

DRAFT, Version 1.1

Draft Management Recommendations for
little brownwort
Tritomaria exsectiformis (Breidl.) Schiffn.

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EXECUTIVE SUMMARY

Species: *Tritomaria exsectiformis* (Breidl.) Schiffn. (little brownwort)

Taxonomic Group: Bryophyte: Liverwort

ROD Components: 1,2

Other Management Status: The Oregon Natural Heritage Program considers *Tritomaria exsectiformis* to be threatened with extirpation within the state of Oregon (List 2, 1995). The Bureau of Land Management includes this taxon on the Bureau Assessment list for Oregon.

Range: *Tritomaria exsectiformis* is known from two sites in Oregon, Deschutes county (Deschutes National Forest), and from one site in Washington, Okanogan county (Okanogan National Forest) which is several miles outside the range of the northern spotted owl.

Specific Habitat: This species occurs in shady, cool, moist sites. More specifically, they have been found in riparian areas on wet soil banks, especially near spring heads; on decaying logs and associated humus; on cliffs, ledges, and rock crevices where covered with thin, peaty, acidic soils. In Oregon, *Tritomaria exsectiformis* occurs on peaty soil near middle elevation, coldwater streams.

Threats: This species had the lowest rating of any species rated by FEMA panels. Trampling by recreationists and livestock in riparian areas are considered the primary threats to this species. Upstream activities could damage downstream populations if water levels changed or if water chemistry changed as from more than occasional livestock excrement. Logging, road construction, campground construction, and collection of special forest products in the vicinity of known sites pose additional threats.

Management Recommendations:

- C Maintain shade and cool, moist habitat for this species at known sites.
- C Avoid disturbance of substrate upon which it lives.
- C Minimize impacts from trampling by livestock and recreationists.
- C Restrict scientific and special forest product collection unless approved with specific guidelines.

Information Needs:

- C Conduct inventory, particularly in late-successional reserves, Research Natural Areas and other withdrawn areas to locate additional populations.
- C Determine distribution of populations, species abundance, and ecological requirements.
- C Determine rates of growth, and mechanisms of dispersal and reproduction.

I. Natural History

A. Taxonomic/Nomenclatural History

Tritomaria exsectiformis (Breidl.) Schiffn. has been previously placed within the genera *Jungermannia*, *Diplophyllum*, *Sphenolobus*, and *Lophozia*. It has no recent synonyms. Although it is separable from related *T. exsecta* only under the microscope, it is difficult to confuse with other species (Schuster 1969). It is placed in the class Jungermanniales, family Jungermanniaceae (Stotler and Crandall-Stotler 1977).

SYNONYMY:

Jungermannia exsecta of Hooker, Brit. Jungerm. Pl. 19 1816, and (in part) of numerous other authors before 1893 (not of Schmidel, Icones Pl. et Anal. Part. ed. 2:241, 1797).

Jungermannia exsectaeformis Breidl., Mitt. Naturw. Ver. Steiermark 30:321, 1894.

Diplophyllum exsectiforme Warnst., Krypt.-Fl. Mark Brandenburg 1:161, 1902

Sphenolobus exsectaeformis Steph., Spec. Hep. 2:170, 1902

Sphenolobus (subg. *Tritomaria*) *exsectiformis* K. Müll., Rabenh. Krypt.-Fl. 6(1):609, fig. 295, 1910; Macvicar, Studs. Hdb. Brit. Hep. ed. 1:211, figs. 1-4, 1912 (ed. 2:217, figs. 1-4, 1926)

Lophozia exsectiformis Boulay, Musc. France 2:92, 1904.

Tritomaria exsectiformis Schiffn., Ber. Naturw. Ver. Innsbruck 31:12, 1908; Loeske, Hedwigia 49:13, 1909-1910; Buch, Mem. Soc. F. et Fl. Fennica 8 (1932):285, dif. I:35, 1933; K. Müller, Rabenh. Krypt.-Fl. ed. 3, 6(I):738, fig. 241, 1954.

Tritomaria (subg. *Eutritomaria*) *exsectiformis* Schust., Amer. Midl. Nat. 45(1):65, pl. 23, 1951; Schuster, *ibid.* 49(2):378, pl. 26, 1953.

