

**Conservation Assessment
for**

***Tritomaria exsectiformis* (Breidl.) Schiffn.**



Photo by Rick Dewey

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Judith A. Harpel Ph.D. and Rick Dewey Ph.D.

**USDA Forest Service Region 6 and
USDI Bureau of Land Management, Oregon and Washington**

Preface:

Converting Survey and Manage Management Recommendations into Conservation Assessments
Much of the content in this document was included in previously transmitted Management Recommendations developed for use with Survey and Manage Standards and Guidelines. With the removal of those Standards and Guidelines, the Management Recommendations have been reconfigured into Conservation Assessments to fit Special Status/Sensitive Species Program (SSSSP) objectives and language. Changes include: the removal of terminology specific to Survey and Manage Standards and Guidelines, the addition of Oregon Natural Heritage Information Center ranks for the species, and the addition of USDA Forest Service and USDI Bureau of Land Management (BLM) Special Status/Sensitive Species status and policy. Habitat, range, and taxonomic information have also been updated to be current with data gathered since the Management Recommendations were initially issued. This document does conform to recently adopted standards for the Forest Service and BLM for Conservation Assessment development in Oregon and Washington.

Assumptions about site management

In the Final Supplemental Environmental Impact Statement (FSEIS) (USDA and USDI 2004a) and Record of Decision (ROD) to Remove or Modify the Survey and Manage Standards and Guidelines (USDA and USDI 2004b), assumptions were made as to how former Survey and Manage species would be managed under Agency Special Status/Sensitive Species policies. Under the assumptions in the FSEIS, the ROD stated “The assumption used in the final SEIS for managing known sites under the Special Status Species Programs was that sites needed to prevent a listing under the Endangered Species Act would be managed. For species currently included in Survey and Manage Categories A, B, and E (which require management of all known sites), it is anticipated that only in rare cases would a site not be needed to prevent a listing.... Authority to disturb special status species sites lies with the agency official who is responsible for authorizing the proposed habitat-disturbing activity.” This species was in Category B at the time of the signing of the ROD, and the above assumptions apply to this species’ management under the agencies’ SSSSP.

Management Considerations

“Management Considerations” are discussed within the “Conservation” section of this document. “Management Considerations” are actions and mitigations that the deciding official can utilize as a means of providing for the continued persistence of the species’ site. These considerations are not required and are intended as general information that field level personnel could utilize and apply to site-specific situations. Management of the species covered in this Conservation Assessment follows Forest Service 2670 Manual policy and BLM 6840 Manual direction. (Additional information, including species specific maps, is available on the Interagency Special Status and Sensitive Species website.)

Executive Summary

Species and Taxonomic Group

Tritomaria exsectiformis (Breidl.) Schiffn. Bryophyte

Management Status

The Oregon/Washington Bureau of Land Management considers this species a Bureau Assessment species (<http://www.or.blm.gov/issp/>). Currently there is no ranking for this species in Washington. In Oregon it is ranked G5, S2 and is on List 2 by the Oregon Natural Heritage Information Center (<http://oregonstate.edu/ornhic/data/nonvasc.html>). This species is not on the Region 6 U.S. Forest Service Sensitive Species list.

Range & Habitat

Tritomaria exsectiformis is an arctic-alpine, circumboreal species that is missing in Eastern Asia. Within Western North America it is known from Alaska, British Columbia, Colorado, Idaho, Montana, Oregon, Washington and Wyoming. Currently all occupied sites within Oregon and Washington occur on U.S. Forest Service lands. Typically, its habitat is open to shaded coniferous forest, in association with low volume, perennial water flow at or near springs and seeps, along very gentle topographic gradients. Substratum is most commonly decay class four, occasionally decay class three or five, down wood that generally is indirect contact with water.

Threats

There are potentially direct and indirect impacts that may occur to this species. Direct impacts result in the degradation or destruction of individuals or populations of *T. exsectiformis* from recreational trampling, fire, water development for wildlife or livestock, over collection of material, and road or trail construction. Because this species requires hydrologic stability (low, steady flow, no scouring) and substratum that will serve as wicks from a constant supply of water, changes in hydrology could result in the loss of populations. Indirect impacts include: upstream activities that would alter the hydrology of a stream system or cause high volume scouring flows.

