

COMMITTEE ON THE
STATUS OF ENDANGERED
WILDLIFE IN CANADA

OTTAWA, ONT. K1A 0H3
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COMITÉ SUR LE STATUT
DES ESPÈCES MENACÉES
DE DISPARITION AU
CANADA

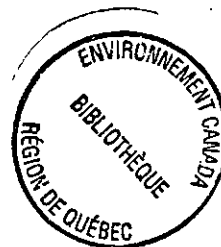
OTTAWA (ONT.) K1A 0H3
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**STATUS REPORT ON THE LARGE-FLOWERED BRICKELLIA
*BRICKELLIA GRANDIFLORA***

IN CANADA

QL
88
573
1996

BY



PETER L. ACHUFF

**STATUS ASSIGNED IN 1996
NOT AT RISK**

**REASON: NATURALLY RARE AND GEOGRAPHICALLY RESTRICTED
PIONEER SPECIES COLONIZING DISTURBED SITES.**

OCCURRENCE: ALBERTA AND BRITISH COLUMBIA

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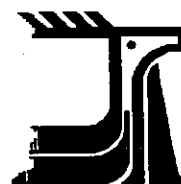
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STATUS REPORT ON ENDANGERED WILDLIFE IN CANADA

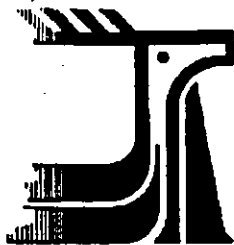
Large-flowered Brickellia



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OF ENDANGERED WILDLIFE
IN CANADA**



COSEWIC



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JUNE 1994

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VULNERABLE: (V)	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
THREATENED: (T)	A species likely to become endangered if limiting factors are not reversed.
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**STATUS REPORT ON THE LARGE-FLOWERED BRICKELLIA
*BRICKELLIA GRANDIFLORA***

IN CANADA

BY

**PETER L. ACHUFF
PARKS CANADA
WATERTON LAKES NATIONAL PARK
WATERTON PARK, ALBERTA
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AND

**ALBERTA REGIONAL OFFICE
CALGARY, ALBERTA**

**REPORT PROVIDED BY PARKS CANADA
WATERTON LAKES NATIONAL PARK**

**STATUS ASSIGNED IN 1996
NOT AT RISK**

EXECUTIVE SUMMARY

Description

Brickellia grandiflora (Hooker) Nuttall (large-flowered brickellia) is a herbaceous perennial from a woody stem base with stems 2-8 dm tall that are often branched above and with short hairs or none. The leaves are simple, mostly one per node (sometimes paired at the base of the stem), triangular-rounded to arrow-shaped in outline, 2-11 cm long and 1-6 cm wide, with short hairs to nearly none, obscurely glandular-punctate, the margins coarsely toothed, and the tip sharp and smooth-margined. Flower heads are in small groups or solitary, drooping at the ends of slender branches. The involucre bracts are 7-12 mm high, overlapping, with green stripes, the outer ones narrow above and minutely hairy, the inner ones broad with a translucent margin and generally longer. Heads contain 20-40 greenish white to cream coloured, tubular disk flowers only. Fruits 4-5 mm long, dark brown, 10-ribbed with stiff white hairs. Pappus of numerous white bristles attached to yellow rim at top of seed.

Distribution

Brickellia grandiflora is endemic to North America and occurs from southwestern Alberta and adjacent southeastern British Columbia, south through Washington, mostly east of the Cascade crest, to Baja California, and east to Nebraska, Missouri, Arkansas, and Texas. In Canada, *Brickellia grandiflora* is currently known only from Waterton Lakes National Park in southwestern Alberta and adjacent southeastern British Columbia.

Habitat

Brickellia grandiflora occurs in the maritime-influenced, continental climate of the 'chinook zone' of southwestern Alberta and southeastern British Columbia in portions of the Montane and lower Subalpine Ecoregions of Waterton Lakes National Park and the Montane Spruce and lower Engelmann Spruce-Subalpine Fir Biogeoclimatic zones of British Columbia at elevations of about 1250-1800 m. It occurs along seasonal stream channels and colluvial slopes in warm, dry situations and similar human-disturbed habitats, on coarse, rocky substrates that are well to rapidly drained. These sites are periodically disturbed.

