

# ***Botrychium crenulatum*** W.H. Wagner

crenulate moonwort

Ophioglossaceae (Adder's Tongue Family)

**Status:** State Sensitive, USFWS Species of Concern

**Rank:** G3S3

**General Description:** From Wagner and Wagner (1993): Trophophore stalk <math>1/16</math> to  $1/4$  inch. Blade yellow-green, oblong, 1-pinnate to  $2\frac{1}{2}$  by  $3/4$  inch, thin herbaceous. Pinnae to 5 pairs, spreading, well-separated, distance between 1<sup>st</sup> and 2<sup>nd</sup> pinnae not or slightly more than between 2<sup>nd</sup> and 3<sup>rd</sup> pairs. Basal pinna pair approximately equal in size and cutting to adjacent pair, broadly fan shaped, undivided to tip, margins mainly crenulate to dentate. Proximal pinnae with 1 or more shallow incisions, apex rounded, apical lobe linear to linear cuneate, well separated from adjacent lobes, venation like ribs of fan, midrib absent. Sporophores 1-2 pinnate, 1 to 3 times the length of the trophophore.

**Identification Tips:** It looks very similar to *B. manganense*, *B. lunaria* and *B. ascendens*. It may be easily confused with *B. manganense*, although the segment margins of *B. crenulatum* are usually wavy. According to Wagner (1991), it looks like a small *B. lunaria* but has a thinner texture, is pale green, and has non-overlapping segments at the tip of the blades.

**Phenology:** Sporophores are present July-September. Leaves appear in mid to late spring; die-back occurs in late summer.

**Range:** Scattered distribution in the western United States, known to occur sporadically in Arizona, California, Idaho, Montana, Oregon, Nevada, Utah, Washington and Wyoming. In Washington, the species is reported from Okanogan, Ferry, Stevens and Pend Oreille counties in the Okanogan Highlands and the Eastern Cascades physiographic provinces.

**Habitat:** In the Okanogan Highlands physiographic province, *B. crenulatum* occurs in moist areas such as moist meadows, along the margins of perennial or intermittent streams, and in seeps. It generally occurs in western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and Englemann spruce (*Picea engelmannii*) forests with greater than 70% canopy cover. Elevation ranges from 2000 to 5200 feet. In the Eastern Cascades physiographic province, the taxon occurs in moist openings and seeps, as well as near intermittent and perennial streams in western redcedar and western hemlock forests over 100 years old. Elevations range from 3000 to 5500 feet.

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**Ecology:** *B. crenulatum* may tolerate low intensity fire if the fire occurs after sporulation in late summer or early fall. Spring and summer burning would likely have adverse impacts.

**State Status Comments:** There are more than 80 occurrences in Washington, but most have fewer than 20 plants reported.

**Inventory Needs:** Additional surveys are needed throughout the species' range in order to better assess its distribution and abundance.

**Threats and Management Concerns:** Threats to the taxon include timber harvest and associated road building and erosion, and changes in soil moisture levels.

## **References:**

- Lellinger, D.B. 1985. *A Field Manual of the Ferns & Fern-Allies of the United States & Canada*. Smithsonian Institution Press, Washington, D.C.
- Wagner, D. 1991. Guide to the species of *Botrychium* in Oregon. Preliminary draft. Unpublished report. n.p.
- Wagner, W.H. Jr., and F.S. Wagner. 1981. New species of Moonworts, *Botrychium* subg. *Botrychium* (Ophioglossaceae), from North America. *Amer. Fern Journal* 71(1): 20-30.
- Wagner, W.H. Jr., and F.S. Wagner. 1993. *Flora of North America, Volume 2: Pteridophytes and Gymnosperms*. Treatment of the Ophioglossaceae Family. pp. 85-106.

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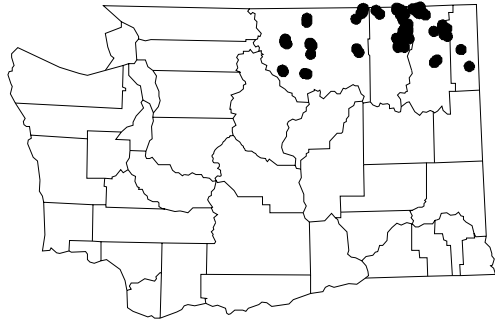
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Source of illustration, David Wagner,  
"Wagners 1991 Willamette Valley, Nature Calendar." 1990.  
NW Botanical Institute, Eugene OR 97403

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Known distribution of  
*Botrychium crenulatum*  
in Washington



- Current (1980+)
- Historic (older than 1980)

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Photo by Kirk Larson, USFS



Photo by Steve Wirt

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