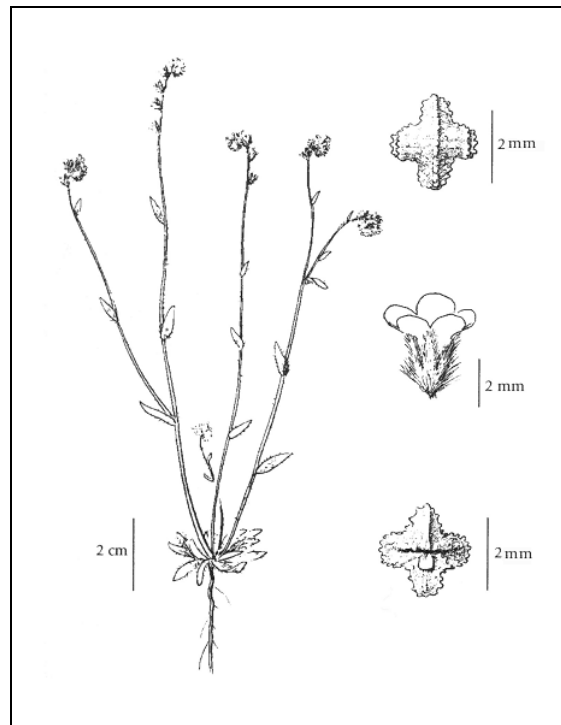


COSEWIC Assessment and Status Report

on the

Slender Popcornflower *Plagiobothrys tenellus*

in Canada



**THREATENED
2008**

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada



COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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COSEWIC Assessment Summary

Assessment Summary – November 2008

Common name

Slender Popcornflower

Scientific name

Plagiobothrys tenellus

Status

Threatened

Reason for designation

An annual herb of grassy slopes and coastal bluffs within the highly reduced and fragmented Garry Oak ecosystem. About half of the known populations have been extirpated from areas heavily impacted by invasive alien plants on southeastern Vancouver Island and adjacent Gulf Islands. Only seven small populations remain. Population sizes fluctuate, likely depending on precipitation, with several comprising only a few individuals. The total population size is estimated to be fewer than 1000 individuals. Invasive plants continue to degrade the species' habitat at all sites.

Occurrence

British Columbia

Status history

Designated Threatened in November 2008. Assessment based on a new status report.



COSEWIC
Executive Summary

Slender Popcornflower
Plagiobothrys tenellus

Species information

Slender Popcornflower *Plagiobothrys tenellus* is a member of a genus of approximately 50 species in the borage family (Boraginaceae). Species of the genus are found mainly in North America, but also occur in South America and Australia. Three species occur in Canada. Slender Popcornflower is an annual growing from a slender taproot. The plant has a single or sometimes branched stem 5-25 cm tall. The basal leaves occur in a rosette and the stem leaves are few, alternate, and reduced upwards. The flowering stems have coiled, terminal inflorescences with small flowers. The petals are white, fused at the base and flare above into 5 lobes. The nutlets are cross-shaped and warty.

Distribution

The species ranges from southwestern British Columbia, south, mostly on the east side of the Cascade Mountains, to southern California and Nevada. In British Columbia, the populations are found in the Garry Oak ecosystem in the dry Coastal Douglas-fir zone of southeastern Vancouver Island and adjacent Gulf Islands. The Canadian range currently makes up less than one percent of the species' total North American range. The Extent of Occurrence of historical and present populations is approximately 370 km², and the current Extent of Occurrence is approximately 300 km². Slender Popcornflower has been reported from thirteen locations in Canada with seven of these considered extant. The Canadian populations are separated by distances of 10-15 km, and are at least 300 km north of the species' main range. In Canada, the species occupies a small area of habitat totalling 150-350 m². Its Index of Area of Occupancy based on a 1 km square grid is 7 km² and 28 km² based on a 2x2 km square grid.

Habitat

Slender Popcornflower populations in British Columbia are found in the Garry Oak ecosystem of southeastern Vancouver Island and adjacent Gulf Islands. This area has a Mediterranean climate, with mild, wet winters and warm dry summers. The species occurs on dry, steep, grassy, south or southwest-facing slopes and coastal bluffs, often on exposed gravelly soils or rocks. Although there are no specific data on the trends in the Canadian habitat for Slender Popcornflower, the Garry Oak ecosystem has seen a dramatic decline to less than 5% of its historical distribution and is now limited to isolated pockets.

Biology

No research has been conducted on Slender Popcornflower. It is known that the species is an annual. Flowers are bisexual with both male and female organs. Flowering has been observed in late-April to late-May in BC, with seed production occurring in June. Birds are likely the only active, long-range dispersers. On a local basis, dispersal is probably by birds, small mammals and gravity.

Population sizes and trends

There are presumed to be seven extant populations of Slender Popcornflower in Canada: one on southeastern Vancouver Island and the remainder on the adjacent Gulf Islands. Population sizes range from 3 to 800 plants on areas of 3 m² to 100 m². Recent population trends are unknown, even though this species has been known from the Victoria area for over a century. A historic decline is known since six of a total of 13 known populations are no longer extant. The most recent surveys of populations indicate that there are approximately 400-800 individuals in Canada. There is evidence that some populations have fluctuated greatly in size. Only one site has been inventoried over multiple years. The potential for Slender Popcornflower seeds to arrive naturally from populations in the United States to effect "rescue" is low since the species' main range is 300 km distant on the east side of the Cascade Mountains.