General Biology

Brickellia grandiflora is a perennial herb that is apparently insect-pollinated during the flowering period of July and August and produces wind-dispersed seed in August and September. It appears to be a weak competitor, dependent on early successional habitats that are periodically disturbed by stream flow, colluviation or avalanche activity. The disturbance presumably reduces competition from other species, especially for light, since it is absent under dense tree or shrub canopies even where stream flow maintained a disturbed, rocky surface. It has recently colonised human-disturbed habitats, opportunistically dispersing from small natural populations.

Population Size and Trends

Six local populations of *Brickellia grandiflora* are currently known in Canada, five in Waterton Lakes National Park, Alberta and one in adjacent southeastern British Columbia. The populations are estimated to total about 8200 plants, about 75% of which are in human-disturbed habitats. No data are available on population trends, although the five populations observed in Waterton Lakes National Park appeared to be healthy and reproducing. This species may be partly a 'fugitive' species with a metapopulation structure in which some populations become locally extinct due to deteriorating habitat conditions or other stochastic factors affecting small populations, and then re-establish periodically on recently disturbed sites. Other portions of the population, on natural, chronically disturbed sites, are probably fairly stable through time. Plants could not be relocated at two historic localities and they may be extirpated, although the precise location of these localities is unclear.

Limiting Factors

Brickellia grandiflora appears to be sensitive to competition from other plants and is restricted to open, early successional habitats that are maintained by periodic disturbance. No immediate threats to the survival of *Brickellia grandiflora* in its natural habitat in Canada are known currently. In its human-disturbed habitats, in which about 75% of the population currently occurs, the species is subject to declining habitat quality due to competition from other plants which increasingly occupy the site during natural succession, to possible habitat destruction from infrastructure construction or maintenance activities, and possibly to the effects of non-native plant control activities (herbicides, mechanical control, enhanced revegetation) aimed at other species on the site. The sites occupied by the populations are relatively small and could be severely affected by single-event, catastrophic disturbances.

Protection

Five of the six Canadian populations are in Waterton Lakes National Park. The sixth is on British Columbia crown land. The species has no special legal status in any jurisdiction, although it is a Red-listed species in British Columbia.

Conclusions

Brickellia grandiflora is recommended for status in Canada as a Vulnerable species (a species of special concern because of characteristics that make it particularly sensitive to human activities or natural events). Management should maintain the dynamic processes that produce its natural habitat and actions that reduce populations on human-disturbed habitats should be avoided.

ACKNOWLEDGEMENTS

The assistance of the following people in the preparation of this report is acknowledged: Mary Coleman (Waterton Lakes National Park), George Douglas (British Columbia Conservation Data Centre), Brij Kohli (University of Alberta herbarium), Gerald Straley (University of British Columbia Botanical Garden), Mieke Vander Valk (Waterton Lakes National Park), and Rob Watt (Waterton Lakes National Park).

TABLE OF CONTENTS

Abstract	vi
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I. Species Information

1. Classification and Nomenclature	1
2. Description	1
Local Field Characters	1
Illustrations	2
3. Biological and Economic Significance	2
4. Distribution	2
Summary	2
Locality Citations	2
Extant Populations Currently or Recently Verified	2
Extirpated Populations	4
Historical Populations of Unknown Status	4
Potential Sites for Investigation	4
Erroneous Reports	5
Status and Location of Presently Cultivated Material	5
5. General Environment and Habitat Characteristics	5
Summary	5
Climate	5
Physiographic and Topographic Characteristics	6
Edaphic Factors	6
Dependence on Dynamic factors	6
Biological Characteristics	6
6. Population Biology	7
Summary	7
Demography	7
Phenology	8
Reproductive Ecology	8
7. Population Ecology	8
Summary	8
8. Land Ownership and Responsibility	9
9. Management Practices	9
10. Evidence of Threats to Survival	9
11. Present Legal or Other Formal Status	9
International Status	9
National Status	10
Provincial Status	10

II. Assessment of Status

12. General Assessment	10
----------------------------------	----

13. Status Recommendations	10
14. Recommended Critical Habitat	11
15. Conservation Recommendations	11

III. Information Sources

16. References Cited	11
18. Collections Consulted	12
19. Field Work	12
20. Knowledgeable Individuals	12
21. Other Information Sources	13

