

COSEWIC
Assessment and Status Report

on the

Lindley's False Silverpuffs
Uropappus lindleyi

in Canada



ENDANGERED
2008

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada



COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC. 2008. COSEWIC assessment and status report on the Lindley's false silverpuffs *Uropappus lindleyi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 22 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Production note:

COSEWIC would like to acknowledge the late George W. Douglas and Shyanne J. Smith for writing the status report on the Lindley's false silverpuffs *Uropappus lindleyi* in Canada. This status report was produced with the initiative and funding of Parks Canada. The COSEWIC status report review was overseen by Erich Haber, co-chair (Vascular Plants) of the COSEWIC Plants and Lichens Specialist Subcommittee, with input from members of COSEWIC. That review may have resulted in changes and additions to the initial version of the report.

For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, ON
K1A 0H3

Tel.: 819-953-3215

Fax: 819-994-3684

E-mail: COSEWIC/COSEPAC@ec.gc.ca
<http://www.cosewic.gc.ca>

Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur l'uropappe de Lindley (*Uropappus lindleyi*) au Canada.

Cover illustration:

Lindley's false silverpuffs — Line drawing from Douglas *et al.* 1998, with permission.

©Her Majesty the Queen in Right of Canada, 2008.

Catalogue No. CW69-14/558-2008E-PDF

ISBN 978-0-662-48946-7



Recycled paper



COSEWIC Assessment Summary

Assessment Summary – April 2008

Common name

Lindley's false silverpuffs

Scientific name

Uropappus lindleyi

Status

Endangered

Reason for designation

An annual flowering plant of British Columbia restricted to only five extant locations in the Gulf Islands. The species is no longer known to occur on Vancouver Island. There are extremely small numbers of individuals known in Canada. The species is also at continued risk from habitat loss and degradation from such factors as home building and spread of invasive plants.

Occurrence

British Columbia

Status history

Designated Endangered in April 2008. Assessment based on a new status report.



COSEWIC
Executive Summary

Lindley's False Silverpuffs
Uropappus lindleyi

Species information

Lindley's false silverpuffs (*Uropappus lindleyi*, formerly named *Microseris lindleyi*), a member of the aster family, is approximately 10-70 cm tall and usually has a simple stem growing from a slender taproot. The long leaves at the base of the plant are linear and pointed at the tip. The stem leaves are usually linear and occur on the bottom half of the stems. The flowering stems emerge from the base or from the axils of the stem leaves. The solitary, terminal flowering heads have strap-shaped, yellow flowers.

Genetic studies of the genus *Microseris* (= *Uropappus*) have discovered numerous DNA and enzyme differences between *M. lindleyi* and other members of the genus resulting, in part, in the recognition of the genus *Uropappus*. Variation within *Uropappus lindleyi* material from the U.S. was not detected; no genetic studies have been conducted using Canadian material of the species.

Distribution

Lindley's false silverpuffs ranges from southwestern British Columbia disjunctly to Idaho and central Washington and south to Oregon, Utah, Texas, New Mexico, Arizona and California. A historic occurrence is known in the San Juan Islands of northwestern Washington. In Canada, Lindley's false silverpuffs is known only from the Gulf Islands in southwestern British Columbia. Less than one percent of the species' total range occurs in Canada. The current Extent of Occurrence in Canada is approximately 150 km². The actual area of habitat occupied is about 0.01 km² but the Area of Occupancy, based on a 1x1 km or 2x2 km grid for the five localities, is a maximum of 20 km².

Habitat

Lindley's false silverpuffs populations in British Columbia are found in, or near, Garry oak (*Quercus garryana*) and associated ecosystems in the dry Coastal Douglas-fir zone of southeastern Vancouver Island and adjacent Gulf Islands. This area has a relatively warm and dry Mediterranean climate. The species occurs in a number of different habitats ranging from sandstone cliffs and steep grassy slopes to xeric deciduous or evergreen forests. There is no specific information on the trends of Lindley's false silverpuffs habitats on southeastern Vancouver Island or the adjacent

Gulf Islands although they almost certainly share the same threats as Garry oak ecosystems, including agricultural development, urbanization and invasion by aggressive alien weeds.

Biology

Lindley's false silverpuffs is an annual species, with flowering typically observed in late-April to mid-May in British Columbia and seed production occurring in from mid-May to June. Compared to similar species in the genus *Microseris*, Lindley's false silverpuffs is characterized by such features such as being self-pollinated and having smaller flowers and fewer scales (bracts) surrounding the flower heads. The bristle-tipped pappus scales attached to the top of the fruitlets could attach to bird feathers, and may possibly enable long-distance dispersal. Most seeds, however, are likely dispersed locally by wind and gravity.

Population sizes and trends

There are five extant locations in Canada where Lindley's false silverpuffs has been collected since 1974. One additional population was recorded in 1998, and is probably extirpated as a result of housing development. Population sizes range from approximately 20 to 1200 plants on areas of less than 1 m² to 1 ha. The most recent survey of the populations indicates that there are probably about 2000 individuals in Canada. The potential for immigration from the species' main range is unlikely. Even locally, exchange of seeds or pollen probably occurs only rarely due to lack of effective dispersal vectors.

Limiting factors and threats

The most immediate threat to Lindley's false silverpuffs in British Columbia is habitat destruction through housing development on private property. Almost all populations occur on valuable, private ocean view properties. Habitat destruction has also resulted in increased fragmentation of populations. In addition, much of the remaining habitat suitable for Lindley's false silverpuffs has been heavily altered due to invasion by introduced species.

