



**Garry Oak
Ecosystems
Recovery Team**

**Stewardship Account for
Annual Sandwort
*Minuartia pusilla***

Prepared for the
Garry Oak Ecosystems Recovery Team
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by

Brenda Costanzo,
BC Conservation Data Centre,
PO Box 9344
Station Provincial Government,
Victoria, BC V8W 9M7

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Canada



STEWARDSHIP ACCOUNT

Minuartia pusilla (S. Wats.) Mattf.

Species information

Kingdom: Plantae
Subkingdom: Tracheobionta
Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Caryophyllidae
Order: Caryophyllales
Family: Caryophyllaceae
Subfamily: Alsinoideae
Genus: *Minuartia*
Species: *pusilla*

Minuartia pusilla (S. Wats.) Mattf.

Annual sandwort
Dwarf sandwort
Dwarf stitchwort

Synonyms:

Arenaria pusilla S. Wats. (NatureServe web site 2001; ITIS database, 2001; USDA Plants database, 2001; Douglas *et al.*, 1998)
Alsinoopsis pusilla (Wats.) Rydb. (Hickman, 1993).

The name *Minuartia* is after Juan Minuart from Barcelona (1693-1768), and *Arenaria* is from the Latin word *arena* for sand (Coombe, 1985).

Taxonomic separation of *Arenaria* from *Minuartia* is based on the capsule opening by as many valves as there are styles in the latter, whereas in *Arenaria* the capsule dehisces by twice as many valves as styles (McNeill, 1980). McNeill and Bassett (1974) place the genus *Minuartia* in the exstipulate subfamily Alsinoideae following Pax and Hoffmann (1934, in McNeill and Bassett, 1974).

Description:

Annual herb from a weak taproot; stems erect, solitary or more usually few, simple to branched, glabrous and more or less glaucous, 2-5 cm tall. Basal and lower stem leaves opposite, linear, 2-4 mm long, less than 0.5 mm wide, glabrous, obtuse, 1-nerved; upper stem leaves few, similar, not much reduced; stipules lacking. Inflorescence of usually several flowers in an open, leafy-bracted cluster that is often 4/5 the total height of the

plant; petals elliptic, 1-2 mm long, sometimes lacking; sepals lanceolate, long-pointed or abruptly sharp-pointed, 2-3 mm long, 3-nerved. Capsules egg-shaped, 1-2 mm long, 3-valved; seeds brown, about 0.3 mm long, minutely pimply. (Douglas *et al.* 1998).

Illustration: see page 255 of Douglas *et al.*, 1998.

Range and Known Distribution:

- a) Global range: Western North America – British Columbia S to Idaho, Arizona and NW California (Douglas *et al.*, 1998); Washington, Oregon, Idaho, California, Nevada, Utah, Arizona (NatureServe website, 2001).
- b) Canadian range: British Columbia
- c) British Columbia range: SW British Columbia, only known from Rocky Point, near Church Hill, S. Vancouver Island (Douglas *et al.*, 2002).

Habitat Description:

In British Columbia, *Minuartia pusilla* grows on dry rock cliffs in the lowland zone (Douglas *et al.* 2001). In the United States the habitat is described as follows: open, dry soil of sagebrush and ponderosa pine forest in Washington, California, Oregon, Idaho (Hitchcock *et al.*, 1964); exposed, often sandy places (Larrison *et al.*, 1974); ponderosa pine and mixed mountain brush Utah (Welsh *et al.* 1987); dry woods Oregon (Peck, 1961); and dry soil Idaho (Davis, 1952). Elevation at Church Hill approximately 20 m. Elevation varied in the United States from 1525 – 1830 m (Welsh *et al.*, 1987) and 800-2400 m (Hickman, 1993).

The habitat at Church Hill was described as “on flat tops of coastal rock cliffs” (CDC HERB records, 2001). Other native species that were growing with *M. pusilla* were: *Triphysaria pusilla* (= *Orthocarpus pusillus*, dwarf owl-clover), *Plagiobothrys scouleri*, (Scouler’s popcornflower), *Poa confinis* (beach bluegrass) (Ceska and Ceska, 1980; CDC HERB record). This specimen is from slightly west of Church Hill in a shallow soil depression of approximately 4 inches of moraine, along with *Ranunculus californicus* (A. Ceska, pers. com.).

