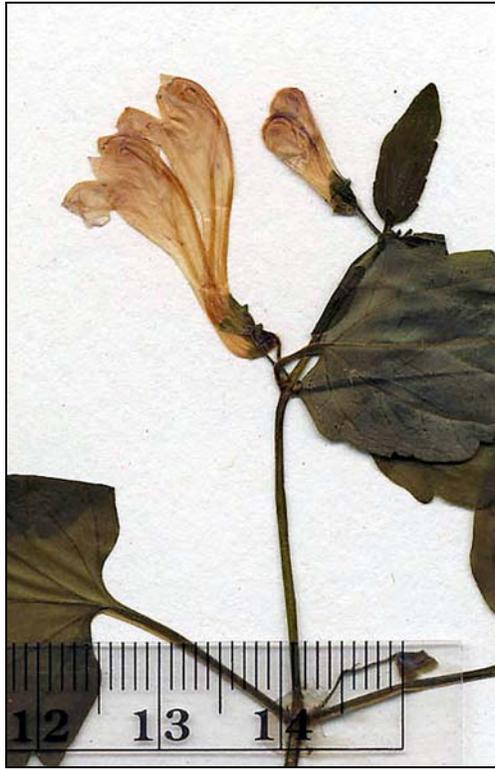


Conservation Assessment
for
Rock skullcap (Scutellaria saxatilis Riddell)



Tennessee Vascular Plants Atlas, University of Tennessee Herbarium

USDA Forest Service, Eastern Region

9/30/04

Rebecca W. Dolan
Butler University
Friesner Herbarium
4600 Sunset Ave.
Indianapolis, IN 46208



This Conservation Assessment was prepared to compile the published and unpublished information on the subject taxon or community; or this document was prepared by another organization and provides information to serve as a Conservation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.

Table of Contents

EXECUTIVE SUMMARY	4
ACKNOWLEDGEMENTS	4
NOMENCLATURE AND TAXONOMY	4
DESCRIPTION OF SPECIES	5
LIFE HISTORY	6
Reproduction	6
Ecology	6
Dispersal/Migration	6
Obligate Associations.....	6
HABITAT	7
Range-wide	7
National Forests	7
Site Specific.....	7
DISTRIBUTION AND ABUNDANCE	9
Range-wide Distribution	9
State and National Forest Distribution.....	10
RANGE WIDE STATUS	10
POPULATION BIOLOGY AND VIABILITY	11
POTENTIAL THREATS.....	11
Present or Threatened Risks to Habitat	11
Over utilization	12
Disease or Predation	12
Inadequacy of Existing Regulatory Mechanisms	12
Other Natural or Human Factors	12
SUMMARY OF LAND OWNERSHIP & EXISTING HABITAT PROTECTION.....	13
SUMMARY OF EXISTING MANAGEMENT ACTIVITIES.....	14
PAST AND CURRENT CONSERVATION ACTIVITIES	14
RESEARCH AND MONITORING	14
Existing Surveys, Monitoring, and Research.....	14
Survey Protocol	14
Research Priorities.....	14
REFERENCES.....	15
APPENDIX	18
LIST OF CONTACTS.....	19
Information Requests	19
Review Requests.....	20

EXECUTIVE SUMMARY

Rock skullcap (*Scutellaria saxatilis* Riddell) is an herbaceous perennial in the mint family. It is generally a plant of rich, often rocky, deciduous woods, but is sometimes found in more open habitat, such as along roadsides. Rock skullcap is distributed throughout the eastern United States, with the exception of New England and Florida. It has a Global Conservation Status rank of G3 and a National rank of N3, indicating it is thought to be vulnerable to extirpation or extinction. It is currently known from 15 states. The plant is listed as Endangered in Maryland, Indiana and Pennsylvania, and as Threatened in Tennessee. It is listed as rare in Kentucky.

At least eighty occurrences are known nationwide, many with more than 1,000 plants. For 121 occurrences tracked by states, 60% are on protected or managed sites, 11% are on private lands, and 29% are on land of unknown ownership.

Rock skullcap is a Regional Forester Sensitive species on the Hoosier, Monongahela, and Wayne National Forests in the USDA Forest Service Region 9. The plant has one occurrence on the Hoosier, six on the Wayne, and thirteen on the Monongahela.

