COSEWIC
Assessment and Status Report

on the

Small-flowered Tonella
Tonella tonella

in Canada

ENDANGERED
2003

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
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ESPÈCES EN PÉRIL
AU CANADA

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Small-flowered tonella — line drawing from Douglas *et al.*2000.

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COSEWIC
Assessment Summary

Assessment Summary – November 2003

Common name
Small-flowered Tonella

Scientific name
Tonella tenella

Status
Endangered

Reason for designation
A small annual herb known from a single site in the Gulf Islands, British Columbia. At risk to potential development, alien species and fire management.

Occurrence
British Columbia

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

COSEWIC
Executive Summary

Small-flowered Tonella
Tonella tenella

Species Information

Tonella tenella (small-flowered tonella; Figwort family) is a slender, ascending to sprawling, annual herb from a delicate taproot. The smooth, often branched stems are 5-25 cm tall with opposite leaves. The leaves are smooth (or soft-hairy on the upper surface). The lowermost leaves are stalked, ovate to round, 1-2 cm long and few-toothed. The middle and upper leaves become un-stalked upward and are deeply 3-lobed with the segments progressively narrowing upward. The uppermost leaves are reduced and often entire. The inflorescence consists of one to several long-stalked flowers in the axils of the bracts with smooth or minutely glandular-hairy stalks. The corollas are blue and white, short-tubular, 2-4 mm wide, and 2-lipped with the upper lip 2-lobed, the lower lip 3-lobed, and the middle lobe the largest. The calyces are up to 3 mm long, and deeply 5-lobed with the lobes longer than the tube. The 4 stamens are exserted and the fruits are ovate to globe-shaped capsules. The 2 to 4 seeds are large, 1-1.5 mm long and wingless.

Distribution

The southwestern British Columbia occurrence of *Tonella tenella* is disjunct from its main range in southern Washington (Columbia River gorge), through Oregon to central California. In Canada, *T. tenella* is known only from the west side of Saltspring Island in the Gulf Islands of southwestern British Columbia.

Habitat

Tonella tenella occurs on west-facing slopes on stable talus. This talus occurs in open *Acer macrophyllum* (big-leaf maple)-*Arbutus menziesii* (Arbutus*)* forests, where associates include *Galium aparine* (cleavers), *Cardamine oligosperma* (little western bitter-cress), *Claytonia perfoliata* (miner's-lettuce), *Bromus sterilis* (barren brome), and *Collinsia grandiflora* (large-flowered blue-eyed Mary) or in open Douglas-fir -Arbutus – *Quercus garryana* (Garry oak) forests with *Kindbergia oregana* (Oregon beaked moss), *Dicranum* sp. (heron's-bill mosses), *Melica harfordii* (Harford's melic)*, Torilis japonica* (upright hedge-parsley) and *Bromus sterilis* (barren brome).

Biology

Species of *Tonella*, along with its sister genus, *Collinsia* (blue-eyed Mary) of the tribe Collinsieae, are self-compatible annuals. *Tonella tenella* is considered a small-flowered type and doesn't maintain spatial separation of anthers and stigmas early in flowering and therefore, doesn't experience the subsequent delay in self-pollination. Instead, anther-stigma contact and self-pollination occur early. Furthermore, the stigmas are receptive to pollen-tube growth early in *Tonella* species. Low elevation pollinators for the tribe include a variety of bees including *Bombus* (bumblebees).

Population sizes and trends

Four small subpopulations of *Tonella tenella* were recently confirmed in 2002 at the Saltspring Island site. These subpopulations, plus an earlier (1976) subpopulation record from the same site but not relocated in 2002, occur in a narrow band extending up the mountainside for approximately 425 m. The subpopulations consisted of 30 to 150 plants with areas of 1 to approximately 40 m², respectively. Since the plant is inconspicuous and extremely difficult to detect, it is quite likely other subpopulations occur on the slope.

Limiting factors and threats

The most immediate threat to *Tonella tenella* in British Columbia is habitat destruction through a housing development at the single location on private waterfront property. Suppression of both natural and human-induced fires could also affect *T. tenella* survival. In the absence of fires, high fuel loads build and catastrophic fires could result. The vegetation at the site is dominated to a large extent by introduced species, particularly grasses, including *Bromus*.

