ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PMLIL280C0
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Zigadenus vaginatus*
COMMON NAME: Sheathed Deathcamas, Alcove Death Camas
SYNONYMS: *Anticlea vaginata*
FAMILY: Melanthiaceae

AUTHOR, PLACE OF PUBLICATION: MacBride, James Francis. Contributions from the Gray Herbarium of Harvard Univ. 53: 4. 1918.

TYPE LOCALITY: Utah: Armstrong Canyon, near the Natural Bridge. Elev. 1600-1800m.

TYPE SPECIMEN: NYBG: NY06318 (HT of *Anticlea vaginata*). P.A. Rydberg, A.O. Garrett, #9407. August 4-6, 1911.

TAXONOMIC UNIQUENESS: There are 15 species of *Zigadenus* in the U.S. and Canada, and six subspecies or varieties. Four species are found in Arizona: Z. *elegans, paniculatus, vaginatus,* and *virescens.*

DESCRIPTION: Plants 4–6 dm, from bulbs; bulbs not clumped, tunicate, narrowly ovoid, 3–6 × 1.5–3 cm. Stems with persistent leaf bases proximally. Leaves: proximal blades 25–40 cm × 5–12 mm. Inflorescences paniculate, 15–30-flowered, with 1–4 branches, 1.5–3 dm × 3–6 cm, proximal branches 7–8 cm. Flowers: perianth perigynous, rotate to rotate-campanulate, 10–15 mm diam.; tepals white, ovate, 3–6 × 3–4 mm, somewhat narrowed at base, apex broadly rounded; gland 1, obcordate, thick; pedicel ascending at anthesis, 1–1.5 cm, bracts often streaked with purple, ovate, 3–6 mm. Capsules narrowly conic, 7–8 mm. (Flora of North America 2015.)

AIDS TO IDENTIFICATION: A perennial herb that can grow up to 1 m tall. The stems arise from an underground bulb and bear basal, grass-like leaves and a terminal, branched cluster of white flowers (NatureServe 2015).

Z. vaginatus is distinguished as bulbous (not rhizomatous) plants having tepals with a single (rather than 2), sometimes obscure, gland, a partly perigynous perianth and obcordate tepal gland, the perianth rotate to rotate-campanulate, pedicel erect or ascending at anthesis, tepals white, and the proximal stem with persistent leaf bases (Flora of North America 2015).

Z. vaginatus differs from the other species of *Anticlea* [*Zigadenus*] in its habit of growing in big clumps, and in its numerous loose sheaths at the base of the stem (Rydberg 1905).

Z. elegans differs from *Z. vaginatus* with larger flowers, occurs at higher elevations, and flowers earlier in the year (Roth 2001).

ILLUSTRATIONS:

Photos and Herbarium Mounts:
http://swbiodiversity.org/seinet/taxa/index.php?taxon=Zigadenus%20vaginatus.

Photo of "Hanging Garden" Habitat: http://explorer.natureserve.org/. [Search under species name.]

Photos: http://www.nndfw.org/nnhp/Plants/ziva.pdf.

TOTAL RANGE: SW Colorado, SE Utah, and northern Arizona.

RANGE WITHIN ARIZONA: From the Kaibab Plateau north of the Grand Canyon to the Canyon de Chelly locality in northeastern Arizona and north to Utah. Coconino, Navajo and Apache Counties.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Perennial herbaceous plant, growing in clumps; with corm-like rootstock.

PHENOLOGY: Flowering: Late July through August.

BIOLOGY:

HABITAT: Wet sandstone ledges of canyons, "hanging garden" community.

ELEVATION: 3600 – 6230 feet (1100-1900m) elevation range is cited in the Flora of North America 2015. Arizona collections, however, extend the upper elevation range. Collections made on the Navajo Nation and Canyon de Chelly N.M. range to 6700 feet (2040m), and the collection from the North Kaibab locality of the Grand Canyon N.P. is from 8440 feet (2575m).

EXPOSURE: Not specified.

SUBSTRATE: Loose rich soil on sandstone substrate.

