

COSEWIC
Assessment and Status Report

on the

Cliff Paintbrush
Castilleja rupicola

in Canada



THREATENED
2005

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:

COSEWIC 2005. COSEWIC assessment and status report on the cliff paintbrush *Castilleja rupicola* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 18 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Production note:

COSEWIC acknowledges the late George W. Douglas and also Ms. Shyanne J. Smith for writing the status report on the cliff paintbrush *Castilleja rupicola*. This status report was produced with the initiative and funding of the British Columbia Ministry of Water, Land and Air Protection. The COSEWIC status report review was overseen by Erich Haber, co-chair (vascular plants) of the COSEWIC Plants and Lichens Specialist Subcommittee, with input from members of COSEWIC. That review may have resulted in changes and additions to the initial version of the report.

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Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur la castilleje des rochers (*Castilleja rupicola*) au Canada.

Cover illustration:

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Catalogue No. CW69-14/430-2005E-PDF
ISBN 0-662-40579-X
HTML: CW69-14/430-2005E-HTML
0-662-40580-3



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COSEWIC Assessment Summary

Assessment Summary – May 2005

Common name

Cliff Paintbrush

Scientific name

Castilleja rupicola

Status

Threatened

Reason for designation

A perennial of restricted geographical occurrence found on cliffs, rock outcrops and ridges at high elevations. The small, fragmented, populations consist of scattered individuals, likely fewer than 250 plants, which are exceptionally vulnerable to stochastic events.

Occurrence

British Columbia

Status history

Designated Threatened in May 2005. Assessment is based on a new status report.



COSEWIC Executive Summary

Cliff Paintbrush *Castilleja rupicola*

Species information

Cliff paintbrush (*Castilleja rupicola*) is a perennial herb that grows up to 20 cm tall. The alternate leaves usually have 3 to 5 linear, spreading lobes. The inflorescence consists of a dense terminal spike consisting of small flowers surrounded by prominent and brightly coloured bracts (specialized leafy structures). The bright scarlet or crimson bracts are mostly deeply 5-lobed and much shorter than the greenish flowers.

Distribution

Castilleja rupicola ranges from southwestern British Columbia south to central Oregon. In Canada, the species is known only from the Chilliwack and Skagit river drainages in the Cascade Mountains of southwestern British Columbia and one historic site in the southern Coast Mountains.

Habitat

The species occurs on gravelly or stony soils, often in crevices on cliffs, rock outcrops and ridges in the subalpine and alpine zones. Vegetative cover in these habitats is sparse, usually less than 10% cover. On some subalpine and alpine slopes, *C. rupicola* occurs in gravelly openings in the *Phyllodoce empetrifomis*-*Cassiope mertensiana* plant community.

Biology

Little information is available on the biology of *Castilleja rupicola* in British Columbia. Only basic reproductive facts have been compiled on the species. It is believed that most, if not all, *Castilleja* species require cross-pollination to set seed. Many species appear to be pollinated by hummingbirds, and bees may be important pollinators of other species. Seed production is likely to be of critical importance to *Castilleja rupicola* because it does not appear to be capable of reproducing by any other means. Short-range dispersal is likely by local scattering of seeds from the capsules by wind, birds and small mammals.

As with other species of *Castilleja*, it is likely that *C. rupicola* is a facultative parasite on the roots of other species. An examination of the roots indicate that *Castilleja* species form special root-like connections called haustoria that attach to the roots of other plants, including other *Castilleja* plants (although they exhibit reduced vigour when grown with members of the same genus). These haustoria enable the parasitic plant to obtain supplementary nourishment from the host plant.

Population sizes and trends

A total of 15 historical and extant populations have been documented. There are three recently surveyed populations of *Castilleja rupicola* in the Skagit River valley in southwestern British Columbia. Eleven other records of the species, documented between 1901 and 1999, are known from both the Skagit and Chilliwack River valleys. A 1912 collection is also known from Mount Brunswick in the southern Coast Mountains. All of the latter 12 collections have virtually no information on population sizes. The three recently confirmed populations, observed in 2003, occur over a distance of 12.5 km. They range in size from one to five m² and number from one to three plants.

Short- and long-term trends for these populations are unknown but can be expected to vary depending on the life span of the plants. Also, since the plants apparently only occur in small numbers, the success of seed germination and seedling survival will play a major role in these trends.

