Whorled Sunflower
(*Helianthus verticillatus*)

5-Year Status Review:
Summary and Evaluation

Photo by Dr. Jennifer Mandel, University of Memphis.

U.S. Fish and Wildlife Service
Southeast Region
Mississippi Ecological Services Field Office
Jackson, Mississippi

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5-YEAR STATUS REVIEW
Whorled Sunflower (*Helianthus verticillatus*)

GENERAL INFORMATION

Current classification: Endangered

Lead Field Office: Mississippi Ecological Services Field Office, Scott Wiggers, (601) 205–9602

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Reviewers:

Lead Regional Office: Southeast Region, Carrie Straight

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Cooperating Regional Office(s): Northeast Region, Sarah Furtak

Date of original listing: September 2, 2014 (79 FR 44712; August 1, 2014)

Critical Habitat designation: September 25, 2014 (79 FR 50990; August 26, 2014)

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about whorled sunflower's biology, habitat, and threats to inform this status review.

Information summarized in this review is from the final listing rule, published and unpublished reports, field observations, and personal communications from recognized experts along with information from the previous 5-year review (Service 2020) and the Species Status Assessment Report (SSA; Service 2023c). The SSA is a peer-reviewed document that represents our evaluation of the best available scientific information regarding the biology, life history, and condition of the species. We published an announcement in the Federal Register requesting information on this species on June 6, 2024 (89 FR 48437), and a 60-day comment period was opened that received no public comments. This review was completed by the U.S. Fish and Wildlife Service, Mississippi Ecological Services Field Office, Jackson, Mississippi. All literature and documents used for this review are on file at the Mississippi Ecological Services Field Office. A completed draft of this 5-year review was sent to other affected Service offices in the species' range for review and comment. All comments received were evaluated and incorporated into this final document as appropriate. All recommendations resulting from this review are the result of thoroughly reviewing the best available information on whorled sunflower.

Federal Register Notice citation announcing the species is under active review: June 6, 2024 (89 FR 48437)

Species' Recovery Priority Number at start of 5-year review (48 FR 43098, 48 FR 51985): 5. Whorled sunflower is a species with a high degree of threat and a low recovery potential.

Review history: A previous 5-year review recommending no change in status was published on May 22, 2020 (Service 2020).

REVIEW ANALYSIS

Listed Entity

Taxonomy and Nomenclature

We are not aware of any changes to the taxonomy of this entity, and it is still considered valid by the Service.

Distinct Population Segment (DPS) (61 FR 4722)

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listing of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy does not apply.

Recovery Criteria

Recovery Plan

Recovery Plan for Whorled Sunflower (*Helianthus verticillatus*). June 2, 2023.

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, states, and others on ways to minimize threats to listed species and criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020). Whorled sunflower's recovery criteria are:

"Whorled sunflower may be considered for reclassification to threatened when the following criteria are met:

> CRITERION 1. At least 20 geographically distinct populations—separated by at least 1 mile (1.6 kilometer)—of at least moderate size (at least 100 individuals) are distributed across the species' range, with each of the 4 known ecoregions (Loess Plains, Northern Hilly Gulf Coastal Plain, Southern Crystalline Ridges and Mountains, and Southern Shale Valleys)[1] supporting at least 3 such populations, including 1 population within each of the 4 designated critical habitat units. (Addresses Factors A and E.)
>
> CRITERION 2. At least 3 large populations (at least 500 individuals), protected by long-term conservation mechanisms, occur in each of the 4 known ecoregions, for a total of 12 protected populations, and are managed to promote open-canopied habitat, native plant

[1] Level IV ecoregions described in USEPA [U.S. Environmental Protection Agency] 2013.

community integrity, and support resilient populations[2] of whorled sunflower. (Addresses Factors A, D, and E.)

CRITERION 3. Monitoring demonstrates that these populations (described in Criteria 1 and 2) are viable, as evidenced by natural recruitment and having stable to increasing populations for at least 10 years (approximately 10 generations). (Addresses Factor E.)

Whorled sunflower may be considered for delisting when the above criteria are met and when:

CRITERION 4. At least 20 additional geographically distinct populations of at least moderate size occur within the species' known range for a total of at least 40 extant populations. (Addresses Factors A and E.)

