

U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Helianthus verticillatus* Small

COMMON NAME: whorled sunflower

LEAD REGION: 4

INFORMATION CURRENT AS OF: March 2010

STATUS/ACTION

Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

New candidate

Continuing candidate

Non-petitioned

Petitioned - Date petition received: May 11, 2004

90-day positive - FR date:

12-month warranted but precluded - FR date:

Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

Latest Date species became a Candidate: October 1, 1999

Candidate removal: Former LPN:

A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

F – Range is no longer a U.S. territory.

I – Insufficient information exists on biological vulnerability and threats to support listing.

M – Taxon mistakenly included in past notice of review.

- N – Taxon does not meet the Act’s definition of “species.”
 X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering Plants - Asteraceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama, Georgia, and Tennessee

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Alabama (Cherokee County), Georgia (Floyd County), & Tennessee (Madison and McNairy Counties)

LAND OWNERSHIP: All known populations of this species occur on private land. The Campbell Group, a timberland investment advisory firm, owns the sites in Alabama and Georgia. The majority of the Georgia plants are in a 929-acre conservation easement area with The Nature Conservancy. This conservation easement was set aside by the previous landowner, Temple-Inland Container Corporation. Plants extend onto a railroad right-of-way at two sites in Tennessee and onto a public roadside in Alabama.

LEAD REGION CONTACT: Rob Tawes, 404-679-7142, robert_tawes@fws.gov

LEAD FIELD OFFICE CONTACT: Cookeville, Tennessee Field Office, Geoff Call, 931-528-6481, ext. 213, geoff_call@fws.gov

BIOLOGICAL INFORMATION

Species Description

Helianthus verticillatus, a member of the sunflower family, is a perennial arising from horizontal tuberous-thickened roots with slender rhizomes. The stems are slender, erect, and up to 2 meters (m) (6 feet (ft)) tall. The leaves are opposite on the lower stem; verticillate (whorled) in groups of 3 to 4 at the mid-stem; and alternate or opposite in the inflorescence at the end. Individual leaves are firm in texture and have a prominent mid-vein. The leaves are linear-lanceolate in shape, narrowing at the tip to a point, and 7.5 to 18.5 centimeters (cm) (3.0 to 7.2 inches (in.)) long and 0.7 to 2.0 cm (0.3 to 0.8 in.) wide. The flowers are arranged in a branched inflorescence typically consisting of 3 to 7 heads. The heads are about 1 cm high (0.4 in.), 1.5 cm (0.6 in.) wide, and have deep yellow ray flowers and lighter yellow disk flowers. The seeds are 4 to 5 millimeters (0.2 in.) long.

Several members of the aster family are similar in appearance to *H. verticillatus*, with minor morphological differences being apparent. *Helianthus grosseserratus* is similar to *H. verticillatus* but its leaves typically are arranged in an alternating pattern, which differs from the whorled arrangement of *H. verticillatus*. *H. angustifolius* can be confused with *H. verticillatus* but it has narrower leaves and reddish disk flowers, as opposed to the yellow disk flowers of *H. verticillatus* (Schotz 2001, p. 1). *H. giganteus* often exhibits whorled leaves but *H. verticillatus* leaves have only the midvein prominent as opposed to *H. giganteus* which has lateral veins evident on the leaves (Matthews et al. 2002, p.22).

Taxonomy

Helianthus verticillatus was described in 1898 by J.K. Small, based on a collection by S.M. Bain from Chester County, Tennessee, in 1892 (Nordman 1998, p. 1). Small distinguished it from the related *H. giganteus* by its mostly whorled leaves, glabrous stems, narrow, entire leaf blades, and its narrowly linear-lanceolate involucre bracts. No additional collections of this species had been made when Beatley (1963 cited in Matthews et al. 2002, p. 20) speculated that the specimens from this single collection site (which lacked basal parts and mature achenes) perhaps represented a single aberrant individual formed from hybridization of an opposite- and alternate-leaved *Helianthus* species. With no new material to examine, Heiser (1969 cited in Matthews et al. 2002, p. 20) and Cronquist (1980, p. 36) accepted Beatley's suggestion that *H. verticillatus* was a hybrid.

The rediscovery of the species in 1994 provided ample material for reexamination of this species' taxonomic status. Plants throughout these new populations were found to conform to the morphology of the type collection of *H. verticillatus*. Morphological studies and root-tip chromosome counts by Matthews et al. (2002, p. 17-23) validated this taxon's status as a distinct, diploid species.

