



**Garry Oak
Ecosystems
Recovery Team**

STEWARDSHIP ACCOUNT FOR

**California Buttercup
(*Ranunculus californicus* Benth.)**

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STEWARDSHIP ACCOUNT FOR *RANUNCULUS CALIFORNICUS* (CALIFORNIA BUTTERCUP)

1 SPECIES INFORMATION

Common Name and Scientific Name

Family: Ranunculaceae

Ranunculus californicus Benth. (Douglas *et al.* 1999)

California Buttercup

Synonymy

Ranunculus californicus var. *austromontanus* L. D. Benson

Ranunculus californicus var. *gratus* Jepson

Ranunculus californicus var. *rugulosus* L. D. Benson

Ranunculus californicus var. *cuneatus* Greene

Ranunculus californicus var. *californicus* sy = *R. c.* var. *typicus* L. Benson

Source: Kartesz 1994; USDA Plants Database (2002)

Hybrids

Ranunculus X heimburgerae (*Ranunculus occidentalis* X *californicus*)

Source: Brayshaw 1989

Work by Hickman (1993), Brayshaw (1989) and others indicates that this species intergrades complexly with *Ranunculus occidentalis* and *R. canus* throughout its range. In our area, it is known to hybridize with *R. occidentalis* and produce hybrid swarms (Brayshaw 1989; Ceska pers. comm.; Pojar pers. comm.).

Similar Species

While hybrids can be hard to distinguish, separating *Ranunculus californicus* from *R. occidentalis* can also be problematic. Few-petaled and many-petaled varieties of each are found. While Brayshaw (1989) separates the species by petal number (*R. californicus* has 9 – 17 petals, while *R. occidentalis* has typically five, but sometimes more), Ceska (pers. comm. 2003) indicates that best separation is provided by style length.

Classification

Ranunculus Linnaeus (subg. *Ranunculus*) sect. *Ranunculus*

Ranunculus sect. *Chrysanthe* (Spach) L. D. Benson

Ranunculus californicus Benth. Pl. Hartw. 295. 1848.

Sect. *Chrysanthe* type species is *Ranunculus acris* (Benson 1936)

Taxonomic Discussion

Benson (1948) discusses the *Ranunculus occidentalis* complex, which includes *R. californicus*. He indicates that this group is “so complex that a number of nomenclatorial recombinations and some new names have been necessary in order to bring classification into harmony with the results of field studies.” He cites specifically the in-breeding of *Ranunculus occidentalis* and *R. californicus* as an example of this complexity within the group and says (Benson 1941 162): “The *Ranunculus occidentalis* group is perhaps only scarcely less difficult to classify than the races of dogs. There are no wholly reliable characters for segregation of the species *R. occidentalis*, *R. californicus* and *R. canus*, and wherever geographic ranges meet all three species and their ten varieties seem to cross-pollinate freely, or at least the plants in the field show abundant evidence of character recombinations.”

Brayshaw (1989), based on work with Heimbürger, discusses *R. californicus* and *R. occidentalis* in British Columbia, and provides some clarification on hybrids for BC plants, naming one hybrid formally as *Ranunculus X heimburgerae* (*Ranunculus occidentalis* X *californicus*). Hybrid swarms are common. Brayshaw (pers. comm. 2003) indicates that there appears to be a greater variety of leaf shapes and forms in our area than expected, possibly as a result of introductions. However, he is confident that we have good populations of *Ranunculus californicus* here.

Ceska (pers. comm. 2003) has examined the specimens of *R. californicus* in the Royal Museum (V) for BC stations, and feels that they are all good *R. californicus*, with one collection from Trial Island representing a mixed collection.

