

COSEWIC
Assessment and Status Report

on the

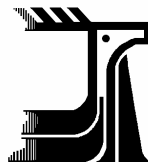
Showy Phlox
Phlox speciosa

in Canada



THREATENED
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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Production note:

COSEWIC would like to acknowledge Ksenia Barton for writing the status report on the showy phlox *Phlox speciosa* prepared under contract with Environment Canada, overseen and edited by Erich Haber, the COSEWIC Plants and Lichens (vascular plants) Species Specialist Subcommittee Co-chair.

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Showy Phlox — Provided by Ksenia Barton.

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COSEWIC Assessment Summary

Assessment Summary – November 2004

Common name

Showy Phlox

Scientific name

Phlox speciosa

Status

Threatened

Reason for designation

A showy perennial known from a very small area and from fewer than 10 locations. The species is present within a region subject to on-going habitat loss and degradation as a consequence of private property development, agricultural practices, and the spread of invasive plants.

Occurrence

British Columbia

Status history

Designated Threatened in November 2004. Assessment based on a new status report.



COSEWIC
Executive Summary

Showy Phlox
Phlox speciosa

Species information

Only a single subspecies of showy phlox, *Phlox speciosa* ssp. *occidentalis*, is known from Canada. The species is therefore referred to simply as *Phlox speciosa* throughout the report. It is a perennial plant with a somewhat shrubby base. Stems are erect, 15-40 cm tall, rising from a woody taproot. The plant is glandular to glandular-hairy above, and hairy below. The opposite leaves are linear to lance-shaped, to 7 cm long and 1 cm wide. The plant has clusters of flowers at the ends of stems, with leafy bracts. Corollas (joined petals) range from pink to white. The corolla tube (1-1.5 cm long) spreads to five wide lobes (1-1.5 cm long) that are notched at the tip. Calyces (joined sepals) are glandular, with flat, transparent segments between the five green ribs. Styles range from 0.5-2 mm long.

Distribution

Historically, the taxon is known to occur in the Okanagan Valley from Summerland in the north, south to Skaha Lake (formerly Dog Lake), and southwest to the Twin Lakes. Extant and newly discovered populations are concentrated in a cluster around Yellow Lake and Twin Lakes, between the towns of Keremeos and Penticton. The known extent of its range in British Columbia is about 57 km². The area of habitat occupied at the known populations is estimated to be between 0.9-1.4 km².

Habitat

Phlox speciosa seems to require the following habitat features: a very hot, dry, interior climate; open *Pseudotsuga menziesii* (Douglas-fir) and/or *Pinus ponderosa* (ponderosa pine) forests or *Artemisia tridentata* (big sagebrush) shrub/grasslands; a specific range of elevations (700-1100 m); and cool aspect slopes or level sites.

Biology

Little specific information is available on the biology of *Phlox speciosa*. The plant is a perennial, and reproduces by seed.

Population sizes and trends

Nine populations and 20 sub-populations of *Phlox speciosa* are known to be extant in Canada. Four of the populations and several of the sub-populations were discovered in 2003. Two or three historical populations have not been relocated, and may be extirpated. A total of 6,400-57,000 mature reproducing individuals are estimated to exist in Canada. Almost no information was available on population sizes prior to 2003, so trends in population sizes for the taxon cannot be characterized.

Limiting factors and threats

A potential threat to *Phlox speciosa* populations is the lack of protection of natural plant communities throughout the majority of the plant's range in Canada. Within the current extent of occurrence, 41% of the area is privately owned land, which is particularly vulnerable to changes in land use and development, including range reseeding. Increasing recreational property development represents the most important trend in habitat loss. Canadian populations are also potentially vulnerable given their relatively small area of occupancy. Another potential threat is weed control activities required by the Weed Control Act. Use of marginally specific herbicides that kill broad-leaved plant species would likely kill *Phlox speciosa*.

Special significance of the species

Canadian populations of *Phlox speciosa* occur at the northern extent of their geographic range. Although so-called "peripheral" populations have often been assigned low priority for conservation, the importance of populations at the edges of their ranges is increasingly being recognized. As its common name suggests, *Phlox speciosa* is also a very showy and attractive plant. It has been used as a horticultural species in appropriate North American climates.

Existing protection or other status designations

No legal protection specifically protects *Phlox speciosa* populations in any part of its range. The taxon has a Subnational Natural Heritage Status Rank of Critically Imperiled (S1) in British Columbia, indicating that it is extremely rare or especially vulnerable to extirpation. A portion of one population occurs on federal land that is being managed by the Nature Trust. Other populations occur on private land and on non-protected provincial crown land.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5th 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

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

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal agencies (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 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 (NOVEMBER 2004)

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 it is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for atleast 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 wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its 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.



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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

Showy Phlox

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in Canada

2004

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SPECIES INFORMATION

Name and classification

Scientific name:	<i>Phlox speciosa</i> Pursh ssp. <i>occidentalis</i> (Durand ex Torr.) Wherry
Synonym:	<i>Phlox speciosa</i> Pursh var. <i>occidentalis</i> (Durand) M. Peck
Bibliographic citations:	<i>Phlox speciosa</i> Pursh. Fl. Amer. Sep. 149. 1814 [Dec 1813]. <i>Armeria speciosa</i> Kuntze Revisio Gen. Pl. 2:432. 1891. <i>Phlox occidentalis</i> Durand ex Torr. Explor. & Surv. Railroad Route from Mississippi River to Pacific Ocean 4(5):125. 1957. <i>Phlox speciosa</i> var. <i>latifolia</i> f. <i>occidentalis</i> A. Brand Pflanzenr. IV. Fam. 250:74. 1907. <i>Phlox speciosa</i> ssp. <i>occidentalis</i> (Durand) Wherry Proc. Acad. Nat. Sci. Philadelphia 90: 133. 1938.
Common name:	Showy Phlox, Western Showy Phlox, Western Pink Phlox
Family:	Polemoniaceae (phlox family)
Major plant group:	Dicot flowering plants

The genus *Phlox* is a member of the family Polemoniaceae. The genus occurs in North America and northern Asia, but the greatest number of species is found in western North America. There are 68 species of *Phlox* in North America, with 16 species found in Canada and 6 in British Columbia (Douglas *et al.* 1999). Currently, there are no known taxonomic problems or uncertainties associated with *Phlox speciosa* ssp. *occidentalis*. The taxon has not been subject to taxonomic or nomenclatural changes in recent history. Since the only subspecies that is found in Canada is ssp. *occidentalis* (Douglas *et al.* 1999), the Canadian plants are referred to, in this report, as *Phlox speciosa* (except where greater precision is required to delimit the range of this taxon). Five other subspecies are found in the western United States.

