

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM**

Plant Abstract

Element Code: PPOPH010R0

Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Botrychium minganense*
COMMON NAME: Mingan Moonwort
SYNONYMS: *Botrychium lunaria* subsp. *minganense*, *B. l.* var. *minganense*
FAMILY: Ophioglossaceae

AUTHOR, PLACE OF PUBLICATION: Victorin, Joseph Louis Conrad Marie.
Proceedings and Transactions of the Royal Society of Canada 21: 331. 1927.

TYPE LOCALITY: Plantes de la Cote-Nord, Du Golfe Saint-Laurent, Archipel de
Mingan: ILE NIAPISCA

TYPE SPECIMEN: Herbarium Russian Acad. Sci. – V.L. Komarov Bot. Inst.: LE8951
(syntype). F.F. Marie Victorin and Rolland Germain, #18122. July 30, 1924.

TAXONOMIC UNIQUENESS: According to NatureServe (2016), there are 35 species, two varieties and one named hybrid of *Botrychium* in the United States and Canada. Ten of these species and one of the varieties occur in Arizona.

DESCRIPTION: Mingan Island Moonwort is a small perennial fern with a single aboveground frond. The frond varies in height, but may reach about 20 cm. It is divided into two segments which share a common stalk, and it is usually a deep, dull green and somewhat fleshy. The sterile segment is once pinnatifid with up to 10 usually well separated pairs of pinnae. The pinnae are variable; they are generally narrowly fan-shaped with rounded, entire margined apices, but can be broader and may be lobed or have incised margins. 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 (NatureServe 2016).

Technical: Trophophore stalk 0--2 cm, 0 to 1/5 length of trophophore rachis; blade dull green, oblong to linear, 1-pinnate, to 10 / 2.5 cm, firm to herbaceous. Pinnae to 10 pairs, horizontal to slightly spreading, approximate to remote, distance between 1st and 2d pinnae not or slightly more than between 2d and 3d pairs, basal pinna pair approximately equal in size and cutting to adjacent pair, occasionally basal pinnae and/or some distal pinnae elongate, lobed to tip, nearly circular, fan-shaped or ovate, sides somewhat concave, margins nearly entire, shallowly crenate, occasionally pinnately lobed or divided, apex rounded, venation like ribs of

fan with short midrib. Sporophores 1-pinnate, 2-pinnate in very large, robust plants, 1.5--2.5 times length of trophophore. 2 n =180. Flora of North America 2016.

AIDS TO IDENTIFICATION: *B. minganense* is highly variable, but the dull green color, somewhat fleshy texture, and the many well-divided, relatively narrow, entire-margined pinnae are typical of Montana plants. This species is most easily confused with *B. crenulatum*, and *B. lunaria*. Reliable field determination of moonworts depends on the careful use of technical keys and 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, and the few diagnostic characters may not be apparent in small plants.

ILLUSTRATIONS:

Photos and Herbarium Mounts: <http://eol.org/pages/596165/media>.

TOTAL RANGE: One of the most widespread moonworts in North America, occurring in practically all parts of Canada and Alaska and throughout the western United States, south to Arizona, and in all the US/Canadian border states.

RANGE WITHIN ARIZONA: Collected from two locations: San Francisco Mountain north of Flagstaff in Coconino County, and Mount Baldy, Apache County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: A perennial fern

PHENOLOGY: Leaves appearing in spring through summer.

BIOLOGY:

HABITAT: Throughout its range, *B. minganense* occupies a wide range of habitats. In Idaho, for example, these habitats include meadows, prairies, woods, sand dunes and riverbanks. In Arizona (two collection sites), it was found in a grassy bald at the edge of a forest, and in patches of bare, gravelly soil amongst scattered spruce.

ELEVATION: Range-wide, 0 – 12135 feet (0-3700m). The two Arizona occurrences were between 10000 and 11200 feet (3050-3415m).

EXPOSURE: Full sun was noted at one site in Arizona, and a grassy bald would be an open exposure as well.

SUBSTRATE: Bare gravelly soil or growing through mats of mosses and lichens at the two Arizona sites.

PLANT COMMUNITY: Edges of montane (spruce) forests, high elevation grass communities.

POPULATION HISTORY AND TRENDS: Unknown for Arizona. There are two collection sites in Arizona, made in 1976. Both noted the *Botrychiums* (multiple species) were common. Arizona is the southern-most extension of the range for this species, and it is listed as critically imperiled by NatureServe due to the limited number of occurrences. Nationally, the species is considered apparently secure. It is widely distributed, but plant numbers per population appear to be small, with some exceptions. NatureServe has assessed the short-term trend as relatively stable, and the long-term trend somewhere within a decline of <30% to an increase of 25%.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None.

STATE STATUS: None.

OTHER STATUS: None.

MANAGEMENT FACTORS: None specified. Foraging or grazing has been noted for some of the other moonworts, but occurrences in Arizona are protected from domestic grazing.

PROTECTIVE MEASURES TAKEN: None, but both known locations are within Forest Service managed Wilderness Areas.

SUGGESTED PROJECTS: Since the species has not been verified as extant in Arizona for 40 years, field surveys at known collection locations should be undertaken.

LAND MANAGEMENT/OWNERSHIP: USDA Forest Service: Coconino (Kachina Peaks Wilderness) and Apache-Sitgreaves (Mount Baldy Wilderness) National Forests.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Flora of North America (eFloras.org), accessed 5/26/2016,
http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500283.

JStor|Global Plants, accessed 5/26/2016,

<http://plants.jstor.org/stable/10.5555/al.ap.specimen.le00008951?searchUri=plantName%3D%2522Botrychium%2Bminganense%2522%26syn%3D1>.

NatureServe Explorer, accessed 5/26/2016, www.natureserve.org.

Tropicos, accessed 5/26/2016, <http://www.tropicos.org/Name/26602182>.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION: *Botrychium minganense* Victorin has been considered a variety of *B. lunaria*, but is tetraloid while *B. lunaria* is diploid (NatureServe 2016).

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