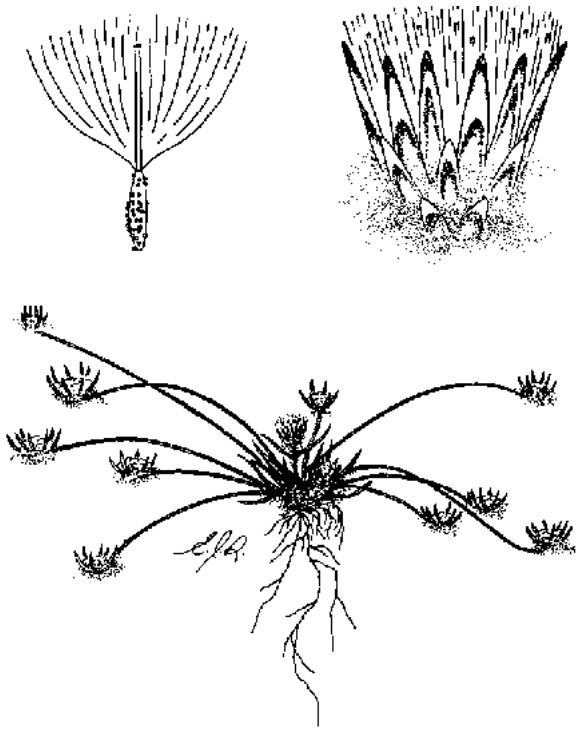
COSEWIC
Assessment and Status Report

on the

Stoloniferous Pussytoes
Antennaria flagellaris

in Canada



ENDANGERED
2004

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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Stoloniferous pussytoes — Line drawing by Elizabeth J. Steven in Douglas 1998.

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COSEWIC
Assessment Summary

Assessment Summary – May 2004

Common name
Stoloniferous pussytoes

Scientific name
Antennaria flagellaris

Status
Endangered

Reason for designation
A short-lived perennial plant present at only three geographically restricted localities occupying very small areas of specialized habitat of ephemerally moist seepage sites on private lands. It is at greatest risk from ATV use that currently is evident in close proximity to the populations. It may also be impacted by changes in ground water hydrology and surface impacts from increased development activities in the area such as the proposed production of coalbed methane.

Occurrence
British Columbia

Status history
Designated Endangered in May 2004. Assessment based on a new status report.

COSEWIC
Executive Summary

Stoloniferous Pussytoes
Antennaria flagellaris

Species information

Antennaria flagellaris was first recorded in the literature in Canada in 1998. *Antennaria flagellaris* is a stoloniferous, short-lived perennial from a fibrous root. The stolons are up to 10 cm long while the few central flowering stems are up to 3.5 cm tall. It has numerous silky woolly-hairy basal leaves and few stem leaves. The flower heads are terminal with involucres of two types: female and male. Fruits are achenes.

Distribution

In Canada, *A. flagellaris* is known only from the Similkameen River valley, south of Princeton in southwestern British Columbia. *Antennaria flagellaris* ranges from southwestern British Columbia, south in the western United States to Idaho, Wyoming Nevada and California. The nearest known occurrence to the BC population is in central Washington, on the Natches River about 190 km to the south.

Habitat

Antennaria flagellaris occurs in *Artemisia tridentata* (big sagebrush) shrub/grassland with scattered *Pinus ponderosa* (Ponderosa pine) and *Pseudotsuga menziesii* (Douglas-fir) in calcareous, gravelly-clay soils or gravelly sands on eroded, unstable, 20-30% slopes with open southerly aspects. The sites are restricted to the Roany soil series and are characterized by ephemeral seepage. They are saturated by underground water in the winter and dry up in the summer. Non-native species are not present.

Biology

Antennaria flagellaris is a short-lived perennial, dioecious (male and female structures on separate plants), and wind-pollinated. The achenes contain a single seed and numerous hair-like bristles when mature facilitating the wind dispersal. Seeds are produced sexually by out-crossing. This species also reproduces vegetatively by producing stolons that terminate in plantlets.

Population sizes and trends

There are three occurrences of *Antennaria flagellaris* in the Similkameen River valley, southwest of Princeton, British Columbia. These populations occur over a distance of 3.2 km and in an occupied area of about 2200 m² with approximately 1,000,000 plants.

Limiting factors and threats

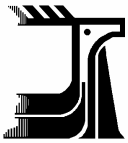
The three populations occur on two private properties in the Agricultural Land Reserve (ALR). The populations occur within 5 km of the town of Princeton, which has seen an increase in housing starts recently. It is quite conceivable that the properties could be removed from the ALR in the future. The roany soil series that occurs in the area produces a landscape with limited suitability to agriculture, which could facilitate removing the land from ALR. In recent years many tracts of ALR land in southern British Columbia have been converted to housing developments, shopping malls and golf courses. Development may be imminent. Currently some of the activities that are permitted in the land reserve may also not be consistent with the persistence of this species. Any developments that even slightly change groundwater levels could be devastating to this taxon. Proposed production of coalbed methane within the region could impact ground water hydrology. Evidence of off-road recreational vehicle use has been observed in close proximity of populations. This activity could alter habitat conditions radically enough to make it inhospitable for *A. flagellaris* and suitable for weedy species.