Description

Phlox speciosa is illustrated in Figure 1. It is a perennial herb with a somewhat shrubby base. Stems are erect, 15-40 cm tall, rising from a woody taproot. The plant is glandular to glandular-hairy above, and hairy below. The opposite leaves are linear to lanceolate, to 7 cm long and 1 cm wide, with well-developed internodes. The inflorescence consists of loose, leafy-bracted, terminal clusters of stalked flowers. Corollas range from pink to white. The corolla tube (1-1.5 cm long) spreads to five wide lobes (1-1.5 cm long) that are notched at the tip. Calyces are glandular, with flat, transparent segments between the five green ribs. Styles range from 0.5-2 mm long (description based on ssp. *occidentalis* in Douglas *et al.* 1999).

Phlox speciosa can be distinguished from other *Phlox* species in British Columbia by its erect stature, opposite leaves (1-7 cm long), stalked flowers, glandular calyces, and short styles 0.5-2 mm long. The most similar species is *Phlox longifolia*, but it has very distinctive long styles (6-15 mm long).

Additional descriptions and keys for *Phlox speciosa* [ssp. *occidentalis*] are available in American floras (see Hitchcock *et al.* 1959; Peck 1961; Cronquist *et al.* 1984; Hickman 1993).



Figure 1. Photograph of *Phlox speciosa* taken in British Columbia in 2003. The flower colour is darker pink than is typical for British Columbia populations.

DISTRIBUTION

Global range

Globally, *Phlox speciosa* ssp. *occidentalis* occurs only in western North America (Figure 2). The range in Figure 2 is interpreted from distributional information provided in two floras (Hitchcock *et al.* 1959, Hickman 1993) and from states of occurrences reported in NatureServe (2004). The species extends from southern British Columbia to northern Oregon and eastward to Idaho and western Montana. From southern Oregon, the species extends into the Sierra Nevada of California and Nevada and the Klamath and Northern Coast ranges of California.

NatureServe has ranked the global status of *Phlox speciosa* ssp. *occidentalis* as G5TNR, meaning “Secure” (common, widespread, and abundant) at the species level, but “not ranked” at the subspecies level (NatureServe 2004).

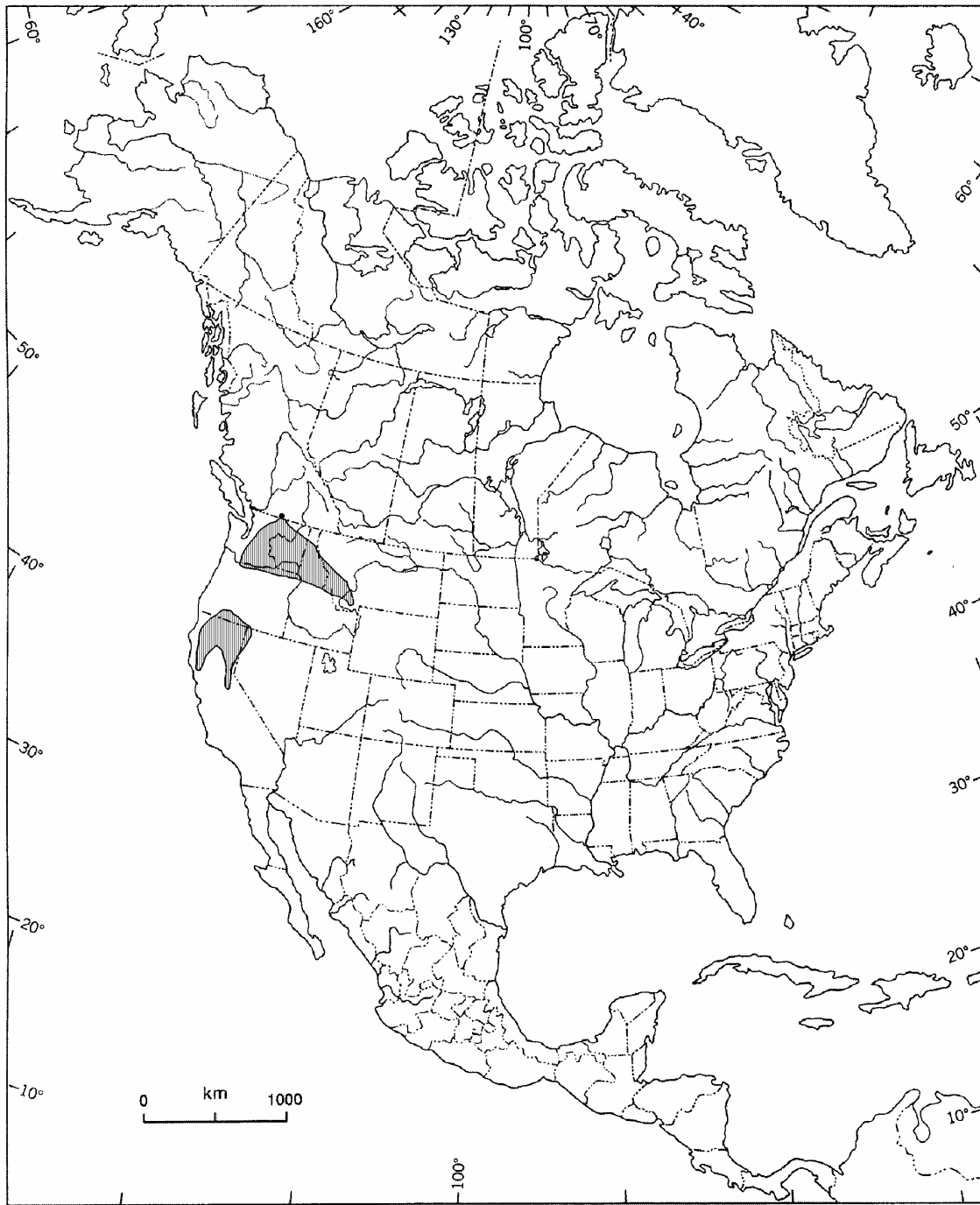


Figure 2. The distribution of *Phlox speciosa* in North America.

Canadian range

The Canadian range of *Phlox speciosa* is illustrated in Figure 3. The taxon has a restricted range, and is known only from the southern interior of British Columbia (Scoggan 1979). All historical, unconfirmed, and confirmed locations for this species occur in the Okanagan Valley.

