



**Rapid Assessment of Four Invasive
Grass Species at Spirit-of-the-Wild
Wildlife Management Area
Hendry County, Florida**

Final Report to the
Florida Fish and Wildlife
Conservation Commission



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Cover Photographs:

- top: Torpedo grass (*Panicum repens*) dominating the shallow outer fringe of a depression marsh within an improved pasture (Dexter Sowell)
- center: West Indian marsh grass (*Hymenachne amplexicaulis*) monoculture in an improved pasture (Dexter Sowell)
- bottom: Dense patch of par grass (*Urochloa mutica*) at the edge of an impoundment (Robert Gundy)

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ABSTRACT

A rapid assessment for four invasive grass species was conducted at Spirit-of-the-Wild Wildlife Management Area's main Keri tract in Hendry County, FL from February 25 through March 1, 2019. Specifically, we surveyed for *Hymenachne amplexicaulis* (West Indian marsh grass), *Melinis repens* (rose natal grass), *Panicum repens* (torpedo grass) and *Urochloa mutica* (pará grass), collectively the four focal species. We identified 363 occurrences of the four focal species. Torpedo grass was the most ubiquitous of the four species, both in number of occurrences and in acreage. West Indian marsh grass, pará grass and rose natal grass each exhibited decreasing frequency and area of extent. Generally, the four focal species were found in the altered man-made landcover habitats, with natural, less disturbed habitats having less occurrences of the four focal species. We provide suggestions for the initial treatment of these four species based on the locations and area of extent within the Wildlife Management Area.

ACKNOWLEDGMENTS

We thank Beth Morford (FWC) for requesting this survey. We thank Tony Harris (FWC) for providing ATVs for our use that vastly contributed to our ability to complete the surveys in a timely manner. Dexter Sowell and Robert Gundy conducted the transect surveys. Dexter Sowell wrote the report. Frank Price (FNAI) and Robert Gundy reviewed an earlier draft of the report. Chad Anderson (FNAI) contributed to data analysis, production of figures, and reviewing an earlier and later draft of the report. Amy Knight (FNAI) proofed GIS data associated with this report for quality control and assuring metadata requirements were met.

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INTRODUCTION

Spirit-of-the-Wild Wildlife Management Area (SWWMA) is a 7,487 acre (excluding the 159 acre disjunct property to the north) conservation area located in northwestern Hendry County, FL. The natural communities were mapped by FNAI in 2014. At that time, about 75% percent of the landcover at SWWMA was classified as altered or highly altered grasslands (FNAI 2014). Due to the high proportion of improved or semi-improved pasture, SWWMA is highly susceptible to exotic grass invasion. For this reason, monitoring is important to guide management and measure progress towards restoration goals. The main parcel of the SWWMA (Keri tract) comprised seven natural communities and eight altered landcover types. The natural communities comprise approximately 2,287 acres, while the altered land cover types comprise approximately 5,200 acres.

The staff of the Florida Fish and Wildlife Conservation Commission's (FWC) SWWMA requested a survey to map locations and estimate areas of extent for four (4) invasive grass species within the Keri Rd tract of the SWWMA: West Indian marsh grass (*Hymenachne amplexicaulis*), rose natal grass (*Melinis repens*), torpedo grass (*Panicum repens*), and par grass (*Urochloa mutica*). The purpose of the survey is to locate these four invasive grass species (hereafter four focal species) so they can be included in impending future invasive grass management plans and invasive species treatments. Thus, the survey was conducted rapidly so the focal species occurrences can be included in FY2020 management plans and proposed projects. At the request of FWC staff, we also recorded cogon grass (*Imperata cylindrica*) occurrences while conducting transect surveys for the four focal species. Two Florida Natural Areas Inventory (FNAI) staff surveyed SWWMA for 5 days from February 25-March 1, 2019.

METHODS

Field Work

We created approximately 43km (26.7mi) of transect distributed through 9 major east-west transects. Transects were spaced equidistantly from south to north within SWWMA (approximately 709m apart), and transects passed close by to each of the previously known occurrences for torpedo grass and West Indian marsh grass (no known prior occurrences for rose natal grass or par grass). We further segmented Transects 2-9 to create distinct break points, usually corresponding to deep water habitats or other geographic features that would likely hinder further continuance, and would likely require turnarounds, e.g., fences, canals, etc. Except for Transect 1, which was only 0.82km, the remaining 8 transects were divided into 37 transect segments, yielding 38 transect segments across the 9 transects. Figure 1 depicts the transect layout FNAI surveyed.

We surveyed all transect segments with the use of ATVs provided by SWWMA, except for two segments in Transect 9, which were surveyed on foot. We traveled slowly along the transect segment surveying for and locating the four focal species, estimating cover class and area of extent. In addition to the east-west transect segments, roads, firelines and open terrain that were traveled between transect segments were also surveyed for the four focal species when moving

between transect segments. We also deviated from the transect path when deep water was encountered, skirting the deeper water while staying as close to the transect segment as possible.

