COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

OTTAWA, ONT. K1A 0H3
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COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

OTTAWA (ONT.) K1A 0H3
(819) 997-4991

STATUS REPORT ON THE SLENDER WOOLLY-HEADS *PSILOCARPHUS TENELLUS* VAR. *TENELLUS* IN CANADA

BY

JEANNE M. ILLINGWORTH

AND

GEORGE W. DOUGLAS

STATUS ASSIGNED IN 1996
NOT AT RISK

REASON: NATURALLY RARE AND GEOGRAPHICALLY RESTRICTED PIONEER SPECIES COLONIZING DISTURBED SITES.

OCCURRENCE: BRITISH COLUMBIA

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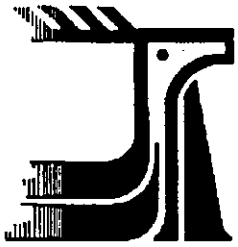
STATUS REPORT ON ENDANGERED WILDLIFE IN CANADA

Slender Woolly-heads

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA

COSEWIC



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JUNE 1994

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SPECIES:	"Species" means an indigenous species, subspecies, variety or geographically defined population of wild fauna and flora.
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THREATENED: (T)	A species likely to become endangered if limiting factors are not reversed.
ENDANGERED: (E)	A species facing imminent extirpation or extinction.
EXTIRPATED: (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
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STATUS REPORT ON THE SLENDER WOOLLY-HEADS *PSILOCARPHUS TENELLUS* VAR. *TENELLUS* IN CANADA

BY

JEANNE M. ILLINGWORTH

AND

GEORGE W. DOUGLAS
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STATUS ASSIGNED IN 1996
NOT AT RISK

Executive Summary

Description

Psilocarphus tenellus var. *tenellus* is an inconspicuous woolly annual that initially grows erect and then becomes prostrate, forming mats 5-30 cm wide. The stems are thinly woolly-hairy with opposite, moderately silvery-hairy, entire leaves. Spherical flower heads are mostly solitary in the axils and at the tips of stems and branches.

Distribution

Psilocarphus tenellus var. *tenellus* ranges from southern BC, south through Idaho, Washington, Oregon and California to northwestern Baja California. In Canada, the northern-most limit of its range, the species is restricted to southeastern Vancouver Island.

Population Size and Trends

Of the 15 sites in which *P. tenellus* var. *tenellus* has been collected in Canada, 12 are extant (post 1949) including 11 which have been confirmed since 1993. The status of the remaining four sites is unknown, although they are likely extirpated. In the majority of cases, population trend analysis is prevented because of limited demographic data.

Habitat

In North America *P. tenellus* var. *tenellus* is known to inhabit dried beds of vernal pools and other open moist, often disturbed, sites. The Canadian populations typically occupy level, slightly depressed habitats in which the soil is well compacted and often gravelly. These sites appear to be unsuitable for the healthy growth of other species. *Psilocarphus tenellus* var. *tenellus* is not found within particular communities and there does not appear to be any specific association with other plants.

General Biology

Little information exists regarding the biology and ecology of *P. tenellus* var. *tenellus*. Lack of structures attractive to insects and animals, and an interpretation of the floral structure, indicate that the species may self-pollinate. It is also suggested that pollen may not be essential for seed-production and that asexual reproduction may also occur. Further studies are required to determine many aspects of the population dynamics of *P. tenellus* var. *tenellus* including the average life-cycle of the variety, the frequency and requirements for seed germination, and its competitive ability with other species.

Limiting Factors

Canadian populations of *Psilocarphus tenellus* var. *tenellus* typically occupy sites alongside roads or paths. Habitat destruction, such as road resurfacing or trampling by pedestrians and motor vehicles, continues to threaten the existing populations. The development of private property often results in the elimination of the gravel tracks and paths on which *P. tenellus* var. *tenellus* appears most frequently. Threats to the continued survival of this species are compounded by the lack of biological and ecological information which create difficulties in site management.

Protection

There is no specific legislation for the protection of rare and endangered vascular plants in BC. Some populations of *P. tenellus* var. *tenellus* are protected to a certain extent by their location on public property. The prohibition of public access on land controlled by the Department of National Defense reduces the risk of trampling by pedestrians, but the majority of the *P. tenellus* var. *tenellus* sites within these properties are regularly subjected to vehicular traffic, particularly those roads used as vehicle turn-arounds. While the risk of site elimination by development is reduced for those populations located within park boundaries, this often depends on the management strategies in place.

Conclusions

Psilocarphus tenellus var. *tenellus* populations in Canada are few in number and, in some cases, only consist of a few individuals over a small area. Restricted to southern Vancouver Island (BC), many of the sites are at risk due to development. Lack of information regarding the ecology of *P. tenellus* var. *tenellus*, and its relationship to the environment and other species, hampers successful management of *Psilocarphus*. Studies are necessary to determine if the present habitats are necessary for the successful growth of *P. tenellus* var. *tenellus* or if these plants are simply outcompeted elsewhere. With little knowledge of the plants biological and ecological requirements, this variety is vulnerable to extirpation.