The nearest population in Washington state may be along the Sanpoil R., about 95 km north of Wilbur and about 128 km south of the main range of the species in British Columbia (Washington State population data courtesy Dr. David Giblin, University of Washington Herbarium).

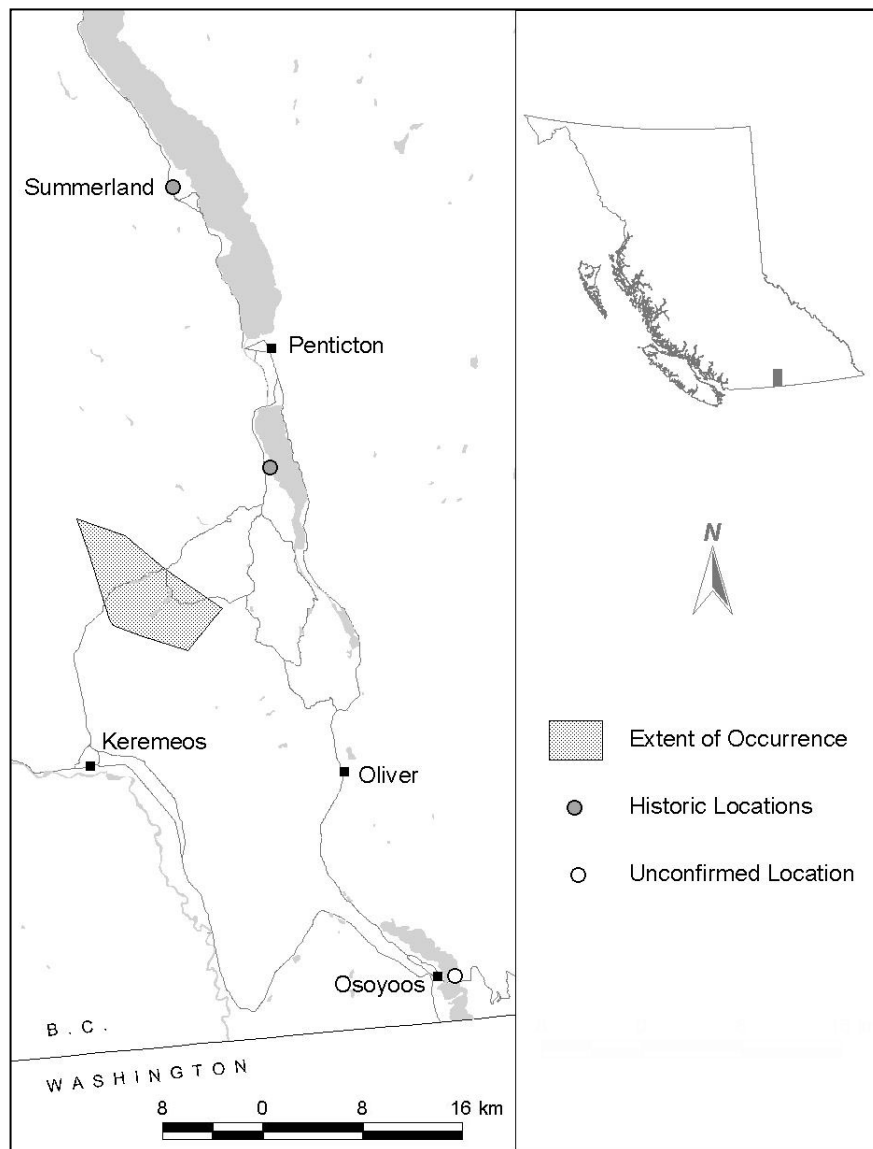


Figure 3. Present extent of occurrence of *Phlox speciosa* in British Columbia (range of species is represented by the shaded polygon; major lakes are shown as grey areas).

Historically, the taxon is known to occur in the Okanagan Valley from Summerland, at the northern extremity of the species range, south to Skaha Lake (formerly Dog Lake), and southwest to the Twin Lakes (Table 1). The historic Summerland (from 1919) and Skaha Lake (from 1927) populations could not be relocated during the June 2003 field survey conducted by Ksenia Barton and Jan Teversham. A brief field survey was conducted in those areas in apparently suitable habitats, but there was no detailed location information available for the Summerland and Skaha Lake sites, and it is possible that the survey failed to find extant populations in those areas. The lack of recent collections/observations at those sites may, however, be an indication that those populations have been extirpated.

Table 1. Status of *Phlox speciosa* populations in British Columbia.

Populations	Number of Sub-populations	First Observed	Last Observed	Population Status
Summerland	?	1919 ¹	1919 ¹	historical – may be extirpated
Skaha Lake	?	1927 ¹	1927 ¹	historical – may be extirpated
(=Dog Lake), west of Skaha Lake (=Dog Lake)	?	?	–	historical – may be extirpated
Osoyoos	?	?	–	recent unconfirmed – possibly misidentified
Twin Lakes	6	1940 ¹	2003 ²	confirmed
Yellow Lake East	2	1964 ^{1?}	2003 ²	may form a single population with Yellow Lake South and West; 1964 observation not specific about location
Yellow Lake South	2	1997 ¹	–	may form a single population with Yellow Lake East and West
Yellow Lake West	1	1964 ^{1?}	2003 ²	may form a single population with Yellow Lake East and South; 1964 observation not specific about location
White Lake	1	2002 ³	2003 ²	confirmed
Ford Lake	2	2003 ²	2003	newly discovered
McKay Creek	1	2003 ²	2003	newly discovered
Park Rill	3	2003 ²	2003	newly discovered
Yellowlake Creek	2	2003 ²	2003	newly discovered

¹BC CDC 2002

²Field survey conducted by Ksenia Barton and Jan Teversham (June 2003)

³Krannitz, pers. comm., 2002

A recent unconfirmed observation of *Phlox speciosa* was made near Osoyoos. The Osoyoos observation may be a case of misidentification as the observer noted the plants flowering in February and March, while *Phlox speciosa* flowered in May and June 2003 in all confirmed locations.

Extant and newly discovered populations are concentrated in a cluster around Yellow Lake and Twin Lakes, between the towns of Keremeos and Penticton. *Phlox speciosa* has been known to occur in the Twin Lakes area since 1940. Of the nine extant populations, four are newly discovered populations and occur within the historical extent of occurrence. It is not known whether the newly discovered populations are recently established, or whether collectors have overlooked them in the past. Most of the populations have more than one sub-population.