Description

This is an easily spotted species of buttercup with numerous shiny lemon-yellow petals and an erect to prostrate form. Sharsmith (1965) reports that pistils mature into dry fat one-seeded fruits that are clustered at the top of the stems. It is common in the southern portions of its range, and often occurs in spreading colonies. A technical description of this species is provided by Whitmore (1997):

Stems erect to prostrate, never rooting nodally, hirsute, strigose, or glabrous, base not bulbous. **Roots** never tuberous. **Basal leaf blades** broadly ovate or cordate in outline, 3-lobed or –parted to 3-foliate, 1.8-5.8 x 2.3-7.6 cm, leaflets or segments undivided or 1 – 2 lobed or –parted, ultimate segments linear to orbiculate, margins toothed, crenate, or entire, apex acute to rounded. **Flowers** : receptacle glabrous or rarely hispid; sepals reflexed 2 – 3 mm

above base, 4 – 8 x 2 – 4 mm, pilose; petals 9 – 17, yellow. Heads of achenes globose or hemispheric, 3 – 7 x 4 – 9 mm, achenes 1.8 – 3.2 x 1.4 – 3.2 mm, glabrous, rarely hispid, margin forming narrow rib, beak persistent, lanceolate, curved, 0.2 – 0.8 mm.

Thomas (1961) reports that “teratological forms in which all of the plants are sepaloid are fairly common.”

2 RANGE AND KNOWN DISTRIBUTION

Global Range

Ranunculus californicus occurs from Baja California, north through California to Oregon, Washington and British Columbia (Douglas *et al.* 1999) (Figure 1). This species was newly reported for Washington State in 1978 by Denton (1978), who discussed the introgression between this species and *R. occidentalis* and indicated that her identifications of collections were confirmed by Hitchcock and R. L. Taylor at UBC.

In the US, it occurs in the California Floristic Province.

Greene (1887) described this species in California as “the one which makes yellow with its brilliant blooms all the running hillsides of the western parts of the State in the months of March and April....”

Canadian Range

In Canada, *Ranunculus californicus* is known only from southeastern Vancouver Island in British Columbia (Douglas *et al.* 1999).

British Columbia Range

Ranunculus californicus was first reported from British Columbia in 1952 from Trial Island, although it is believed that it may have been in BC before that, but not discovered because of low levels of collection activity (Douglas *et al.* 1999).

In British Columbia, this species is reported from nine “stations” (BCCDC 2003; Brayshaw 1989; Ceska 1986, 2003 pers. comm.; Roemer 2003 pers. comm.) (Table 1). Eight verified stations are found in the Victoria area, with one additional confirmed station from the Gulf Islands. These are: Trial Island, Little Trial Island, Discovery Island, Alpha Islet, Griffin Island, Chatham Island, Saturna Island, Rocky Point, and Uplands Park.

Based on the COSEWIC definition of population (Haber pers. comm. 2003), however, there may only be five actual populations of this species. Several of the



Figure 1: Distribution of *Ranunculus californicus* in North America (the eastern and southern boundaries of the distribution are approximate and subject to revision). (Sources: Hickman 1993, NatureServe Explorer 2002, BCCDC 2003).