NOTE: Although the authors have recommended a status of vulnerable, COSEWIC members have interpreted the data as reflecting a species that is presently Not At Risk.

Erich Haber, Chairman, Subcommittee for Vascular Plants, Mosses and Lichens
September 1996

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I. SPECIES INFORMATION

1. Classification and Nomenclature

Scientific name:

Psilocarphus tenellus Nutt. var. *tenellus*

Bibliographic citation:

Trans. Am. Phil. Soc. II. 7:341. 1840.

Pertinent synonyms:

None

Common Names:

Slender woolly-heads

Family Name:

Asteraceae

Major Plant Group:

Angiosperm

History of taxon:

Psilocarphus is part of the large family Asteraceae that encompasses about 950 genera and 20,000 species found throughout the world (Bailey and Bailey 1976). The family is divided into 12 or 13 tribes and numerous subtribes. *Psilocarphus* belongs to the tribe, Inuleae.

Psilocarphus tenellus is one of five species in the genus *Psilocarphus*. Three species are found in western North America, one occurs in South America (Chile) and another is common to both areas.

The species was first described by Thomas Nuttall from a collection made in Santa Barbara, California, prior to 1840. Two varieties are recognized: the var. *tenellus* and the var. *globiferus* (Bertero ex DC.) Morefield. The latter, until recently (Morefield 1993), was treated as var. *tenuis* (Eastw.) Cronq. The var. *globiferus* occurs only in California.

2. Description

Taxonomic Description

Psilocarphus tenellus var. *tenellus*

[Description from Cronquist (1955) and Ferris (1960)]

General: Annual, stems thinly woolly-hairy, much branched, erect at first but later prostrate and matted, the mats 5-30 cm wide.

Leaves: Spatulate to linear-oblong, 4-15 mm long, moderately silvery-hairy, opposite, entire.

Flowers: Spherical heads, mostly solitary in the axils and at the tips of stems and branches, up to 3-4 mm tall; involucres lacking but involucral-like leaves present; outer rays female, 25-45, filiform, each with a well developed receptacle bract, these 1.3-2.5 mm long bracts with a hyaline appendage below the summit; disk flowers few.

Fruits: Glabrous, cylindric, brown achenes, 0.6-1.2 mm long; pappus absent.

Illustrations

1) see p. 281 in Cronquist (1955).
2) see Fig. 5864, p. 493 in Abrams and Ferris (1960).

Diagnostic Features

Two species of *Psilocarphus* occur in Canada. In British Columbia (BC) *P. tenellus* var. *tenellus* may be distinguished from *P. elatior* Cronq. by its prostrate and matted habit, smaller heads and smaller receptacular bracts. Some plants of *P. elatior* are difficult to separate from *P. tenellus* var. *tenellus*, especially depauperate specimens where minimum head size (ca. 6 mm) and minimum receptacular bracts size (ca. 2.4 or 2.5 mm) approach the maximum sizes of *P. tenellus* var. *tenellus*. The only good character distinguishing these depauperate plants from *P. tenellus* var. *tenellus* appears to be the erect habit of *P. elatior*.

In the field, young specimens of *P. tenellus* var. *tenellus* are sometimes difficult to separate from young specimens of *Gnaphalium palustre* Nutt. with which it sometimes grows. Close examination will reveal that most of the leaves of the latter are alternate and the flower heads are not spherical, have densely woolly involucres and broader ray flowers.

3. Distribution

Psilocarphus tenellus var. *tenellus* ranges from southern BC, south through Idaho, Washington, Oregon and California to northwestern Baja California (Cronquist 1955, Morefield 1993). In BC it is restricted to southeastern Vancouver Island (Fig. 1).

4. Climate

The west coast of BC is exposed to an oceanic climate typified by high rainfall and mild temperatures. The southeastern side of Vancouver Island, however, lies in a rainshadow created by mountains, to the west on Vancouver Island and to the south on the Olympic Peninsula. Typical of the Coastal Douglas-fir zone, this region is therefore characterized by mild wet winters and warm dry summers (Meidinger and Pojar 1991). Annual precipitation is particularly low in the southeastern corner of Victoria, which receives about one-third of the rainfall to that west of the city (Fig. 2). More hours of bright sunshine have also been recorded for this area than for any other station in BC. Since the bulk of the rainfall (95%) occurs during the winter months, the high temperatures and limited precipitation during the summer period cause moisture deficiencies (McMinn *et al.* 1976).

5. Habitat

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

In North America *Psilocarphus tenellus* var. *tenellus* is known to inhabit dried beds of vernal pools and other open moist, often disturbed, sites at elevations below 2000 m (Abrams and Ferris 1960, Douglas 1989, Morefield 1993).