The known extent of occurrence is approximately 57 km². The known area of occupancy is estimated to be within the range of 0.9-1.4 km². The trends in extent of occurrence and area of occupancy are unknown.

HABITAT

Habitat requirements

All previously known *Phlox speciosa* locations in Canada were surveyed in June 2003 by Ksenia Barton and Jan Teversham, but the locations from 1927 and earlier could not be relocated. In addition, four new populations were discovered. Additionally, it was found that the extent of occurrence, area of occupancy, and population sizes are substantially larger than previously suspected.

Douglas *et al.* (1999) summarize the habitats of *Phlox speciosa* in British Columbia as “dry grasslands, shrublands, and open forests in the steppe and montane zones”. In the Pacific Northwest, *Phlox speciosa* [spp. *occidentalis*] occurs “in sagebrush and ponderosa pine areas” (Hitchcock and Cronquist 1973).

More specifically, *Phlox speciosa* occurs within the very hot, dry, interior of British Columbia’s Okanagan Valley within three biogeoclimatic units: the Okanagan Very Dry Hot Bunchgrass variant (BGxh1), the Okanagan Very Dry Hot Ponderosa Pine variant (PPxh1), and the Okanagan Very Dry Hot Interior Douglas-fir variant (IDFxh1). The extent of these biogeoclimatic units is shown in Figure 4. See Lloyd *et al.* (1990) and Meidinger and Pojar (1991) for descriptions of these units.

Sites typically occur on dry soils including Brunisol, Chernozem or Regosol soils, derived from morainal, colluvial, glaciofluvial, or bedrock surficial materials. Sites sometimes exhibited signs of moderate erosion. The populations occur on open sites, such as areas of widely spaced bunchgrasses where big sagebrush (*Artemisia tridentata*) is a characteristic element, and in open ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) forests with 25% canopy closure or less.

Locations were recorded using a GPS unit, then mapped onto a topographic base to determine location elevations. Plants occur within an elevational range of 700-1100 m where they are found on slopes and level sites. Sloping sites tend to be somewhat protected from direct sunlight, and have aspects ranging from 285°-135°.

In general, at sites with the required climate and elevational range, *Phlox speciosa* occurs within a variety of habitats including areas subject to various disturbances, including: roadcuts, logging, soil disturbance, moderate cattle grazing, deer trampling, and the proliferation of introduced species.

Not all areas of seemingly appropriate habitat in close proximity to patches of *Phlox speciosa* are apparently suitable, or at least not occupied. Additional habitat requirements, or other factors may exist that would explain why the extent of occurrence is much smaller than the extent of apparently suitable habitat.

Trends

Figure 4 shows the extent of biogeoclimatic units in which *Phlox speciosa* occurs. Within that area, suitable habitat is restricted to locations that meet the plant's habitat requirements, outlined above, including a specific range of elevations (700-1100 m). The past and present extents of suitable habitat are unknown. There are fairly extensive areas of potential habitat that have not been surveyed, especially in areas lacking good road access and on Aboriginal lands.

The habitat availability for *Phlox speciosa* is clearly decreasing. The Okanagan Valley is considered one of the most endangered natural areas in Canada. There were significant habitat losses in the valley in the 20th century, and the losses are expected to continue. Very little of the valley has protected area status, and the area is heavily crossed by roads. In general, the habitats that support *Phlox speciosa* are subject to a variety of anthropogenic threats, including livestock grazing, range re-seeding, off-road recreation, agricultural cultivation and development, recreational property development, prescribed burning, forest encroachment, road and trail development, and alien plant species introductions (Royal British Columbia Museum 1995).

Recreational property development represents the most important trend in habitat loss. Within the current extent of occurrence, 41% of the area is privately owned land. The remainder of the extent of occurrence is within provincial crown land, but none of that crown land occurs within a protected area. Current private land uses in and around the extent of occurrence include rangeland, agricultural cultivation, hobby farms, golf course, residential properties, and recreational properties.

Habitat loss due to property development is illustrated by cases where *Phlox speciosa* occurs in yards directly adjacent to homes. In some cases, perhaps only a small area of habitat has been lost in others a larger loss may have occurred. At the time of writing, at least 32 ha of property were for sale and were marketed as undeveloped sites for the construction of homes and for keeping horses.