CRITERION 5. At least 2 additional large populations are protected and managed as described in Criterion 2 within 3 of the 4 known ecoregions, for a total of at least 18 protected populations. (Addresses Factors A, D, and E.)

CRITERION 6. Monitoring demonstrates that these populations (described in Criteria 1, 2, 4, and 5) are viable, as evidenced by natural recruitment and having stable to increasing populations for at least 10 years (approximately 10 generations). (Addresses Factor E.)" (Service 2023b, pp. 5–6)

The Service believes these criteria are appropriate and relevant. Discovery of new populations, monitoring existing populations, and establishment of populations on protected lands have contributed to the recovery of the species; however, no criteria have currently been met.

Biology and Habitat Summary

Comprehensive summaries of whorled sunflower's biology, habitat, and distribution are found in the Species Status Assessment (Service 2023c) and previous 5-year review (Service 2020). New information is summarized below.

Range and Distribution

Whorled sunflower was known from five populations in 2020 and increased to eight extant populations in 2023 (Service 2020, 2023b, respectively). Surveys and chance discoveries have revealed additional populations in Mississippi and Virginia, most of which were found in Mississippi (Kees 2022; Breeden 2024b) so that 26 natural, extant populations are now known across the species' range.

Mississippi. These recent discoveries have increased whorled sunflower's known range by six counties in Mississippi (including new discoveries in both counties with previously known populations; Table 1; Figure 1). While recent surveys have revealed substantially more populations in Mississippi (3 populations in 2023 versus 21 now), these populations are generally small, consisting of one to several stems, but can be locally abundant with 100s of stems (Breeden 2024b). These surveys may have also found 20 additional populations in Mississippi, but lack of access to plants prevented confirmation of species identity (Breeden 2024b).

Virginia. In Virginia, one new population was recently discovered in Roanoke County; however, this is considered to be a planted population (Townsend 2023, pers. comm.; Virginia Botanical

[2] Larger populations are considered to be more resilient to most likely stochastic and/or catastrophic events, and therefore, are likely to remain viable into the foreseeable future.

Associates 2025). The provenance of Virginia's previously discovered population has also been questioned and may have also been planted (see Service 2023c for more detail). Both Virginia's previously known population and recently discovered planted population occur on conservation lands—the National Park Service's Blue Ridge Parkway in Franklin County and county owned land Roanoke County, respectively. Additional monitoring and evaluation of Roanoke County's whorled sunflower will be required.

Tennessee. Recent discovery surveys in Tennessee did not identify any new populations (Breeden 2024b). Two small populations in Tennessee have been transplanted (Table 1), one on Freed-Hardeman University in Chester County (described in more detail in Service 2020) and another established on Madison County's Pinson Mounds Archaeological Park in 2022 and 2023 (Breeden 2024b). Additional potential reintroduction sites in Tennessee have also been identified. Of Tennessee's two remaining natural populations, one is small (less than 10 stems in 2022) and the other consists of several patches collectively supporting over 200 stems as of 2022 (Tennessee Department of Environment and Conservation 2024).

Georgia. Georgia's population, located on private timber lands protected by a conservation easement, is in apparent decline possibly due to the lack of prescribed fire in recent years (Breeden 2024a, pers. comm.; Brown 2024, pers. comm.). The Georgia population was previously robust and one of the largest known populations (Service 2020, 2023c).

Alabama. Alabama's population is split among two small sites in Cherokee County (Service 2023c; Thompson and Kirby 2023). A small test planting of 10 rhizomes in DeKalb County, Alabama, was completed during 2021 (Thompson and Kirby 2023), but this site is not yet counted toward recovery given its preliminary nature.

Table 1. Distribution and status of whorled sunflower populations.

