

Endangered Flatwoods Sunflower (*Helianthus carnosus*): Management Recommendations for Roadside Populations

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The information and recommendations in this document are based largely on information and data provided by Chase Mason, a PhD student at the University of Georgia. Chase is a member of a research team headed by Dr. Lisa Donovan, Professor of Plant Biology. The Florida Natural Areas Inventory (FNAI) was the other main information source: location data (provided via Chase), and Field Guide to the Rare Plants of Florida. All plant and street level images were provided by Chase Mason except where noted.

Flatwoods Sunflower is an endemic species listed as endangered by the State of Florida. It naturally occurs in only five counties in northeast Florida: Clay, Flagler, Putnam, St. Johns, and Volusia; however, according to FNAI, as of 2000, "...it has not been seen in Clay County for decades", and Chase Mason noted that during his field research in 2010-12 he was not able to locate any populations in the northern half of its historical range.



While its natural range is limited to northeastern Florida, Flatwoods Sunflower has been established by seeds in central Florida; seeds were harvested from nursery-grown plants (N. Bissett, 2014, pers. comm.). Flatwoods Sunflower also has been used in central Florida landscapes.

Chase Mason recorded data about seven populations, five of which occurred on state roadsides, four in Flagler County and one in Putnam County. Information about these populations is in Table 1 on pages 6-7, with aerial and street level images on pages 8-12. Management recommendations are on pages 3-5.

Natural Habitat

Flatwoods Sunflower only occurs on moist fine sandy loam soils of wet flatwoods and prairies, as well as roadsides where "...sunny, sandy berms next to wet ditches [are] an excellent mimic of the historical wet meadow habitat." (C. Mason, 2014, personal comm.)

Description

Flatwoods Sunflower has linear to lance-shaped, hairless leaves with entire margins. Leaves are moderately to densely clustered near the base of the plants, with some smaller leaves part way up the stem.

One or two flowers are borne at the end of 2 to 2 ½ ft tall stems. The 2.5- to 4-inch wide yellow flowers have yellow centers.



Flatwoods Sunflower has a thickened root beneath the basal rosette of leaves, and exhibits little to no suckering. The basal leaves are evergreen, with additional leaves and a new flowering shoot produced each year. Life expectancy is 2 to 3 years, although that is based on very limited data.

Flatwoods Sunflower is easy to distinguish from other sunflowers that occur in Northeastern Florida as it is the only species in that region with nearly leafless stems.

Blooming

“The historically listed flowering time for the species is June-August, but populations I’ve worked with have seemed much more scattered in their flowering time - I’ve had profuse flowering from populations in June, but many as late as December, likely as a second burst attempt after being mowed. It’s my unverified suspicion that regular mowing of the roadside populations during June-August has broken up the normal tight 2-3 month flowering window and selected for individuals able to flowering as late as December.” (C. Mason, 2014, personal comm.)

Biology

Flatwoods Sunflower, like all sunflowers, is “...mostly generalist bee pollinated, perhaps a few hoverflies and such, [and] not much in the way of butterflies.” (C. Mason, 2014, personal comm.). And like all sunflowers, other than the cultivated ones and Southeastern Sunflower (*Helianthus agrestis*), Flatwoods Sunflower is self-incompatible, that is, it will only produce viable seeds when flowers are pollinated by genetically different plants. Moreover, sunflowers have a type of self-incompatibility which further limits plants that can pollinate each other. The consequence is that Flatwoods Sunflower



populations under 100 plants are unlikely to persist long (C. Mason, 2014, personal comm.).

Sunflowers are known for their ability to hybridize. Under controlled conditions, Flatwoods Sunflower was successfully crossed with Rayless Sunflower (*Helianthus radula*), which can co-occur with Flatwoods Sunflower; however, most of the pollen of the offspring was sterile [Heiser, Jr., C. B. (1969). *The North American sunflowers (Helianthus)*. Durham: Seeman Printery.]. Naturally occurring hybrids of Flatwoods Sunflower and Rayless Sunflower are not known to exist (C. Mason, 2014, personal comm.).