Special significance of the species

In California, Lindley's false silverpuffs seeds are collected from the wild and sold in at least one native plant nursery; other cultural, medicinal or spiritual uses are unknown. Since the Canadian population represents the northern extent of the species' range, it may be of evolutionary and ecological significance. Genetic study of *Microseris* (the genus within which Lindley's false silverpuffs was formerly included) indicates that Lindley's false silverpuffs (= *M. lindleyi*) has distinct differences from other members of the genus. Consequently, the recent reclassification places Lindley's false silverpuffs in the genus *Uropappus*, consisting of a single species (*U. lindleyi*).

Existing protection or other status designations

Globally, Lindley's false silverpuffs has a rank of G5, indicating that it is considered "frequent to common to very common; demonstrably secure and essentially ineradicable under present conditions". The species is tracked as a rare species outside of British Columbia only by Utah, with a rank of S1 (critically imperiled) in the state or province because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation). Since the species is restricted to British Columbia in Canada, it has a national rank of N1 (critically imperiled in the nation because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation). Provincially, Lindley's false silverpuffs is ranked by the British Columbia Conservation Data Centre as S1 and appears on the British Columbia Ministry of Environment red list.



COSEWIC HISTORY

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

COSEWIC MANDATE

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

COSEWIC MEMBERSHIP

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

DEFINITIONS (2008)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

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

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

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



Environment Canada
Canadian Wildlife Service

Environnement Canada
Service canadien de la faune

Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

COSEWIC Status Report

on the

Lindley's False Silverpuffs *Uropappus lindleyi*

in Canada

2008

TABLE OF CONTENTS

SPECIES INFORMATION.....	4
Name and classification.....	4
Morphological description.....	4
Genetic description.....	4
Designatable units.....	7
DISTRIBUTION.....	7
Global range.....	7
Canadian range.....	7
HABITAT.....	7
Habitat requirements.....	7
Trends.....	11
Habitat protection/ownership.....	11
BIOLOGY.....	11
Life cycle and reproduction.....	11
Herbivory.....	11
Physiology.....	12
Dispersal.....	12
Interspecific interactions.....	12
Adaptability.....	12
POPULATION SIZES AND TRENDS.....	12
Search effort.....	12
Abundance.....	12
Fluctuations and trends.....	13
Rescue effect.....	13
LIMITING FACTORS AND THREATS.....	13
SIGNIFICANCE OF THE SPECIES.....	14
EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS.....	14
International status.....	14
National and provincial status.....	15
TECHNICAL SUMMARY.....	16
ACKNOWLEDGEMENTS AND AUTHORITIES CONSULTED.....	18
INFORMATION SOURCES.....	18
BIOGRAPHICAL SUMMARY OF REPORT WRITERS.....	20
COLLECTIONS EXAMINED.....	21

List of figures

Figure 1. Illustration of <i>Uropappus lindleyi</i> : a) growth form, b) fruitlet with bristly-tipped pappus bracts, c) involucre of bracts that surround a flower head.....	5
Figure 2. <i>Uropappus lindleyi</i> in seed on Galiano Island, British Columbia.....	6
Figure 3. Distribution of <i>Uropappus lindleyi</i> in North America.....	8
Figure 4. Canadian <i>Uropappus lindleyi</i> sites.....	9
Figure 5. <i>Uropappus lindleyi</i> on sandstone cliffs on Saturna Island.....	10

List of tables

Table 1. Locations and population sizes for *Uropappus lindleyi* in British Columbia. 13

List of appendices

Appendix 1. Unsuccessful search sites for *Uropappus lindleyi* made by several botanists in 2003 and 2004. 22

SPECIES INFORMATION

Name and classification

Scientific name: *Uropappus lindleyi* (DC.) Nutt.
Synonyms: *Microseris lindleyi* (DC) A. Gray, *Calais linearifolia* DC., *Microseris linearifolia* (Nutt.) Schultz-Bip., *Uropappus linearifolius* Nutt.
Common name: Lindley's false silverpuffs, Lindley's microseris
Family: Asteraceae, Aster Family
Major plant group: Eudicot flowering plant

Uropappus lindleyi has been known by a number of names. Peck (1961) treated the plant under the name *Uropappus linearifolius* Nutt. Elsewhere in the Pacific Northwest, Cronquist (1955) and Chambers (1960) used the name *Microseris linearifolia*. In recent years, it has been treated either as *Microseris lindleyi* (Douglas *et al.* 1998 & 2002, NatureServe Explorer 2003) or as *Uropappus lindleyi* (Chambers 1993, Kartesz & Meacham 1999). It is presently treated as *Uropappus lindleyi* in Flora North America. It is the sole species in the monotypic genus *Uropappus*. The first collection of this species in Canada was recorded on Saturna Island by H. Janszen in 1974.

Morphological description

Uropappus lindleyi is a 10-70 cm tall annual, usually with a simple stem, growing from a slender taproot (Figure 1, Figure 2, Douglas *et al.* 1998). The 15-30 cm long basal leaves are linear and long-pointed at the tip. They may be entire, or more usually, with linear swept-back lobes. The stem leaves are usually linear, entire and occur on the bottom half of the stems. The flowering stems emerge from the base or from the axils of the stem leaves. The solitary terminal flowering heads have strap-shaped yellow flowers and 15-30 mm long lanceolate involucral bracts. The achenes are slender, 7-17 mm long, blackish and finely ribbed. The pappus consists of 5 linear scales, each terminating in a shorter hair-like bristle arising from a distinct bifid notch in the scale-tip.

Within the range of *Uropappus lindleyi* in southwestern British Columbia, upon casual examination, this species may be mistaken for many other similar-leaved members with strap-shaped flowers in the tribe Lactuceae. However, a close inspection of the hair-like bristle arising from a distinct bifid notch in the scale-tip of the pappus readily distinguishes this species.

