COSEWIC
Assessment and Status Report

on the

Pink Sand-verbena
Abronia umbellata

in Canada

ENDANGERED
2004

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – May 2004

Common name
Pink Sand-verbena

Scientific name
Abronia umbellata

Status
Endangered

Reason for designation
An herb of maritime beach habitats last seen at a single site along the west coast of Vancouver Island with losses of two historic populations. The site of the last documented population is greatly disjunct from other small populations in Oregon. The species is found characteristically, in low numbers and tends to persist in the seed-bed of its beach and foredune habitats, sporadically producing flowering plants. The species was last recorded in 2001 with only several plants present. It is assumed that the species may still persist as dormant seeds and may produce reproductive plants at some future date. The expansion of exotic beach grasses has reduced the quality and availability of its upper beach and foredune habitats at a number of sites within its historic range.

Occurrence
British Columbia

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

COSEWIC
Executive Summary

Pink Sand-verbena
Abronia umbellata

Species information

Pink sand-verbena, *Abronia umbellata,* is a member of a genus of 25 species of western North America. Two species occur in British Columbia and three in Canada. *Abronia umbellata is represented by a single subspecies (*ssp*. breviflora*) in Canada. The typical subspecies (ssp. *umbellata*) is found only in California. *Abronia umbellata* is a perennial herb from a thick, deep taproot. The Canadian plants have trailing stems up to 1.5 m long with short branches and opposite, thick, fleshy, densely glandular leaves. The leaves are lanceolate to narrowly egg-shaped, 2-6 cm long, 0.8-3.5 cm wide with stalks 2.5-7 cm long. The many-flowered, rounded heads occur on stout, 2-4 cm stalks. The flowers consist of a 6-8 mm long, greenish to pinkish perianth tubes that flare into pink, 5-lobed limbs 5-6 mm wide. The fruits consist of 10-12 mm achenes, which are prominently 3- or 4-winged. The wings of the achenes are wider than the achenes. Each achene has a single, brown seed approximately 1.5 mm wide and 3 mm long.

Distribution

Historically, *Abronia umbellata* ranged from southwestern British Columbia, south sporadically along the outer coast of Washington and Oregon to northern California. In Canada, *A. umbellata* was known, prior to 1927, from Bamfield (Pachena Bay) and Tofino (Ahousat) on the central-west coast of Vancouver Island. Recently it was recollected in 2000 and observed again in 2001 at Clo-oose Bay, south of Tofino. The plant did not reappear in 2002.

Habitat

Abronia umbellata habitat in British Columbia is restricted to upper sand beaches, just below the driftwood zone, along the outer coast. These sites are scoured by high tides and winter storms thus few plants in this zone ever persist over winter. At Clo-oose Bay, the two *Abronia umbellata* plants were swept away in the first winter storm in October, 2000. A similar situation occurred in 2001. Few plants are adapted to this ephemeral habitat and only scattered specimens of *Cakile maritima*, a European introduction, occur along this area of the beach. In 2000, two plants of *Abronia latifolia* were also found on Clo-oose Bay. The sand beach/sand dune habitat is relatively uncommon on the outer coast of British Columbia with only three of the beaches (at

Ahousat, Clo-oose Bay and Pachena Bay) having occurrence records of *Abronia umbellata.* A number of other beaches are potential sites for the species since they support, or have supported, *Abronia latifolia* , a species with similar habitat requirements.

Biology

Reproduction of *A. umbellata* is only by seed with a high percentage of all seeds being viable. Germination tests indicate that when fruits are left intact seeds germinate at less than a 1% rate. These experiments suggest that, in the natural environment, *Abronia umbellata* fruits must be sand-abraded to expose the seeds and subsequently germinate. Stratification treatments involving the naked seeds had germination rates of 52% to 81%. The short-term survival of *A. umbellata* plants is precarious due to the ephemeral, sandy beach habitat, which occurs within the extreme high-tide zone. Long-term survival, however, is enhanced by the extreme toughness of the fruits although germination rates in the field are low with only 1 in 1000 untreated seeds germinating after scattering on natural beaches. Long-term survival is also highly variable.

Population sizes and trends

Abronia umbellata has been collected at three sites in British Columbia, with the last observation being in 2001. The counts of two and three plants at Clo-oose Bay, in 2000 and 2001, respectively, are the only counts known. The latter plants were washed away at the end of each growing season. It is likely that the seed bank of the ephemeral beach habitat rarely results in large numbers of plants germinating in any given year.

