ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDMAL140T0
Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Sphaeralcea gierischii* N.D. Atwood & C.L. Welsh
COMMON NAME: Gierisch mallow; Gierisch globemallow
SYNONYMS:
FAMILY: Malvaceae

AUTHOR, PLACE OF PUBLICATION: Atwood, N.D. & S.L. Welsh, Novon 12(2): 161-163, f. 1. 2002.

TYPE LOCALITY: United States of America. Arizona. Mohave Co., North of Black Rock Gulch, W of road.

TYPE SPECIMEN: HT: BRY. N.D. Atwood #25293, B. Furniss and L.C. Higgins, 24 Apr 2000. IT: ARIZ, ASU, GH, MO, NY (collectors Atwood & Furniss; photologue also included Higgins), RM, US, UTC.

TAXONOMIC UNIQUENESS: Formerly thought to be *Sphaeralcea* rusbyi. Described as a distinct species in 2002 (Atwood and Welsh 2002). In North America the species *Sphaeralcea gierischii* is 1 of 28 in the genus *Sphaeralcea*, and in Arizona it is 1 of 17 species in the genus (BONAP, accessed 25 Aug 2010).

DESCRIPTION: A flowering perennial mallow, which produces few to many stems from a woody caudex (short, thickened, woody stem that is usually subterranean or at ground-level). The stems are 43-103 cm (17-41 in) tall, often dark red-purple, produced in tall, open clumps, and are only sparingly leafy. The foliage is bright green and glabrous (smooth, not hairy). The main foliage leaves in the lower portion of the stems are large, oval shaped in outline (central lobe greatly elongated, having a long-crenuate base). Three to five lobed leaf blades are 1.2-4.0 cm (0.47-1.57 in) long and 1.0-5.0 cm wide (0.4-1.9 in); usually longer than wide. The inflorescence is open, panicle-like, with more than one flower per node. The calyx is 5-10 mm (0.2-0.4 in) long, green, becoming stramineous in fruit, uniformly glabrous externally, the lobes ovate to lance-acuminate. Petals are 1.5-2.5 Cm (0.6-0.98 in) long, orange (grenadine) in color; carpels 10-15, 4.5-5.5 mm high. (Atwood and Welsh 2002; Tiley et al. 2011; USFWS 2009b).

AIDS TO IDENTIFICATION: Although they both share an open inflorescence, *Sphaeralcea gierischii* differs from *S. rusbyi* (Rusby globemallow) by its larger flowers (1.5-2.5 cm), glabrous foliage, few or no stellate (star-shaped) hairs restricted to the leaf margins, and restricted range and habitat. It differs from *S. moorei*, another closely related species, by

having 3- to 5-parted narrow leaf lobes, bright green leaves (sometimes suffused with red-purple), and different habitat. (Atwood and Welsh 2002; USFWS 2009b). *S. ambigua* (desert globemallow) differs vastly from *S. gierischii* in its dense white to yellow canescent, thick, usually rugose, prominent veined, deltoid to nearly orbicular cordate-based leaves, short pedicels, and larger prominent reticulate carpels (1.2-1.6 cm high). (Atwood and Welsh, 2002).

ILLUSTRATIONS:

Line drawing from Holotype (*in* Atwood and Welsh, 2002: fig. 1)
Line Drawing (*in* UNPS, 2003-2005)
Color photos of plant and habitat (L. Hughes, *in* UNPS, 2003-2005)
Color photos of plant and habitat (A. Frates, *in* UNPS supplemental information, 2003-2005)
Color photo of plant in habitat (W. Hunter, *in* UNPS supplemental information, 2003-2005)
Color photo of plant (USDIFWS 2021)

TOTAL RANGE: Endemic to narrow range (less than186 ha (460 ac)) associated with the Harrisburg Member of the Kaibab Formation in northern Mohave County, Arizona and southern Washington County, Utah. Historical range of this species is unknown. Currently, the species range includes 24 individual locations functioning as three separate populations (USDIFWS 2021).

