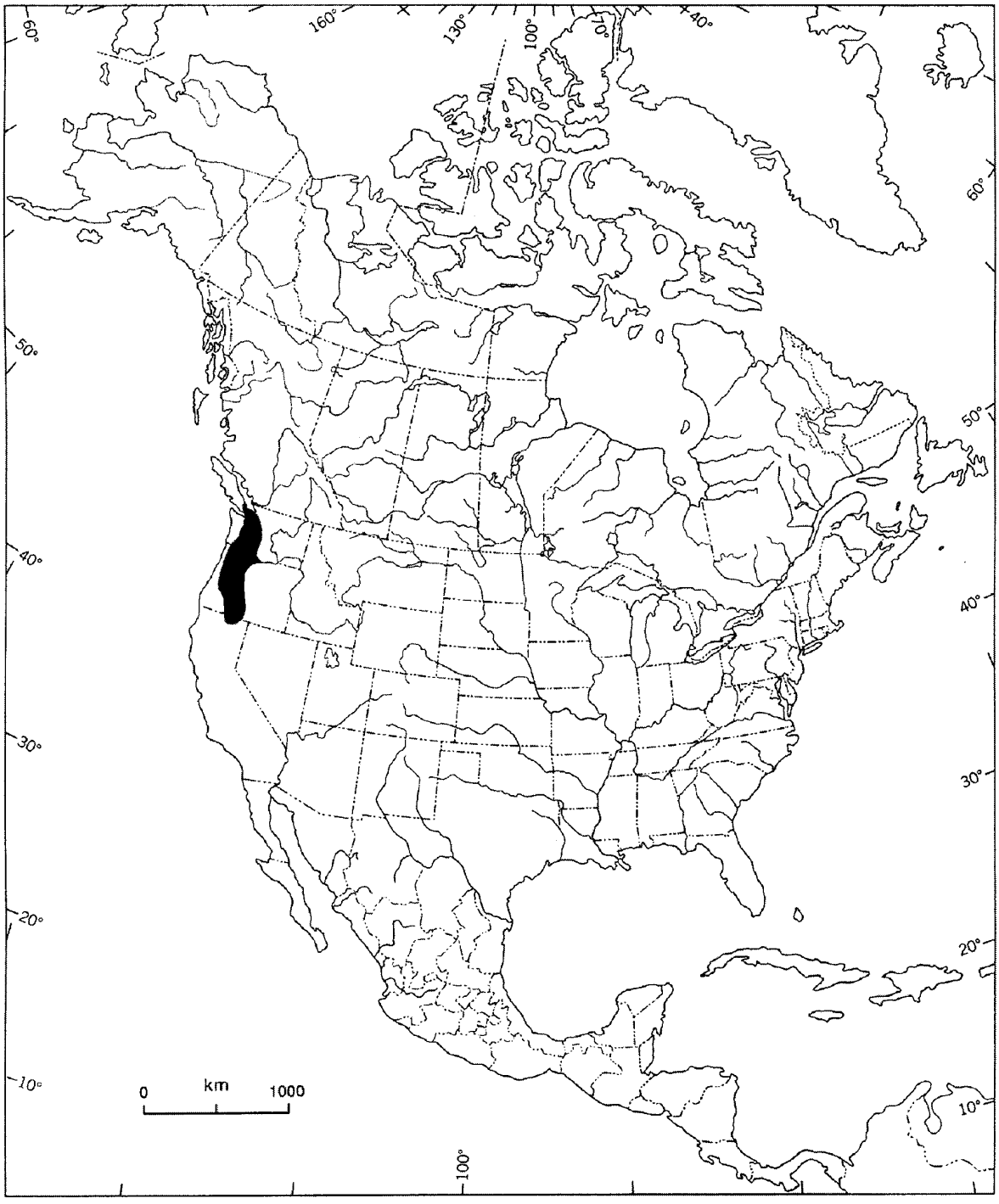

Figure 2. Distribution of *Triteleia howellii* in North America.

