

PROJECT TITLE: Rangewide Survey of longspurred mint (*Dicerandra cornutissima*) Huck on the Marjorie Harris Carr Cross Florida Greenway, the Florida Department of Transportation Marion County right-of-way, and private property.

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PROBLEM AND NEED:

Originally classified as *Dicerandra frutescens* Shinnery, in 1981 Botanist Robin Huck re-assigned specimens from Sumter and Marion counties in Florida to a new species, *Dicerandra cornutissima* (USFWS 1985, Huck 1981). Huck recognized *Dicerandra cornutissima* as distinct from *D. frutescens* based on the following characters: corolla rose-purple, floral style with a few or no hairs, anther appendage over 1 mm long, and restricted to north-central Florida (Huck 1981, Huck 1984, Chafin 2000) (Figs. 1-3). Another noted Botanist, Robert Kral was studying *Dicerandra* at the same time and reached the same conclusions as Huck (Kral 1982).

When the endemic longspurred mint (*Dicerandra cornutissima*) was first listed as an endangered species in 1985, it was only known to be extant on four sites, all in Marion County (FGFWFC 1976, Huck 1981). Florida Natural Areas Inventory (FNAI) surveys, Johnson (1988), Knight et al. (1991), and MacLaren (1991) documented some of the earliest occurrences in Marion County subsequent to the listing. A population of longspurred mint had been known from Sumter County prior to the 1985 listing but was not observed during a survey in 1984 and was presumed extirpated because of habitat loss (Wunderlin 1984). McCormic and Mercer (1988) documented a population along a powerline, through private land, in Sumter County, that was the most recent documented Sumter County population. In 1987, the recovery criteria, which is mandated by The Endangered Species Act (Species Recovery Priority # 48FR43098:2C), for *Dicerandra cornutissima* included this statement: “Reclassification to threatened status when ten separate, self-sustaining populations of the species are established at secure, maintained sites in peninsular Florida. Recovery and delisting could be considered for any species if 20 separate, self-sustaining populations are established at secure sites in peninsular Florida.” (USFWS 1987).

The most recent 5-Year Review of the longspurred mint was completed in 2008 by the U.S. Fish and Wildlife Service (USFWS 2008). The review recommended that the classification status of the longspurred mint not change. At that time, longspurred mint was thought to occur at four sites in Marion County: the Marjorie Harris Carr Cross Florida Greenway (MHCCFG), along the Florida Department of Transportation (FDOT) I-75 right-of-way, Marion Oaks subdivision, and

Ocala Waterways Estates subdivision. USFWS (2008) listed three historical sites where the species had been found, but not updated for over a decade: Rainbow Lake Estates (Lindsay Lake) in 1993, along State Road 200 near Bahia Oaks development in 1991, and south of Marion Oaks subdivision along a powerline in Sumter County in 1988. Only the MHCCFG and to a lesser degree the FDOT I-75 corridor afford long-term protection to this federally listed species. Surveys for longspurred mint have been conducted on the MHCCFG and surrounding areas by FNAI prior to the 2008 USFWS 5-Year Review during rare and exotic plant and ecological surveys related to the Florida Cross-Barge Canal (Johnson 1988, Knight et al. 1991, Herring and Schultz 2003a and 2003b, Herring 2005). Since the 2008 USFWS 5-Year Review additional information on longspurred mint was conducted on the MHCCFG during natural community (NeSmith et al. 2008) and invasive plant (NeSmith et al. 2013) fieldwork, and rare plant surveys (FNAI 2017a). The FDOT I-75 right-of-way was surveyed by G&O/Stantec in 2011 (Tonjes, personal communication 2015). The earlier FNAI surveys were 12 to almost 30 years ago, and the more recent surveys recorded only incidental occurrences of longspurred mint and were not thorough surveys of the species within the MHCCFG; the G&O/Stantec 2011 study was a comprehensive survey targeted at longspurred mint along the I-75 corridor (Tonjes, personal communication 2015).