Management Considerations

Consider limiting local fuels reduction activities such as thinning, mowing, and prescribed burning that could impact occupied sites.

Avoid using wetting agents or chemicals other than water in or near occupied sites during fire suppression activities.

Promote a continued recruitment of mixed diameter classes of down logs in the vicinity of occupied sites.

Avoid grazing and recreational activities around an occupied site.

Avoid management activities that would alter the hydrology of an occupied site.

Limit collection of this species.

Research, Inventory, and Monitoring Opportunities

Conduct purposive surveys to provide a better understanding of the range and distribution of *T. exsectiformis*.

How long does a species persist at a site?

How is *T. exsectiformis* dispersed, by gemmae or shoot fragments?

What substratum conditions are most likely to allow successful colonization by propagules?

Annual monitoring of selected sites would allow an increased understanding of the length of persistence.

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Introduction

Goal

The goal of this Conservation Assessment is to summarize existing knowledge regarding the biology and ecology of *Tritomaria exsectiformis*, threats to the species, and management considerations to provide information to line managers to assist in the formation of options for management activities. This species is of concern due to limited distribution within Oregon and Washington. Federal management for this species follows Forest Service Region 6 Sensitive Species (SS) policy, and/or Oregon/Washington Bureau of Land Management Special Status Species (SSS) policy.

For Oregon and Washington BLM administered lands, SSS policy details the need to manage for species conservation. Conservation is defined as the use of all methods and procedures that are necessary to improve the condition of SSS and their habitats to a point where their Special Status recognitions are no longer warranted. Policy objectives also state that actions authorized or approved by the BLM do not contribute to the need to list species under the Endangered Species Act.

For Region 6 of the Forest Service, SS policy requires the agency to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands. Management “must not result in a loss of species viability or create significant trends toward federal listing” (FSM 2670.32) for any identified SS.

Scope

The geographic scope of this assessment includes consideration of the known and suspected range of the species, within the Pacific Northwest. An emphasis of species considerations is provided for federal lands in Oregon and Washington; however, species-knowledge compiled from non-federal lands is included as it is relevant to the overall conservation of the species. A summary of known or suspected threats is listed but may change with time. Management considerations apply to localities, within Oregon and Washington. The uncertainty caused by management actions for *T. exsectiformis* is not clearly known at this time and management activities within the habitat of this species may increase the uncertainty.

Management Status

Tritomaria exsectiformis was originally rated under FEMAT, (Thomas et al 1993) and was placed in Categories 1 and 2 under the original Record of Decision (USDA, USDI 1994). In 2001 it was placed in Category B (USDA, USDI 2001). According to NatureServe (2004) the global rank for *T. exsectiformis* is G5. In Oregon it is ranked S2 and is on List 2 by the Oregon Natural Heritage Information Center (2004). The Oregon/Washington Bureau of Land Management considers it a Bureau Assessment species. Currently there is no ranking status for this species in Washington and it is not on the USFS Sensitive Species list.

Classification and Description

Systematics and synonymy

Tritomaria exsectiformis (Breidl.) Schiffn. Was previously known as *Sphenolobus exsectiformis* (Breidl.) Steph.

Species Description

Tritomaria exsectiformis is a small 1.0-2.0 mm wide, green to brownish-green, liverwort. Shoots are ascending to erect, unbranched or little branched, in pure patches or intermixed with other liverwort species. Leaves are generally longer than wide, more or less transversely inserted, typically asymmetrically 2-3 lobed, lobes acute, the dorsal lobe small, tooth-like, often appearing remote from the ventral 1 or 2 lobes. Leaf cells are thin-walled with bulging trigones and 7-15 oil bodies per cell. Underleaves are absent. When plants are in pure patches, abundance of red gemmae can give a reddish cast to the patches, causing them to contrast with the green of adjacent liverwort species.

Biology and Ecology

Life History and Reproductive Biology

Tritomaria exsectiformis is dioicous, and rarely produces sporophytes. Perianths are cylindrical to cylindrical-clavate, strongly 4-5 plicate above and contracted to mouth, the mouth lobed and ciliate or sharply toothed. Rusty-red, (1)-2 celled, angular gemmae are often abundant on the lobes of the upper leaves. Given the apparent infrequency of sporophyte production in this species, gemmae or vegetative fragmentation appears to be the principal means of local dispersal and establishment. Moving water and possibly, invertebrates, are probable dispersal vectors.

