

Botrychium ascendens W. H. Wagner**UPSWEPT MOONWORT**

FAMILY: *Ophioglossaceae*, the adder's-tongue family. **SYNONYMS:** *Botrychium lunaria* var. *onondagense* (misapplied)

STATUS: **Heritage Program SENSITIVE LIST, ranks: G2G3 S1**

USFWS/ESA: species of concern. **STATE OF NEVADA:** none. **BLM:** none. **USFS:** Humboldt-Toiyabe NF and Region 5 (California) Sensitive Species. **NNNPS:** watch list.

POPULATION CENSUS (NEVADA): 3 occurrences mapped; total estimated individuals unknown, total estimated area 2.0+ ha (4.9+ ac). **TREND:** unknown.

IMPACTS AND MAJOR THREATS (NEVADA): No summary available (see references).

INVENTORY EFFORT (NEVADA): Not yet systematically surveyed in Nevada. Most recent entered survey 1998, average year of last survey 1966. **Years since last entered survey** (percent of mapped records at various survey ages): **0-5 yrs:** 33.3%; **51+ yrs or unknown:** 66.7%.

LAND MANAGEMENT (NEVADA) in decreasing predominance: designated wilderness, Humboldt-Toiyabe National Forest, private lands (?).

RANGE: Clark County, Nevada; also in AB (?), AK, BC, CA, MT, ON, OR, WY, and YT. In Nevada known so far only from the Spring Mountains. Maximum Nevada **range dimension 7.2 km (4.5 mi)**.

ELEVATIONS RECORDED (NEVADA): 8891-11155 feet (2710-3400 meters).

HABITAT (NEVADA): Moist ground of spring head area in deep shade on north-facing slope with *Dodecatheon redolens*, *Smilacina stellata*, *Pinus monophylla*, *Pinus ponderosa*, *Pinus flexilis*, *Aquilegia formosa*, and *Pinus longaeva*. Aquatic or wetland-dependent in Nevada.

PHENOLOGY: fertile late-spring to summer. Range of most frequent **survey months:** August.

LIFE-FORM AND HABIT: small cormous fern-ally.

DESCRIPTION: Upward-lobed Moonwort is a small, perennial fern with a single aboveground frond. The frond is usually about 10 cm tall, yellow-green, and divided into two segments which share a common stalk. The mostly sterile segment is once pinnatifid with up to six pairs of strongly ascending, narrowly triangular pinnae which have deeply lacerate margins. The sterile segment often has a few sporangia on the margins of the pinnae or on small branches. The fertile segment is longer than the sterile segment, is branched, and bears grape-like sporangia. Spores germinate underground and develop into minute, subterranean, non-photosynthetic gametophytes which depend on an endophytic fungus for nourishment. **Distinguishing features:** Strongly ascending pinnae with lacerate margins and a yellow-green color are diagnostic of *B. ASCENDENS*. It may be easily confused with *B. CRENULATUM*, *B. MINGANENSE*, and *B. MONTANUM*. Reliable field determination of moonworts depends on the careful use of technical keys and on comparison with silhouette outlines of verified specimens. Identification can be complicated because there is often a high degree of morphological variability between individuals in a population and between populations of the same species; several species may grow together at the same site. Also, the few diagnostic characters may not be apparent in small plants.

PHOTOGRAPHS: Fertig et al. (1994); Nevada Natural Heritage Program images web page (1998-present).

ILLUSTRATIONS: Fertig et al. (1994).

OTHER GENERAL REFERENCES (listed separately): Clokey (1951), Flora of North America editorial Committee (1993), Hickman (1993).

SPECIFIC REFERENCES:

Wagner, W. and F. Wagner. 1986. Three new species of moonworts (*Botrychium* subgenus *Botrychium*) endemic in western North America. *American Fern Journal* 76(2): 33-47.

Wagner, W. H., Jr., and F. S. Wagner. 1981. New species of moonworts, *Botrychium* subg. *Botrychium* (*Ophioglossaceae*), from North America. *American Fern Journal* 71: 20-30.

Wagner, W. H., Jr. and F. S. Wagner. 1990. Notes on the fan-leaflet group of moonworts in North America with descriptions of two new members. *American Fern Journal* 80: 73-81.

Wagner, W. H. and F. S. Wagner. 1993. *Ophioglossaceae*. Pages 85-106 in: Flora of North America editorial Committee. Flora of North America vol. 2. New York: Oxford University Press.

OF FURTHER INTEREST: Wagner (in FNA Vol.2) notes that *B. ascendens* is a distinctive species "that grows with *B. crenulatum*, *B. lunaria*, and *B. minganense*. This species and *B. pedunculatum* [which has a similar range, but is not known from Alaska] are the only grapeferns that often have extra sporangia on the proximal pinnae."