It was recommended in the 2008 USFWS 5-Year Review that the recovery criteria should be revised to include objective and measurable targets for all threats to this species and its management needs should be updated with new information. Of the five listing factors, habitat loss and degradation (Factor A) and fire suppression and competition from invasive plant species (Factor E) were the main threats to the longspurred mint (USFWS 2008). Prior to the current survey, the suspected threats to the longspurred mint within the MHCCFG and FDOT I-75 sites were the encroachment of the invasive species cogon grass (*Imperata cylindrica*) and natal grass (*Melinis repens*), both Florida Exotic Pest Plant Council (FLEPPC) Category I invasive species, as well as fire suppression in the sand pine scrub and sandhill natural communities (Factor E). Based on the earlier surveys, if extant, the populations of longspurred mint that occur within the two privately-owned Marion County subdivisions, are highly susceptible to habitat degradation and destruction due to land use changes (Factor A). A rangewide survey of the mint and concurrent documentation of the extent of invasive plant encroachment and habitat destruction will provide valuable information for USFWS, and FDOT and MHCCFG land managers.

OBJECTIVES:

The main objectives of this project were to: 1) conduct a rangewide survey of the longspurred mint by revisiting all known extant and historical populations, expand searches for new plants/populations, and determine population size; 2) document presence and extent of invasive plant species in vicinity of the mint; and 3) develop a monitoring plan for this species after completing a rangewide survey; select a subset of populations in varying habitat conditions (including invasive plant infestations) and develop a protocol for a simple, yet effective way of evaluating population size and habitat health that can be utilized in the future.

All three of the objectives were met. Objective 1): The survey focused on collecting data on location and distribution of longspurred mint. Field surveys were conducted on known extant and historical occurrences on the MHCCFG and surrounding areas, and on potential new sites

where the habitat conditions appeared promising. Historical occurrences included element occurrences in FNAI's database as well as data obtained from herbarium voucher labels and literature reviews. Field data collected included survey date, surveyor, count (# of clumps) or estimate (# of clumps), phenology, natural community, disturbances (including exotic species), notes on health and vigor, and area of coverage. A specific count was recorded in the count attribute field or an estimate or range was recorded in the estimate attribute field. Size of a distinct group of plants was determined by counting clumps of plants and noting area of coverage where possible. Objective 2): Invasive species, such as cogon grass and natal grass, were documented when present. Objective 3): A cost effective monitoring plan is proposed that will provide a method of tracking the presence, status, and population trends of the longspurred mint.

RESULTS AND BENEFITS:

Within the time frame that was allocated for this project, the coordinators 1) gained more current knowledge on the distribution of the longspurred mint and determined a population size, 2) documented the occurrence and extent of invasive plant species that threaten the mint, and 3) proposed a monitoring plan for monitoring the mint on the MHCCFG and the I-75 corridor, the two sites with some protection in place.

Surveys were conducted within eight areas with five of the sites located in Marion County (Lindsay Lake, MHCCFG, I-75 corridor, and Marion Oaks and Ocala Waterways Estates subdivisions) and three sites in Sumter County (Potts Preserve, Lake Panasoffkee, and Halpata-Tastanaki Preserve, all Southwest Florida Water Management District lands). Longspurred mint was documented within all five of the Marion County sites, but no observations were made within the three Sumter County sites. The Lake Panasoffkee sites were the historical locations of 1938 and 1946 specimens collected by West and Arnold (USFWS 1984) that were not re-located by Wunderlin (1984). The Sumter County powerline site, south of Marion Oaks subdivision, was not visited because of access issues with private property but was accepted as an extant population based on recent data that was gleaned from a 2014 FSU Herbarium record (Hofkes 2014 and Hofkes personal communication 2017). Marion Oaks subdivision is divided into north and south by S.R. 484. The E of Marion Oaks north site was kept separate because it is mostly undeveloped and there is interest by MHCCFG in possible acquisition. A summary of the minimum and maximum number of clumps counted by survey site is given in Table 1.

The worst infestations of non-native and invasive plant species were observed on the I-75 corridor and some parts of the MHCCFG. Cogon grass was dominant in some areas on the south bound side of I-75 but was thin and dried in appearance, presumably treated at some point. The non-native Asian crabgrass (*Digitaria bicornis*) was crowding out most all other species where it occurred on both the north and south bound sides of the interstate. Natal grass may become especially problematic in a restoration area (sand pine removal) along the south boundary of the MHCCFG, just north of Marion Oaks subdivision. MHCCFG personnel have been treating the grass and hopefully will be able to control its spread. Not as common or problematic as natal grass and cogon grass, mimosa (*Albizia julibrissin*) was documented within a large population of longspurred mint on the MHCCFG south of the Ocala Waterways housing subdivision.