Limiting factors and threats

There are no major threats to populations of *Castilleja rupicola* at this time. However, if climate change predictions of higher global temperatures develop, it is possible that the subalpine/alpine habitats could be affected. It is not possible, at this time, to predict what specific changes to the habitat would occur.

Special significance of the species

Populations of *C. rupicola* in British Columbia are unique in that they are at the northern extent of their geographic range. This species is globally rare and has a relatively small global range consisting of less than 100 populations. Although no information on this species was found in a major ethnobotany database, other species of *Castilleja* are used extensively by Aboriginal peoples in North America.

Existing protection or other status designations

Castilleja rupicola 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, *C. rupicola* has a rank of G2G3 (imperiled/vulnerable). Provincially, *C. rupicola* is ranked by the Conservation Data Centre as S2 (imperiled) and appears on the British Columbia Ministry of Sustainable Resource Management's Red List.

There is currently no specific endangered species legislation in place for the protection of vascular plants in British Columbia that have been given this S2 rank. Some of the populations of *C. rupicola* in British Columbia, however, are protected by the *Provincial Park Act*.



COSEWIC HISTORY

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

COSEWIC MANDATE

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

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal 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 at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A 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.

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2005

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SPECIES INFORMATION

Name and classification

Scientific name: *Castilleja rupicola* Piper¹
Synonyms: *Castilleja andrewsii* Henderson
Common name: Cliff paintbrush
Family: Orobanchaceae (broom-rape family)
Major plant group: Dicot flowering plant

Description

Castilleja rupicola Piper is a member of a genus of about 150-200 species, occurring mostly in western North America but also found in northern Asia and southern South America (Ownbey 1959). Twenty species occur in British Columbia and 24 in Canada (Scoggan 1979, Pojar 2000). This species was first collected in Canada on Mt. Cheam in 1899 by F. Anderson.

Castilleja rupicola is a perennial herb from a somewhat woody stem-base (Pojar 2000, Figure 1). The several stems are clustered, ascending to erect, 10-20 cm tall, unbranched and thinly long-soft-hairy with crinkly hairs. The leaves are alternate and divided into 3 to 5 (7) linear, spreading lobes, or rarely the lowermost entire. The finely long-soft-hairy lateral lobes are not much narrower than the mid-blade. The inflorescence is a prominently bracted terminal spike that is compact and relatively few-flowered. The bright scarlet or crimson bracts are mostly deeply 5-lobed, much shorter than the flowers, minutely hairy and long-soft-hairy. The corollas are greenish, 25-35 (45) mm long, 2-lipped, the upper lip beak-like, short-hairy, about equalling or slightly longer than the tube and much longer than the thickened, 3-toothed lower lip. The calyces are long-hairy, 15-25 mm long and deeply 2-lobed, these primary lobes are again divided into 2 blunt or sharp, 1-5 mm long segments. There are four stamens. The fruits consist of capsules with many loose and net-veined seeds.

Castilleja rupicola is a well-defined species that is part of the *Parviflorae* complex. It is distinguished from most other members of the genus in British Columbia by its bright scarlet or crimson bracts that are mostly deeply 5-lobed. *Castilleja parviflora*, a related species growing in the same area, usually has purple to pinkish or white bracts that are 3-lobed well above the middle. Another species, *Castilleja rhexifolia*, found in the same area, may also have crimson bracts but these are unlobed.

¹Taxonomy and nomenclature follows Douglas *et al.* (1998, 1999, 2000, 2001)