Genetic description

Studies of *Microseris* genetics have been conducted using plant material from the United States, mostly from California (Pak *et al.* 2001; Battjes *et al.* 1994, Price and Bachmann 1975, Jansen *et al.* 1991a and b, Wallace and Jansen 1990). These studies examined DNA and allozyme variation between species of *Microseris*. Although *Uropappus lindleyi* has generally been treated as a member of the genus *Microseris*, numerous morphological, as well as DNA and allozyme differences, have resulted in

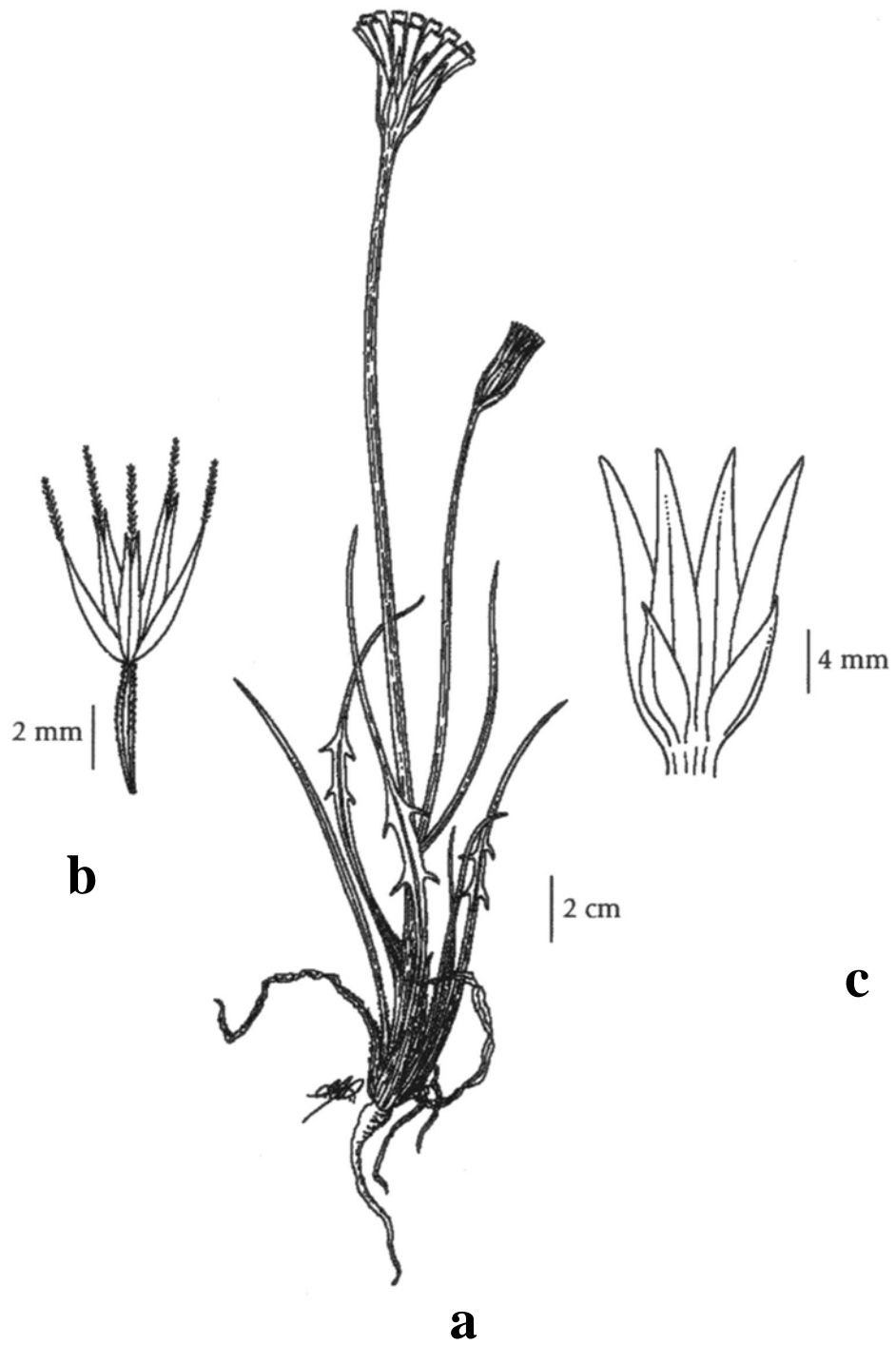


Figure 1. Illustration of *Uropappus lindleyi*: a) growth form, b) fruitlet with bristly-tipped pappus bracts, c) involucre of bracts that surround a flower head (Line drawing from Douglas *et al.* 1998, with permission).



Figure 2. *Uropappus lindleyi* in seed on Galiano Island, British Columbia. A plant with one large, round mature fruiting head is present in centre of photo (Photo by S.J. Smith 2004).

several researchers suggesting that this species be reclassified as *Uropappus lindleyi* (Battjes *et al.* 1994, Jansen *et al.* 1991, Wallace and Jansen 1990). It is now treated as *Uropappus lindleyi* in Flora North America (Chambers 2006).

Although genetic variation within *Uropappus lindleyi* has not yet been examined, Canadian populations may be genetically isolated by the 300 km distance from the main portion of the plants' range on the eastern side of the Cascades Mountains in Washington State (University of Washington Herbarium Database 2004). Many of the individual Canadian populations may also be isolated from each other by distances of 10-15 km and by water bodies of over 1 km wide.

Designatable units

Only a single designatable unit is recognized for the five localities that all occur within a single ecozone.

DISTRIBUTION

Global range

Uropappus lindleyi ranges from southwestern British Columbia disjunctly to Idaho and central Washington and south to Oregon, Utah, Texas, New Mexico, Arizona and California (Cronquist 1955, Chambers 1993, Figure 3). A historic occurrence (1956) is known from the San Juan Islands of northwestern Washington (Atkinson and Sharpe 1993), about 8-12 km south of the Canadian populations.