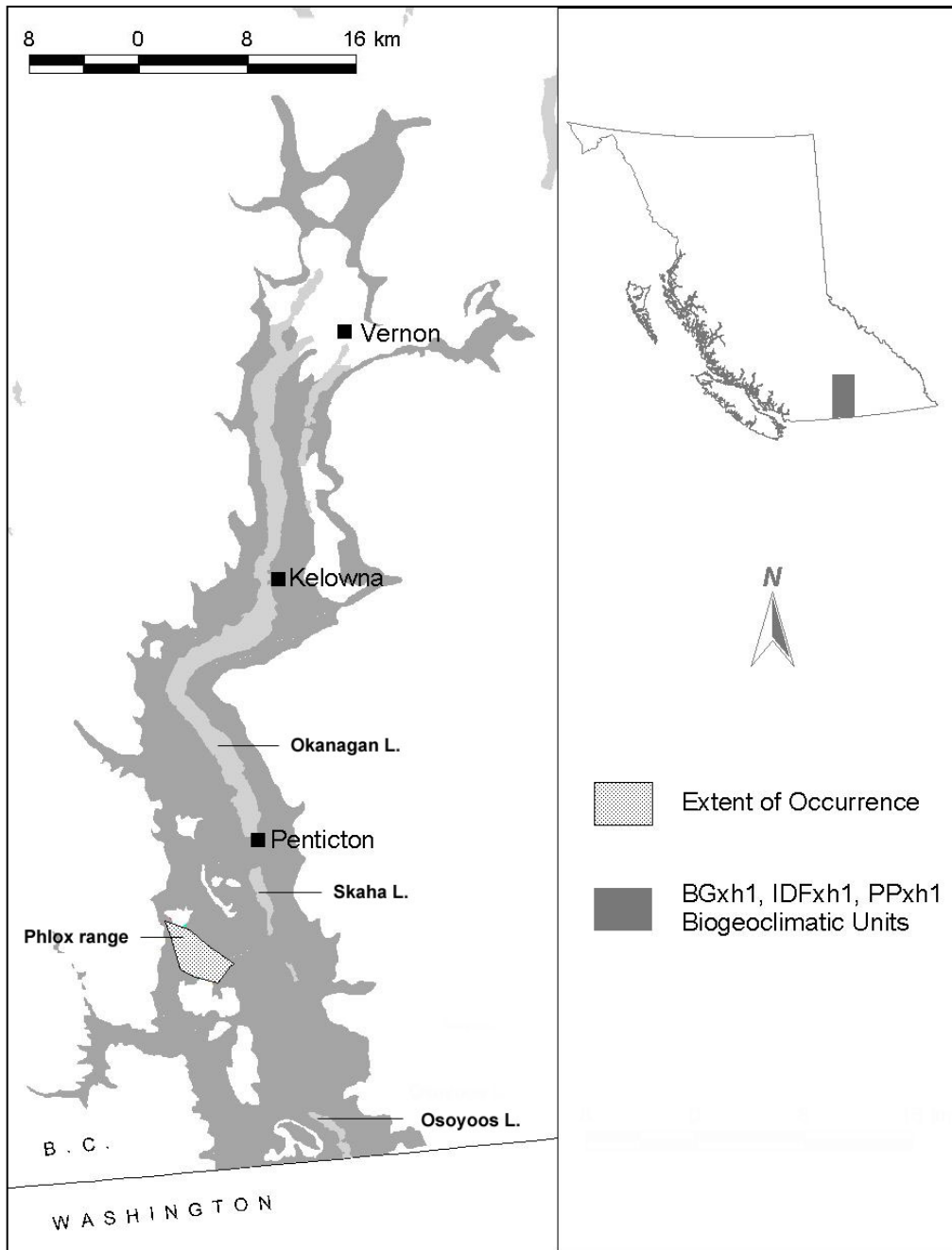


Figure 4. Extent of biogeoclimatic units within which *Phlox speciosa* occurs.

Habitat protection/ownership

The majority of the current extent of occurrence of *Phlox speciosa*, about 59%, occurs within provincial crown land. None of the provincial crown land within the extent of occurrence currently has protected area status.

The remainder of the extent of occurrence (41%) is privately owned land. The majority of the area of occupancy occurs on private land. The White Lake Ranch, which supports a portion of a population of *Phlox speciosa*, is on federal land owned by the National Research Council. The Ranch is being managed as a “biodiversity ranch” by the Nature Trust, in conjunction with the South Okanagan Similkameen Conservation Program. At the White Lake Ranch, conservation activities are being integrated with grazing and other sustainable resource uses to enhance biodiversity and other habitat values.

BIOLOGY

General

The taxon is a perennial with plants observed in the field varying from small, non-flowering, and essentially herbaceous plants, to larger plants with woody stems with showy displays of dozens of flowers. There is little information available in the literature on the biology and ecology of *Phlox speciosa*.

Reproduction

Because *Phlox* species vary in their mating systems, and no specifics were found for *Phlox speciosa*, it would be difficult to make any useful generalizations based on information from the genus as a whole.

The species does not have any structures specialized for asexual reproduction. Because *Phlox speciosa* has often been observed in flower in British Columbia (BC CDC 2002), the plant is assumed to reproduce primarily by seed. Propagation of plants can be done in the spring with ripe seed and cuttings can be made in late summer (Slabý 2004). Pollinators were not observed in the field; however, flowering plants tend to grow in dense clusters, so reproductive individuals likely grow in close enough proximity to allow for effective pollen transfer. Site visits coincided with peak flowering, consequently no fruiting plants were observed.

Survival

The factors that affect the survival of *Phlox speciosa* are unknown. No diseases or herbivory of the plant were observed in the field.

Physiology

In British Columbia, the species grows within a narrow climatic range in a region with very dry, hot summers, but seemingly restricted to somewhat cooler sites based on aspect of the topography. Plants also grow within a narrow range of elevations, from 700 to 1100 m.

Like many perennial herbs, *Phlox speciosa* undergoes a dormant period during the winter. At most sites in British Columbia, the plant was in full bloom in the first week of June of 2003. In the sagebrush grassland habitat at the White Lake Ranch, the peak of blooming likely occurred in late May 2003, as most flowers had shriveled by early June.

Movements/dispersal

Dispersal by seed is likely the primary mode of dispersal of *Phlox speciosa*. In some species of *Phlox*, seed dispersal is aided by an explosive opening of the fruit, but it is not known whether this occurs in *Phlox speciosa*. The mechanism of pollen dispersal is unknown for *Phlox speciosa*.

Whereas *Phlox speciosa* is rare in southcentral British Columbia, the plant is widespread in the Pacific Northwest (Douglas *et al.* 1999; Hitchcock and Cronquist 1973). Due to the lack of information on dispersal abilities, if Canadian populations disappeared, it is uncertain whether populations in Washington State would eventually serve as a source for recolonization within the Okanagan valley. From the southernmost extent of occurrence of *Phlox speciosa* in British Columbia to the nearest population in Washington State is more than 120 km.

Nutrition and interspecific interactions

No specific information is available about the nutrient requirements or interspecific interactions of *Phlox speciosa*. Like many native grassland herbs, *Phlox speciosa* is probably vulnerable to competition from alien species.

Behaviour/adaptability

Given its limited range, *Phlox speciosa* is adapted to a relatively narrow range of climate but has some adaptability to a degree of habitat disturbance.

Phlox speciosa seems to tolerate an intermediate level of disturbance within its range. The plant was often observed growing on the edge of soil and bedrock road-cuts and along roadsides. The taxon often grows in habitats grazed by cattle and deer, however, it was not observed to grow in habitats that have been severely overgrazed. *Phlox speciosa* habitats are often subject to natural fires, and require regular burning to maintain the plant communities. Some *Phlox speciosa* locations occur in areas that have been cleared or mechanically altered in the past, often growing with a higher proportion of introduced grasses and other species. *Phlox speciosa* also grows on slopes that are subject to natural erosion processes.

Phlox speciosa is grown as an ornamental plant in residential gardens in the United States.

POPULATION SIZES AND TRENDS

Population sizes

The number of populations, population sizes, and area of occupancy of *Phlox speciosa* in Canada is greater than previously suspected. Table 2 summarizes the available information on *Phlox speciosa* populations. The populations known to be extant are located within a 57 km² area.

All of the current information on *Phlox speciosa* population sizes in Canada is based on a field survey completed over a 5-day period in June 2003 by Ksenia Barton and Jan Teversham. Only two locations have previous population size estimates available, from 1994 (BC CDC 2002). No census information or results from monitoring studies are available.