Limiting factors and threats

The most obvious threat to Slender Popcornflower in British Columbia is habitat destruction through housing developments on private property. This is the likely cause of the extirpation of the historical populations known from Vancouver Island. Six of the seven extant populations occur on the Gulf Islands, which are now experiencing increasing housing development. The remaining habitat and populations may be threatened by introduced plant species. Increased development on both the Gulf Islands and on Vancouver Island has increased habitat fragmentation, reducing potential for new population establishment and transfer between populations.

Special significance of the species

The extant populations of Slender Popcornflower are at the northern extent of the species' main geographic range, as well as being disjunct. These peripheral populations may be important for the long-term survival of the species as a whole.

Existing protection or other status designations

Globally, Slender Popcornflower is ranked as G4G5, meaning it is considered to be either "frequent to common (greater than 100 occurrences); apparently secure but may have a restricted distribution; or there may be perceived future threats" (G4) or "frequent to common to very common; demonstrably secure and essentially ineradicable under present conditions" (G5). The species is considered rare outside British Columbia only in Utah. Provincially, Slender Popcornflower is ranked by the British Columbia Conservation Data Centre as S2, meaning it is "imperiled because of rarity (typically six to 20 extant occurrences or very few remaining individuals) or because of some factor(s) making it very susceptible to extirpation or extinction". The species is also included on the British Columbia Ministry of Environment red list (list of potentially extirpated, endangered or threatened species in BC). At least three of the seven extant populations of Slender Popcornflower in British Columbia are afforded some protection, within regional, provincial or federal parks. The remaining 4 populations potentially occur in protected areas but because of a lack of detailed locality information and unsuccessful recent searches their occurrence in protected areas could not be established.



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 5, 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 entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2008)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* 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. Definition of the (DD) category revised in 2006.



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

COSEWIC Status Report

on the

Slender Popcornflower

Plagiobothrys tenellus

in Canada

2008

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SPECIES INFORMATION

Name and classification

Scientific Name: *Plagiobothrys tenellus* (Nutt. ex Hook.) A. Gray
Synonyms: *Myosotis tenella* Nutt. ex Hook., *Eritrichium tenellum* A. Gray, *Plagiobothrys echinatus* Greene; *P. asper* Greene
Common Name: Slender Popcornflower; Pacific Popcornflower
Family: Boraginaceae (Borage) Family
Major Plant Group: Eudicot flowering plant

Plagiobothrys tenellus is a member of a genus of approximately 50 species, mainly from North America but also found in South America and in Australia (Hitchcock *et al.* 1959). Three species occur in British Columbia and Canada (Scoggan 1979, Douglas *et al.* 1998a).

Morphological description

Plagiobothrys tenellus is a 5-25 cm tall annual, usually with a single or sometimes branched stem, growing from a slender taproot (Figures 1 & 2; Douglas *et al.* 1998b). The 0.7-4 cm long basal leaves occur in a rosette. The stem leaves are few, alternate, simple, entire, spreading-hairy and reduced upwards. The flowering stems have coiled terminal inflorescences with small flowers. The petals are white, fused at the base and flare above into 5 lobes that are 2-4 mm wide. The usually 4, 1.5-2.5 mm long nutlets are cross-shaped and warty in rows.

Within the range of *Plagiobothrys tenellus*, in southwestern British Columbia, this species is usually easily separated from *P. figuratus* and *P. scouleri* by the presence of a basal rosette of leaves and the cross-shaped, warty nutlets.

Genetic description

There has been no genetic research on Canadian populations of *P. tenellus*.

Designatable units

A single designatable unit is recognized since all extant populations occur within a restricted geographical region, the Pacific National Ecological Area recognized by COSEWIC.