IV. Authorship

23. Initial Authorship of Status Report	13
24. Maintenance of Status Report	13

APPENDIX I: Precise Locality Information

(on file with Chairman, Plants Subcommittee, COSEWIC)

SUPPLEMENT: Conservation Recommendations

(on file with Chairman, Plants Subcommittee, COSEWIC)

Abstract

Brickellia grandiflora (Hooker) Nuttall (large-flowered brickellia) is a herbaceous perennial that is endemic to North America and occurs from southwestern Alberta and adjacent southeastern British Columbia, south through Washington to Baja California, and east to Nebraska, Missouri, Arkansas, and Texas. In Canada, it is currently known from six localities, five in Waterton Lakes National Park, Alberta and one in British Columbia.

The populations are estimated to total 8200 plants, about 75% of which are in human-disturbed habitats. It occurs at elevations of 1250-1800 m, along seasonal stream channels and colluvial slopes in warm, dry situations and similar human-disturbed habitats, on coarse, rocky substrates that are well to rapidly drained. It appears to be dependent on periodic disturbance to reduce competition from other plants.

No immediate threats in its natural habitat are known. In its human-disturbed habitats, in which about 75% of the population currently occurs, the species is subject to declining habitat quality due to competition from other plants which increasingly occupy the site during natural succession, to possible habitat destruction from infrastructure construction or maintenance activities, and possibly to the effects of non-native plant control activities (herbicides, mechanical control, enhanced revegetation) aimed at other species on the site. The sites occupied by the populations are relatively small and could be severely affected by single-event, catastrophic disturbances.

Brickellia grandiflora is recommended for status in Canada as a **Vulnerable** species (a species of special concern because of characteristics that make it particularly sensitive to human activities or natural events).

I. Species Information

1. Classification and Nomenclature

Scientific Name: *Brickellia grandiflora* (Hooker) Nuttall

Bibliographic Citation: Transactions of the American Philosophical Society II: 287. 1840.

Synonyms:

Brickellia grandiflora var. *minor* Gray (Proc. Acad. Philadelphia 1863: 67. 1863)

Brickellia umbellata A. Nelson (Man. Bot. Rocky Mts. 486. 1909)

Coleosanthus grandiflorus Kuntze (Rev. Gen. 1: 328. 1891)

Coleosanthus minor Daniels (Fl. Boulder. 225. 1911)

Coleosanthus umbellatus Greene (Pitt. 4: 238. 1901)

Eupatorium grandiflorum Hooker (Fl. Bor. Am. 2: 26. 1834)

Common Name: Large-flowered brickellia

Family Name: Asteraceae (Compositae)

Common Family Names: Aster Family, Sunflower Family

Major Plant Group: Angiosperm (Dicotyledon)

2. Description

Brickellia grandiflora is a herbaceous perennial from a woody stem base with stems 2-8 dm tall that are often branched above and with short hairs or none. The leaves are simple, mostly one per node (sometimes paired at the base of the stem), triangular-rounded to arrow-shaped in outline, 2-11 cm long and 1-6 cm wide, with short hairs to nearly none, obscurely glandular-punctate, the margins coarsely toothed, and the tip sharp and smooth-margined. Flower heads are in small groups or solitary, drooping at the ends of slender branches. The involucre bracts are 7-12 mm high, overlapping, with green stripes, the outer ones narrow above and minutely hairy, the inner ones broad with a translucent margin and generally longer. Heads contain 20-40 greenish white to cream coloured, tubular disk flowers only. Fruits 4-5 mm long, dark brown, 10-ribbed with stiff white hairs. Pappus of numerous white bristles attached to yellow rim at top of seed. (adapted from Cronquist 1955, Kuijt 1982, Moss 1983).

Local Field Characters

Brickellia grandiflora may be confused locally with *Prenanthes sagittata* (white lettuce). The latter can be distinguished by having milky juice, narrowly winged leaf stalks, smooth leaf margins, involucre bracts without stripes or hairs,

and fruits hairless. *Brickellia grandiflora* usually occurs in open, rocky habitats whereas *Prenanthes sagittata* is usually in moist, shaded ones. Vegetatively, *Brickellia grandiflora* may also resemble some plants of *Senecio triangularis*. The latter has shiny hairless leaves, hairless stems, yellow flowers with both disk and ray flowers, and usually grows in wetter habitats.

