ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDLYT0B030

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Rotala ramosior*
COMMON NAME: Branched Toothcup, Lowland Toothcup, Lowland rotala
SYNONYMS: *Ammannia ramosior*
FAMILY: Lythraceae

AUTHOR, PLACE OF PUBLICATION: Koehne, Bernard Adalbert Emil. In: Martius, Carl (Karl) Friedrich Philipp von: Flora Brasiliensis 13(2): 194. 1877.

TYPE LOCALITY: Philippines.

TYPE SPECIMEN: Conservatoire et Jardin botaniques de la Ville de Geneve, G227389. L.A. Chamisso (SN). 1828. (Isotype)

TAXONOMIC UNIQUENESS: There are three species of *Rotala*. *R. ramosior* is the only species found in Arizona; it is widely distributed throughout the US. A fourth species, R. dentifera, has never been seen in the State, but the type specimen was collected near Santa Cruz, Sonora, Mexico, a few miles south of the international boundary, at "margins of pools and mountain streams" (Kearney and Peebles 1951).

DESCRIPTION: Herbs, annual, terrestrial or amphibious, to 20[-55] cm. Stem erect or ascending, usually branched, weakly 4-angled. Leaves decussate, oblanceolate, narrowly oblanceolate, or elliptic, 1-2.5[-5] × 0.5[-1] cm, base attenuate, apex obtuse. Bracts like foliage leaves. Flowers 4-merous, solitary, sessile, axillary on main stem and branches; bracteoles 1-2.5 mm, less than 1/2 as long as floral tube [or exceeding floral tube]. Floral tube green, tinged with red, narrowly campanulate to subglobose, 2-5 mm; sepals 4, shallowly deltate; epicalyx segments apiculate to deltate, ca. as long as or longer than sepals. Petals absent to 4, pale pink, minute to equaling sepals, caducous. Stamens 4; anthers included. Ovary globose; style shorter than ovary. Capsules globose, 2-3 mm in diam., (3 or)4-valved, slightly exserted from floral tube. Seeds ca. 0.5 mm.

AIDS TO IDENTIFICATION: Annual herb with four petals, white or pink; flowers solitary in axils; leaves opposite and arranged at right angles to leaf pair above and below (decussate). *Ammannia coccinea* has sessile, clasping leaf bases rather than leaves attenuating at the base and short petioled or subsessile like *R. ramosior*. The plant can be easily identified when in flower or fruit, but can be very inconspicuous at other times and easily overlooked even by experienced botanists.

ILLUSTRATIONS:
Photos, Line Drawing, Herbarium Mounts: http://eol.org/pages/582096/media.
Photos: http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDLYT0B030.
Photos: http://www.missouriplants.com/Pinkopp/Rotala_ramosior_page.html.

TOTAL RANGE: Widely distributed in the US, but with considerable variability and notable gaps. Not found in the extreme NE (VT, NH, ME), and absent or rare in the montane west (MT south to NW, AZ, UT and NV). Also absent or rare in the western Canadian border states. Found only in two Canadian provinces (BC and ON), but rare. Exhibits some preference for the SE, where it is considered secure or apparently secure in KY, DE, MD, VA, NC and MS). *R. ramosior* extends south into Mexico, Central America and the West Indies, and is scattered in the northern half of South America. It is also reported to be recently naturalized in some far eastern Asia countries, including Taiwan and The Philippines.

RANGE WITHIN ARIZONA: *R. ramosior* is known from only two extant collections in southern Arizona. One is in Santa Cruz County, about 10 miles N of Nogales, along Sonoita Creek. The other is in Graham County in the Upper Sulphur Springs Valley, SW of Mount Graham. A third historical record, a collection by Lemmon (#493) from Apache Pass, Cochise County, is noted in Kearney and Peebles 1951, but no additional information or herbarium records can be located for this record.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Annual herb, terrestrial, aquatic or semi-aquatic.

PHENOLOGY: Flowers: Jul-Sep; Fruit: Aug-Oct. One Arizona collection noted flowers in mid-September.

BIOLOGY: This small annual has been reported to experience population booms and busts that may be related to water level fluctuations that seem to benefit this species.

HABITAT: Lakes and ponds, especially margins, streams and irrigation ditches; marshy areas, mudflats, wet meadows.

ELEVATION: Not well reported in the literature, but CA records indicate a range from 0 – 6232 feet (0-1900m). The two Arizona collections were made at 3610 and 4425 feet (1100 and 1350m). The historic record from Apache Pass would extend the elevation to around 5000 feet (1525m).

EXPOSURE: Not specified.

SUBSTRATE: Damp areas in sand and silt. Also seasonally submerged/ emergent.

