# Stewardship Account for Scouler's Catchfly

***Silene scouleri ssp. grandis***

Prepared for
the Garry Oak Ecosystems Recovery Team
March 2002

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Funding provided by the Habitat Stewardship Program of the Government of Canada and the Nature Conservancy of Canada

# TABLE OF CONTENTS

**List of figures**



**List of tables**

# SPECIES INFORMATION

**Name and classification**

Kingdom: Plantae

Subkingdom: Tracheobionta

Superdivision: Magniolophyta

Class: Magniolopsida

Subclass: Caryophyllidae

Order: Caryophyllales

Family: Caryophyllaceae

Genus: *Silene*

Species: *scouleri*

Subspecies: *grandis*

*Silene scouleri* Hooker ssp. *grandis* Hitchcock and Maguire

Scouler's Campion, Scouler's Catchfly

Synonymy: (from Douglas and MacKinnon 1998, Hitchcock *et al.* 1964)

*S. grandis* Eastw.

*S. pacifica* Eastw.

*S. grandis* var. *pacifica* Jeps.

*S. scouleri* var. *pacifica* (Eastw.) C.L. Hitchc.

*S. scouleri* Hook. ssp. *grandis* (Eastw.) C.L. Hitchc. & Maguire

*S. scouleri* Hook. ssp. *scouleri* var. *scouleri*

S. repens Patrin ex. Pers. var. costata (Williams) Boivin

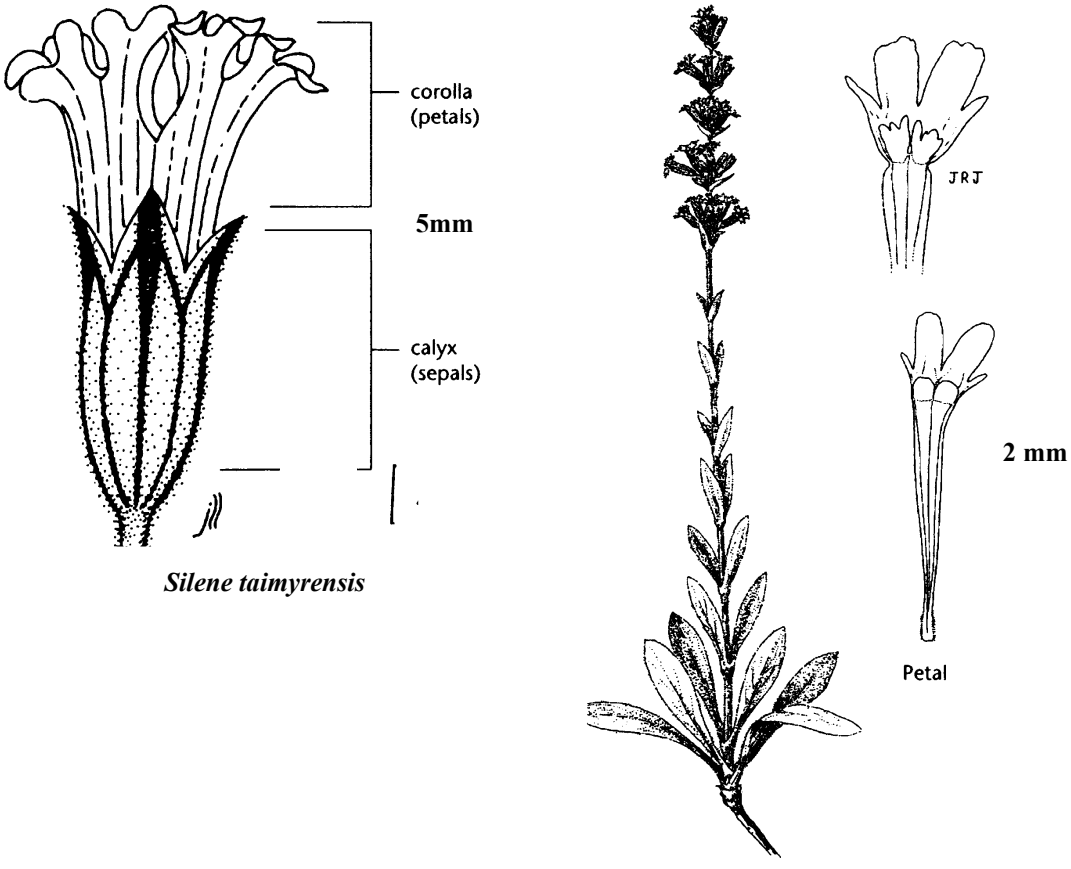
Silene scouleri is the most complex element within its genus and its taxonomy is under active review. Regardless of which name is attached to the Pacific coast populations they belong to a different subspecies from other populations in Canada (John Morton, Professor of Botany, University of Waterloo, March 13 2002, pers. com).