The taxonomic validity of this species was again confirmed through genetic studies by Ellis et al. (2006, p. 2345-2355). Their studies showed that *H. verticillatus* is a good taxonomic species of non-hybrid origin through comparative genetic studies with its putative parents, *H. grosserratus* and *H. angustifolius* (Ellis et al. 2006, p. 2351-2352).

Habitat

This species is found in moist, prairie-like openings in woodlands and along adjacent creeks. Soils are sandy clays which are alkaline, high in organic matter, and seasonally wet. The soil type in the wet prairie habitat in northwest Georgia is likely of the Ketona series (Matthews et al. 2002, p. 17) and in Alabama, populations inhabit the Gaylesville silty clay loam soils (Schotz 2001, p. 3). These series consist of deep, poorly, drained, slowly permeable soils formed from limestone. They are on floodplains and depressed areas in limestone valleys. They are saturated with water in late winter and early spring and subject to flooding. In Madison County, Tennessee, the population is on Falaya silt loam, from alluvial deposits of Tertiary Porters Creek Clay (Matthews et al. 2002, p. 17). The soil type at the McNairy County, Tennessee, site is Bibb fine sandy loam, frequently flooded in winter and spring and poorly drained (Bishop, pers. comm., 2008).

The list of associated species in these habitats indicates a community with strong prairie affinities. Dominant grasses of the tall grass prairie are present including *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indian grass), *Andropogon gerardii* (big bluestem), and *Panicum virgatum* (switch grass). Other common associates include *Carex cherokeensis*, *Sporobolus heterolepis*, *Physostegia virginiana*, *Silphium terebinthinaceum*, *Pycnanthemum virginianum*, *Symphotrichum novae-angliae*, *Hypericum sphaerocarpum*, *H. angustifolius*, and *Helenium autumnale* (Matthews et al. 2002, p. 23; Schotz 2001, p. 3). These areas are also habitat for a number of other rare species including *Marshallia mohrii* (Mohr's Barbara's buttons), which is federally listed as threatened.

Life History

Helianthus verticillatus is a clonal perennial which flowers from August into October (Matthews et al. 2002, p. 17-20; Ellis 2006, p. 1). There is little information available on the life history of this species, and it is unclear why *H. verticillatus* is so rare. This species may represent a narrow endemic or a relict species that was once more extensive in range (Ellis et al. 2006, p. 2352).

Helianthus verticillatus has been shown to have a high level of genetic diversity at the population and species level despite its apparent rarity, thus Ellis et al. (2006, pp. 2351-2352) speculate that this is indicative of a species that was more widespread in the past and perhaps became rare relatively recently.

Helianthus verticillatus has been grown in cultivation and seed germination is high in the laboratory. Upon transplanting, this species has been shown to reproduce rapidly from rhizomes, forming a dense colony. The stems can reach over 4 meters (m) [13 feet (ft)] in height, but the heights of the stems decreased to about 2 m (6 ft) with age (Matthews et al. 2002, 17-20).

Historical Range/Distribution

There is little information on the historical range of this species. After the first collection of *H. verticillatus* in 1892 from Chester County, Tennessee, this species was not documented again for over 100 years until, in 1994, Allison (1997, p. 143; 2002, p. 1) identified a 1993 specimen collected by Ware from a prairie area in Floyd County, Georgia, as *H. verticillatus*. In 1996, Allison and A. Schotz discovered a second population in a remnant strip of prairie in Cherokee County, Alabama, about 3.2 kilometers (km) [2 miles (mi)] west of the Georgia locality. Nordman (1998, p. 1-2) rediscovered the species in Tennessee with his 1998 collection near Pinson in Madison County. Pinson is about 10 km (6.3 mi) northwest of Henderson, the locality given for Bain's 1892 collection. Nordman surveyed Chester and Madison Counties, Tennessee, along with four contiguous counties and found no other populations (Nordman 1999, p. 1-4). In 1999, Schotz (2001, p. 1, 10) found a second occurrence in Alabama, about 2 km (1.2 mi) southwest of the Alabama population that was found in 1996. Continued surveying in Floyd County, Georgia, has revealed several additional local populations in the general area of the original Floyd County population (Allison 2002, p. 1). An additional population was located in McNairy County, Tennessee, in 2006 during a systematic survey (Tennessee Division of Natural Areas 2008, p. 2).