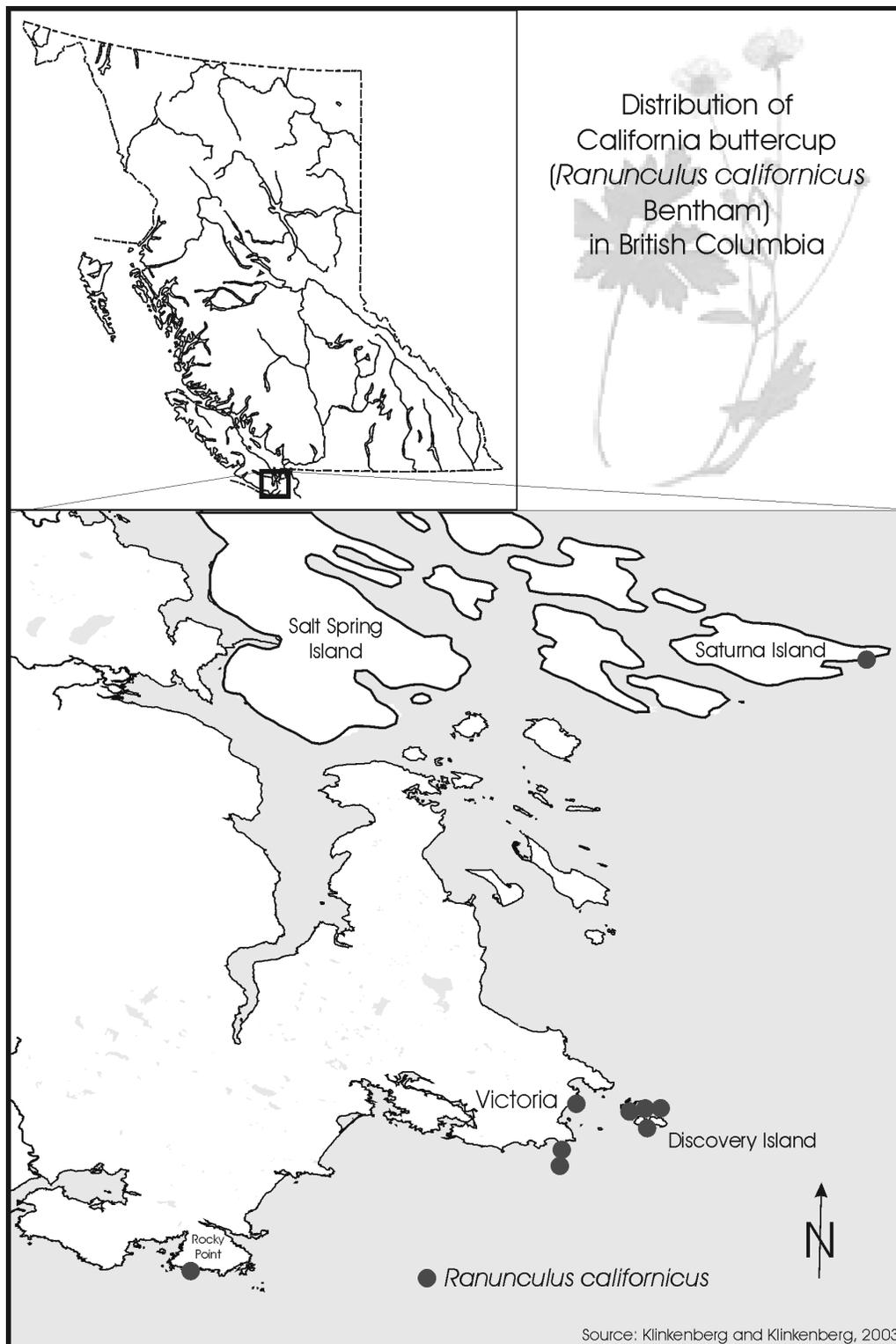


Figure 2: Distribution of *Ranunculus californicus* in British Columbia (Sources: BCCDC 2003; Roemer pers. comm. 2003; Ceska pers. comm. 2003).

stations occur within less than one kilometre from each other and may be interactive, though this depends upon pollinator interactions and seed dispersal patterns. Specific pollinators and their foraging distances are presently unknown (Figure 2), and thus population and station isolation is not known.

Populations may be 1) Griffin and Alpha Islet, along with Chatham Island, 2) the Trial Islands may constitute a second population, 3) Uplands Park, 4) Rocky Point, and 5) Saturna Island.

The site occurrences for this species in British Columbia overlap with several other species at risk in the Victoria area, including *Silene scouleri* ssp. *grandis*, *Juncus kelloggii*, *Epilobium densiflorum*, and *Lupinus densiflorus*, with overlapping habitats and potentially site requirements (Costanzo 2002a, b; Ford and Fairbarns 2002; Fairbarns and Wilkinson 2002).