The Canadian populations of *P. tenellus* var. *tenellus*, restricted to southern Vancouver Island, typically inhabit open, exposed sites in which the soil is well compacted and often gravelly. The locations are generally level, although usually slightly depressed. The habitat suggests a weedy nature to this species, often occupying sites unsuitable for the healthy growth of other plants. Associated species, if any, are generally sparse and stunted. *Psilocarphus tenellus* var. *tenellus* is not found within particular communities and there does not appear to be any specific association with other plants.

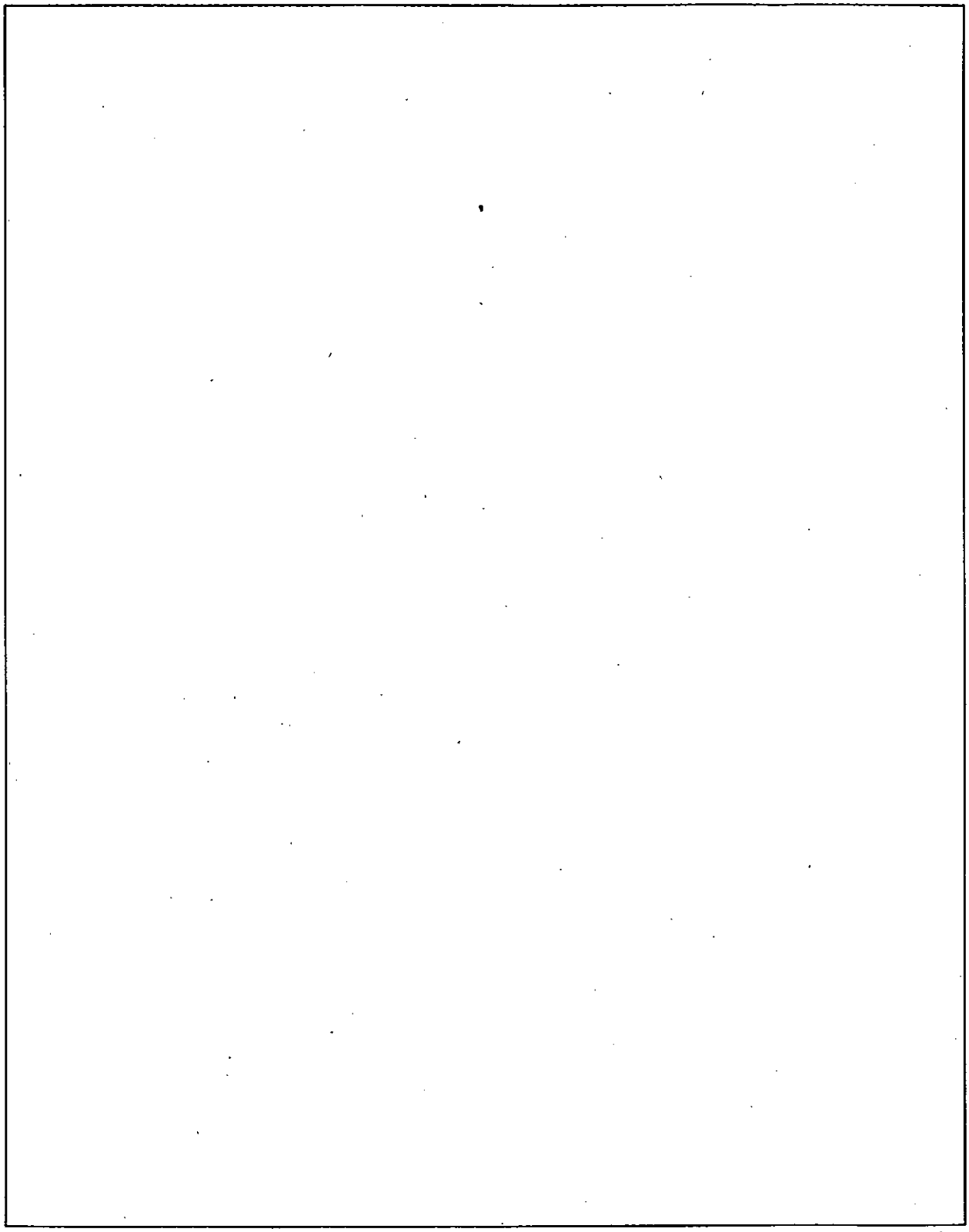

Figure 1. Location of *Psilocarphus tenellus* var. *tenellus* sites in Canada. (○ - Extirpated; ● - Recently confirmed site)