Limiting factors and threats

The greatest threat to the persistence of populations of *Abronia umbellata* is the invasion and subsequent stabilization of upper beach and foredune systems by *Ammophila arenaria and A. breviligulata*. At Wickaninnish Beach, Pacific Rim National Park, one of the most extensive beaches on the British Columbia outer coast, this *Ammophila* invasion has greatly reduced the potential habitat for *Abronia umbellata .*

The eradication of *A. arenaria*, because of its extensive underground rhizome network, has proven to be a difficult and challenging problem for land managers. It is now so widespread on the United States west coast that its eradication, except in local situations, is not presently practical. To date, the main eradication techniques have included chemical, manual and mechanical techniques. All of these have met with variable success.

Winter storms are also a major factor. The sand beach habitats of Abronia umbellata are often scoured by high tides and winter storms thus few plants in this zone ever persist over winter. These storms also alter beach and sand dune morphology. The annual phenomena of winter storms, although natural, must be considered for management purposes, especially if reintroduction is considered.

Special significance of the species

Abronia umbellata occurs in an uncommon ecosystem in British Columbia; the sand beach/sand dune system on the outer west coast. The species is also unusual in that it is an ephemeral plant that appears and disappears at lengthy intervals. It is one of the rarest plants in Canada.

Existing protection or other status designations

British Columbia does not have specific legislation in place for the protection of vascular plants at risk. If *A. umbellata* should re-appear in Pacific Rim National Park Reserve it would be afforded protection under the *Canada National Parks Act*. COSEWIC listed plants included under the *Species at Risk Act* will be protected on Federal lands.

COSEWIC HISTORY

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

COSEWIC MANDATE

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

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS
(after May 2004)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

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COSEWIC Status Report

on the

Pink Sand-verbena

Abronia umbellata

in Canada

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2004

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SPECIES INFORMATION

Name and classification

Scientific Name:	*Abronia umbellata* Lam. ssp. *breviflora* (Standley) Munz
Synonyms:	*Abronia umbellata* Lam. ssp. *acutalata* (Standley) Tillett; *Abronia umbellata* Lam. var. *acutalata* (Standley) C.L. Hitchcock; *Abronia acutalata* Standley; *Abronia breviflora* Standley
Common Name:	Pink Sand-verbena
Family:	Nyctaginaceae, Four O'clock family
Major Plant Group:	Angiosperm (Dicot flowering plant)

Description

Pink sand-verbena, *Abronia umbellata* ssp. *breviflora* is a member of a genus of 25 species of western North America (Spellenberg 1993). Two species occur in British Columbia and three in Canada (Scoggan 1978; Douglas *et al*. 1999, 2002a, b).

The *A. umbellata* Lam. complex has received markedly different taxonomic treatments over the years. In 1791, J. B. P. A. Lamarck, a French botanist described *A. umbellata* from seed collected at Monterey on the central California coast. Later, in a monographic treatment of the subtribe Abroniinae, Standley (1909) split the *A. umbellata* complex and described four additional species on the west coast. In contrast, Ferris (1944), in Abrams' *Illustrated Flora of the Pacific States*, concluded that the Pacific Coast material was best treated within a single species. Munz (1959), in his *Flora of California*, recognized all five of Standley's taxa for coastal California but treated them at the subspecies level. In 1964, C.L. Hitchcock, in the *Vascular Plants of the Pacific Northwest* (Hitchcock 1964) recognized only two taxa for the Pacific westcoast: *Abronia umbellata* var. *umbellata* (ranging from central Califonia south to Mexico and var. *acutalata* (Standl.) C.L. Hitchc ranging from central California north to British Columbia). Subsequently, Tillett (1967) conducted a detailed investigation into the westcoast *A. umbellata* complex that resulted in his recognition of three subspecies: ssp. *acutalata* (Standl.) Till. in Washington and British Columbia, ssp. *breviflora* (Standl.) Munz in Oregon and northern California and ssp. *umbellata* from central California to Mexico. Spellenberg (1993) treating the genus for *The Jepson manual: Higher plants of California* and Kaye (1995, 1999), working on the Oregon coast, followed the concept of Hitchcock (1964) but choose to recognize the northern taxon as ssp. *brevifolia.* In contrast, when material from British Columbia was recollected, after a hiatus of 73 years (Douglas 2001), measurements from a limited number of achenes lead Douglas (2002a, b) to conclude that the concept of Tillett (1967), was the most appropriate and that the northern material should be recognised as ssp. *acutalata*.