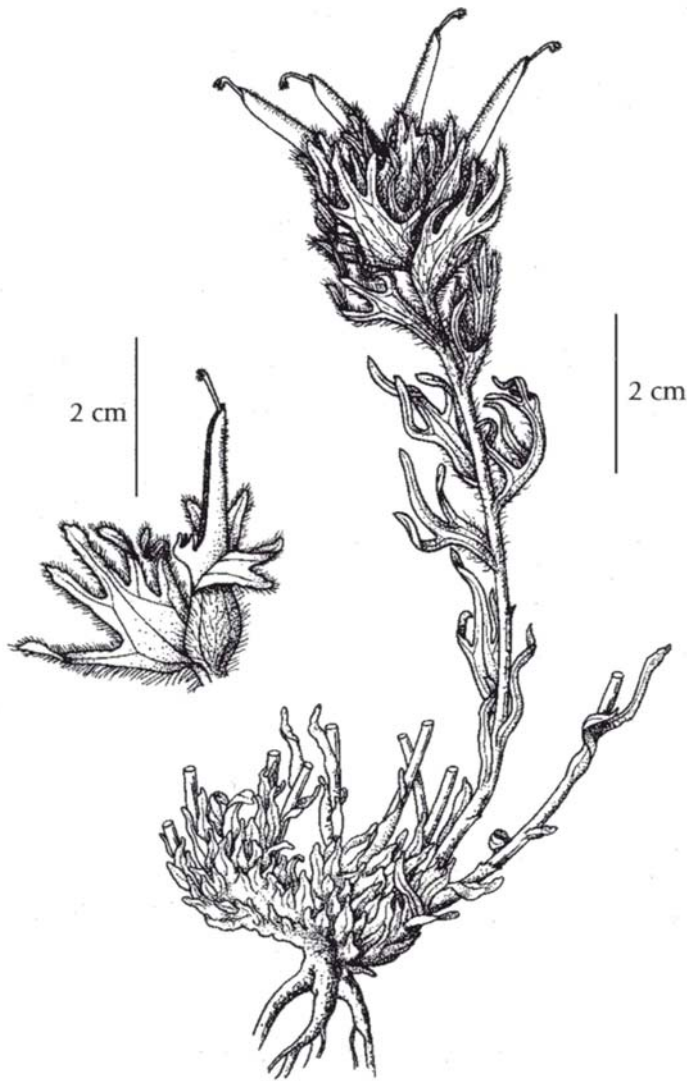


Figure 1. Illustration of *Castilleja rupicola*: flower and subtending bract (left); plant growth form (right). Drawing by Elizabeth J. Steven in Pojar 2000, by permission.

DISTRIBUTION

Global range

Castilleja rupicola is limited to the Cascade Mountains, where it is found at moderate to high elevations on rocky ridges, between southwestern British Columbia and central Oregon (Ownbey 1959, Peck 1961, Pojar 2000, NatureServe 2003; Figure 2).



Figure 2. North American range of *Castilleja rupicola*.

Canadian range

In Canada, *C. rupicola* is known from the Chilliwack and Skagit River drainages in the Cascade Range of southwestern British Columbia, where it ranges from the upper montane to alpine zones. There is also a 1912 collection from Mt. Brunswick on the southern edge of the Coast Mountains, approximately 115 km west of the occurrences in the Cascade Range (Straley *et al.* 1985, Pojar 2000, Douglas *et al.* 2002; Figure 3). The total extent of occurrence of extant populations in Canada is approximately 1000 km². The area of occupancy for *Castilleja rupicola* is comparatively small; the species only occupies approximately 200-300 m².