HABITAT

Habitat requirements

Triteleia howellii sites in British Columbia are found in the *Quercus garryana* (Garry oak[1]) ecosystem in the Dry Coastal Douglas-fir zone (Nuszdorfer *et al*. [1991]) of southeastern Vancouver Island. This area is in a rainshadow belt created by the Olympic mountains to the south, resulting in a relatively warm and dry Mediterranean climate with warm, dry summers and mild, wet winters.

Triteleia howellii occurs on rock outcrops, in *Quercus garryana* woodlands and in highly disturbed sites dominated by weeds in private yards and on roadsides. In the highly disturbed sites, dominants include *Dactylis glomerata* (orchard grass), *Vicia sativa* (common vetch), *Bromus rigidus* (rip-gut brome), *B. hordeaceus* (soft brome), *Lolium perenne* (perennial ryegrass) and *Sanicula crassicaulis* var. *crassicaulis* (Pacific sanicle), all introduced except for the latter.

The *Quercus garryana* woodland in the Cowichan Garry Oaks Preserve is classified as a *Quercus garryana/Dactylis glomerata* plant community (Douglas *et al*. 2001) 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, and other *Quercus* stands of the region, this plant community would have fallen within the *Q. garryana/Bromus carinatus* (California brome) community type (Roemer 1972). An extremely rich low shrub and herb stratum is present during the spring. The most prominent species in the Cowichan Garry Oaks Preserve Garry oak stand are *Sanicula crassicaulis* var. *crassicaulis* and *D*. *glomerata* (Douglas *et al*. 2001). Other species with moderate to high constancies associated with *T. howellii* include *Camassia* spp. (common camas), *Bromus* spp., *Dodecatheon hendersonii* ssp. *hendersonii* (broad-leaved shooting-star), *Galium aparine* (cleavers), and *Symphoricarpos albus* (common snowberry). A marked change in composition takes place by mid-summer. Many of the conspicuous native plants (e.g., *Camassia leichtlinii* (great camas), *C. quamash*, *Dodecatheon hendersonii*, and *Viola praemorsa* ssp. *praemorsa* (yellow montane violet)) 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 introduced 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 include the native grasses, *Bromus carinatus* and *Melica subulata* (Alaska oniongrass) and the introduced grasses, *Bromus sterilis* (barren brome) and *Poa pratensis* (Kentucky bluegrass).

[1]Taxonomy and nomenclature follows Douglas *et al*. (1998a, 1998b, 1999a, 1999b, 2000, 2001a, b).