More recently, a study of chloroplast DNA found no difference between British Columbia and Oregon populations (Kaye 2002). Kaye (2002) also conducted a morphometric analysis of British Columbia and Oregon from greenhouse grown material

and found only slight differences between them. As a result of the latter investigations, the British Columbia taxon should now be recognized as ssp. breviflora.

Only a single infraspecific taxon of *Abronia umbellata* is present in Canada. In this report pink sand-verbena is referred to simply as *Abronia umbellata* rather than by its more precise name of *Abronia umbellata* ssp. *breviflora.*

Abronia umbellata is a perennial herb from a thick, deep taproot (Figure 1; Douglas 2002a, b). Canadian plants have trailing stems up to 1.5 m long with short braches and opposite, thick, fleshy, densely glandular leaves. The leaves are lanceolate to narrowly egg-shaped, 2-6 cm long, 0.8-3.5 mm wide with stalks 2.5-7 cm long. The many-flowered, rounded heads occur on stout, 2-4 cm stalks. The flowers consist of a 6-8 mm long, greenish to pinkish perianth tubes that flare into pink, 5-lobed limbs 5-6 mm wide. The fruits consist of 10-12 mm achenes that are prominently 3- or 4-winged. The wings of the achenes are wider than the achenes. Each achene has a single, brown, seed approximately 1.5 mm wide and 3 mm long.

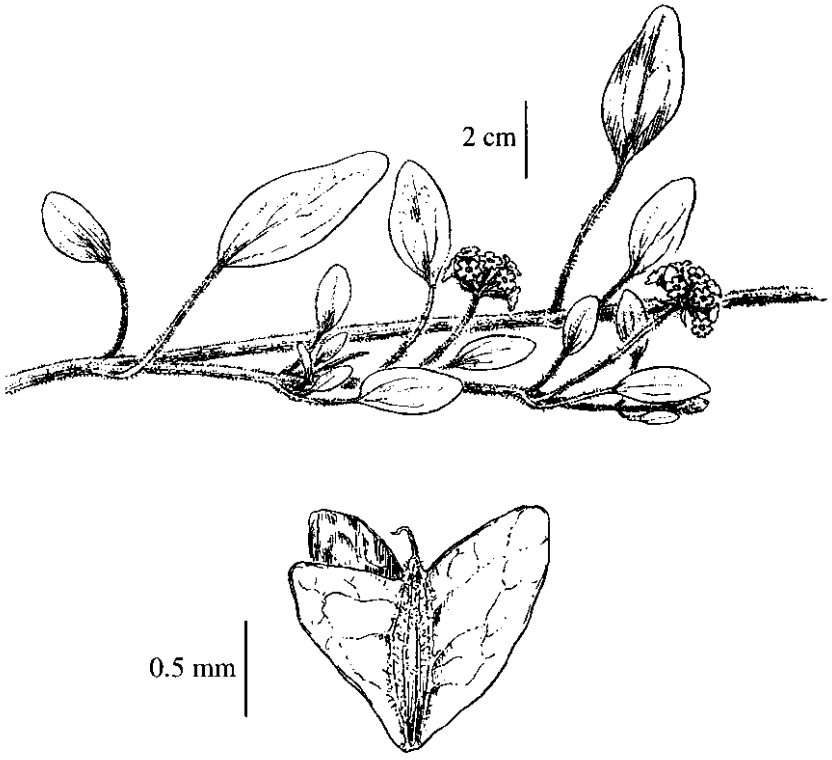

Figure 1. Illustration of *Abronia umbellata* (ssp. *breviflora*). (Line drawing from Hitchcock 1964, by permission).

Abronia umbellata could be confused with its relative, *Abronia latifolia*[1], especially if the plants are immature or not in flower. The latter species has yellow flowers, broader, egg- to kidney-shaped leaves and achenes with wings narrower than the fruit bodies (Douglas 1999, 2002b).

DISTRIBUTION

Global range

Historically, *Abronia umbellata* ranged from southwestern British Columbia, south sporadically along the outer coast to Washington, Oregon and northern California (Figure 2).