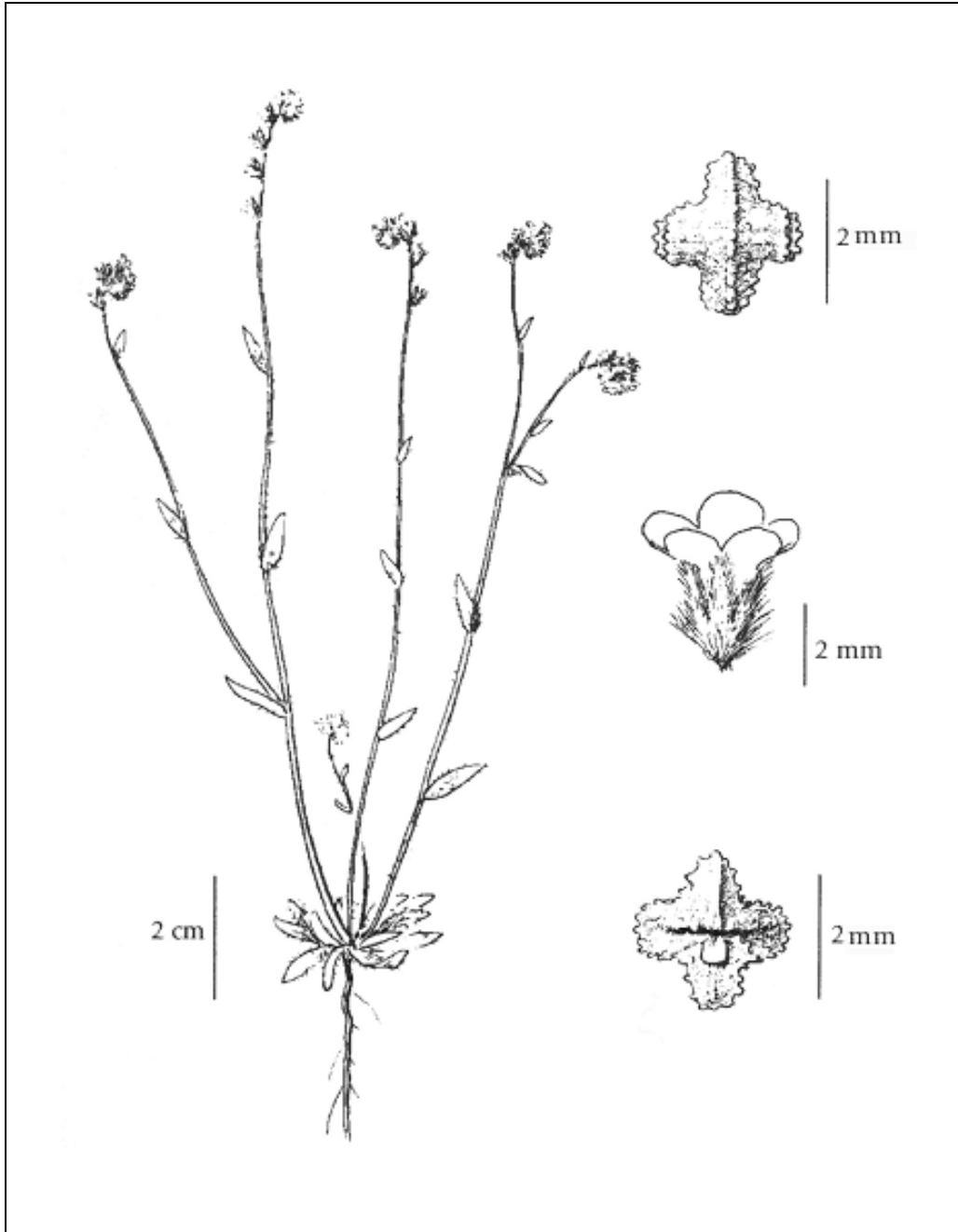


Figure 1. Illustration of *Plagiobothrys tenellus* (Line drawing from Douglas *et al.* 1998a, by permission).



Photo by S.J. Smith 2004

Figure 2. *Plagiobothrys tenellus* in flower on Saturna Island, British Columbia.

DISTRIBUTION

Global range

Plagiobothrys tenellus ranges from southwestern British Columbia, south, mostly on the east side of the Cascade Mountains, through Washington, Idaho, Oregon, Utah, Nevada and southern California (Hitchcock *et al.* 1959, Messick 1993, Kartesz and Meacham 1999; Figure 3).