Canadian range

In Canada, *Uropappus lindleyi* is known only from southeastern Vancouver Island and the adjacent Gulf Islands (Douglas *et al.* 1998, 2002, Figure 4). The Canadian range of this species is fragmented, as well as being disjunct from its main range in the U.S. The Canadian populations are about 300 km northwest of the nearest extant populations in Washington (University of Washington Herbarium Database 2004) (Figure 3). The Canadian range is less than one percent of the species' total range in North America (Figure 3 & 4).

The historical Extent of Occurrence of *Uropappus lindleyi* in Canada is not known, as the species was first reported in 1974. The current Extent of Occurrence in Canada is approximately 150 km², based on the area of a convex polygon including extant sites. The present area of habitat occupied by the species is 0.01 km² but the Area of Occupancy for the 5 sites, based on a 1x1 km grid, is 5 km² or 20 km² using a 2x2 km grid overlay.

HABITAT

Habitat requirements

Uropappus lindleyi occurs in dry open places in valleys, foothills and plains across its range in the U.S. (Cronquist 1955). Populations in British Columbia are found in, or near, Garry oak¹ and associated ecosystems in the dry Coastal Douglas-fir (CDF) zone of southeastern Vancouver Island and adjacent Gulf Islands (Nuszdorfer *et al.* 1991). This area is in a rainshadow belt created by the Olympic Mountains to the southwest and the Vancouver Island Ranges to the west, resulting in a relatively warm and dry Mediterranean-like climate.

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



Figure 3. Distribution of *Uropappus lindleyi* in North America (based on USDA, NRCS 2007).

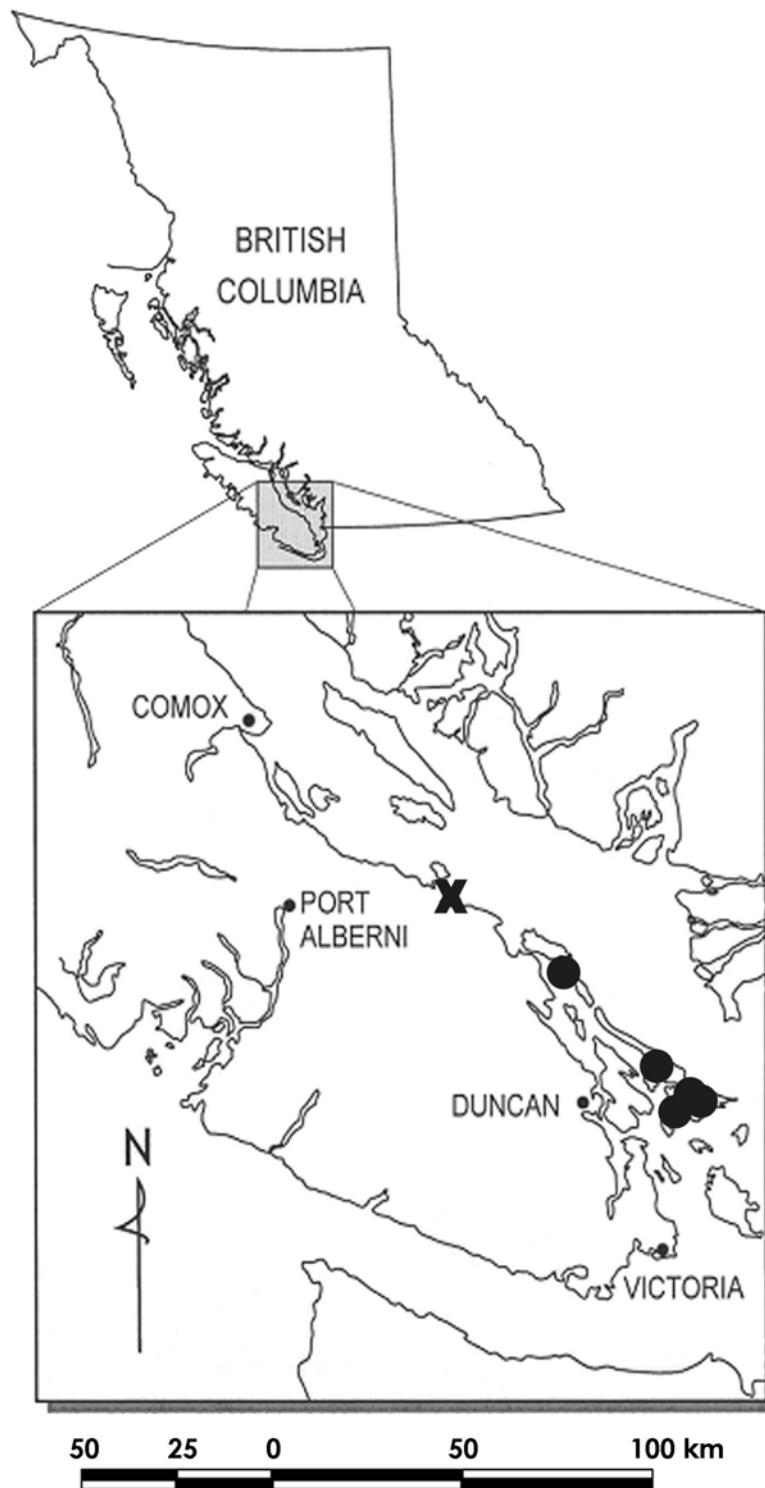


Figure 4. Canadian *Uropappus lindleyi* sites (● = extant site; X = extirpated site).

