

*Conservation Assessment*  
*for*  
*Roundleaf water-hyssop (Bacopa rotundifolia (Michx.)*  
*Wettst.)*



*Missouri Botanical Garden*

*USDA Forest Service, Eastern Region*

9/30/04

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*This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation Assessment for the Eastern Region of the Forest Service. It does not represent a management decision by the U.S. Forest Service. Though the best scientific information available was used and subject experts were consulted in preparation of this document, it is expected that new information will arise. In the spirit of continuous learning and adaptive management, if you have information that will assist in conserving the subject taxon, please contact the Eastern Region of the Forest Service - Threatened and Endangered Species Program at 626 East Wisconsin Avenue, Milwaukee, Wisconsin 53203.*

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## EXECUTIVE SUMMARY

Roundleaf water-hyssop, *Bacopa rotundifolia* (Michx.) Wettst., is a plant of wet places. It grows on pond edges, muddy shores of streams, lakeshores and ditches. It is found in both natural and man-made habitats. It is a small, stoloniferous, herbaceous perennial, typically having submersed stems with floating tips. Leaves are opposite and sessile. Flowers are white and less than 1mm long.

Roundleaf water hyssop has a Global Heritage Status Rank of G5, indicating it is thought to be demonstrably widespread, abundant and secure. *Bacopa rotundifolia* naturally occurs in the central United States and adjacent Canada. It has been introduced in some western states and considered a weed in rice fields. It is less common at the periphery of its range and is tracked by the Natural Heritage Programs in six states. Its only official protected status is in Indiana, where it is currently listed as Endangered. Based on Element Occurrence Records in states that do track *Bacopa rotundifolia*, of 43 reported localities, 10 (23%) were protected to some degree, 15 (35%) were on private land, and 18 (42%) were of unknown ownership.

The plant was known recently from a single locality on the Hoosier National Forest in Indiana. The occurrence is now thought to be extirpated, although suitable habitat remains. Plants from a degraded site off the Forest were transplanted in the site's artificial pond habitat in 1997. Recent surveys have not relocated any individuals.

Potential threats to persistence of Roundleaf water-hyssop populations include alterations to the hydrology of its wetland habitat and disturbance from off-road vehicles and livestock trampling. No current conservation activities, monitoring, or research projects for *B. rotundifolia* are on-going at this time. Additional surveys should be conducted for several years to confirm that the single locality on the Hoosier National Forest has been extirpated.

## ACKNOWLEDGEMENTS

I would like to thank Science Librarian Barb Howes at Butler University for tireless assistance with references, Marcia Moore, Herbarium Assistant for help in all things and Butler student Kathy Fidler for research and clerical assistance. I am grateful to Kirk Larson, Botanist on the Hoosier National Forest, and to all agency personnel who provided information.

## NOMENCLATURE AND TAXONOMY

*Bacopa rotundifolia* (Michx.) Wettst.

**Published in:** *Die Natürlichen Pflanzenfamilien* IV. 3b: 76. 1891.

**Common name:** Roundleaf or Disc water-hyssop

**Synonyms:**

*Bacopa nobisiana* Mason

*Bacopa simulans* Fern.

*Bramia rotundifolia* (Michx.) Britt.

*Hydrantheium rotundifolium* (Michx.) Pennell

*Macuillamia rotundifolia* (Michx.) Raf.

**Family:** Schrophulariaceae or Figwort family

## DESCRIPTION OF SPECIES

From Gleason and Cronquist (1991), Crow and Hellquist (2000) and others:

**Stems:** typically submersed, lax and procumbent, with the tips floating, less often emersed, 2-6 dm, the younger parts usually hairy but soon glabrate;

**Leaves:** sessile, opposite, very thin, obovate to subrotund, 1-3.5 cm, entire, palmately 5-13 veined, sessile and opposite, pedicels 2-4 times as long as the calyx;

**Flowers:** usually 2-4 from the uppermost nodes, on pedicels (0.5)1-1.5 cm, without bractlets; sepals 5, 3-5 mm, obtuse, the upper one rotund-elliptic, obscurely to evidently reticulate-veiny; corolla white with a yellow throat, narrowly campanulate, mostly 4-10 mm, its lobes equaling or a little shorter than the tube, the 2 upper united half-length; stamens 4, small; stigmas 2, distinct;

**Fruit:** a 5 mm long globose capsule.

Steyermark (1963) states when growing under water the stems are usually elongated with widely separated pairs of leaves, the lower submerged ones generally much smaller than the uppermost floating leaves.