## Description

Silene scouleri ssp. grandis is a greenish-white to purplish perennial herb from a simple or branched stem-base, 15-80 cm tall. The basal leaves are hairy, 6-20 cm long to 1.5 cm wide. The stem leaves are opposite, hairy, in 3-11 pairs which become gradually unstalked above. Flowers are arranged in an elongated narrow inflorescence. Petals are 5, greenish-white to purplish, stalklike at the base and 7-16 mm long. Petals vary from being divided into two, to being almost 4-parted. There are prominent teeth on each lobe of the petal. The sepals form a tube 10-18 mm long and have 10-veins. The fruits are elliptical capsules, which contain 0.9-1.5 mm long, greyish-brown seed with pimples on the surface (Douglas and MacKinnon 1998).

**Figure 1. Illustration of *Silene scouleri* ssp. *grandis***

from Douglas and MacKinnon (1998)




*Silene taimyrensis*

*Silene scouleri ssp. grandis*

# RANGE AND KNOWN DISTRIBUTION

## Global range

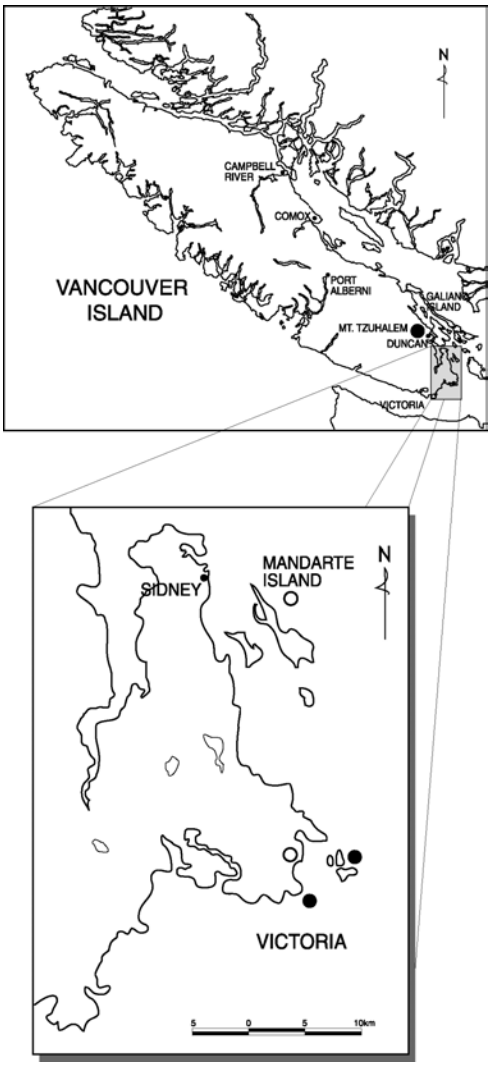
*Silene scouleri* ssp. *grandis* is a strictly coastal taxon found from the Victoria area of southern B.C. south to San Mateo County south of San Francisco Bay (Hitchcock *et al*. 1964, Wilken 1993, Douglas and MacKinnon 1998).