RANGE WITHIN ARIZONA: Mohave County, vicinity of Black Rock Gulch, Black Knolls, and Pigeon Canyon.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Perennial. Because this species is woody at the base and the same individuals have been observed for more than one year, the U.S. Fish and Wildlife Service believes that this plant is perennial (USDIFWS 2021). Longevity and generation time of the species are unknown, though similar mallow species have been documented to survive more than two years (USDIFWS 2021).

PHENOLOGY: Dies back to the ground in early winter (December), then re-sprouts from the base in late winter and spring (January to March), depending on rainfall and daytime temperatures (USDIFWS 2021). Flowers from April through June, though flowers have been observed as early as February (Hughes 2012).

BIOLOGY: According to the Service (USFWS, ECOS 2010), it is not known how the flowers are pollinated, nor the pollination system (self-pollinated or obligate out crosser), seed dispersal mechanisms, or the conditions under which seeds germinate. Other members of the genus are pollinated by *Diadasia diminuta*, the Globemallow Bee, which is known to occur within the range of the Gierisch Mallow, and may pollinate the species (Sipes and Tepedino

2005, Sipes and Wolf 2001). High seedling density after winter rainfall events, as well as the presence of seedlings within reclaimed mine areas suggest that they grow from seeds stored in the seedbank (Hughes 2009, USDIFWS 2008).

HABITAT: A scarcely scattered obligate gypsohile (plant limited to gypsum-based soils), often found on gypsum outcrops in the warm desert scrub (Mohave desert scrub) community, in association with the Harrisburg Member of the Kaibab Formation (Atwood and Welsh 2002; Tilley et al. 2011; USFWS 2010). The area receives approximately 13 to 20 cm (5 to 8 in) of annual precipitation (WRCC 2011, in Tiley et al. 2011). Biological soil crusts may be important for carbon and nitrogen fixation in nutrient-poor gypsum soils (Bowker et al. 2008, Escolar et al. 2012)

ELEVATION: Occur between 2,694-3,766 feet (821-1,148 m) in Arizona, and 2,477-2,825 feet (755 to 861m) in Utah (USDIFWS 2021).

EXPOSURE: Occurrences do not appear to correlate to specific topography (USDIFWS 2021).

SUBSTRATE: Found only on gypsum outcrops associated with the Harrisburg Member of the Kaibab Formation (USDIFWS 2021).

PLANT COMMUNITY: Warm desertscrub plant communities of the northern Mohave Desert. Codominant and diagnostic species include *Coleogyne ramosissima* (blackbrush), *Eriogonum fasciculatum* (buckwheat), *Ephedra nevadensis* (Nevada jointfir), and *Grayia spinosa* (spiny hopsage). Common associates include *Acacia greggii* (catclaw acacia), *Ephedra nevadensis* (Nevada jointfir), *Ephedra torreyana* (desert Mormon tea), *Encelia farinosa* (brittlebush), *Purshia stansburiana* (Stansbury cliffrose), *Gutierrezia sarothrae* (broom snakeweed), *Achnatherum hymenoides* (Indian ricegrass), *Achnatherum speciosum* (desert needlegrass), *Muhlenbergia porteri* (bush muhly), *Eriogonum* spp. (various annual buckwheats), *Pleuraphis jamesii* (James' galleta), and *Poa secunda* (Sandberg bluegrass) (USDIFWS 2021).

POPULATION HISTORY AND TRENDS: Unknown. Inconsistent data collection methods, type of data provided, and a lack of consistent monitoring make it difficult to determine abundance and population trends (USDIFWS 2021).

Based on high-end monitoring values of know locations it was estimated that approximately 30,000 Gierisch Mallow plants occur across the entire known range. Of these, approximately 90% of plants occur in just five locations (Hills 4, 5, 6, 7 and the Utah location) in the Central and North populations. Mining operations resumed on Hill 5 in 2018, and it is now assumed to support no plants (USDIFWS 2021).