PLANT COMMUNITY: Can be found in a community of small emergent annuals. Associated species can include *Salix, Ammannia, Juncus, Eleocharis* and *Cyperus*. One of the AZ collections listed the following associated species: *Mecardonia procumbens, Helenium thurberi, Chamaesyce hirta, Lipocarpha micrantha, Ipomoea costellata.*

POPULATION HISTORY AND TRENDS: Unknown for Arizona. Only two collection sites. One 1979 collection recorded the plant as abundant in marshy area, and was assigned a rank of good to fair estimated viability.

SPECIES PROTECTION AND CONSERVATION

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

MANAGEMENT FACTORS: The following limiting factors and threats were reported in a 2008 British Columbia Recovery Strategy for *Rotalia ramosior* (National Toothcup Recovery Team 2008):

Limiting factors

Water-level fluctuations: *R. ramosier* requires strongly fluctuating water levels to complete its life cycle. As an obligate annual plant, its population numbers undergo wide fluctuations from year to year, dependent on the water-level regime at the site. Germination takes place under flooded conditions, and flowering and seed production occur as the water level recedes and the habitat dries. The changing nature of the habitat reduces competition from other species by flooding terrestrial vegetation and keeping the habitat free of woody plants that would shade the diminutive toothcup, thereby reducing its vigor.

Threats

1. **Habitat loss or degradation**. Any development or other form of alteration to sites with this fragile species could well result in its extirpation.
2. **Changes to ecological dynamics: flood regimes or water table fluctuations**. Given the apparent fact that this species relies on water table fluctuations to both germinate and eventually set seed, any changes which alter this dynamic could be detrimental.
3. **Invasive species**. Invasive (non-native) plants pose a potential threat by reducing toothcup available habitat and/or competing for resources. Mechanical or chemical efforts to control these species might also be inadvertently harmful.
4. **Other potential threats**. Cattle grazing, trampling or recreational activities such as all-terrain vehicles use could be detrimental to *R. ramosior* populations.

PROTECTIVE MEASURES TAKEN: None, although both known sites have some degree of protection.

SUGGESTED PROJECTS: Revisit both collection locations to verify whether the species is still extant, and assess population and viability. Given the distance between the two sites, it would seem that other suitable and known wetland habitats should be surveyed to ascertain whether additional populations exist. Note that the best time to survey for *Rotala ramosior* is when it has reached full growth and reproductive structures are present: August and possibly September in Arizona.

Some other research needs identified by the Canadian Recovery Strategy were (1) determine seed viability, dispersal mechanism, and success ratios; (2) identify specific habitat requirements and related ecological parameters (e.g., soil texture, pH, other soil nutrient needs, and possibly water chemistry); (3) light characteristics (wavelengths and duration); and (4) the effects of hydrology and water regimes on the germination and growth.

LAND MANAGEMENT/OWNERSHIP: The first AZ collection was made on private land; the second was from the State owned Sonoita Creek State Natural Area.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Dept of Natural Resources, Minnesota, Rotala ramosior, accessed 6/19/2014, http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDLYT0B030.

Dept of Natural Resources, Washington State, Rotala ramosior, accessed 6/19/2014, http://www1.dnr.wa.gov/nhp/refdesk/fguide/pdf/rora.pdf.

Encyclopedia of Life, accessed 6/18/2014, http://eol.org/pages/582096/details.

Jepson eFlora, accessed 6/19/2014, http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=41724.

JStor| Global Plants, accessed 6/19/2014, http://plants.jstor.org/specimen/g00227389?s=t.

Kearney, Thomas H. and Robert H. Peebles. 1951 with Supplement 1960. Arizona Flora, 2nd ed. Univ. of Berkeley Press. Berkeley. p. 588.

National Toothcup Recovery Team. 2008. Recovery strategy for the toothcup (*Rotala ramosior*) in British Columbia and Ontario. Prepared for the British Columbia Ministry of Environment, Victoria, BC, and the Ontario Ministry of Natural Resources, Peterborough, ON. 22 pp. Available on line: http://www.env.gov.bc.ca/wld/recoveryplans/rcvry1.htm.

NatureServe Explorer, an Encyclopedia of Life, accessed 6/19/2014, http://explorer.natureserve.org/servlet/NatureServe?searchSciOrCommonName=Rotala&x=15&y=16.

Tropicos, accessed 6/18/2014, http://www.tropicos.org/Name/19200259.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

ADDITIONAL INFORMATION:

Revised: 2014-06-19 BDT

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX **(= year of last revision as indicated at end of abstract)**. X...X **(= taxon of animal or plant)**. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.

draft