Church Hill and the surrounding area at Rocky Point are part of the Department of National Defence property. It is under the jurisdiction of the Federal Government of Canada. Future use of land is not known.

Status of Species:

Global rank: G5

Canada rank: N1

BC: S1

California: S?

Idaho, Nevada, Oregon, Washington: SR

Utah: S1

One other *Arenaria* species is blue listed in British Columbia (*A. longipedunculata*) but it is a northern and southeastern distributed species. Two other species of *Minuartia* are blue listed in British Columbia, but these are also northwestern and southeastern in distribution (BC CDC Tracking Lists, 2002).

Minuartia pusilla is potentially confused with shining sandwort (*Stellaria nitens*), however it has entire, not cleft petals. The sepals of *M. pusilla* have 3 prominent nerves but lack the broad scarious margins on the upper parts found in *S. nitens* (Ceska and Ceska, 1980).

As it is at the northern range limit of the species in North America, there are potentially genetic differences in this population from other populations south of the border.

There are no known horticultural uses, although members of the genus are favourite horticultural rock garden species (Bailey and Bailey, 1976).

Rocky Point is within Federal Lands of the Department of National Defence and is protected from access by the public. There are currently no plans for the area where *M. pusilla* occurs except for the ongoing use as a buffer area and for training patrols (Art Robinson, pers. comm.).

Life History:

a) **General** - *Minuartia pusilla* is a winter annual that grows on flat rocks presumably on shallow soils. For *Arenaria uniflora*, Wyatt (1984) found that deeper soils lead to the invasion of other plants that would potentially out compete smaller species such as *Arenaria* spp.

b) **Phenology** - Leaves emerge in the late fall to winter, with flowers developing in April to June (Hitchcock *et al.*, 1964) or mid-spring (Larrison *et al.*, 1974). This is an annual species that reaches reproductive age within one year, potentially overwintering in the seedling stage.

Although no work has been done on *Minuartia pusilla*, Baskin and Baskin (1987) found in *Arenaria fontinalis* (an eastern endemic) that seeds germinated in the fall and the plant behaved as a winter annual remaining in the semi-rosette stage over the winter. In general, winter annuals germinate in the fall and overwinter as rosettes or semi-rosettes. They then flower to produce seeds the following spring or summer (Baskin and Baskin, 1974). *A. fontinalis* seeds were found to be dormant at maturity in spring and required an after-ripening period during the summer at high temperatures. Wyatt (1984) found that an after-ripening period was also required for the germination of *A. uniflora*. Baskin and Baskin (1987) found that *A. fontinalis* seeds were non-dormant by fall and flowered without vernalization. As in the case in the majority of winter annual species, flowering is potentially controlled by temperature and not photoperiod (Baskin and Baskin, 1987).

c) Pollination Biology - In the western United States, species of *Arenaria* are reported to be pollinated by Andrena bees. The pollinators of *Arenaria uniflora* were Dipterans (particularly syrphid flies), Hymenoptera species (particularly andrenid and halictid bees) and one species of Lepidoptera (Wyatt, 1986).

Wyatt (1984) found in *A. uniflora* that the plants were either insect pollinated or selfing when the flowers closed, and that there was a range of strongly protandrous to homogamy within the population (Wyatt 1986). Wyatt (1986) also reported that there was a relationship between the mean moisture levels and the rates of outcrossing in *A. uniflora*. Lloyd (1965, in Wyatt 1986) suggested that populations of plants that grew on shallow soils were forced to bloom earlier, thereby missing the emergence of pollinating insects. Fishman and Wyatt (1999) found that selfing was common in ephemeral habitats for *A. uniflora*, and Fishman (2000) found that male fitness in this species appeared to be dependent on ecological context and morphological trade-offs. More field data is required on the effective levels of pollinators.

d) Reproductive ecology - *Minuartia pusilla* is an annual, completing its life cycle within one year. Nothing specific is known about its reproduction. It likely reproduces by the development of seeds in the spring followed by germination in the fall and overwintering in the seedling stage. *Arenaria fontinalis* was thought to require an after-ripening period at high temperatures during the dry summers (Baskin and Baskin, 1987). Arroyo (1975, in Wyatt, 1986) suggested that droughts late in the season can induce the abortion of developing seeds in some plant species.

e) Survival - No studies done on this species. Wyatt (1986) did survivorship studies on *A. uniflora* a species that grows in eastern U.S. on granite outcrops. In dry years, survivorship decreased due to competition for available water. He found that soil depth was an important determinant in population density. Sharitz & McCormick (1973 in Wyatt, 1986) found that soil depth and moisture determined plant densities and the outcome of within-species competition.