Monitoring at two rehabilitated mining sites indicates strong reestablishment, with populations increasing from 85 and 60 in 2008 to current estimates of 800 and 500 (Hughes 2008, USDIFWS 2021).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE with Critical Habitat (USDI, FWS 2013)
[PE (USDI, FWS 2012)]
[C USDI, FWS 2008-2011]
PE with Critical Habitat, USDI, FWS, 2012

STATE STATUS: ANPA: Highly Safeguarded

OTHER STATUS: Bureau of Land Management Sensitive (UDSDI, BLM AZ 2017)

MANAGEMENT FACTORS: The Gierisch Mallow is highly susceptible to habitat destruction and modification, due to limited range and distribution and extreme habitat specificity of the species (USDIFWS 2021). Mineral extraction, livestock grazing, recreational activities, and increased fire frequency and intensity due to the spread of nonnative grass species are threats to the mallow and its habitat. The Fish and Wildlife Service considers mining operations and livestock grazing to be the most significant threats to Gierisch Mallow habitat (USDIFWS 2021).

In Arizona, gypsum mining is an on-going source of habitat destruction for the Gierisch globemallow. Many of the most valuable gypsum deposits are not at ground level, meaning that surface materials need to be removed and stockpiled, while the gypsum is mined from below. This type of activity completely removes the plant's habitat, and reclaimed sites following mining activities may not provide suitable habitat, due to alteration of soil structure and the composition and function of the biological soil crust (Bowker et al. 2008). Mining currently threatens approximately 46% of the known individual plants rangewide, and is considered the most significant threat affecting Gierisch Mallow (USDIFWS 2021).

Livestock grazing occurs in most mallow locations and effects all three populations. Livestock may graze or trample Gierisch Mallow, contribute to the spread of invasive grasses, and negatively impact the desert ecosystem in general, particularly the soils (USDIFWS 2021). However, livestock may not spend much time in most Gierisch Mallow habitat, as many locations occur on moderate to steep slopes, and livestock prefer to forage on level ground (USDIFWS 2021). Grazing is considered a threat with a moderate level of impact, especially during drought years where forage is limited and during the reproductive season, when herbivory may depress recruitment (USDIFWS 2021)

The progressive incursion of the non-native, invasive cheat grass and red brome into close proximity of Gierisch Mallow habitat is also a matter of concern. The mallow has evolved in sparsely vegetated habitats, and is unlikely to be adapted to survive the high frequency fires

that usually accompany these exotic annual grasses (USDIFWS, 2012). Cheatgrass and Red Brome are likely to increase due to climate change, as elevated carbon dioxide levels increase biomass and seed production (Smith et al. 2000, Ziska et al. 2005).

The northern population is the most at risk to recreational effects, as swift population growth of St. George, Utah has resulted in an increase in outdoor recreation in the surrounding area (USDIFWS 2008). Unauthorized OHV use, target shooting, and illegal trash dumping may negatively impact this population (USDIFWS 2021).

Other threats to the species include sensitivity to stochastic events due to the small population size and limited range of the species, drought and climate change, and pollinator decline (USDIFWS 2021).

PROTECTIVE MEASURES TAKEN: Gierisch Mallow is protected at the federal level as an endangered species with designated critical habitat and at the state level in Arizona as a "Highly Safeguarded" species under the Arizona Native Plant Act. There are no State regulations in Utah for the protection of the plant, at this time (USDIFWS 2021). On Arizona State Land Department lands, mining claims exist in Gierisch Mallow habitat. The ASLD has strict reclamation provisions, however, the reclamation plans do not have to include stipulations for protection of Gierisch Mallow habitat at this time (USDIFWS 2021).

On BLM lands, operators of mining claims must reclaim disturbed areas (Cox 2012), and mitigate operations to avoid unnecessary or undue degradation of public lands (USDIFWS 2021). The Black Rock Gypsum Mine permit predates listing of the species, and therefore no section 7 consultation was required for permitting. Future actions are subject to section 7 consultation, though limited opportunities are allowed within mining claims due to limitations imposed by the Mining Law of 1872 (USDIFWS 2021).

The BLM has implemented timing restrictions and pasture rotation systems on some grazing allotments containing Gierisch Mallow locations to minimize disturbance during the flowering period. These measures have not been incorporated officially into allotment management plans, but if they are continued to be implemented, current grazing regulations are adequate to protect mallow locations (USDIFWS 2021).