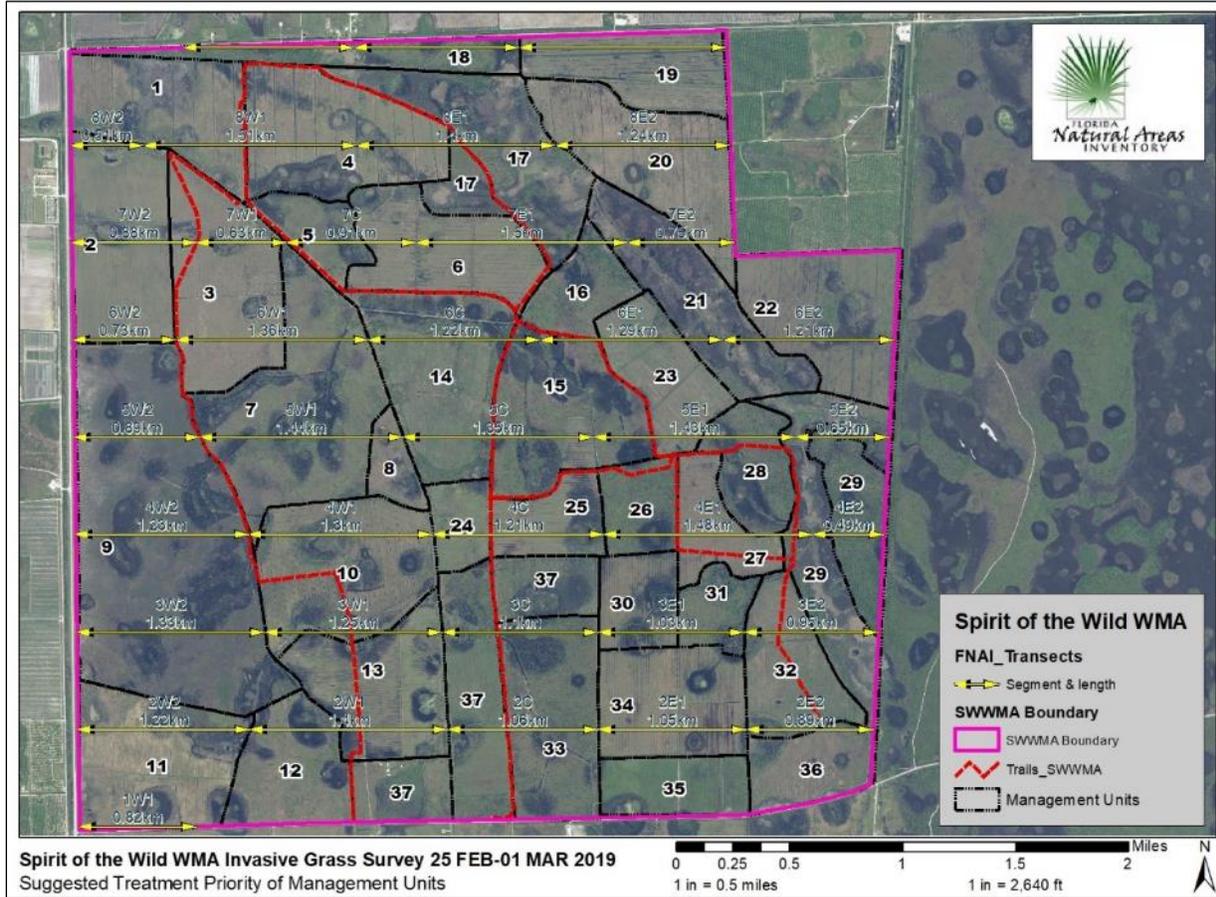


Figure 1. Layout of the nine main transects with smaller segments in SWWMA.

Data Management

GPS points were recorded using a Trimble GPS/datalogger and exported into ArcGIS shapefiles using GPS Pathfinder Office, version 5.8. All data points were edited in ArcMap 10.6 and corrected for consistency. At each focal species occurrence we recorded with a GPS unit numerous data with a data dictionary (see Appendix 1 for full data collected), but of particular importance to this study: *Species*; *Distribution of Plants* (single plant/clump, scattered plants, linearly scattered, scattered dense patches, dominant cover, dense monoculture); *Area (Gross Acreage) of Extent* (0.01, 0.1, 0.25, 0.5, 1, 2, etc.); *Cover Class* (<5%, 5-25%, 25-50%, 50-75%, >75%); *Photo Info* (picture number if photo taken). With Arc GIS 10.6 we intersected points collected in the field to FNAI natural community maps for the purposes of analyzing infested acres and number of points by habitat type.

Data were downloaded and exported to shapefiles¹ with GPS Pathfinder Office for use in ArcMap 10.6. We plotted survey tracks and invasive species points, and edited data. We

¹ We provide four shapefiles along with this report. The first shapefile has the location and data for the four focal species observed during this survey (SpiritOfTheWild_Exotics_FourFocalSpecies_Locations_2019). The second

calculated the number of occurrences for each focal species, gross acreage of extent for each focal species, plus the net acreage for each focal species. Net acreage was calculated by multiplying the gross acreage times the mid-point value for a cover class (e.g., 25-50%=37.5%=0.375; >75%=87.5%=0.875).

RESULTS AND DISCUSSION

We recorded 363 occurrences of the four focal species. Table 1 gives the number of occurrences and area of extent (gross and net acres) for each species observed. Figure 2 depicts the overall distribution and gross acreage of occurrences for the four focal species within SWWMA.

Table 1. Species observed, number of occurrences, gross and net acreage of each species.