Illustrations

Line drawings are in Cronquist (1955) and Kuijt (1982).

3. Biological and Economic Significance

Brickellia grandiflora is one of a number of species that have their main distribution in the United States and reach their northern range limit in southwestern Alberta and southeastern British Columbia (Ogilvie 1962, Kuijt 1982).

Brickellia grandiflora has no known economic significance.

4. Distribution

Summary

Brickellia grandiflora is endemic to North America and occurs from southwestern Alberta and adjacent southeastern British Columbia, south through Washington, mostly east of the Cascade crest, to Baja California, and east to Nebraska, Missouri, Arkansas, and Texas (Cronquist 1955, Moss 1983). In Canada, *Brickellia grandiflora* is currently known only from Waterton Lakes National Park in southwestern Alberta and adjacent southeastern British Columbia (Figure 1).

Locality Citations

Precise locality information is on file with COSEWIC and Parks Canada. The information is generally available unless the localities are considered to be publicly sensitive.

Extant Populations Currently or Recently Verified

Populations of *Brickellia grandiflora* are currently known or recently verified from six localities in Canada, five in Alberta and one in British Columbia. The five Alberta localities are all in Waterton Lakes National Park and include:

1. Waterton townsite
2. South Bellevue Hill
3. North Bellevue Hill
4. Rowe Lakes trail
5. Twin Falls

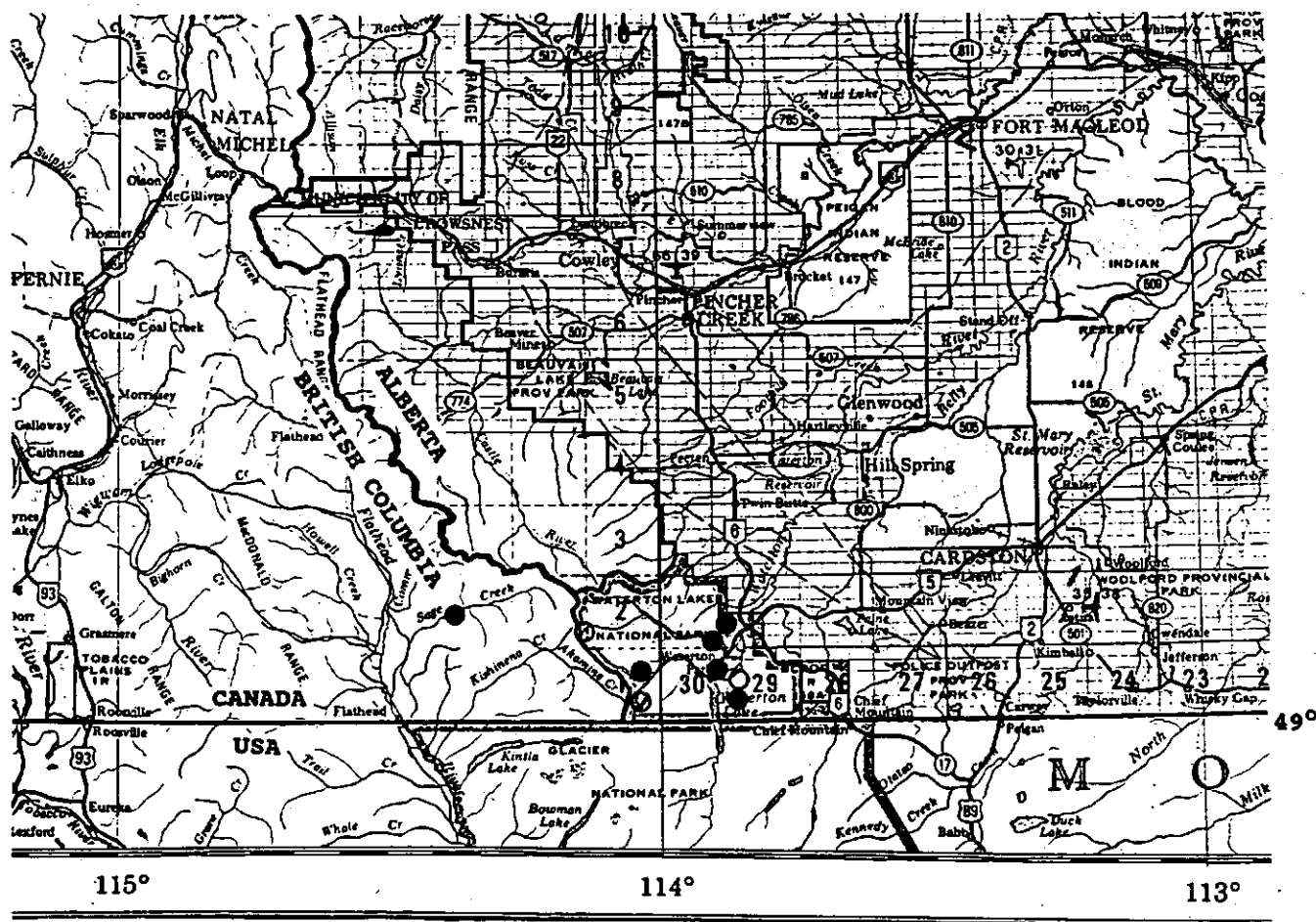


Figure 1. Distribution of *Brickellia grandiflora* in Canada.
 ○ - pre-1925, ◐ - 1925-1949, ● - post-1965

The British Columbia locality is in the Sage Creek valley in the far southeastern corner of the province.

Extirpated Populations

R.H. Dickson collected *Brickellia grandiflora* on 2 Jul 35 from the "beach at Cameron Lake" (specimen in ALTA). It is not clear where the plant was found along the extensive lake shore, although most likely at the easily accessible north end. This population was not relocated in 1994 and given the amount of disturbance from development along the beach at the north end of the lake, the population may well be extirpated. However, the entire beach of the lake was not searched so *Brickellia grandiflora* may still exist in this locality.

A reported population at South Kootenay Pass could not be relocated and may be extirpated. See the following sections for more detail.

Historical Populations of Unknown Status

The location of several collections has not been reconfirmed mainly due to very general location information. These include:

Macoun 11688, 28 Jul 1895, Sheep Mountain [probably now Vimy Peak], amongst debris (CAN).

Moss, Survey 619, 7 Sep 39, Waterton Lakes National Park, rocks by stream (ALTA).

Hart 33, 23 Jul 40, beach, Waterton Lakes (DAO).

Moss 9681, 19 Aug 51, Waterton Lakes National Park, eroded slopes (ALTA).

Scoggan 16540, 26 Aug 64, Waterton Lakes National Park, dry slopes of Rocky Mountains (ALTA).

Additionally, the existence of a South Kootenay Pass population, previously collected in 1874, could not be confirmed by field survey on 14 Aug 94 and there is question about the accuracy of the original location.

Potential Sites for Investigation

Potential sites for investigation are small, rocky, seasonal stream channels and colluvial slopes in warm, dry situations (especially southerly and westerly aspects and wind exposed slopes) at elevations between about 1250 and 1800 m in the mountains of southwestern Alberta (south of Crowsnest Pass) and the Flathead Valley area of southeastern British Columbia.

Erroneous Reports

An 1874 collection of *Brickellia grandiflora* has been reported from the British Columbia side of South Kootenay Pass (Henry 1915, Scoggan 1979). However, it has been determined that the collection was actually made in Alberta (B. Boivin pers. comm. in Douglas et al. 1989). An extensive search of South Kootenay Pass on 14 Aug 94 did not locate this population. The population may be extirpated, however, there is some question about the accuracy of the original collection being from South Kootenay Pass.

Status and Location of Presently Cultivated Material

Cultivated material from the Sage Creek locality in southeastern British Columbia is presently being grown at the University of British Columbia Botanical Garden in Vancouver (G. Straley, pers. comm.).

5. General Environment and Habitat Characteristics

Summary

Brickellia grandiflora occurs in the maritime-influenced, continental climate of the 'chinook zone' of southwestern Alberta and southeastern British Columbia in portions of the Montane and lower Subalpine Ecoregions of Waterton Lakes National Park and the Montane Spruce and lower Engelmann Spruce-Subalpine Fir Biogeoclimatic zones of British Columbia (Meidinger and Pojar 1991) at elevations of about 1250-1800 m. It occurs along seasonal stream channels and colluvial slopes in warm, dry situations and similar human-disturbed habitats, on coarse, rocky substrates that are well to rapidly drained. It appears to be dependent on periodic disturbance to reduce competition from other plants.