Across its range, Rock skullcap is thought to be threatened by loss of forest canopy (although clearing some small shrubs has increased population size at a site in Great Smoky Mountains National Park). It is a plant of rich, moist woods, appearing to require dense shading. It is also threatened at many sites by competition with invasive exotic species such as stilt grass (*Microstegium vimineum*) and Japanese honeysuckle (*Lonicera japonica*). Flooding and disturbance from access to a privately-owned in-holding are additional threats to the only known population on the Hoosier National Forest. Insect herbivory has been observed on the Wayne National Forest.

Additional inventory work is needed in states where the plant is not tracked to establish true distribution and abundance of this globally uncommon plant. More information is needed on life history and population dynamics.

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

Scutellaria saxatilis Riddell

Published in: *Cat. Ohio Pl. Suppl.* 14. 1836

Common names: Rock skullcap, Smooth skullcap, Smooth rock skullcap

Synonyms: None

Family: Lamiaceae, mint family

DESCRIPTION OF SPECIES

From Gleason and Cronquist (1991), Radford et al. (1968) and The Nature Conservancy Element Stewardship Abstract (1995) and others:

Stems: slender, declined, decumbent or erect, 2-5 dm, simple or branched, commonly glabrous, sometimes obscurely pubescent with curved-ascending hairs;

Leaves: ovate or deltoid-ovate, 2-4 cm long, 1.2-3.5 cm wide, with a few (less than 10) rounded teeth on each side, broadly rounded to cordate at base, long-petioled (0.5-3 cm long);

Bracts: gradually reduced, all or all but the lowest entire;

Racemes: usually solitary, 5-17 cm long, lower bracts leaf-like, reduced upward;

Flowers: pedicels and calyx densely soft-hairy; corolla 13-20 mm, light-blue-violet and white. The nectar guide on the lower lip consists of dark blue spots uniting to form several dark blue bands on a white to light blue background.

Fruit: a brown, wingless nut, 1 mm in diameter, covered with rounded tubercles, 0.8-1.2 mm long.

Scutellaria saxatilis can be distinguished from other skullcaps by virtue of its reclining habit and cordate leaves (Hedge et al. 2002). It also has flowers in terminal racemes, or also in accessory lateral racemes arising from the upper axils but regularly subordinate to the terminal, a corolla tube without a terminal ring of hairs, and the stem (at the middle) is glabrous or very sparsely and minutely pubescent with eglandular curved-ascending hairs (Gleason and Cronquist 1991).

Gleason and Cronquist (1991) state Rock Skullcap is most often confused with *S. ovata*. However, *S. ovata* has pubescent stems, with simple or glandular, spreading decurved hairs, well-differentiated racemes, bracts entire and quite unlike the crenate leaves. It also has longer leaves and is not decumbent (Ohio Department of Natural Resources

1983). *S. saxatilis* has 1-sided racemes, lowest bracts petioled, *S. ovata* racemes not 1-sided and bracts sessile (Radford et al. 1968).

It can also be confused with *S. arguta* (Gleason and Cronquist 1991), which has pubescent stems, with simple or glandular, spreading decurved hairs, racemes poorly differentiated, and the lowest bracts much like the upper leaves, many or most of the bracts dentate.

Radford et al (1968) say it is similar to *S. lateriflora* in the southeast. Shape of the leaf bases (cordate, truncate, cuneate, or obtuse) is important, leading to a different place in their key. Rock Skullcap can be distinguished from *S. incana* by racemes not 1-sided, principal leaf blades cuneate, and decurrent on the petiole.

Rock skullcap may also be confused with *Meehanian cordata*, but it has leaves and upper stems covered with hairs and the calyx does not have pubescence on the tube (The Nature Conservancy 1995).

LIFE HISTORY

Scutellaria saxatilis is an herbaceous perennial.

Reproduction

Sexual reproduction is via seeds from flowers borne in July and August. The plant also spreads asexually via runners.

Ecology

Rock skullcap does not tolerate competition from other ground flora (M. Ortt, retired Field Botanist with the Ohio Department of Natural Resources, cited in USDA, Wayne National Forest, Species Data Collection Form, 2003). Its habitat and positive response to clearing of small trees in the Smokey Mountains (Janet Rock, pers. com.) suggest it may be a canopy gap species. Pollinators of the plant are not known.

Dispersal/Migration

No information found.

Obligate Associations

No information found.