Species	N	Gross Acres	Net Acres
<i>Hymenachne amplexicaulis</i> -West Indian marsh grass	132	25.00	12.22
<i>Melinis repens</i> -Rose natal grass	2	0.101	0.003
<i>Panicum repens</i> - Torpedo grass	178	489.70	292.78
<i>Urochloa mutica</i> - Pará grass	51	29.02	16.66
Focal species totals	363	543.82	321.67

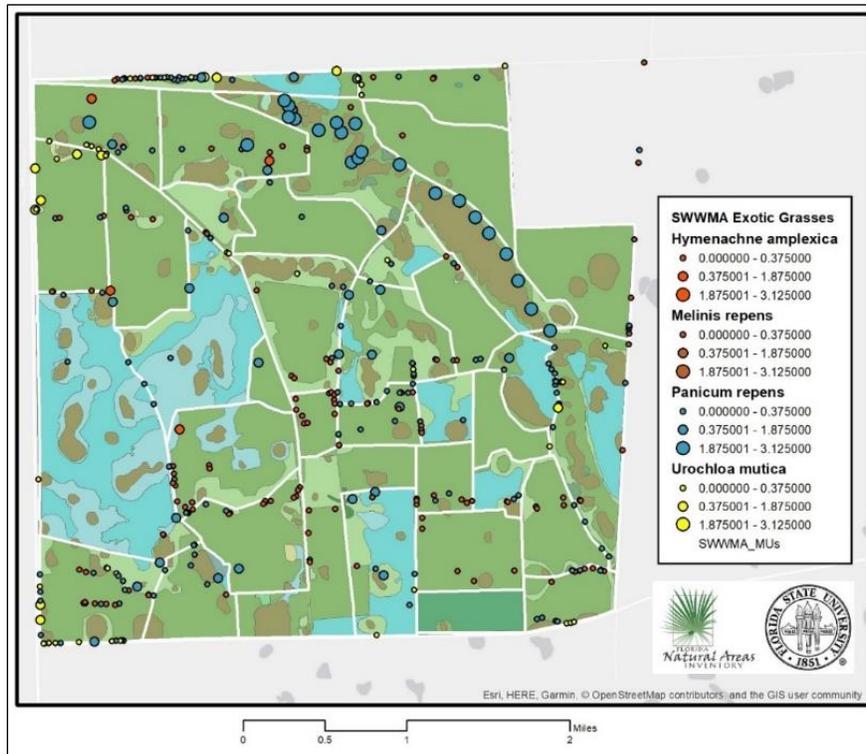


Figure 2. Locations and gross area of extent (acres) of focal species in SWWMA.

shapefile (SpiritOfTheWild_Cogongrass_Locations_2019) has the location and data for cogon grass observed during this survey. The third shapefile (SpiritOfTheWild_Exotics_FNAI_Survey_Tracks_2019) has the survey tracks FNAI personnel drove or walked. The fourth shapefile (SpiritOfTheWild_Exotics_FNAI_Transects_2019) has the original transects created for this survey.

Most of the four focal species were observed in the two most common habitat types, improved pasture and semi-improved pasture (234 and 68 occurrences, respectively). However, more focal species observations were made in these pastures than one would expect, based on the proportion of habitat acreage present. Figure 3 shows the number of occurrences of the four focal species observed in each habitat type. Natural communities, e.g., mesic and wet flatwoods, wet prairie, etc., usually had fewer occurrences of the four focal species than expected based on proportion of habitat acreage present. Disturbed, human-altered communities, e.g., pastures, canal/ditch, impoundment, etc., always had more occurrences of the four focal than expected based on percentage of habitat acreage present. Past alterations to these habitats appear to have allowed these four focal species to gain a foothold and persist, in many cases thrive, in disturbed habitats.