*B. rotundifolia* is distinguished from other *Bacopa* species by its entire, orbicular leaves with broadly clasping bases, pubescent petioles and stems, 8-10 mm long corolla, and stamens numbering 4.

## **LIFE HISTORY**

Roundleaf water-hyssop is a fibrous-rooted, stoloniferous herbaceous perennial.

### **Reproduction**

Roundleaf water-hyssop has asexual reproduction via stolons and sexual reproduction via seeds. Its vegetative spread rate is rated moderate by the USDA (W-18). Flowers are produced June through September. Numerous small seeds are produced in globose capsules. The plant is a tetraploid ( $2n=36$ ), predominately autogamous (selfing), and may hybridize with *B. eisenii* in California (Barrett and Strother 1978).

### **Ecology**

Roundleaf water-hyssop is listed as an invasive weed by the Southern Weed Science Society on its 2001 cd-rom "Weeds of the United States and Canada".

Populations fluctuate in size from year to year and the plant may persist in a seed bank during dry years (Homoya, pers. com.).

### **Dispersal/Migration**

*Bacopa rotundifolia* can form floating mats (W-6). Steyermark (1963) reports ducks eat the seeds and leaves and that this plant is sometimes used in tropical aquaria and in outdoor pools.

### **Obligate Associations**

None known.

## **HABITAT**

### **Range-wide**

Roundleaf water-hyssop is a plant of shallow water and wet soils. It is reported from muddy shores of ponds and streams, pools, lakeshores, and ditches (Crow and Hellquist 2000). Steyermark (1963) reports it in Missouri from borders of sloughs, slow streams, natural and artificial ponds and ditches, also in swamps and low wet woods.

This species has a USFWS National Wetland Indicator status of Obligate (W-11).

## **National Forests**

The plant is known in recent history (discovered in 1994) from the Hoosier National Forest in Indiana but is currently considered extirpated at its single known locality in the Lost River Unit. Reported associates include *Ceratophyllum demersum*, *Eleocharis acicularis*, *E. obtusa*, *Leersia oryzoides*, *Rotala ramosior* and *Sagittaria latifolia* (Indiana Natural Heritage Database 2002).

The Indiana Natural Heritage Database (2002) has 12 other occurrences state-wide, mostly historical. Only 5 sites have been confirmed to have the plant present since 1935. Deam's (1940) flora of Indiana states *B. rotundifolia* is infrequent in sink holes.

## **Site Specific**

Indiana Natural Heritage Database (2002) and Forest Service records (Larson pers. com.) list one locality on the Hoosier National Forest in the Lost River Unit at a site called Georgia Pond. The site is a constructed pond, not a sinkhole pond (Ellen Jacquart, pers. com.). Four colonies of Roundleaf water-hyssop were present at the site in 1994 and it was considered abundant (Scott et al. 1996). One colony was seen in 1995. The site was revisited in 2000, 2001 and 2004 but the plant was not seen (Larson pers. com). The last reported sighting was in 1996. Habitat is shallow water in a small artificial pond. Additional appropriate habitat exists on the Forest (Hedge et al. 2002).

## **DISTRIBUTION AND ABUNDANCE**

### **Range-wide Distribution**

*Bacopa rotundifolia* is found in the central United States, west to CA, AL and KS, and in Canada (AB and SK) (W-10). Gleason and Cronquist (1991) list its distribution from IN to IA, ND and MT, south to MS and TX, and occasionally introduced elsewhere, as in tidal VA and MD. The USDA Plants website (W-18) says continental US, excluding the northeast, SC, GA and FL, NV, WA, and OR (Figure 1).