Canadian range

In Canada, *A. umbellata* was known prior to 1927, from Bamfield (Pachena Bay) and Tofino (Ahousat), on the central-west coast of Vancouver Island. Recently it was recollected in 2000 and observed again in 2001 at Clo-oose Bay, south of Tofino, (Figure 3; Douglas 2001; Douglas et al. 2002a, b). The plant did not reappear in 2002. A historic extent of occurrence including all three sites known would be <100 km^2. No data are available for its area of occupancy at the recent site at Clo-oose Bay but this is likely <<20 km^2.

HABITAT

Habitat requirements

Abronia umbellata habitat in British Columbia is restricted to upper sand beaches, just below the driftwood zone, along the outer coast. These sites are scoured by high tides and winter storms thus few plants in this zone ever persist over winter. At Clo-oose Bay, the two *Abronia umbellata* plants were swept away in the first winter storm in October, 2000. A similar situation occurred in 2001. Few plants are adapted to this ephemeral habitat and only scattered specimens of *Cakile maritima*, a European introduction, occur along this area of the beach.

The sand beach/sand dune habitat is uncommon on the outer coast of British Columbia. Only three of the beaches (at Ahousat, Clo-oose Bay and Pachena Bay) have records of former occurrences of *Abronia umbellata.* A number of other beaches are potential sites for the latter species since they support, or have supported, *Abronia latifolia*, a species with similar habitat requirements.

[1]Taxonomy and nomenclature follows Douglas et al. (1998; 1999; 2001).

Figure 2. Historic distribution of *Abronia umbellata* in North America.