Range, Distribution and Abundance

Tritomaria exsectiformis is an arctic-alpine, circumboreal species that is missing in Eastern Asia. Within Western North America it is known from Alaska, British Columbia, Colorado, Idaho, Montana, Oregon, Washington and Wyoming. In Oregon it occurs on the Deschutes National Forest, (Deschutes and Jefferson Counties) and on the Umpqua National Forest, (Douglas County). Recently a new site was located on the Olympic National Forest, (Clallam Co.) near Sequim, Washington. In eastern Washington there are sites on the Okanogan-Wenatchee National Forest (Okanogan County) and on the Colville National Forest (Stevens County).

Population Trends

Most Oregon and Washington *T. exsectiformis* sites exist within riparian plant communities appearing to be stable in both structure and composition. Certainly, this is due in part to the hydrologic stability at most of these sites. Seasonal, high volume, scouring flows are never evident at *T. exsectiformis* sites.

It seems reasonable to suppose that natural fire has tended to limit the persistence of *T. exsectiformis* on a very local scale. It is also an important to note that the substrate for *T. exsectiformis*, rotten wood, is susceptible to destruction by fire. It is unknown the degree to which the riparian zones in which *T. exsectiformis* typically occurs can buffer the species from the damaging effects of fire. Studies of fire history in a variety of

vegetation types on the eastern side of the Oregon Cascades document fire return intervals consistently under fifty years and often less than 15 years (McNeil and Zobel, 1980; Bork, 1984). The small cross-sectional extent of many of the *T. exsectiformis* sites would appear to make them susceptible to damage or destruction by intense fires that could occur in the fuel-rich upland plant communities that often exist nearby.

Essentially no information is available concerning the types of interactions that occur between *T. exsectiformis* and other members of the biological communities where it is found. Unlike in the genus *Lophozia*, subgenus *Lophozia*, stem anatomy in the genus *Tritomaria* provides no evidence of a mycorrhizal relationship. *T. exsectiformis* seemingly never exists as a sole leafy liverwort species intermixed with mosses or other small plants. The plants generally occur, whether as a species-pure patch or intermixed, as part of a diverse assemblage of other leafy liverwort species. The extent of possible competition between different leafy liverwort species in these assemblages is unknown. It frequently appears that these leafy liverwort assemblages are collectively competing with local moss species for space on suitable substratum.

Habitat

Within the Pacific Northwest this species is currently known from mid-elevational (3200-5200 feet) riparian zones. Typically, its habitat is open to shaded coniferous forest in association with low volume, perennial water flow at or near springs and seeps, along very gentle topographic gradients. Lodgepole pine (*Pinus contorta*) is present at nearly all sites of *T. exsectiformis* within the Oregon and Washington Cascades. Other tree species occurring at these sites include white fir, ponderosa pine, Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tusga heterophylla*), mountain hemlock (*Tusga mertensiana*), and subalpine fir (*Abies lasiocarpa*). Currently, all but one of the *T. exsectiformis* sites in the Oregon and Washington Cascades occur within spring-fed hydrologic systems.

Substratum is most commonly decay class four, occasionally decay class three or five, down wood that generally is in direct contact with water. Plants have been documented to occur on a "small twig" hanging over water, and may also occur on rotten limbs as small as three inches in diameter. Generally, however, the woody substratum is rotten logs that are 10+ inches in diameter. Plants may also occur on wet, peaty soil beside spring-fed creeks. Key habitat elements appear to be hydrologic stability (low, steady flow, no scouring) and substrates that will serve as wicks for a water supply that is continuously available during the snow-free period of the year. It may also be significant that the surface water associated with *T. exsectiformis* locations, being generally spring-fed, is usually very cold. A fairly broad range of sunlight (amount direct light vs. diffuse light or shade) appears to be tolerated as long as these hydrologic and substrate conditions are met. It is notable that the microsite conditions observed at the Cascade *T. exsectiformis* sites within Oregon and Washington appear to differ markedly from those described for this species in British Columbia. In southwestern British Columbia, Godfrey (1977) found *T. exsectiformis* "growing on humus over rotting logs, boulders, and in outcrop crevices. Substrate dry to mesic, partially shaded."