Special significance of the species

The calcareous clay, seepage slopes where *A. flagellaris* occurs are unique in the Princeton area. In addition, they are not invaded by introductions resulting in a habitat in relatively pristine condition. 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 may have an evolutionary and ecological significance important to the species.

Existing protection or other status designations

Provincially, *A. flagellaris* has been ranked by the Conservation Data Centre as S1 (critically imperiled) and appears on the British Columbia Ministry of Sustainable Resource Management red list, the most critical rank. There is currently no specific endangered species legislation in place for the protection of vascular plants in British Columbia that have been given this critical rank. The populations may be afforded some protection against certain types of property development because they occur in the Agricultural Land Reserve, where the primary use is agriculture. Intensive uses are not prohibited and could be inconsistent with the habitat requirements of *A. flagellaris*.



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. 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 and include 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 2004)

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 that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
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.

COSEWIC Status Report

on the

Stoloniferous Pussytoes

Antennaria flagellaris

in Canada

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2004

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SPECIES INFORMATION

Name and classification

Scientific name:	*Antennaria flagellaris* (A. Gray) A. Gray[1]
Synonyms :	*Antennaria dimorpha* var. *flagellaris* A. Gray
Common name:	Stoloniferous Pussytoes
Family:	Asteraceae (Compositae) Sunflower family
Major plant group:	Dicot flowering plant

Description

Antennaria flagellaris (A. Gray) A. Gray is a member of a genus of approximately 35 species mainly of North America but also found in South America (Cronquist 1994). The genus *Antennaria* belongs to the Inuleae tribe of the Asteraceae family. *Antennaria* has long been known for its taxonomic complexity, due to the existence of numerous apomictic clones that have been recognized as distinct species.

Fifteen species occur in British Columbia (Douglas 1998) and approximately 18 in Canada (Kartesz 1999). *Antennaria flagellaris* was first recorded in Canada by Douglas *et al*. (1998a).

Antennaria flagellaris is a stoloniferous, short-lived perennial from a fibrous root (Douglas 1998; Figure 1). The stolons are up to 10 cm long while the few central flowering stems are up to 3.5 cm tall. The numerous basal leaves and the few stem leaves are linear to linear-oblanceolate, silky woolly-hairy and 1-3 cm long. The flower heads are terminal with involucres of two types. The female involucres are 7-13 mm tall bracts that are tinged brown or reddish-brown, thinly woolly-hairy below. The male involucres are 4-7 mm tall translucent bracts that are brownish at the tips. The female flowers are 5-7 mm tall while the male flowers are 3-4.5 mm tall. The achenes are elliptic, warty and 2-3 mm long with a 6-8 mm tall pappus that has white, hairlike bristles.

Antennaria flagellaris is easily distinguished from other members of the genus in British Columbia by its conspicuous slender, leafless stolons. The species is easily overlooked, however, due to its small size and indistinct colour.

[1]Taxonomy and nomenclature follow Douglas *et al.* (1998c, 1998d, 1999, 2001).