Populations in Table 2 were defined by mapping all extant locations in relation to one another. Gene flow is assumed to be significantly reduced between locations with significant intervening distances. As no data from gene flow studies are available for *Phlox speciosa*, the NatureServe's Element Occurrence Data Standard was applied to determine how locations should be grouped into populations. For species Element Occurrences, the recommended minimum separation distance is ≥ 1 km where the type of separation is unsuitable habitat or apparently suitable habitat (NatureServe 2002). Locations less than 1 km apart were therefore considered sub-populations of a single population.

Population and sub-population sizes were based on field estimations. For calibration, individuals (flowering and non-flowering) were counted within large defined areas to determine exact densities. Densities were typically higher than expected due to the less noticeable appearance of non-flowering individuals. Then sub-populations were surveyed on foot as qualitative changes in density were noted. The number of individuals was calculated based on the estimated area of occupancy and the estimated average density. Area of occupancy was estimated visually or by pacing for small areas. For large areas, area of occupancy was estimated by recording GPS points around the boundaries of the area. The points were then mapped onto a topographic map and a boundary was drawn around the area, taking into account GPS points and topography.

The estimated ranges of population sizes span up to an order of magnitude, due to the crude field population size estimation methods employed. Due to time limitations, field surveying emphasized finding new occurrences of Showy Phlox and defining the extent of occurrence of the species, as opposed to carrying out detailed population size estimates.

Table 2. Population sizes of *Phlox speciosa* in British Columbia.

Populations	Subpop.	Number of Plants	Reprod. Plants	Area of Occupancy (m ²)	Comments
Ford Lake		14-24	5-9	11-16	newly discovered in 2003
	A	9	3-5	6	
	B	5-15	2-4	5-10	
McKay Creek		100-200	20-30	50-150	newly discovered in 2003
Park Rill		150-1,150	58-552	300-2,300	newly discovered in 2003
	A	25-75	4-26	50-150	
	B	100-1,000	50-500	200-2,000	
	C	25-75	4-26	50-150	
Osoyoos	?	?	?	?	recent unconfirmed – possibly misidentified
Skaha Lake (=Dog Lake), west of	?	?	?	?	historical – last observation 1927
Skaha Lake (=Dog Lake)	?	?	?	?	historical – last observation 1927?
Summerland	?	?	?	?	historical – last observation 1919
Twin Lakes		11,000-100,000	2,100-24,000	350,000-530,000	areas of occupancy of sub-populations A and E estimated from map and GPS points size of sub-population A based on extrapolating from a census of plants within a 25 m ² plot the only previous quantitative survey around Twin Lakes (1994) found 75 plants within 200 m ² in one sub-population and 300 plants within 200 m ² in the other sub-population
	A	500-1,500	50-150	4,400-6,600	
	B	6	2	4	
	C	16-32	4-8	8-16	
	D	100-1,000	25-250	50-500	
	E	10,000-100,000	2,000-24,000	350,000-520,000	
	F	10-20	5-10	25-100	
White Lake		10,000-100,000	2,000-24,000	550,000-820,000	area of occupancy estimated from map and GPS points
					size of population based on extrapolating from a census of plants within a 25 m ² plot
Yellow Lake East		500-1,300	200-450	1,400-2,400	may form a single population with Yellow Lake South and West
	A	200-800	50-200	100-400	
	B	300-500	150-250	1,300-2,000	
Yellow Lake South		?	?	?	may form a single population with Yellow Lake East and West locations discovered in 1997 (BC CDC 2002) – no data available
	A	?	?	?	
	B	?	?	?	

Table 2. Population sizes of *Phlox speciosa* in British Columbia.

Populations	Subpop.	Number of Plants	Reprod. Plants	Area of Occupancy (m ²)	Comments
Yellow Lake West		4,000-10,000	2,000-7500	42,000-63,000	may form a single population with Yellow Lake East and South area of occupancy estimated from map and GPS points size of population based on extrapolating from a census of plants within a 100 m ² plot
Yellowlake Creek		36	6-12	300-500	newly discovered in 2003
	A	16	2-4	5	
	B	20	4-8	300-500	

Unless otherwise indicated, data above are based on fieldwork conducted by Ksenia Barton and Jan Teversham (June 2003). Where a single value is given, that is the exact value that was measured or counted in the field. Where a range of values is given, the values have been estimated.

In summary, the Ford Lake and Yellowlake Creek populations are very small (<100), the McKay Creek, Park Rill, and Yellow Lake East populations are of medium size (100s to 1,000s), and the Twin Lakes, White Lake, and Yellow Lake West populations are abundant (1,000s to 10,000s). The Yellow Lake South population size is unknown. The three Yellow Lake populations may actually form a single population along a large slope – additional surveying would be required to determine this.

Number of individuals in Canada

Population estimates detailed in Table 2 indicate an approximate range of 25,000-220,000 individuals of *Phlox speciosa* spp. *occidentalis* in Canada. Of those, approximately 6,400-57,000 individuals are reproductive, and flowered in 2003. The full extent of every population identified has not necessarily been surveyed, and population estimates may be low in some cases. It is likely that additional surveying within habitats that meet *Phlox speciosa* habitat requirements will also result in discoveries of new populations and sub-populations.

Population trends

Little information is available on the long-term or recent changes in *Phlox speciosa* numbers and range. Before the June 2003 field survey conducted by Ksenia Barton and Jan Teversham, most of the information available was from herbarium labels, with relatively vague location information in some cases.

Population sizes and areas of occupancy were estimated for two Twin Lake locations in 1994 (BC CDC 2002). It is likely, however, that those estimations were based on incomplete surveys of what are now considered sub-populations of the Twin Lake population. The current population estimate for Twin Lakes is two orders of magnitude greater than the 1994 estimates, a change that does not represent a realistic population increase.

Two or three historical populations have not been relocated. Their original sizes or exact locations are unknown. If they have been extirpated, it would appear that *Phlox speciosa* range within Canada has substantially contracted. It is possible, however, that the historical locations are still extant.

The population sizes of *Phlox speciosa* are not expected to fluctuate greatly from year to year as the plant is a perennial.

Based on herbarium records, it can be assumed that *Phlox speciosa* has always been of limited distribution in Canada. The taxon's limited distribution can be attributed, in part, to its habitat requirements.

Although *Phlox speciosa* is rare in southcentral British Columbia, the plant is apparently widespread in the Pacific Northwest (Douglas *et al.* 1999; Hitchcock and Cronquist 1973).