State Populations	County Populations	Ecoregions Occupied
Alabama: 1	Cherokee: 1	Southern Shale Valleys: 1
Georgia: 1	Floyd: 1	Southern Shale Valleys: 1
Mississippi: 21	Benton: 4	Loess Plains: 4
	Clay: 1	Blackland Prairie: 1
	Grenada: 3	Bluff Hills: 1; Loess Plains:2
	Holmes: 3	Northern Holocene Meander Belts: 3
	Humphreys: 1	Northern Backswamps: 1
	Leflore: 1	Northern Holocene Meander Belts: 1
	Marshall: 6	Loess Plains: 6
	Union: 2	Flatwoods/Blackland Prairie Margins: 1; Northern Hilly Gulf Coastal Plain: 1
Tennessee: 2, 2T, 1H	Chester: 1T, 1H	Northern Hilly Gulf Coastal Plain: 1T, 1H
	Madison: 1, 1T	Northern Hilly Gulf Coastal Plain: 1, 1T
	McNairy: 1	Northern Hilly Gulf Coastal Plain: 1
Virginia: 1, 1T	Franklin: 1	Southern Crystalline Ridges & Mountains: 1
	Roanoke: 1T	Southern Limestone/Dolomite Valleys & Low Rolling Hills: 1T
Total: 26, 3T, 1H		

Notes: H = Historical, T = Transplant.