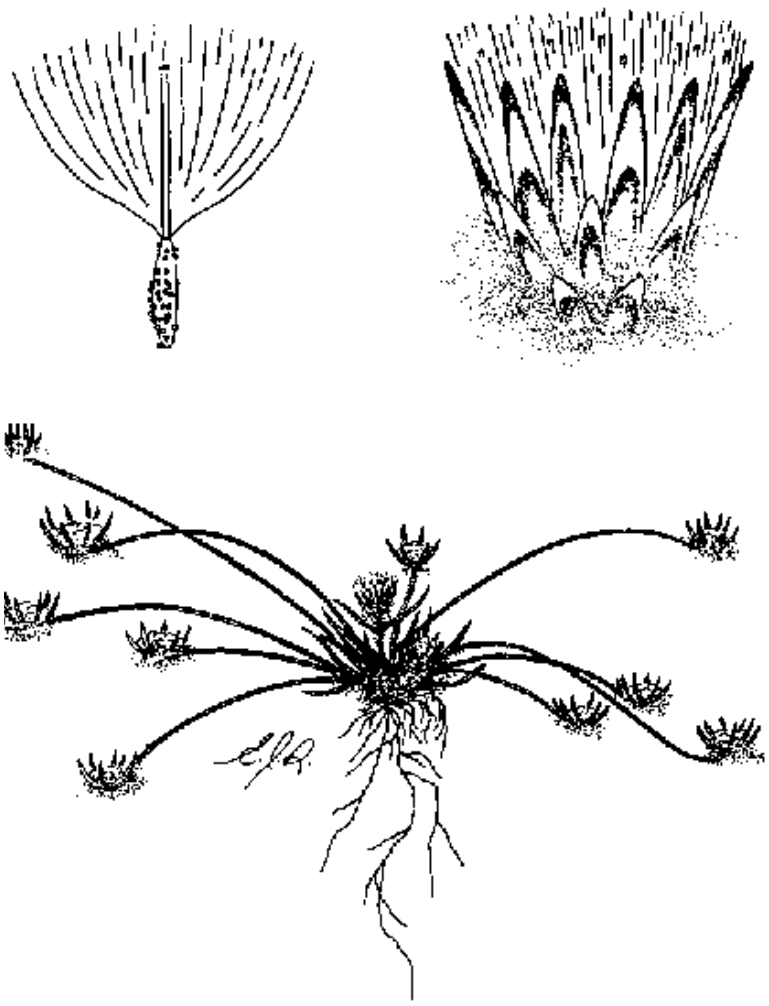

Figure 1. Illustration of *Antennaria flagellaris*; plant with plantlets reproduced at about ¾ life size (Line drawing by Elizabeth J. Steven in Douglas [1998]).

DISTRIBUTION

Global range

Antennaria flagellaris ranges from southwestern British Columbia, south in the western United States to Idaho, Wyoming, Nevada and California (Cronquist 1994; Figure 2). The nearest known occurrence to the BC population is in central Washington, on the Naches River (Hitchcock 1964), about 190 km to the south. Dispersal is by wind. Considering the distance and the limited habitat available, it is unlikely that United States populations will provide emigrants that can contribute to a rescue effect.

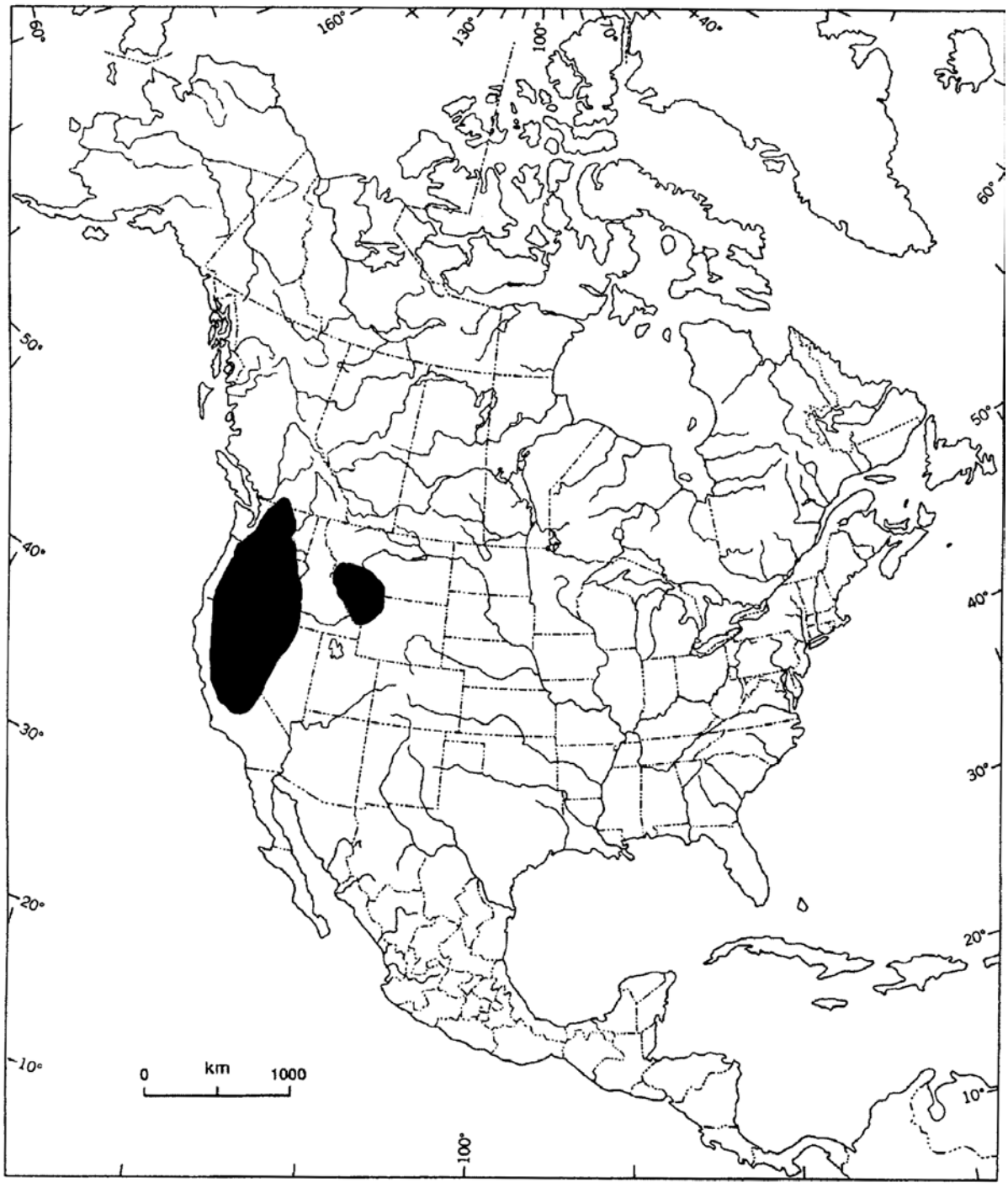

Figure 2. Distribution of *Antennaria flagellaris* in North America.

