

JOURNAL

OF THE

Tennessee Academy of Science

VOLUME LX

JULY 1985

JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE

VOLUME 60, NUMBER 3, JULY 1985

THE HISTORICAL AND PRESENTLY-KNOWN DISTRIBUTION OF *RANUNCULUS FLABELLARIS* (RANUNCULACEAE) IN TENNESSEE

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ABSTRACT

The distribution of *Ranunculus flabellaris* Raf. (Ranunculaceae) in Tennessee, where it is a threatened species, is discussed. The status of three previously-known sites of occurrence is given and three new sites reported.

INTRODUCTION

Ranunculus flabellaris Raf. (Ranunculaceae), the yellow Water-Crowfoot or Buttercup, is found in quiet shallow waters and on muddy shores from southern British Columbia and Maine southward to Louisiana and also in a few western states (Fernald 1950). It is rare in the Southeast (Keener 1976) and of such limited occurrence in Tennessee that it was designated a threatened species (*i.e.*, could become endangered) by the Committee for Tennessee Rare Plants (1978).

The previously-reported Tennessee distribution includes Lake and Obion counties, both represented by Reelfoot Lake specimens, and Robertson County, represented by 1940's collections from Cedar Hill Swamp (Committee 1978, Wofford and Evans 1979). A literature report from Franklin County (Svenson 1941) has not usually been included in accounts of the state flora.

A preliminary study by Scott *et al.* (1980) pointed out the need for a status update on previously-reported sites, especially those in Robertson and Franklin counties, and additional floristic studies of appropriate habitats to locate new populations. This paper reports the results of a study encompassing these facets.

METHODS

Previously-known sites of occurrence were obtained by collating (1) literature reports, (2) records kindly supplied by Paul Somers and Thomas Patrick from the Natural Heritage data bases of the Tennessee Department of Conservation and the Tennessee Valley Authority, and (3) data from herbarium sheets. The following Tennessee herbaria

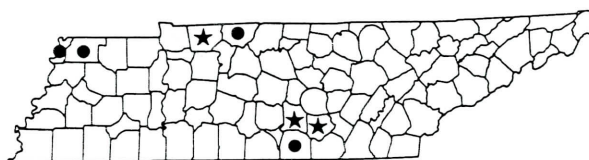


FIG. 1. Presently-known distribution of *Ranunculus flabellaris* in Tennessee (stars indicate new records).

were contacted and specimens studied there or borrowed (if available): Austin Peay State University, East Tennessee State University, Memphis State University, Memphis Pink Palace Museum, Middle Tennessee State University, Tennessee Technological University, University of Tennessee-Knoxville, UT-Martin, UT-Chattanooga, and Vanderbilt University. In addition, specimens were borrowed from the Herbarium of the Brooklyn Botanic Garden, which houses the Tennessee collections of Svenson, and information obtained from the Gray Herbarium.

Valuable information on West Tennessee sites was furnished by Vernon Bates, Edward T. Browne, Jr., Thomas Heineke, G. K. Sharma, and Larry Wilson. Likewise, Tom Hemmerly, Dennis Horne, Gene Van Horn, Robert Kral, and Elsie Quarterman provided information concerning Middle Tennessee locations.

All previously-reported sites were visited several times between 1978-1984, including at least once during 1984, and the population status and integrity of each site subjectively evaluated. Also, new sites were sought in likely West and northern Middle Tennessee wetlands during the same time span and in southeastern Highland Rim counties from 1982-1984.

RESULTS AND DISCUSSION

The presently-known Tennessee distribution of *Ranunculus flabellaris* is shown in Figure 1. Historical and current data on each site are presented by counties, which are

listed in chronological order of reports, and all Tennessee specimens examined are cited.

OBION AND LAKE COUNTIES: *Ranunculus flabellaris* was apparently first reported from Tennessee by Shaver (1933). While visiting Reelfoot Lake with a 1932 ornithology class, he noted that "Where the water is very shallow, as in the "Scatters" in the upper lake, there is a great abundance of Yellow Water Crowfoot." This observation was probably in Obion County but a voucher was not collected or at least specimens are not present in the Shaver collection currently housed in the Vanderbilt University Herbarium.

With one exception (*i.e.*, Moore 1933), a later series of papers on the ecology and flora of Reelfoot Lake (Bevel 1938, Eyles 1942, Eyles and Eyles 1943) mentioned this species. The specific county (Lake or Obion) was not given but Robinson and Shanks (1959), in their synopsis of Tennessee vascular aquatic plants, cited the Eyles (1942) report and listed Obion. Sharp *et al.* (1960) based their Tennessee checklist mainly on specimens in the State Herbarium and reported Lake Co., the only site vouched there at that time. The Committee for Tennessee Rare Plants (1978) and Wofford and Evans (1979) reported both of these counties.