Current Range/Distribution

Currently, there are a total of seven sites known for this species which represent five populations: Floyd County, Georgia (three sites, separated from one another by a distance of 1 mile or less, that make up one population), Cherokee County, Alabama (two sites that make up two populations), and McNairy and Madison Counties, Tennessee (one site and one population per county).

Population Estimates/Status

Status surveys have been conducted for this species throughout its range (Nordman 1998, p. 1-17; 1999, p. 1-5; Schotz 2001, p. 1-14; Allison 2002, p. 1-2; Lincicome 2003, p. 1-2). Despite these extensive surveys, population numbers have remained low. Schotz (2001, pp. 1, 10) located 1 new population out of 44 attempts, representing a success rate of only 2 percent. Surveys during 2000 and 2002 in Tennessee were unsuccessful at locating any additional sites

(Lincicome 2003, p. 1-2). However, in 2006, one new site was found in Tennessee (Tennessee Division of Natural Areas 2008, p. 2).

It is difficult to determine the exact number of plants due to the species' clonal nature; however, estimates of population sizes have been made in the past by counting stems (Allison 2002, p. 3-8; Schotz 2001, p. 8-10). Ellis (2006, p. 2-3; et al. 2006, p. 2351) found that the genetic population size is much smaller than the number of stems in a population and that a more accurate population census could be made at most *H. verticillatus* sites by counting obvious clusters of stems rather than individual stems. Plants were found growing along a railroad right-of-way, in an adjacent hayfield, along a roadside right-of-way, and along a nearby creek at the Madison County, Tennessee, site (Nordman 1998, p. 2). Ellis et al. (2006, p. 2351) counted 70 distinct clusters at this site, which equated closely to 70 separate individuals through genetic analyses. At the recently discovered McNairy County, Tennessee population, 36 clusters of plants were found growing along creek banks at the unplowed edges of cultivated crop fields and extending into a railroad right-of-way (Tennessee Division of Natural Areas 2008, p. 3).

Although the clonal structure in the Alabama and Georgia populations was not as well defined as that in the sampled Tennessee population, each cluster generally represented a single genetic individual (Ellis 2006, p. 2-3). Genetic studies in the Alabama and Georgia populations found the ratio of counted stems to genetic individuals to be approximately 2 to 1 (Ellis 2006, p. 3). A thorough count for the Alabama and Georgia sites is lacking; however, Ellis (pers. comm. 2007) estimated 15 to 20 separate individuals at the main Georgia site based on clumping of stems. Approximately 40 plants were previously estimated as outliers of this main site (Allison 2002, p. 4-8); however, the actual number of genetic individuals is likely much lower, as this number is based on number of stems and not number of individual clumps. Ellis (pers. comm. 2007) noted that plants at the Georgia site appeared less fit, due to the absence of flowering and shorter stature of plants as compared to those at other sites. However, *H. verticillatus* responded well to a prescribed fire that was conducted in 2008 at the largest of the Georgia occurrences. These plants occur within a 450-acre burn unit, and hundreds of stems, many approaching 3 meters in height, were observed in a 1-acre prairie included within the unit (Hodges pers. comm 2009).

Alabama supports the largest population with an estimated 100 individuals at the original Alabama site (Ellis pers. comm. 2007). Schotz estimated approximately 175 to 200 stems were present at the second Alabama site in September 2008 (Schotz pers. comm. 2009); however, no estimate of individual plants is available for this site. The Alabama Natural Heritage Program considers the habitat partially degraded at both Alabama populations; however, it is thought that restoration efforts could further enhance the populations (Schotz 2001, p. 4, 8-10).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

This species appears to be a narrow habitat specialist, occurring in natural wet meadows or prairies and calcareous barrens. Such habitats were likely more extensive in the East before European settlement, subsequent fire suppression, and conversion of large areas to farmland (Allison 1995 cited in Matthews et al. 2002, p. 23; Ellis et al. 2006, p. 2352). Today these prairie

areas are not very extensive, and they are often degraded or destroyed for a number of reasons (e.g., agriculture, silviculture, and residential development). Most of the remaining wet prairies exist as remnants along roadside rights-of-way where mid-successional stages are artificially maintained (Allison pers. comm. 1999, Matthews et al. 2002, p. 23).