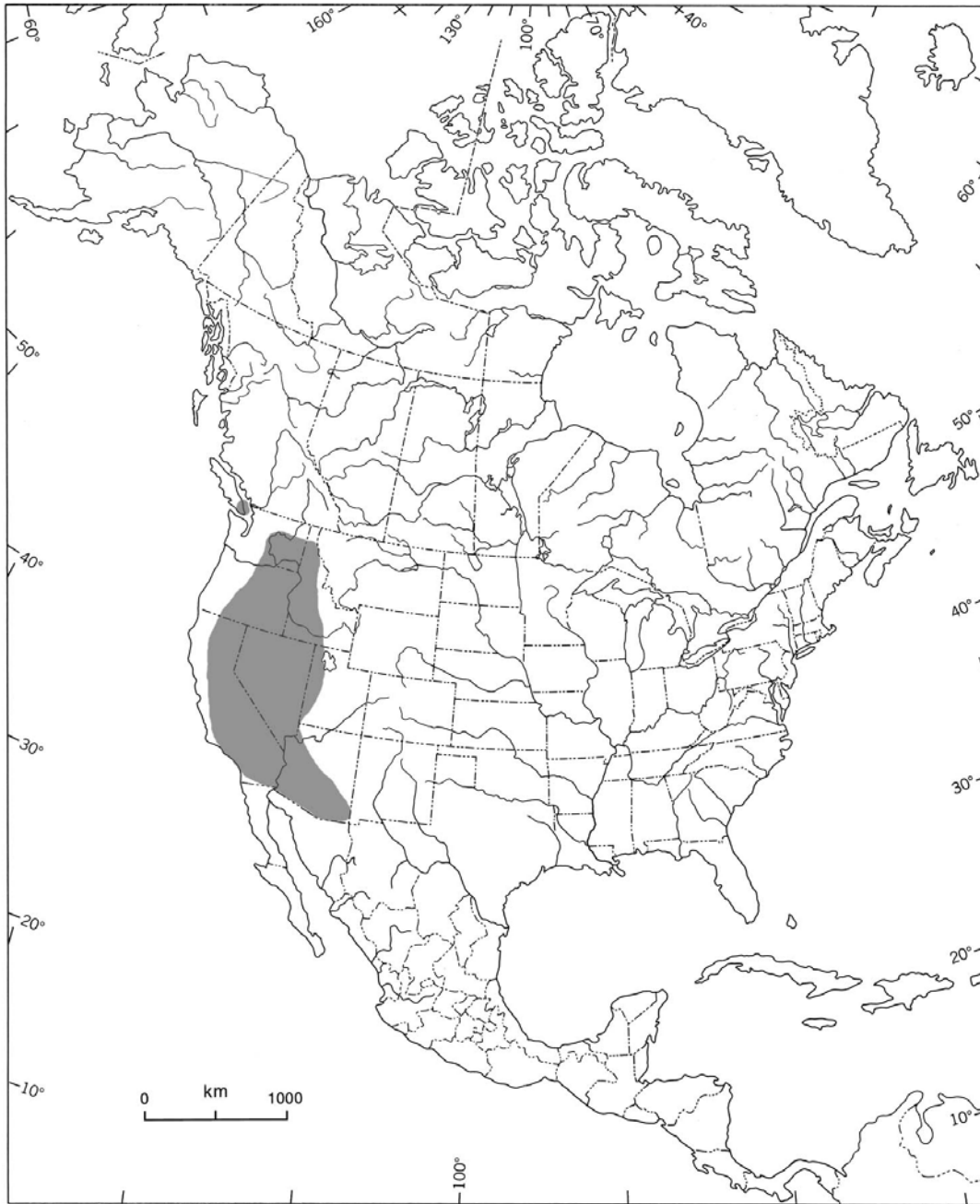


Figure 3. Distribution of *Plagiobothrys tenellus* in North America.

Canadian range

In Canada, *Plagiobothrys tenellus* is known only from the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic zone of southeastern Vancouver Island and the adjacent Gulf Islands in southwestern British Columbia (Douglas *et al.* 2002; Figure 4). These Canadian populations, as well as populations 8-12 km to the south on the San Juan Islands in Washington, are disjunct from the species' main range, being at least 300 km north of the nearest populations in eastern Washington (University of Washington Herbarium Database 2004) (Figure 4). The Canadian range currently makes up less than one percent of the species' total North American range. The Extent of Occurrence of historical and present populations is approximately 370 km², and the current Extent of Occurrence is approximately 300 km².

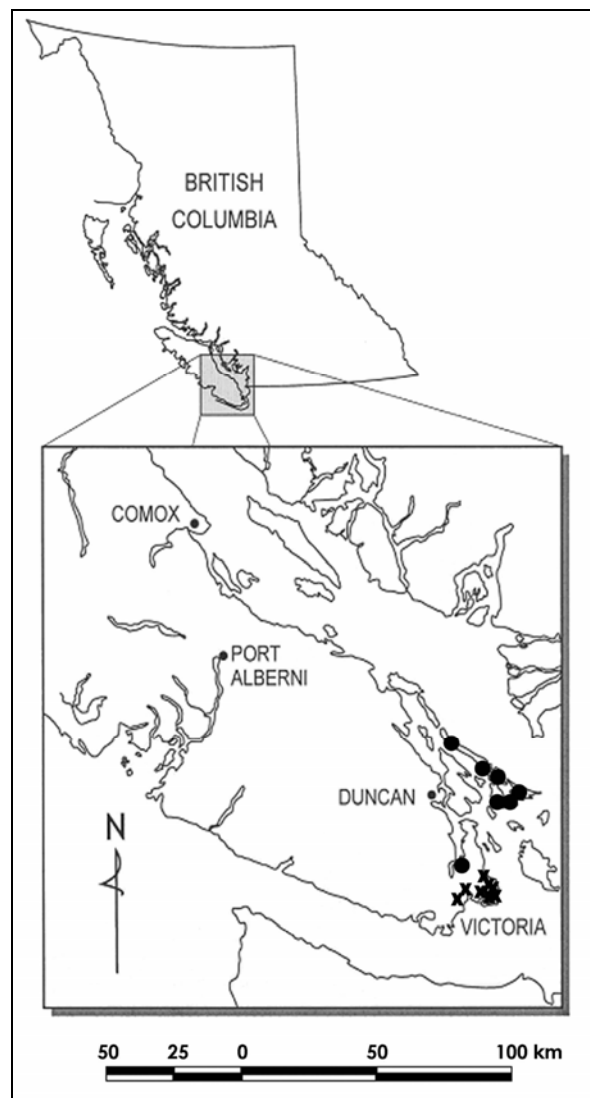


Figure 4. Canadian range of *Plagiobothrys tenellus*, showing historical (✱) and extant (post-1958) populations (●).

The estimated area of habitat occupied by three of the seven populations is approximately 150 m². The area covered by the other four populations is unknown. The area covered by a *P. tenellus* population can vary widely; therefore, it is not possible to accurately estimate the total area occupied. It is likely in the range of 150-350 m², based on known areas. Canadian populations are separated by distances of 10-15 km. The Index of Area of Occupancy as determined by a 1x1 km grid overlay is equivalent to 7 km² and 28 km² if a 2x2 km grid is applied.