**Figure 2. North American Range of *Silene scouleri* ssp. *grandis***

## Canadian range

In Canada, *Silene scouleri* ssp. *grandis* is restricted to the Victoria area in British Columbia where it occurs on Trial Island and Alpha Islet (Douglas and MacKinnon 1998, B.C. Conservation Data Centre database 2002) (Figure 3).

**Figure 3. Distribution of *Silene scouleri* ssp. *grandis* in Canada.**



# HABITAT DESCRIPTION

## Habitat Requirements

There is no detailed information on habitat relationships of Silene scouleri ssp. grandis but parallels can be drawn to similar species. Kephart and Paladino (1997) found that shallow rocky soils were not optimal for S. douglasii and that its abundance is also negatively correlated with vegetation height, cover and soil depth. Silene spaldingii is tolerant of light to moderate grazing (Schassberger 1988) and may benefit from prescribed burning (Lesica 1992).

In Oregon, Silene scouleri ssp. grandis occurs on seaward slopes along the coast (Peck 1941). In California, it occurs on rocky slopes and coastal bluffs under 300 m elevation (Hickman 1993).

In Canada, Silene scouleri ssp. grandis is restricted to the lowland Coastal Douglas-fir biogeoclimatic zone. It prefers in winter wet/summer dry grassy openings on gently-sloping sites, generally under 30 m elevation. Common associates include Rosa nutkana, Symphoricarpos albus, Pteridium aquilinum, Festuca rubra, Achillaea millefolium, Grindelia integrifolia, Fragaria chiloenesis, Piperia maritima, Lomatium nudicaule, Hypochaeris radicata, Camassia sp. and Aira praecox. It is absent from shrub thickets and from patches of robust introduced grasses within both populations. The Mount Tzuhalem population, now presumed extirpated, was atypical with respect to elevation (over 200 m); otherwise the site and vegetation characteristics of that location are similar to conditions at Trial Island and Alpha Islet.

## Trends

The loss of Garry Oak ecosystems in Victoria parallels the loss of suitable habitat for Silene scouleri ssp. grandis. The extent of these ecosystems decreased 95% from 10,510 ha in 1800 to 512 ha in 1997 (Lea 2002). This loss is almost entirely attributable to agricultural conversion followed by residential and recreational development.

Silene scouleri ssp. grandis is now restricted to open meadows a few metres above sea level on offshore islets. Habitat quality has decreased on these islets as several introduced species of shrubs, grasses and forbs have formed thick swards at many locations. Aboriginal burning to improve camas crops may have maintained habitat in the past. If so, fire suppression may now favour the development of dense patches of native shrubs where Silene scouleri ssp. grandis cannot survive.

## Protection/ownership

Silene scouleri ssp. grandis populations are restricted to areas that are provincially owned. No populations are known to occur on private lands. The Alpha Islet population occurs in Oak Bay Islands Ecological Reserve while the Trial Island population occurs on lands leased to Seacoast Communications, who maintain radio-communication towers on the site.

# STATUS OF SPECIES

**Populations**

Silene scouleri ssp. grandis has been up to 12 locations in Canada, all on southeast Vancouver Island or adjacent small islands (table 1). Two locations, 'near Victoria' and Burnside District, are very imprecise and may well refer to other locations described in the table. The Mount Douglas, Beacon Hill, Oak Bay, Uplands and Ten Mile Point areas are frequently visited by botanists and the lack of recent records likely indicates the populations are now extirpated. The author surveyed suitable habitats in each of these locations in 2001. The 'Bare Island' location is probably Mandarte Island – the two names appear to be synonymous. This is an unoccupied reserve (Bare Island Indian Reserve 9). It was not visited in 2001 and the population may still be extant, although it has not been observed since 1915.

The Griffin Island population is problematic. This island is only a few metres from Alpha Islet, where the plant is abundant. Exhaustive surveys of Griffin Island during the peak flowering season in 2001 did not find any plants in flowering or vegetative state. It has only been reported on Griffin Island once, in 1991. The collector was not certain the plants were actually collected on Griffin Island (M.G. Shepard, naturalist, pers. com. May, 2001). It seems likely the collection was made from Alpha Islet and the label is in error.