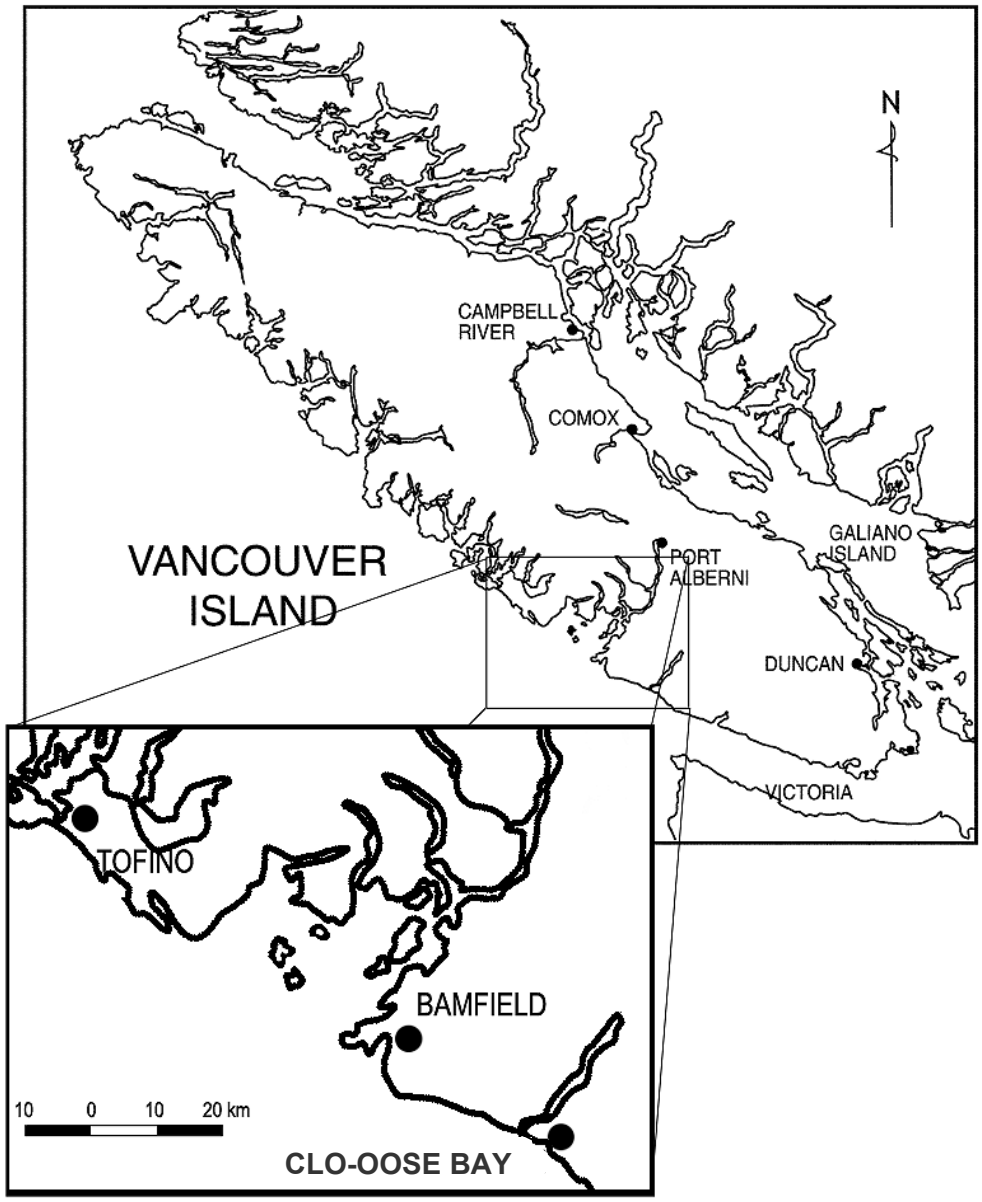

Figure 3. Historic distribution of *Abronia umbellata* in British Columbia.

Over the last century the sand beach and sand dune habitat along the Pacific Coast has been radically modified by the introduction of the non-native, sand dune stabilizing grasses, *Ammophila arenaria* and *A. breviligulata* (Wiedemann 1984, Rittenhouse 1994, Buell et al 1995, Wiedeman and Pickart 1996, Pickart and Sawyer 1998). These vigorously growing, rhizomatous grasses have created heavily vegetated foredunes that exclude most natural vegetation. The foredunes are higher, steeper and more stabilized than those that previously supported native vegetation. The *Ammophila* species also intrude on the upper sand beaches, the natural habitat of *Abronia*

species also intrude on the upper sand beaches, the natural habitat of *Abronia umbellata.*

Trends

The habitat, or potential habitat, to which *Abronia umbellata* is restricted, has been substantially reduced over the years, especially in the U.S.A. The appearance of the introduced grass, *Ammophila arenaria*, and more recently *A. breviligulata*, has drastically altered the sand beach/sand dune habitat on many west coast beaches. The earliest records of *A. arenaria* in the Tofino area date back to the mid-1920's. The longest (over 3 km) beach on the west coast of Vancouver Island has undergone unnatural foredune formation to such an extent as to render the potential *Abronia umbellata* habitat nonexistent. In recent years*, A. breviligulata*, which appears to be even more vigorous than *A. arenaria* on newer dunes, has also invaded the dunes. There are, however, several relatively *Ammophila*-free beaches such as those at Clo-oose Bay and Pachena Bay.

Protection/ownership

The most recent population of *Abronia umbellata* at Clo-oose Bay occurred in Pacific Rim National Park Reserve. This site is protected under the Canada National Parks Act. The ownership of the other two extirpated sites is not known due to poor locational records.

BIOLOGY

General

Abronia umbellata is a perennial that grows on ephemeral sandy beach habitats. It only reproduces by seeds that undergo a period of forced dormancy since the tough fruit coat must first be abraded in order to allow seeds to germinate. Studies indicate that when seeds are treated by various stratification methods a high proportion germinate. In nature, however, germination success appears to be low. Long and short-term survival appears precarious since the ephemeral shoreline habitat fluctuates and, as well, plant numbers tend to be low and fluctuate greatly on a yearly basis.

Reproduction

Reproduction of *A. umbellata* is only by seed; a high proportion of the seeds collected by Kaye (1999) in 1991 and 1992 were shown to be viable. Germination tests were conducted by Kaye (1999) using a variety of treatments. These ranged from placing whole fruits on moist sand through placing dry stored, individual seeds on wet paper, wet sand or KNO_3 soaked paper. These treatments were also conducted with stratified seeds. Results from the germination experiments indicated that when fruits were left intact seeds germinated at less than a 1% rate. These experiments suggest

that, in the natural environment, *Abronia umbellata* fruits must be sand-abraded to expose the seeds and subsequently germinate. Stratified treatments involving the naked seeds had germination rates of 52 % to 74%. Another germination test with seed collected in 1996 from the same site, however, did show that stratification significantly improved germination from an average of 32% to 81% (df=10, t=2.23, P<0.0001).