HABITAT

Habitat requirements

Plagiobothrys tenellus populations in British Columbia are found in, or near, Garry Oak and associated ecosystems¹ in the dry Coastal Douglas-fir zone (Nuszdorfer *et al.* 1991) of southeastern Vancouver Island and adjacent Gulf Islands. This area is in a rainshadow belt created by the Olympic Mountains to the southwest and the Vancouver Island Ranges to the west, resulting in a relatively warm and dry Mediterranean climate.

Plagiobothrys tenellus occurs on dry, grassy slopes and coastal bluffs. Sites are generally steep, south- or southwest-facing, open and often with exposed gravelly soils or rocks (Figure 5). These habitats are characterized by a rich mix of species, both native (e.g., *Lotus micranthus*, *Poa secunda*, *Stipa lemmonii* and *Trifolium microcephalum*) and introduced (e.g., *Aira caryophyllea*, *A. praecox*, *Athysanus pusillus* and *Bromus sterilis*).

¹ Taxonomy and nomenclature of plant species in these ecosystems follow Douglas *et al.* (1998a, b; 1999a, b and 2001).



Figure 5. *Plagiobothrys tenellus* rock outcrop habitat on Saturna Island. Photo by G.W. Douglas 2004.

Trends

There is no specific information on *Plagiobothrys tenellus* habitat trends on southeastern Vancouver Island or the adjacent Gulf Islands. However, these habitats almost certainly share the same trends as Garry Oak ecosystems with which they are associated. The major threats that have influenced Garry oak and associated ecosystem trends over the past century include agricultural development, urbanization and invasion by aggressive introduced species. These factors have reduced Garry Oak ecosystems to less than 5% of their original extent in the Victoria area (Lea 2002). Garry oak ecosystems now persist largely as isolated pockets of heavily fragmented habitat that lack connections. No data are available to distinguish between historic losses and losses of the specific habitat for this species within recent decades. However, 6 historic populations are extirpated, presumably due to loss of Garry Oak ecosystems.

The habitat required by *Plagiobothrys tenellus* is naturally somewhat fragmented since it is quite specific, but this fragmentation has been severely magnified by urban development, especially in the greater Victoria area. All six historic Victoria populations (observed prior to 1960) are now considered extirpated, leaving only one remaining population on Vancouver Island.

The six other extant populations of *Plagiobothrys tenellus* are found on the Gulf Islands and were first recorded in 1980. Little is known about these populations, and some have not been observed for up to 25 years in spite of directed searches in 2004.

Habitat protection/ownership

Plagiobothrys tenellus receives some level of protection at three of the seven extant locations. On Saturna Island the species occurs within Gulf Islands National Park Reserve and on Galiano Island within a provincial park. The southeastern Vancouver Island location is in a regional park.

Of the remaining four populations, three may also occur in protected areas; however, because the exact locations of these populations are unknown, this has yet to be determined. The South Pender Island population may be within the Gulf Islands National Park Reserve, the North Pender population may be in a local park, and one of the Galiano Island populations may be located on a property held by a land trust (Galiano Conservancy Association). The habitat ownership of the Mayne Island population is unknown.

The majority of plants in the Canadian populations of *Plagiobothrys tenellus* appear to be protected within parks. The Galiano Island Population 2 (Table 1), contains about 90% of the Canadian population but occurs over only a few square metres.

Table 1. Locations and population sizes for *Plagiobothrys tenellus* in British Columbia.

Population	Previous & Last Observations	Observer	Number of Plants/Area
"Near Victoria, BC"	1885	Fletcher	Probably extirpated
"Victoria, West District"	1915	Macoun	Probably extirpated
Mt. Tolmie (Victoria area)	1916	Newcombe	Probably extirpated
Mill Hill (Victoria area)	1916	Newcombe	Probably extirpated
Mt. Douglas (Victoria area)	1925	Redfern	Probably extirpated
Thetis Lake (Victoria area)	1958	Melburn	Probably extirpated
S. Pender Island	1980 2004	Janszen Douglas <i>et al.</i>	1980 data unavailable – 2004 search unsuccessful
N. Pender Island	1983 2004	Ceska Douglas <i>et al.</i>	1983 data unavailable – search unsuccessful
Galiano Island (Population 1)	1980 2004	Janszen Douglas <i>et al.</i>	1980 data unavailable – search unsuccessful
Galiano Island (Population 2)	1998 2004	Lomer Douglas <i>et al.</i>	400-500/3 m ² search unsuccessful
Mayne Island	1996	Penny	15 plants
Lone Tree Hill (Victoria area)	1977 1996 1997 1999	? ? ? Ceska	9/? 13/? 6/? 3 plants/50 m ²
Saturna Island	2004 2007	Douglas <i>et al.</i> Fairbarns	50/100 m ² 400-800/ area not recorded

BIOLOGY

No biological research has been conducted on *Plagiobothrys tenellus*.

Life cycle and reproduction

Plagiobothrys tenellus is an annual species with bisexual flowers containing both male and female organs. Flowering has been observed in late-April to late-May in BC. Flowers are likely cross-pollinated by insects as in other species of the genus such as *P. hirtus* (USFWS 2003). Seed production occurs in June with each flower producing up to four 1-seeded nutlets. There are no data on seed longevity or viability.

Herbivory

There is no information about herbivory. No evidence of herbivory was observed during the 2004 survey by the authors.

