

DRAFT, Version 1.1

Draft Management Recommendations for
Crum's extinguisher moss
Encalypta brevicolla var. *crumiana* (Horton) Crum & Anderson

Version 1.1
November 4, 1996

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EXECUTIVE SUMMARY

Species: New classification: *Encalypta brevicolla* (Bruch, Schimper et Gumbel) Bruch ex Ångstr. subsp. *crumiana* (Horton) Crum & Anderson (*E. brevicolla* var. *crumiana* in ROD)

Taxonomic Group: Bryophyte: Moss

ROD Components: Strategies 1 and 3

Other Management Status: This species has been listed by the Oregon Natural Heritage Program as threatened with extinction throughout its entire range (List 1, 1995). It is considered a Bureau Sensitive species by the Bureau of Land Management in Oregon. It is included on a preliminary list of rare mosses submitted to the Washington Natural Heritage Program (Harpel and Gamon, pers. comm.) with suggested category S1 (critically imperiled in the state because of extreme rarity or because it is particularly vulnerable to extinction or extirpation).

Range: *Encalypta brevicolla* var. *crumiana* is an extremely rare moss, endemic to the Pacific Northwest. It has been reported from two sites in the world, both on federal lands. Specifically, it is known from Mt. Rainier National Park (Pierce County, Washington) and near Squirrel Peak in Curry County, Oregon (Siskiyou National Forest).

Specific Habitat: In Washington, it occurs in moist, protected microsites on rock outcrops, in crevices, and on ledges, wedged among stones or roots, which are otherwise relatively exposed, dry, montane, windswept sites. The Oregon locality is on a ridgeline subject to fog interception, and is partially shaded by old-growth forest.

Threats: The Mt. Rainier site is located near a campground (Longmire) and may be vulnerable to trampling and activities associated with recreation. Removal of shade and modification of the local microclimate would also threaten this species. Other threats to this species are collecting, quarrying, and air pollution.

Management Recommendations:

- C Maintain microsite characteristics and avoid disturbance at known sites, including modification of canopy and disturbance of substrate upon which the species lives.
- C Prohibit collection of bryophytes for scientific purposes at the known sites, unless specifically approved. Collection of special forest products in the vicinity of known sites should not be permitted.

Information Needs:

The two known sites should be surveyed to verify status of populations of *Encalypta brevicolla* var. *crumiana*. Once the habitat is characterized, conduct surveys to locate additional populations, under Survey and Manage Strategy 3.

I. Natural History

A. Taxonomic/Nomenclatural History

Encalypta brevicolla (Bruch, Schimper et Gümberl) Bruch ex Ångstr. subsp. *crumiana* (Horton) Crum & Anderson was described as a subspecies of *Encalypta brevicolla* by Horton (1983), then treated by Crum and Anderson (1989) as a variety. There are no additional recent synonyms. This species is placed in the order Encalyptales, family Encalyptaceae.

B. Species Description

1. Morphology (Horton 1983, Christy and Wagner 1996)

Plants of *Encalypta brevicolla* var. *crumiana* are erect, to 25 mm tall, with leaves that are light green at the shoot tips and dark green to blackish below. Leaves are contorted when dry, keeled with a prominent, shiny green or brown costa that is plainly spiny-papillose on the back toward the tip of the leaf. Leaf blades are relatively broad, oblong or obovate, hooded when dry and have cells with straight walls and simple papillae. Most leaves bear awns to 2 mm. Capsules are smooth or wrinkled with a dark red seta ranging from 2.5 to 17 mm long. Peristome teeth are # 0.4 mm long, smooth, and white to peach-colored.

Members of this genus are quite similar to each other. This variety is separated from the typical variety *E. brevicolla* var. *brevicolla* by its smooth peristome and poor ornamentation of the spores. *E. brevipes* has a short beak on the calyptra and lacks a peristome.