Table 1: Current Locations of *Ranunculus californicus* records in British Columbia

Big Trial Island (ER)**

1952 A. Hardy (V)

Little Trial Island

1982 T. C. Brayshaw (V)

Discovery Island Marine PP

1985 C. Brayshaw

Oak Bay Islands ER

n. d. Hans Roemer (ERLIT)

Alpha Islet (Oak Bay ER)

1976 Jim Pojar (V)

1976 Adolf and Oluna Ceska (V 177080)

1983 T. C. Brayshaw (V)

1999 G. W. Douglas (CDC), [350 plants over .72 ha]

Griffin Island (Oak Bay ER)

1983 T. C. Brayshaw (V)

1999 G. W. Douglas (CDC), [5000+ plants]

Chatham Island IR

n. d. Hans Roemer (Photo)

Saturna Island

1978 H. Janszen (V)

1996 Jenifer Penny (V), [50 plants]

Rocky Point DND *

1977 Adolf and Oluna Ceska (V 16995, Church Hill; May 7)

Uplands Park, Victoria*

n.d. Hans Roemer (observation)

* new records

** hybrids present (Ceska pers. comm.)

Precise locality information is available from the British Columbia Conservation Data Centre.

Ranunculus californicus is one of a group of species that are described by Ceska and Ceska (1997, 1999) that occur from California to the Columbia River Gorge, are usually rare or missing in Washington State and then occur on southeastern Vancouver Island. The list of species includes *Limnanthes macounii*, *Allium amplexans*, *Crassula connata*, *Dryopteris arguta*, *Ranunculus californicus*, *Isoetes nuttallii*, *Juncus kelloggii*, *Microseris bigelovii*, *Montia howellii*, *Myrica californica*, *Trifolium depauperatum*, *Vulpia pacifica*, *Woodwardia fimbriata*, and *Triphysaria versicolor*. “Most of these species have ecology similar to *Limnanthes macounii* and some occur in the same localities...” (Ceska and Ceska (1999).

3 HABITAT DESCRIPTION

Ranunculus californicus is a species of coastal vernal moist native prairies and rangelands, on northward-facing seaward coastal ranges, where it can occur in range of salt spray (Benson 1941). Brayshaw (pers. comm. 2003) agrees that it seems more of a prairie species than, for example, an oak savannah species, and shows some preference for more open sites.

General habitat requirements of the species

In British Columbia, this species is associated with Garry oak ecosystems.

In 1978, Denton described *Ranunculus californicus* as a species that was “known as an indicator species for coastal prairies” (Denton 1978), while Holzman (2002 web citation) places *Ranunculus californicus* within coastal native prairies and rangelands. Denton described it as species that is “typically found on the islands in southern California and along the coast in northern California and southern Oregon.” This can be extrapolated today to include Washington State (Denton 1978) and British Columbia (Douglas *et al.* 1999). Historically, coastal prairie is described from northern San Francisco Bay to Oregon (Holzman 2003 web citation).

Denton (1978) described the preferred habitat for *Ranunculus californicus* as “open, south to southwest facing grassy bluffs or rocky slopes just above the seacoast, at elevations up to 150 feet”. This southern aspect is contrary to Benson (1941), cited above.

Hickman (1993) further expands this description and indicates that the species is found throughout its range in grasslands, oak woodlands, and mixed evergreen or coniferous forest (Hickman 1993).

Thomas (1961), in the Flora of the Santa Cruz Mountains of California, described this species as very common in open fields, meadows and grasslands, sometimes in serpentine soils.

In British Columbia, it occurs in areas of high winter precipitation, such as Trial Island (Ford and Fairbarns 2002). Roemer (pers. comm. 2003) describes it as occurring in maritime meadows or turf sites that are close to the ocean and somewhat moist in spring. This is consistent with a habitat description for it given by Mooney *et al.* (1983), who studied the photosynthetic characteristics of this and other coastal species. They describe sites as occurring in immediate coastal regions of Northern California that are noted for their cool foggy climates, and they state that “although seasonal temperatures vary little, there is a pronounced summer drought. The plants which inhabit the coastal bluffs and dunes of these regions are predominantly low-growing herbaceous perennials which are tolerant of salt spray that characterizes these habitats.”