Physiology

No information is known on the species' physiology. The population of *Plagiobothrys tenellus* observed in 2004 occurred on shallow soil on a ridge top. This location likely experiences prolonged drought during the summer months.

Dispersal

Birds are the most likely long-range dispersal mechanism for *Plagiobothrys tenellus* since populations occur on islands and are not found near shore where fruits could be potentially dispersed by water currents. The small (1.5-2.5 mm long) fruits are hard and could possibly survive after being eaten by birds, although the most likely to eat such fruits are birds such as finches that commonly crack open seeds and fruitlets. In such cases, the embryos may not survive passing through the bird gut. On a local basis, dispersal is probably by small mammals and gravity although no specific information has been found to substantiate these assertions. There do not appear to be any abiotic mechanisms that could account for dispersal over the 1-10 km distance between the islands.

Interspecific interactions

There is no information about interspecific interactions. It is likely that invasive introduced species are negatively affecting *Plagiobothrys tenellus*.

Adaptability

There are no known studies on propagation, seed germination or overall growth.

POPULATION SIZES AND TRENDS

Search effort

Most of the potential habitat for *Plagiobothrys tenellus* has likely been searched in Canada, since botanists have been aware of this species in southwestern British Columbia for over a century. *Plagiobothrys tenellus* has been reported from a total of thirteen locations in Canada. Newcombe in 1916 apparently made the first collection of this species in Canada on Mt. Tolmie (Victoria), although there are reports of the species near Victoria as far back as 1885. Of the thirteen locations, five were reported in or before 1925 and one in 1958 (see Table 1) and all of these are now extirpated, as they have not been relocated for more than 40 years. The remaining seven extant (post-1958) locations are located on southeastern Vancouver Island and on the Gulf Islands.

All presumed extant locations have been visited within the last eight years, and five were visited in 2004. Of the five sites visited in 2004, only Saturna Island yielded *P. tenellus*. The total area of potential habitat has not been quantified. A number of potential sites from Nanoose Bay south to Victoria and east to the Gulf Islands were searched in 2004 (see Appendix 1). The three sites not visited in 2004, due to time limitations, had been visited in recent years (1996, 1998, and 1999). The Saturna Island population was surveyed again in 2007.

Abundance

The most recent observations for *Plagiobothrys tenellus* populations (1996-2007) indicate that there were probably between 400-800 individuals in Canada in 2007. If seed banks were still present for this annual species in all or most of the 7 populations that are considered to be extant, then the total number of individuals that could potentially develop in a favourable year for growth is likely <<2500 (Table 1).

Fluctuations and trends

There are as many as seven extant locations for *Plagiobothrys tenellus* in Canada: one on southeastern Vancouver Island and remainder on the adjacent Gulf Islands (Figure 4, Table 1). No plants were found at four of the sites in 2004. Population sizes ranged from 3 plants (in 1999) to 400 - 800 plants (in 2007) on areas of 3 m² to 100 m². One of the largest known populations (400-500 plants in 1998), in Bodega Ridge Provincial Park on Galiano Island, occurs over the smallest area (3 m²).

Population trends are not well known because few sites have been visited more than once, and no focused monitoring has been undertaken. A survey of the Galiano Island population #2 in 1998 recorded 400-500 plants (Table 1); however, a thorough search of the small site by four botanists in 2004 (a drought year) found no plants. In contrast, the Saturna Island population was estimated to consist of 50 plants in 2004 (Douglas & Smith, Table 1) but there were 400-800 plants in 2007 (Fairbarns pers. comm. 2008). The implication is that this annual species undergoes considerable fluctuation in population size, likely on the order of one magnitude. Viable seeds likely remain in the soil seed bank. Such fluctuations in plant numbers may be a reflection of variable climatic conditions, especially drought. Precipitation information for the Canadian Pacific Coast indicates that the summers of 2002 and 2003 were among the 10 driest summers in this region and the winters of 2000-2004 were among the driest for the Pacific Coast (http://www.msc-smc.ec.gc.ca/ccrm/bulletin/regional_e.cfm?).

The Vancouver Island population, the only one that has been visited repeatedly, either fluctuates at low numbers or is in fact declining. There were nine plants noted when the population was first observed in 1977, 13 plants in 1996, 6 in 1997, and only 3 in 1999 (Table 1; BC CDC 2003).

Rescue effect

The potential for rescue for *Plagiobothrys tenellus* from the species' main range, 300 km away on the east side of the Cascade Mountains in the U.S. (University of Washington Herbarium Database 2004), is low. Even locally, exchange of seeds or pollen may occur only rarely, likely due to ineffective dispersal vectors. Fragmentation between Canadian populations is high, with distances of 10-15 km between extant populations. Dispersal of fruitlets from the nearby San Juan Islands is also likely low given that the species is rare on the islands. Past historical dispersals across the range of the species, if effected by birds, likely occurred over a period of thousands of years. Potential rescue from U.S. populations, even from those nearby on the San Juan Islands, would likely have a low probability.

LIMITING FACTORS AND THREATS

The most direct and obvious threat to *Plagiobothrys tenellus* in British Columbia is habitat destruction through housing development on private property or other land development. Six of the seven extant *P. tenellus* populations occur on the Gulf Islands. Only two of these are known to be located within a protected area, although there is a possibility that three of the other four populations are also protected from development.