The Mount Tzuhalem population was first observed 'many years ago' by Adolf Ceska (ecologist, B.C. Conservation Data Centre, pers. com., Oct 5 2001). It never consisted of more than 2-3 shoots and was most recently observed in 2000 when it failed to flower. A detailed search of the precise location in 2001 did not reveal any evidence of the plant and it is presumed extirpated from the site. This location is very unusual; it is well inland and much higher than any other observation or collection.

The current extent of occurrence of Silene scouleri ssp. grandis in Canada is approximately 0.6 $km^2$. The area of occupancy is 1.28 ha (0.0128 $km^2$). Past observations of the other populations have included estimates of abundance but these appear to be too unreliable to use as a basis for tracking trends. Estimates from 2000 and 2001 suggest a total of between individuals in the two populations.

**Table 1. *Silene scouleri* ssp. *grandis* Population and Location Data**

| Population | Last Observed | Observer | Extent* | Number of individuals** | Apparent Status |
|---|---|---|---|---|---|
| Trial Island | October 2001 | M. Fairbarns | 20 x 4 m | 5 | Extant |
| Alpha Islet | October 2001 | M. Fairbarns | 160 x 80 m | 250-300 | Extant |
| Mount Tzuhalem | July 2000 | A. Ceska | 2 x 2 m | 2-3 shoots | Extirpated |
| Griffin Island | August 1991 | M.G. Shepard | Unknown | Unknown | Error |
| Ten Mile Point | August 1966 | A.S. Harrison | Unknown | Unknown | Extirpated |

| | | | | | |
|---|---|---|---|---|---|
| Upands, Victoria | July 1953 | M.C. Melburn | Unknown | Unknown | Extirpated |
| 'near Victoria' | July 1938 | J.W. Eastham | Unknown | Unknown | Imprecise |
| Burnside District | August 1935 | E. Cooke | Unknown | Unknown | Imprecise |
| Oak Bay | August 1924 | G.A. Hardy | Unknown | Unknown | Extirpated |
| Beacon Hill | 1921 | G.V. Copley | Unknown | Unknown | Extirpated |
| Bare (Mandarte?) Island | June 1915 | J.R. Anderson | Unknown | Unknown | unknown |
| Mount Douglas (Cedar Hill) | July 1897 | J.R. Anderson | Unknown | Unknown | Extirpated |

*Circumscribes entire population

** Each individual (genet) includes an average of about 3 shoots in a clump

**Other Uses**

Silene scouleri is an attractive garden plant and a number of commercial nurseries supply the species (e.g. www.elkhornnursery.com/perennials.htm, www.cnps-yerbabuena.org/plantsale2000.html)

Essences of Silene scouleri are also commercially available from Flower Essence Services (www.fesflowers.com/flower_essences/research_essences.htm).

**Existing protection**

*Silene scouleri* ssp. *grandis* is not covered under the Convention on International Trade in Endangered Species (CITES), the Endangered Species Act (USA) or the IUCN Red Data Book. Natureserve has designated a G5T?Q rank for the *Silene scouleri* var. *pacifica* but indicate they do not consider it to be completely synonymous with *S. scouleri* ssp. *grandis*. The G5 indicates that the species is classified as "common to very common; demonstrably secure and essentially ineradicable under present conditions". The T? ranking reveals that the subspecies has not been ranked and the Q indicates that the taxonomic validity of the variety is not clear.

The British Columbia Conservation Data Centre (2002) provincial ranking is S1, "critically imperiled, because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Silene scouleri ssp. grandis is currently on the B.C. Conservation Data Centre RED LIST, which includes any indigenous species or subspecies (taxa), considered to be Extirpated, Endangered, or Threatened in British Columbia.

Federal endangered species legislation has been proposed in Canada. This is most likely to affect rare species on federal land but populations are restricted to provincial lands. Federal activities on the Trial Island lighthouse property may affect the species so that population may be eligible for protection once this legislation is passed, if the species is officially listed as endangered, threatened or of special concern.