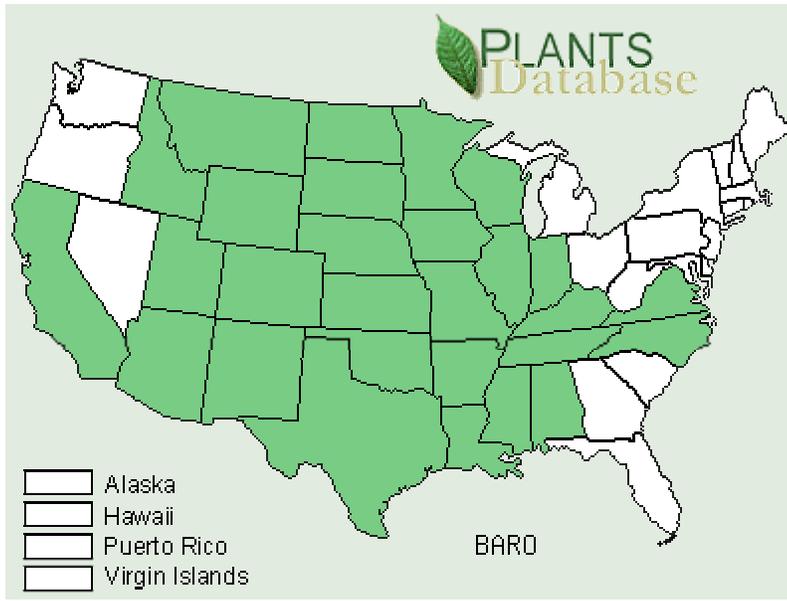


Figure 1. PLANTS Database ([www.plants.usda.gov](http://www.plants.usda.gov)) map for range of *Bacopa rotundifolia*.

Roundleaf water-hyssop is common through most of its range. It becomes less abundant at the peripheries of its range, especially to the northeast, and appears to be spreading westward, experiencing range expansion likely facilitated by humans.

The plant has always been rare in Virginia. Occurrences have never numbered more than two, it is close to being lost if not already extirpated (John Townsend, pers. com.) One site is likely extirpated. Records indicate plants at the second have decreased at the site from 11 to 1 over the last few decades.

Deam (1940) states it is infrequent in sink holes in Indiana. He found it in 3 southern counties and noted it was not found in other counties where the same habitat occurs. It was “very common” in ponds.

In Nebraska, it is common in wetlands, especially Rainwater Basin wetlands in south-central Nebraska (Gerry Steinauer, pers. com.). *B. rotundifolia* is common and widespread in Louisiana. It grows in ponds and along streams particularly on mud and in rice fields and roadside ditches (Christopher Reid, pers. com.).

In Kansas, it is found in widely scattered permanent and ephemeral wetlands in the eastern 2/3 of the state. Herbarium records probably underestimate its abundance in Kansas (Craig Freeman, pers. com.).

A recent study of 55 wetland sites in Oklahoma identified a vegetation class dominated by *Heteranthera limosa*-*Bacopa rotundifolia*-*Marsilea vestita*

(Hoagland 2002). Previous studies in Oklahoma had not identified vegetation dominated by these species.

Roundleaf water-hyssop may be adventive in Wyoming, a recent immigrant following white settlement. Origin of populations in the state is not known, but the recent discovery dates of the plants (all since 1982) suggest recent introduction (Wyoming Department of Natural Resources 2000).

The plant is not tracked in Idaho. It is on the Idaho Native Plant Society's Review list for species that may be of conservation concern, but for which more information is needed. It may be introduced in the state (Michael Mancuso, pers. com.).

In Arizona, Roundleaf water-hyssop is similar to the more common *Bacopa monnieri* when seen in the field. There is potential habitat in slow moving water in canals, sloughs, ponds, and springs even in mostly dry Arizona, so the plant may be more common than thought, but is still uncommon or rare (Philip Jenkins, pers. com.).

It is believed to be introduced in California (Barrett and Strother 1978, W-1), perhaps via rice seed from Louisiana or Texas. It was reported in 1978 to be one of the most common weeds in California rice fields (Barrett and Strother 1978). When it was first collected in California, the species was thought to be new to science and was called *B. nobisiana*, now an accepted synonym for *B. rotundifolia*.

### **State and National Forest Distribution**

Roundleaf water-hyssop has a recent historic occurrence on the Hoosier National Forest in USDA Forest Service Region 9. It is also known from the Mark Twain National Forest in Missouri and from the Shawnee National Forest in southern Illinois (W-17). On the Mark Twain, the plant is widely scattered (David Moore pers. com.) and is not monitored or tracked. Likewise, since the plant is not a Regional Forester Sensitive species and is not state listed in Illinois, it is not tracked on the Shawnee National Forest (Beth Shimp, pers. com.).