Pollinated flowers take about 2 months to produce mature seeds. In lab tests, fresh seed exhibited the highest germination. Harvested seed that has been cleaned and then dried for at least 1 week in an air-conditioned environment should be stored in a refrigerator in an airtight container with a tight-fitting lid or in a zipper-type re-sealable freezer bag. Nancy Bissett (The Natives, Davenport, Fla.) noted that “Having grown and used *H. carnosus* for several years now, we are pleased with how easy it is to grow from seed and produce in the nursery, seed directly on sites, and bloom most of the growing season.”

Pests. Flatwoods Sunflower appears to be “...much more resistant to sunflower beetle larvae, aphids, leaf hoppers, and carrot beetles than a standard cultivated sunflower... In the field I have never noticed any extreme insect damage to leaves or flowers.” (C. Mason, 2014, personal comm.)

Management Recommendations for Flatwoods Sunflower on FDOT-Maintained Roadsides

NOTE: Commercial availability of plants and its use in landscapes should not be a reason for limiting practices that will facilitate preservation of naturally occurring stands. These stands are a refuge for the gene pool and genetic diversity that is necessary to preserve the long term sustainability of this endangered, endemic species.

The status of the five populations in Table 1 should be updated, and the start and end points delineated (GPS).

Mowing

Mowing (or string trimming) is necessary at least once per year to prevent development of woody plants, which eventually would outcompete Flatwoods Sunflower. The best time to mow is February and March as any seeds from late fall flowering plants will have matured. Flowering shoots emerge in early spring, with flowers blooming mainly from June to August; however, a second flush of flowers has been observed in late fall as noted previously.

Mower deck height should be no lower than 4 inches at any time of year to avoid damaging the foliage; however, deck height may need to be set higher than 4 inches to account for tires sinking into the sandy soil resulting in an actual mowing height of less than 4 inches. String trimmers should be used in any area susceptible to soil scalping by the mower.

Flatwoods Sunflower does not tolerate shade (C. Mason, 2014, personal comm.) so selective string trimming may be necessary during the growing season to cut back any species that has created a canopy over the sunflowers.

Weed Management

While no weed issues were noted in 2010-12, any weeds that might pose a threat to the sustainability of a Flatwoods Sunflower population should be identified and the extent of their occurrence noted so that an appropriate management regime can be developed.

If the weed management plan includes the use of glyphosate, please see below.

Use of Glyphosate for Weed Control in the Vicinity of Flatwoods Sunflower

- Products
 - Glyphosate is the only active ingredient.
 - Only use products labeled for roadsides.
 - In areas with wet or inundated ditches, make sure the product is labeled for such use.
- Use methods that minimize herbicide drift. Methods include, but are not limited to, shielded nozzles, increased droplet size, reduced nozzle pressure, only spraying when wind is < 5 mph, and spraying as close to the ground as possible.
- Read and follow all label directions.

Supplementing Populations

Enhancing sites with commercially produced plugs or seeds will help to sustain populations at greatest risk of becoming extinct, that is, populations with less than 100 individuals. At least three Central Florida nurseries (<http://www.afnn.org>) are known to produce containerized plants of Flatwoods Sunflower. The only source of seeds is that hand-harvested from nursery stock; however, all nurseries may not offer it for sale. It is best to purchase seeds from nurseries that have a large number of plants, and the more the better as the seeds will be more genetically diverse.

Plugs. Intersperse about 50 plugs throughout an existing population of Flatwoods Sunflower. Use only well-rooted plugs – the root ball should easily pull out of the container, with the root ball maintaining the shape of the plug container, and most roots should be white. Transplanted plugs must be irrigated in a manner that ensures establishment of healthy plants.