Canadian range

In Canada, *A. flagellaris* is known only from a 3.2 km length of Highway 3 in the Similkameen River valley, over about 4.8 km², southwest of Princeton in southwestern British Columbia (Douglas 1998; Douglas *et al*. 2002a, b; Figure 3).

Antennaria flagellaris is just one of a number of species recently discovered (since the1980s) along the British Columbia border from the Princeton area to the Roosville area. Some of these other species include: *Carex vallicola, Collomia tenellus, Floerkea proserpinacoides, Hedeoma hispida, Lipocarpha micrantha, Orobanche ludoviciana, Orthocarpus barbatus, Phacelia ramosissima, Psilocarphus brevissimus, Silene spaldingii* and *Trichostema oblongum* (Douglas *et al.*1998a, b). Most of these species have at least one thing in common; the areas in which they were found were never subjected to botanical collecting. Examination of collection localities in all major herbaria in Canada reveal that none of the many active field botanists working along the border ever collected in the immediate vicinity of the recently collected plants.

This species was discovered in British Columbia in 1996 by F. Lomer. It grows in a natural ephemeral habitat type absent of non-native species in an undeveloped area, so it is unlikely that it was introduced to this site. Furthermore, the region has been generally under-collected so it was likely over-looked. Only one of the other 10 rare plant species that occur in the Princeton area was collected (on one other occasion) prior to 1996. The Princeton area may have been passed over by numerous botanists who were en route from the coast to collecting destinations in the biologically rich Okanagan Valley further east. Another argument that favors this species as a native element is the existence of numerous taxa whose distribution follows a similar pattern in the Pacific Northwest with the northern limit of the species' range in British Columbia. The shrub steppe and open forests of southern British Columbia are part of a much larger ecological unit that extends south to Washington, Oregon and other intermountain states. In addition, it is likely a native population since it is comprised of several subpopulations, and it would have taken some time to disperse as it has over this area.

Finally, 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 native.

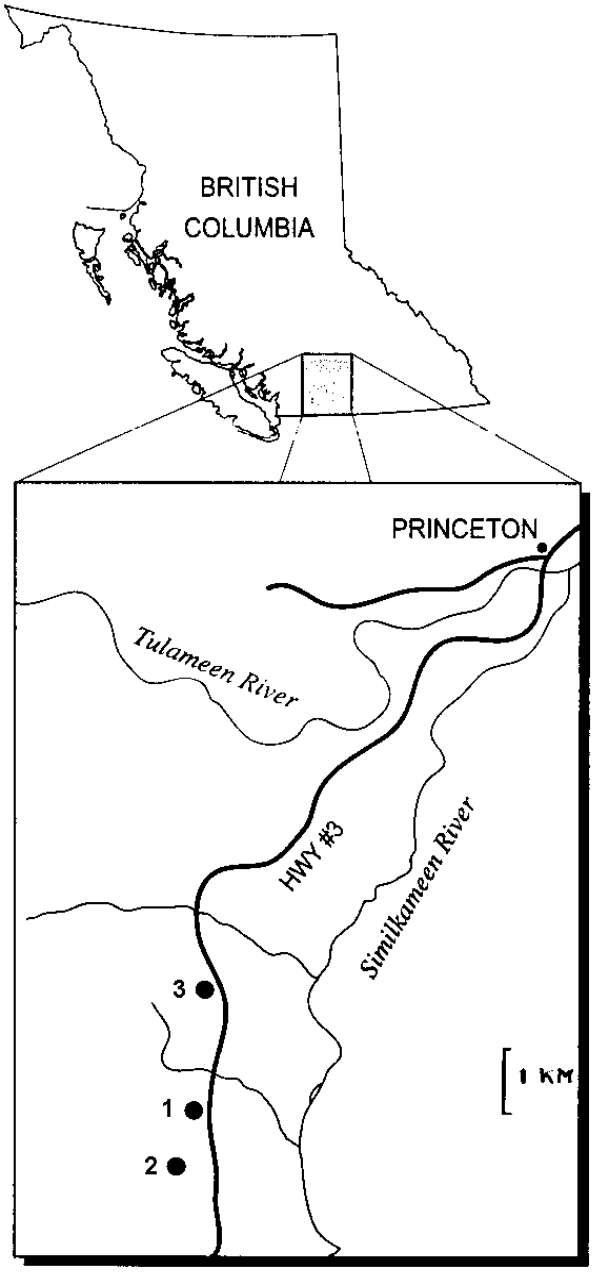

Figure 3. Distribution of *Antennaria flagellaris* in British Columbia (numbers refer to populations in Table 2).