Ecological Considerations

Several studies have attempted to determine which microclimatic variables correlate with plant distribution in order to determine what factors drive habitat preferences for bryophytes. The most significant factors appear to be water availability and evaporation (Busby et al. 1978, Foote 1966, Potzyer 1939, Zehr 1977, and Clausen 1952).

Temperature and light intensity may also play an important role (Busby et al. 1978, Seltzer and Wistendale 1971). A combination of environmental variables including pH, relative humidity, temperature, potential evapo-transpiration rate, and water availability all play important roles in defining where a species may occur.

Because bryophytes lack roots and have leaves that are usually only one cell layer thick they are extremely sensitive to desiccation. According to Proctor (1982) some species found in moist habitats are always killed from even slight drying, while other species that have adapted to arid environments can tolerate high temperatures for short periods. It has been demonstrated that the lethal temperatures for moister habitat species are generally around 40° C – 50° C (Proctor 1982). Therefore direct contact with fire or the heat generated by a fire may lead to the loss of individuals.

Conservation

Threats

There are potentially direct and indirect impacts that may occur to this species. Direct impacts result in the degradation or destruction of individuals or populations of *T. exsectiformis* from recreational trampling, fire, water development for wildlife or livestock, over collecting of material, road and trail construction. Because this species requires hydrologic stability (low, steady flow, no scouring) and substratum that will serve as wicks from a constant supply of water, changes in hydrology could result in the loss of populations. Indirect impacts include: upstream activities that would alter the hydrology of a stream system or cause high volume scouring flows.

Conservation Status

For *T. exsectiformis*, several environmental factors appear to be critical to local persistence. These factors include 1) local availability of colonizeable substratum, 2) future recruitment of colonizeable substratum, 3) threat of fire, and 4) stability of flow of local surface water. Although *T. exsectiformis* is known to occur on peaty substratum, it typically is found on rotting wood. Because rotting wood is a short-lived substratum, recruitment of local, colonizeable substratum (i.e., down logs) will determine persistence of this species at the site into the near future. Fire and hydrology are critical environmental factors that are associated with a high degree of uncertainty. The Bridge Creek *T. exsectiformis* site on the Deschutes National Forest may represent the only local *T. exsectiformis* colony to survive the high severity, 3,300 acre Bridge Creek Fire in 1979. Severe reduction in spring flow at another *T. exsectiformis* site on the Deschutes National Forest appears to have resulted in a complete loss of *T. exsectiformis* at that location.

Known Management Approaches

There were no prior management approaches applied to this species

Management Considerations

Below are options to consider if managing a site for continued persistence:

- Consider limiting local fuels reduction activities such as thinning, mowing, and prescribed burning that could impact occupied sites.
- Avoid using wetting agents or chemicals other than water in or near occupied sites during fire suppression activities.
- Promote a continued recruitment of mixed diameter classes of down logs in the vicinity of occupied sites.
- Avoid grazing and recreational activities around an occupied site.
- Avoid management activities that would alter the hydrology of an occupied site.
- Limit collection of this species.

Research, Inventory and Monitoring Opportunities

- Conduct purposive surveys to provide a better understanding of the range and distribution of *T. exsectiformis*.
- How long does a species persist at a site?
- How is *T. exsectiformis* dispersed, by gemmae or shoot fragments or both?
- What substratum conditions are most likely to allow successful colonization by propagules?
- Annual monitoring of selected sites would allow an increased understanding of the length of persistence.

Definitions

Natureserve G5. Globally, demonstrably widespread, abundant, and secure.

Oregon Natural Heritage Information Center S2. Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.

Oregon Natural Heritage Information Center List 2. Contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. They can be very significant when protecting the genetic

diversity of a taxon. ORNHIC regards extreme rarity as a significant threat and has included species which are very rare in Oregon on this list.

Site (Occupied). The location where an individual or population of the target species (taxonomic entity) was located, observed, or presumed to exist and represents individual detections, reproductive sites, or local populations. Specific definitions and dimensions may differ depending on the species in question and may be the area (polygon) described by connecting nearby or functionally contiguous detections in the same geographic location. This term also refers to those located in the future. (USDA, USDI 1994). Other terms such as known site, species location, and element occurrence are included in this definition.

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