Seeds. Walk over the area to be sown to ensure that the sandy soil is slightly compact. Sow seeds at the rate of about 5000 per 1000 square feet. Since this amount of seeds is very small for the area to be sown, dilute the seeds with an inert material before they are spread to ensure even distribution of the seeds over the entire site. Fill a clean 5-gal bucket about halfway with vermiculite or sand; then add just enough water until it's slightly moist after mixing. Then add the seeds and thoroughly mix by hand until the seeds are evenly distributed. Spread the seed

mixture over the entire area (except for one handful); then walk over the seeded area to press the seeds into the top layer of soil. Sow the reserved handful of seed mixture in a recognizable pattern in one small spot and flag it; use this planted spot to monitor germination, and to be able to recognize Flatwoods Sunflower seedlings.

Supplementary irrigation every other day for at least 2 weeks should enhance germination; irrigate with at least 1/3 inch of water per irrigation event. Water droplet size should be no larger than that of a lawn sprinkler. Once seedlings emerge, gradually reduce irrigation frequency over 2 to 3 weeks.

Table 1. State Roadside Populations of Flatwoods Sunflower (*Helianthus carnosus*). The information in this table is based on observations compiled by Chase Mason in 2010-12. These populations may no longer exist or shifted slightly, and there may be other populations on state roadsides in Clay, Flagler, Putnam, St. Johns, and Volusia counties.

| Location | | | | | |
|----------|------|--|--------------------------|---|--|
| County | Code | Road | GPS Coord. | Description ¹ | Sustainability Outlook ² (J. Norcini) |
| Flagler | FCR | US 1, about 0.25 miles north of intersection with Royal Palm Parkway | 29.500656, -81.265022 | This population is in the power line/highway ROW adjacent to some land owned by Flagler County Public Schools. This is a rather large population (several hundred plants when checked in 2011 and 2012), though regularly and heavily mowed. Most plants on the slightly higher embankment on the far side of the ditch, and scattered plants extending to the tree line. | Fair to Good. While population size is good, location in the power line ROW will necessitate cooperation of power company. |
| Flagler | FSR | SR 100, about 10.75 to 11 miles south of the SR 100 / US 17 intersection in San Mateo | 29.488600, -81.467500 | This population is along the embankment on the north side of SR100, from the ditch right up to a pasture fence. It's one of the most profusely flowering populations I've seen. It has perhaps a few hundred plants. | Good to excellent |
| Flagler | SOF | SR 11, about 1.6 miles south of Cody's Corner, or about 400 ft south of dirt road entrance to Relay Wildlife Management Area | 29.320000, -81.310220 | This population is along the east side of SR 11 along the tree line of pines. This is the southernmost population I could find in the FNAI records (though I did not attempt to locate the single Volusia county record from inaccessible wilderness land). [JGN Note: appears to be adjacent to Relay WMA] | Fair to Good (no info provided about population size; if > 100 plants then at least good because it's adjacent to the WMA) |