HABITAT

Range-wide

Rock skullcap is a plant of rich deciduous woods. Gleason and Cronquist (1991) cite woods, hillsides and moist cliffs, chiefly in the mountains. In Ohio, it is found in semi-shady habitats (Ohio Department of Natural Resources 1983). Habitat in Indiana includes the tops of sandstone boulders (Yatskievych 2000). In eastern Kentucky, it grows in rich mesophytic ravines (Debroah White, pers. com.)

National Forests

The plant is found on north-facing slopes of moist, wooded, rocky hills and cliffs on the Hoosier National Forest in Indiana. (Hedge et al. 2002, Olson et al. 1990). In Ohio on the Wayne National Forest, it is found in dry woods, moist areas along streams, rocky woods, talus slopes, and bluffs (McCartney and Goodwin 2003).

A 2002 survey on the Monongahela National in West Virginia found 13 populations on south-facing, mesic slopes of 20 degrees, with a canopy of predominately sugar maple and American basswood on sandstone “chutes” with deep moss accumulation. (Melissa Thomas-Van Gundy, pers. com.)

Site Specific

On the Hoosier National Forest, the plant is found along the Little Blue River in Crawford County. Habitat on the site is north-facing slopes of moist, wooded, rocky hills and cliffs. Associated species include *Quercus rubra*, *Acer saccharum*, *Aesculus glabra*, *Phacelia bipinnatifida*, *Pilea pumila*, *Asarum canadense*, *Dryopteris marginalis*, *Parthenocissus virginiana*, *Hepatica acutiloba*, *Hydrangea arborescens*, and *Staphylea trifolia* (Hedge et al. 2002).

The site, known as Carnes Mill Preserve, is co-managed by The Nature Conservancy. Their website (W-5) states: “Most of the preserve contains a steep, old growth deciduous forest along a rugged sandstone outcrop overlooking the Little Blue River. A profusion of ferns, mosses, and lichens cover the rocks, cliff sides, and forest floor. Plants in the area include rock skullcap (*Scutellaria saxatilis*), mountain laurel (*Kalmia latifolia*), barren strawberry (*Waldsteinia fragarioides*) and hairy wood mint (*Blephilia hirsuta*). Also present are wild ginger (*Asarum canadense*), silvery spleenwort (*Athyrium thelypteroides*) and black maple (*Acer nigrum*). The rough terrain and rich flora help make this an exquisitely scenic site.” The species was first discovered at this site in 1927 by Charles Deam (Deam 1940).

On the Wayne National Forest in Ohio, three sites were known on the Ironton Ranger District prior to 2004 (Cheryl Coon, pers. com.). Two other sites were not

relocated during 1994 surveys, but *Meehania cordata* was, indicating the original records, based on sight reports, may have been misidentified. A population was located in 1994 along a horse trail north of the Iron Ridge Campground. The site is a mixed mesophytic woods with buckeye, chestnut oak, and tulip poplar. Associates included *Cornus florida*, *Desmodium nudiflorum*, *Smilax rotundifolia*, *Iris cristata*, *Prenanthes altissima*, *Solidago* sp., *Viburnum acerifolium*, and *Parthenocissus quinquefolia*.

A second site is south of the campground. Plants were found scattered on the east side of a horse trail in mixed mesophytic woods with white oak, buckeye, and sugar maple. Associates included *Osmorhiza longistylis*, *Circaea quadrisulcata*, *Asarum canadense*, *Uvularia* sp., *Phegopteris hexagonoptera*, *Adiantum pedatum*, *Cimicifuga racemosa*, *Arisaema triphyllum*, and *Viburnum prunifolium*.

The third site is primarily on private land. Plants are scattered over a large area of mixed mesophytic woods on a south-facing slope with red oak and sugar maple. Spicebush was scattered in the understory. Associates included *Desmodium nudiflorum*, *Podophyllum peltatum*, *Asarum canadense*, *Arisaema triphyllum*, *Iris cristata*, *Parthenocissus quinquefolia*, *Cimicifuga racemosa*, *Circaea quadrisulcata*, and *Dioscorea quaternata*.

Records report that plants at the first two sites were much different from typical decumbent specimens. They were small and erect. At the third site, some plants were lax and decumbent in habit, others short and erect.