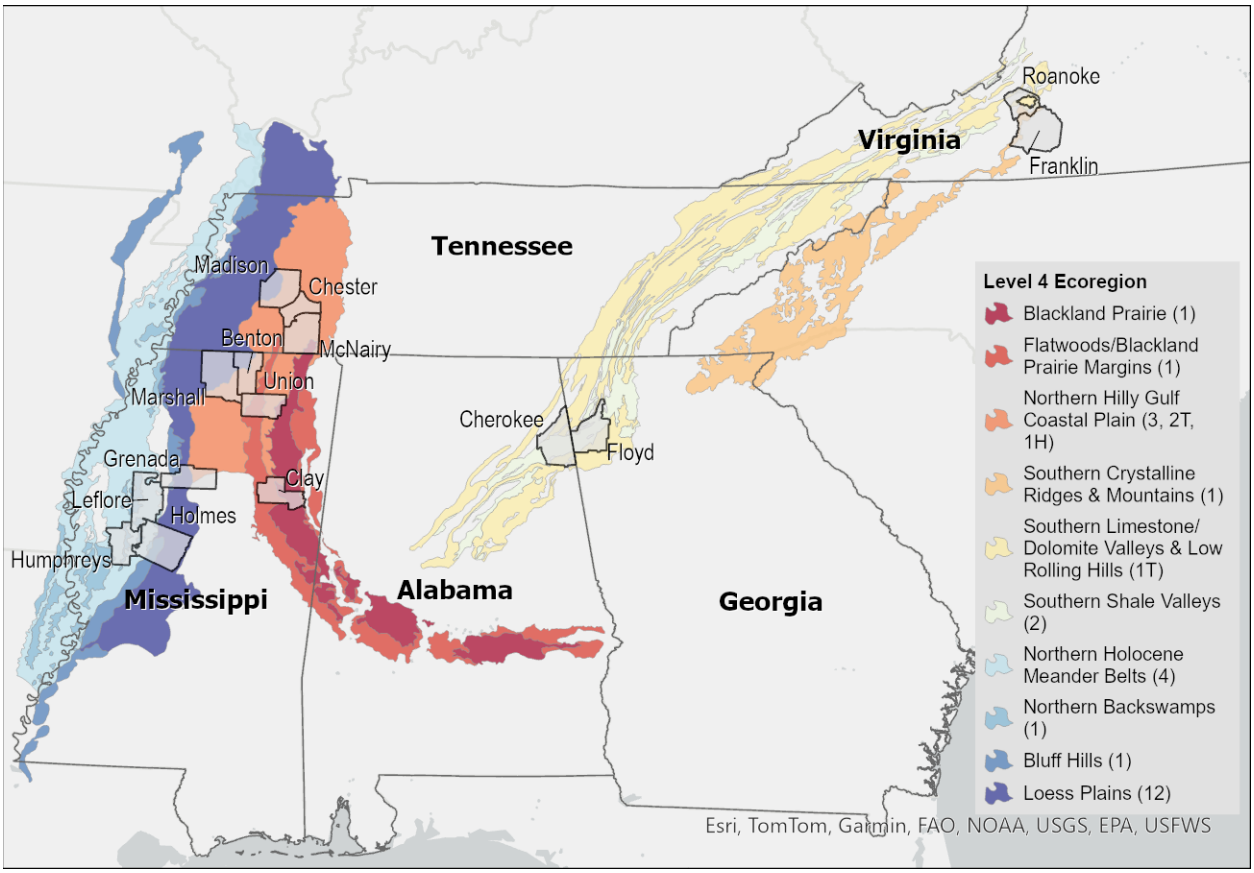

Figure 1. County-level distribution of whorled sunflower within Level 4 Ecoregions. The numbers in parentheses indicate number of populations within each ecoregion, including historical (denoted by an 'H') and transplanted (denoted by a 'T'). The Flatwoods/Blackland Prairie Margins and Northern Hilly Gulf Coastal Plain ecoregions share one population that is included only in the count for the Flatwoods/Blackland Prairie Margins.

Genetics

The morphological distinctiveness of Mississippi's whorled sunflower plants has been noted, with the suggestion that these plants may be unique forms of the closely related and more common sawtooth sunflower (*H. grosseserratus*; Kees 2022); however, Mississippi's whorled sunflower populations are genetically distinct from sawtooth sunflower (Drewry 2024). Recent genetics work also indicates that Mississippi's populations may be an undescribed species of sunflower (Drewry 2024), supporting earlier genetic research (Moore et al. 2021). Additional morphological and genetic work are needed to confirm if Mississippi's populations represent a distinct taxon. The species' occurrence in the state is considered valid as whorled sunflower until uncertainties are resolved.

Conservation Activities

Recent surveys for whorled sunflower were conducted in Mississippi and Tennessee, with new locations found in Mississippi. Monitoring of known populations and collection of seeds for seed banking, research, and propagation were also performed (Breeden 2024b). Habitat management, including removal of competing vegetation and prescribed fire is vital for maintaining healthy populations of whorled sunflower (Service 2023a, 2023c). Habitat management to remove competing vegetation has recently occurred in Alabama (Thompson and Kirby 2023). Recent

research into propagating whorled sunflower, including stem cuttings, seeds, and various in vitro methods (Nowakowska et al. 2020; Trigiano et al. 2021; Nowakowska et al. 2023), has added options to enhance *ex situ* (off-site) conservation (Bruns et al. 2022) and support research and population augmentation and establishment. Work establishing populations in Tennessee (Service 2023c; Breeden 2024b) and Alabama (Thompson and Kirby 2023) is ongoing but limited to three sites (two in Tennessee and one in Alabama). The purpose behind establishing plants in Roanoke County, Virginia, is unknown.

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4(a)(1) of the Act. A summary of this assessment is detailed below.

Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range.

Populations throughout whorled sunflower's range remain vulnerable to incompatible or inadequate habitat management, as they occur in utility or road rights-of-way, adjacent to agricultural fields, or on lands managed primarily for timber production (Service 2020; Breeden and Estes 2021; Service 2023c; Breeden 2024b). Site preparation and management for forestry or agricultural practices have altered suitable habitat for whorled sunflower or killed whorled sunflower plants in Alabama, Georgia, and Tennessee (Service 2020, 2023c). Herbicide application during utility, road, and railroad rights-of-way management has impacted at least three populations in Tennessee (in Madison and McNairy counties) and Mississippi (in Marshall County), apparently killing some of the plants comprising these populations (Breeden and Estes 2021; Breeden 2024b; see also Service 2020, 2023c). Likewise, mowing that was not timed to minimize impacts to the species occurred along a road right-of-way and prevented flowering and seed production at one site in Cherokee County, Alabama, but signage has since been installed to minimize future mowing issues (Service 2023c). Inadequate habitat management, such as lack of prescribed fire or hand clearing, can degrade habitat by increasing shade and promoting the growth of competing and invasive vegetation (Service 2023c). Lack of prescribed fire is likely contributing to recent declines in Georgia's population (Brown 2024, pers. comm.) while unchecked growth of vegetation has degraded habitat at a site in Madison County, Tennessee (Lincicome 2017, pers. comm.). Alabama's population has also been affected by growth of competing vegetation (Service 2023c). However, these threats can be ameliorated by working with land managers to install appropriate signage by utility companies and state and local Departments of Transportation and with landowners (e.g., private citizens, private timber corporations) to ensure that whorled sunflower is not sprayed with herbicide and that compatible and beneficial habitat management activities including prescribed fire and hand removal of competing vegetation occur, as has been proposed (e.g., Breeden and Estes 2021; Breeden 2024b) and conducted previously (e.g., Service 2020, 2023c; Thompson and Kirby 2023).