These data will help satisfy in full or in part “Recommendations for Future Actions” (section IV in USFWS 2008) that address rangewide distribution and identification of threats, and will indirectly contribute to investigating the effects of prescribed burning and other management tools on the longspurred mint (USFWS 2008 section IV - 1, 2a, 2b, and 4). Also 3) the MHCCFG has data on timber sales, mechanical treatment history, burn history, and invasive plant treatment within the current known range of the mint on their property. Updated distribution data, in conjunction with these data layers, will help in the design and implementation of a monitoring program to help answer questions regarding the effectiveness of various management strategies on the health and well-being of the mint.

Table 1. Minimum and maximum number of clumps of *Dicerandra cornutissima* by survey site.

Survey Site	Sum of Min	Sum of Max	# of FNAI element occurrences
Marjorie Harris Carr Cross Florida Greenway	22,698	26,648	5
U.S. I-75 Corridor	2,805	2,838	1
E of Marion Oaks Subdivision North (E of SW 29 th Avenue Rd.)	2,862	3,064	1
Powerline Corridor S of Marion Oaks Subdivision South	50	100	1
Lindsay Lake (Rainbow Lake Estates)	273	345	1
Marion Oaks Subdivision North (of S.R. 484)	382	422	1
Marion Oaks Subdivision South (of S.R. 484)	4,441	5,650	1
Ocala Waterway Estates	4,524	4,787	1
Private or Local ownership – narrow strip of abandoned pasture adjacent to MHCCFG south boundary (part owned by Marion County)	400	470	incl. with MHCCFG
Lake Panasoffkee	0	0	extirpated
Potts Preserve	0	0	
Halpata-Tastanaki Preserve	0	0	
Grand Total	38,435	44,324	

APPROACH:

The proposed work consisted of four major tasks.

- Job 1. Prepared preliminary maps with known historical and recent occurrences of longspurred mint and identified potential habitat (preferentially on nearby public lands) using the latest aerial photography available. Developed a set of data metrics for data collection of longspurred mint populations, habitat condition, and invasive plant occurrences. Gave USFWS, and FDOT and MHCCFG land managers an opportunity to review dictionary.

During the final quarter of 2016 (December), field files were created to be imported onto Trimble Nomad data loggers including background files for all areas to be searched, which included historical records dating back to 1938. Maps were prepared and printed with known historical and recent occurrences of longspurred mint and identified potential

habitat on nearby public and private lands using the latest aerial photography available. Notes were transcribed from original FNAI occurrences. A list of contacts to ask about gaining access to several public lands in the vicinity of the oldest longspurred mint records was also compiled. Correspondence was made with Catherine Owen and Heather Chasez, both with Florida Department of Transportation (FDOT) District Five, regarding data along I-75. The digital data originally taken by G&O (now Stantec) for FDOT in 2011 was not available so H. Chasez digitized Stantec's non-digital data and provided FNAI with a shapefile for use in the field (Chasez 2016). Additionally, Juliet Rynear (Florida Native Plant Society) provided updated information for an older FNAI element occurrence for the species at Lindsay Lake (Rynear 2016).

- Job 2. The majority of the field work was conducted in fall 2017. Known historical and old occurrences were re-visited and potential habitat was searched in the vicinity of the older documented occurrences. As much coverage was attempted as possible within the survey areas, given the constraints of the contracted time. Within the MHCCFG, searches started at previously documented occurrences and expanded out to new areas, many that had undergone restoration activities. The subdivisions were searched starting with older records and expanded out from these; not all of the road edges were inspected because of time limitations. Information on metrics developed in Job 1 such as, location (latitude, longitude), population size, status and condition, vegetative associates, management needs, and threats to long-term viability, were gathered. Observations of additional rare species were also recorded where possible.