Industrial forestry practices were considered in the past to be a primary threat to *H. verticillatus* (Allison pers. comm. 1999). While surveying potential habitat for additional populations, Allison (pers. comm. 1999) noted that much of this species' prairie habitat had been converted to pine monoculture. However, with the exception of a few outlying plants, the Georgia population of this species is now protected from habitat destruction or degradation due to its inclusion in a 929-acre conservation easement area donated by the Temple-Inland Corporation to The Nature Conservancy (Breyfogle, Temple-Inland Corporation, pers. comm. 2005). This land has recently come under new ownership by The Campbell Group, a timberland investment advisory firm. Indications, thus far, are that the 929-acre easement area will continue to be managed in accordance with the terms of the original easement agreement (Moffett pers. comm. 2008). A prescribed burn was conducted at this site in 2008 (Hodges pers. comm. 2009), continuing the conservation efforts initiated with the prior landowners. A portion of one of the Alabama populations, located near Kanaday Creek, is apparently included in these lands managed by The Campbell Group; though, the proportion of the population that is included is not known at this time (Schotz pers. comm. March 4, 2009). Despite concerns about the threat of timber harvest that occurred at this site circa 2001, the population has apparently responded well to the canopy removal that resulted (Schotz pers. comm. February 12, 2009).

Other land management practices threaten *H. verticillatus*, including incompatible or poorly timed mowing or other maintenance activities in transportation rights-of-way (Barger pers. comm. 2009) and agricultural practices including clearing, pesticide use, and harvesting (Tennessee Division of Natural Areas 2008, p. 3). Plants at one of the Alabama sites extend onto a roadside, leaving them vulnerable to mortality or reduced vigor if they were exposed to herbicides used in association with right-of-way maintenance. Poorly timed mowing of this right-of-way prevented full maturation of some plants at this site in 2008; however, the Alabama Department of Conservation and Natural Resources, Alabama Department of Transportation, and Cherokee County Highway Department cooperated in placing signage at the site to prevent this in the future (Barger pers. comm. 2008). Future road construction at this location would pose a potential threat to plants located along the roadside.

Helianthus verticillatus has not been relocated at the type locality in Tennessee despite intensive surveys of that area (Nordman 1998, p. 1-2). However, this record is over 100 years old and locality information is vague, so it is not possible to ascertain the reason for the loss of that site. In Tennessee, much of this species' suitable habitat has been converted for agricultural usage (Bishop, pers. comm. 2008). In July 2009, TDEC biologists observed that one clump consisting of two stems had been destroyed by conversion to rowcrops at the McNairy County, Tennessee, population. Roads on the perimeter of this field had also been widened and were encroaching on *H. verticillatus* plants (7 clumps, 140 stems) in an adjacent railroad right-of-way (Bishop pers. comm. 2010). The largest concentration of plants at the Tennessee population in Chester County is located in a successional old field (Bishop pers. comm. 2008, Nordman 1998, p. 2). This site is surrounded by cultivated fields and pastures and active crop cultivation practices, such as

discing, plowing, and herbicide application, could pose a threat (Lincicome pers. comm. 2006). Plants extending onto the roadside within a powerline at this site were subjected to herbicide spraying in association with roadside and powerline maintenance in 2004, causing significant mortality (Bishop pers. comm. 2008, Lincicome pers. comm. 2006).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

Helianthus verticillatus is currently of limited availability in the horticultural trade; though, no negative impacts are known to have occurred due to poaching of wild material for commercial sale. Nonetheless, the conspicuous, attractive flowers of *H. verticillatus* combined with easy access of some sites leaves the species vulnerable to collection or poaching. Poaching from the small populations of *H. verticillatus* that are known to exist could contribute to altered demographic or genetic structure of populations, potentially diminishing their viability; however we have no information to suggest this is an active threat.

C. Disease or predation.

This species is not known to be threatened by disease or predation.

D. The inadequacy of existing regulatory mechanisms.

Helianthus verticillatus is officially state-listed as Endangered in Georgia and Tennessee, but has no official state status in Alabama. The majority of the Georgia plants are within a 929-acre conservation easement donated to The Nature Conservancy by Temple-Inland in 2003. This easement area has recently come under new ownership to The Campbell Group, a timberland investment advisory firm (Moffett pers. comm. 2008). Terms of this easement ensure permanent protection for those plants within the easement by restricting timbering activities and future development on the property. In addition, active management of the site and monitoring studies are components of the easement agreement (Breyfogle, pers. comm., 2005). The Alabama and Tennessee sites have received no protection to date.