Factor B: overutilization for commercial, recreational, scientific, or educational purposes.

We have no indication that overutilization for commercial, recreational, scientific, or educational purposes currently threatens the species. However, whorled sunflower's conspicuous, attractive flowers combined with easy access of some sites, leaves the species vulnerable to collection or poaching should interest in the species increase. Interest in growing the species ornamentally is

apparently increasing (e.g., Trigiano et al. 2018; Moore 2021), as evidenced by the recent development of unique whorled sunflower cultivars (Trigiano et al. 2024, 2025).

Factor C: disease or predation.

Disease and predation are not considered threats to the species. However, several fungi and fungus-like pathogens have been reported for whorled sunflower (see Trigiano et al. 2016; Edwards et al. 2017; Trigiano et al. 2020; Boggess et al. 2022; Trigiano et al. 2022; Odoi et al. 2023), only one of which was reported from a wild population, and their impacts on the species are currently considered to be minimal. Similarly, weevil larvae (Curculionid or "true" weevils) have been noted on whorled sunflower achenes (see Service 2020 for more detail) but have been infrequently observed and are considered to have minimal impact on the species. Deer browsing has also recently been noted on whorled sunflower plants in Georgia (Steppe 2025, pers. comm.) but, as with weevil larvae, the lack of consistent and range-wide observations of such damage suggests that this may have only periodic, local impacts and, as such, represents a minimal threat to the species range-wide.

Factor D: the inadequacy of existing regulatory mechanisms.

Whorled sunflower is state listed as endangered in Georgia and Tennessee but has no official state status in Alabama, Mississippi, or Virginia. While the species does not receive specific protections in Mississippi, theft of the species is punishable as a misdemeanor in the state under Mississippi Code §97-17-89. Georgia's Wildflower Preservation Act of 1973 (O.C.G.A. 12-6-170) provides some protections to designated species from unlawful collection, transportation, and sale. In addition, the Georgia Environmental Policy Act (GEPA) (O.C.G.A. 12-16-1) requires that impacts to protected species be addressed for all projects on state-owned lands and for certain state-funded projects undertaken by a municipality or county, but these considerations only apply to the actions of governmental entities. Tennessee's Rare Plant Protection and Conservation Act of 1985 (T.C.A. 11-26-201) 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. On private lands, regulations require written permission from the landowners or land managers before knowingly removing or destroying state-listed species (T.C.A. §§70-8-301–314), while state-issued permits are required for knowingly removing such species from state-owned lands (Tennessee Department of Environment and Conservation [TDEC] Rule 0400-02-02-.23). Furthermore, state-issued licenses are required to sell state-listed species in Tennessee (TDEC Rule 0400-06-02-.06). Whorled sunflower is included in State Wildlife Action Plans (SWAPs) in Alabama (a Plant of Conservation Concern; Alabama Department of Conservation and Natural Resources 2016), Georgia (a High Priority Plant; Georgia Department of Natural Resources 2015), and Tennessee (a Tier 4 species of Greatest Conservation Need; Tennessee State Wildlife Action Plan Team 2015). SWAPs do not mandate specific conservation actions or guarantee funding of such actions for whorled sunflower; however, inclusion within SWAPs informs and promotes conservation of the species by highlighting and focusing attention on the conservation needs of whorled sunflower and its habitats. In addition, whorled sunflower was recently ranked as a species of very high conservation concern in the *Southeastern Plants RSGCN* [*Regional Species of Greatest Conservation Need*] *List* (Radcliffe et al. 2023), a regional cooperative effort funded by the Service to identify and assess plant conservation needs, improve conservation of these species, and inform development of SWAPs within the greater southeastern region.

Factor E: other natural or manmade factors affecting its continued existence.