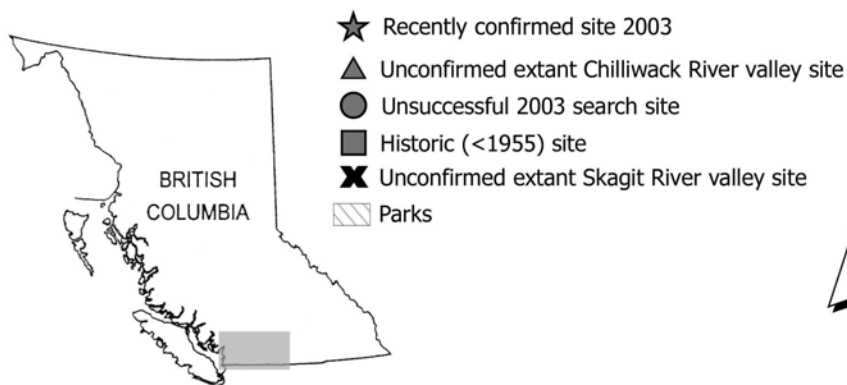
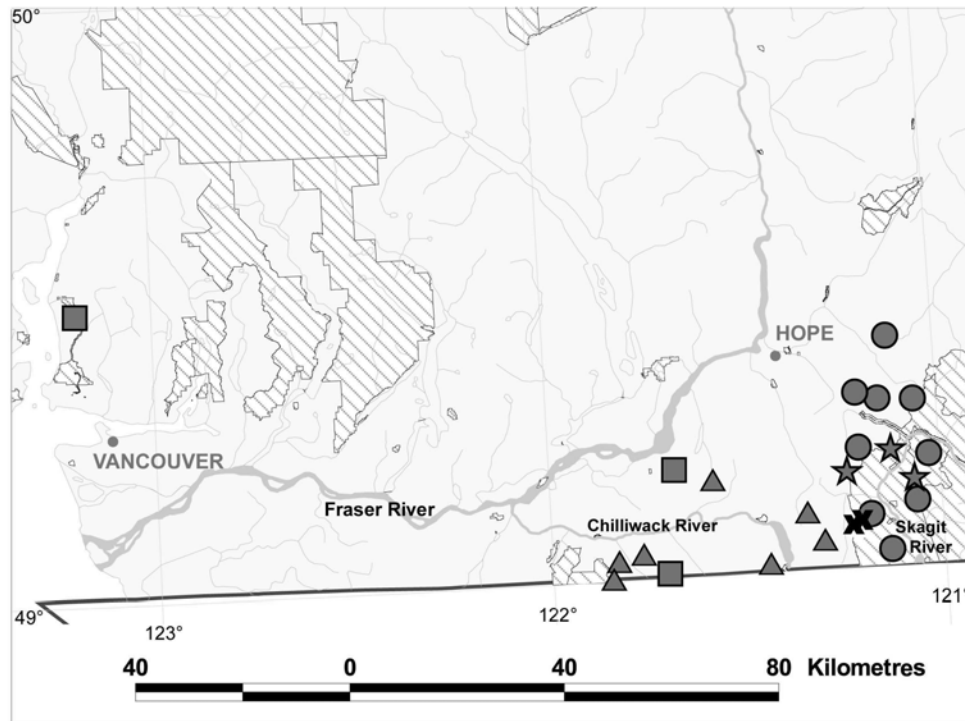


Figure 3. Distribution of *Castilleja rupicola* in southwestern British Columbia. The nearest site in Washington State is on Church Mountain just below the international boundary at about 122° west.

The writers searched for *C. rupicola*, above the 1900 m level, on 14 different mountains in the Skagit River drainage in 2003. These 14 mountains represent most (about 80%) of the potential peaks that could support this species in this drainage. The writers had success on only three of these mountains, with only 1-3 plants found on each mountain (Figure 3). This plant is so scarce on these mountaintops that even populations at two known sites (Whitworth and Finlayson Peaks, see Table 1, Figure 3) were not relocated in 2003. The mountain peaks searched unsuccessfully include: Brown Peak, Mount Dewdney, Mount Outram, Johnson Peak, Shawatum Mountain, Finlayson Peak, Unnamed peak (approx. 2 km ENE of Whitworth Peak), Wright Peak, Silverdaisy Mountain, Tulameen Mountain and Whitworth Peak. Two previous collectors of this plant, A. Ceska and F. Lomer (pers. comm., 2003), stated that at their collection sites the plant was extremely sparse. The only potential area not thoroughly searched to date is in the Coast Mountains, between the 1912 collection site (Mt. Brockman) and the Cascade Mountains. There were, however, intensive collections made in this area in the 1950's and 1960's, especially by workers from the University of British Columbia, but none of these collections included *Castilleja rupicola*. At any rate, it is not likely many more sites would be found in the latter area since suitable, vegetated rocky ridges above the 1900 m level are few.

The nearest populations in Washington State are on Church Mountain, Whatcom County, based on a checklist prepared by Deummel (1995-1997) and a collection from high alpine ledges on Church Mountain made in 1934 in Washington State (WTU 2005). This site is about 10 km from the nearest unconfirmed extant site in the mountains of the Chilliwack River sites.

HABITAT

Habitat requirements

Castilleja rupicola was found between 2030 and 2170 m elevation in the subalpine and alpine zones of the Skagit River drainage in the writers' 2003 survey (Figure 4). Elevations for collections previously made in British Columbia range from 1830 to 2300 m. Climatic conditions in this region are coastal, characterized by mild or occasionally warm, dry summers, a short growing season and wet winters with abundant snowfall.