The species occurs on sandstone cliffs and steep grassy slopes, and xeric, open deciduous or evergreen forests within the CDF zone. On sandstone cliffs, the plants grow in cracks and on ledges (Figure 5). The few plants growing with *U. lindleyi* on these cliffs include Alaska brome (*Bromus sitchensis*), great camas (*Camassia leichtlinii*), American wild carrot (*Daucus pusillus*) and Pacific stonecrop (*Sedum spathulifolium*). The steep, grassy slopes are occupied mainly by alien species such as early hairgrass (*Aira praecox*), ripgut brome (*Bromus rigidus*), barren brome (*B. sterilis*), and Scotch broom (*Cytisus scoparius*).



Figure 5. *Uropappus lindleyi* on sandstone cliffs on Saturna Island. Whitish fluffy round fruiting heads are visible at middle centre of photo (Photo by G.W. Douglas).

The forests associated with *U. lindleyi* include rocky slopes and cliffs dominated by Garry oak (*Quercus garryana*) or mixed woodland types with an overstory of Douglas-fir (*Pseudotsuga menziesii*), arbutus (*Arbutus menziesii*) and Garry oak. These dry, open, south- to west-facing forests occur on slopes between 70% and 90%, that are well-drained, gravelly or rocky, and between elevations of 50 to 80 metres. Prominent native species in the understories of the mixed forests include blue wild rye (*Elymus glaucus*), bladder desert parsley (*Lomatium utriculatum*) and Wallace's spikemoss (*Selaginella wallacei*). Barren brome, early hairgrass, crested dog's-tail grass (*Cynosurus cristatus*), Scotch broom, and hairy cat's-ear are frequent introduced species.

Trends

There is no specific information on the trends of *U. lindleyi* habitats on southeastern Vancouver Island or the adjacent Gulf Islands, although they almost certainly share the same trends as Garry oak ecosystems with which they are often closely associated. Field surveys indicate that some unoccupied *U. lindleyi* habitat still exists. Some reduction in these sites is likely however, due to habitat fragmentation that has been severely magnified by urban development.

The major threats that have influenced Garry oak and associated ecosystems over the past century include agricultural development, urbanization and invasion by aggressive introduced species. These factors have reduced Garry oak systems to less than 5% of their original extent in the Victoria area (Lea 2002). Garry oak ecosystems persist largely as isolated pockets of heavily fragmented habitat and lack connections that would allow substantial genetic interchange.

Habitat protection/ownership

Most habitat occupied by *U. lindleyi* is located on private land. The only occupied habitat that is found on public land is on Galiano Island where the population extends into a regional park. Although little habitat is legally protected, it is possible that an increased amount will be protected through conservation covenants, since some of the habitat is on steep, seaside cliffs that can be costly and generally difficult to develop. The habitat of one population on Saturna Island is already protected by such a covenant.

BIOLOGY

Little biological research has been conducted on *U. lindleyi*, although there have been significant taxonomic studies of the genus, mostly in the U.S.

Life cycle and reproduction

Uropappus lindleyi is an annual species that flowers in mid-April to mid-May in B.C. Seed production occurs in mid-May-June. In addition, flowering is asynchronous, with many flowering plants observed with still-unopened heads. This did not appear to be a result of different microhabitat conditions, since seed-distributing plants and plants in bud were observed side by side.

Herbivory

Little information is available with respect to herbivory. Plants heavily grazed by deer have been noted by Fairbarns (pers. comm. 2004), although the authors found virtually no grazing on *U. lindleyi* in 2004.

Physiology

Uropappus lindleyi, like other annuals of similar species of *Microseris* occurring in warmer and drier climates, has specialized features such as autogamy (self pollination), reduction in flower size and pappus scale numbers, as well as subcaulescent to acaulescent stems (Chambers 1955, Stebbins 1972).

Dispersal

The bristle-tipped pappus scales may tend to attach to bird feathers, thus possibly resulting in long-range dispersal. Most seeds, however, are likely dispersed locally by wind and gravity. The pappus scales diverge from the crown of the achene in an open fashion that likely allows wind to move the light achenes mainly over short to moderate distances.

Interspecific interactions

No data are available on interspecific interactions for *U. lindleyi*.

Adaptability

There appears to be little available information on successes in artificial propagation and seed germination but seeds appear to be available through some suppliers of wildflower seeds (Payne 2004).

POPULATION SIZES AND TRENDS

Search effort

Uropappus lindleyi is often found in steep, somewhat inaccessible microhabitats, which may explain the lack of records of this species prior to its first observation in 1974. Casual surveys of potential *U. lindleyi* habitat have been conducted by botanists over the last 30 years with little success. A comprehensive search of suitable habitat was conducted in 2003 and 2004 by several botanists searching habitats specifically for *U. lindleyi* (see Appendix 1 for unsuccessful search sites). It is possible, however, additional populations may exist in small patches at sites not thoroughly searched. Further details of search effort are not available because the primary writer (George Douglas) is now deceased.

Abundance

There are five extant *U. lindleyi* locations in Canada. All of these are in the Gulf Islands (Figure 4, Table 1). One population was recorded on southern Vancouver Island in 1998. This site, revisited by the authors in 2004, is now considered extirpated due to the construction of a housing development that has completely obliterated most of the slope on which it occurred. Existing population sizes range from approximately 20 to 1200 plants, on areas of less than one square metre up to one hectare.

Table 1. Locations and population sizes for *Uropappus lindleyi* in British Columbia.

Population	Last Observation	Observer	Number of Plants/Area
North Pender Island	1996	Penny	20/? m ² – 2004 search unsuccessful
Vancouver Island	2004	Douglas and Smith	Extirpated
Ruxton Island	2003	Ennis	800/1 ha
Saturna Island: Population 1	2003	Janszen	22+/-0.7 m ²
Population 2	2004	Douglas & Smith	28/8 m ²
Galiano Island: Subpopulation 1	2003	Janszen	390/512 m ²
Subpopulation 2	2004	Douglas & Smith	800/440 m ²

The most recent observations of the five *U. lindleyi* populations in British Columbia, made in 2003 and 2004 (Figure 4) indicate that there are a total of about 2000 individuals (Table 1).

