ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PPMAR01080

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Marsilea vestita*
COMMON NAME: Hairy Water Clover
SYNONYMS: *M. fournieri, M. mucronata, M. tenuifolia, M. uncinata, M. vestita* ssp. *tenuifolia.*
FAMILY: Marsileaceae

AUTHOR, PLACE OF PUBLICATION: Hooker, William Jackson and Robert Kaye Greville. Icones Filicum 2: pl. 159. 1830[1829].

TYPE LOCALITY: Arkansas, below Little Rock. In small pond in the Arkansas bottom, near Sevier's Farm.

TYPE SPECIMEN: Holotypes:
MO 255622. G. Engelmann (SN). 1835/6.
MO 251363. Charles A. Geyer. 7/24/1839.

TAXONOMIC UNIQUENESS: There are seven species of *Marsilea* found in the United States (including one species found only in Hawaii and listed as endangered). Two species, *M mollis* and *M. vestita* are found in Arizona. There may be some confusion for identifications between these two species (see Aids to Identification).

DESCRIPTION: Plants forming diffuse or dense clones. Roots arising at nodes. Petioles 2--20 cm, sparsely pubescent. Pinnae 4--19 × 4--16 mm, pubescent to glabrous. Sporocarp stalks erect, unbranched, attached at base of petiole (occasionally up to 3 mm above it), not hooked at apex, 0.5--25 mm. Sporocarps perpendicular or slightly nodding, 3.6--7.6 × 3--6.5 mm, 1.5--2 mm thick, elliptic to nearly round in lateral view, pubescent but soon glabrate, scars left by fallen trichomes often appearing as purple or brown specks; raphe 1.1--1.7 mm, proximal tooth 0.3--0.6 mm, blunt, distal tooth 0.4--1.2 mm, acute, often hooked at apex. Sori 14--22. Flora of North America. Looks like a floating 4-leaf clover.

AIDS TO IDENTIFICATION: Sporocarps are required for most species determinations in *Marsilea*. In the Arizona species, these tend to be produced only during the under collected "terrestrial phase" when plants stranded by receding waterlines produce stems with relatively closely spaced nodes and short-petiolate leaves. Thus, the distributions of the two species present in Arizona are not fully understood (Yatskievych and Windham 2009):

1. Sporocarps mostly 3–5 mm long, 2–3 mm wide, the tooth distal to the stalk tip absent or

poorly developed, less than 0.2 mm long; leaflets symmetrically cuneate, the lateral margins relatively straight ..... ***M. mollis***

1' Sporocarps mostly 4–7 mm long, 3–6 mm wide, the tooth distal to the stalk tip well developed, 0.4–1.2 mm long; leaflets often slightly asymmetrically cuneate, with 1 of the margins shallowly concave ..... ***M. vestita***

ILLUSTRATIONS:

Line Drawing: http://www.efloras.org/object_page.aspx?object_id=40842&flora_id=1.
Photos and line drawings: http://plants.usda.gov/core/profile?symbol=MAVE2.
Photos, line drawings, herbarium mounts: http://eol.org/pages/597514/media.

TOTAL RANGE: The distribution of *M. vestita* in North America is essentially from Louisiana north to Minnesota (excluding Missouri), just entering the southern parts of the three western Canadian provinces (Saskatchewan, Alberta and British Columbia), and west to the Pacific Ocean. It is also found in Mississippi and Florida, and in Mexico and Peru. According to NatureServe, the species is listed as critically imperiled in Mississippi, Oklahoma, Iowa, Minnesota and British Columbia, and imperiled in Arizona, Utah, Alberta and Saskatchewan.

RANGE WITHIN ARIZONA: *Marsilea vestita* is fairly widely distributed in Arizona south of Flagstaff. It occurs in all counties except Las Paz, Maricopa, Navajo, Apache and Greenlee. There may, however, be some identification conflicts because the 2009 Yatskievych and Windham analysis shows that the Coconino County and northern Yavapai County collections assigned to *M. vestita* in SEINet might actually be *M. mollis*. The respective Herbariums for these collections have been contacted for clarification.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Colonial aquatic herbaceous perennial ferns.

PHENOLOGY: Sporocarps produced spring through fall (April – October).

BIOLOGY: The sporocarps of *Marsilea* species, which have a long fossil history, also are extremely long-lived. Samples from century-old herbarium specimens have been germinated successfully in the laboratory. The life cycle is also completed extremely quickly (most ferns require several months), perhaps as an adaptation to fluctuating water levels, and less than a week usually is necessary following sporocarp germination for fertilization and the subsequent generation of new sporophytes (Yatskievych and Windham 2009).

HABITAT: In ponds and wet depressions, river floodplains, and margins of lakes, stock tanks, reservoirs and streams. A few collections in Arizona were made from seemingly atypical habitats such as a dry streambed, a grassland habitat and the edge of a saltbush playa (which is inundated for extended periods).

ELEVATION: Range-wide, *M. vestita* is reported from elevations of 0 – 7545 feet (0-2300m). More specifically, collections made in Arizona range from 680 to 8075 feet (207 – 2462m).