Frank Lomer was the first collector to intensively investigate this area, especially the areas within the Roany soil series (Figure 4). He has searched for new sites for this species ever since he found it in 1996 (Lomer, pers. com., 2003). He regularly collects throughout the interior of British Columbia in unique or interesting habitats with hopes of new discoveries and keeps an eye out for several rare species including *Antennaria flagellaris*. He has found no other locations during this time. In both 2002 and 2003, he was contracted to do specific searches for new sites for the rare species known in the Princeton area. He surveyed the east side of the Similkameen River opposite the known sites without success.

George Douglas also searched the Princeton area in the years 1996, 1999, 2002 and 2003. His early searches (1996, 1999) were not in the areas where *A. flagellaris* occurs but did encompass the areas of the Roany soil series north of Princeton. All *A. flagellaris* populations occur within the southwestern roany soils polygon (Figure 4). It is estimated that at least 70% of the potential habitat has been surveyed.

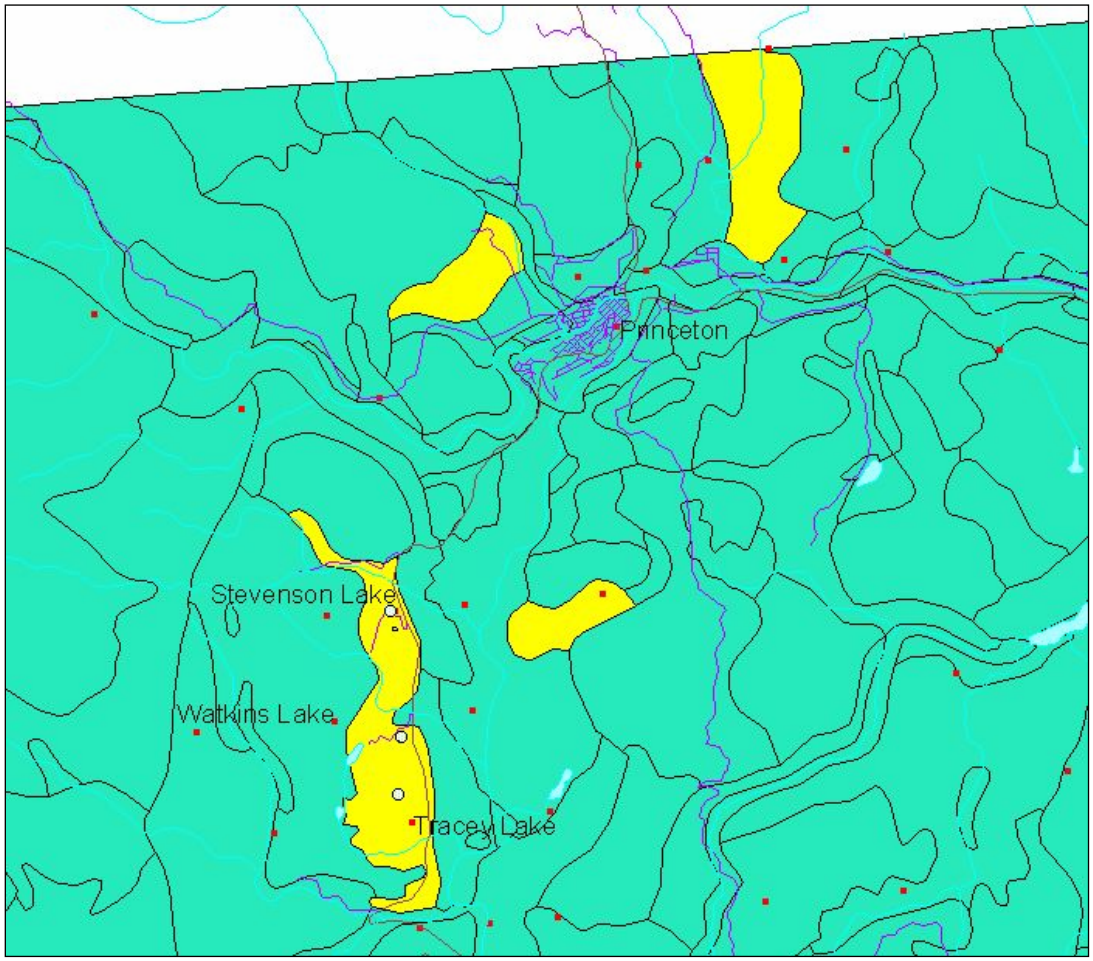

Figure 4. Extent of the Roany soil series in British Columbia (four yellow areas, or pale areas in b/w copies). The three *Antennaria flagellaris* sites are indicated by the small open white circles between Stevenson Lake and Tracey Lake.

HABITAT

Habitat requirements

Antennaria flagellaris occurs in the southern interior of British Columbia along the Similkameen River valley in the lower montane zone in the Interior Douglas-fir biogeoclimatic zone (Hope *et al*. 1991). Climatic conditions in this region are continental, characterized by hot, dry summers, a fairly long growing season and cool winters. A rainshadow effect prevails in this area due to the presence of the Coast-Cascade Mountains to the west.