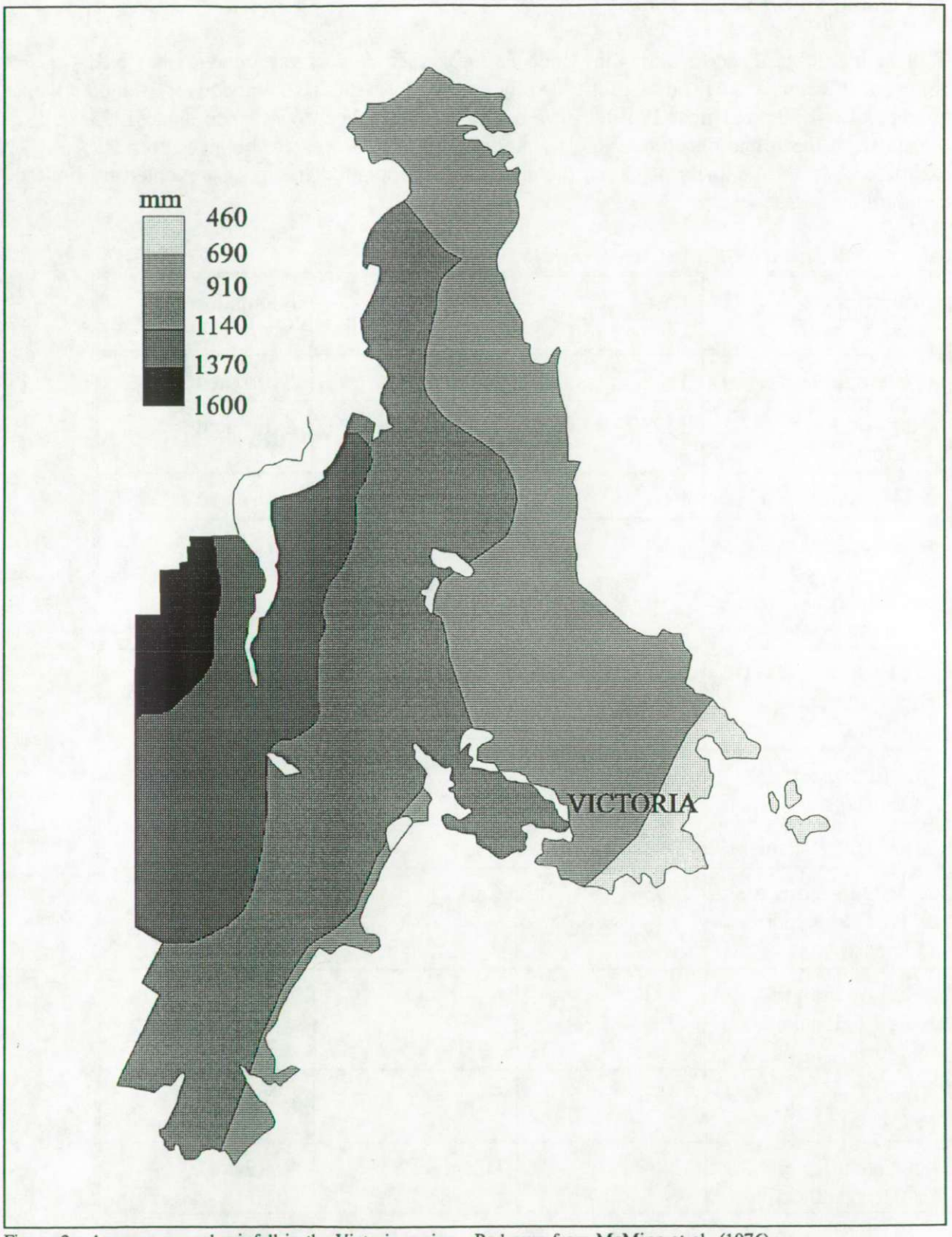

Figure 2. Average annual rainfall in the Victoria region. Redrawn from McMinn et al. (1976).

6. Population Size and Trends

Table 1 identifies those locations in which *Psilocarphus tenellus* var. *tenellus* has been collected in Canada. All populations have been found on southern Vancouver Island. Of the 15 sites, 12 are extant (post 1949). Eleven locations have been confirmed since 1993 while the status of the remaining four sites is unknown the populations are believed to be extirpated. In the majority of cases, the analysis of population trends is prevented by limited demographic data.

Table 1. ***Psilocarphus tenellus*** **var.** ***tenellus*** **sites in Canada.**

Collection Site	Last Observation	Collector	Population (no./area)
Cloverdale (Victoria)	1887	Macoun	Extirpated
Burnside Road (Victoria)	1893	Macoun	Extirpated
Miller Ave (Victoria)	1949	Tilfesley	Extirpated
Near junction of Millstream Rd. & Mt. Finlayson Arm Rd. (Victoria)	1951	Hardy	Extirpated
Rocky Point Naval Establishment (Victoria)	1993	Ryan	10,500+/ 600+ m^2
Mt. Finlayson (Victoria)	1993	Ryan	4,000/200 m^2
Mary Hill (Victoria)	1993	Ryan	68,500+/800 m^2
Near Dunsmore Ave. & Ivor Rd. junction (Victoria)	1993	Ceska	50/100 m^2
South of Francis-King Regional Park (Victoria)	1993	Ryan	22/1 m^2
Albert Head (Victoria)	1993	Ryan	120/80+ m^2
Cowichan River Estuary (Duncan)	1994	Douglas	40/12 m^2