Three new occurrences were located during 2004 (Cheryl Coon, pers. com.), also on the Irontown Unit. One population was along an old logging road on a ridgetop, with lots of *Smilax rotundifolia*. Another was also a ridgetop location along an old road. The third was on a northeast-facing slope approximately 100 feet about a stream clustered around the base of a large oak tree.

Detailed information on specific recent occurrences on the Monongahela National Forest are in Table 1, prepared by Melissa Thomas-Van Gundy (pers. com.). Elderberry and wood nettle were often associated with Rock skullcap at these sites.

Table 1. Compartment, stand, number of plants, and some stand descriptions for populations found on the Forest in the Upper Williams River area in 2002.

Stand Identification	Number of Populations	Number of plants	Forest type	Stand age (age of overstory trees in 2004)
09210400017008	1	500+	Sugar maple – beech/yellow birch	34
09210400017012	1	500+	Mixed upland hardwoods	76
09210400017017	3	50-100/500+/50+	Mixed upland hardwoods	71
09210400017018	1	100+	Sugar maple – beech/yellow birch	81
09210400017025	2	25-50/1500+	Mixed upland hardwoods	74
09210400017050	1	100+	Red spruce	61
09210400017070	1	500+	Mixed upland hardwoods	68
09210400017081	1	50+	Mixed upland hardwoods	77
09210400017046	1	10-20	Mixed upland hardwoods	74
09210400017082	1		Mixed upland hardwoods	76

DISTRIBUTION AND ABUNDANCE

Rock skullcap is found in the eastern United States, with the exception of New England and Florida. Its western-most location is Arkansas (W-6).

At least 80 localities are known nation-wide (W-6). It is common enough that it is not tracked in all states where it occurs. Many sites have more than 1,000 plants, but the species is rhizomatous and there may be many more ramets than genets. During a recent survey of a rich cove in Tennessee, Cherokee National Forest Botanist Mark Pistrang found a site where rock skullcap was the understory dominant (pers. com.). It is reported for Ohio to be a fairly abundant plant that is “rather inconspicuous and may be overlooked” (Ohio Department of Natural Resources 1983). Deam (1940) reported it to be “a rare plant throughout its general range.”

Jim Allison (pers. com.) reports the plant is not confirmed from Georgia. “A mislabeled Walker County collection was actually *S. ovata*. My 1988 Decatur County, Georgia and Henry County, Ala. collections were determined "*S. saxatilis*?" by Bert Pitman, the basis for the only [I think] report from Alabama. I recently concluded that both collections were actually *S. incana* var. *australis*.”

State and National Forest Distribution

Rock skullcap is a Regional Forester Sensitive species on the Hoosier, Wayne and Monongahela National Forests. Records of the Indiana Natural Heritage Database (2002) show one locality on the Hoosier National Forest, Carnes Mill Preserve, co-managed by The Nature Conservancy, along the Little Blue River in Crawford County. 101-1000 plants were seen at this site in both 1989 and 2000. The plant was reported to be thriving in 1990 (Olson et al. 1990). Approximately 100 plants were seen in 2002 (Hedge et al. 2002). Concerns about the presence of invasive exotics at the site were stated in this report. It also stated the likeliness of additional populations being found in the forest was low. The only other record for Indiana is a site last seen by Deam in 1940.

For the Wayne National Forest, numbers of plants for 3 sites on the Ironton Ranger District are reported (Cheryl Coon, pers. com.). Two sites had approximately 100 plants, with only 3 plants in flower at one and 12 at the other. One had more than 100 plants with at least 25 in flower or fruit. For three occurrences discovered in 2004, all plants looked healthy and approximately 75% of plants were in flower or fruit.

On the Monongahela National Forest, a 2002 survey of a possible timber harvest area located 13 populations (considered one occurrence by the West Virginia Natural Heritage Program) with from 10 to over 1,500 plants (Melissa Thomas-Van Gundy, pers. com.). Plants were reported to be abundant and vigorous (see Table 1).

RANGE WIDE STATUS

Scutellaria saxatilis has a Global Conservation Status rank of G3 (W-6). This status is used for taxa deemed vulnerable to extirpation or extinction. It has a National ranking of N3 in the United States, reflecting the same status. It is a Regional Forester Sensitive species on the Hoosier, Monongahela, and Wayne National Forests in the USDA Forest Service Region 9.