The populations of *C. rupicola* occur in the Alpine Tundra (AT) and Mountain Hemlock Parkland (MHmmp) biogeoclimatic zones (Meidinger and Pojar 1991) or alpine and subalpine zones *sensu* Krajina (1969), Douglas (1971, 1972), Douglas and Bliss (1977). The subalpine zone is defined as that area above the montane zone and below the upper limit of conifers as an upright tree form (Douglas 1972). The vegetation in this zone consists of a meadow/tree-clump complex (Douglas 1971, 1972). Above the subalpine zone, the alpine zone (commonly referred to as alpine tundra) has been described as an area where trees occur only in krummholz (dwarfed) form and the vegetation is extremely short, less than 1 m (Krajina 1969, Douglas 1972, Douglas and Bliss 1977). Coniferous trees, or krummholz, in the subalpine and alpine zone in the Skagit River drainage include the following species: *Abies lasiocarpa*, *Larix lyallii*, *Picea engelmannii*, *Pinus albicaulis* and *Tsuga mertensiana*.



Photo S.J. Smith 2003

Figure 4. Subalpine/alpine ridges on Marmot Mountain, Skagit River valley.

Castilleja rupicola occurs on gravelly or stony soils, often in crevices on cliffs, rock outcrops and ridges (Figures 4, 5, and 6). Vegetative cover is sparse (usually less than 10% cover) on these habitats. Associated species in these habitats include *Antennaria lanata*, *Castilleja rhexifolia*, *Erigeron aureus*, *Penstemon davidsonii* var. *menziesii*, *Phlox diffusa*, *Potentilla villosa*, *Saxifraga bronchialis*, *Tonestus lyallii*, *Salix nivalis*, *Silene acaulis* and *Trisetum spicatum*. On some subalpine and alpine slopes, *C. rupicola* occurs in gravelly openings in the *Phyllodoce empetriformis*/*Cassiope mertensiana* plant community (see Douglas 1972 and Douglas and Bliss 1977). The sites surveyed in 2003 were moderately steep (20 to 40% slope) with westerly aspects.

Trends

Habitat trends are probably stable at this time. However, if climate change predictions of higher global temperatures develop, it is possible that the subalpine/alpine habitats could be adversely affected. It is not possible at this time to predict what specific changes to the habitat would occur.



Photo by G.W. Douglas 2003

Figure 5. Typical rocky alpine habitat of *Castilleja rupicola* on Mount Brice in the Skagit River valley.



Photo by G.W. Douglas 2003

Figure 6. *Castilleja rupicola*, in fruit (centre foreground), on Mount Brice, Skagit River valley.

Protection/ownership

All populations of *C. rupicola* in British Columbia occur on Crown land. Three of the 12 extant sites (Finlayson Peak, Whitworth Peak, and Mount Brice) are located in Skagit Valley Provincial Park and receive protection through the Provincial Parks Act. Two other sites (Silvertip Mountain and Marmot Mountain) are within 500 m and 10 m, respectively, of the park boundary.

BIOLOGY

General

Little information is available on the biology and ecology of *Castilleja rupicola*. Only basic reproductive facts have been compiled about the genus.

Reproduction

It is believed that most, if not all, *Castilleja* species require cross-pollination to set seed. According to Duffield (1972) and Pennell (1948), many species appear to be pollinated by hummingbirds, and bees may be important pollinators of other species (Bauer 1983, Duffield 1972). The average number of seeds produced by an individual is not known although Sheenan and Sprague (1984) report that it is not uncommon to observe more than 100 seeds produced by a single capsule. Seed production is likely to be of critical importance to *Castilleja rupicola* because it does not appear to be capable of reproducing by any other means.

Only a few gardening enthusiasts have experimented with *Castilleja* propagation by seeds. The process, although sometimes difficult and never a certainty, can meet with some success following a few general rules. Guppy (1997) placed seeds in a refrigerator and attained germination in one to four months. During this time young plants of potential host plants are potted in sandy soil. When the *Castilleja* seedlings have unfolded their seed leaves they are ready to place in the host pots, eventually thinning to about three per pot. A plastic tent, to retain moisture, will be required until the seedlings are well established. Field survival of these seedlings may not be successful with subalpine/alpine species, either at low or high elevations.