Information from Saltspring Island indicates a marked increase in housing development related to rising population numbers in the Gulf Islands. The population of Saltspring Island has increased 78% between 1986 and 2001 and further projections indicate a further increase of 43% by 2026 (Linda Adams pers. comm. 2003). All but one of the populations in the more populated Victoria area are now considered extirpated, likely due to habitat destruction through urban development.

Much of the remaining habitat suitable for *Plagiobothrys tenellus* has been heavily altered by invasion of introduced weeds. This habitat degradation poses a critical and urgent threat to *P. tenellus*, as well as all other native species and habitats in the Garry oak ecosystem on southeastern Vancouver Island and the adjacent Gulf Islands. Invasion of introduced plant species may be contributing to the decline in observed *P. tenellus* plant numbers since 1998 (only 53 plants observed from 1999 to 2004); however, this cannot be determined without further monitoring of populations, and/or research on the effects of introduced species on *P. tenellus*. Potential effects of invasives on *P. tenellus* may be increased competition and decreased soil moisture.

Habitat destruction also indirectly threatens the *Plagiobothrys tenellus* by increasing the natural fragmentation of populations. The resulting habitat fragmentation limits the ability of the species to become established in new locations or re-establish extirpated populations, and limits transfer between populations.

Fire suppression and former and ongoing grazing by livestock likely also affected *Plagiobothrys tenellus* populations. Fire suppression may have resulted in increased thatch build-up and a forestation, and grazing could have altered soil properties and encouraged nonnative and weedy species. Ongoing grazing by feral goats at the Saturna Island site has likely resulted in soil erosion and increased competition from weedy introduced plants.

Although the degree of impact of climatic variability on this annual species is unknown, climatic data for the Victoria region indicate that the summer of 2004 was a dry year with the 5th lowest precipitation since 1948 (Environment Canada 2008). The summer of 2004 followed the previous winter that had the 4th lowest precipitation since 1948. The unsuccessful searches in 2004 at a number of sites (Table 1) may have, in part, been the consequence of reduced numbers of plants present during this drought year.

SPECIAL SIGNIFICANCE OF THE SPECIES

Plagiobothrys tenellus is not known in the horticultural trade nor is it known to have cultural, medicinal or spiritual uses (Turner pers. comm. 2004).

The extant populations are at the northern extent of the species' geographic range and are 300 km northwest of the core of the U.S. populations. 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 total population they represent (Mayr 1982, Lesica and Allendorf 1995). The protection of these 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 DESIGNATIONS

Plagiobothrys tenellus 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 List. Globally, *P. tenellus* has a rank of G4G5, indicating that, on a global scale, the plant is considered either "frequent to common (greater than 100 occurrences); apparently secure but may have a restricted distribution; or there may be perceived future threats" or "frequent to common to very common; demonstrably secure and essentially ineradicable under present conditions" (NatureServe 2003).

Plagiobothrys tenellus is tracked as a rare species outside of British Columbia only by Utah, with a rank of S1, meaning it is "critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation" (NatureServe 2003). Elsewhere in Arizona, California, Idaho, Nevada, Oregon, Washington and Utah this species is ranked SNR, meaning that it has not yet been ranked in those states (NatureServe 2003).

In Canada, the species is restricted to British Columbia, and it has a national rank of N2. Provincially, *Plagiobothrys tenellus* is ranked by the British Columbia Conservation Data Centre as S2 and appears on the British Columbia Ministry of Environment red list, which includes all species considered to be extirpated, endangered, or threatened in BC (Douglas *et al.* 2002). The S2 rank is one of the more critical ranks that can be applied to species at the provincial level and indicates that the species is "imperiled because of rarity (typically six to 20 extant occurrences or very few remaining individuals) or because of some factor(s) making it very susceptible to extirpation or extinction" (NatureServe 2003).

Three of the seven extant *P. tenellus* locations in British Columbia are located in regional, provincial or federal parks. The *Provincial Park Act* protects the population located within a provincial park (on Galiano Island). The Saturna Island population is located within the Gulf Islands National Park Reserve and is protected under the *Canada National Park Act*. *Plagiobothrys tenellus* could also be a candidate for listing under the provincial *Wildlife Amendment Act* (2004) due to its British Columbia Ministry of Environment red-list status.

TECHNICAL SUMMARY

Plagiobothrys tenellus

Slender Popcornflower

Plagiobothryde délicate

Range of Occurrence in Canada: British Columbia

Demographic Information

Generation time (average age of parents in the population)	<1 yrs
Observed percent reduction in total number of mature individuals over the last 10 years.	Unknown
Projected percent reduction in total number of mature individuals over the next 10 years.	Unknown
Observed percent reduction in total number of mature individuals over any 10 years period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible?	
Are the causes of the decline understood?	
Have the causes of the decline ceased?	
Observed trend in number of populations Declines occurred historically; the status of 4 populations visited recently with no plants present is uncertain.	Unknown
Are there extreme fluctuations in number of mature individuals? Populations can seemingly undergo considerable fluctuations but a seed bank in the soil likely persists.	No
Are there extreme fluctuations in number of populations?	No