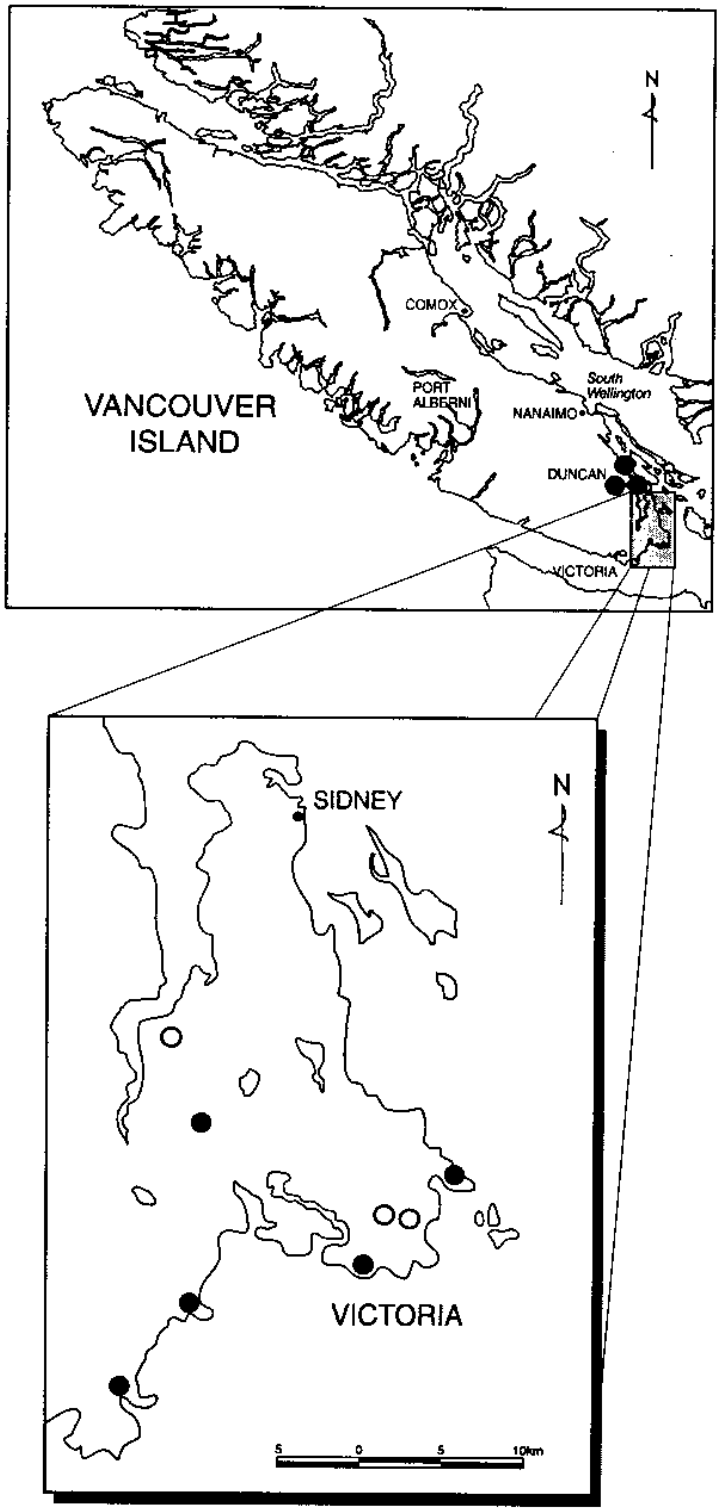

Figure 3. Distribution of *Triteleia howellii* in British Columbia (○-extirpated sites, ●-recently confirmed sites).

Triteleia howellii also occurs in a *Quercus garryana-Arbutus menziesii* (Arbutus) stand at the base of rock outcrops on Horth Hill. The shrub layer is more prominent at this site and is dominated by *Mahonia aquifolium* (tall Oregon-grape) and *Holodiscus discolor* (oceanspray). Associates include *Lonicera hispidula* (hairy honeysuckle), *Bromus rigidus*, *Galium aparine*, *Nemophila parviflora* (small-flowered nemophila) and *Cynosurus echinatus* (hedgehog dogtail).

Trends

The habitats in which *Triteleia howellii* occurs within the *Quercus garryana* ecosystems have been converted to urbanized centers and agricultural land over most of their range. There is little undisturbed *Q. garryana* ecosystem left and most of these stands contain an abundance of introduced species. In urban areas the only remnants of oak stands are more often just a few veteran trees with an understory of lawn grass or pavement. The woodlands are also threatened by conifer encroachment as a result of the exclusion of fire throughout most of their range (Thilenius 1968).

Protection/ownership

The nine extant populations of *Triteleia howellii* occur in regional and municipal parks, as well as on private properties.

BIOLOGY

General

There is very little information available on the biology of *T. howellii* in British Columbia.

Reproduction

Reproduction is through division of the corm, by the production of numerous cormlets, and by seed (Barkworth 1977b).

Survival

Unknown.

Physiology

Unknown.

Movements/dispersal

Unknown.

Nutrition and interspecific interactions

Unknown.

Behaviour/adaptability

Unknown.

POPULATION SIZES AND TRENDS

Triteleia howellii has been collected at 12 sites in Canada, all of which are located on southeastern Vancouver Island (Table 1). Nine of the twelve sites have been confirmed since 1997, while the status of plants at the remaining three sites is unknown and the populations are likely extirpated. Population areas range from small (1 m^2) to over three or four hectares, while plant numbers range from a single plant to over 450 plants (Table 1).

The analysis of population trends is prevented by limited demographic data. The sites that have recently been examined show the populations are apparently stable although flowering plants may vary.