Additional protection measures include the designation of two Areas of Critical Environmental Concern (ACECs) in Utah by the BLM in 2016 (USDIFWS 2016), seed collection before expansion of the Black Rock Gypsum Mine, propagation studies, and habitat restoration studies (USDIFWS 2021).

SUGGESTED PROJECTS: Life history studies, along with pollination and seed dispersal studies are needed, along with the effect of fragmentation on the remaining populations, (USFWS, 2009b, USFWS 2011). Establishment of an ACEC in Arizona to offer special management to protect mallow locations, as well as maintaining locations in order to

support gene flow among and between populations, maintenance of habitat for solitary bees and other pollinators, and maintenance of soil composition are all important to Gierisch Mallow recovery (USDIFWS 2021).

LAND MANAGEMENT/OWNERSHIP: BLM – Arizona Strip Field Office and St. George Field Office, Utah; Arizona State Land Department (ASLD) lands. Note - 90% of estimated population is found in Arizona primarily on BLM lands. (USFWS, 2009).

SOURCES OF FURTHER INFORMATION

REFERENCES:

Atwood, N.D., and S.L. Welsh. 2002. Overview of *Sphaeralcea* (Malvaceae) in Southern Utah and Northern Arizona, U.S.A., and Description of a New Species. Novon, 12(2): 159-166.

Bowker, M.A., M.E. Miller, J. Belnap, T.D. Sisk, and N.C. Johnson. 2008. Prioritizing conservation efforts through the use of biological soil crusts as ecosystem function indicators in an arid region. Conservation Biology. 22(6): 1533-1543.

Cox, R. 2011. E-mail communication on December 6, 2011, in response to U.S. Fish and Wildlife Service question regarding gypsum mining on AZ Strip BLM land. Geologist, AZ Strip Field Office, St. George, Utah.

Escolar, C. I. Martinez, M.A. Bowker, and F.T. Maestre. 2012. Warming reduces the growth and diversity of biological soil crusts in a semi-arid environment: implications for ecosystem structure and functioning. Philosophical Transactions of the Royal Society B. 367: 3087-3099.

Harvard University Herbaria. Index of Botanical Specimens. http://brimsa.huh.harvard.edu/cms-wb/. (Accessed: 5/16/2005).

Hughes, L. 2008. Annual update 2008 of rare and listed plants of the Arizona Strip BLM. Unpublished annual report prepared for the BLM AZ Strip District. 18 pp.

Hughes, L. 2012a. Annual update 2012 of rare and listed plants of the Arizona Strip BLM. Unpublished annual report prepared for the BLM AZ Strip District. 18 pp.

International Plant Name Index (IPNI). http://www.ipni.org/ipni/plantsearch. Accessed: 5/16/2005.

Missouri Botanical Garden. 1995-2003. Research: Publications: Abstractid=597. at http://ridgwaydb.mobot.org/mobot/mbgpress/abstract.asp?abstractid=597.

Missouri Botanical Garden – TROPICOS, Nomenclatural Data Base. *Sphaeralcea gierischii* N.D. Atwood & S.L. Welsh. http://mobot.mobot.org/cgi-bin/search_vast. (Accessed: 16 May 2005).

SEINet. Collections Search Result. Accessed 5/16/2005 at http://seinet.asu.edu/collections/list.jsp.

Sipes, S.D. and P.G. Wolf. 2001. Phylogenetic relationships within Diadasia, a group of specialist bee. Molecular Phylogenetics and Evolution. 19(1): 144-156.

Sipes, S.D. and V.J. Tepedino. 2005. Pollen-host specificity and evolutionary patterns of host switching in a clade of specialist bees (Apoidea: Diadasia). Biological Journal of the Linnean Society. 86: 487-505.

Smith, S.D., Huxman, T.E., Zitzer, S.F., Charlet, T.N., Housman, D.C., Coleman, J.S., Fenstermaker, L.K., Seemann, J.R. and Nowak, R.S., 2000. Elevated CO 2 increases productivity and invasive species success in an arid ecosystem. Nature, 408(6808), pp.79-82.

The New York Botanical Garden. NYBG Specimens Detailed Results. http://scisun.nybg.org:8890/. (Accessed: 5/16/2005).