The BCCDC data sheets for the species list the following habitats of occurrence for *R. californicus*: grassy meadow and grassy coastal prairies dominated by *Camassia quamash* and *C. nudicaule* (Oak Bay Islands/Alpha Islet), moist border of fields above south-facing cliffs (Saturna Island), rocky, grassy knoll (Trial Islands), open prairie dominated by *Camassia quamash* (Griffin Island).

Roemer (pers. comm. 2003) indicates that, in our area, this species occurs frequently with introduced species including *Bromus*, *Poa*, and other shoreline annuals.

The University of California, Nature Reserve System web pages (2003) list *R. californicus* as occurring in the Donald and Sylvia McLaughlin Reserve in non-serpentine blue oak woodland, where it is found on cooler slopes and under dense oak cover with *Allium serratum*, *Clarkia purpurea* ssp. *quadrivulnera*, *Linanthus bicolor* and *Navarretia pubescens*.

Associated Species:

Roemer (pers. comm. 2003) indicates that many associates of *Ranunculus californicus* in our area are alien species. Based on photo records, he reports the following associates: *Triteleia hyacinthine*, *Silene gallica*, *Achillea millefolium*, *Luzula campestris*, *Rumex acetosella*, *Agrostis stolonifera* and *Holcus lanatus*? occurring with *R. californicus* on Chatham Island.

The BCCDC Conservation Data Sheets list *Camassia quamash* as an associate on Alpha Islet. On Saturna Island, the associates are listed as *Achillea millefolium*, *Geranium molle*, *Plantago lanceolata*, *Pteridium aquilinum*, *Rosa egalanteria*, *Trifolium repens*, *Veronica americana*, *Rumex acetosella*, and *Anthoxanthum odoratum* under Douglas fir.

Pojar (pers. comm. 2003) lists it as occurring on Trial Island along with “*Sanicula arctopoides*, *S. bipinnatifida*, *Sidalcea hendersonii*, “*Habenaria greenii*” and *Castilleja levisecta*, for which Trial Island is renowned.”

Habitat availability and net trends in habitat change

Changes to habitat availability for this species in BC primarily come from the presence of alien species (Roemer pers. comm. 2003), and past habitat destruction along the Victoria shoreline.

Habitat ownership/protection

This species occurs on a combination of crown land (provincial ecological reserves, provincial park), municipal park and federally-owned reserve lands (Chatham Island) or Department of Defence lands. The ownership of the population on Saturna Island is not known. Precise locality and ownership information may be obtained from the British Columbia Conservation Data Centre.

4 STATUS INFORMATION

Ranunculus californicus is common in California, and is described as abundant in the San Francisco Bay area (Sharsmith 1965). It is reported from Oregon, possibly imperilled in Washington and imperilled in British Columbia, where it is on the BC red-list.

In British Columbia it is known from nine stations at five locales.

Information from the NatureServe web site (NatureServe Explorer 2002) provides the following information:

Global Heritage Status Rank:	G5
United States Heritage Status Rank	N5
Canada Heritage Rank	N2

United States:

California (S?-Underanked), Oregon (SR- Reported), Washington (S2?-possibly imperilled)

Canada:

British Columbia (S2-Imperiled)

5 LIFE HISTORY

General

Ranunculus californicus is described as an annual or perennial species (Brayshaw 1989), and Darlington and Wylie (1955) report the chromosome number for this species as: 28, Coonen 1931. However, little information was found on *Ranunculus californicus* specifically, although some of the information on the genus in general may provide some insight into this species. For example, “these are mostly herbaceous plants, often with actinomorphic simple flowers, not especially fragrant or scented” (Morrell 2002).