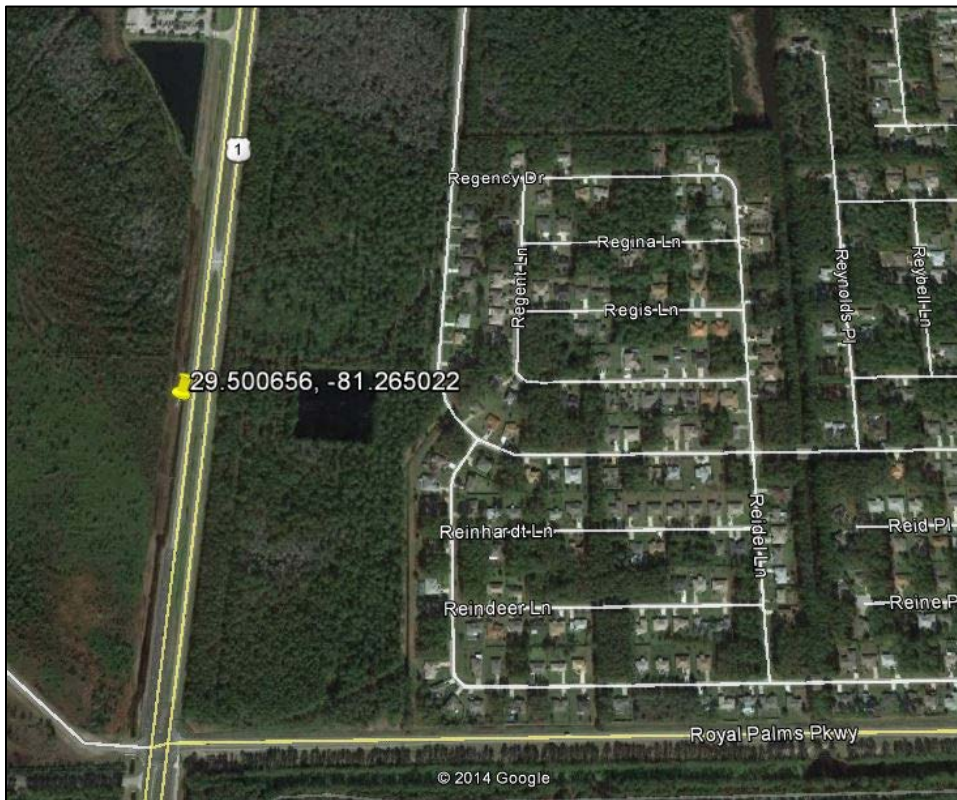
| Location | | | | | |
|----------|------|--|-----------------------|--|--|
| County | Code | Road | GPS Coord. | Description ¹ | Sustainability Outlook ² (J. Norcini) |
| Flagler | WOB | SR 100, about 3 miles southeast of Flagler FSR population | 29.480910, -81.419350 | This population ³ was stumbled upon while looking (and failing to find) FNAI records for <i>H. carnosus</i> in the White Oak Branch conservation area (I think that's the name – SJRWMD land?). It's just down the road to the east of that property, along the southern ditch and embankment for SR100, extending maybe ten feet into someone's yard. A few hundred plants interspersed with <i>Helianthus radula</i> (Rayless Sunflower). | Poor to Good depending on cooperation of homeowner(s) and power company (part of population in power line ROW) |
| Putnam | PCR | SR 100, about 3.5 to 3.7 miles south of the SR 100 / US 17 intersection in San Mateo | 29.567193, -81.546415 | This population is along the northeast side of SR100 along the tree line. Look for an orange marker (denoting a buried gas line?); plants are to the left of that. The population is very small, under 50 plants, and the two times I've visited only had a few flowers out. | Poor to fair given the population size. |

¹ Edited quotes of Chase Mason.

² Sustainability Outlook– Populations with greatest likelihood of long-term sustainability if managed appropriately, which is substantially affected by population size. Minimum population size for a high likelihood of long-term sustainability is 100; however, other factors may imperil even large populations as Chase Mason has noted in his unsuccessful search for some large populations based on FNAI data.

³ Chase Mason suggestion to consider – Is it possible “...to relocate [this population] to the nearby (and possibly source) White Oak Branch site, given the close proximity and plenty of sunny, sandy, open space there?... would take less than a weekend with help from the local FNPS chapter.”

Population FCR (Flagler) – US 1, about 0.25 miles north of intersection with Royal Palm Parkway.



Population FSR (Flagler) – SR 100, about 10.75 to 11 miles south of the SR 100 / US 17 intersection in San Mateo.



Population SOF (Flagler) – SR 11, about 1.6 miles south of Cody’s Corner.



Population WOB (Flagler) – SR 100, about 3 miles southeast of Flagler FSR population.



Population PCR (Putnam) – SR 100, about 3.5 to 3.7 miles south of the SR 100 / US 17 intersection in San Mateo