Within this zone, *A. flagellaris* occurs on calcareous, gravelly-clay soils or gravelly sands. Detailed soil mapping for the area indicates a complex of the Belfort, Lamont, and Roany soil series (Green and Lord 1979). Of particular interest is the Roany soil series (Figure 4), a till-derived soil type with a Solonetzic Dark Gray Chernozem classification, that occupies an area of 1750 ha. Pockets of bentonite (an absorptive and colloidal clay mineral) and eroded banks are a characteristic feature of the Roany soil series. The unusual soil moisture regimes of the *A. flagellaris* sites may be due to bentonite outcroppings or other soil characteristics. The Roany soil series also has high pH and salt crystals at depth.

The *A. flagellaris* sites are characterized by a unique hydrology. The slopes, which are moderate (20-30%) with open southerly aspects, are eroded, unstable, and characterized by ephemeral seepage. These moist microsites are saturated by underground water in the winter and dry up in the summer. The slow down-slope movement that occurs as a result of the unusual hydrology is unique in the region and excludes many taxa that are not able to tolerate the conditions. As a result, the slope is disturbed and sparsely vegetated with *A. flagellaris* the dominant component. No non-native species occur in these sites.

Vegetation in the vicinity of the *A. flagellaris* sites is characterized by *Artemisia tridentata* (big sagebrush) shrub/grassland with scattered *Pinus ponderosa* (Ponderosa pine) and *Pseudotsuga menziesii* (Douglas-fir). The sites occur at the western edge of the distribution of open shrub/grassland at that elevation.

In these sites, *A. flagellaris* occurs with *Eriogonum ovalifolium* var. *nivale*, *E. heracleoides* var. *angustifolium*, *Lomatium ambiguum*, *Arenaria capillaris* ssp. *americana*, *Elymus trachycaulus*, *Danthonia unispicata, Ericameria nauseosus var. speciosa*, and *Erigeron compositus* var. *glabratus*. No non-native species were found in association with *Antennaria flagellaris*.

Trends

Past range use appears to have been light in the specific habitat type that *Antennaria flagellaris* occupies.

Table 1. Summary of Populations and Associated Vascular Plant Species.	
Populations	Associated vascular plant species (including community dominants and co-dominants)
Princeton, South of Stevenson Lake	*Ericameria nauseosus* var. *speciosa* and *Pseudotsuga menziesii*
Princeton, Tracey Lake	Unknown
Princeton, Stevenson Lake	1. *Arenaria capillaris*, *Danthonia unispicata*, and *Eriogonum heracleoides*. 2. *Eriogonum ovalifolium*, *Erigeron compositus* var. *glabratus* and *Arenaria capillaris* 3. *Arenaria capillaris*, and *Elymus trachycaulus*

Protection/ownership

The populations of *A. flagellaris* in British Columbia occur on two private properties in the Agricultural Land Reserve.

BIOLOGY

Little information is available on the biology and ecology of *Antennaria flagellaris* in British Columbia. Only basic reproductive facts have been compiled about the species.

Antennaria flagellaris is a short-lived, dioecious perennial (male and female structures on separate plants). The species is wind-pollinated and produces seeds sexually by outcrossing (Bayer 1996). The numerous hair-like bristles of the mature achenes facilitate its dispersal by wind. Plants also reproduce vegetatively by producing stolons that terminate in plantlets. Initially, the mother plant provides the plantlet with nutrients via the stolon. The genetically identical plantlets eventually become independent plants as stolons are severed over time. This mode of reproduction results in very restricted dispersal, as stolons only grow up to 10 cm long (Douglas 1998).

The fruits consist of single-seeded achenes. There is no specific information on survival and longevity of the species or on aspects of its physiology or adaptability.

The ability of this species to persist, and produce fruits well after the calcareous soils lose most of their moisture is impressive, especially considering the shallow root systems. In most areas, where severe drought takes place annually, most of the plants have taproots.

POPULATION SIZES AND TRENDS

Three geographically restricted populations of *Antennaria flagellaris* are known from a 3.2 km stretch of highway over about 4.8 km² (Figure 3) in the Similkameen

River valley, south of Princeton, British Columbia (Table 2). They occupy about 2200 m² and number approximately 1,000,000 plants. (Plant numbers for the latter count were made by extrapolating from exact counts in five 1-m plots to the area covered.)

Table 2. Locations and Population Sizes for *Antennaria flagellaris* in Princeton, British Columbia.

Population	First counts and year	Current Number of plants/area (m²)
1. Princeton, South of Stevenson Lake	50+ - 1996	Ca. 5000/100 m² - 2003
2. Princeton, Tracey Lake area	unknown - 1997	400-500/84 m² - 2003
3. Princeton, Stevenson Lake area	1,400,000 +/- 100,000 - 2002	No visit in 2003

Short- and long-term trends for these populations are unknown but can be expected to vary markedly due to differences in yearly plantlet survival, seed germination and seedling success. Conditions on the unstable, ephemerally moist clay slopes may vary drastically from year to year when abnormal climatic fluctuations affect the site hydrology. Since this species is dioecious, we can infer that 50% of the population is not seed-bearing but for this species even these plants can reproduce asexually.