In the first quarter of 2017 (January-March), three areas in Marion County where longspurred mint had been previously documented were surveyed: Lindsay Lake, area off of S.R. 200 near Bahia Oaks development, and an area within the southern boundary of the MHCCFG. The Lindsay Lake area represents the northwestern most population of longspurred mint. An estimated 273 - 345 clumps was recorded, all in fruit, and many with empty capsules. The Lindsay Lake site encompassed mostly sandhill with some components of scrub and was surveyed in January 2017. Associated species observed included longleaf pine (*Pinus palustris*), sand live oak (*Quercus geminata*), turkey oak (*Quercus laevis*), myrtle oak (*Quercus myrtifolia*), silk bay (*Persea borbonia* var. *humilis*), gopher apple (*Geobalanus oblongifolius*), earleaf greenbrier (*Smilax auriculata*), narrowleaf silkgrass (*Pityopsis graminifolia*), coastalplain honey-comb-head (*Balduina angustifolia*), wiregrass (*Aristida stricta*), and cup lichen (*Cladonia leporina*). Disturbances noted included clearing, ORV trail, firebreak/road, and trash dumping. We conclude that the population of longspurred mint in the area off of S.R. 200 (MacLaren 1991; previously EO# 13) was mapped incorrectly in the FNAI database because of ambiguous directions and that the correct location was most likely somewhere on the MHCCFG; the record has been deleted from the FNAI database. Within the MHCCFG, along the southern boundary and south of the canal diggings, where only incidental data had been collected previously, 212 clumps, all of which were in fruit were documented in January 2017. They occurred in sandhill and along the road edge and fire breaks with longleaf pine, sand live oak, turkey oak, gopher apple, earleaf greenbrier, narrowleaf silkgrass, and coastalplain honey-comb-head. Clearing, ORV trail, and firebreaks were some of the disturbances observed.

Work completed during the second quarter (April-June) of 2017 involved contacting the Southwest Florida Water Management District (SWFWMD) and arranging access to several of their properties within Lake Panasoffkee, Potts Preserve, and Halpata-Tastanaki Preserve. Chad Hughes was very helpful in granting permits and Cyndi Gates and Joel DeAngelis provided assistance with the surveys. Historical records (1938 and 1946) (USFWS 1984) of longspurred mint along the north boundary of the Lake Panasoffkee (Sumter County) property and several scrub patches within the property were selected for surveys. Potts Preserve in Citrus County had an unconfirmed old report of longspurred mint on site (Chafin, personal communication 2017) and SWFWMD staff believed that it may occur on their Halpata-Tastanaki Preserve property in Marion County (DeAngelis personal communication 2017).

During the third quarter (July-September) and the first part of the fourth quarter (early October) 2017, the historical locations of longspurred mint at Lake Panasoffkee, as well as possible occurrences at Potts and Halpata Tastanaki Preserves were surveyed. No occurrences were found on these properties despite suitable habitat observed. Scrub sites were visited at Lake Panasoffkee, with vegetation consisting of sand live oak, myrtle oak, scrub palmetto (*Sabal etonia*), saw palmetto (*Serenoa repens*), wild olive (*Cartrema americanum*), and maidencane (*Panicum hemitomon*). Disturbances documented at the Lake Panasoffkee site included road widening, ORV trails, and hog digging. Scrub sites were also visited within Potts Preserve that had received different prescribed fire regimes. Surveys were conducted in open scrub areas as well as along edges of trails and fire breaks adjacent to denser vegetation. The scrub at Potts Preserve consisted of sand pine (*Pinus clausa*), sand live oak, Myrtle oak, scrub palmetto, saw palmetto, wild olive, rusty staggertbush (*Lyonia ferruginea*), Florida rosemary (*Ceratiola ericoides*), tarflower (*Bejaria racemosa*), sandyfield beaksedge (*Rhynchospora megalocarpa*), Evans' reindeer lichen, reindeer lichen (*Cladonia subtenuis*), and cup lichen. While not common, several individuals of garberia (*Garberia heterophylla*) were also documented within the Potts Preserve site. Both sandhill and scrub were visited at Halpata- Tastanaki Preserve. The sandhill sites were dominated by longleaf pine, sand live oak, bluejack oak (*Quercus incana*), turkey oak, common persimmon (*Diospyros virginiana*), winged sumac (*Rhus copallinum*), saw palmetto, gopher apple, yankeeweed (*Eupatorium compositifolium*), wiregrass, and bahiagrass (*Paspalum notatum*). The density of oaks were thick and bahiagrass was prolific indicating fire suppression and land clearing within the sandhill. The scrub had open patches of white sand within a forest of sand live oak, common persimmon, saw palmetto, pricklypear (*Opuntia humifusa*), narrowleaf silkgrass, Evans' reindeer lichen, reindeer lichen, and cup lichen.