The law that provides official protection to designated species of plants in Georgia is known as the Wildflower Preservation Act of 1973. Under this law, no protected plant may be collected without written landowner permission. No protected plant may be transported within Georgia without a transport tag with a permit number affixed. Permits are also used to regulate a wide array of conservation activities, including plant rescues, sale of protected species, and propagation efforts for augmentation of natural populations and establishment of new ones. No protected plants may be collected from State-owned lands without the express permission of the Georgia Department of Natural Resources. The Georgia Environmental Policy Act (GEPA), enacted in 1991, requires that impacts to protected species be addressed for all projects on state-owned lands, and for all projects undertaken by a municipality or county if funded half or more by state funds, or by a state grant of more than \$250,000. The provisions of GEPA do not apply to actions of non-governmental entities. On private lands, the landowner has ultimate authority on what protection efforts, if any, occur with regard to protected plants (Patrick et al. 1995, p. 1 of section titled “Legal Overview”).

The law that provides official protection to designated species of plants in Tennessee is the Tennessee Rare Plant Protection Act of 1985 (T.C.A. 11-26-201), which forbids persons from knowingly uprooting, digging, taking, removing, damaging, destroying, possessing, or otherwise disturbing for any purpose, any endangered species from private or public lands without the written permission of the landowner.

Because *H. verticillatus* receives no protection under state law in Alabama, and the Georgia and Tennessee state laws protecting plants do not forbid destruction of plants on private lands with landowner consent, we conclude that inadequacy of existing regulatory mechanisms is a threat to the species.

E. Other natural or manmade factors affecting its continued existence.

The whorled sunflower is extremely vulnerable to localized extinction because of the small number of known populations and small population sizes at all known locations. *Helianthus verticillatus* appears to have restricted ecological requirements and is dependent upon the maintenance of prairie-like openings for its survival. Alteration or elimination of disturbance processes that maintain these openings can result in the extinction of small populations of this species. Further, the highly fragmented distribution of populations within Tennessee, combined with their disjunct location with respect to those in Georgia and Alabama, leaves little chance of natural recolonization of these populations in the event of localized extinctions.

As discussed in the previous “Population Status/Estimates” section, the plants at the Georgia site appear less fit, due to their shorter stature and the absence of flowering (Ellis, pers. comm. 2007). Further investigation is needed to determine possible limiting factors at this site.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED:

Temple-Inland Corporation donated a 929-acre conservation easement of Coosa Valley prairie property in Georgia to The Nature Conservancy, thereby protecting most of the Georgia population of this species. In 2002, The Georgia Department of Natural Resources and The Nature Conservancy worked with staff of Temple-Inland to develop a 10-year management plan for conservation of rare species within this easement area. Site specific plans for the management of several open wet prairies, known to provide habitat for this species within the easement, were developed. Temple-Inland implemented a prescribed burn and selective timber harvest on 600 acres of the easement in 2001 to improve habitat conditions for *H. verticillatus* and other species. Temple-Inland conducted additional burns within the easement area in 2002, 2004, 2005, and 2006. Mechanical thinning and exotic control was also a component of their management of this site in cooperation with The Nature Conservancy. This easement area is now owned by The Campbell Group, and a prescribed burn was conducted in a 450-acre unit containing a small prairie inhabited by *H. verticillatus* in 2008. Vegetation monitoring is being conducted by TNC and GADNR on a regular basis and will aid in assessing effectiveness of management actions. At this time, The Campbell Group has indicated that they will continue to manage the easement area in accordance with the terms of the original easement.

Funding was provided for initiating landowner contacts and development of a site conservation

plan for the Madison County, Tennessee site during 2005/2006 (Lincicome, pers. comm., 2005). The Alabama Heritage Program is working with the landowner of the Alabama sites to develop conservation measures for those populations through a grant with the Service. The Service has funded status surveys throughout the species' range. These surveys have been completed; however, surveys for new populations are planned next field season for Alabama and Tennessee. Plants have been on display in the past as an educational exhibit at the Lichterman Nature Center in Tennessee (Bishop, pers. comm., 2008). A graduate student at Vanderbilt University in Tennessee recently completed research to determine genetic variability of this species (Ellis et al. 2006, p. 2345-2346). The greenhouse plants from Tennessee that were used in this study have been transplanted to a wetland mitigation site on Freed-Hardeman University in Chester County, Tennessee (Bishop, pers. comm., 2008).