Collection Site	Last Observation	Collector	Population (no./area)
Collection Site	Last Observation	Collector	Population (no./area)
Elk/Beaver Lake Regional Park (Victoria)	1994	Ryan	350+ plants
Sidney Island	1994	Ryan	41/5 m^2
West of Layritz Park (Victoria)	1994	Ryan	3,000-5,000+/ 70 m^2
Francis-King Regional Park (Victoria)	1994	Douglas	19/13 m^2

Recently Verified Populations

Rocky Point Naval Establishment (Victoria)

Three populations of *Psilocarphus tenellus* var. *tenellus*, totalling 10,500+ plants, were recorded from Rocky Point Naval Establishment in 1993. The largest group (10,000+ plants) was located over an area of approximately 600 m^2. Two smaller groups, numbering 500 and 50 stems, were also observed but the respective areas covered by these latter groups were not recorded. While variable in size, each group was found on, or alongside, gravel roads or paths in compacted gravelly soil. It was noted that plants tended to be abundant within the old wheel tracks but disappeared along the road edges or road centre where dominant grasses occurred.

Species associated with the *Psilocarphus* populations included *Matricaria discoidea*, *Spergularia rubra* and *Bromus* sp. Other plants tended to be absent, likely because of substrate density and trampling of vehicular traffic. Although the *Psilocarphus tenellus* var. *tenellus* populations were generally located in open, exposed areas, the smallest group was partially shaded by nearby *Pseudotsuga menziesii* trees.

Since no previous demographic information has been recorded for these populations, it is unknown whether these groups are increasing or decreasing in numbers. The largest site, consisting of 10,000+ plants in a 50x12 m^2 strip, was located on a gravel road that had recently been fenced off. It is likely that this particular population will eventually be eliminated by invasive grasses and forbs as the soil becomes less compacted without regular vehicular traffic.

Mount Finlayson (Victoria)

Situated within Goldstream Provincial Park, approximately 4,000 *Psilocarphus tenellus* var. *tenellus* plants were observed in scattered patches over an area of 200 m^2. The site was located at the junction of two old fire trails near Mt. Finlayson, at an elevation of 260 m with a range in slope of 5-10%. The majority of these plants were growing in open, disturbed areas on bare, hardpacked, stony soil. The compacted soil conditions appeared to reduce competition from other species that might normally invade the site. Associated, but stunted, species included *Navarretia squarrosa*, *Plantago lanceolata*, *Juncus bufonis* and *Spergularia rubra*.

Mary Hill (Victoria)

The largest populations of *Psilocarphus tenellus* var. *tenellus*, totalling over 68,000 plants, were recorded in the Mary Hill area in 1993. Six groups were located and ranged in population size from approximately 67,000 plants in 670 m^2 to 15 plants in 2 m^2. All of the groups were growing on, or alongside, gravel roads or trails. Most of the locations were on almost level ground at slopes less than, or equal to, 5%, however, a slope of 30% was recorded for one group situated on an old trail near a paved road. The sites were generally open and exposed, although some groups were partially shaded by adjacent trees such as *Pseudotsuga menziesii*, *Quercus garryana* and *Arbutus menziesii*.

Associated species were sparse and stunted. These included *Matricaria discoidea*, *Spergularia rubra* and *Navarretia squarrosa*. It was noted that *Psilocarphus* was absent in areas where the vegetation became denser, such as the ridge between wheel ruts.

No demographic information has been previously recorded for *P. tenellus* var. *tenellus* in this area and it is therefore not yet possible to determine population trends.

Dunsmore Avenue/Ivor Road junction (Victoria)

Four groups of *P. tenellus* var. *tenellus* were located in 1993 on a dirt road near the junction of Dunsmore Avenue and Ivor Road. Site descriptions and associated species were not recorded, however, it was noted that the populations totalled approximately 50 plants over an area of 100 m^2. Since no previous observations have been recorded for this locality, population trends are unknown.

Francis-King Regional Park, south of (Victoria)

In 1993, a single population of *P. tenellus* var. *tenellus* was discovered on a gravel road, near a reservoir south of Francis-King Regional Park. This site contained approximately 22 plants within 1 m^2. The plants were growing along a wheel rut on very compacted soil with a gentle slope (5%). Associated plants included stunted specimens of *Matricaria discoidea*, *Hypochaeris radicata* and *Plantago lanceolata*.