Old occurrences of longspurred mint within the Marion Oaks subdivision, (south of the MHCCFG), and the Ocala Waterways Estates (west and north of the MHCCFG) were also surveyed during summer-fall 2017 and most were relocated and numerous new locations were documented. Within the Marion Oaks subdivision between 7,685 and 9,136 clumps of longspurred mint were observed. Between 4,524 - 4,787 clumps were observed within the Ocala Waterways Estates subdivision. For both of the subdivisions, the plants were almost always restricted to roadsides adjacent to undeveloped lots, as well as around the perimeters of the upper elevations of retention ponds and within cleared

utility corridors. The sites occur in a variety of upland habitats such as scrub and sandhill and the vegetation associates vary from native, introduced, to invasive. Many introduced and FLEPPC ranked plant species were documented in association with the longspurred mint such as centipede grass (*Eremochloa ophiuroides*), bahiagrass, cogon grass, and natal grass. Numerous disturbances were noted such as habitat loss from development, exotic plant encroachment, trash dumping, as well as mowing and off-road driving.

The Sumter County longspurred mint information was based on data gathered from a R.K. Godfrey Herbarium, Florida State University plant voucher (Mast et al. 2017). Specimen #212732 was observed and vouchered on September 23, 2014 by Joshua F. Hofkes. Latitude and longitude coordinates, directions, plant associates, and general information about the site were also provided on the specimen label. From the coordinates and directions provided, the location coincided with an FNAI element occurrence record based on a specimen collected by McCormic and Mercer (1988). Hofkes (2014) notes that the plants were found along a mowed powerline with *Andropogon*, *Serenoa*, *Eupatorium*, *Licania*, *Rubus*, and *Pityopsis*. Additional notes were that the longspurred mints were frequent and some of the plants had white flowers (Hofkes 2014). “Frequent” was interpreted as an estimate of a minimum of 50 to a maximum of 100 clumps. Attempts to contact Hofkes for clarification after the initial communication was made were unsuccessful.

Other sites surveyed during the summer-fall 2017 included a private/local ownership in Marion County, the I-75 corridor, and part of the MHCCFG. An estimate of 400 - 470 clumps of longspurred mint was documented just south of the MHCCFG boundary that is east of SW 49th Avenue on private and local (Marion County) property. The mints occur in an abandoned pasture/abandoned field that was formerly sandhill, but had been cleared. Associated plants observed growing with the longspurred mint included longleaf pine, sand pine, sand live oak, swamp laurel oak (*Quercus laurifolia*), common persimmon, narrowleaf silkgrass, dogfennel (*Eupatorium capillifolium*), yankeeweed, and bahiagrass. The I-75 corridor was surveyed during the peak flowering period in late September with help from Heather Chasez, FDOT. An estimate of 2,805 - 2,838 clumps was documented within the east and west sides of the I-75 corridor south of the Marion County I-75 Rest Area and north of the MHCCFG I-75 land bridge. A similar comprehensive survey conducted in 2011 documented approximately 1,972 plants (Tonjes personal communication 2015). Habitat was mostly scrub and ruderal. Associated plants included native, introduced, and invasive plant species. Many introduced and FLEPPC ranked plant species were documented in association with the mint such as Asian crabgrass, hairy indigo (*Indigofera hirsuta*), bahiagrass, cogon grass, and natal grass. Disturbances were primarily exotic plant encroachment, trash dumping, as well as mowing and off-road driving.

The MHCCFG was also surveyed during the peak of the flowering season (late September to early October, 2017). FNAI and FDEP staff Adele Mills, Ashley Crawford, and Laurie Dolan conducted the field work. An estimate of 22,698 - 26,648 clumps of longspurred mint was documented. Habitat included scrub, sandhill, successional hardwood forest, and upland mixed woodland as well as firebreak/road