Survival

Unknown.

Physiology

Unknown.

Movements/dispersal

Castilleja rupicola depends on seeds for reproduction. Local dispersal is likely effected by winds shaking the seeds out of the capsules and possibly by birds and small mammals similarly promoting the scattering of the minute seeds. Rescue from adjacent populations in Washington State is highly unlikely due to the localized dispersal mechanism and the long periods of time likely required for this species to disperse over distances of many kilometres.

Nutrition and interspecific interactions

As with other species of *Castilleja*, it is likely that *C. rupicola* is a facultative parasite on the roots of other species. (See “Habitat requirements, for a list of possible host species.) Heckard (1962) investigated the growth of eleven species of *Castilleja* with and without hosts. All plants are capable of completing their life cycle in the absence of a host. However, when they are grown in culture with other species, all but one *Castilleja* species exhibit faster growth rates, produce a larger number of branches, and flower earlier than when grown in isolation. An examination of the roots indicates that *Castilleja* species form haustoria with the roots of other plants, including other *Castilleja* plants (although they exhibit reduced vigour when grown with members of the same genus). Pscheidt *et al.* (2003) indicates that leguminous plants have been shown to be more beneficial hosts than grasses.

Behaviour/adaptability

Unknown.

POPULATION SIZES AND TRENDS

A total of 15 historic and extant populations have been documented. Three recently surveyed populations are found in the Skagit River valley in southwestern British Columbia (Figure 3; Table 1). Eleven other records of the species are known from both the Skagit and Chilliwack River valleys from 1901 to 1999 (Table 1). A 1912 collection is also known from Mount Brunswick in the southern Coast Mountains. All of the latter 12 collections have virtually no information on population sizes. The recently confirmed populations, observed in 2003, cover an extent of occurrence (EO) of about 90 km² with the EO of all known sites totalling <1000 km² (Figure 3). Their area of occupancy ranges from one to five m² each and consist of one to three plants.

It is likely that the 9 populations reported in 1984, and thereafter, are extant since none of the sites is at risk. Two of these locations (Finlayson Peak and Whitworth Peak) were revisited in 2003 but the populations were not relocated. This is probably due to the rareness of the plants on the high ridges and the difficulty in finding plants in rugged terrain when present in very low numbers.

Short- and long-term trends for these populations are unknown but can be expected to vary depending on the plant's life span, which, unfortunately, is unknown for this perennial herb. Also, since the plant apparently only occurs in small numbers, the success of seed germination and seedling survival will play a major role in these trends.

Table 1. Locations and population sizes for *Castilleja rupicola* in southwestern British Columbia.

Collection Site	Last observation	Collector	Number of plants/area (m ²)
Tomyhoi Peak, CRV ²	1901 (historic record)	Macoun	Unknown
Mount Brunswick, Coast Mtn. Range	1912 (historic record)	Perry	Unknown
Mount Cheam, CRV	1954 (historic record)	Brayshaw	Unknown
Church Mountain, CRV	1984	Ceska	"few plants"
Mount McGuire, CRV	1984	Ceska	"few plants"
Mount Liumchen, CRV	1984	Ceska	"few plants"
Thompson Peak, CRV	1984	Ceska	"few plants"
Mount Lindeman, CRV	1984	Ceska	"few plants"
Finlayson Peak, SVPP ³	1988	Ceska	"few plants"
Whitworth Peak, SVPP	1988	Ceska	"few plants"
Klesilkwas Mountain, CRV/SVPP	1992	Ceska	"few plants"
Foley Peak, CRV	1999	Lomer	"few plants"
Silvertip Mountain, SRV ⁴	2003	Lomer	2/2m ²
Mt. Brice, SVPP	2003	Douglas & Smith	3/5m ²
Marmot Mountain, SRV	2003	Douglas & Smith	1/1 m ²

²CRV = Chilliwack River valley

³SVPP = Skagit Valley Provincial Park

⁴SRV = Skagit River valley

LIMITING FACTORS AND THREATS

There are no major threats to populations of *Castilleja rupicola* at this time. However, if climate change predictions of higher global temperatures develop, it is possible that the subalpine/alpine habitats could be affected. It is not possible, at this time, to predict what specific changes to the habitat would occur.