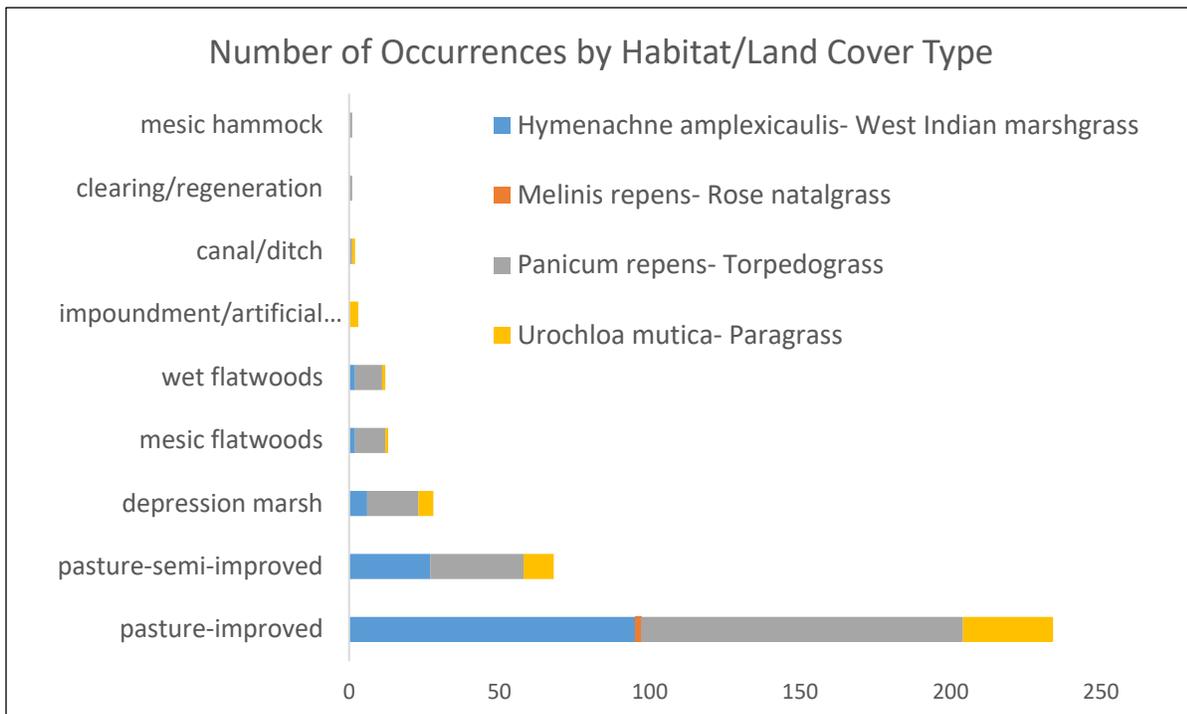


Figure 3. Number of occurrences for each focal species by habitat or landcover type.

Torpedo grass

By far, torpedo grass had the most number of occurrences (N=178, 49% of occurrences), and also had the largest total area of extent (489.7 gross acres, 292.8 net acres). Torpedo grass seemed to be the least constrained by hydrology. Occurring in the wettest habitats with standing water much of the year, to mesic flatwoods that are rarely inundated, this adaptability to a wide hydrologic regime likely explains in part why torpedo grass is so abundant within SWWMA, both in the number of occurrences observed and area of extent. In natural areas, torpedo grass is an excellent competitor and only is reduced in extent over many years where soil disturbance is minimized.

Torpedo grass can be abundant and persist long-term in heavily impacted areas, i.e., areas receiving frequent land management activity. Torpedo grass is frequent where firelines are maintained by frequent disking by tractor implements. The tractor implements dig up and sever

torpedo grass rhizomes and are distributed linearly along the fireline. These rhizomes can root and form newly colonized patches. Torpedo grass will be problematic to control where disking will continue to occur in the future. These torpedo grass observations are not unique to SWWMA, either, as torpedo grass exhibits this behavior throughout all of Florida.

West Indian Marsh grass

West Indian marsh grass had the second largest number of occurrences (N=132, 36% of occurrences), but had much less area of extent (25.0 gross acres, 12.2 net acres) relative to torpedo grass. In natural areas, West Indian marsh grass rarely occurs outside of hydric environments, but can be found in mesic habitats where small, shallow depressions in firelines and trails hold water longer than the surrounding terrain.

Land management activities can facilitate the persistence of West Indian marsh grass over time. West Indian marsh grass can colonize firelines by maintenance disking of firelines by tractor implements, which cut and move stolon fragments. The stolon fragments root at the nodes and can form new plants. Seeds of West Indian marsh grass can float in flooded firelines and flow with water, distributing seeds along the length of the flooded sections of firelines. Typically, West Indian marsh grass does not colonize drier sections of firelines and roads. This likely explains why West Indian marsh grass has reduced area of extent relative to torpedo grass.

Pará grass

Pará grass had many fewer number of occurrences (N=51, 14% of occurrences), but had an area of extent similar to West Indian marsh grass (29.0 gross acres, 16.7 net acres). Outside of SWWMA, para grass is often found in long, linear monocultures in roadside ditches where roads cross extensive wetland habitats. Within SWWMA, this affinity for wet habitats holds as well, but para grass could be found in all heavily disturbed habitats, whether hydric or mesic. Para grass was rarely seen in natural habitats, and seems to need some initial and continued disturbance to persist over time. When found, para grass is usually in a monoculture. Para grass was most frequently observed along the outermost management units of SWWMA, colonizing from extensive monocultures in large ditches paralleling Keri Road, State Highway 29 and Sears Road. Mowing, road grading, fireline disking and linear movement of water along firelines and roadside swales likely moves both seeds and stolons to new areas.

Rose Natal Grass

Rose natal grass was the least frequently encountered focal species (N=2, 1% of occurrences), due to its affinity for drier, mesic to xeric soils, with only two observations made within the Keri tract of SWWMA. Thus, the area of extent is small (0.1 gross acres, 0.003 net acres). Not included in this report are several locations mapped along the abandoned railroad tram (Tram Road) that lies between the Okaloacoochee Slough State Forest and SWWMA.

MANAGEMENT RECOMMENDATIONS

We provide the following management recommendations as a means of prioritizing initial treatment of management units for the four focal species. Though it may be possible that the entirety of the Keri tract of SWWMA could be treated for the four focal species in one fiscal year, we are providing a prioritized treatment strategy to highlight the invasive species which pose the most threat to biodiversity and overall ecosystem function. Our rationale for the following prioritization is that the focal species, especially torpedo grass and West Indian marsh grass, are densest in the 'central slough' that runs along the eastern and northern portions of SWWMA, generally, management units 17, 18, 21, and parts of 29. The treatment plan below focuses on generally treating units furthest from the central slough, then working toward the slough. Lastly, the central slough is recommended for treatment.

We acknowledge that the staff of SWWMA must balance the initial treatment of the four focal species with the treatment of other invasive plant species that impact wildlife management, prescribed burning, and the management of other resources, as well as similar activities at the other nearby wildlife management areas (Okaloacoochee Slough, Dinner Island Ranch). Therefore, we recommend the following initial treatment prioritization as a first step for the SWWMA to plan for management of these four focal species.