British Columbia does not protect endangered species through legislation. The Alpha Islet population occurs within an ecological reserve and is protected by law, as are all native plants within ecological reserves. B.C. Parks staff rarely visit Alpha Islet and the legal protection is not backed up by a meaningful management presence.

The Trial Island population is not included within Trial Island Ecological Reserve, instead it is a few metres inside a telecommunications lease. It has no formal or informal protection.

# LIFE HISTORY

### General

Silene scouleri ssp. grandis is a tap-rooted perennial species with a shallowly buried caudex that gives rise to multiple stems, which form compact genets. Large clumps may die off in segments as in Silene douglasii var. oraria (Kephart and Paladino 1997). This could produce gaps creating several weakly separated clumps from a single genet. Silene scouleri ssp. grandis does not possess rhizomes or any other means of vegetative reproduction. No information is available on its biology and ecology in B.C.

### Reproduction

Little is known about pollination and reproduction in Silene scouleri ssp. grandis. Several species of Silene are self-compatible (Kephart and Nebenzahl 1983, Lesica 1993, Menges 1995). Jürgens et al. (1996) noted that the stigmas of some Silene are receptive in the bud and flowers may be capable of selfing. Lesica (1993) concluded that flowers of S. spaldingii rarely self-pollinate because the anthers shed their pollen before styles expand, although he observed limited fruit development in flowers denied access to pollinators.

Sticky-glandular hairs on the foliage and calyx tube capture small insects that try to steal nectar without pollinating the flowers hence the common name, catchfly.

Seed production in some species of Silene decreases greatly when pollinators are excluded (Lesica 1993, Menges 1995) and juvenile plants from selfed seed may be substantially smaller than those from open-pollinated seed (Lesica 1993). Many species of Silene are pollinated by insects including bumblebees, moths and mosquitoes (Brantjes and Leemans 1976, Kay et al. 1984, Kephart and Nebenzahl 1983, Lesica 1993, Pettersson 1991). They typically possess nectaries at the base of their stamens (Jürgens et al. 1996). The larger and more colourful Silene regia is pollinated by hummingbirds rather than insects (Menges 1995) but this appears to be an exception.

Silene scouleri ssp. grandis at Trial Island matured slowly in 2001. A few of the earliest flowers produced abundant mature seed while others still had pale, small seeds or no seeds at all by late October.

## Germination

Silene scouleri seeds typically germinate best at about 20ºC when sown in a pot of stone mulch such as grani-grit, placed in polyethylene bag. Germination occurs over 2-5 weeks (Deno 1994; Jane Grushow, professional gardener, pers. com. February 2002; Tom Clothier, native seed supplier, http://users.anet.com/~manytimes/page62.htm). Seeds of Silene douglasii and S. spaldingii, two closely related species, appear to require cold stratification as germination occurs mainly in spring (Lesica 1988, Kephart and Paladino 1997).

## Seedling Ecology

There is no documentation of factors affecting the establishment of Silene scouleri ssp. grandis seedlings. Seedlings of Silene douglasii var. oraria had higher survival rates in burned areas compared to unburned plots which may be attributable to higher seedling mortality in areas of thick litter (Kephart and Paladino 1997). Silene spaldingii produces rosettes in the first summer and flowers during or after the second season (Lesica 1993).

## Survival

Perennial species of Silene may survive for several to many years under natural conditions (Marsden-Jones and Turrill 1957).

Field observations of the Trial Island population during the summer of 2000 and 2001 did not reveal any significant cases of adult mortality. There was no evidence of leaf or flower herbivory in either population, aside from a light infestation of spittlebugs on one Trial Island plant in 2001.

The small population that once occurred on Mount Tzuhalem gradually declined in vigour during the 1990s, first failing to flower and finally failing to overwinter. This atypical site is approximately 250 m above sea level and climatic limitations may have led to the population's demise.