LIMITING FACTORS AND THREATS

The factors limiting the size and distribution of *Phlox speciosa* populations in Canada are unknown. The taxon's habitat requirements within the biogeoclimatic regions BGxh1, IDFxh1, and PPxh1 and restricted elevation range (700-1100 m) may, in part, be limiting factors in the plant's distribution. Within these biogeoclimatic restrictions and elevational limits, the plant occurs in a variety of site and vegetation types. The amount of apparently suitable habitat greatly exceeds the extent of actual occurrence (57 km²) of the taxon in Canada. Perhaps, another limiting factor may be the plant's inability to disperse readily to adjacent areas of suitable habitat, although no specific information has been found to support this contention.

A potential threat to *Phlox speciosa* populations is the lack of protection of natural plant communities throughout the majority of the plant's range in Canada. In general, the habitats that support *Phlox speciosa* are subject to a variety of anthropogenic threats, including livestock grazing, range re-seeding, off-road recreation, agricultural cultivation and development, recreational property development, prescribed burning, forest encroachment, road and trail development, and alien plant species introductions (Royal British Columbia Museum 1995). Although field observations indicate that the plant tolerates a certain degree of anthropogenic disturbance, greatly increased levels of disturbance would likely result in loss of habitat for the taxon.

Recreational property development represents the most important trend in habitat loss. Within the current extent of occurrence, 41% of the area is privately owned land. The remainder of the extent of occurrence is within provincial crown land, but none of that crown land occurs within a protected area. The following populations (or portions) occur on private land: Park Rill (majority), Twin Lakes (majority), White Lake (majority, part on federal), Yellow Lake East (minority), and Yellowlake Creek. Current private land uses in and around the extent of occurrence include rangeland, agricultural cultivation, hobby farms, golf course, residential properties, and recreational properties.

The potential threat of property development is illustrated by cases where *Phlox speciosa* occurs in yards directly adjacent to homes. For example, a portion of the Twin Lakes population occurs in a yard between a public road and a private driveway and large new home. Given the site topography, it is likely that the home and driveway occupy former *Phlox speciosa* habitat, and that a portion of the population was lost during construction. This represents a relatively small loss of habitat for the relatively large population, but such incremental losses could become significant if the habitat of the population experiences significant development pressures. Another example is the small McKay Creek population that occurs on a private property within tens of metres of a home, the construction of which may have resulted in loss of *Phlox speciosa* plants. In that case, a significant portion of the population may have been lost. At the time of writing, at least 32 ha of property are for sale within the extent of occurrence of *Phlox speciosa* (Canadian Real Estate Association 2003). The properties for sale are being marketed as undeveloped sites to build homes on and for keeping horses. Both of those land uses have the potential to result in loss of habitat for *Phlox speciosa*.

Another potential threat is the loss of populations due to demographic and environmental stochasticity and loss of genetic variability. These factors are a concern for geographically restricted populations (Primack 1998). Populations of *Phlox speciosa* are vulnerable given their relatively small area of occupancy, only 0.9-1.4 km².

A final potential threat is weed control activities. In the future, *Phlox speciosa* populations could potentially be threatened by weed control activities required by the Weed Control Act. Various legally designated noxious weeds, including hound's-tongue (*Cynoglossum officinale*) and diffuse knapweed (*Centaurea diffusa*), occur at some of the phlox locations. Use of marginally specific chemical weed control substances that kill broad-leaved plants would likely kill *Phlox speciosa*. Under the Weed Control Act, an occupier must control noxious weeds growing or located on land and premises.

SPECIAL SIGNIFICANCE OF THE SPECIES

Canadian populations of *Phlox speciosa* occur at the northern extent of their geographic range. Although so-called "peripheral" populations have often been assigned low priority for conservation, the importance of populations at the edges of their ranges is increasingly being recognized.

At one time it was assumed that when a species becomes endangered, its geographical range would contract inwards, with the core populations persisting the longest. Recent work has shown that the opposite is often the case: species often persist along the periphery of their original ranges. This is because range contraction is strongly influenced by anthropogenic forces of extinction, in spite of historical patterns of species density (Channell and Lomolino 2000).

In addition, peripheral populations are often genetically distinct from populations from the centre of the taxon's range (Lesica and Allendorf 1995). Protection of the genetic diversity of the taxon would therefore require the protection of the peripheral populations. No specific genetic information of this sort is, however, available for *Phlox speciosa*.

Finally, as its common name suggests, *Phlox speciosa* is a very showy and attractive plant. *Phlox speciosa* has a visual appeal that is valued by the general public. The species has been used as a horticultural plant in appropriate North American climates.

Phlox speciosa is similar in appearance to the more common species *Phlox longifolia*, which differs somewhat in habitat and in floral characters that require careful inspection.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

No legal protection specifically protects *Phlox speciosa* populations in any part of the taxon's range. The species is not listed or proposed for listing under the US Endangered Species Act, the IUCN Red Book, or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The species is not the subject of any international agreements.

The Global Heritage Status Rank of *Phlox speciosa* [ssp. *occidentalis*] is G5TNR, indicating that the status of the species is "Secure" and the status of the subspecies *occidentalis* has not yet been assessed (NatureServe 2004). The Secure rank applies to taxa that are common, widespread, and abundant. Taxa with this rank typically have considerably more than 100 occurrences and more than 10,000 individuals.

No National Heritage Status Rank (N rank) has been applied to *Phlox speciosa* in either Canada or the United States (NatureServe 2004).

In the United States, the Subnational Heritage Status Rank of *Phlox speciosa* [ssp. *occidentalis*] is "not ranked" (SNR) in the six states in which the plant occurs.

In Canada, *Phlox speciosa* is Red-listed in British Columbia. The Red List includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in the province. *Phlox speciosa* has a Subnational Natural Heritage

Status Rank of Critically Imperiled (S1) in British Columbia. This provincial rank is applied to taxa that are extremely rare or especially vulnerable to extinction. Taxa ranked as Critically Imperiled typically have five or fewer occurrences or very few remaining individuals (<1000; BC CDC 2002). Based on the present field data, this ranking likely requires revision.

A portion of the White Lake population occurs on federal land belonging to the National Research Council that is being managed by the Nature Trust, in conjunction with the South Okanagan Similkameen Conservation Program, as a “biodiversity ranch”.