edges. The scrub was characterized by sand pine, longleaf pine, sand live oak, myrtle oak, swamp laurel oak, Chapman's oak (*Quercus chapmanii*), silk bay, garberia, scrub palmetto, saw palmetto, Florida rosemary, rusty staggerbush, winged sumac, muscadine (*Vitis rotundifolia*), earleaf greenbrier, sand blackberry (*Rubus cuneifolius*), eastern poison oak (*Toxicodendron pubescens*), sandyfield beaksedge, summer farewell (*Dalea pinnata*), sweet goldenrod (*Solidago odora*), narrowleaf silkgrass, bracken fern (*Pteridium aquilinum*), yankeeweed, hairy indigo, natal grass, cup lichen, and Evans' reindeer lichen. Disturbances noted included clearing, excavation, forestry operations, logging debris, fire exclusion, firebreaks, herbicide treatment, woody encroachment, recreation trails, ORV trails, roads, heavy equipment driving and parking off road, mowing, natural causes (trees down due to Hurricane Irma), the invasive species cogon grass and natal grass, urban interface, and trash dumping (Fig. 4). A limerock road runs east-west from the land bridge through the center of the MHCCFG. Preparation for paving this road was concurrent with the 2017 survey. Widening of the road and heavy equipment appeared to destroy some longspurred mint plants/clumps, and examination of the area following completion of the project is recommended (Fig. 4, in part). The sandhill was comprised of sand pine, longleaf pine, loblolly pine (*Pinus taeda*), sand live oak, turkey oak, bluejack oak, Myrtle oak, common persimmon, garberia, scrub palmetto, saw palmetto winged sumac, earleaf greenbrier, sand blackberry, coastalplain goldenaster (*Chrysopsis scabrella*), coastalplain honey-comb-head, sweet goldenrod, narrowleaf silkgrass, shortleaf gayfeather (*Liatris tenuifolia*), bracken fern, dogfennel, yankeeweed, poor Joe (*Diodia teres*), coastal foxtail (*Setaria corrugata*), natal grass, wiregrass, and Evans' reindeer lichen. Disturbances included clearing, mowing/chopping, excavation, invasive species (natal grass, cogon grass, and mimosa), fire exclusion, firebreaks, forestry operations, recreation trails, ORV trails, and roads. Most longspurred mint was associated with scrub or sandhill, but a few plants were also observed in successional hardwood forest and xeric hammock. The latter habitats were historically scrub or sandhill communities and have succeeded through time because of insufficient fire. Plants were often linearly distributed along firebreak/road edges of sandhill or scrub. Some of the largest populations of the mint, however, were observed in openings created by relatively recent sand pine removal in the interior of these communities (i.e., away from major firebreaks or dirt roads). This was more common in sandhill than scrub. Much of the "Triangle" portion (between I-75 and Ocala Waterway Estates) of the MHCCFG is being restored (sand pine removal, prescribed fire) for the Florida scrub-jay and yet, for unknown reasons, longspurred mint is much more common on the firebreaks surrounding the Triangle. Similarly, a large rectangular area where sand pine has been removed, due south of the Triangle on the south boundary, has much more mint in the western third of the area that is sandhill than the eastern two thirds of scrub (Fig 5, in part).

- Job 3. A final report detailing findings is presented here. Data was downloaded using Trimble GPS Pathfinder Office and exported as ESRI shapefiles. FNAI rare plant points and the survey tracks where searches were made for longspurred mint are provided as shapefiles. The data was reviewed for quality control and contains metadata according to Federal Geographic Data Committee metadata standards. Data on existing occurrences has been updated in the FNAI Rare Plant Conservation Database and new occurrences were

entered. Twelve extant longspurred mint element occurrences (Table 1 above) were determined to occur during the survey based on a one kilometer mapping separation distance between points and/or polygons (This is the standard separation distance set by NatureServe Methodology). This rule was overwritten when ownership, management, and threats were profoundly different between different sites within one kilometer of each other.

One element occurrence was reconfirmed from Sumter County, just south of the Marion County line in a powerline clearing. The other eleven occurrences were documented in Marion County. A relatively small population occurs at the Lindsay Lake site, which is over 20 kilometers northwest of the closest population on the MHCCFG. Populations in subdivisions were kept as separate occurrences from the MHCCFG despite sharing fence lines and often clumps of plants (Fig 5, in part). The Ocala Waterway Estates constitutes one occurrence and the Marion Oaks subdivision is broken into three occurrences, one north, one south, and one east. The survey area East of Marion Oaks Subdivision North is mostly undeveloped and is of interest as a possible addition to the MHCCFG so was kept as a separate occurrence. Marion Oaks Subdivision North and South are over five kilometers apart. The I-75 Corridor site is also its own occurrence despite its closeness with the MHCCFG because of ownership and management differences. Five occurrences are within the MHCCFG, with four of those occurrences comprised of small groups of plants. Four of the five occurrences are greater than one kilometer apart; the fifth is just east of I-75 from the largest, most robust population that includes the area between SW 49th Avenue and I-75, including the Triangle. East of I-75 is an area of successional hardwood forest (former sandhill) that has had several locations of mint, two with 100 clumps each in 2002, that were considered ‘failed to find’ during the current survey. There were less than 30 plants found at the most northern of the locations, which were not robust, with many covered in pine litter and very shaded.