Special significance of the species

Tonella tenella occurs in one location within a unique habitat in Canada, the Garry oak ecosystem, which is restricted to southeastern Vancouver Island, several islands in the Gulf of Georgia and a narrow strip of adjacent mainland in British Columbia. This vegetation type has been greatly reduced by urban development in the last one hundred years, and contains a high number of rare species. Furthermore, the populations are unique as they are at the northern extent of their geographic range. Peripheral populations are often genetically and morphologically divergent from central populations and therefore provide plasticity for the species as a whole.

Existing protection or other status designations

The British Columbia Ministry of Sustainable Resource Management Conservation Data Centre ranks *T. tenella* as an S1 or "red-listed" species in British Columbia. This is the most critical rank that can be applied to species at the provincial level and indicates that the species is "critically imperiled because of extreme rarity." The *T. tenella* site

occurs on private land with no active stewardship in place by land owners. Furthermore, no provincial endangered species legislation exists. Federal legislation applies mainly to federal lands but may be invoked if provincial actions fail to adequately address the conservation of a species on private lands.

COSEWIC HISTORY

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. On June 5th 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS
(After May 2003)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct 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.

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

Update
COSEWIC Status Report

on the

Small-flowered Tonella
Tonella tenella

in Canada

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2003

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SPECIES INFORMATION

Name and classification

Scientific name: *Tonella tenella* (Benth.) Heller
Common name: Small-flowered Tonella
Family: Scrophulariaceae (Figwort family)
Major plant group: Dicot flowering plant

Description

Small-flowered tonella, *Tonella tenella* (Benth.) Heller, is a member of a genus of only two species occurring in western North America (Hitchcock *et al*. 1959). It is the only species found in British Columbia and Canada (Pojar 2000). *Tonella tenella* was first recorded in Canada in 1976 (Douglas and Ruyle-Douglas 1978).

Tonella tenella is a slender, ascending to prostrate, annual herb from a delicate taproot (Figure 1; Pojar 2000). The smooth, often branched stems are 5-25 cm tall with opposite leaves. The leaves are smooth (or soft-hairy on the upper surface) and the lowermost are stalked, ovate to round, 1-2 cm long and few-toothed. The middle and upper leaves become unstalked upward and are deeply 3-lobed with the segments progressively narrowing upward. The uppermost leaves are reduced and often entire. The inflorescence consists of one to several long-stalked flowers in the axils of the bracts with smooth or minutely glandular-hairy stalks. The corollas are blue and white, short-tubular, 2-4 mm wide, and 2-lipped with the upper lip 2-lobed, the lower lip 3-lobed, and the middle lobe the largest. The calyces are up to 3 mm long, and deeply 5-lobed with the lobes longer than the tube. The 4 stamens are exserted and the fruits are ovate to globe-shaped capsules. The 2 to 4 seeds are large, 1-1.5 mm long and wingless.

Figure 1. Illustration of *Tonella tenella* (Line drawing from Douglas *et al*. 2000).

DISTRIBUTION

Global range

The southwestern British Columbia occurrence of Tonella tenella is disjunct from its main range in southern Washington (Columbia River gorge), through Oregon to central California (Wetherwax 1993; Pojar 2000) (Figure 2). This range disjunction is a common occurrence for many of British Columbia's peripheral native plants. This phenomena has been presented at length by Fairbarns et al. (2003) who stated that "…The sub-Mediterranean climate of Victoria and the Georgia Basin (including San Juan County) is anomalous along the Pacific Northwest coast and may account for the pattern of disjunct distributions of many "semi-desert species" as noted by Hitchcock et al. (1961) (e.g., Allium amplectens, Crassula connata, Clarkia purpurea ssp. quadrivulnera, Dryopteris arguta, Isoetes nuttallii, Juncus kelloggii, Minuartia pusilla, Lupinus densiflorus, Montia howellii, Myrica californica, Ranunculus californicus, Trifolium depauperatum, Triphysaria versicolor, Vulpia pacifica, and Woodwardia fimbriata, as well as the salamander, Aneides ferreus)."

Canadian range

In Canada, *T. tenella* is known only from the west side of Saltspring Island in the Gulf Islands of southwestern British Columbia (Figure 3; Pojar 2000; Douglas *et al.* 2002a, b). This delicate and relatively inconspicuous plant was first documented in 1976 (Douglas and Douglas 1978) but has likely been present at the site for a considerable period of time since it is unlikely that previous botanists ever visited this steep, inaccessible slope.