Sixteen states have sub-national rankings for rock skullcap. It is SR in AR, DC, NJ, and SC. This ranking means the plant is reported from these states, but without persuasive documentation that would provide a basis for either accepting or rejecting the species. It is ranked SH in DE, meaning it is possibly extirpated.

AL, GA, IN, MD, NC, PA and WV rank the plant S1, indicating it is extremely rare; typically 5 or fewer known occurrences in the state, or only a few remaining individuals; may be especially vulnerable to extirpation. It is slightly more common in TN, where it

is ranked S2 (very rare; typically between 6 and 20 known occurrences; may be susceptible to becoming extirpated).

Two states, OH and VA, rank the plant as slightly more secure, with a rank of S2S3, somewhere between the status of S2 and S3. S3 indicates a taxon is 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.

Finally, VA ranks rock skullcap S3S4, with S4 meaning the plant is common and 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.

It is listed as Endangered (= critically imperiled) in Maryland, Indiana and Pennsylvania and as Threatened in Tennessee. It is listed as rare in Kentucky. In Ohio, the plant has moved from being listed as Endangered (1980-1981) to threatened (1982-1991) to its current status as potentially threatened.

POPULATION BIOLOGY AND VIABILITY

Very little is known of the population biology of this plant. There are no long-term records of population monitoring. The single known current site in Indiana, on the Hoosier National Forest, was first discovered in 1927, rediscovered in 1986, and was reported to be “thriving” in 2002 (Hedge et al. 2002). 101- 1,000 plants were reported at the site in 1989 and 2000 (Indiana Natural Heritage Database 2002). This suggests the plant can be persistent.

POTENTIAL THREATS

Present or Threatened Risks to Habitat

Across its range, Rock skullcap is thought to be threatened by loss of forest canopy (W-6). It is generally considered a plant of rich, moist woods, requiring dense shading. This suggests sites should be protected from logging and other actions that would reduce forest canopy cover. However, it is not known if its preference is for dense shade, adequate soil moisture, or both. In addition, clearing some small shrubs that appeared to be crowding Rock skullcap plants has increased population size at a site in Great Smoky Mountains National Park (Janet Rock, pers. com.), however considerable canopy remains over the population. There is anecdotal evidence (Ohio DNR statement of semi-shay habitats, and a Monongahela National Forest occurrence in a 34 year old stand) that dense shade is not required throughout the range of Rock skullcap (Melissa Thomas-Van Gundy, pers. com.). One site on the Monongahela is adjacent to the clearing of a two-lane highway.

Olson et al. (1990) report disturbance from access to a privately-owned in-holding on the Hoosier National Forest and occasional flooding at the site is listed in the Hoosier National Forest risk evaluation (1999). The Element Occurrence record in the Indiana Natural Heritage Database (2002) also lists competition from non-native species (*Glechoma hederacea*, *Lonicera japonica*, and *Stellaria media*). Ellen Jacquart (pers. com.), former Botanist on the Hoosier reports that when she was last at the site 8 years ago Japanese honeysuckle was moving in and that there was potential that Japanese stilt grass (*Microstegium vimineum*) is now in the floodplain and threatening the plants. Likewise, in the Great Smoky Mountains National Park, plants have been threatened by Japanese stilt grass. (Janet Rock, pers com.).

Insect herbivory, mostly foliar, has been noted in populations on the Wayne National Forest (Chery Coon, pers. com.).

On the Monongahela National Forest, major threats reported are loss of shade (moisture is an important component, along with rocky habitat) and competition from invasives (Melissa Thomas-Van Gundy, pers. com.). Plants discovered during a recent survey for a timber harvest were mostly protected by a harvest layout designed to protect riparian areas. Plants outside riparian buffers were recommended to receive no-harvest buffers and or small portions of the harvest units were dropped from the proposal to protect the plants.

Over utilization

No information found.

Disease or Predation

Insect herbivory, mostly foliar, has been noted in populations on the Wayne National Forest (Cheryl Coon, pers. com.).

Inadequacy of Existing Regulatory Mechanisms

No information found.

Other Natural or Human Factors

Unknown, but perhaps soil compaction and exposure to sunlight after logging in Ohio (Ohio Department of Natural Resources 1983). The Alabama Element Stewardship (1983) report suggests *S. saxatilis* needs preserves large enough to allow for population expansion and to buffer from surrounding disturbance. The plant requires moist, shaded habitat. Grazing and recreational use of habitat resulting in trampling are also threats (W-6). State mowing crews are mentioned as threats to roadside populations in North Carolina (North Carolina Natural Heritage Database 2004), again suggesting dense shade is not always a requirement for Rock skullcap.