Abronia umbellata seed production in the field in British Columbia was good with virtually all fruits collected in 2000 having a viable seed. The two plants growing at Clo-oose Bay had a total of about 300 flower heads with 15 to 20 seeds in each head for a total of approximately 5200 seeds (Douglas 2001).

Survival

The short-term survival of *A. umbellata* plants is precarious due to the ephemeral, sandy beach habitat that occurs within the extreme high-tide zone. Its long-term survival, however, is enhanced by the extreme toughness of the fruits of the plants. Experiments have shown that, until the fruit is abraded and the seed exposed, germination rates are low (Kaye 1999). However, even when the seeds are exposed, the germination rates in the field remain low (Kaye et al 1998). The latter researchers reported that only 1 in 1000 untreated seeds germinated after scattering on natural beaches.

Long-term survival is also highly variable. At Otter Point, Oregon, numbers ranged from nine to 15 between 1993 and 1996, increased to between 136 and 177 from 1997 to 1999, declined to zero in 2000, then increased to three in 2001 (Kaye et al 1998, Kaye 2002). In British Columbia the sporadic appearance of the plant over long periods of time indicates that the seeds either are able to persist for years in the seed bank or are able to germinate successfully after traveling on ocean currents from Oregon.

Physiology

Unknown.

Genetics

Since most populations of *A. umbellata* contain very few plants it might be expected that there is a potential for the population to be vulnerable to demographic and environmental variation and loss of genetic variability. In some cases, small populations are at risk of inbreeding depression, genetic drift and loss of fitness (Primack 1998).

McGlaughlin *et al.* (2002 quantified genetic variation in four reintroduced populations of *Abronia umbellata* ssp. *breviflora* in Oregon ranging in size from 18 to 4,111 individuals. Genetic variation was also quantified in the natural seed-source population. Two of the reintroduced populations maintained approximately 90% of the genetic variation in the source population. Based on these results, it is predicted that reintroduced populations of *A. umbellata* that have at least 1,000 individuals should maintain 90% of the genetic variation of the source population.

Movements/dispersal

Abronia umbellata does not reproduce from cuttings or pieces of the plants (Kaye 1998) thus dispersal of the species is dependent on seeds. Local dispersal is probably aided by winds blowing the winged fruits into and out of the driftwood zone. As previously noted, the tough fruits of this species provide the potential to persist in the seed bank or travel on ocean currents.

Nutrition and interspecific interactions

Dune and beach sands are nutrient poor soils. Since there is no accumulation of organic matter, nutrient status is so low it cannot be effectively measured (Wiedemann 1984). Because of the high rainfall and rapid drainage, salinity is not an important factor on the sand beaches (Wiedemann 1984).

Behaviour/adaptability

Unknown.

POPULATION SIZES AND TRENDS

Abronia umbellata has been collected, historically, at three sites in British Columbia with the last observation in 2001 at Clo-oose Bay (Table 1). Field surveys in 2000 consisted of low-level flight by helicopter over 60 km of beaches, most of which were unsuitable habitat. All potential beaches were marked on maps and suitable sites were visited on foot. The aerial view of plants at the Clo-oose Beach site confirmed that the presence of plants could be confirmed by means of a low-level flight survey. The Clo-oose Bay site and all sand beaches within the area over a distance of 20 km were again searched by Douglas and Smith in 2003.

Table 1. Locations and population sizes for *Abronia umbellata* on the central-westcoast of Vancouver Island, British Columbia

Collection Site	Observation Date	Collector/Observer	Population Size/Status
Pachena Bay (Bamfield)	<1915	Henry	?/Extirpated
Ahousat (Tofino)	1915	Newcombe	?/Extirpated
Pachena Bay (Bamfield)	1927	Evans	?/Extirpated
Clo-oose Bay	1941	?	?
Clo-oose Bay	2000	Douglas, Penny & Rogers	2
Clo-oose Bay	2001	Hamilton	3
Clo-oose Bay	2002	Parks Canada	0
Clo-oose Bay	2003	Douglas & Smith	0

The counts of two and three plants at the same location at Clo-oose Bay, in 2000 and 2001, respectively, are the only counts known. The latter plants were washed away at the end of each growing season. Plants were also absent in 2003. It is likely that the seed bank within the precarious beach habitat rarely produces large numbers of plants in any given year due to the harsh environment.