Phenology

This species is reported by Sharsmith (1965) and by Thomas (1961) as having a long flowering season in the San Francisco Bay Region and in the Santa Cruz Mountains (Feb.–April/May). In British Columbia, Brayshaw (1989) states that “its growing season is September to May, with flowering occurring in April and early May, concurrently with neighbouring populations of *R. occidentalis*.”

Seeds of *Ranunculus* in general are described as “generally watery-fleshy” and the seeds of *R. californicus* are described as “representative of a major part of this genus” (Martin 1946).

Pollination biology

Dobson (1988) includes *Ranunculus californicus* in her list of species pollinated by bees. Otherwise, pollination biology for this species is unknown, although we can summarize some of the related pollination literature for other species of *Ranunculus*.

- Baker and Cruden (1991) indicate that most small-flowered species in Ranunculaceae are characterized by traits associated with autonomous self-pollination.
- In addition, some species of *Ranunculus* use strong UV patterns to attract pollinators, such as the rare *Ranunculus reptans*, perhaps because the species may not flower each year, and attracting pollinators is important. It is not known if this is the case with this species.
- *Ranunculus scleratus* is pollinated by small bees, flies and thrips (Baker and Cruden 1991)
- Several insects are attracted to flowers with partly concealed nectar, such as we find in buttercups. Syrphid flies, short- and long-tongued bees, honeybees, and a few butterflies are attracted to the moderately showy flowers of stone fruits, strawberry, raspberry, cactus, buttercups, and cruciferous plants (Levin, 2002).

Reproductive ecology

This species is a perennial that sometimes behaves like an annual (Brayshaw 1989). Hybridization is a common where it comes into contact with *R. occidentalis* (Brayshaw 1989; Benson 1948). Honeybees and bumblebees vary in their foraging distances, with honeybees generally covering greater distances, though often being specific to one species. However, bumblebee foraging distances can range from as little as 400 m to as much as 8 km, dependent on the species, but it is not known at present if this bee and pollen movement occurs between islands.

Polyploidy is reported to occur in 50 – 69% of the species in the genus *Ranunculus* (Stebbins 1950).

No information is available on vegetative reproduction in this species. Van Kleunan (pers. comm. 2003) wonders if it could be “that *R. californicus* reproduces vegetatively through layering of stems.... It might also reproduce vegetatively from the roots, I have seen that on a few occasions in *R. reptans*.”

Survival

No specific information on survival for this species was found.

Physiology

Mooney *et al.* (1983) studied photosynthetic responses of coastal bluff plants to temperature, light and humidity, including *Ranunculus californicus*. They found that the coastal plants investigated are characterized by moderate photosynthetic capacities, and that the low growth form of these species results in relatively high leaf vapour deficits.

Weber (1977) reports that *Ranunculus californicus* is an irritant.

By its occurrence on coastal bluffs and shoreline, this species appears to be salt tolerant.

Dispersal

No information has been found for this species, although buttercups in general are eaten by voles (Nordhuis 1993), and are thought to be dispersed both by adhesion (fur, feathers, clothing) and for short distances by wind. Some species (*R. acris*) are reported to germinate after passage through animal digestive systems, and thus would be dispersed by movement of the herbivore. Van Kleunan (pers. comm. 2003), who has done extensive work on the conservation genetics of *Ranunculus reptans*, is not aware of any studies on seed dispersal in *Ranunculus*.

Nutrition and interspecific interactions

Ranunculus californicus hybridizes with *R. occidentalis* in our range, and in our BC populations.

Behaviour and adaptability

This is a summer dormant species that shows a strong preference for open sites very close to the shore, while *R. occidentalis* occurs sometimes in more treed areas, such as on Griffin Island (Brayshaw, 1989). Brayshaw further indicates that while there is strong introgression with *R. occidentalis*, the hybrid plants are less fertile, with perhaps 50% of the pollen being viable, and 50% of the ovaries producing seeds. The species is not overwhelmed by *R. occidentalis*, but rather the two seem to be in balance, perhaps because the site conditions favour *R. californicus* close to the water where salt spray is a factor.