SUMMARY OF LAND OWNERSHIP & EXISTING HABITAT PROTECTION

There are 73 occurrences known to be protected by the following agencies or organizations: Indiana (Hoosier National Forest), Kentucky (Daniel Boone National Forest, Grayson Lake Wildlife Management Area), Maryland (National Park and National Battlefield), North Carolina (Pisgah National Forest and a State Park), Ohio (Shawnee State Forest, The Nature Conservancy Preserve, Wayne National Forest), Pennsylvania (State Game Commission, Bureau of State Parks), Tennessee (Cherokee National Forest), West Virginia (Monongahela National Forest, State and National Park).

Ownership as determined by state Natural Heritage Database records is presented in the table below:

State	Ranking	Total Occurrences	protected	private	unknown
AL	S1	0			
IN	S	2	1	0	1
KY	S2S3	4	1	0	3
MD	S1	2	2	0	0
PA	S1	21	5	2	14
TN	S2S3	53	43	1	9
NC	S1	16	7	4	5
OH	S2S3	23	14	6	3
VA	S3S4	not tracked			
WV	S1	12 counties	?	?	?
GA	S1	0			

For West Virginia, 7 occurrences are recent county records and 5 are historic records (Brian McDonald, pers. com.). The plant is not currently tracked in the state.

For 121 occurrences tracked by states, 60% are on protected or managed sites, 11% are on private lands, and 29% are on land of unknown ownership.

SUMMARY OF EXISTING MANAGEMENT ACTIVITIES

Invasive exotic species are removed at some sites. Understory species have been removed in the Great Smoky Mountains National Park to reduce crowding. Plants appear to have responded favorably (Janet Rock, pers. com.).

PAST AND CURRENT CONSERVATION ACTIVITIES

No information found.

RESEARCH AND MONITORING

Existing Surveys, Monitoring, and Research

In the Great Smoky Mountains National Park, there are several occurrences of Rock skullcap. One is monitored due to concerns over its status due to its location near a trail where it is at risk of trampling (Janet Rock, pers. com.). The population was in decline from 1991 (531 plants) to 2000 (56 plants) but trailside maintenance (causing disturbance to the site) and trampling were not evident. In 2001, some saplings were cleared from the area to increase light which gave the population a boost in 2002 (718 plants). Surveys in 2003 found 409 plants. If numbers continue to decline, they will consider mechanical clearing again (Janet Rock, pers. com.).

Botanists on the Wayne National Forest in Ohio sporadically monitor the population in Lawrence Co. Total plant number and number in flower/fruit are recorded (datasheets from 1992, most recent 1998, no summary report) (Cheryl Coon, pers. com.).

Survey Protocol

None available.

Research Priorities

There is some suggestion mountain and coastal plain populations may be distinct taxa (Alabama Natural Heritage Program 1998). Additional inventory work is needed in states where the plant is not tracked to establish true distribution and abundance of this globally rare plant. How populations of the plant are delineated needs clarification. More information is needed on life history, population dynamics, and habitat preference.

REFERENCES

- Alabama Natural Heritage Database. 2004. Element Occurrence Records: *Scutellaria saxatilis*. Alabama Natural Heritage Program 1 record.
- Alabama Natural Heritage Program. 1998. Element Stewardship Account: *Scutellaria saxatilis*.
- Alabama Natural Heritage Program. n.d.. Element Global Ranking Form: *Scutellaria saxatilis*.
- Brown, M. L. and R. G. Brown. 1984. Herbaceous plants of Maryland (p. 797). Port City Press, Inc: Baltimore.
- Deam, C. C. 1940. Flora of Indiana (p. 804). Indianapolis, IN: Department of Conservation, Division of Forestry.
- Gleason, H. A. and A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada 2nd ed (p. 437). New York: New York Botanical Garden.
- Hedge, C., M. Homoya, and P. Scott. 2002. Endangered, threatened, and rare plant species of the Hoosier National Forest. US Forest Service, Hoosier National Forest, and Indiana Department of Natural Resources, Division of Nature Preserves.
- Holmgren, N. H. 1998. Illustrated companion to Gleason and Cronquist's manual: illustrations of the vascular plants of northeastern United States and adjacent Canada (p. 410). New York: New York Botanical Garden.
- Indiana Natural Heritage Database. 2002. Element Occurrence Record: *Scutellaria saxatilis*. Indiana Department of Natural Resources. 2 records.
- Joshee, N., T. S. Patrick, R. S. Mentreddy, and A. K. Yadav. 2002. Skullcap: potential medicine crop. *In*: Trends in New Crops and New Uses, J. Janick and A. Whipkey, eds. ASHS Press, Alexandria, VA.
- Kartesz, J. T. 1994. A synonymized checklist of the vascular flora of the United States, Canada, and Greenland, Vol. 1, 2nd ed. (p. 352-353). Biota of North America Program, North Carolina Botanical Garden. Portland Oregon: Timber Press.
- Kentucky Natural Heritage Database. 2004. Element Occurrence Record: *Scutellaria saxatilis*. Indiana Department of Natural Resources. 13 records.