SPECIAL SIGNIFICANCE OF THE SPECIES

Populations of *Castilleja rupicola* in British Columbia are unique in that they are at the northern extent of their geographic range. This species is globally rare and has a relatively small range with less than 100 populations (NatureServe 2003).

The species has no commercial value and is not known in cultivation. It is not known to have cultural, medicinal or spiritual uses. Although no information on this species was found in a major ethnobotany database (<http://herb.umd.umich.edu/>), other species of *Castilleja* are used extensively by Aboriginal peoples in North America.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

International status

Castilleja rupicola 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, *C. rupicola* has a rank of G2G3 indicating that in most of its range the plant is either “imperiled because of rarity (typically 6-20 extant occurrences or few remaining individuals) or because of some factor(s) making it vulnerable to extirpation or extinction” or it is “rare or uncommon (typically 21-100 extant occurrences); may be susceptible to large-scale disturbances; e.g., may have lost extensive peripheral populations” (NatureServe 2003).

This species is ranked SR and SU, in Washington and Oregon, respectively, by NatureServe (2003). The SU rank for Oregon indicates that the species is “unrankable”. The Oregon Natural Heritage Information Center (2003), however, has ranked *C. rupicola* as S2S3. The SR rank for Washington is also in error since that rank should indicate that a species is “reported for the state, but without persuasive evidence for either accepting or rejecting the report”. In fact, the species may be found in the floristic treatments of Jones (1938), Muenscher (1941), Ownbey (1959), Douglas (1971) and Taylor and Douglas (1995). The latter two floras mention that it is common in the western North Cascade Range of Washington. The correct rank should be S?, indicating that it has yet to be ranked (NatureServe 2003).

National and provincial status

Since the species in Canada is restricted to British Columbia, it has a national rank of N2. Provincially, *Castilleja rupicola* is ranked by the Conservation Data Centre as S2 and appears on the British Columbia Ministry of Sustainable Resource Management Red List (Douglas *et al.* 2002). The S2 rank is one of the most critical ranks that can be applied to species at the provincial level and indicates that the species is “imperiled because of rarity (typically six to 20 extant occurrences or very few remaining individuals) or because of some factor(s) making it very susceptible to extirpation or extinction”.

Recent changes in legislation brought about with the passage of the Wildlife Amendment Act of British Columbia allow for the listing and protection of plants under the Act. At this time, however, the necessary regulations for the Act are not in place and this species does not occur on the list of four species currently protected under the Act. Some of the populations of *C. rupicola* in British Columbia, however, are protected by the *Provincial Parks Act* which does not allow such activities as logging and mining.

TECHNICAL SUMMARY

Castilleja rupicola

cliff paintbrush

castilléjie des rochers

Range of Occurrence in Canada: British Columbia

Extent and Area Information	
<ul style="list-style-type: none"> • <i>Extent of occurrence (EO)(km²)</i> [area enclosed within the limits of a polygon including all sites] 	<1000 km ²
<ul style="list-style-type: none"> • <i>Specify trend in EO</i> 	Unknown, probably stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in EO?</i> 	Unlikely
<ul style="list-style-type: none"> • <i>Area of occupancy (AO) (km²)</i> [actual area occupied by the small populations] 	<1 km ² (200-300 m ²)
<ul style="list-style-type: none"> • <i>Specify trend in AO</i> 	Unknown, probably stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in AO?</i> 	Unlikely
<ul style="list-style-type: none"> • <i>Number of known or inferred current locations</i> 	12
<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> 	Unlikely
<ul style="list-style-type: none"> • <i>Specify trend in area, extent or quality of habitat</i> 	Unknown, probably stable
Population Information	
<ul style="list-style-type: none"> • <i>Generation time (average age of parents in the population)</i> 	Unknown (possibly several years)
<ul style="list-style-type: none"> • <i>Number of mature individuals</i> 	Unknown, probably in the 100s
<ul style="list-style-type: none"> • <i>Total population trend:</i> 	Unknown, probably stable based on the natural sub-alpine and alpine habitats in which plants occur
<ul style="list-style-type: none"> • <i>% decline over the last/next 10 years or 3 generations.</i> 	N/A
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of mature individuals?</i> 	Unknown
<ul style="list-style-type: none"> • <i>Is the total population severely fragmented?</i> 	Yes
<ul style="list-style-type: none"> • <i>Specify trend in number of populations</i> 	Unknown, probably stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of populations?</i> 	Unknown but unlikely
<ul style="list-style-type: none"> • <i>List populations with number of mature individuals in each:</i> <ul style="list-style-type: none"> Silvertip Mtn: 2 Mt. Brice: 3 Marmot Mtn: 1; the remainder either “few plants” or unknown 	
Threats (actual or imminent threats to populations or habitats)	
<ul style="list-style-type: none"> - None known at present for these sub-alpine localities - Perhaps potential threat in future with climate change 	
Rescue Effect (immigration from an outside source)	
<ul style="list-style-type: none"> • <i>Status of outside population(s)?</i> USA: Unknown (have not been adequately assessed in WA and OR) 	
<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> 	Yes
<ul style="list-style-type: none"> • <i>Is there sufficient habitat for immigrants in Canada?</i> 	Yes
<ul style="list-style-type: none"> Is rescue from outside populations likely? 	Unlikely due to the localized means of seed dispersal
Quantitative Analysis	
[provide details on calculation, source(s) of data, models, etc]	
N/A	
Current Status	
COSEWIC: Threatened (May 2005)	