Climate

The regional climate is cool, continental characterised by cold winters and short, cool summers (Coen and Holland 1976, Meidinger and Pojar 1991). The area is influenced considerably by maritime air masses as frequent chinooks in the winter and a general summer-dry, winter-wet pattern, with a pronounced precipitation peak in spring, and with milder temperatures and somewhat higher precipitation than other parts of the mountains further north (Coen and Holland 1976, Ogilvie 1962).

The microclimate of habitats occupied by *Brickellia grandiflora* is typically one of high light intensities due to lack of shading vegetation and generally southerly or westerly aspects, and seasonal water stress in mid to late summer, due to the coarse, well to rapidly drained substrate, slope angle, and exposure to wind.

Physiographic and Topographic Characteristics

Brickellia grandiflora in Canada occurs at elevations of about 1250 to 1800 m along seasonal stream channels and colluvial slopes in warm, dry situations (especially southerly and westerly aspects and wind-exposed slopes) in the mountains and foothills of the Rocky Mountains in southwestern Alberta (south of Crowsnest Pass) and the Flathead Valley area of southeastern British Columbia.

Edaphic Factors

Brickellia grandiflora occurs primarily on coarse, rocky substrates that are well to rapidly drained. These include seasonal stream courses, scree and avalanche slopes, and similar human-disturbed habitats, such as roadsides, cut banks, and ditches in coarse parent materials. The soils are classified mostly as Regosolics or non-soil.

Dependence on Dynamic Factors

Brickellia grandiflora appears to be disturbance-dependent in that its natural habitats are periodically disturbed by stream flow, colluviation or avalanche activity. The disturbance presumably reduces competition from other species, especially for light, since it is absent under dense tree or shrub canopies even where stream flow maintained a disturbed, rocky surface. It was not found outside of such disturbed habitats in more stable, shady or more heavily vegetated situations. Its colonisation of recently disturbed habitats in the Waterton townsite and South Bellevue Hill localities indicates that it can opportunistically occupy human-disturbed habitats dispersing from small natural populations. Population monitoring data are not available, but *Brickellia grandiflora* may be partly a 'fugitive' species with a metapopulation structure in which some populations become locally extinct due to deteriorating habitat conditions or other stochastic factors affecting small populations, and then re-establish periodically on recently disturbed sites. Other portions of the population, on natural, chronically disturbed sites, are probably fairly stable through time.

Biological Characteristics

Brickellia grandiflora occurs primarily in the Montane and lower Subalpine Ecoregions in Waterton Lakes National Park and in the equivalent Montane Spruce and lower Engelmann Spruce-Subalpine Fir Biogeoclimatic Zones in British Columbia (Meidinger and Pojar 1991). It occurs in a plant community of very limited areal extent in a microhabitat that is not represented by the regional or modal vegetation communities of the area. Few other species occur in these microsites but include scattered *Epilobium angustifolium*, *Fragaria virginiana*, *Hedysarum sulphurescens*, *Acer glabrum* and *Achillea millefolium* and, on human-disturbed sites, non-native ruderals such as *Centaurea maculosa*, *Cirsium arvense*, *Melilotus officinalis*, *Trifolium repens* and *Verbascum thapsus*.

As discussed above, *Brickellia grandiflora* occurs characteristically in periodically disturbed, early successional habitats. On sites disturbed naturally by stream action, colluviation and avalanche, the habitat probably remains suitable over considerable periods of time. However on human-disturbed sites, natural succession may lead to development of a dense vegetation cover that, through shading and other competitive interactions, will greatly reduce or eliminate *Brickellia grandiflora* from the site. Portions of the Waterton townsite population appear to be approaching this condition currently.

6. Population Biology

Summary

Six local populations of *Brickellia grandiflora* are currently known in Canada, five in Waterton Lakes National Park, Alberta and one in adjacent southeastern British Columbia. The populations are estimated to total about 8200 plants, about 75% of which are in human-disturbed habitats.