B. Species Description

1. Morphology (Frye and Clark 1945:118, Schuster 1953:378, Schuster 1969:653, Smith 1990:128)

Tritomaria exsectiformis is a pale green to yellowish-brown leafy liverwort that grows in small tufts among other liverworts and mosses. It has two rows of concave to canaliculate (channeled) asymmetrical leaves, which are 2 to 3-lobed. The dorsal lobe is slender and divergent, positioned no more than two-thirds of the length of the strongly arched and dilated ventral lobe. Numerous rust-red to brownish masses of polygonal, angular gemma are present at the shoot tips. Underleaves are lacking. Capsules are rare.

This species is very similar to *T. exsecta*, which can be distinguished by the smooth, ovoid gemma. Gemmae of *Tritomaria quinquedentata* are angular, polygonal to pyriform. *Lophozia longidens* also has dark reddish-brown gemmae, but *Tritomaria exsectiformis* differs in its asymmetric, three-lobed leaves (Vitt et al. 1988).

2. Reproductive Biology

Plants of *Tritomaria exsectiformis* are usually sterile, but reproduce by means of gemmae. Like all bryophytes, it requires water for sexual reproduction. Sporophytes are rare.

3. Ecology

According to Schuster (1969), throughout its range *Tritomaria exsectiformis* may be found under a rather wide variety of conditions, from decaying logs to thin, peaty soil over cliffs. It appears to be intolerant of pH above 6.5. It prefers substrates of humus and detritus in rock crevices and fissures, occurring less frequently on rock and bark. When it occurs on logs, it is not an early colonizer, but may persist until the logs virtually disintegrate to humus. In at least certain portions of its wide range, *Tritomaria exsectiformis* has a rather high tolerance for direct sunlight and moderate tolerance for intermittent moisture conditions (Schuster 1964). This statement may be based on non-United States populations so these conditions may not be appropriate in our range. However, the ecological amplitude of the populations at the known sites in the Cascade Range may differ considerably from those observed by Schuster.

C. Range, Known Sites

Tritomaria exsectiformis is known from two known sites in Deschutes county, Oregon (Deschutes National Forest) and from one site in Okanogan county, Washington (Okanogan National Forest), which is immediately outside the range of the northern spotted owl. In western North America, it is distributed sporadically from Yukon-Alaska south through the Rocky Mountains to Colorado. It is reported to be common in eastern North America. It is also known from Europe, where it extends eastward into Siberia.

D. Habitat Characteristics and Species Abundance

This species occurs in shady, cool, moist sites. More specifically, it occurs in forests along riparian areas on wet soil banks, especially near spring heads; on decaying logs and associated humus; on cliffs, ledges, and rock crevices where covered with thin, peaty, acidic soils at a wide range of elevations. In Oregon, *Tritomaria exsectiformis* occurs in mixed coniferous forests on peaty soil next to middle elevation, coldwater streams. Hong reports that in British Columbia and the interior it also occurs on trunks and branches of hardwoods, including the genera *Malus* and *Alnus*. According to Hong (1994) this species occurs in forests on creek banks, decayed wood and on humus over decayed wood. Elevation at one known site is 975 m (3200 ft.).

II. Current Species Situation

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

The panels convened by the Forest Ecosystem Assessment Team included *Tritomaria exsectiformis* in the group of rare species rated individually. Of all the species rated during this process, it received the lowest rating, with no likelihood of being well-distributed throughout its range, 30 percent likelihood of being locally restricted, 40 percent likelihood of restriction to refugia, and 30 percent likelihood of becoming extirpated on Federal lands. At the time of the panels, the two known populations were both considered to be at risk from recreational impacts.

Because inventories have not been done for this species, it was thought that it may occur in more locations, so extirpation risk was assessed based on this assumption.

B. Major Habitat and Viability Considerations

C. Threats to the Species

Bryophytes are sensitive to changes in the chemistry of their environment, which includes more than occasional excrement in water. Trampling by recreationists and livestock in riparian areas is the greatest threat to this species. The Tumalo Falls site is located near or within the Tumalo Campground which may be at risk of inadvertent trampling by recreationists. Upstream activities could damage down stream populations if water levels changed (siltation, flooding and scouring, or dewatering of stream banks.)