Figure 1. Line drawing of *Encalypta brevicolla* var. *crumiana* from Horton (1983) (to be added). (AWAITING COPYRIGHT PERMISSION)

2. Reproductive Biology

Although no specific information has been located on the reproductive biology of *Encalypta brevicolla* var. *crumiana*, some generalizations may apply to this moss. Asexual reproduction is common in most bryophytes (Wyatt and Anderson 1984) and dispersal distance may be limited even in those species which reproduce by means of spores (Stoneburner et al. 1992). While it was previously speculated that the small spores of bryophytes were widely dispersed, few spores may actually survive the atmospheric environment (Pócz and van Zanten 1991). Limited dispersal ability of bryophytes has important conservation implications. Populations may not recolonize areas readily and outcrossing opportunities may be limited. Even in

continuously distributed bryophyte taxa, it appears that gene flow may be highly restricted (Wyatt 1992).

3. Ecology

No information was located on the ecology of *Encalypta brevicolla* var. *crumiana*.

C. Range, Known Sites

This species is reported from two sites in the world. These include one in Pierce County, Washington near Longmire, Mt. Rainier National Park at 850 m elevation (2800 ft.) and one in Curry County, Oregon near Squirrel Peak at 1340 m elevation (4400 ft.). It is unknown whether these populations still exist. The date from the Mt. Rainier collection was 1937. The Squirrel Peak site was discovered in 1921 and revisited in 1978.

Figure 2. Map of known sites of *Encalypta brevicolla* var. *crumiana* (to be added).

D. Habitat Characteristics and Species Abundance

At its two known localities, this taxon grows in crevices and on ledges of igneous rocks, in partial shade and exposed locations. In Washington, it occurs in moist, protected microsites on rock outcrops, in crevices, and on ledges, wedged among stones or roots, which are otherwise relatively exposed, dry, montane, windswept sites. The Oregon locality is on a ridgeline subject to fog interception, and is partially shaded by old-growth forest. Associated species include *Drytodon patens*, *Claopodium bolanderi*, *Cheilanthes gracillima* and *Sedum*. Expected elevations for this species would range from 760 to 1370 m (2,500 to 4,500 ft.).

II. Current Species Situation

A. Why Species is Listed under Survey and Manage Standards and Guidelines

Encalypta brevicolla var. *crumiana* is known only from two widely separated sites in Oregon and Washington. It was not rated by the panels during the Forest Ecosystem Assessment Team (FEMAT) process because of limited information. It is considered threatened with extinction or presumed extinct throughout its entire range by the Oregon Natural Heritage Program. Because it is endemic to the Pacific Northwest and appears to be very rare, this species was included under Survey and Manage Strategy 1 and 3 in the Record of Decision (USDA and USDI 1994). The basis for its inclusion was to maintain species viability and to conduct inventories to determine the actual extent of its range, abundance, and associations. While FEMAT bryophyte viability panel members felt that it met the criteria for being closely associated with late-successional and old-growth forests, it is unknown what habitat characteristics necessary for this species are provided by old-growth forests. The degree of association with old-growth forest warrants further investigation.

This species is believed to be at high risk due to the uncertainty that viable populations still exist within the area of consideration. The Mt. Rainier population is located near a campground (Longmire) and may have been impacted by recreational use or development since the time of the original collection in 1931.

B. Major Habitat and Viability Considerations

The major viability considerations for *Encalypta brevicolla* var. *crumiana* are loss of populations due to management activities which directly impact the habitat or population.

C. Threats to the Species

The Mt. Rainier site is located near a campground (Longmire) and may be vulnerable to trampling and activities associated with recreation. Modification of the local microclimate would also threaten this species. Other threats to this species are collecting, quarrying, and air pollution. Although the sensitivity of this taxon to air pollution is unknown, bryophytes are particularly vulnerable on fog-drenched ridges because aerosols concentrate pollutants.