LIMITING FACTORS AND THREATS

The most direct and immediate threat to *Triteleia howellii* is habitat destruction. Consequently, dispersal into new sites is very limited. This is of particular concern in the grass-dominated meadows often associated with the *Quercus garryana* communities that are limited 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. Roemer (1972) believes that without human interference some of these stands would have eventually been replaced by *Pseudotsuga menziesii* forests.

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 introductions.

Table 1. Locations and Population Sizes for *Triteleia howellii* on southeastern Vancouver Island, British Columbia.

Collection Site	Last Observation	Collector	Population (no./area)
Oak Bay (Victoria)	1912	Beaven	Extirpated
Uplands (Victoria)	1917	Anderson	Extirpated
Saanich Arm (Victoria)	1919	Newcombe	Extirpated
Albert Head (Metchosin)	1997	Ussery	8/2 m²
Witty's Lagoon Regional Park (Metchosin)	1999	Douglas & Penny	43/200 m²
Horth Hill Regional Park (North Saanich)	1999	Fontaine	4/3 m²
Gordon Head (Saanich)	1999	Fontaine	51/5 m²
Somenos Lake, Timbercrest development (Duncan)	2001	Douglas	45/8 m²
Cowichan River Estuary (Duncan)	2001	Douglas	62/3 m²
Cowichan Bay Garry Oak Nature Park, near Quamichan Lake, (Duncan)	2001	Douglas	450/3-4 ha
Beacon Hill Park (Victoria)	2002	Ceska	40/12 m²
Thetis Lake Regional Park (View Royal)	2002	Ceska	1/1 m²

The introduction of European species has resulted in substantial 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 *Cytisus scoparius* (Scotch broom), 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 *Aira praecox* (early hairgrass), *Anthoxanthum odoratum (*sweet vernalgrass*), Cynosurus echinatus* and *Dactylis glomerata.*

There are only nine known populations and some of these 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).

SPECIAL SIGNIFICANCE OF THE SPECIES

Triteleia howellii occurs in a very restricted habitat type, the Garry oak ecosystem on southeastern Vancouver Island, which itself is within habitat type that covers a restricted area in the province, the open, dry Douglas-fir forests that are also found on several islands in the Gulf of Georgia and a narrow strip of adjacent mainland. In this unique vegetation type in Canada, which has been greatly reduced by urban development in the last one hundred years, a high number of rare species are also found.

These populations are at the northern extent of their geographic range. Peripheral populations are often genetically and morphologically divergent from central populations

and may have an evolutionary and ecological significance out of proportion to the percentage of the species they represent (Mayr 1982; Lesica and Allendorf 1995). The protection of genetically distinct peripheral populations may be important for the long-term survival of the species as a whole (Lesica and Allendorf 1995).

The bulb-like corms of this species are edible and like other related species may have been used by native peoples as a food source (pers. comm., Nancy Turner).

EXISTING PROTECTION OR OTHER STATUS

International Status

Triteleia howellii is not covered under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Endangered Species Act (USA) or the IUCN Red Data Book. NatureServe (2002) has designated a global rank of "G3G4" for the species, a ranking which indicates that, on a global scale, it is considered to be "apparently secure." *Triteleia howellii* is considered "Imperiled" in California.

National and provincial status

The British Columbia Ministry of Sustainable Resource Management Conservation Data Centre ranks *T. howellii* as an S2 or Red-listed species in British Columbia. This indicates that this species is "imperiled 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". It has a national status of N2 (NatureServe 2002).

British Columbia does not have specific legislation in place for the protection of vascular plants at risk. At the federal level the *Species at Risk Act* protects COSEWIC-isted plants on federal lands. The federal minister can also recommend a federal Cabinet Order that would provide for protection of COSEWIC species on provincial lands if the laws of the province do not effectively protect the species or the residences of its individuals.