Fluctuations and trends

Population trends are not known, and will be difficult to assess due to the annual nature of the species.

Rescue effect

The potential for rescue from the species' main range, 300 km away on the east side of the Cascade Mountains in the U.S., is unknown but could be considered to be highly unlikely. Even locally, the amount of genetic exchange between populations is unknown. Canadian populations are fragmented, with distances of 10-15 km between populations.

LIMITING FACTORS AND THREATS

The most immediate threat to *U. lindleyi* in British Columbia is habitat destruction through housing development on private property. All five extant *U. lindleyi* populations occur on the Gulf Islands and all but one population occurs entirely on private land, most of which are ocean view properties. These view properties, along with waterfront properties, are the most desirable sites for housing developments in this area. Information from Salt Spring Island is typical of the trend in housing development on the Gulf Islands. A marked increase in housing development on Salt Spring Island is related to population numbers that have increased 78% between 1986 and 2001. Growth projections indicate a further increase of 43% by 2026 (Linda Adams, pers. comm. 2003).

Habitat destruction also indirectly threatens the species by increasing the natural fragmentation of populations. The resulting significant habitat fragmentation limits the ability of the species to become established in new locations or re-establish extirpated populations.

Much of the remaining habitat suitable for *U. lindleyi* has been heavily altered due to invasion by introduced species. This habitat degradation poses a significant and urgent threat to *U. lindleyi*, and other native species and their habitats in the Garry oak ecosystem on southeastern Vancouver Island and the adjacent Gulf Islands.

SIGNIFICANCE OF THE SPECIES

Uropappus lindleyi is not well known in the horticultural trade, but seeds from the wild are presently collected and sold by at least one native plant nursery in California (Payne 2004). It is not known to have other cultural, medicinal or spiritual uses.

The extant B.C. populations are at the northern extent of the main geographic range of *U. lindleyi* and are 300 km north of U.S. populations. Peripheral populations are sometimes genetically and morphologically divergent from central populations and may have an evolutionary and ecological significance out of proportion to the percentage of the species they represent (Mayr 1982, Lesica and Allendorf 1995). The protection of genetically distinct peripheral populations may be important for the long-term survival of the species as a whole (Lesica and Allendorf 1995). Research on genetics of most British Columbia native plants, in relation to more southern populations, has not been conducted. In one case, however, the populations of a similar species, *Microseris bigelovii* in British Columbia, which are disjunct from the distributional centre of *M. bigelovii* in California, were confirmed to be genetically distinct (van Heusden and Bachmann 1992).

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

International status

Uropappus lindleyi is not covered under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the *Endangered Species Act* (U.S.) or the IUCN Red Data Book. Globally, *U. lindleyi* has a rank of G5, indicating that, on a global scale, the plant is considered "common; widespread and abundant" (NatureServe Explorer 2003).

This species is listed as, S1 ("critically imperiled") only in Utah (NatureServe Explorer 2003). In Arizona, California, Idaho, Nevada, New Mexico, Oregon, Texas and Washington this species is ranked SNR, meaning that its ranking status has not yet been assessed (NatureServe Explorer 2003).

National and provincial status

In Canada, *U. lindleyi* is restricted to British Columbia, and has national and provincial rankings of N1 and S1, respectively. These are the most critical ranks that can be applied to species at the national and provincial levels and indicate that the species is "critically imperiled because of extreme rarity (typically five or fewer occurrences or very few remaining individuals) or because of some factor(s) making it especially vulnerable to extirpation or extinction" (NatureServe Explorer 2003). The species is also included on the British Columbia Ministry of Environment red list (Douglas *et al.* 2002).

Uropappus lindleyi could be a candidate for listing under the provincial *Wildlife Amendment Act* (2004) due to its British Columbia Ministry of Environment red-list status.

TECHNICAL SUMMARY

Uropappus lindleyi

Lindley's false silverpuffs

uropappe de Lindley

Range of Occurrence in Canada: British Columbia

Demographic Information

Generation time (average age of parents in the population)	3-4 months
Population trend and dynamics	
Observed percentage of reduction in total number of mature individuals over the last 10 years.	Unknown
Projected percentage of reduction in total number of mature individuals over the next 10 years.	Unknown
Observed percentage reduction in total number of mature individuals over any 10 years period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible?	Unknown
Are the causes of the decline clearly understood? Habitat loss and degradation have been documented.	Partially
Are the causes of the decline clearly ceased? There are ongoing threats to habitat area and quality	No
Observed trend in number of populations	Decline
Are there extreme fluctuations in number of mature individuals?	No
Are there extreme fluctuations in number of populations?	No

Number of mature individuals in each population

Population	N Mature Individuals
	Ruxton Island: 800 North Pender Island: 20? Galiano Island: 1190 Saturna Island (1): 22+ Saturna Island (2): 28
Grand Total	2000

Extent and Area Information

Estimated extent of occurrence (km ²) <i>Based on a convex polygon</i>	150 km ²
Observed trend in extent of occurrence historic loss	Decline
Are there extreme fluctuations in extent of occurrence?	No
Estimated area of occupancy (km ²) Actual area of habitat occupied is 0.01 km ² but the Area of Occupancy for the 5 sites, based on a 1x1 km grid is 5 km ² or 20 km ² using a 2x2 km grid overlay	20 km ²
Observed trend in area of occupancy	Decline
Are there extreme fluctuations in area of occupancy?	No
Is the total population severely fragmented?	Yes
Number of current locations	5
Trend in number of locations	Decline
Are there extreme fluctuations in number of locations?	No
Observed trend in quality of habitat	Decline