LIMITING FACTORS AND THREATS

Invasive species – *Ammophila arenaria* and *A. breviligulata*

The greatest threat to the persistence of populations of *Abronia umbellata* is the potential invasion and subsequent stabilization of upper beach and foredune systems by *Ammophila arenaria and A. breviligulata*. At Wickaninnish Beach, Pacific Rim National Park, one of the most extensive beaches on the British Columbia outer coast, *Ammophila* invasion has greatly reduced the potential habitat for *Abronia umbellata.*

Ammophila arenaria spreads primarily by rhizomes, although viable seeds are produced. Long distance dispersal is usually by marine transport of rhizomes, which can withstand submersion for long periods (Pickart and Sawyer 1998). Once established it develops vigourous root and rhizome systems. It also has the ability to withstand more sand burial (up to one m) than *Leymus mollis.* Without fresh sand burial *Ammophila arenaria* declines in vigour (Pickart and Sawyer 1998). Although *A. breviligulata* has the same vigorous rhizome system as *A. arenaria*, it is even more aggressive but has less ability to trap sand, probably due to its lower stem density and less persistent winter leaves (Seabloom and Wiedemann 1994).

The eradication of *A. arenaria*, because of its extensive underground rhizome network, has proven to be a difficult and challenging problem for land managers. It is now so widespread on the United States coast that its eradication, except in local situations, is not presently practical. To date, the main eradication techniques have included chemical, manual and mechanical techniques. All of these have met with variable success (Pickart 1997). In some areas, however, the use of herbicides, D8 caterpillars, and intensive manual follow-up has resulted in upper beaches and foredunes being returned to a nearly natural state (Pickart 1997).

Winter storms

The sand beach habitats of *Abronia umbellata* are usually scoured by high tides and winter storms thus few plants in this zone ever persist over winter. These storms also alter beach and sand dune morphology. The annual phenomena of winter storms, although natural, must be considered for management purposes, especially if reintroduction is considered.

Recreation

A minor threat to populations of *A. umbellata* is the potential of trampling by hikers. There are often numerous hikers in areas of potential *A. umbellata* habitat on the coast of British Columbia and if plant numbers are small fencing of these areas would be desirable.

SPECIAL SIGNIFICANCE OF THE SPECIES

Abronia umbellata occurs in an uncommon ecosystem in British Columbia; the sand beach/sand dune system on the outer west coast. The species is also unusual in that it is an ephemeral plant that appears and disappears at lengthy intervals. It is one of the rarest plants in Canada.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

International status

Abronia umbellata ssp. breviflora is listed by the State of Oregon as endangered and is considered to a Species of Concern by the U.S. Fish and Wildlife Service. It 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. NatureServe (2002) has designated a global rank of G4G5T2 for this subspecies, a ranking that indicates that, on a global scale, it is "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". The subspecies is ranked S2 (with about 12 sites) in California (Kaye 1995), S1 (with three wild populations) in Oregon (Kaye 1995) and SX (extirpated) in Washington [Washington Natural Heritage Program 1994].

National and provincial status

In British Columbia, *Abronia umbellata* ssp. *breviflora* is considered endangered/threatened and has been placed on the Ministry of Sustainable Resources red list (Douglas et al. 2002a) It has been ranked either S1 (Douglas et al. 2002a) which indicates it is "critically imperilled because of extreme rarity (typically five or fewer occurrences or very few remaining individuals) or because of some factors making it especially vulnerable to extirpation or extinction" or SX (Douglas et al. 1998) indicating that the plant is extirpated. This is the most critical status that can be applied to a species at the provincial level. It is presently (2003) ranked SX by the British Columbia Conservation Data Centre. Since the species is restricted to British Columbia and presently ranked SX, the National rank, by definition is NX.

British Columbia does not have specific legislation in place for the protection of vascular plants at risk. If *A. umbellata* should re-appear in Pacific Rim National Park Reserve it would be afforded protection under the *Canada National Parks Act*. COSEWIC listed plants included under the *Species at Risk Act* will be protected on Federal lands.