Number of mature individuals in each population

Population	N Mature Individuals
Galiano Is #1: 0; Galiano Is #2: 400-500 (in 1998), 0 in 2004; Lone Tree Hill: 3 in 1999; Mayne Is: 15 in 1996; Saturna Is: 50 in 2004, 400-800 in 2007; N. Pender Is: 0 in 2004; S. Pender Is: 0 in 2004	
Grand Total	400-800 (in 2007)

Extent and Area Information

Estimated extent of occurrence (km ²) historic: 370	300 km ²
Observed trend in extent of occurrence Recent losses unknown but 6 populations lost historically with 3-4 populations of questionable status.	
Are there extreme fluctuations in extent of occurrence?	No
Estimated area of occupancy (km ²) 7 if based on 1x1 grid; 28 if based on 2x2 grid; actual area occupied is 150-350 square m	2x2 grid = 28km ² 1x1 grid = 7km ² Actual AO = 150-350m ²
Observed trend in area of occupancy Recent trend unknown but decline historical.	Unknown
Are there extreme fluctuations in area of occupancy? Likely some fluctuations since it is an annual with fluctuation in population size.	Unknown
Is the extent of occurrence or area of occupancy severely fragmented? Uncertain since not all areas of occupied habitat have been documented and viable population size has not been determined.	Unknown
Number of current locations	possibly up to 7

Trend in number of locations Declines occurred historically but recent declines uncertain due to population fluctuation	Unknown
Are there extreme fluctuations in number of locations?	No
Observed trend in area of habitat	Decline

Quantitative Analysis

	Ex.: % probability of extinction in 50 years
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Threats (actual or imminent, to populations or habitats)

- invasion of introduced plant species; habitat destruction; habitat fragmentation
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Rescue Effect (immigration from an outside source)

Status of outside population(s)? USA: secure	
Is immigration known or possible?	Unknown
Would immigrants be adapted to survive in Canada?	Likely
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely? Nearest populations occur on the San Juan Islands but dispersal to Canadian sites unlikely.	No

Current Status

COSEWIC: Threatened 2008

Status and Reasons for Designation

Status: Threatened	Alpha-numeric code: B1ab(iii)+2ab(iii); D1
Reasons for designation: An annual herb of grassy slopes and coastal bluffs within the highly reduced and fragmented Garry Oak ecosystem. About half of the known populations have been extirpated from areas heavily impacted by invasive alien plants on southeastern Vancouver Island and adjacent Gulf Islands. Only seven small populations remain. Population sizes fluctuate, likely depending on precipitation, with several comprising only a few individuals. The total population size is estimated to be fewer than 1000 individuals. Invasive plants continue to degrade the species' habitat at all sites.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. Uncertain if recent population sizes reflect a decline or fluctuation.
Criterion B (Small Distribution Range and Decline or Fluctuation): Meets Threatened B1ab(iii)+2ab(iii). Extent of occurrence and area of occupancy of 7 localities are well below threshold limits. Continuing decline in habitat quality is due to the presence of invasive exotic plants.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable. Uncertain if recent population sizes reflect a continuous decline although total size of the population in 2007 meets threshold for Endangered.
Criterion D (Very Small Population or Restricted Distribution): Meets Threatened D1 with a population size in 2007 of fewer than 1000 plants.
Criterion E (Quantitative Analysis): Not available.

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BIOGRAPHICAL SUMMARY OF REPORT WRITERS

George W. Douglas (deceased) held an M.Sci. (Forestry) from the University of Washington and a Ph.D. (Botany) from the University of Alberta, Edmonton. George worked with rare plants for over 20 years. He was senior author of *The Rare Plants of the Yukon* (1981), *The Rare Plants of British Columbia* (1985) and *Rare Native Plants of British Columbia* (1998, 2002). He was also the senior editor for the *Illustrated Flora of British Columbia* (1998-2002) and was the program botanist for the British Columbia Conservation Data Centre from 1991 until 2003. George wrote or co-authored 30 COSEWIC status reports and three update status reports during this period.

Shyanne J. Smith has a B.Sc. (Geography) from the University of Victoria. She has conducted botanical inventory, research, and mapping projects in British Columbia since 2001. Shyanne was a co-author of the National Recovery Plan for Southern Maidenhair Fern (2004), four COSEWIC status reports, and three stewardship accounts for rare plants.

COLLECTIONS EXAMINED

Collections housed at the Royal British Columbia Museum (V) in Victoria, University of Victoria (UVIC) and University of British Columbia (UBC) were examined.

Appendix 1. Unsuccessful *Plagiobothrys tenellus* search sites in 2004.

Suitable Sites Searched Unsuccessfully

Mt. Sutil, Galiano Island
Matthews Point, Galiano Island
Mt. Galiano, Galiano Island
Bluffs Park, Galiano Island
Mt. Fisher (Brown Ridge), Saturna Island
Mt. Maxwell, Salt Spring Island
Reginald Hill, Salt Spring Island
Mt. Tuam, Salt Spring Island
Thetis Lake Park, Vancouver Island
Mill Hill, Vancouver Island
Mt. Tolmie, Vancouver Island
Mt. Douglas, Vancouver Island
Mt. Tzuhalem, Vancouver Island
Mt. Helmcken, Vancouver Island
Cowichan Lake, Vancouver Island
Malahat Drive, Vancouver Island
Nanoose Hill, Vancouver Island
Horth Hill Park, Vancouver Island
Maple Mtn., Vancouver Island