Ethnobotanical Uses

Sharsmith (1965) reports that fruits of this species “were eaten by the California Indians”, while Calacademy (2002) reports that the seeds of this species were eaten by Native Americans, and they were “parched and beaten into a flour.”

6 HOW THIS SPECIES IS AT RISK

- This species is vulnerable in British Columbia because of the small areal extent of occurrence, primarily on a handful of small islands, and because of the small population sizes that leaves them vulnerable to catastrophic disturbances and occurrences.
- Additionally, the great degree of hybridization that is reported for the species, and the presence of hybrids swarms, raises concerns about loss of the species to hybridization in our area. However, we say this with the caveat that this hybridization occurs throughout the species natural range, and is not apparently the result of anthropogenic removal of barriers or isolation. Brayshaw (pers. comm. 2003) indicates that the hybrids are less fertile and do not swamp *R. californicus*. In this instance, hybridization may not be a threat to the species.
- Trampling is reported in some locations (Roemer pers. comm. 2003; Ceska pers. comm. 2003), and it is possible that, prior to development of the coastal bluff areas in Victoria, this species was once more common along the shoreline. Trampling, intensive use, and park management practices would have had an impact on abundance and perhaps have led to decline, and to the primarily island distribution we see today

7 MANAGEMENT RECOMMENDATIONS

In assessing this species, several key management recommendations become apparent. These are:

- With only nine “stations” of this species in five locales, and with eight of the stations in close relative proximity, *Ranunculus californicus* should be recommended as an endangered species in Canada.
- Management recommendations made for other co-incident rare species in this habitat type should be applied here, including informing kayakers and coast guard personnel of the sensitivity of the species in the area
- Removal of gorse and Scotch broom, and other invasives at the stations for this species should be regular practice.
- Because there is a strong likelihood that introduced species limit available habitat for this species, and because no literature was found on population dynamics for this species, it is recommended that demographic and plant community studies be initiated for this species. It would be useful to know the current extent of coverage and abundance at each site as a baseline for future change. An initial three-year monitoring program should be established in order to collect baseline information on these populations and their dynamics. It could be established in conjunction with monitoring of other red-listed species.
- Trampling remains a problem on Trial Island, and perhaps at other sites. It may be useful to consider developing people management strategies for this site such as are used in coastal dune systems in other locations (e.g. Pinery Provincial Park in Ontario). These strategies aim to channel people movement via the use of boardwalks and other “paths”.
- Pollinator identification and requirements appears to be an overlooked factor on the small islands and coastal bluffs where this species occurs, and is lacking for this species and other rare species in the same sites (e.g. Ford and Fairbarns 2002; Fairbarns and Wilkinson 2002). As it is likely that *Ranunculus californicus* shares pollinators with several other coastal rarities, such as *Lupinus densiflorus* and *Silene scouleri* ssp. *grandis*, a pollinator study of these small islands should be initiated. Protecting pollinator nest sites for short-distance pollinators (such as some bumblebees) may be important to the continued health of all populations of rare species on these islands and bluffs. Fraser (pers. comm. 2003) has queried the role of the introduced European honeybee in the population dynamics of this locale and associated rare species because of that species ability to forage over longer distances.
- A systematic survey and collection of specimens from each location should be made in order to map populations.

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Jim Pojar, Research Ecologist, B.C. Forest Service, Postal Bag 5000, Smithers, BC, V0J 2N0 Email: Jim.Pojar@gems3.gov.bc.ca BC station information for this species.

Hans Roemer, Roemer Field Botany Consulting, 1717 Woodsend Drive, Victoria, BC, Telephone: 250-479-6470 Email: hroemer@shaw.ca Extensive knowledge about sites of occurrence for this species in BC.

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