LIMITING FACTORS AND THREATS

In general, only 2% of BC grassland areas had protected status in 1992 (The Land Conservancy of BC 2002); however grassland and open forest habitats are threatened by a number of factors. Development pressure from the expanding population, habitat fragmentation, degradation due to weed invasion, and off-road vehicle activity have been identified as threats (BC WLAP 2002).

The most imminent threat to the populations of *Antennaria flagellaris* is their vulnerability to extirpation due to their small, occupied area (ca. 0.22 hectares). Such geographically restricted populations are more vulnerable to demographic and environmental variation and loss of genetic variability (Primack 1998). Since suitable habitats for *A. flagellaris* are also extremely restricted the opportunities for colonization and expansion are also limited.

The potential habitat of *A. flagellaris*, the open eroded slopes within the Roany soil series, is extremely restricted. Even within the area (1750 ha) mapped as Roany soil series, there are sizable pockets of two other series (Belfort and Lamont). These occupy 40% or 700 ha of the Roany soils series area. In addition, Roany soil series support large amounts of open *Pinus ponderosa* forests or *Artemisis tridentata* shrublands (Green and Lord 1979), thus suitable habitat is further limited.

Another threat that is likely to have an impact is recreational off-road vehicles use. The authors observed evidence of ATV and dirt bike use in the immediate area of the sites in 2002. In fact, there was evidence of it throughout the area and even as close

several metres at the most northern site. These vehicles have easy access to the area since fences only occur to the south. Due to the nature of the steep, clay slopes where *A. flagellaris* occurs, habitats could easily be modified by this activity. When moist, this habitat would be highly susceptible to disturbance, and at the same time, be at its most desirable to off-road users. Overuse of the habitat in this way could disturb the sites enough to radically alter the substrate, and promote the establishment of non-native species. Once ruts are created, especially across the slopes, organic debris accumulates and slope soil movement or soil moisture regimes are likely to be disrupted and become more favorable to non-native species.

The private properties where *A. flagellaris* occurs are in the Agricultural Land Reserve (ALR), where primary land use is agriculture. On these lands, development pressures may not appear to be an issue at this time. There have been no applications to have the private properties taken out of the ALR for development thus far (Wallace, pers. com., 2003), but landowners may decide to apply in the future. The success of these applications would be enhanced on the Roany soils series where *A. flagellaris* occurs since “steep slopes and lack of water for irrigation limit use of roany soils for agriculture. The shallow soil and the slow permeability of the underlying materials cause these soils to erode readily” (Green and Lord 1979). Furthermore, housing sales have trended upwards in the last 12-18 months in the Princeton area in tandem with markets in the Okanagan Valley (Fabri, pers. com., 2003). The *Antennaria flagellaris* locations are only within five kilometers of the town of Princeton. The first author has observed that in recent years many tracts of ALR land in southern British Columbia have been converted to housing developments, shopping malls and golf courses, either by decisions of the Agricultural Land Commission or very rarely by an 'order in council' by the sitting provincial legislature.

Even if the ALR status currently prevents subdivision development, activities that are allowable in the ALR could also potentially threaten the populations. For instance, some types of fill/soil removal are allowable without application to the Agricultural Land Commission (Provincial Agricultural Land Commission 2003). Any developments that even slightly change groundwater levels could be devastating to this taxon.

Another potential threat is weed control activities. Marginally specific chemical weed control substances that kill broad-leaved plant species would likely kill *A. flagellaris*. The populations occur within 50-150 m of the power line right-of-ways which presents a significant problem in terms of weed control.

The potential development of coalbed methane from deposits underlying the region around Princeton potentially could have significant impacts on surface habitats and ground water hydrology.

SPECIAL SIGNIFICANCE OF THE SPECIES

The calcareous clay seepage slopes occupied by *A. flagellaris* are unique in the Princeton area. In addition, they are not yet invaded by introduced species. Therefore, they represent important conservation areas in relatively pristine condition.

Furthermore, the populations of *A. flagellaris* are unique in that they 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 DESIGNATIONS

International status

Antennaria flagellaris 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. Globally, *A. flagellaris* has a rank of G5? indicating that in most of its range the plant is “apparently common, demonstrably secure and essentially ineradicable under present conditions".

National and provincial status

Since the species is restricted to British Columbia, it has a national rank in Canada of N1. Provincially, *A. flagellaris* has been ranked by the Conservation Data Centre as S1 and appears on the British Columbia Ministry of Sustainable Resource Management red list, the most critical rank (Douglas *et al*. 2002b). 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".

There is currently no specific endangered species legislation in place for the protection of vascular plants in British Columbia that have been given this critical rank. The population may be afforded some protection against certain types of property development because it occurs in the Agricultural Land Reserve, where the primary use is agriculture. Intensive uses are not prohibited and could be inconsistent with the habitat requirements of *A. flagellaris*. As a result, in the absence of active stewardship, populations of rare plants on these private lands are not secure.