Quantitative Analysis

	[0.00% probability of extirpation in years]
--	---

Threats (actual or imminent, to populations or habitats)

1. habitat destruction through housing development on private property
2. habitat fragmentation
3. invasion of alien plant species

Rescue Effect (immigration from an outside source)

Status of outside population(s)? USA: secure	
Is immigration known or possible?	Unknown
Would immigrants be adapted to survive in Canada?	Likely
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely?	No

Current Status

COSEWIC: Endangered 2008

Status and Reasons for Designation

Status: Endangered	Alpha-numeric code: B1ab(iii)+2ab(iii)
Reasons for Designation: An annual flowering plant of British Columbia restricted to only five extant locations in the Gulf Islands. The species is no longer known to occur on Vancouver Island. There are extremely small numbers of individuals known in Canada. The species is also at continued risk from habitat loss and degradation from such factors as home building and spread of invasive plants.	

Applicability of Criteria

Criterion A: (Decline in Total Number of Mature Individuals): Not applicable; no decline data available
Criterion B: (Small Distribution Range and Decline or Fluctuation): Endangered B1ab(iii)+2ab(iii) with EO and AO below maximum limits for Endangered and only 5 severely fragmented localities with loss in AO and mature individuals due to recent extirpation of 1 population and continued impact on habitat inferred due to spread of invasive plants and development.
Criterion C: (Small and Declining Number of Mature Individuals): Population size is below maximum limit for Endangered and continuing decline can be inferred due to spread of invasives and pressures for land development but population structure under this criterion is not met
Criterion D: (Very Small Population or Restricted Distribution): Threatened D2; only 5 populations with a maximum AO of 20 km ²
Criterion E: (Quantitative Analysis): None available

ACKNOWLEDGEMENTS AND AUTHORITIES CONSULTED

Harvey Janszen and Frank Lomer provided information on sites they visited in 2003. Harvey Janszen assisted with Gulf Island fieldwork in 2004. Jenifer Penny at the British Columbia Conservation Data Centre provided information from the Conservation Data Centre database. Tim Ennis kindly provided data on the Ruxton Island population. Brenda Costanzo, Matt Fairbarns, Ted Lea, Terry McIntosh and Hans Roemer provided valuable comments on an early draft of the manuscript.

Authorities consulted

- Ms. Florence Caplow. January 2004. Botanist, Washington Natural Heritage Program, Department of Natural Resources, P.O. Box 47014, Olympia, WA 98504-7014.
Dr. Adolf Ceska. June 2004. Botanist, Ceska Geobotanical.
Mr. Matt Fairbarns. June 2004. Botanist, Aruncus Consulting.
Dr. Harvey Janszen. January 2004. Botanist. 251 East Point Road, Saturna Island, B.C. Canada V0N 2Y0.
Ms. Jenifer Penny. January 2004. British Columbia Conservation Data Centre, Wildlife Inventory Section, Resources Inventory Branch, Ministry of Environment, Lands and Parks, P.O. Box 9344, Station Provincial Government, Victoria, British Columbia V8W 9M1.
Dr. Hans Roemer. June 2004. Botanist, Victoria.
Dr. Nancy Turner. January 2004. Professor, School of Environmental Studies, P.O. Box 1700, University of Victoria, Victoria, BC.

INFORMATION SOURCES

- Adams, L., pers. comm. 2003. *Email correspondence to S.J. Smith*. Chief Administrative Officer, Executive and Trust Area Services, Islands Trust, British Columbia.
Atkinson, S. and F. Sharpe. 1993. *Wild Plants of the San Juan Islands*. 2nd Edition. The Mountaineers. Seattle. 191 pp.
Battjes, J., K.L. Chambers, and K. Bachmann. 1994. Evolution of microsporangium numbers in *Microseris* (Asteraceae: Lactuceae). *Journal of Botany* 81(5): 641-647.
Chambers, K.L. 1955. A biosystematic study of the annual species of *Microseris*. *Contributions to the Dudley Herbarium* 4:207-312.
Chambers, K.L. 1960. *Microseris* Pages 554-562 in *Illustrated Flora of the Pacific States: Washington, Oregon and California*. Vol. IV. Bignoniaceae to Compositae. R. Ferris (editor). Stanford Univ. Press, Stanford, California. 732 pp.
Chambers, K.L. 1993. *Uropappus*. Pages 355-356 in *The Jepson Manual: Higher Plants of California*. J.C. Hickman (editor). University of California Press. Berkeley, California. 1400 pp.
Chambers, K.L. 2006. *Uropappus*. In: *Flora of North America* Editorial Committee, eds. 1993+. *Flora of North America North of Mexico*. 12+vols. New York and Oxford. Vol. 19, p. 322.