Regular visits to Reelfoot Lake since 1967 have confirmed the presence of *R. flabellaris* in both Obion and Lake County sections. Greatest abundance and best growth appears to be in shallow water and temporary pools around the lake periphery, especially in the northeast (Walnut Log) area. In all probability, Reelfoot Lake now harbors the largest populations of *R. flabellaris* in the state. However, human-accelerated lake succession is apparently destroying this resource and its unique habitats and species (Denton 1984).

FRANKLIN COUNTY: The first Middle Tennessee report was that of Svenson (1941), who collected specimens from an Elk River meadow in 1939. This literature report was used by Robinson and Shanks (1959) but not included in later reports (*e.g.*, Sharp *et al.* 1960, Committee 1978, Wofford and Evans 1979). However, this collection is vouched by an excellent flowering-fruiting specimen in the Herbarium of the Brooklyn Botanic Garden and a duplicate in the Gray Herbarium. The collection site (Elk River meadows at Patterson Bridge) was located with the help of Mr. Charlie Brown, longtime Road Commissioner of Franklin Co., even though the bridge was replaced and the road slightly relocated more than 20 years ago.

A short visit was made to this site in 1982 and a more careful survey conducted in 1984. The meadows visited by Svenson have undergone vegetational succession and are now dominated by thickets of *Rubus* and *Salix*; no pools exist except immediately after flooding and *R. flabellaris* was not found. Attempts to locate populations at other suitable Franklin Co. sites were also unsuccessful. Much of the Elk River bottomland in that county has been inundated by Woods Lake and Tims Ford Reservoir, reducing the amount of floodplain meadow. Several upland swamps, including the extensive Mingo Swamp, were also examined without success.

ROBERTSON COUNTY: The 1946 and 1949 collections from Cedar Hill Swamp, an upland swamp or karst fen on the northwestern Highland Rim, were not reported in the literature until the Committee report (1978) and

Wofford and Evans atlas (1979). Efforts to verify these collections were unsuccessful prior to 1984 when scattered plants were observed in shallow water south of the L. and N. Railroad embankment which bisects the swamp. Interestingly, *R. longirostris*, the rare white Water-Buttercup, is quite abundant in this swamp and the two species were observed in the same pools. Neither this swamp nor the rare species found there appears immediately threatened; however, the swamp is in multiple, private ownership and some lumbering and conversion to agricultural usage has occurred. These activities may eventually affect the natural integrity of Cedar Hill Swamp.

MONTGOMERY COUNTY: Vegetative material tentatively identified as *R. flabellaris* was found in Long Pond Slough, a privately-owned Cumberland River bottomland swamp, in 1970. Yearly attempts to verify the identification with reproductive specimens have been made since but were unsuccessful prior to 1984, usually due to spring floods. However, rains were deficient prior to 5 May, 1984 and good flowering and fruiting material was present in late April. This population is apparently not large and the swamp is suffering from siltation, agricultural encroachment, and timber harvest. The known Montgomery Co. population definitely appears endangered at this point.

COFFEE COUNTY: Specimens were taken in 1984 from a good population growing in a shallow pool in bottomlands of the Elk River. The pool is in a thinly-wooded pasture and appears to be spring fed. The number and vigor of plants present suggests longtime growth there and hardness to drying out during summer as well as to major disturbances such as trampling by cattle.

GRUNDY COUNTY: a healthy population was found in a stagnant pool under the Elk River Bridge on Highway 41. This pool is several feet above normal river level and probably dries out during summer but is replenished by floodwaters during rainy seasons.

SUMMARY

Ranunculus flabellaris is more widely distributed in Tennessee than generally thought and is now known to occur in six counties. Good voucher material is available from a seventh (Franklin) but no recent collections have been made there.

Known Tennessee sites are from three regions of the state and represent diverse wetland habitats. West Tennessee is represented by Reelfoot Lake (Lake and Obion counties) where extensive populations have been known since 1932. While it seems likely that other populations exist in some of the vast West Tennessee wetlands, they have yet to be located.

The northwestern Highland Rim collections are from a lowland swamp (Montgomery Co.) subject to periodic flooding by the Cumberland River and an upland swamp (Robertson Co.) where washout is unlikely if not impossible. Numerous other Rim swamps of both types have been visited by the author since 1967 but *R. flabellaris* has not been otherwise observed.