SUMMARY OF STATUS REPORT

Triteleia howellii is known only from nine extant populations in British Columbia, some of which have very few individuals putting them at risk of inbreeding depression, genetic drift and loss of fitness. Aggressive exotic species and the degradation of the ecosystems that *T. howellii* occur in, as well as direct habitat destruction, threaten its long-term persistence in British Columbia. Consequently, dispersal into new sites is very limited. The populations of *T. howellii* in British Columbia are at the northern extent of their range and may represent populations that are genetically distinct and important for the long-term survival and evolution of the species. Failure to protect peripheral species could result in a significant and irreversible loss of Canada’s genetic resources.

TECHNICAL SUMMARY

Triteleia howellii
Howell's Triteleia tritéléia de Howell
Range of Occurrence in Canada: British Columbia

Extent and Area information	
• *extent of occurrence (EO)(km²)*	50
• *specify trend (decline, stable, increasing, unknown)*	uncertain
• *are there extreme fluctuations in EO (> 1 order of magnitude)?*	no
• *area of occupancy (AO) (ha)*	3-4
• *specify trend (decline, stable, increasing, unknown)*	decline (loss of 3 sites)
• *are there extreme fluctuations in AO (> 1 order magnitude)?*	no
• *number of extant locations*	9
• *specify trend in # locations (decline, stable, increasing, unknown)*	decline
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	no
• *habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	declining
Population information	
• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	?
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	704
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	Apparently stable from short-term observations at a few of the locations
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	no
• *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)?*	uncertain
• *list each population and the number of mature individuals in each*	1) Albert Head-8, 2) Witty's Lagoon Regional Park-43 3) Horth Hill Regional Park-4 4) Gordon Head, Margaret Bay-51 5) Somenos Lake-45 6) Cowichan River Estuary-62 7) Cowichan Garry Oaks Preserve-450 8) Beacon Hill Park-40 9) Thetis Lake Regional Park-1
• *specify trend in number of populations (decline, stable, increasing, unknown)*	Apparently stable
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	no

Threats (actual or imminent threats to populations or habitats)	
-habitat loss to development -fire suppression -introduced species competition -low genetic diversity due to small population sizes	
Rescue Effect (immigration from an outside source)	Low
• *does species exist elsewhere (in Canada or outside)?*	yes
• *status of the outside population(s)?*	Critically imperiled in California, unknown status in Washington and Oregon
• *is immigration known or possible?*	unknown
• *would immigrants be adapted to survive here?*	unknown
• *is there sufficient habitat for immigrants here?*	Perhaps but unlikely
Quantitative Analysis	

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THE AUTHORS

George W. Douglas has an M.Sci. (Forestry) from the University of Washington and a Ph.D (Botany) from the University of Alberta, Edmonton. George has worked with rare plants for over 20 years. He was senior author of *The Rare Plants of the Yukon* (1981), co-authored *The Rare Plants of British Columbia* (1985) and was senior author of the *Rare Native Plants of British Columbia* (1998, 2002). He is also the senior editor for the *Illustrated Flora of British Columbia* (1998-2002) and has been the program botanist for the British Columbia Conservation Data Centre since its inception in 1991. George has written or co-written 24 COSEWIC status reports during this period.

Jenifer L. Penny has a B.Sc. in Biology from the University of Victoria. She has been employed by the British Columbia Conservation Data Centre as assistant program botanist since 1995. Jenifer has extensive field work in botany and has co-authored six COSEWIC status reports. She is also senior author for the family Primulaceae in the *Illustrated Flora of British Columbia* (1999) and co-author of the *Rare Native Vascular Plants of British Columbia*, second edition (2002).

AUTHORITIES CONSULTED

Dr. M. Barkworth. Utah State University Intermountain Herbarium. Address: UMC 45 Utah State University, Logan, UT. UT 8432; Mary@biology.usu.edu

Dr. J. Christopher Pires, University of Wisconsin Agronomy Post doc. Address: Department of Agronomy, University of Wisconsin-Madison, 1575 Linden Dr., Madison, WI 53706; jcpires@wisc.edu.

Dr. N. Turner. School of Environmental Studies, University of Victoria, nturner@uvic.ca

COLLECTIONS EXAMINED

Herbarium specimens housed at the Royal British Columbia Museum in Victoria (V) were viewed and verified.