Albert Head (Victoria)

Psilocarphus tenellus var. *tenellus* was recorded in 1993 at Albert Head, west of Victoria. Approximately 100 plants were located within an area of 120 m^2, with scattered specimens nearby. These plants were growing on compacted gravel, either along the edges of paved and gravel roads, or along the centre of the gravel roads which were occasionally trampled by vehicular traffic. All of the sites were open and exposed. Associated species included *Spergularia rubra*, *Matricaria discoidea*, *Lolium perenne* and *Bromus sp.*

Cowichan River estuary (Duncan)

In 1994, a single population of *Psilocarphus tenellus* var. *tenellus*, consisting of 40 plants within 12 m^2, was located on the dry gravel roadside of Khenipsen Road, on the northeast side of the Cowichan River estuary. Although the site was level, open and exposed, the plants were in a slight depression which is likely saturated during spring. Associated species included *Gnaphalium palustre* and *Epilobium densiflorum.*

Layritz Park, west of (Victoria)

Two groups of *Psilocarphus tenellus* var. *tenellus* were observed in 1993 on property between Layritz Park and a community college. The exposed, level site was north of a meadow which is adjacent to a *Pseudotsuga menziesii* forest. The *Psilocarphus tenellus* var. *tenellus* populations were located along the edge, and in the centre, of an old dirt road in heavily compacted soil and gravel. The largest group consisted of approximately 3,000-5,000 plants in an area of 70 m^2. This population was heavily shaded on the south side by *Symphoricarpos albus* and appeared to have much longer stems than seen at previous sites. The second group nearby contained about 50 scattered plants. Species associated with both groups were stunted and sparse due to compacted soil conditions. These included *Matricaria discoidea*, *Spergularia rubra*, *Plantago lanceolata* and *Bromus* sp.

Francis-King Regional Park (Victoria)

Psilocarphus tenellus var. *tenellus* is known from two small groups in Francis-King Regional Park. Verified in 1994, the open, exposed sites were situated on, and along the edges of, a trail located beneath powerlines. The species appeared to occur along the path in depressed areas that likely flood during the winter as indicated by the occurrence of *Spiraea douglasii* adjacent to the sites. Subject to trampling, these trails consisted of very hardpacked soil. Other species associated with these sites were sparse and stunted as a result and included *Plantago lanceolata*, *Hypochaeris radicata* and *Agrostis* sp.

A visit to the site in 1993 indicated eight plants in a 3 m^2 strip and 12 plants in a 10 m^2 strip. A subsequent visit in 1994 recorded ten plants and nine plants in the same locations respectively.

Elk/Beaver Lake Regional Park (Victoria)

Two populations of *Psilocarphus tenellus* var. *tenellus* were discovered in this park in 1994, although the areas covered by each group were not recorded. The first site consisted of 300-400 plants and was located along a path, at the end of Jennings Lane, on the east side of Elk Lake. The level, exposed area was typically disturbed, on compacted gravel or sand, and was surrounded by open fields. The second site was situated on heavily compacted soil along a path on the west side of Beaver Lake, near a boat ramp, and contained approximately 50 plants. Species associated with both these locations included *Spergularia rubra* and various grasses.

Sidney Island

Psilocarphus tenellus var. *tenellus* were found in 1994 on Sidney Island, a small island situated off the southeastern tip of Vancouver Island. A total of 41 plants, within three groups, were found along trails and dirt tracks in compacted soil.

Two of the groups were found within the boundaries of Sidney Spit Marine Provincial Park, at the north end of Sidney Island. One of these groups consisted of ten plants in 4 m^2. The site was located on a path commonly frequented by hikers and four-wheel drive vehicles in compacted sandy soil, with a slope of less than 5%. Associated species were stunted and included *Plantago lanceolata*, *Aira caryophyllea*, *Cerastium vulgare* and *Anthoxanthum odoratum*. The second site, containing a single specimen of *Psilocarphus tenellus* var. *tenellus*, was situated farther along the track adjacent to a campground. No other species were growing with this plant.

The third group, 30 plants in 1 m^2, was located just outside the boundary of the park, on private property. The open and level site was found in compact gravel in a small depression on a logging road. The adjacent forests on both sides of the road had been recently clear-cut but species associated with this group included stunted *Hypochaeris radicata* and *Spergularia rubra*.

Extirpated Populations

Cloverdale (Victoria)

Psilocarphus tenellus var. *tenellus* was last collected and observed in this area in 1887. Sparse label details described the site as "in ditches" with no other information recorded. Other than a few remnant *Quercus garryana* trees, most of the original native vegetation has been removed and this area is now primarily dominated by residential dwellings. Given the length of time involved since this variety was last observed, it is unlikely that *Psilocarphus tenellus* var. *tenellus* is extant in this region.

Burnside Road (Victoria)

Psilocarphus tenellus var. *tenellus* was observed in ditches in this area in 1893, with no other site information recorded. Since this area has been extensively developed, and given the length of time since this variety was last recorded at this location, this population is likely extirpated.

Miller Avenue (Victoria)

Psilocarphus tenellus var. *tenellus* was last observed along this short road, when it was still unpaved, in 1949. It is likely that this site was destroyed when this road was resurfaced.