- McCartney, D. and M. Goodwin. 2003. Species Data Collection Form for *Scutellaria saxatilis*, report to the Wayne National Forest.
- Morton, C. M., C. J. Hansen, and G. Gil. 2002. Checklist of the vascular plants of Alabama from the John D. Freeman Herbarium and the University of Alabama Herbarium (p. 36). Carnegie Museum of Natural History special publication no. 21: Pittsburgh.
- North Carolina Natural Heritage Program. 1998. Element Stewardship Account: *Scutellaria saxatilis*.
- North Carolina Natural Heritage Database. 2004. Element Occurrence Record: *Scutellaria saxatilis*. North Carolina Department of Natural Resources. 16 records.
- Olson, S., C. L. Hedge, M. A. Homoya, and C. M. LeBlanc. 1990. Inventory of endangered, threatened, and rare plant species in the Tell City district of the Hoosier National Forest (p. 237-239). Indiana Department of Natural Resources, Division of Nature Preserves.
- Ohio Department of Natural Resources. 1983. Element Stewardship Account: *Scutellaria saxatilis*.
- Ohio Natural Heritage Database. 2004. Element Occurrence Record: *Scutellaria saxatilis*. Ohio Department of Natural Resources. 23 records.
- Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the vascular flora of the Carolinas (p. 900). Chapel Hill, NC: The University of North Carolina Press.
- Rhoads, A. F. and W. M. Klein, Jr. 1993. The vascular flora of Pennsylvania annotated checklist and atlas (p. 318). Philadelphia, PA: American Philosophical Society.
- Tatnall, R. R. 1946. Flora of Delaware and the Eastern shore (p. 219). Delaware: The Society of Natural History of Delaware.
- Tennessee Natural Heritage Database. 2004. Element Occurrence Record: *Scutellaria saxatilis*. Tennessee Department of Natural Resources. 53 records.
- The Nature Conservancy. 1995. Element Stewardship Abstract for *Scutellaria saxatilis*.
- USDA Forest Service, Wayne National Forest. 2003. Species Data Collection Form: *Scutellaria saxatilis*, prepared by Deborah McCartney and Mark Goodwin.
- Yatskievych, K. 2000. Field guide to Indiana wildflowers, number 867. Bloomington, Indiana: Indiana University Press.

Web references

- W-1. The Biota of North America Program, and The Texas A&M Bioinformatics Working Group. <http://www.csdl.tamu.edu/FLORA>.
- W-2. Integrated Taxonomic Information System (ITIS). <http://www.itis.usda.gov>.
- W-3. Lake Michigan Monitoring Coordination Council (LMMCC) – Wildlife Work Group: summary of priority species for relevant states and agencies. <http://wi.water.usgs.gov/lmmcc/workgroups/wildlife/plants.pdf>.
- W-4. Missouri Botanical Garden. Available: http://mobot.mobot.org/cgi-bin/search_vast.
- W-5. The Nature Conservancy. <http://nature.org/wherewework/northamerica/states/Indiana/work/art8122.html>.
- W-6. NatureServe Explorer: An online encyclopedia of life. <http://www.natureserve.org/explorer>.
- W-7. Ohio Department of Natural Resources, Division of Natural Areas and Preserves. <http://www.dnr.state.oh.us/odnr/dnap/Abstracts/S/scutsaxa.htm>.
- W-8. Ohio Natural Heritage Database: Lawrence County. <http://www.dnr.state.oh.us/dnap/heritage/counties/lawrence.html>.
- W-9. Ohio Natural Heritage Database: Meigs County. <http://www.dnr.state.oh.us/dnap/heritage/counties/meigs.html>.
- W-10. Ohio Natural Heritage Database: Vinton County. <http://www.dnr.state.oh.us/dnap/heritage/counties/vinton.html>.
- W-11. Regional forester sensitive plants. USDA Forest Service, Region 9. http://www.fs.fed.us/r9/wildlife/tes/docs/rfss_plants_083002.pdf.
- W-12. Regional Forester summary of effects of RFSS Plant and Animal Species. http://fs.fed.us/r9/hoosier/project_docs/eas/braun_ea_predec_app_e.pdf.
- W-13. University of Tennessee Herbarium, Tennessee Vascular Plants Atlas. <http://www.tenn.bio.utk.edu/vascular/database>.
- W-14. USDA and NRCS PLANTS Profile. <http://plants.usda.gov>.