### **RANGE WIDE STATUS**

*Bacopa rotundifolia* has a Global Conservation Status Rank of G5. This rank indicates the species is demonstrably widespread, abundant, and secure globally (W-9). Its national rank is N5?, with the “?” denoting inexact or uncertain numeric rank.

The plant is listed as a Regional Forester Sensitive Species on the Hoosier National Forest in Indiana.

Individual state rankings have the species ranked SR (reported from the state, but without persuasive documentation that would provide a basis for either accepting or rejecting the species) in 17 states, SH (possibly extirpated) in one, and S? (uncertain numeric) in 2 states. See Appendix 1 for a table of ranking by state.

Roundleaf water-hyssop is ranked S1 (critically imperiled, usually with fewer than 5 occurrences) in 6 states: AZ, ID, IN, MT, VA, and WY. It is ranked S3 (vulnerable to extirpation, due to restricted range, few occurrences (usually fewer than 80), or recent declines) in IA and MN.

It has legal protection as a listed species only in Indiana, where it is listed as Endangered (5 or fewer occurrences). It is being considered for a change to Threatened (6-10 occurrences) but it is not clear that populations are increasing, it may be that already established populations are just now being seen by botanists (Mike Homoya, pers. com.).

It is a species of Special Concern in Minnesota (Sharron Nelson, pers. com.). Species of Special Concern are species that, although not endangered or threatened, are extremely uncommon, or have unique or highly specific habitat requirements and deserve careful monitoring of their status. Species on the periphery of their range, that are not listed as threatened, may be included in this category along with species once threatened or endangered but now having increased or protected, stable population.

## **POPULATION BIOLOGY AND VIABILITY**

Populations fluctuate in size from year to year and the plant may persist in a seed bank during dry years (Mike Homoya, pers. com.).

Population viability on the Hoosier National Forest is moderately threatened by (Dolan 2003):

- changes in water level in pond habitat
- off-road vehicle disturbance
- trampling by livestock

## **POTENTIAL THREATS**

### **Present or Threatened Risks to Habitat**

Off-road vehicle and cattle disturbance to pond shore habitat has occurred at the single historic locality on the Hoosier National Forest. (Scott et al. 1996). Steve Olson (pers. com.) reports off-road vehicle and horse disturbance.

**Over utilization**

No information found.

**Disease or Predation**

No information found.

**Inadequacy of Existing Regulatory Mechanisms**

No information found.

**Other Natural or Human Factors**

Alteration of hydrology of its wetland habitat and injury by livestock trampling (Deam 1940) are two threats. Urbanization of watershed habitat with resultant pollutants and sedimentation has caused extirpation of a site recently in Virginia (John Townsend, pers. com.).

A site near the Hoosier National Forest, on SR 37 just south of Orleans, was lost in 2002 (Ellen Jacquart, pers. com.) The site was a sinkhole pond on private land on the east side of SR 37 just north of a small business. The pond was filled and leveled out. Plants had not been observed at this site for many years, however (Steve Olson, pers. com.).

**SUMMARY OF LAND OWNERSHIP & EXISTING HABITAT PROTECTION**

Based on Element Occurrence Records in states that do track *Bacopa rotundifolia*, of 43 reported localities, 10 (23%) were protected to some degree, 15 (35%) were on private land, and 18 (42%) were of unknown ownership.

Detailed information by state:

AZ: 2 occurrences

Privately-owned – 2

Based on herbarium and 2004 Natural Diversity Database records. The Database has only one occurrence (Susan Schuetze, per.com).

IN: 13 occurrences

Protected – 1 (believed extirpated)

Hoosier National Forest

Privately-owned – 5

Ownership unknown – 7

MN: 21 occurrences

Protected – 7

State Park

National Monument

Water Fowl Protection Area – USFWS

National Wildlife Refuge

The Nature Conservancy

MN-DNR Parks and Recreation

Privately-owned – 6

Ownership unknown – 8

MT: 4 occurrences

Protected – 2

BLM Area of Critical Environmental Concern

National Wildlife Refuge

Privately-owned land – 2

VA: 2 occurrences

Both occurrences on private, unprotected land. One was reported by Fernald in 1942 and has not been relocated recently despite a lot of effort. Urbanization has negatively affected its watershed habitat with pollutants and sediment. The second site was added to the database in 1987, but may have been known to botanists before the official entry date (John Townsend, pers. com.).