Millstream Road (Victoria)

One small population of *P. tenellus* var. *tenellus* was observed on a gravelly roadside site, with *Gnaphalium palustre*, near Mount Finlayson in 1951. Described on the collection label as "Millstream Rd., Mt. Finlayson fork", this likely refers to Finlayson Arm Road which runs north of Mt. Finlayson and eventually meets Millstream Road. Since 1951, the roads in the area have been widened and resurfaced to accommodate the increased development that has occurred. It is therefore likely that this *Psilocarphus* population is extirpated.

7. General Biology

Other than general habitat information, there are few details in the literature regarding the biology and ecology of *P. tenellus* var. *tenellus*. It is likely, however, that this plant shares many of the same traits that are typical of the genus.

Lack of structures attractive to insects and animals, and an interpretation of the floral structure, indicate these inconspicuous, woolly annuals may self-pollinate. Cronquist (1950) suggested that the position of the receptacular bracts, together with the position of the corolla and stigmas, effectively guide these latter structures towards the central flowers. Since it is the central flowers alone that produce pollen, and since the wool and leaves surrounding the head appeared to prevent pollen loss by wind, self-pollination is indicated. Cronquist also added that pollen may not be essential for seed-production and that asexual reproduction may be occurring although chromosome counts would be necessary to verify this.

Seed dispersal also appears limited. Because the achenes are much smaller than the enclosing bracts, the only obvious means of dispersal is by water or wind. The plants habitat in vernal pools may also permit the bracts and achenes to be transferred by the muddy feet of waterfowl (Cronquist 1950). It is also possible that since many of the locations are associated with roads, motor vehicles may also be major dispersal vectors.

Further studies are required to determine many aspects of the population dynamics of *Psilocarphus tenellus* var. *tenellus* including the average life-cycle of the variety, the frequency and requirements for seed germination, and its competitive ability with other species.

8. Limiting Factors

Potential Threats

The majority of the *P. tenellus* var. *tenellus* populations are characterized by their locations on hard, compacted, and often gravelly, soil found alongside roads or paths. These locations may be detrimental to the species survival because of increased susceptibility to trampling by pedestrian or vehicular traffic. These sites may also be enhanced by this constant trampling, however, by creating depressed, muddy sites in the spring that appear necessary for the continued growth of this species.

Habitat destruction continues to threaten these populations, particularly on private property, as areas become developed with residential and business dwellings. This often eliminates the gravel tracks and paths that *P. tenellus* var. *tenellus* appears most frequently on, particulary if existing roads are resurfaced.

Changes in Populations

Little demographic data for *P. tenellus* var. *tenellus* has been recorded in BC and it is therefore not yet possible to analyze population trends. It is highly possible that, being an annual, a yearly fluctuation in population size is common for this species. The species appears opportunistic, inhabiting sites unsuitable for the healthy, normal growth of other plants as seen by the usual stunted appearance of the associated plants. It is possible, however, that *P. tenellus* var. *tenellus* is restricted to these locations because of competition. Regardless, the alteration or elimination of these habitats may result in the eventual extirpation of this species from BC.

9. Protection

Rehabilitation or Reintroduction Efforts

No attempts have been made to introduce *P. tenellus* var. *tenellus* to suitable habitats or to increase the numbers of individuals at the current locations. To do this at present would be based on trial and error since biological and ecological research is necessary. In particular, it will be necessary to determine what effect trampling has on this species since there is question as to whether or not a certain amount of trampling is necessary to inhibit invasion by other species and maintain soil conditions. To date, there are no records of such studies being done.

Regulatory Measures

There is no specific legislation for the protection of rare and endangered vascular plants in BC. However, some populations of *Psilocarphus tenellus* var. *tenellus* are protected to a certain extent by their location on public property.

Cloverdale, Burnside Road and Miller Avenue (Victoria)

Given the vague site locations, the extent of protection to these sites, if they still exist, is unknown. It is likely that city maintenance crews have eliminated the sites through resurfacing of roads.

Millstream Road (Victoria)

If this site is still in existence, in spite of past road construction, there is little, if any, protection from future road development projects or trampling by pedestrian and vehicular traffic.

Dunsmore Avenue and Ivor Road (Victoria)

Located on an unnamed dirt road, near the junction of Dunsmore Avenue and Ivor Road, the four groups of *P. tenellus* var. *tenellus* are likely on private property and therefore have no legal protection.

Cowichan River estuary (Duncan)

Since this site is located on the roadside of Khenipsen Road, there is no protection from road maintenance crews or vehicular trampling.

Francis-King Regional Park, south of (Victoria)

The single population at this site is legally unprotected given its location on a dirt road on private property.

Layritz Park, west of (Victoria)

Located on private property, these population are legally unprotected.

Albert Head, Mary Hill and Rocky Point Naval Establishment (Victoria)

Populations located in these areas are on land owned and controlled by the Department of National Defense. Public access is prohibited and although portions of these various properties have been extensively altered, a considerable amount remains undisturbed.