An important exception to the prioritization recommendations below will be anytime a management unit is prescribed burned. Regardless of where the management unit is prioritized for treatment below, the four focal species, and ideally all other invasive plant species, should be treated 2-6 months after prescribed burning. Plant regrowth from prescribed fire causes increased metabolism, yielding more efficient uptake of systemic herbicides. Also, ease of target searching and herbicide application are greatly increased in recently burned management units. Figure 4 maps the recommended priority treatment within the SWWMA.

Treatment Prioritization

First priority-Treat management unit (MU) areas that recently received prescribed burns, especially within last 6 months (MUs 02, 04, 06 and western adjacent portion of MU 17; MUs 13, 15; 23, 26-28, and top portion of MU 37). Since these MUs have been burned recently, the four focal species will be easier to spot, and effectiveness of treatment is likely to increase with the new plant growth after recovery from fire.

Second priority-Treat MUs with predominately intact ground cover west of Roberts Canal (MUs 07, 09). Since these MUs have predominately native ground cover, these units would receive the most ecological benefit from the treatment of the four focal species.

Third priority-Treatment of remaining MUs west of Roberts Canal, including the Roberts Canal (MUs 03, 08, 10-12, and the portion of MU 37 west of Roberts Canal). After this treatment, all MUs west of Roberts Canal will have been treated.

Fourth priority-Treat all MUs east of Roberts Canal, west of Canoe Road, and north of Trails 1 and 4, including all MUs within Albritton Loop, excluding MU 01 (MUs 05, 14, 16, 24, portion of 37).

Fifth priority-Treat all MUs east of Canoe Road, south of Trails 1 and 4, and west of the central slough (MUs 25, 30-36), including the portion of MU 29 that is predominately mesic flatwoods adjacent to the eastern boundary along Tram Road).

Sixth priority-Treat the central slough (MUs 17, 18, 21, hydric section of 29, as well as MU 01). Management Unit 01 has a large dense cover of both torpedo grass and West Indian marsh grass. Its treatment should be conducted at the time the central slough is treated due to similar conditions of treatment, likely aerial or airboat application of herbicide.

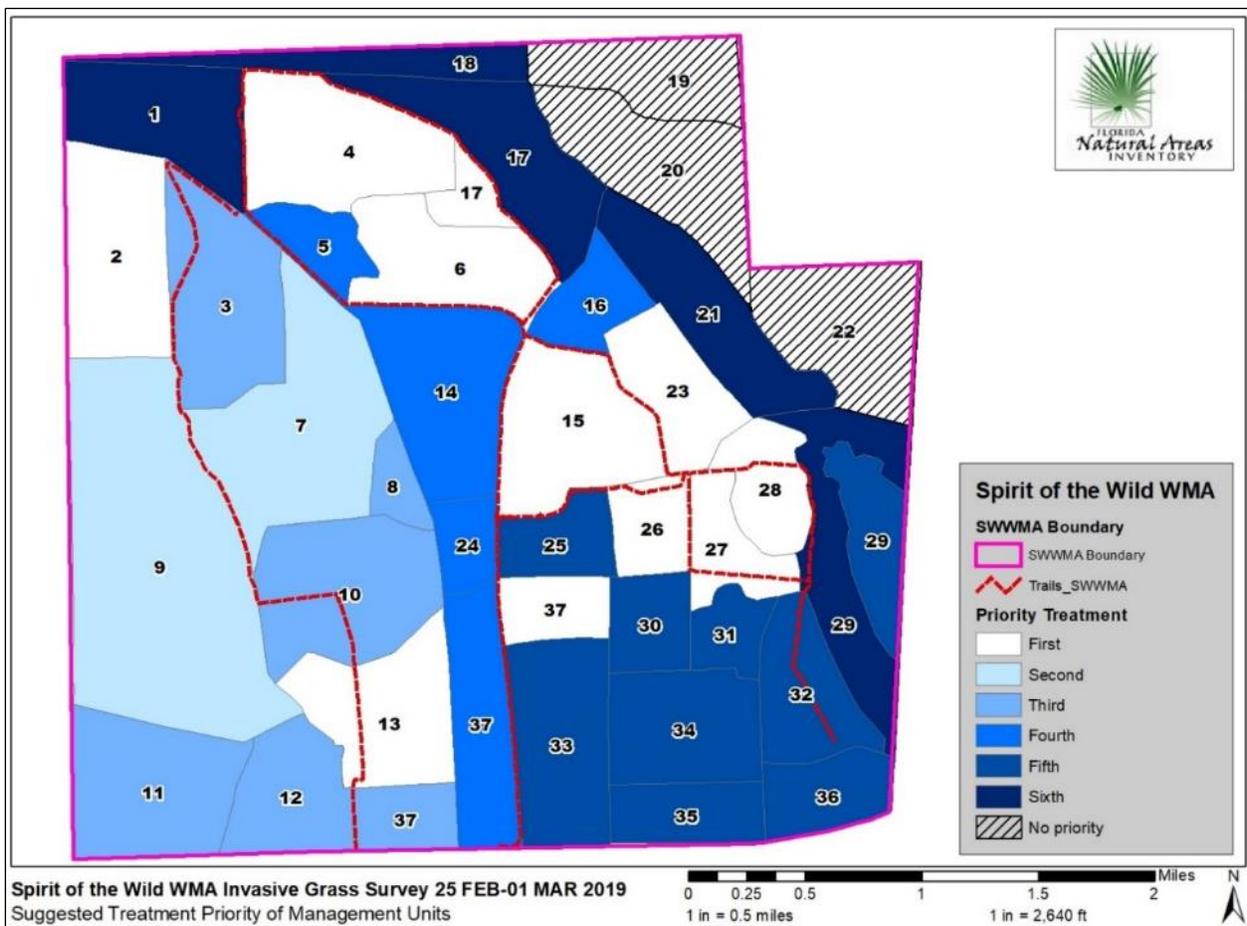


Figure 4. Initial treatment prioritization for the four focal species at SWWMA.

