ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PPOPH010B0
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Botrychium multifidum*
COMMON NAME: Leathery Grape-fern
SYNONYMS: *Osmunda multifidi, Sceptridium multifidum*
FAMILY: Ophioglossaceae

AUTHOR, PLACE OF PUBLICATION: Ruprecht, Franz Josef (Ivanovich). Beitraege zur Pflanzenkunde des Russischen Reiches 40. 1859.

TYPE LOCALITY:

TYPE SPECIMEN:

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.

The recognition of subspecific taxa in *B. multifidum* is questionable on numerous grounds, the most convincing being the presence of more than one of the previously described subspecies (Clausen 1938) as branches of the same individual (Stevenson 1975).

DESCRIPTION: Trophophore stalk 2--15 cm, 0.3--1.2 times length of trophophore rachis; blade shiny green, plane, ternate, 2--3-pinnate, to 25 × 35 cm, leathery. Pinnae to 10 pairs, approximate to remote, horizontal to ascending, distance between 1st and 2d pinnae not or slightly more than between 2d and 3d pairs, divided to tip. Pinnules obliquely ovate, rounded, margins usually ± entire to shallowly crenulate, sometimes inconspicuously and shallowly denticulate, apex rounded, venation pinnate. Sporophores 2--3-pinnate, 1.2 times length of trophophore. 2 n =90. Flora of North America 2016.

AIDS TO IDENTIFICATION: According to Reeves (1977), *B. multifidum* can be distinguished from other *Botrychium* species in Arizona by the stalk of the sterile blade which is 1.5-5.5cm long (>1.5cm and <5.5cm) and inserted near the base of the plant. The plant is fleshy; the ultimate divisions of the sterile blade rather uniform in size; the pinnae regularly divided to near the apex; and the segments obtuse (not acute) at the apex.

ILLUSTRATIONS:
Photos: http://calphotos.berkeley.edu/cgi/img_query?query_src=ucjeps&where-genre=Plant&where-taxon=Botrychium+multifidum&title_tag=Botrychium+multifidum.
http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=91688.
Line Drawing: http://www.efloras.org/object_page.aspx?object_id=41042&flora_id=1.

TOTAL RANGE: Alaska and most all Canadian Provinces south to California, Arizona and New Mexico; east across northern U.S. including Iowa, Illinois, West Virginia and the NE states, south to North Carolina. Europe; NW Asia.

RANGE WITHIN ARIZONA: White Mountains: small lakes south and west of Mount Baldy, Apache County. With very few exceptions, the various *Botrychium*s have been found growing together on two high mountain sites in Arizona. *B. multifidum* is one of the exceptions found growing at somewhat lower elevations (8400-9040 feet) in the White Mountains.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: A perennial fern.

PHENOLOGY: Leaves green over winter, appearing in spring. Except for *B. multifidum* and *B. dissectum*, Arizona *Botrychium*s are winter deciduous (Reeves 1977).

BIOLOGY: Gametophytes of *B. multifidum* have never been observed except for a 1858 illustration by Milde (Stevenson 1975). It seems that sexual reproduction for this species is very rare.

Plants of this genus generally produced one leaf (sometimes two) per year. Accordingly, a conservative estimate for the age of an individual plant may be obtained by counting the leaf scars on the rhizome and dividing by two. Using this method, plants over 100 years of age have been identified from old rhizomes (Stevenson 1975).

A unique feature that may well be limited to *B. multifidum* and perhaps *B. dissectum*, is the occurrence of contractile roots. This was first reported by Baas-Becking in 1921 and investigated more systematically by Stevenson (1975). This oddity is evidenced by the wrinkled or corrugated appearance of older roots when compared to the smooth, even appearance of younger roots. There are lysigenous cavities that form in the root cortex at regular intervals. When these cavities collapse, the roots effectively contracts, and presents its wrinkled appearance. It is believed that this contractile root feature either aids in anchoring plants in or on a substrate, or in keeping them embedded in the soil. In the case of *B. multifidum*, it seems to be the latter function because the bud is below the soil surface. This occurrence of contractile roots in lower vascular plants seems to be restricted to *B. multifidum* and possibly *B. dissectum*.

HABITAT: In fields, wet meadows, edges of lakes and srteams, among willows (Jepson Herbarium 2016, and eFloras 2016).

ELEVATION: Range-wide, given as 0 – 9840 feet (0-3000m). Several Arizona collection sites elevations range from 8400 – 9040 feet (2560-2756m).

EXPOSURE: In meadows at edges of forests: open to partial shade.

SUBSTRATE: Not specified.

PLANT COMMUNITY: Higher elevation meadows. Associated species include: *Pteridium, Viola, Veratrum, Aconitum*, grasses, *Iris, Carex.*

POPULATION HISTORY AND TRENDS: Unknown for Arizona. There are three known occurrences in the White Mountains that were collected from 1940 to 1980, and not since. One of these collections observed that the species was uncommon. Range-wide *B. multifidum* is considered secure, but is listed by NatureServe as critically imperiled in Arizona due to the very few know occurrences.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None.
STATE STATUS: None.
OTHER STATUS: None.

MANAGEMENT FACTORS: None specified.

PROTECTIVE MEASURES TAKEN: None.

SUGGESTED PROJECTS: Try to verify if species is still extant at known collection sites.

LAND MANAGEMENT/OWNERSHIP: USDI Bureau of Indian Affairs, White Mountain Apache Indian Reservation.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Clausen, Robert T. 1938. A Monograph of the Ophioglossaceae. Memoirs of the Torrey Botanical Club, 19(2). p. 89

Flora of North America (eFloras.org), accessed 6/2/2016, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500286.
Jepson Herbarium, accessed 6/2/2016, http://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=91688.
NatureServe Explorer, accessed 6/2/2016, www.natureserve.org.
Reeves, Timothy. 1977. The Genus *Botrychium* (Ophioglossaceae) in Arizona. American Fern Journal 67(2) : 33-39.
Stevenson, Dennis Wm. 1975. Taxonomic and morphological observations on Botrychium multifidum (Ophioglossaceae). Madrono 23: 198-204.
Tropicos, accessed 6/2/2016, http://www.tropicos.org/Name/26610816.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION:

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