TECHNICAL SUMMARY

Abronia umbellata
Pink sand-verbena abronie rose
Range of Occurrence in Canada: British Columbia

Extent and Area Information	
• *Extent of occurrence (EO)(km²)* **(Polygon enclosing historic sites)**	100 km² (historic)
• *Specify trend in EO*	historic decline
• *Are there extreme fluctuations in EO?*	no
• *Area of occupancy (AO) (km²)* **(Potential beach shoreline previously occupied)**	<<20 km²
• *Specify trend in AO*	decline
• *Are there extreme fluctuations in AO?*	unknown
• *Number of known or inferred current locations*	1?
• *Specify trend in #*	historic decline
• *Are there extreme fluctuations in number of locations?*	no
• *Specify trend in area, extent or quality of habitat*	declining
Population Information	
• *Generation time (average age of parents in the population)*	1 year
• *Number of mature individuals*	No mature plants; possibly seeds in the beach seed-bank
• *Total population trend:*	Fluctuating numbers rather than declines
• *% decline over the last/next 10 years or 3 generations.*	Not Applicable
• *Are there extreme fluctuations in number of mature individuals?*	yes
• *Is the total population severely fragmented?*	yes
• *Specify trend in number of populations*	historic decline
• *Are there extreme fluctuations in number of populations?*	no
• List populations with number of mature individuals in each: 1) Clo-oose Bay -2000 – 2 plants 2) Clo-oose Bay -2001 – 3 plants 3) Clo-oose Bay – 2002 – 0 4) Clo-oose Bay – 2003 – 0	
Threats (actual or imminent threats to populations or habitats)	
- introduced species competition; decimation by winter storms; trampling by hikers	
Rescue Effect (immigration from an outside source)	
• *Status of outside population(s)?* **USA:** Critically imperiled in Oregon and California, extirpated in Washington	
• *Is immigration known or possible?*	possible?
• *Would immigrants be adapted to survive in Canada?*	yes
• *Is there sufficient habitat for immigrants in Canada?*	yes
• ***Is rescue from outside populations likely?***	**unlikely**
Quantitative Analysis	Not Applicable
Current Status	

Status and Reasons for Designation

Status: Endangered	**Alpha-numeric code:** B1ab(ii,iii)+2ab(ii,iii); C2a(i,ii); D1

Reasons for Designation:

An herb of maritime beach habitats last seen at a single site along the west coast of Vancouver Island with losses of two historic populations. The site of the last documented population is greatly disjunct from other small populations in Oregon. The species is found, characteristically, in low numbers and tends to persist in the seed-bed of its beach and foredune habitats, sporadically producing flowering plants. The species was last recorded in 2001 with only several plants present. It is assumed that the species may still persist as dormant seeds and may produce reproductive plants at some future date. The expansion of exotic beach grasses has reduced the quality and availability of its upper beach and foredune habitats at a number of sites within its historic range.

Applicability of Criteria

Criterion A (Declining Total Population): Applicability of this criterion in relation to reduction in population size is uncertain in view of the fragmentary and relatively recent population data and the small numbers of plants present and the inherent characteristic of fluctuating population size associated with this perennial species**.**

Criterion B (Small Distribution, and Decline or Fluctuation): Endangered under B1 and B2 (a) plus (b, ii, iii) due to small historic EO of < 100 km^2 and area of occupancy of << 20 km^2 and only 1 recent site with very few plants; most recently, no plants were found at the single site. Criterion B1 and B2 (b) applies due to the inferred loss of area of occupancy and extent or quality of habitat due to the major invasion of suitable beach habitats by exotic grasses.

Criterion C (Small Total Population Size and Decline): Endangered under C2(a i, ii) due to population fragmentation with no population >250 plants and 95% of mature individuals in one population.

Criterion D (Very Small Population or Restricted Distribution): Endangered under D1 due to the potential production of a small number of plants from the seed bed in the beach sands; characteristically this species only produces a very few plants in a sporadic fashion which in all likelihood would total <250 plants.

Criterion E (Quantitative Analysis): **Not Applicable**

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George W. Douglas has a M.Sci. (Forestry) from the University of Washington and a Ph.D (Botany) from the University of Alberta, Edmonton. George has worked with rare plants for over 20 years. He was senior author of *The Rare Plants of the Yukon* (1981), co-authored *The Rare Plants of British Columbia* (1985) and was senior author of the *Rare Native Plants of British Columbia* (1998, 2002). He is also the senior editor for the *Illustrated Flora of British Columbia* (1998-2002) and was the program botanist for the British Columbia Conservation Data Centre from in 1991 until 2003. George has written or co-written 24 COSEWIC status reports during this period.

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COLLECTIONS EXAMINED

Herbarium specimens, from British Columbia as well as those collected in California and Oregon by G. W. Douglas, housed at the Royal British Columbia Museum in Victoria (V) were viewed and verified.