Managing known sites and conducting surveys, applying riparian reserves, protecting sites from grazing, and manage recreation areas to minimize disturbance were mitigation measures proposed to reduce threats to *Tritomaria exsectiformis* (USDA and USDI 1994). While these mitigation measures would benefit this species, viability would remain at risk in the range of the northern spotted owl.

D. Distribution Relative to Land Allocations

The Tumalo Falls site is located on Deschutes National Forest, near Tumalo Campground. The site near the head of Jack Creek is also on Deschutes National Forest in land designated as Late-successional Reserve.

III. Management Goals and Objectives

A. Management Goals for the Taxon

The goal for the management of *Tritomaria exsectiformis* is to assist in maintaining species viability.

B. Specific Objectives

- C Maintain microsites conditions at known sites, especially wet soil banks along riparian areas and cool spring heads.
- C Maintain integrity of substrates upon which it lives at known sites and avoid compaction and other disturbance from grazing and trampling (human or other animal).
- C Maintain adequate abundance of plants at all known sites to ensure continuation of populations.

IV. Habitat Management

A. Lessons from History

There is a considerable literature on the decline of bryophytes in Europe. Rapid decreases and

fragmentation of primeval forests have caused a serious threat to bryophytes (Laaka 1992). In addition, air pollution (particularly sulphur compounds in combination with low pH) and acid rain are implicated in declines of bryophytes (Hallingbäck 1992, Rao 1982). The extinction rate and rates of decline are high in areas where trends are documented (Greven 1992, Hallingbäck 1992). Factors associated with logging that cause declines in bryophytes include the temperature extremes and the drying effect of increased wind, the lowering of surface water, and drying of logs, reduction in amount of coarse woody debris substrate, increased dispersal distance between fragments of primeval forest (Laaka 1992). Increased urea (from livestock grazing) raises substrate pH has a negative effect on some bryophytes (Dirkse and Martakis 1992). In the case of the two known sites of *Tritomaria exsectiformis*, which are apparently subject to trampling by livestock, the effects of cattle may be compounded.

B. Identification of Habitat Areas for Management

The two known sites occur on the Deschutes National Forest and are both identified for management. In addition, any new sites which are discovered will be included in habitat areas for management. Because there are so few known sites, it is recommended to not experiment with management variations until many more sites are found.

C. Management within Habitat Areas

- C Maintain microsite conditions by retaining shade, and cool, moist conditions associated with decaying logs, riparian areas, cool spring heads, and associated wetlands.
- C Because bryophytes may be sensitive to more than occasional livestock manure and associated trampling, known sites should be managed to reduce these impacts. Specifically, fencing of known sites at the Head of Jack Creek and Tumalo Falls to reduce trampling by livestock and recreationists is recommended.
- C Avoid disturbance of substrate upon which it lives.
- C Avoid trampling associated with recreation use.
- C Restrict scientific and special forest product collection unless approved with specific guidelines

D. Other Management Issues and Considerations

This species cannot be distinguished from *T. execta* in the field and requires a microscope for identification.

V. Research, Inventory and Monitoring Needs

A. Data Gaps and Information Needs

It is likely that additional sites of this species will be located once inventories are initiated. Initial surveys should focus on cold springs and headwaters. The areas on the Okanogan National Forest near Winthrop within the range of the northern spotted owl, the Deschutes and Willamette National Forests, and the Eugene District BLM may be high priority areas for preliminary surveys. Ecological data should be collected in conjunction with surveys to further characterize the habitat.

B. Research Questions

- C What is the ecological amplitude of *Tritomaria exsectiformis* in the Pacific Northwest?
- C How does it compare with populations in other portions of its global range?
- C What are the effects of urea on this species? (This information could aid in evaluating the effect of livestock on *Tritomaria exsectiformis*).

C. Monitoring Needs and Recommendations

- C Monitor the effectiveness of mitigation (including the installation and maintenance of fences surrounding known sites).
- C Monitor population trends after mitigation to determine if populations increase, decline, or remain stable.

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