WY: 3 recent collections on land of unknown ownership.

## **SUMMARY OF EXISTING MANAGEMENT ACTIVITIES**

None known.

## **PAST AND CURRENT CONSERVATION ACTIVITIES**

Reestablishment of a population has been attempted at the only known locality on the Hoosier National Forest. In 1996, former Hoosier National Forest Botanist Ellen

Jacquart (pers. com.) noted the Georgia Pond population on the Lost River unit of the Hoosier National Forest was lost due to off road vehicle and horse traffic around the edge of the pond. In 1997 the site was fenced off and the area signed to keep off road vehicles and horses out. “Starts” were taken from a population in a private sinkhole pond near Fredricksburg, Indiana that was being severely impacted by cattle. The starts were planted into Georgia Pond. In 1998, one plant was found at Georgia Pond, nowhere near where the transplants had been planted. Either this was a remnant plant of the original population, or the ones planted in the fall of 1997 floated around and reestablished in new places. Plants were not seen at the Georgia Pond site during 2000, 2001, and 2004 surveys (Larson, pers. com.).

## **RESEARCH AND MONITORING**

### **Existing Surveys, Monitoring, and Research**

None known.

### **Survey Protocol**

N/A.

### **Research Priorities**

Although it has not been seen for several years at its historical locality on the Hoosier National Forest, Roundleaf water-hyssop is easily overlooked (Ellen Jacquart, pers. com.) and may have a persistent seed bank (Homoya pers. com.). Detailed surveys should be conducted over several years to determine if the Georgia Pond site on the Lost River Unit is indeed extirpated.

Given the generally secure status of the plant globally, and its emergence as a weed in some locations, additional research into its biology are probably not warranted. Loss of historic populations in some eastern states is most likely due to alteration of hydrology and disturbance to pond shore habitat. Studies to document the origin and spread of apparently adventive populations in western states would help confirm if this plant is increasing its range.

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## APPENDIX

NaureServe Conservation Status Ranks by State for *Bacopa rotundifolia* (W-10).

Alabama	SR	Mississippi	SR
Arizona	S1	Missouri	SR
Arkansas	SR	Montana	S1
California	SR	Nebraska	SR
Colorado	SR	New Mexico	SR
Idaho	S1	North Carolina	SH
Illinois	S?	North Dakota	SR
Indiana	S1	Oklahoma	SR
Iowa	S3	South Dakota	SR
Kansas	SR	Tennessee	SR
Kentucky	S3S4	Texas	SR
Louisiana	SR	Utah	SR
Maryland	SR	Virginia	S1
Minnesota	S3	Wyoming	S1

Alberta	S1	Saskatchewan	SR
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S1: Extremely rare; typically 5 or fewer known occurrences in the state, or only a few remaining individuals may be especially vulnerable to extirpation.

S2: Very rare; typically between 6 and 20 known occurrences; may be susceptible to becoming extirpated.

S3: Rare to uncommon; typically 21 to 50 known occurrences; S3 ranked species are not yet susceptible to becoming extirpated in the state but may be if additional populations are destroyed.

S4: Common; apparently secure under present conditions; typically 51 or more known occurrences, but may be fewer with many large populations; usually not susceptible to immediate threats.

S5: Very common; demonstrably secure under present conditions.

SX: Species has been determined or presumed to be extirpated. All historical occurrences have been searched, or all known sites have been destroyed and a thorough search of potential habitat has been completed.

SR: Reported from the state, but without persuasive documentation that would provide a basis for either accepting or rejecting the species.

S?: Not enough information available to assess at this time, more field studies and/or specimen identification is needed.

SH: Possibly extirpated (historical); occurred historically and there is some expectation that it may be rediscovered. Its presence may not have been verified in the past 20 years.

SU: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

HYB: Unranked because it represents an interspecific hybrid, not a species.

## LIST OF CONTACTS

### Information Requests

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### **Review Requests**

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