- Cronquist, A. 1955. Vascular Plants of the Pacific Northwest. Part 5: Compositae. University of Washington Press, Seattle. 343 pp.
- Douglas, G.W., D. Meidinger and J.L. Penny. 2002. Rare Native Vascular Plants of British Columbia. Second edition. Province of British Columbia, Victoria, British Columbia. 359 pp.
- Douglas, G.W., D. Meidinger, and J. Pojar. 1999a. Illustrated Flora of British Columbia. Volume 3. Dicotyledons (Diapensiaceae through Onagraceae). British Columbia Ministry of Environment, Lands and Parks and British Columbia Ministry of Forests, Victoria, British Columbia. 423 pp.
- Douglas, G.W., D. Meidinger, and J. Pojar. 1999b. Illustrated Flora of British Columbia. Volume 4. Dicotyledons (Orobanchaceae through Rubiaceae). British Columbia Ministry of Environment, Lands and Parks, and British Columbia Ministry of Forests, Victoria, British Columbia. 427 pp.
- Douglas, G.W., D. Meidinger, and J. Pojar. 2001. Illustrated Flora of British Columbia. Vol. 7. Monocotyledons (Orchidaceae to Zosteraceae). Ministry of Sustainable Resource Development, and Ministry of Forests, Victoria, British Columbia. 379 pp.
- Douglas, G.W., G.B. Straley, and D. Meidinger. 1998. Illustrated Flora of British Columbia. Volume 1. Gymnosperms and Dicotyledons. (Aceraceae through Asteraceae). British Columbia Ministry of Environment, Lands and Parks, and British Columbia and Ministry of Forests, Victoria, British Columbia. 436 pp.
- Fairbarns, M., 2004. pers. comm. *Email correspondence to G.W. Douglas*. September 2004. Botanist, Aruncus Consulting, Victoria, British Columbia.
- Jansen, H., J. Michaels, and J.D. Palmer. 1991a. Phylogeny and character evolution in the Asteraceae based on chloroplast DNA restriction site mapping. *Systematic Botany* 16:98-115.
- Jansen, R.K., R.S. Wallace, K. Kim, and K.L. Chambers. 1991b. Systematic implications of chloroplast DNA variation in the subtribe Microseridinae (Asteraceae: Lactuceae). *Journal of Botany* 78: 1015-1027.
- Kartesz, J.T. and C.A. Meacham. 1999. Digital Floristic Synthesis of North America North of Mexico. Published for the Biota of North America Program of the North Carolina Botanical Garden, by Patricia Ledlie Bookseller, Incorporated. Buckfield, Maine.
- Lea, Ted. 2002. Historical Garry Oak Ecosystems of Greater Victoria and Saanich Peninsula. 1:20,000 Map. Terrestrial Information Branch, B.C. Ministry of Environment. Victoria, British Columbia.
- Lesica, P. and F.W. Allendorf. 1995. When are peripheral populations valuable for conservation? *Conservation Biology* 9: 753-760.
- Mayr, E. 1982. Adaptation and selection. *Biologisches Zentralblatt* 101: 161-174.
- NatureServe Explorer. 2003. An online encyclopedia of life [web application]. Version 1.6. Arlington, VA: NatureServe. Web site: <http://www.natureserve.org/explorer> [accessed January 2004].
- Nuszdorfer, F.C., K. Klinka and D.A. Demarchi. 1991. Coastal Douglas-fir zone. Pages 95-112 *in* Ecosystems of British Columbia. *Edited by* D. Meidinger and J. Pojar. British Columbia Ministry of Forests Special Report Series No. 6, Victoria, BC. 330 pp.

- Pak, J., J. Park, and S.S. Whang. 2001. Systematic implications of fruit wall anatomy and surface sculpturing of *Microseris* (Asteraceae, Lactuceae) and relatives. *International Journal of Plant Science* 162: 209-220.
- Payne, T. 2004. Web site: www.theodorepayne.org/seeds/Wildflowers-ko.htm [accessed March 2004].
- Peck, M.E. 1961. *A Manual of the Higher Plants of Oregon*. Binfords and Mort. Portland, Oregon. 936 pages.
- Price, H.J., and K. Bachmann. 1975. DNA content and evolution in the Microseridinae. *American Journal of Botany* 62:262-267.
- Stebbins, G.L. 1972. Research on the evolution of higher plants: problems and prospects. *Canadian Journal of Genetic Cytology* 14:453-462.
- University of Washington Herbarium Database. 2004. Website: <http://herbarium.botany.washington.edu/FMPro?-db=VP%20Inventory&-lay=web&-format=vpsearch.htm&-view> [Accessed January 2004].
- USDA, NRCS. 2007. The PLANTS Database (<http://plants.usda.gov>, 23 October 2007). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
- van Heusden, A.W. and K. Bachmann. 1992. Nuclear DNA polymorphisms among strains of *Microseris bigelovii* (Asteraceae, Lactuceae) amplified from arbitrary primers. *Bota. Acta* 105: 331-336.
- Wallace, R.S. and R.K. Jansen. 1990. Systematic implications of chloroplast DNA variation in the genus *Microseris* (Asteraceae: Lactuceae). *Systematic Botany* 15(4): 6006-616.

BIOGRAPHICAL SUMMARY OF REPORT WRITERS

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

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

COLLECTIONS EXAMINED

Herbarium specimens housed at the Royal British Columbia Museum (V) in Victoria were viewed and verified.

APPENDIX 1

Unsuccessful search sites for *Uropappus lindleyi* made by several botanists in 2003 and 2004.

Suitable Sites Searched Unsuccessfully

Bodega Ridge, Galiano Island
Mt. Sutil, Galiano Island

Mt. Galiano, Galiano Island

Mt. Warburton-Pike (Brown Ridge), Saturna Island
Mt. Fisher (Brown Ridge), Saturna Island

Heck Hill, Mayne Island

Mt. Maxwell, Salt Spring Island
Reginald Hill, Salt Spring Island
Mt. Tuam, Salt Spring Island

Mt. Norman, South Pender Island

Lone Tree Hill Park, Gowlland Range, Vancouver Island
Thetis Lake Park, Vancouver Island
Cedar Hill, Vancouver Island
Mill Hill, Vancouver Island
Mt. Tolmie, Vancouver Island

Mt. Tzuhalem, Vancouver Island
Mt. Helmcken, Vancouver Island
Cowichan Lake, Vancouver Island
Malahat Drive, Vancouver Island
Nanoose Hill, Vancouver Island
Horth Hill Park, Vancouver Island

Tree Island