Although it is difficult to ascertain, with a high degree of confidence, whether some recently discovered peripheral species are native it is probably best to assume they are native. Since the habitat is natural, it is likely that this species is native. In addition, it is likely a native population since it is comprised of several subpopulations; it would have taken some time to disperse and establish these subpopulations. Also, in the Species at Risk Act (Section 2.2), it states that for the purposes of a wildlife species in subsection 1, " a species, subspecies or biologically distinct population is, in the absence of evidence to the contrary, presumed to have been present in Canada for at least 50 years" (Government of Canada 2003). Therefore, since there is no support for the argument that it is a non-native species, it should be assumed to be native

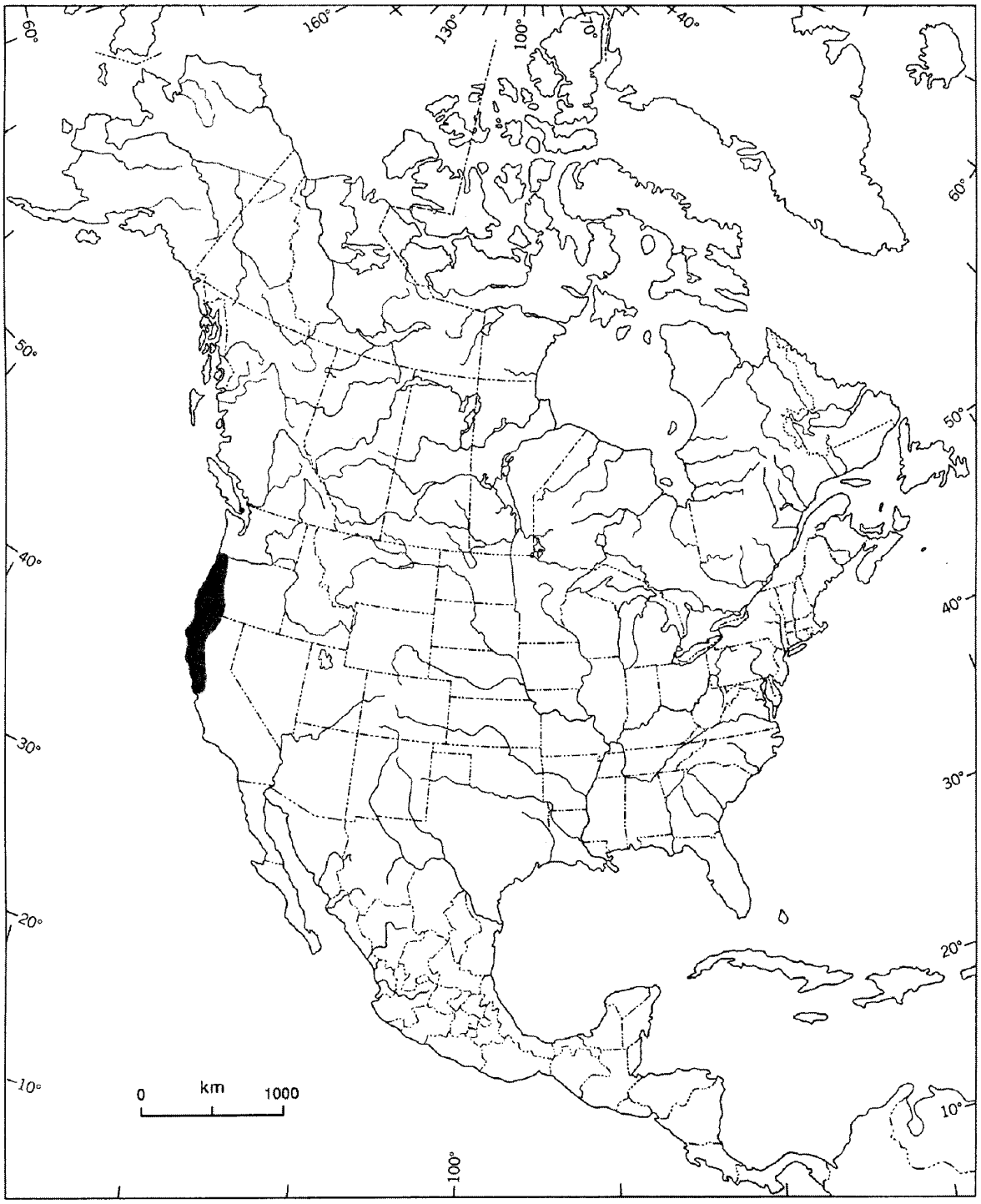

Figure 2. Distribution of *Tonella tenella* in North America.

