ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PPOPH010H0
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Botrychium virginianum*
COMMON NAME: Rattlesnake Fern
SYNONYMS: *Botrychium brachystachys, Botrychium charcoviense, Botrychium cicutarium, Botrychium dichronum, Botrychium virginianum* subsp. *meridionale, Botrychium virginianum var. meridionale, Botrychium virginianum* var. *mexicanum, Botrypus virginianus, Botrypus virginianus* subsp. *europaeus, Japanobotrychium virginianum, Osmunda cicutaria, Osmunda virginiana, Osmundopteris virginiana*
FAMILY: Ophioglossaceae

AUTHOR, PLACE OF PUBLICATION: Swartz, Olof (Peter). Journal für die Botanik 1800(2): 111. 1800[1801].

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.

DESCRIPTION: Perennial fern 12 - 75 cm tall Stem: single, upright, very short and inconspicuous, up to 5 mm in diameter, with a thickened base (caudex). Spores: thousands per sac, all of one kind, three-sectioned (trilete), thick-walled, and with a bumpy or pimply surface. The spores give rise to the gametophyte (the sexual phase of the plant), which is broadly egg-shaped, unbranched, tiny (1 - 3 mm tall, 1 - 10 mm diameter), fleshy, not green, underground, saprophytic, and inhabited by symbiotic fungi (mycorrhizae). Leaf: one per stem, on long stalk arising from an expanded, clasping base, which forms an open sheath around stem apex. The single leaf is made up of two parts arising from a shared stalk: a sterile, green, expanded blade portion (trophophore); and a fertile, stalk-like, spore-bearing portion (sporophore). Leaves appear in early spring and die in late summer. Roots: up to fifteen per plant, yellow to brown, 0.5 - 2 mm in diameter, smooth, and originating 1 cm below the base of the plant (The Morton Arboretum, Chicago).

Technical: Trophophore sessile; blade pale green, 3--4-pinnate, to 25 × 33 cm, thin, herbaceous. Pinnae to 12 pairs, usually approximate to overlapping, slightly ascending, distance between 1st and 2d pinnae not or slightly more than between 2d and 3d pairs, lanceolate, divided to tip. Pinnules lanceolate and deeply lobed, lobes linear, serrate, apex pointed, venation pinnate, midrib present. Sporophores 2-pinnate, 0.5--1.5(--2) times length of trophophore. 2 n =184 (Flora of North America 2016).

AIDS TO IDENTIFICATION: The following key from eFloras (2016) can be used to differentiate *B. virginianum* from all other species of *Botrychium*:

- Leaf blades deltate, mostly 5--25 cm (vs. 2-4cm), commonly sterile (vs all fertile), sporophores absent or misshapen; plants mostly over 12 cm; leaf sheaths open or closed.
- Trophophore blade thin, herbaceous; leaf sheaths open; sporophores, when present, arising from base of trophophore blade high on common stalk; leaves absent during winter…... *B. virginianum*

Botrychium virginianum is probably most similar to *B. dissectum*, and *B. multifidum*, but those species have the sterile portion of the leaf (trophophore) on a long stalk arising from the base of the plant, rather than stalk-less at the base of the fertile portion of the leaf (sporophore). The Morton Arboretum, Chicago.

ILLUSTRATIONS:

Photos and Herbarium Mounts: http://www.tropicos.org/Name/26602189?tab=images.
Photos: http://swbiodiversity.org/seinet/taxa/index.php?taxon=Botrychium%20virginianum.
Photos: http://eol.org/pages/597549/media.

TOTAL RANGE: From southern Alaska east to Labrador, in all Canadian Provinces, south through the United States from California to Florida; Mexico; Central America; South America in Brazil, Columbia, Ecuador and Peru; Eurasia. This is the most widespread *Botrychium* species in North America.

RANGE WITHIN ARIZONA: Known from three scattered collections: W Fork Oak Creek Canyon (Coconino County); E Fork of Whiteriver (Navajo County); and the Santa Rita Mountains (Santa Cruz/Pima County).

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: A perennial fern.

PHENOLOGY: Leaves seasonal, appearing in early spring and dying in late summer.

BIOLOGY: A fertile leaf begins to develop before the sterile leaf has fully unfolded during the late spring. Spores are released from the fertile leaf during the summer. They are distributed by the wind. The root system is fibrous and fleshy. Occasionally, clonal offsets are produced (Illinoiswildflowers 2016).

Spores form underground gametophytes (the sexual life stage of ferns) that lack chlorophyll and take several years to develop. Their survival is dependent on the presence of appropriate mycorrhizal fungi in the soil. After this life stage is complete, a fern will begin to produce above-ground leaves (the sporophytic life stage), Illinoiswildflowers 2016.

HABITAT: Common to abundant, especially in shaded forests and shrubby second growth, rare or absent in arid regions. The preference is partial sun to light shade, mesic to dry-mesic conditions, and a fertile loamy soil with an abundance of decaying organic matter.

ELEVATION: 0-1500m

EXPOSURE: Partial sun to light shade.

SUBSTRATE: Fertile loamy soil was mentioned in an Illinois publication and likely holds for much of the plant's distribution. However, an Arizona collection noted the specimen had to be chipped from a sandstone crevice, and that no organic soil was present.

PLANT COMMUNITY: Forests and secondary shrubby communities.

POPULATION HISTORY AND TRENDS: Unknown for Arizona. There have been three collections within the State, rather widely distributed, spanning exactly 100 years from 1884 to 1984. Although the species is very widely distributed throughout the world and is considered secure by NatureServe, Arizona and Colorado are the two states which are known to have very few occurrences, and the species is ranked as critically imperiled in these states.

SPECIES PROTECTION AND CONSERVATION

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

MANAGEMENT FACTORS: None specified.

PROTECTIVE MEASURES TAKEN: None specified.

SUGGESTED PROJECTS: None.

LAND MANAGEMENT/OWNERSHIP: USDA Forest Service, Coconino National Forest and USDI Bureau of Indian Affairs, White Mountain Apache Indian Reservation.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Flora of North America (eFloras.org), accessed 5/27/2016, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500296.

Illinoiswildflowers, accessed 5/27/2016, http://www.illinoiswildflowers.info/grasses/plants/rattlesnake_fern.html.

Tropicos, accessed 5/27/2016, http://www.tropicos.org/Name/26602189.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION:

Revised: 2016-05-31 (BDT)

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