Following the determination of element occurrences and rough population size, the global rank of longspurred mint was evaluated with the NatureServe Rank Calculator (<http://www.natureserve.org/conservation-tools/conservation-rank-calculator>) (NatureServe 2017). The global rank of longspurred mint has been updated from G1 to G2. The G2 ranking is defined as “*Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor*” (FNAI 2017b). Other factors that weigh in on the global rank include the following criteria: 1) range extent (100-250 square kilometers); 2) number of occurrences (12); 3) population size (minimum number of 38,435 longspurred mint clumps and a maximum number of 44,324 clumps was documented during the 2016-2017 survey); 4) number of occurrences with excellent or good viability (few, 4-12 occurrences); 5) environmental specificity (very narrow, specialist or community with key requirements scarce); 6) intrinsic vulnerability (highly vulnerable due to habitat loss and exotic species).

- Job 4. This methodology was designed to provide a framework for an easy and efficient method of tracking the presence, status, and population trends of *Dicerandra cornutissima* on the MHCCFG and I-75 corridor. Two comprehensive surveys, in 2011 and 2017 (this

survey), establish a good baseline for the I-75 corridor. Polygons are delineated for surveying and any management actions within these could be tied to the survey results on any given year.

Monitoring plots within the MHCCFG should include areas undergoing various management applications and focus on population size and habitat conditions. A large decrease in population size would trigger a re-evaluation of current management practices. Longspurred mint is a robust colonizer of open, disturbed (e.g., sand pine removal) areas, at least in sandhill. It was doing least well in shady, long unburned sites, and locations where it was crowded out by exotic plants (e.g., Asian crabgrass in the I-75 corridor). A monitoring program that follows populations undergoing different management applications could help clarify for land managers what effect prescribed fire has on the health of the longspurred mint.

MHCCFG populations and I-75 corridor population:

Quantitative Objective 1: Annually census all populations of *Dicerandra cornutissima* within the I-75 corridor to determine if large changes (e.g., 20% decrease) in population size are detected.

Monitoring methods: Annually census all *Dicerandra* plants in the I-75 corridor; polygons are delineated for both east and west sides.

Quantitative Objective 2: Annually census representative populations of *Dicerandra cornutissima* within the MHCCFG to determine if large changes (e.g., 20% decrease) in population size are detected; select populations of variable sizes and patterns of distribution across a range of management zones and habitat management actions.

Monitoring methods: Plots should be placed in center and edges of several large continuous populations. A (10 to) 20 m diameter circle plot would be established at each location. The edge plots should be situated to include currently populated and unpopulated areas to capture the possible spread of longspurred mint into adjacent habitat. Roadside plots would be rectangular and parallel to the road and 10 x 50 (100) m in size. Again, placement should include currently populated and unpopulated areas. All plants within the plot boundaries would be counted on an annual basis, preferably in the fall when in full bloom. Notes on numbers of seedlings should be collected. Individual plants could be marked to determine longevity over a number of years. Changes in habitat management (e.g., road closure, herbicide treatment, burn regimes, and forestry activities) and weather conditions such as drought or unusual amounts of rain (hurricane) should be recorded.

GEOGRAPHIC LOCATION:

Longspurred mint was documented in Marion and Sumter Counties. Within Marion County longspurred mint occurs on the MHCCFG, along the FDOT I-75 right-of-way, Marion Oaks and Ocala Waterways Estates subdivisions, and in the Lindsay Lake area (west of Rainbow Springs State Park). The Sumter County population of longspurred mint represents the southernmost occurrence and is located just south of the Marion Oaks subdivision and Marion County boundary. The Lindsay Lake population remains the westernmost and northernmost population and a small population just east of I-75 on the MHCCFG represents the easternmost plants.

RELATED FEDERAL PROJECTS:

There are no known current federal projects.

COST SCHEDULE:

	2016-2017	
	Federal	Match
Job 1	\$ 1,060	\$ 353
Job 2	\$ 11,913	\$ 3,971
Job 3	\$ 2,783	\$ 928
Job 4	\$ 2,121	\$ 707
Total	\$ 17,877	\$ 5,959