APPENDIX

State Heritage rankings (from W-6).

Alabama	S1	New Jersey	SR
Arkansas	SR	North Carolina	S1
Delaware	SH	Ohio	S2
District of Columbia	SR	Pennsylvania	S1
Georgia	S1	South Carolina	SR
Indiana	S1	Tennessee	S2
Kentucky	S2S3	Virginia	S3S4
Maryland	S1	West Virginia	S1

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

- AL: Al Schotz, Botanist/Community Ecologist, Alabama Natural Heritage Program.
aschotz@alnhp.org.
- Michael Barbour, Science Information Program Manager. Alabama Natural Heritage Program. mbarbour@anhp.org.
- GA: Jim Allison, Botanist, Georgia Natural Heritage Program.
Jim_Allison@dnr.stste.ga.us.
- IN: Kirk Larson, Botanist, Hoosier National Forest. kwlarson@fs.fed.us.
- Mike Homoya, Botanist, Division of Nature Preserves, Indiana Department of Natural Resources. mhomoya@dnr.state.in.us.
- Ellen Jacquart, Indiana Field Office, The Nature Conservancy. ejacquart@tnc.org.
- Steve Olson, Botanist, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands. solson01@fs.fed.us.
- KY: Deborah White. Botanist and Heritage Branch Manager. Kentucky State Nature reserves Commission. Deborah.White@ky.gov.
- MD: Chris Frye, Maryland Department of Natural Resources. CFrye@dnr.state.md.us.
- NC: Mistry Franklin, Botanist, North Carolina Natural Heritage Program.
mistry.franklin.ncmail.net.
- NY: Nick Conrad, New York Natural Heritage Database, New York Department of Conservation. nbconrad@gw.dec.state.ny.us.
- Troy Welty, Botanist, New York Natural Heritage Program New York Department of Conservation. twwelty@gw.dec.state.ny.us.
- OH: Cheryl Coon, Botanist, Wayne National Forest. ccoon@fs.fed.us.

PA: Susan Klugman, GIS Manager, The Nature Conservancy/PA Natural Heritage Program. c-sklugman@state.pa.us.

John Kunsman, Botanist, PA Natural Heritage Program. c-jkunsman@state.pa.us.

TN: Roger McCoy, Natural Heritage Inventory Coordinator, Tennessee Division of Natural Heritage. roger.mccoy@state.tn.us.

Mark Pistrang, Botanist, Cherokee National Forest. 423-476-9700.

VA: John Townsend, Staff Botanist, Virginia Department of Conservation and Recreation. John.Townsend@dcr.virginia.gov.

WV: Brian McDonald, Natural Heritage Program, Wildlife Resource Section WV Division of Natural Resources. bmcDonald@dnr.state.wv.us.

Melissa Thomas-Van Gundy, Forest Ecologist, Monongahela National Forest. mthomasvangundy@fs.fed.us.

NPS: Janet Rock, Botanist, Great Smoky Mountains National Park. Janet_Rock@nps.gov.

Review Requests

Cheryl Coon, Botanist, Wayne National Forest. ccoon@fs.fed.us.

Steve Olson, Botanist, Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands. solson01@fs.fed.us

Melissa Thomas-Van Gundy, Forest Ecologist, Monongahela National Forest. mthomasvangundy@fs.fed.us