Demography

Demographic characteristics of the six populations are as follows:

1. **Waterton townsite:** This locality consists of a series of subpopulations extending in a narrow band along the base of Mt. Crandell for about 2 km. It contains a total of about 6500 plants, 6200 in human-disturbed habitat and 300 in natural habitat. The plants appear to have spread from the natural habitat into the human-disturbed areas, which have been disturbed most recently about 20-30 years ago (R. Watt, pers. comm.). Plants of various sizes (ages?) were present and all portions of the population produced and dispersed seed in 1994.
2. **South Bellevue Hill:** This population occurs on the south end of Bellevue Hill and consists of approximately 70 plants, about evenly split between natural and human-disturbed habitats. Seed was produced and dispersed here in 1994.
3. **North Bellevue Hill:** This population occurs on the northeast flank of Bellevue Hill and contains about 560 plants all in natural habitat along a seasonal stream channel. Seed was produced and dispersed here in 1994.
4. **Rowe Lakes:** The Rowe Lakes population occurs in natural habitat along a seasonal stream channel and adjacent colluvial slope, and contains about 725 plants. Seed was produced and dispersed here in 1994.
5. **Twin Falls:** This population occurs along a series of small stream channels in natural habitat and contains about 350

plants. Seed was produced and dispersed in 1994.

6. **Sage Creek:** This site was not visited by the author and the extent of this population is not known. The original collector noted only one clump of plants at the site. *Brickellia grandiflora* is typically sparsely distributed in natural habitat and a wider search here may locate additional plants.

The situation in Waterton Lakes National Park suggests that *Brickellia grandiflora* can readily colonise suitable disturbed sites and expand its population rapidly from small populations in naturally disturbed situations. However, as these disturbed areas undergo natural succession, they likely become unsuitable for *Brickellia grandiflora* and the populations shrink again.

Phenology

Flowering began in the Waterton Lakes National Park populations in 1994 in mid-July and extended into late August. Seed began to be dispersed in early August and extended into at least late September, with some well developed seed being retained on plants into December. Herbarium specimens indicate a similar period of flowering.

Reproductive Ecology

Little is known of the reproductive ecology of this species. It appears to be a sexual diploid ($n=9$, Cronquist 1955) and no evidence of vegetative reproduction has been noted. Visits to *Brickellia grandiflora* flowers by bees and butterflies were noted in 1994 but other information on pollination is unknown. Flower heads typically contain 20-40 flowers, a large proportion of which appeared to produce mature seeds in 1994. The seeds are wind-dispersed with the aid of the 'parachute' of pappus hairs on the top of the seed. No information is known on the seed biology of this species.

The 'regeneration niche' of *Brickellia grandiflora* has not been characterised by experimental studies but can be inferred tentatively from its field habitat. It appears to require habitat that has little or no competition from other plants, and typically is recently disturbed, with high light intensities, and a coarse, well to rapidly drained substrate that is subject to seasonal water stress especially in mid to late summer.

7. Population Ecology

Summary

Little is known of the population ecology of this species. Negative interactions with other plants by shading and perhaps root competition can be inferred from its microhabitat distribution. These negative interactions likely increase during

natural succession on disturbed sites. On some human-disturbed sites, *Centaurea maculosa*, which produces allelopathic root exudates (Watson and Renney 1974), occurs with *Brickellia grandiflora* and may have a negative effect on it. No evidence of grazing or diseases has been observed in the Waterton Lakes National Park populations.

8. Land Ownership and Responsibility

Five of the populations of *Brickellia grandiflora* are in Waterton Lakes National Park, Alberta. The precise location of the Sage Creek population is not clear but it appears to be on British Columbia provincial crown land administered by the British Columbia Ministry of Forests.

9. Management Practices

None of the populations of this species in Canada appear to have been subjected to active management. The sites in Waterton Lakes National Park are subject to a general policy of maintaining natural processes (Parks Canada 1994). The human-disturbed sites occupied by *Brickellia grandiflora* were produced by infrastructure development (roads, sewage treatment, etc.) in the national park. These areas generally have not been actively rehabilitated but have been allowed to recover on their own following disturbance. The status of the Sage Creek population in British Columbia is unknown.