D. Distribution Relative to Land Allocations

Both known sites are located on federal land. The Washington site is in Mt. Rainier National Park and the Squirrel Peak site appears to fall within Matrix lands on Siskiyou National Forest.

III. Management Goals and Objectives

A. Management Goals for the Taxon

The goal for the management of *Encalypta brevicolla* var. *crumiana* is to assist in maintaining species viability.

B. Specific Objectives

- C Maintain microsite characteristics at known sites, including temperature, moisture, and shade, and avoid disturbance of substrate upon which the species lives.
- C Minimize recreational impacts at the Longmire site in Mt. Rainier National Park.

IV. Habitat Management

A. Lessons from History

No information is available at this time.

B. Identification of Habitat Areas for Management

The only known sites for this species are near Squirrel Peak (Siskiyou National Forest, Curry County, Oregon) and near Longmire, Mt. Rainier National Park (Pierce County, Washington). Once these population are relocated, the habitat area will be defined as an area surrounding the *Encalypta brevicolla* var. *crumiana* populations which is large enough to maintain the microclimate at the site. If additional populations of *Encalypta brevicolla* var. *crumiana* are

located, management guidelines described below apply to the site.

C. Management within Habitat Areas

Determine if recreation is impacting populations and take appropriate actions to prevent impacts. Protect known sites by maintaining microsite characteristics and avoiding disturbance, including modification of the canopy at the site and within a zone around the site which could alter microsite conditions (see Chen et al. 1993, 1995). Trees should be left for shade and to retain temperature and moisture regimes at known sites. Removal of canopy shade may result in replacement by more drought-tolerant bryophytes and vascular plants typical of exposed rock outcrops. Maintain windfirm buffers along fog-drenched ridges to maintain conditions for reproduction and dispersal near known sites.

No collection of bryophytes for scientific purposes shall be permitted at the known sites unless specifically approved after consideration to ensure species persistence at the site. It may be difficult to protect this species from accidental collection elsewhere, since many other species resemble it in the field. It is not anticipated that collection of bryophytes as special forest products would impact this species, as it has been reported only from rock substrates. Limitation of special forest product harvest in the vicinity of known sites should be done according to the recommendations of the botanist/ecologist.

D. Other Management Issues and Considerations

Air quality is a concern for bryophytes in general, although the level of air pollution at the Siskiyou site may not be a concern at this time. The Mt. Rainier site is probably affected by pollution from the Seattle area.

The small size of bryophytes allows many individuals to exist within a small area (Wyatt 1992). As long as the microsite conditions are maintained, it may be preferable to maintain numerous smaller reserves rather than a few larger ones, to better capture their genetic diversity.

V. Research, Inventory and Monitoring Needs

A. Data Gaps and Information Needs

Initial efforts should focus on gathering additional information on associated species, habitat, and ecology in order to characterize suitable habitat. Habitat similar to that occurring at the two known sites should be surveyed.

The two known sites should be surveyed to verify status of populations of *Encalypta brevicolla* var. *crumiana* and once the habitat is characterized, surveys conducted to locate additional populations, under Survey and Manage Strategy 3. Locating populations within late-successional reserves, Research Natural Areas and other withdrawn areas would be a high priority. Location of additional populations would relieve concerns about stochastic events that could result in extirpation of extinction of this species.

B. Research Questions

- C What ecological factors characterize the habitat of *Encalypta brevicolla* var. *crumiana* ? Specifically, what is the degree of association with late-successional and old-growth forests?
- C What are factors limiting to *Encalypta brevicolla* var. *crumiana*?
- C How different genetically is *Encalypta brevicolla* var. *crumiana* from the common variety?
- C Assuming populations are relocated, how do populations at Squirrel Peak and Mt. Rainier differ genetically? What can we learn about dispersal from this information?

C. Monitoring Needs and Recommendations

None identified at this time. Once populations are located, a standardized monitoring strategy should be developed to document population trends.

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