TECHNICAL SUMMARY

Antennaria flagellaris
stoloniferous pussytoes antennaire stolonifère
Range of Occurrence in Canada: British Columbia

Extent and Area Information	
• *Extent of occurrence (EO)(km²)* (along 3.2 km of highway)	4.8 km²
• *Specify trend in EO*	Unknown, probably stable
• *Are there extreme fluctuations in EO?*	Unknown since no losses or re-discoveries of sites have been documented
• *Area of occupancy (AO) (km²)* (area of 3 habitats occupied)	<<1 km² (0.22 ha)
• *Specify trend in AO*	Unknown, probably stable, but might fluctuate depending on groundwater hydrological changes with precipitation patterns
• *Are there extreme fluctuations in AO?*	Unknown but some fluctuations in area may occur due to annual fluctuations in climatic conditions and site hydrological regime
• *Number of known or inferred current locations*	3
• *Specify trend in #*	Unknown, probably stable
• *Are there extreme fluctuations in number of locations?*	Unknown but perhaps some fluctuation is possible due to annual fluctuations in climatic conditions and site hydrological regime
• *Specify trend in area, extent or quality of habitat*	Unknown, probably stable
Population Information	
• *Generation time (average age of parents in the population)*	Unknown, possibly 3 years
• *Number of mature individuals*	ca. 1,400,000 +/- 100,000
• *Total population trend:*	Inferred decline based on potential developments in the region such as coalbed methane production
• *% decline over the last/next 10 years or 3 generations.*	Not applicable
• *Are there extreme fluctuations in number of mature individuals?*	Unknown but perhaps possible under severe conditions of drought
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	Unknown, probably stable

• *Are there extreme fluctuations in number of populations?*	Unknown and unlikely considering the few sites known and no evidence of changes based on site hydrological regime fluctuations
• List populations with number of mature individuals in each: 1) 5000; 2) 400-500; 3) 1,400,000 +/- 100,000	
Threats (actual or imminent threats to populations or habitats)	
-off-road vehicle use - weed control activities on power line just north of site - potential change in water table level with increasing population base and potential coalbed methane production	
Rescue Effect (immigration from an outside source)	
• *Status of outside population(s)?* **USA:** S1 in Wyoming, and S3.2 in California. It is unranked in Washington, Oregon and Idaho.	
• *Is immigration known or possible?*	Unknown
• *Would immigrants be adapted to survive in Canada?*	Unknown
• *Is there sufficient habitat for immigrants in Canada?*	Unlikely
• *Is rescue from outside populations likely?* (Distance to nearest population in Washington State is about 190 km and habitats are very small.)	Unlikely
Quantitative Analysis	Not Applicable
Other Status	

Status and Reasons for Designation

Status: Endangered	**Alpha-numeric code:** B1ab(ii,iii,v)+2ab(ii,iii,v)

Reasons for Designation:
A short-lived perennial plant present at only three geographically restricted localities occupying very small areas of specialized habitat of ephemerally moist seepage sites on private lands. It is at greatest risk from ATV use that currently is evident in close proximity to the populations. It may also be impacted by changes in ground water hydrology and surface impacts from increased development activities in the area such as the proposed production of coalbed methane.

Applicability of Criteria

Criterion A (Declining Total Population): Not applicable: No declines documented

Criterion B (Small Distribution, and Decline or Fluctuation): Endangered under B1 and B2 (a and b, ii, iii, v) due to the small distribution with an extent of occurrence of <5 km^2 and small area of occupancy of << 1 km^2 (0.22 ha) and only known from 3 localities; threats of loss of area of occupancy, change in quality of habitat and reduction in number of individuals from ATV use are very real and of imminent occurrence; impacts from chemical weed control of nearby hydro right-of-way are a potential threat, as is the change in water table due to increased housing development.

Criterion C (Small Total Population Size and Decline): Not applicable: Large population and no declines documented.

Criterion D (Very Small Population or Restricted Distribution): Threatened under D2 with a small area of occupancy (<20 km^2) and < 5 locations.

Criterion E (Quantitative Analysis): Not applicable.

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George W. Douglas has an M.Sci. (Forestry) from the University of Washington and a Ph.D (Botany) from the University of Alberta, Edmonton. George has worked with rare plants for over 20 years. He was senior author of *The Rare Plants of the Yukon* (1981), co-authored *The Rare Plants of British Columbia* (1985) and was senior author of the *Rare Native Plants of British Columbia* (1998, 2002). He is also the senior editor for the *Illustrated Flora of British Columbia* (1998-2002). George served as the program botanist for the British Columbia Conservation Data Centre from 1991 to 2003 and is currently running an ecological consulting company. George has written or co-written or is in the process of writing 33 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 a botanist since 1995. Jenifer has done extensive field work in botany and is senior author for three 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).

Ksenia Barton has an M.Sc. (Biology) from McGill University. Ksenia specializes in plant ecology and has conducted research and resource inventory projects throughout British Columbia for the past seven years. She has written four species accounts for rare plants as part of the British Columbia Identified Wildlife Strategy. She has recently completed extensive surveys for rare plants throughout the Black Hills (in South Dakota and Wyoming) for the US Forest Service.

COLLECTIONS EXAMINED

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