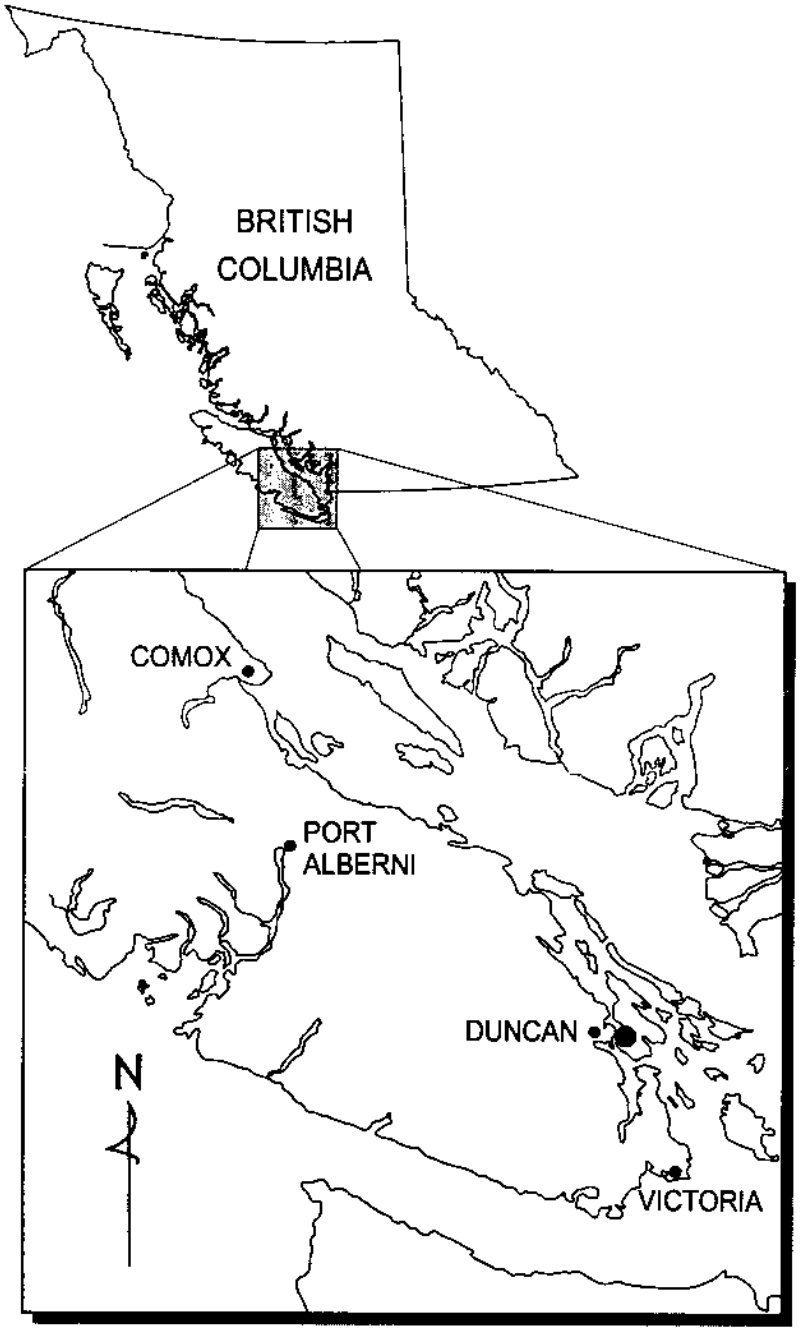

Figure 3. Distribution of *Tonella tenella* in British Columbia (● - recently confirmed site).

HABITAT

Habitat requirements

The *Tonella tenella* population in British Columbia is 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.