Tiley, D., L. St. John and D. Ogle. 2011. Plant guide for Gierisch globemallow (*Sphaeralcea gierischii*). USDA-Natural Resources Conservation Service, Idaho Plant Materials Center. Aberdeen, ID.

U.S. National Herbarium Type Specimen Register (US). Accessed 5/16/2005. http://ravenel.si.edu/botany/types//fullRecords.cfm?myFamily=.

USDI, Bureau of Land Management, Arizona. 2017. Bureau Sensitive Species List.

USDI, Fish and Wildlife Service. 2008. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Descriptions of Progress on Listing Actions; Notice of Review. Federal Register 73(238):75176-75244.

USDI, Fish and Wildlife Service. 2009a. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Descriptions of Progress on Listing Actions; Notice of Review. Federal Register 74(215):57808-57878.

USDI, Fish and Wildlife Service. 2009b. Species Assessment and Listing Priority Assignment Form: *Sphaeralcea gierischii* (Gierisch mallow). Region 2, April 2009.

USDI, Fish and Wildlife Service, Environmental Conservation Online System (ECOS). 2010a. Species Profile: Gierisch Mallow (*Sphaeralcea gierischii*). Accessed: 6/2/2010. http://ecos.fws.gov/speciesprofile/.

USDI, Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Descriptions of Progress on Listing Actions; Notice of Review. Federal Register 75(217):69292.

USDI, Fish and Wildlife Service. 2011. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Descriptions of Progress on Listing Actions; Notice of Review. Federal Register 76(207):66438.

USDI, Fish and Wildlife Service. 2011. Species Profile: Gierisch mallow (*Sphaeralcea gierischii*). Environmental Conservation Online System. http://ecos.fws.gov/species profile/

USDI, Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Determination of Status for Gierisch Mallow and Designation of Critical Habitat; Proposed Rule. Federal Register 77(160): 49893:49919.

USDI, Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Sphaeralcea gierischii* (Gierisch Mallow) Throughout Its Range. Final Rule. Federal Register 78(156) 49149:49165.

USDI, Fish and Wildlife Service. 2013. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Sphaeralcea gierischii* (Gierisch Mallow). Final Rule. Federal Register 78(156) 49165:49183.

USDI, Fish and Wildlife Service. 2016a. Recovery Plan Development and Implementation. Memorandum from Deputy Director to Regional Directors, September 21, 2016

USDI, Fish and Wildlife Service. 2021. (Draft) Species Status Assessment Report for Gierisch Mallow. Arizona Ecological Services Field Office, Flagstaff, Arizona. 88 pp.

Utah Native Plant Society. 2003-2005. Utah Rare Plant Guide. Salt Lake City, UT: Utah Rare Plant Guide Home Page. http://www.utahrareplants.org.

Ziska, L.H., Reeves III, J.B. and Blank, B., 2005. The impact of recent increases in atmospheric CO2 on biomass production and vegetative retention of Cheatgrass (Bromus tectorum): implications for fire disturbance. Global Change Biology, 11(8), pp.1325-1332.

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ADDITIONAL INFORMATION:

Specific epithet honors the late Ralph K. Gierisch, ardent collector of plants in the Intermountain West for more than five decades, who spent several years in the latter part of the century (1970s and 1980s) investigating the flora of the Mohave Strip, Mohave County, Arizona. He made the first collection of the species in 1978.

The largest population in Arizona is affected by an existing gypsum mining operation (Black Rock Gypsum Mine), in which the operator would like to expand. The proposed expansion would remove the entire population and its habitat. The U.S. FWS, based on the Environmental Assessment (EA) it received for expansion of the quarrying activities, assume that the expansion will occur in the near future. (USFWS 2009b).

The gypsum mine operated by Georgia-Pacific, is on ASLD lands and is located near Hill 5, the second largest Arizona population. Due to lack of permission to enter the area, Service biologists were unable to visit the site in February 2008. Although there has been no mining activity on ASLD lands since 2007, this inactivity is temporary and the Service believes that mining will resume when the housing market improves over the next few years. (USFWS 2009b).

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