Not included in the prioritization recommendations above are management units northeast of the central slough (MUs 19, 20, and 22, identified as No Priority in Figure 4). The predominant invasive plant species in these management units is Peruvian primrose willow (*Ludwigia peruviana*). These units should only be treated for the four focal species where access on foot is easy and treatment is feasible, e.g., management unit boundaries and trails.

REFERENCES

Florida Natural Areas Inventory (FNAI). 2014. Natural Community Mapping Certification Project. Report to the Florida Fish and Wildlife Conservation Commission, Tallahassee, FL.

APPENDIX A
DATA ATTRIBUTES, DEFINITIONS, AND VALUES FOR EXOTIC PLANT POINTS

<u>ATTRIBUTES</u>	<u>VALUES</u>
FIELD_ID	Number assigned to this point during field work; not necessarily unique.
POINT_ID	Unique number assigned to each point by ArcMap.
SURVEYSITE	Name of the wildlife management area.
SURVEYDATE	Date of data collection.
SURVEYOR	Name of the FNAI field surveyor
EVAL_TYPE	Type of visit to site. Valid values: Initial - first observation and assessment of a species in that spot Revisit - observations/assessments on subsequent visits Pre-treatment - only an observation /assessment taken directly before treatment is applied Post-treatment – observation /assessment and evaluation of the targeted invasive species post-treatment
SPECIES	Scientific name of exotic plant occurring at that point.
DISTRIBUTN	Pattern of plant distribution within the gross acreage. Possible values are: Single plant or clump – One individual plant or one small clump of a single species. Scattered plants or clumps – Multiple individual plants or small clumps of a single species scattered within the gross area infested. Scattered dense patches – Dense patches of a single species scattered within the gross area infested. Dominant cover – Multiple plants or clumps of a single species that occupy a majority of the gross area infested. Dense monoculture – Generally a dense stand of a single dominant species that not only occupies more than a majority of the gross area infested, but also covers/excludes other plants. Linearly scattered – Plants or clumps of a single species generally scattered along a linear feature, such as a road, trail, property line, ditch, ridge, slough, etc. within the gross area infested. No live plants – No live plants observed
FEAT_TYPE	Conceptual feature type: point or polygon
FEATYPCOM	Comments regarding feature type
ACRES	Estimated area of infestation. Valid values are: 0.01 0.10 0.25 0.50 1 2, etc up to 10 other
PCTCOVER	A visual estimate of the percentage of the area infested that is actually covered by the canopy of the plants. Percent Cover classes are: < 5 % 5 - 25 % 26 - 50 % 51 - 75 % > 75 %

MATURITY Stage of plant development for the recorded infestation. Possible values are:
Mature
Immature
Both

PHENOLOGY Characteristic phenology of the plants. Phenology values:
flower/bud
flower/fruit
fruit
sporulating
in leaf
dormant

TREATEDB4 Indication of whether or not plants were previously subject to management efforts. Allowed values are:
Yes
No
Unknown

FNAL_NC Natural community present in area of invasive plant occurrence. *Note: not collected in the field, but joined from community mapping shapefile finalized in 2014 during GIS edits.*

POLY_SEVER Severity of the disturbance(s). Disturbance severity values are:
none
light
moderate
heavy
severe

POLYDIST_1 Describes the primary disturbance in the vicinity. Disturbance values are:
not evident
agriculture
cattle disturbance
clearing (includes dove fields, old fields, and food plots that are less than 0.5 acre, i.e. that are not delineated as ruderal polygons)
ditch/canal
exotics
firebreaks
fire suppression
forestry operations (e.g., logging, loading areas, bedding, equipment rutting, slash piles, and other mechanical disturbances; does not include burning.)
hog digging
impoundment (e.g. artificial ponds and lakes, borrow pits, dams, dikes)
natural
ORV trail
road
trash dumping
woody encroachment
cause unknown
other (details provided in the DISTURBCOM field)

POLYDIST_2 Description of the secondary disturbance, if any, in the vicinity of the rare plant record. Disturbance values are the same as DISTURB 1.