TECHNICAL SUMMARY

Phlox speciosa

Showy Phlox

phlox de l'Ouest

Range of Occurrence in Canada: British Columbia

Extent and Area Information	
<ul style="list-style-type: none"> • <i>Extent of occurrence (EO)(km²)</i> 	57 km ²
Total area encompassed by the 9 populations	
<ul style="list-style-type: none"> • <i>Specify trend in EO</i> 	range contraction is uncertain
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in EO?</i> 	probably not, as species is perennial
<ul style="list-style-type: none"> • <i>Area of occupancy (AO) (km²)</i> 	0.9-1.4 km ²
[Sum of areas occupied by the populations]	
<ul style="list-style-type: none"> • <i>Specify trend in AO</i> 	unknown but portions of habitat have been lost to developments
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in AO?</i> 	probably not, as species is perennial
<ul style="list-style-type: none"> • <i>Number of known or inferred current locations</i> 	9 populations with 20 sub-populations
<ul style="list-style-type: none"> • <i>Specify trend in #</i> 	unknown, probably stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of locations?</i> 	probably not, as species is perennial
<ul style="list-style-type: none"> • <i>Specify trend in area, extent or quality of habitat</i> 	unknown, probably relatively stable but some recent losses due to housing developments and quality of habitat has declined due to various anthropogenic activities
Population Information	
<ul style="list-style-type: none"> • <i>Generation time (average age of parents in the population)</i> 	unknown, probably 1-5 years
<ul style="list-style-type: none"> • <i>Number of mature individuals</i> 	6,400-57,000
<ul style="list-style-type: none"> • <i>Total population trend:</i> 	unknown, probably stable
<ul style="list-style-type: none"> • <i>% decline over the last/next 10 years or 3 generations.</i> 	unknown
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of mature individuals?</i> 	unknown, probably not
<ul style="list-style-type: none"> • <i>Is the total population severely fragmented?</i> 	unknown, considering little is known of the dispersal mechanism (large areas of suitable habitat are present that are not occupied, a fact that might suggest fragmentation)
<ul style="list-style-type: none"> • <i>Specify trend in number of populations</i> 	unknown, probably stable; potential losses are of historic populations
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of populations?</i> 	probably not, as species is perennial
<p>List populations with number of mature individuals in each: estimated ranges: Ford Lake: 5-9 McKay Ck.: 20-30 Park Rill: 60-550 Twin Lakes: 2100-24,000 White Lake: 2000-24,000 Yellow Lake E.: 200-450 Yellow Lake S.: ? Yellow Lake W.: 2000-7500 Yellowlake Ck.: 6-12</p>	

Threats (actual or imminent threats to populations or habitats)	
<ul style="list-style-type: none"> • a large proportion of habitat within the extent of occurrence is on private land and is undergoing rapid development for hobby farms or other land uses that result in habitat loss • stochastic events based on the small area of occupancy • weed control activities could threaten populations, especially small ones • anthropogenic threats, including livestock grazing, range re-seeding, off-road recreation, agricultural cultivation and development, recreational property development, prescribed burning, forest encroachment, road and trail development, and alien plant species introductions 	
Rescue Effect (immigration from an outside source)	
<ul style="list-style-type: none"> • <i>Status of outside population(s)?</i> USA: Widespread in suitable habitats in the eastern Cascades in Washington and five other states 	
<ul style="list-style-type: none"> • <i>Is immigration known or possible?</i> 	Unknown
<ul style="list-style-type: none"> • <i>Would immigrants be adapted to survive in Canada?</i> 	Likely
<ul style="list-style-type: none"> • <i>Is there sufficient habitat for immigrants in Canada?</i> 	unknown considering that there exists more “seemingly suitable” habitat than is presently occupied
<ul style="list-style-type: none"> • <i>Is rescue from outside populations likely?</i> 	No Nearest population is > 120 km to the south
Quantitative Analysis [provide details on calculation, source(s) of data, models, etc]	N/A
Current Status	

Status and Reasons for Designation

Status: Threatened	Alpha-numeric code: B1ab (ii, iii, v) + 2ab (ii, iii, v); D2
Reasons for Designation: A showy perennial known from a very small area and from fewer than 10 locations. The species is present within a region subject to on-going habitat loss and degradation as a consequence of private property development, agricultural practices, and the spread of invasive plants.	
Applicability of Criteria	
Criterion A (Declining Total Population): Not applicable – no data to support specific population decline percentages	
Criterion B (Small Distribution, and Decline or Fluctuation): Threatened B1ab (ii, iii, v) + 2ab (ii, iii, v). The species has a very small extent of occurrence (57 km ²) and area of occupancy (< 1.5 km ²) and is known from fewer than 10 locations with recent losses in area of occupancy, decline in habitat quality and loss of mature individuals as inferred from the considerable decline in natural habitat in the Okanagan and specific examples of likely losses of portions of populations at two sites due to property development. A decline in quality of habitat is also recognized based on practices such as range re-seeding and due to the spread of invasive plants. No recent declines in extent of occurrence have been noted nor have recent populations been lost entirely.	
Criterion C (Small Total Population Size and Decline): Not applicable due to large population size. Although the estimate of the population size spans a considerable range due to difficulties in determining population boundaries, the total population size is likely >10,000.	
Criterion D (Very Small Population or Restricted Distribution): Threatened D2 (<20 km ² area of occupancy). The number of verified populations is relatively small (<10) and they occur in a region undergoing considerable human population expansion and property development.	
Criterion E (Quantitative Analysis): Not available.	

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The BC Conservation Data Centre provided information about historical and extant populations of *Phlox speciosa* in British Columbia. Jenifer Penny of the BC CDC facilitated obtaining spatial data and advised on mapping criteria for populations. Jan Teversham generously donated her time and skills by assisting with field surveying. Dr. David Giblin, University of Washington Herbarium, kindly provided population locality data for northern Washington State.

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BIOGRAPHICAL SUMMARY OF REPORT WRITER

Ksenia Barton has an M.Sc. (Biology) from McGill University and she is a Registered Professional Biologist with the College of Applied Biology of British Columbia. Ksenia specializes in plant ecology and has worked on research and resource inventory projects throughout British Columbia for the past nine years. She has written four species accounts for rare plants as part of the British Columbia Identified Wildlife Strategy. She is also a contributing author of two COSEWIC status reports for rare plants. She has

completed extensive surveys for rare plants throughout the Black Hills (in South Dakota and Wyoming) for the US Forest Service. She recently worked with a British Columbian forest company to model potential habitat of rare plants and to develop a sampling plan to survey for rare plants for the company's operating areas.

COLLECTIONS EXAMINED

No collections were examined but records were obtained from the BC Conservation Data Centre.