Within this region, *Tonella tenella* occurs on west-facing slopes on gravelly rock outcrops or stable talus. This talus occurs in open *Acer macrophyllum* (big-leaf maple)-*Arbutus menziesii* (Arbutus*)* forests, where associates include *Galium aparine* (cleavers), *Cardamine oligosperma* (little western bitter-cress), *Claytonia perfoliata* (miner's-lettuce), *Vicia sativa* (common vetch)*, Bromus sterilis* (barren brome), and *Collinsia grandiflora* (large-flowered blue-eyed Mary) or in open Douglas-fir -Arbutus - Garry Oak forests with *Kindbergia oregana* (Oregon beaked moss), *Dicranum* sp. (heron's-bill moss), *Melica harfordii* (Harford's melic)*, Galium aparine, Torilis japonica* (upright hedge-parsley) and *Bromus sterilis.*

Trends

Habitat trends are mainly dependant on the development activities at the sites. Development would likely eliminate or reduce the extent of *T. tenella* habitat at the site.

Protection/ownership

The single occurrence of *T. tenella* in British Columbia occurs on private property.

BIOLOGY

Little is known specifically about the biology of this species. Species of *Tonella,* along with its sister genus, *Collinsia* (blue-eyed Mary) of the tribe Collinsieae, are self-compatible annuals (Armbruster *et al*. 2002). Their persistence at the site in British Columbia indicates that at this time the seeds are viable and germinate readily. *Tonella tenella* is considered a small-flowered type and according to Armbruster *et al*. (2002), large- and small-flowered taxa appear to have differences in timing of self-pollination. Large-flowered taxa maintain spatial separation of anthers and stigmas early in anthesis by differential elongation of staminal filaments, while small-flowered taxa do not show this elongation pattern. As a result, large-flowered taxa experience a delay in self-pollination whereas in small-flowered taxa, anther-stigma contact and self-pollination occur early. Furthermore, the stigmas are receptive to pollen-tube growth early in *Tonella* species. Low elevation pollinators for the tribe include the insects *Bombus, Anthophora, Emphoropsis, Synhalonia* and *Osmia* (Armbruster *et al*. 2002).

[1] Taxonomy and nomenclature follows Douglas et al. (1998a, 1998b, 1999a, 1999b, 2000, 2001) and Schofield (1992).

POPULATION SIZES AND TRENDS

Four small subpopulations of *Tonella tenella* were confirmed in 2002 at the Saltspring Island site. These subpopulations, plus an earlier (1976) collection record, occur in a narrow band extending up the mountainside for approximately 425 m. The subpopulations consisted of 30 to 150 plants with areas of 1 to approximately 40 m², respectively. Since the plant is inconspicuous and extremely difficult to detect, it is quite likely other subpopulations occur on the slope.

Trends for the existing population of *Tonella tenella* remains unknown due to a lack of study. In addition, it has not been possible to locate other populations of the species, even though searches have been made by the authors at potential habitats on Saltspring Island as well as on the adjacent mainland of Vancouver Island.

LIMITING FACTORS AND THREATS

The most immediate threat to *Tonella tenella* in British Columbia is habitat destruction through a housing development on waterfront private property. Previous owners had plans for a residence on the site but these did not materialize. In recent years Saltspring Island has shown a marked increase in housing development with waterfront property at a premium. The population of Saltspring Island has increased by 78% between 1986 and 2001 and further projections indicate a further increase of 43% by 2026 (Linda Adams, Islands Trust, pers. comm., 2003).

Suppression of both natural and human-induced fires in the last century may also have an effect on the survival of *T. tenella*. The vegetation in this region would naturally be maintained by fires, however, in their absence, high fuel loads build and catastrophic fires could result. During the past few years, drought conditions have led to numerous fires in British Columbia. The site on Saltspring Island is certainly susceptible to a wildfire that could possibly remove *T. tenella* completely. Even if the plant survived a wildfire, changes to the habitat might prove unfavorable for *T. tenella.*

Table 1. Locations and Sizes of *Tonella tenella* subpopulations on Saltspring Island, British Columbia.

Collection site	Last Observation	Collector	Number of plants/area (m²)
Subpopulation #1- Upper slope, south	1976	Douglas	unknown
Subpopulation #2- Upper slope, north	2002	Lomer	56+ /40
Subpopulation #3- Mid-slope	2002	Lomer	100-150/15
Subpopulation #4-Lower slope	2002	Douglas	50-80/6
Subpopulation #5- ca. 10 m uphill from beach	2002	Lomer	30 /1

Introduced species are also a problem at the site. The vegetation characterizing the *T. tenella* site has been altered with the introduction of European species. Although a large number of native forbs occur in these areas, much of the vegetation is dominated to a large extent by introduced species, particularly grasses, including a number of species of Bromus.