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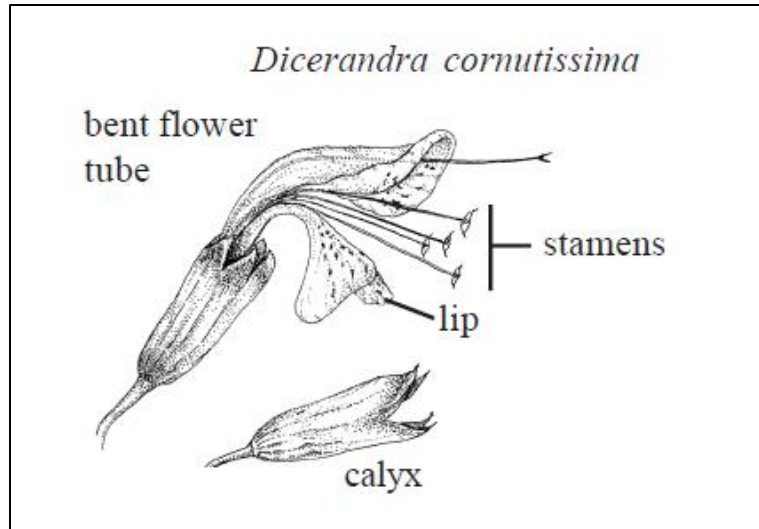


Figure 1. Line drawing of *Dicerandra cornutissima*, drawn by Jean Putnam for use in Chafin 2000.



Figure 2. Longspurred mint (*Dicerandra cornutissima*) in bloom.

Photo by Katy NeSmith



Photos by Katy NeSmith

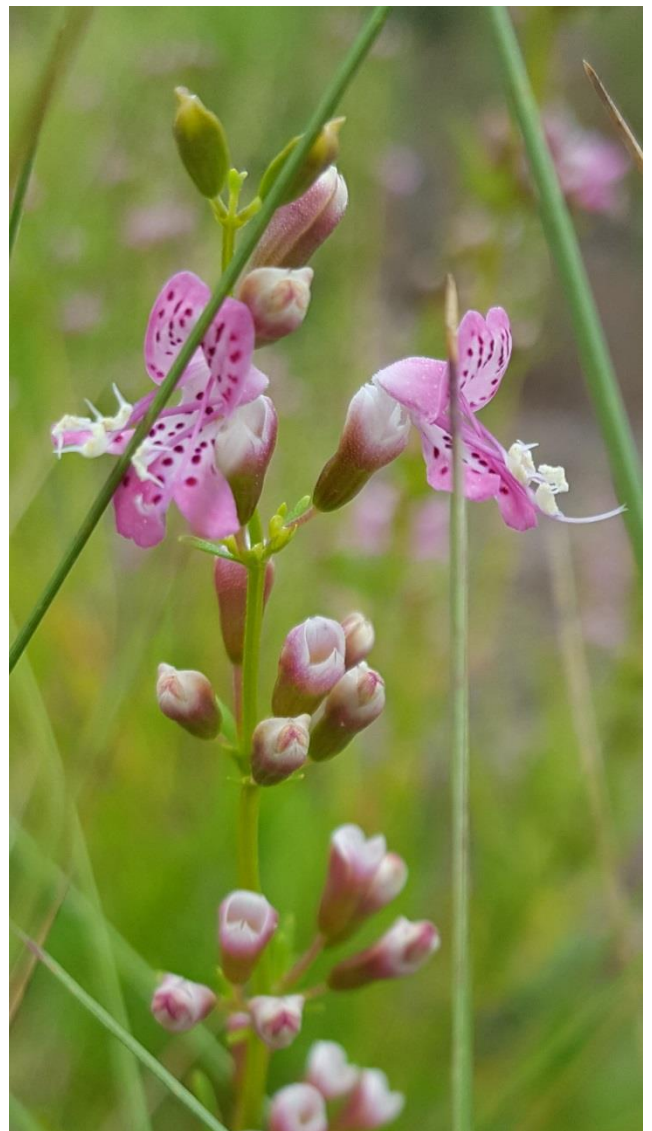


Photo by Brenda Herring

Figure 3. Longspurred mint (*Dicerandra cornutissima*) with old fruit and in bloom.



Photos by Brenda Herring



with cogon grass and centipedegrass



Photos by Katy NeSmith



Figure 4. Disturbances (I-75, trash, invasive and non-native plants, neighborhood roadside, and construction equipment) to longspurred mint (*Dicerandra cornutissima*).



Photos by Brenda Herring



Photo by Katy NeSmith

Figure 5. Longspurred mint (*Dicerandra cornutissima*) in sandhill and scrub after sand pine removal, in scrub after Hurricane Irma, and in Ocala Waterway Estates sharing a fence line with the Marjorie Harris Carr Cross Florida Greenway.