10. Evidence of Threats to Survival

No immediate threats to the survival of *Brickellia grandiflora* in its natural habitat in Canada are known currently. In its human-disturbed habitats, in which about 75% of the population currently occurs, the species is subject to declining habitat quality due to competition from other plants which increasingly occupy the site during natural succession; to possible habitat destruction from infrastructure construction or maintenance activities, and possibly to the effects of non-native plant control activities (herbicides, mechanical control, enhanced revegetation) aimed at other species on the site. The sites occupied by the populations are relatively small and could be severely affected by single-event, catastrophic disturbances.

11. Present Legal or Other Formal Status

International Status

Brickellia grandiflora has a global rank of G5 (abundant and demonstrably secure) in The Nature Conservancy ranking system, reflecting its widespread occurrence in the western USA.

National Status

Canada

Brickellia grandiflora is currently ranked N1 (critically imperiled because of rarity) in Canada and has a Canadian priority of 5, the lowest category (Argus and Pryer 1990).

USA

There is no formal national ranking for *Brickellia grandiflora* in the USA. However, since the vast majority of its range is in the USA, the global rank of G5 adequately reflects its status in the USA. It is considered S2 (imperiled because of rarity) in Arkansas and S? (of concern, rank not established) in Nebraska; both states are at the eastern edge of its geographic range. It is not known to have any legal designation in the USA.

Provincial Status

Brickellia grandiflora is ranked as S1 in both Alberta and British Columbia currently. It has no formal legal status in either province, although it is on the British Columbia Red List which includes species "that are candidates for legal designation as endangered or threatened species" (British Columbia Conservation Data Centre 1994).

II. Assessment of Status

12. General Assessment

Brickellia grandiflora is at the northern boundary of its range in Canada, occupies a restricted area in extreme southwestern Alberta and southeastern British Columbia, and consists of six small populations totalling about 8200 plants. About 75% of these plants occur at one locality on human-disturbed habitat. Populations in natural habitat are typically smaller, several hundred plants/locality, and occupy limited areas. The five populations within Waterton Lakes National Park do not appear to be declining currently. The status of the sixth population on British Columbia crown land is not known. Two historic localities (South Kootenay Pass and Cameron Lake) could not be relocated and these populations may be extirpated, although the precise location of these localities is unclear. The small range and population size in Canada make the species vulnerable to catastrophic disturbance in natural habitats and to both habitat change and further disturbance in human-disturbed habitats.

13. Status Recommendations

Brickellia grandiflora is recommended for status in Canada as a Vulnerable species (a species of special concern because of

characteristics that make it particularly sensitive to human activities or natural events).

14. Recommended Critical Habitat

Critical habitat for *Brickellia grandiflora* includes low elevation, seasonal stream channels, colluvial slopes, and rocky avalanche paths in Waterton Lakes National Park and adjacent southeastern British Columbia.

15. Conservation Recommendations

The author's conservation recommendations have been transmitted separately to the land management agencies involved (Parks Canada, British Columbia Ministry of Forests). All enquiries regarding these recommendations should be directed to the appropriate agency or COSEWIC and are available at the discretion of these agencies.

III. Information Sources

16. References Cited

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18. Collections Consulted

The following herbaria were checked for specimens of *Brickellia grandiflora*: ALTA (University of Alberta), CAFB (Canadian Forest Service, Edmonton), CAN (Canadian Museum of Nature, Ottawa), DAO (Centre for Land and Biological Research, Ottawa), LEA (University of Lethbridge), UAC (University of Calgary), UBC (University of British Columbia, WLNP (Waterton Lakes National Park)).

19. Field Work

Field surveys specifically for *Brickellia grandiflora* were conducted by the author in 1994 on 19 & 28 July; 9-11, 14, 27 August; and 14 & 16 September. As well, the species was looked for during the course of other fieldwork in Waterton Lakes National Park in May-September. Mieke Vander Valk, Parks Canada, Waterton Lakes National Park, conducted field surveys for this species on 22 August 1994.

20. Knowledgeable Individuals

Dr. Gerald B. Straley
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Dr. Straley has knowledge of
the cultivated plants at the
Botanical Garden.

21. Other Information Sources

Field notes and reports of Peter L. Achuff and Mieke Vander Valk are on file with Peter L. Achuff at the Warden Service, Waterton Lakes National Park.

IV. Authorship

23. Initial Authorship of Status Report

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24. Maintenance of Status Report

The report will be maintained by the author.