Although legally these populations do not have the same degree of protection as they would in public parks, the lack of public access is likely more important to the continued existence of these populations that the legal protection provided by their occurrence in public parks. The majority of the *Psilocarphus tenellus* var. *tenellus* populations, however, are located on sites regularly subjected to vehicular traffic, particularly those roads used as vehicle turn-arounds, thus increasing the risk of elimination by trampling. Conversely another gravel road containing a site, on Rocky Point, has since been fenced off and is now abandoned. It is likely that *P. tenellus* var. *tenellus* will eventually be eliminated at this particular site as soil becomes less compacted over time and grasses or large weeds begin to invade the roadway.

Mount Finlayson (Victoria)

This area, extremely rich in rare plant diversity, is located west of Victoria and was designated as a Provincial Park in 1994. While rare plants will receive a much higher degree of protection than when on private land, the amount of protection will be largely determined by the type of management strategy developed and implemented.

Elk/Beaver Lake Regional Park, Francis-King Regional Park (Victoria)

Unlike those populations on private land, *P. tenellus* var. *tenellus* found within parklands are protected to a certain degree from development although this often depends on the management strategies in place. In general, both of these parks are treated as "natural" parks with little active management accordingly. There are, however, indications of path maintenance and park "improvements" including the addition of trail markers and information signs posted at various points of interest. These efforts can often be detrimental to populations of native, and often rare, plant species, particularly if park maintenance crews are unaware of the rare plant sites.

If park trails containing the *P. tenellus* var. *tenellus* sites are "improved", it is likely that this species will become extirpated as enhanced soil conditions permit other species to become established from lack of compaction. Some areas deemed excessively wet, particularly along paths, are often subjected to gravel deposits by park maintenance staff.

The resulting effect on *P. tenellus* var. *tenellus* populations is questionable since the site may possibly be enhanced for this species by providing a gravel substrate but may also increase drainage and thus prevent the muddy habitat apparently necessary for the growth of this plant.

Sidney Island

Because Sidney Island is only accessible by boat, the sites containing the rare plants are protected to a slightly higher degree because of limited public access. The sites located within the boundaries of the Sidney Spit Marine Provincial Park are protected against private

development but because of their locations on four-wheel drive tracks, they are threatened by trampling from pedestrians and recreational vehicles. The balance of Sidney Island is privately owned and there is evidence of residential development and logging. The *Psilocarphus tenellus* var. *tenellus* site, located along the roadside on this private property has no legal protection whatsoever.

II. ASSESSMENT OF STATUS

10. Comments on Status

Globally, *P. tenellus* var. *tenellus* is ranked as G4T4 by The Nature Conservancy (US). This ranking indicates that on a global scale, this variety is considered "frequent to common (greater than 100 occurrences); apparently secure but may have a restricted distribution; or there may be perceived future threats".

In BC, *P. tenellus* var. *tenellus* is ranked by the Conservation Data Centre (BC Ministry of Environment, Lands and Parks) as S1 which indicates this variety to be "critically imperiled because of extreme rarity (5 or fewer extant occurrences or very few remaining individuals) or because of some factor(s) making it especially vulnerable to extirpation or extinction". This is the most critical status which can be applied to a species at the provincial level.

11. Status Recommendation

Unlike other rare species whose habitat is disappearing, *P. tenellus* var. *tenellus* appears to be opportunistic. It cannot, therefore, be considered "threatened" since this 'weedy' species has plenty of potential sites. *Psilocarphus tenellus* var. *tenellus* should be ranked as a vulnerable species for the following reasons:

1) *Psilocarphus tenellus* var. *tenellus* populations in Canada are few in number and, in some cases, only consist of a few individuals over a small area.

2) The Canadian range of *P. tenellus* var. *tenellus* is restricted to southern Vancouver Island in BC, with many of the sites at risk due to development.

3) *Psilocarphus tenellus* var. *tenellus* in BC represents the northern limits of this taxon and may represent populations that are genetically distinct to those found elsewhere.

12. Prognosis

The prognosis for this species is unpredictable since this plant is an annual and appears opportunistic. They are, however, highly susceptible to trampling by pedestrian or vehicular traffic since the majority of the *P. tenellus* var. *tenellus* populations are in, or along, trails

and gravel roads. Some sites are also threatened with elimination because of road resurfacing as a result of regional development. With so little information known on the ecology of *Psilocarphus tenellus* var. *tenellus*, and on its relationship to the environment and other species, successful management of *Psilocarphus* is hampered.

The stability of the present populations will remain unknown without both research on the growth requirements, and further demographic information. Studies are also required to determine if the present habitats are necessary for the successful growth of *P. tenellus* var. *tenellus* or if these plants are simply outcompeted elsewhere.

The limited number of individuals also reduces the potential for genetic variation which may be necessary to respond to environmental changes in the future. Without increased information on the plants biological and ecological requirements, this variety is vulnerable to extirpation.

III. INFORMATION SOURCES

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