SUMMARY OF THREATS:

This species has a restrictive range and is only known from five populations in seven sites. It appears to have restricted ecological requirements and is dependent upon the maintenance of prairie-like openings for its survival, thus active management of habitat is needed to keep competition and shading under control. The combination of restricted distribution, small population sizes, and dependence on disturbance processes for maintaining suitable habitat conditions presents the greatest threat to the persistence of this species across its range. Much of its habitat has been degraded or destroyed for agricultural, silvicultural, and residential purposes. The Alabama populations have been impacted by timber harvesting and poorly timed right-of-way maintenance in the past. Populations near roadsides or powerlines are threatened by herbicide usage or poorly timed mowing in association with right-of-way maintenance. The majority of the Georgia population is protected as it is located within a conservation easement area; however, only 15 to 20 individuals occur at this site and plants appear less fit than those at other populations. We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

RECOMMENDED CONSERVATION MEASURES:

- Work with The Campbell Group to obtain protection and management for plants outside easement area in Georgia and for populations in Alabama
- Work with State and private landowners in Tennessee to obtain protection for Tennessee populations
- Develop agreements with Departments of Transportation, railroad authorities, and powerline companies to ensure protection of populations extending onto rights-of-ways
- Encourage and support additional surveys for populations
- Conduct research at Georgia site to determine possible limiting factors for low fitness there.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8*
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: There are only five populations, none of which contains a large number of individuals. One site is permanently protected through a conservation easement with The Nature Conservancy; however, this population has the lowest number of plants and the plants there appear less fit than those at the other populations. The remaining four sites are not formally protected, but efforts have been taken to abate threats associated with highway right-of-way maintenance at one Alabama population, and, despite past concerns about threats from timber removal degrading *H. verticillatus* habitat, the other Alabama population has responded favorably to canopy removal that took place circa 2001. We therefore currently consider threats to be of moderate magnitude.

Imminence: Only one site containing *H. verticillatus* is currently formally protected, thus the

threat of habitat destruction or degradation is considered imminent at this time. This threat is most imminent at the Tennessee populations, where no measures have yet been taken to prevent threats associated with adjacent agricultural land uses or railroad right-of-way maintenance.

Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes

Is Emergency Listing Warranted? No, this species is not in imminent danger of becoming extinct as one site is permanently protected from habitat destruction through a conservation easement. This site is actively managed and monitored. Currently there are no known projects that threaten to destroy other populations; though, habitat degradation is an ongoing threat. Protection is currently being sought for the Alabama and Tennessee populations.

DESCRIPTION OF MONITORING

Species experts, botanists with the state conservation programs within this species' range, and affected Service offices have been provided copies of the candidate form for review and asked to supply any new information. In addition to the Service's Alabama, Georgia, and Tennessee offices, those contacted included: Mincy Moffett, botanist with the Georgia Department of Natural Resources (GADNR); Wayne Barger of the Alabama Heritage Program (State Lands Division, Alabama Department of Conservation and Natural Resources); Al Schotz, botanist with the Alabama Natural Heritage Program; David Lincicome and Andrea Bishop of the Tennessee Department of Environment and Conservation (TDEC); Sam Breyfogle of Temple-Inland Corporation; and Malcolm Hodges with the Georgia office of The Nature Conservancy. Data from observations in 2008 were provided for populations in Alabama and Georgia.

COORDINATION WITH STATES

All states within the species' range were contacted. Information provided by Georgia, Tennessee, and Alabama have been incorporated into the latest species assessment.

This species is listed as a "high priority species" in Georgia's state conservation plan. No plants are discussed in the State Wildlife Action Plans for Alabama and Tennessee.

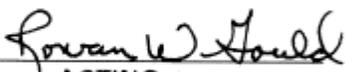
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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  June 15, 2010
for Regional Director, Fish and Wildlife Service Date

Concur:  Date: October 22, 2010
ACTING
Director, Fish and Wildlife Service

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: March 28, 2010

Conducted by: Geoff Call, Fish and Wildlife Biologist, Cookeville, Tennessee Field Office