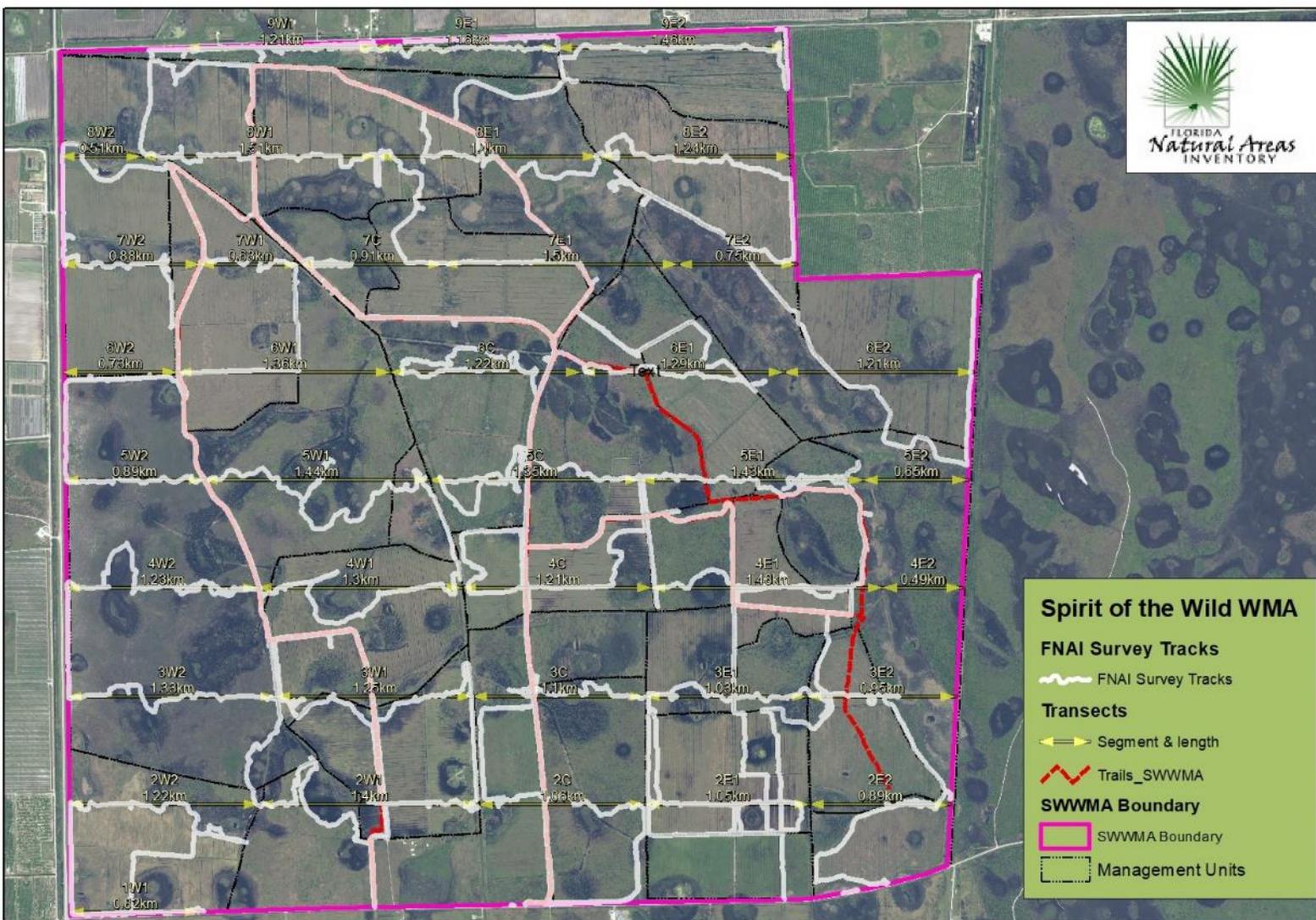
POLYDIST_3 Description of the tertiary disturbance, if any, in the vicinity of the rare plant record. Disturbance values are the same as DISTURB 1.

DISTURBCOM Comments regarding disturbance

PHOTO_INFO Observation, Assessment, or Treatment Photos

COMMENTS Comments is an optional field used by the surveyor to provide additional information about the exotic pest plant population.