Sharitz and McCormick (1973) found in *M. uniflora* the early juvenile stages were the most vulnerable period, due to the washout of seeds and seedlings as well as sensitivity to moisture stress. These both contributed to early mortality. Wyatt (1986) also performed transplant studies on *A. uniflora* in gardens, and found that survivorship was greater in the transplant gardens than in natural quadrants. In reciprocal transplant studies, the plants did better in the native sites, and fruit production was greater for the within-site transplants compared to other sites.

Further research is needed on seedling survival and rate of survival to maturity.

f) Physiology - No known. Possibly requires moisture in the fall and the spring for germination and growth, followed by dryness in summer for the after-ripening of seeds. Sharitz and McCormick (1973) in *Minuartia uniflora* found that stunting of growth was a response largely to severe environment. Also that the species was less resistant to abiotic stress than other primary invaders (of granite outcrops).

g) Dispersal - Not known. Seeds have no mechanisms for dispersal. Wyatt (1984) found that seashore birds walking in muddy areas potentially dispersed seeds of *A. uniflora*.

h) Nutrition & Interspecific Interactions - Not known.

i) Behaviour/Adaptability - Not known. No horticultural varieties (Bailey and Bailey, 1976).

How the species is at risk:

Only one recorded occurrence in British Columbia and partially protected as on Federal lands (not accessible to the public). It is not known whether there are management plans at the Department of Defence.

Management Recommendations:

The Department of National Defence should be made aware of the occurrence of this species on their Rocky Point lands, and an effort made to check for other occurrences of this species in similar habitats. Planning and maintenance departments should also be made aware of the locality and impressed upon them the rarity of this species. In particular, reduce walking on the cliff face to prevent removal by accidental kicking-off the plants from the cliff face. There is a Forest Management Plan for Rocky Point and the rare species are mapped.

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International Organization for Plant Information: <http://iopi.csu.edu.au/iopi/>

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Authorities Consulted/Personal communications:

George Argus. Flora of North America Project. Email: GeorgeArgus@sympatico.ca
(responded, no information).

Pamela Brunsfeld, University of Idaho Herbarium. Email: pambruns@uidaho.edu

Florence Caplow. Botanist, Washington Natural Heritage Program. Department of Natural Resources. PO Box 47014. Olympia, Washington. Phone: 360-902-1793.
Email: Florence.Caplow@wadnr.gov (responded, but information to come).

Adolf Ceska, Plant Ecologist, Conservation Data Centre, Victoria, BC. December 5,

2001.

J.K. Morton. Dept. of Biology, University of Waterloo, Waterloo, ON Canada N2L 3G1. Phone: 519-885-1211 ext 2564. Fax: 519-746-0614. Email: jkmorton@sciborg.uwaterloo.ca.

Honor C. Prentice. Dept. of Systematic Botany, Lund University, Ostra Vallagatn 14-20, Lund, Sweden SE 223 61. Email: honor.prentice@sysbot.lu.se (responded, no information).

Michael Mancuso, Idaho Conservation Data Center. PO Box 25, 600 S. Walnut Street, Boise, Idaho 83707. Email: mmancuso@idfg.state.id.us. (responded).

John Packer, Taxonomy Editor and Regional Coordinator Western Canada, Flora of North America Project. Email: apacker@compusmart.ab.ca. (no response)

Richard Rabeler. Univ. of Michigan Herbarium, 1205 North University Avenue, Ann Arbor, MI 48109-1057. Phone: 734-647-2811. Fax: 734-647-5719. Email: rabeler@umich.edu. (no response)

Art Robinson, Pacific Forestry Centre and Department of National Defence. Secretariat, DND Environmental Science Advisory Committee. Phone: 250-363-0729. Email: arobinson@pfc.forestry.ca.

Mike Ryan, Consultant, Mill Bay, BC. December 5, 2001. Phone: 250-743-
Email: mwryan@attcanada.net