The southeastern Highland Rim collections (Coffee, Franklin, and Grundy counties) were taken from meadows or pools associated with the Elk River and it is likely that other populations occur within that drainage system. No specimens have been found in any of the numerous upland swamps there but that possibility also exists.

Several reasons, in addition to rareness, may account for the lack of Tennessee records and collections. Except for the short period when flowers are emergent, the plant is difficult to observe and easily overlooked. Also, leaves often deteriorate soon after flowering, rendering the species unrecognizable. In addition, other emergent and floating aquatic species mask the dissected leaves and the temporary pools often become stagnant and obviously not inviting to collectors. Although locally abundant in a few sites, *R. flabellaris* meets the criteria established for threatened status in Tennessee and should be afforded protection where possible.

SPECIMENS EXAMINED

COFFEE CO.: Highway 50 at Elk River, 4 June 1984, Souza, *Chester 84-139* (APSU, TENN). FRANKLIN CO.: Elk River near Patterson's Bridge, 13 May 1939, Svenson 9910 (BKL, GH). GRUNDY CO.: Highway 41 between Pelham and Mt. View at Elk River Bridge, 4 June 1984, Souza, *Chester 84-141* (APSU, TENN). LAKE CO.: Cranetown NE of Tiptonville, 25 June 1947, Fairchild, Clebsch, *Clebsch 7908* (TENN); Reelfoot Lake, 13 May 1972, Stockdale, Sharma s.n. (UTM); Reelfoot Lake, 12 May 1979, McMinn s.n. (APSU); Reelfoot Lake adjacent to airstrip, 5 May 1984, *Chester 84-44* (APSU). MONTGOMERY CO.: Long Pond Slough, 18 June 1970, *Chester 2341* (APSU); same site, 18 April 1984, Souza, *Chester 84-4* (APSU). OBION CO.: South of Walnut Log, Reelfoot Lake, 2 June 1970, Bowers, Rogers 45199 (TENN, VDB); same site, 5 May 1984, *Chester 84-38* (APSU). ROBERTSON CO.: Nine miles N. of Springfield, 26 April 1946, Quarterman 1619 (VDB)—Dr. Quarterman recollects that this collection was from Cedar Hill Swamp; Cedar Hill Swamp, 24 April 1949, Helm 115 (VDB); same site, 21

April 1984, *Chester 84-9* (APSU).

ACKNOWLEDGMENTS

Appreciation is extended to the herbarium curators cited for providing specimens and to the other individuals mentioned for sharing information. I especially thank Vernon Bates for supplying information on *R. flabellaris* material in the Gray Herbarium. Travel was supported by Austin Peay State University.

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JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE

VOLUME 60, NUMBER 3, JULY 1985

HORSEHAIR WORMS (NEMATOMORPHA, GORDIOIDEA) FROM TENNESSEE, WITH A REVIEW OF TAXONOMY AND DISTRIBUTION IN THE UNITED STATES

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ABSTRACT

Gordian worms were collected from 11 sites in 10 counties of Tennessee. Both sexes of *Chordodes morgani* were taken from two sites, but it was abundant at only one of these. *Gordius robustus* was represented only by males and was collected from six sites, one of which had *C. morgani*. *Gordius* sp. were all females and came from three sites, each in a different county. Two females of *Paragordius varius* were found at two sites, each in a different county. These are the first records for *C. morgani* and *P. varius* in Tennessee, and six new sites in the state were recorded for *G. robustus*. A review of the pertinent literature revealed that 11 species of hairworms have been reported for the United States, which, in addition to the species from Tennessee, include: *Gordius paranensis*, *Neochordodes occi-*

dentalis, *Parachordodes alascensis*, *Parach. densareolatus*, *Parach. lineatus*, *Parach. longareolatus*, *Parach. platycephalus*, and *Pseudochordodes manteri*; synonyms of the foregoing species are provided. Records of hairworms were tabulated for 35 states and the District of Columbia. These showed that *G. robustus*, *P. varius* and *C. morgani* were the most widely distributed, whereas *Parach. alascensis*, *Parach. longareolatus*, and *Pseud. manteri* were reported only from Alaska, California, and Nebraska, respectively.

INTRODUCTION

Horsehair worms (hairworms or gordian worms) have been studied since 1604 in Europe and were first referred to by Albertus Magnus in the 13th century (May 1919). However, little recent work on taxonomy and distribution