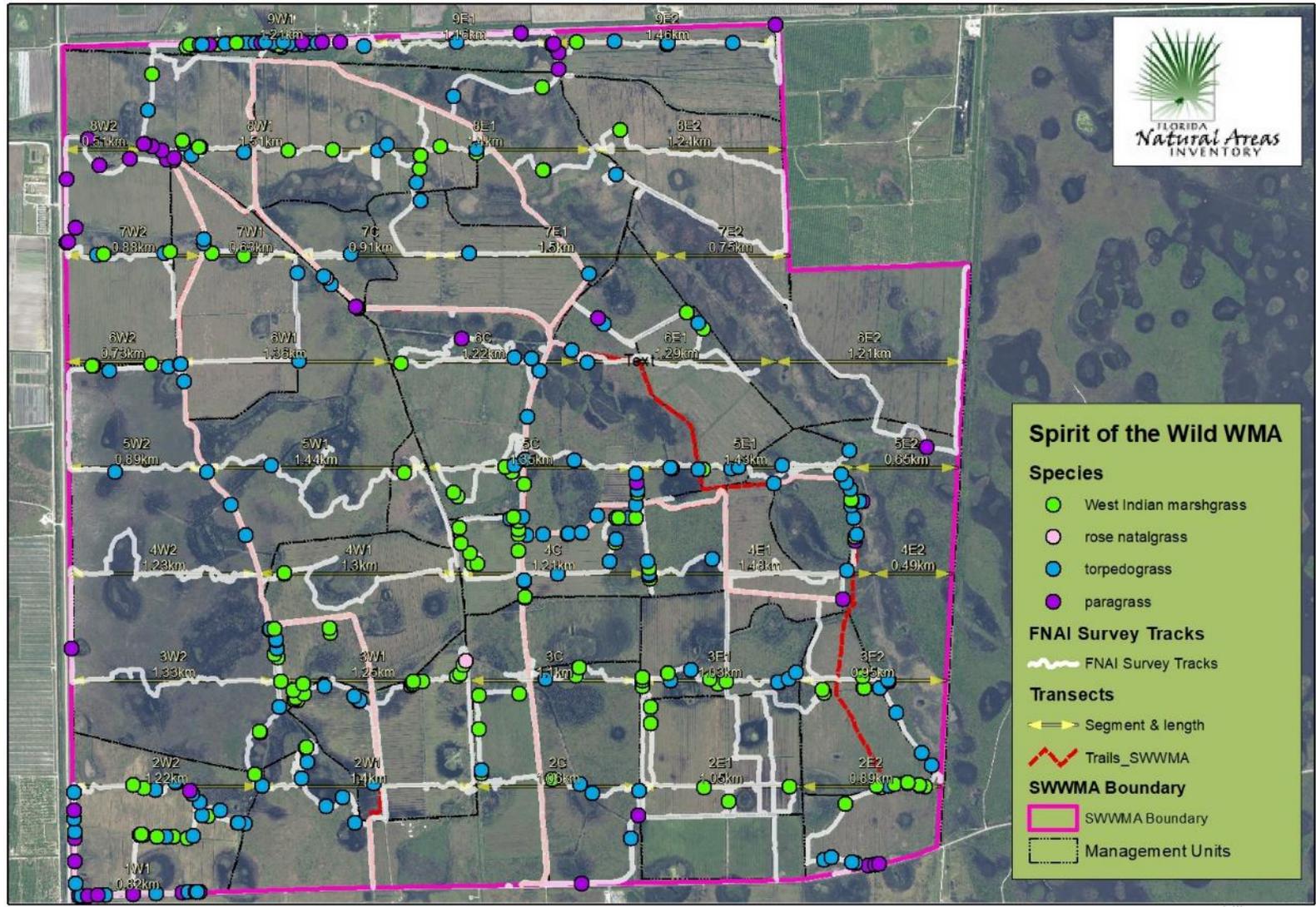
APPENDIX B
 MAP OF SURVEY TRACKS ALONG TRANSECTS AND TRAILS



Spirit of the Wild WMA Invasive Grass Survey 25 FEB-01 MAR 2019
 Survey tracks along transects and trails



APPENDIX C
 LOCATION OF FOUR FOCAL SPECIES ALONG TRANSECTS, TRAILS AND OPEN TERRAIN



Spirit of the Wild WMA Invasive Grass Survey 25 FEB-01 MAR 2019
 Survey tracks and locations of four focal invasive grass species

APPENDIX D
PHOTOS REPRESENTATIVE OF THE TYPICAL FOCAL SPECIES OCCURRENCES

TORPEDO GRASS



Top: Torpedo grass heavily infesting a management boundary trail with lower elevation than the surrounding pasture. *Bottom:* Torpedo grass in a swale within a pasture.

TORPEDO GRASS



Top: Small patch of torpedo grass in a newly created fireline in hydric pine flatwoods and depression marsh. *Bottom:* Torpedo grass dominating the ecotone between a depression marsh and an improved pasture. West Indian marsh grass occurs out of view to the right of this photo (see Top photo page 17).

TORPEDO GRASS



Top: Large 40+ acre patch of torpedo grass in the central slough. *Bottom:* A two acre occurrence where torpedo grass is the dominant cover in the shallower ends of a large depression marsh.

WEST INDIAN MARSH GRASS



Top: West Indian marsh grass dominating an ecotone between pasture and a depression marsh. Peruvian primrose willow (*Ludwigia peruviana*) can be seen in the background outcompeting both West Indian marsh grass and torpedo grass. *Bottom:* West Indian marsh grass growing thickly in a ditch surrounding an improved pasture. Though some plants are tan and curing from cold spells, other plants clearly had traces of blue dye from herbicide treatment. Peruvian primrose willow is also in the ditch.

WEST INDIAN MARSH GRASS



Top: A few West Indian marsh grass plants growing at the edge of an impoundment. *Bottom:* West Indian marsh grass dominating a ditch that empties in a larger ditch/shallow canal. Torpedo grass is intermingled within, and a small solid patch of torpedo grass occurs in the deeper water (white oval).

WEST INDIAN MARSH GRASS



Top: West Indian marsh grass on left side of photo showing winter die-back, with new green growth recently emerged. Torpedo grass is dominant on the right side of the photo. *Bottom:* A large two acre patch of West Indian marsh grass in near monoculture in Management Unit 1. Though plants experienced die-back in the winter, new green growth is visible near water level.

PARÁ GRASS



Top: Dominant cover of para grass near the northwest corner of Albritton Loop. Peruvian primrose willow and dog fennel (*Eupatorium capillifolium*) are only two other species successfully competing with para grass. *Bottom:* Pará grass occupying a large 2 acre patch with numerous other woody species at the edge of a pasture. Dog fennel, Peruvian primrose willow, and a few other weedy species are competing to coexist at the edge of the pasture next to the management boundary trail.

PARÁ GRASS



Top: A small patch of pará grass at the edge of the mow line between pasture and a ditch.
Bottom: Tall growth of pará grass along a management unit boundary trail.

ROSE NATAL GRASS



Above: A few small plants of rose natal grass were discovered at this occurrence along the west bank of Roberts Canal. Rose natal plants at this occurrence are in the center of the photo above, but were not bearing their diagnostic white to pink flower/seed heads. The plants at the occurrence along the east bank of Roberts Canal were flowering/fruitleting. Not included in the GIS data are several occurrences of rose natal grass along the mowed Tram Road just east of the SWWMA boundary.