Individuals of both Silene spaldingii and S. douglasii var. oraria may reappear after a year or dormancy, as desiccated stems produce new plants (Kephart and Paladino 1997, Lesica and Steele 1994).

## Physiology

The physiology of Silene scouleri ssp. grandis has not been studied.

## Movements/dispersal

There is no information on gene dispersal by Silene scouleri ssp. grandis. Insects are presumably capable of dispersing pollen over short distances but between-population dispersal in Canada is unlikely given the distances involved.

Seeds of Silene scouleri ssp. grandis lack any strong adaptations for long-distance dispersal and most seeds are probably gravity-dispersed, although the pimply surface texture may aid in short-distance wind dispersal as with other species in the genus (Marsden-Jones and Turrill 1957). During a 10-year study Silene douglasii var. oraria, another rare species of coastal grasslands, was not able to colonize a network of vacant quadrats within an established population (Kephart and Paladino 1997).

The localized distribution and well-documented history of populations in British Columbia suggest that dispersal and establishment of new populations is rare.

# HOW THE SPECIES IS AT RISK

Habitat loss presents a serious and urgent threat to Silene scouleri ssp. grandis in Canada. The specialized coastline habitats in Victoria and surrounding areas have been extensively developed for residential and commercial purposes and recreation facilities.

Habitat degradation compounds this threat. Both populations are threatened by the encroachment of exotic grasses and shrubs, most notably Cytisus scoparius, Hedera helix, Ulex europaeus, Dactylis glomerata, Anthoxanthum odoratum, Lolium perenne, Bromus sterilis and B. hordeaceus.

The warm dry sites that support Silene scouleri ssp. grandis were probably burned frequently by First Nations groups seeking to improve camas production on the adjacent uplands. Fire has been almost completely suppressed on coastal sites for several decades, which has favoured ingrowth by introduced shrubs as well as native species including Rosa nutkana, Symphoricarpos albus, Populus tremuloides and Pteridium aquilinum. S. scouleri ssp. grandis was not found within dense patches of native or exotic shrubs or thick swards of introduced grasses.

Seed dispersal and rescue effects present a complex problem. At the broad scale, seed dispersal over distances greater than 10 m is probably extremely rare. The widely separated populations have no potential for unassisted re-colonization of former sites.

Both Trial Island and Alpha Islet are frequently visited by kayakers. They may cause some mortality as they walk about the islet and their beach fires could escape and burn the uplands. While Silene scouleri ssp. grandis may benefit from light fires, heavy fuel build-ups due to the introduction of exotic shrubs and grasses may lead to intense fires that could kill the plants caudices.

The Trial Island population faces additional pressure from trampling by resident staff from both the federal coast guard lighthouse a few hundred metres away and workers associated with the radio-communications towers and associated facilities. Two of the five plants on Trial Island are within a metre of a maintained path and are susceptible to impacts trail maintenance activities including mowing and herbicide application.

Both populations are also at risk from potential marine pollution as they grow close to the intertidal zone of one of the most active oil shipping lanes in North America.

# MANAGEMENT RECOMMENDATIONS

Silene scouleri ssp. grandis should be recommended for Endangered status in Canada.

Population biology studies should be conducted to determine what steps are most limiting in the production and dispersal of seed and establishment of new plants and populations.

Kayakers and staff from Canada Coast Guard and Seacoast Communications should be informed of the location and sensitivity of the populations to disturbance.

Gorse and Scotch broom should be removed from Alpha Islet and Trial Island and their control should be monitored annually.

Seed should be collected and propagated in order to provide a source for re-introduction to extirpated sites and introductions to new, suitable sites.

# ACKNOWLEDGEMENTS

The authors would like to acknowledge the very valuable assistance of the British Columbia Conservation Data Centre, and in particular Brenda Costanzo, in the preparation of this account. George Douglas gave us valuable advice on the complex taxonomy of this species and provided us with illustrations and the Canadian range map.

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# COLLECTIONS EXAMINED

The following collections were consulted:

Royal BC Museum herbarium