EXPOSURE: Not specified.

SUBSTRATE: Not specified, but generally saturated soils, at least seasonally.

PLANT COMMUNITY: The broad-ranging *M. vestita* occupied aquatic habitats are associated with multiple plant communities including ponderosa pine, oak-juniper woodlands, desert scrub, and even grassland and saltbush vegetation types. Specific plant species associated with *M. vestita* collections include: *Eleocharis palustris, Alisma, Ranuncula, Glyceria borealis, Potamogeton nodosus, Juncus acominatus, Euphorbia spathulata, Teucrium cubense, Eragrostis lehmanniana, Bouteloua gracilis, Mimosa biucifera, Baccharis salicifolia, B. sarothroides, Chilopsis linearis, Plantanus wrightii, Populus fremontii, Bromus japonicas, Carex occidentalis, Eriogonum divergens, Glandularia gooddingii.*

POPULATION HISTORY AND TRENDS: Not well known. Assuming the identifications for the 30 collection sites are correct, five of which date back to the 1940s, the species may not be as imperiled in Arizona as currently ranked. The extant populations are widely distributed throughout multiple habitat types. And although *M. vestita* is listed as an aquatic obligate, it has certainly been collected from some non-aquatic settings, making the species more versatile. For collections that included such information, the species was noted as abundant more often than rare or uncommon. At two sites it was collected over multiple years, suggesting a stable trend. The fact that the sporocarps are extremely long-lived suggests that the species has a mechanism to persist, so in the absence of any indications that the species is in decline, we can perhaps presume that many populations are at least stable.

SPECIES PROTECTION AND CONSERVATION

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

MANAGEMENT FACTORS: It is notable that although *M. vestita* is considered to be an aquatic obligate, it has been found in atypical settings such as a dry creek bed or a grassland. More generally however, the species does require adequate moisture, at least periodically, so changes in hydrologic regimes or water tables that affect the wetland settings required would be a cause for concern and possibly management intervention. The fact that the sporocarps can persist for very long periods and then germinate when favorable conditions occur, is certainly advantageous for the survival of the species. A single collection record noted that the species appeared to be grazed, so this could be another consideration for management.

PROTECTIVE MEASURES TAKEN: There are no known ongoing protective measures and it does not seem that any are required at this time. Given the species' need for wetland habitats, it is likely to be a corollary beneficiary of any management actions undertaken for other more sensitive species at shared locations. In the event that some measure of protection becomes necessary, this can be better facilitated because many of the known sites are within national forests, game reserves or other federally managed lands.

SUGGESTED PROJECTS: Given the possible confusion over identifications as noted in Yatskievych and Windham 2009, this matter needs to be resolved by consultation with the herbariums or other knowledgeable persons. Depending on the outcome, it is possible that additional collections that expand the known distribution of *Marsilea vestita* may facilitate a reconsideration of its currently imperiled conservation status in Arizona.

LAND MANAGEMENT/OWNERSHIP: Of the 30 collections sites identified in Arizona, nearly half occur in US National Forests (Coconino has 6, Kaibab 3, Coronado 2, and Prescott and Tonto, 1 each). Ten other sites are found on USDI BLM lands. Two sites are on the BIA Tohono O'Odham Reservation; three are found on the Las Cienegas National Conservation Area, the USFWS Buenos Aires and Cabeza Prieta Game Reserves; and the remaining two are on State Trust and private lands.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Encyclopedia of Life, accessed 6/4/2014, http://eol.org/pages/597514/details.

Flora of North America, accessed 6/4/2014, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=200005214 .

JOHNSON, D.M. 1986. Systematics of the New World Species of *Marsilea* (*Marsileaceae*). Systematic Botany Monographs 11: 1–87.

JStor: Global Plants, http://plants.jstor.org/search?plantName=%22Marsilea+vestita%22&syn=1.

Tropicos, accessed 6/4/2014, http://www.tropicos.org/Name/26602153.

USDA Plants Database, accessed 6/4/2014, http://plants.usda.gov/core/profile?symbol=MAVE2.

Yatskievych, George and Michael D. Windham. 2009. Vascular Plants of Arizona: Marsileaceae. Canotia 5(1): 30.33.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

George Yatskievych, Missouri Botanical Garden, St. Louis.

ADDITIONAL INFORMATION: A number of segregate species have been named and recognized in regional floras in North America: *Marsilea mucronata* A. Braun (less hairy, found east of Rocky Mountains), *M . uncinata* (glabrous, sporocarp stalks long, distal tooth of sporocarp hooked, south central United States), *M . tenuifolia* (pinnae very narrow, central Texas), and *M . fournieri* (small plants and pinnae, southwest). The features upon which these species are based intergrade into one another. The species are therefore best treated as conspecific with *M . vestita* (D. M. Johnson 1986).

Putative hybrids between *Marsilea macropoda* and this species are discussed under the former.

Marsilea is named for the Italian soldier, botanist, geographer, and naturalist named Luigi Ferdinando, Count de Marsigli, 1658-1730, while *vestita* means covered, clothed, usually with hairs.

Revised: 2014-06-05 BDT