Whorled sunflower is vulnerable to localized extinction because of its restricted distribution and small population sizes at most known locations, which reduces the resiliency of these populations and their ability to recover from acute demographic effects of threats to its habitat, as discussed under Factor A. Whorled sunflower is dependent upon the existence of prairie openings and woodlands or remnant roadside prairie habitats for its survival (Service 2023c). Alteration or elimination of disturbance processes that maintain these openings could result in the extinction of populations of this species. Furthermore, limited connectivity between populations, likely precludes or severely restricts gene flow among them and leaves little chance for natural recolonization of these populations in the event of localized extinctions. Small population size could be reducing reproductive fitness of whorled sunflower via limited mate availability of this self-incompatible species or extensive inbreeding (Ellis and McCauley 2009).

Synthesis

Whorled sunflower is a tall, flowering herbaceous plant (to over 13 feet [4 meters] high) in the sunflower (or aster) family (Asteraceae or Compositae) that is endemic to the southeastern United States. Its natural habitat is moist-soiled areas with little to no overstory canopy present, including remnant prairies or prairie-like openings along small streams, but is mostly known today from road, railroad, and utility rights-of-way and along the margins of agricultural fields. There are currently 26 extant, natural populations range-wide and 3 transplanted populations (2 in Tennessee and 1 in Virginia). When listed, whorled sunflower was only known from a few sites in Tennessee, Alabama, and Georgia, but recent discoveries have since expanded the species' range to include Mississippi and Virginia. Although there are substantially more populations now known than when the species was listed, morphological and genetic uncertainties regarding Mississippi's populations require additional research. Likewise, one of Virginia's two populations was likely planted and the provenance of the remaining population has also been questioned and may also have been planted. Without regular habitat management, such as prescribed fire and hand clearing, whorled sunflower's habitats can be overgrown by competing vegetation (e.g., woody and invasive species) thereby degrading conditions favorable to whorled sunflower. Inadequate habitat management has impacted populations in Georgia, Alabama, and Tennessee. Populations are also vulnerable to incompatible habitat management—such as herbicide application, poorly timed mowing, and site preparation for timber or agriculture—which has affected populations in Georgia, Alabama, Tennessee, and Mississippi. Likewise, whorled sunflower's small, isolated populations increase its vulnerability to acute disturbance and demographic processes, increasing the chances of localized extirpation. Because of ongoing threats, the current condition of the species, and uncertainties regarding the identity and provenance around recently discovered populations, whorled sunflower continues to meet the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery criteria and actions are presented in the species' Recovery Plan (Service 2023b) and Recovery Implementation Strategy (Service 2023a). During this status review, new and/or targeted potential recovery activities were identified. These actions are recommended to support and promote recovery of whorled sunflower. Recommendation numbers are for convenient reference only and do not imply prioritization of any activity over others.

Recovery Activities

1. Expand searches for additional locations throughout the species' range to identify additional populations.
2. Continue pursuing population establishment and augmentation on protected lands.
3. Continue to expand *ex situ* (off-site) conservation activities, such as seed banking and growing plants in cultivation, to encompass more populations and increase genetic representation in safeguarding collections.
4. Work with landowners and other interested parties to improve habitat management and pursue protection of populations.

Monitoring and Research Activities

1. Complete genetic and morphological study to determine if Mississippi's populations are taxonomically distinct from other whorled sunflower populations.
2. Create species distribution model to guide future population searches and identify potentially suitable areas for potential population establishment.
3. Study pollinator community associated with the whorled sunflower to inform population delineation, understanding of population connectivity, and habitat management needs.
4. Expand genetics studies to better understand population delineation, connectivity, and dynamics.

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RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of Whorled Sunflower

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species' status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

- ☐ Downlist to Threatened
- ☐ Uplist to Endangered
- ☐ Delist:
  - ☐ *The species is extinct*
  - ☐ *The species is recovered*
  - ☐ *New information indicates the species does not meet the definition of an endangered or threatened species*
  - ☐ *The listed entity does not meet the statutory definition of a species*
- ☒ No change needed

FIELD OFFICE APPROVAL:

Field Supervisor, Mississippi Ecological Services Field Office, Fish and Wildlife Service

JAMES AUSTIN Digitally signed by JAMES AUSTIN
Date: 2025.06.12 08:31:35 -05'00'

Approve _____

COOPERATING REGIONAL OFFICE APPROVAL:

We emailed this 5-year review to the Northeast Regional Office for their concurrence prior to finalizing the document. We will retain any comments received, as well as verification of concurrence from other regions, in the administrative record for this 5-year review.