Status and Reasons for Designation

<p>Status: Threatened</p>	<p>Alpha-numeric code: Met criteria for Endangered, D1, but designated Threatened, D1+2, because it is distributed over several mountain ridges and thus is not at imminent risk of extirpation.</p>
<p>Reasons for Designation: A perennial of restricted geographical occurrence found on cliffs, rock outcrops and ridges at high elevations. The small, fragmented, populations consist of scattered individuals, likely fewer than 250 plants, which are exceptionally vulnerable to stochastic events.</p>	
<p>Applicability of Criteria</p>	
<p>Criterion A (Declining Total Population): No information on declines.</p> <p>Criterion B (Small Distribution, and Decline or Fluctuation): Not met.</p> <p>Criterion C (Small Total Population Size and Decline): Not met due to lack of decline data.</p> <p>Criterion D (Very Small Population or Restricted Distribution): Qualifies as Endangered, D1, based on a presumed population size of fewer than 250 plants but best considered as Threatened D1+2 because the plants are located on several mountaintops and are therefore at reduced risk from stochastic events and imminent extirpation.</p> <p>Criterion E (Quantitative Analysis): None available.</p>	

ACKNOWLEDGEMENTS AND AUTHORITIES CONTACTED

Acknowledgements

We thank Frank Lomer for his assistance in the field. Judy Millar, Ministry of Water, Land and Air Protection, coordinated the project with the Skagit Environmental Endowment Commission as well as arranging helicopter support. Orville Dyer and Ted Lea, Ministry of Water, Land and Air Protection, provided aid with various aspects of the project. Jenifer Penny and Marta Donovan, Conservation Data Centre, provided information on past collection sites. Jenifer Penny also reviewed a draft of the report and made valuable comments. We also thank the Skagit Environmental Endowment Commission through Ecosystems Section and the Okanagan Region, British Columbia Ministry of for funding this project.

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BIOGRAPHICAL SUMMARY OF REPORT WRITERS

Dr. George Wayne Douglas (1938-2005), well-known and respected British Columbia botanist, whose contribution to COSEWIC has included over 30 status reports, died in Duncan, BC, on 10 February 2005, after a short battle with cancer.

George W. Douglas had an M.Sci. (Forestry) from the University of Washington and a Ph.D (Botany) from the University of Alberta, Edmonton. George worked with rare plants for over 20 years. He was senior author of *The Rare Plants of the Yukon* (1981), *The Rare Plants of British Columbia* (1985) and *Rare Native Plants of British Columbia* (1998, 2002). He was also the senior editor for the *Illustrated Flora of British Columbia* (1998-2002) and was the program botanist for the British Columbia Conservation Data Centre from 1991 until 2003. George wrote or co-wrote 33 COSEWIC status reports and three update status reports during this period.

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

COLLECTIONS EXAMINED

Herbarium specimens housed at the Royal British Columbia Museum in Victoria (V), the University of BC (UBC), the National Museum, Ottawa (CAN) and Agriculture Canada, Ottawa (DAO) were examined and verified.