PLANT COMMUNITY: "Hanging Garden" plant community: *Mimulus eastwoodiae, Cirsium bipinnatum, Muhlenbergia, Celtis reticulata, Brickellia brachyphylla, Thalictrum fendleri, Philadelphus microphyllus, Aletes macdougalii, Carex specuicola, Amelanchier utahensis, Aquilegia micrantha, Heterotheca villosa, Cirsium, Pinus edulis, Andropogon,*

Aletes macdougalii, Epipactis gigantea, Pinus edulis, Schizachyrium scoparium, Yucca angustissima, Helianthella microcephala, Heterotheca villosa, Castilleja linariifolia, Quercus turbinella, Senecio multilobatus, Ephedra, Adiantum capillus-veneris, Phragmites australis, Elaeagnus, Carex meadii, Symphyotrichum laeve, Dasiphora floribunda, Cirsium calcaleum, Rosa woodsia, Betula occidentalis, Rhus trilobata, Potentilla fruticose, Sorghastrum nutans, Dicanthelium lanuginosum, Melilotus alba, Hedeoma drummondii, Tragia ramosa, Stephanomeria, Cercocarpus intricatus, Carex atherodes, Deschampsia caespitosa, Eleocharis acicularis, E. palustris, Ranunculus flammula, Juncus mertensianus, Populus tremuloides, Cirsium rydbergii.

POPULATION HISTORY AND TRENDS: In 2013, NatureServe ranked this species as imperiled. They noted there were likely less than 20 populations throughout its range (8-17 in Utah, perhaps 4 in Colorado, and about 6 in Arizona (the AZ Game and Fish Department Heritage Data Management Program recognizes 8 as of this writing in 2015, and ranks the species as critically imperiled). NatureServe estimates a total population of approximately 1400 individuals. One of the Arizona collections noted fair to good viability for the population; others noted only few or scattered plants. Knowledgeable persons believe that other populations are likely to exist within the State. But as a rare habitat specific species (inhabiting canyon walls with a seep water component), *Zigadenus vaginatus* is a species at risk from changes to the hydrologic regime.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None.
STATE STATUS: None.
OTHER STATUS: Group 3 (NNDFW, NESL 2008)

MANAGEMENT FACTORS: The Navajo Natural Heritage Program suggests that at least a 200 feet buffer zone to avoid disturbance, and recommends that any activity impacting groundwater receive special consideration (Roth 2001).

Z. vaginatus is threatened by the fact that this is a rare species with isolated populations, restricted to canyon walls with a seep component. Loss of water would be detrimental to populations. Major threats are drying of the seeps on which the species relies (due to drought/climate change or groundwater development), and trampling by livestock and humans (Hazelton 2012, in NatureServe 2015).

PROTECTIVE MEASURES TAKEN: The majority of known sites are found on U.S. National Park lands (Grand Canyon NP and Canyon de Chelly NM). The species is also listed in Group 3 (likely to be in jeopardy in the near future) by the Navajo Natural Heritage Program.

SUGGESTED PROJECTS: Survey other known hanging gardens and suitable canyons in northern Arizona. At both extant and any new sites, record some level of plant population data so future trends can be better evaluated.

LAND MANAGEMENT/OWNERSHIP: Most of the known Arizona collections are from U.S. National Park Service properties: Canyon de Chelly National Monument and the Grand Canyon National Park (a single collection). Other collections are on the U.S.D.I. Bureau of Indian Affairs Navajo Nation.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Flora of North America (eFloras), accessed 6/30/2015, http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242102104.

JStor| Global Plants, accessed 6/30/2015, http://plants.jstor.org/stable/10.5555/al.ap.specimen.ny00006318.

NatureServe Explorer, accessed 6/30/2015, http://explorer.natureserve.org/.

Navajo Nation Department of Fish and Wildlife. 2008. Endangered Species List for the Navajo Nation. The Navajo Nation, Window Rock, Arizona.

Roth, Daniela. 2001. Species account for *Zigademus vaginatus*. Navajo Natural Heritage Program. P.O. Box 1480, Window Rock, AZ 86515. http://www.nndfw.org/nnhp/Plants/ziva.pdf.

Rydberg, Per Axel. 1905. Studies on the Rocky Mountain Flora XXVI. Montana Agr. Coll. Sci. Stud. Bot. I: 39. pgs. 108-109.

Tropicos, accessed 6/30/2015, http://www.tropicos.org/Name/50072306.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

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ADDITIONAL INFORMATION: This plant is poisonous to humans and livestock; hence, the common name (NatureServe 2015). All fresh parts of the plant (leaves, bulbs, flowers) are toxic. Dried parts (especially seeds and capsules) are even more potent, presumably because the alkaloids are more concentrated. Ingestion of *Zigadenus* by humans may result in severe illness and occasionally death even for adults. Livestock (sheep and cattle) poisoning is a serious problem in some rangeland areas of the western United States. Native Americans used these plants for their analgesic, antirheumatic, and emetic properties, as dermatological and orthopedic aids, and as a snake-bite remedy (Flora of North America 2015).

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