SPECIAL SIGNIFICANCE OF THE SPECIES

Tonella tenella, in British Columbia, occurs in a restricted habitat type, the Garry Oak ecosystem of southeastern Vancouver Island. In this vegetation type, which has been greatly reduced by urban development in the last one hundred years, a high number of rare species are found.

Furthermore, the populations are at the northern extent of their geographic range. Peripheral populations are sometimes 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).

EXISTING PROTECTION OR OTHER STATUS

International status

Tonella tenella 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 "G5" for the species, a ranking that indicates, on a global scale, it is considered to be "common to very common; demonstrably secure and essentially ineradicable under present conditions".

National and provincial status

Tonella tenella has been given a national rank of “N1.” The British Columbia Ministry of Sustainable Resource Management Conservation Data Centre ranks *T. tenella* as an S1 or a “red-listed” species in British Columbia. This is the most critical rank that can be applied to species at the provincial level and indicates that the species is "critically imperiled because of extreme rarity (typically five or fewer occurrences or very few remaining individuals) or because of some factor(s) making it especially vulnerable to extirpation or extinction".

British Columbia does not have specific legislation in place for the protection of vascular plants at risk.

SUMMARY OF STATUS REPORT

Only one extant population of *T. tenella* is known in British Columbia, thus the loss of the one site results in the loss of the species from British Columbia and Canada. Potential housing developments threaten *T. tenella* in Canada where the site occurs on private ocean-side property. The population of *T. tenella* in British Columbia is at the northern extent of its range and may represent a population that is genetically distinct and important for the long-term survival and evolution of the species. Failure to protect peripheral species could result in an irreversible loss of some of Canada's genetic resources.

TECHNICAL SUMMARY

Tonella tenella
Small-flowered tonella tonelle délicate
Range of Occurrence in Canada: British Columbia

Extent and Area Information	
• *Extent of occurrence (EO)(km²)* Based on area encompassed by the 5 subpopulations at one site.	<1 km^2 (3400 m^2)
• *Specify trend in EO*	Unknown
• *Are there extreme fluctuations in EO?*	Unknown
• *Area of occupancy (AO) (km²)* Based on an approximation of area occupied by the 5 subpopulations.	<<1 km² (62 m^2)
• *Specify trend in AO*	Unknown
• *Are there extreme fluctuations in AO?*	Unknown
• *Number of known or inferred current locations*	1 with 5 subpopulations
• *Specify trend in #*	Unknown
• *Are there extreme fluctuations in number of locations?*	Unknown
• *Specify trend in area, extent or quality of habitat*	Decline
Population Information	
• *Generation time (average age of parents in the population)*	1 year
• *Number of mature individuals*	about 230-315 estimated at 4 sub-populations plus an unknown number at the remaining unconfirmed sub-population
• *Total population trend:*	Unknown
• *% decline over the last/next 10 years or 3 generations.*	N/A
• *Are there extreme fluctuations in number of mature individuals?*	Unknown
• *Is the total population severely fragmented?*	Yes
• *Specify trend in number of populations*	Unknown
• *Are there extreme fluctuations in number of populations?*	Unknown
List populations with number of mature individuals in each Subpopulations #1: unknown #2: 56+, #3:100-150, #4: 50-80, #5: 30	
Threats (actual or imminent threats to populations or habitats)	
- Housing development - Exotic species, especially grasses	
Rescue Effect (immigration from an outside source)	
• *Status of outside population(s)?* **USA:** Common	
• *Is immigration known or possible?*	Unknown
• *Would immigrants be adapted to survive in Canada?*	Unknown
• *Is there sufficient habitat for immigrants in Canada?*	Yes
• ***Is rescue from outside populations likely?***	Unlikely
Quantitative Analysis	N/A
Current Status COSEWIC: Endangered	

Status and Reasons for Designation

Status: Endangered	**Alpha-numeric code: Met criteria for Endangered, B1ab(iii)+2ab(iii); C2a(ii).**
Reasons for Designation: A small annual herb known from a single site in the Gulf Islands, British Columbia. At risk to potential development, alien species and fire management.	

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BIOGRAPHICAL SUMMARIES OF THE REPORT WRITERS

George W. Douglas has a 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 it's 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 fieldwork experience 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).

COLLECTIONS EXAMINED

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