



FLORIDA MOUSE SURVEY AT BULLFROG CREEK WILDLIFE AND ENVIRONMENTAL AREA



Final Report to Florida Fish
and Wildlife Conservation Commission

May 2018

Florida Natural Areas Inventory



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Cover Photographs:

- top: Florida mouse (*Podomys floridana*) captured at Bullfrog Creek Wildlife and Environmental Area during March 2018.
- center: Cotton mouse (*Peromyscus gossypinus*) captured at Bullfrog Creek Wildlife and Environmental Area during March 2018.
- bottom: Scrubby flatwoods at Bullfrog Creek Wildlife and Environmental Area, habitat in which Florida mouse was captured during March 2018.

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Recommended citation: Florida Natural Areas Inventory (FNAI). 2017. Florida Mouse Survey at Bullfrog Creek Wildlife and Environmental Area. Report to Florida Fish and Wildlife Conservation Commission. Florida Natural Areas Inventory, Tallahassee, FL.

ACKNOWLEDGMENTS

Florida Natural Areas Inventory (FNAI) conducted this survey as a Task Assignment under a contract administered by FWC's Division of Habitat and Species Conservation. Jennifer Myers (FWC) initiated this project and was the project manager. Joshua Birchfield (FWC Biologist) provided assistance with access and coordination with management activities on the WEA. Jennifer Myers provided helpful review of this report. We thank Dan Sullivan for his administration of the overarching contract that facilitates this work.

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ABSTRACT

FNAI conducted a survey for Florida mouse (*Peromyscus floridanus*) at Bullfrog Creek Wildlife and Environmental Area in Hillsborough County, Florida. The survey areas were determined by a habitat model developed by FWC, based in part on the natural communities previously mapped by FNAI. Habitats included scrubby flatwoods (44 acres), mesic hammock (34 acres that will be reclassified as restoration - scrubby flatwoods), mesic flatwoods (22 acres buffering xeric communities), and clearing regeneration (13 acres). Trapping was conducted over a 5 day/4 night period from March 26th through the 30th using FWC's Standard Monitoring Protocol for Florida Mouse (*Peromyscus floridanus*) Occupancy Surveys. Trap stations (two traps at each) were set in non-random transects distributed across each survey habitat at a density of at least one station per two acres of habitat for each habitat patch. A total of 330 trap stations-nights (660 trap-nights) were set among the 4 habitat types at BCWEA. Three rodent species were captured in a total of 98 individual captures. A total of 7 Florida mice were captured at BCWEA within scrubby flatwoods and adjacent restoration – scrubby flatwoods (last mapped as mesic hammock, but soon to be revised). These data were incorporated into the geodatabase provided by FWC and submitted along with this report.

INTRODUCTION

The Florida Natural Areas Inventory (FNAI) is part of the Florida Resources and Environmental Analysis Center at Florida State University. Our mission is to gather, interpret, and disseminate information that is critical to the conservation of Florida's biological diversity. To further this mission FNAI works cooperatively with the Florida Fish and Wildlife Conservation Commission (FWC) and other agencies on inventory and monitoring projects throughout Florida. The goal of this project was to determine the presence of Florida mouse (*Podomys floridanus*) on Bullfrog Creek Wildlife and Environmental Area (BCWEA).

BCWEA lies in southern Hillsborough County immediately adjacent to the Hillsborough County-managed Bullfrog Creek Scrub Preserve (BCSP) and aids in maintaining wildlife connectivity among a series of conservation lands across Hillsborough County (Figure 1). BCWEA encompasses several natural communities characteristic of the region that support a wide variety of imperiled, as well as common wildlife species. These natural communities provide excellent habitat for the gopher tortoise, a keystone species that is designated as threatened by the State of Florida. Gopher tortoise burrows, which help support a large suite of commensal species, can be found throughout the upland communities of the BCWEA. Among the potential commensals at BCWEA is the Florida mouse, which is endemic to xeric uplands of Florida and although not currently listed by the state of Florida, it is included in the Imperiled Species Management Plan. Because of its limited distribution, narrow habitat needs, and vulnerability to loss or degradation of habitat the Florida mouse remains a species of concern. FWC continues to monitor sites to inform their management.

METHODS

The methods for this survey follow the "Standard Monitoring Protocol for Florida Mouse (*Podomys floridanus*) Occupancy Surveys" produced by the FWC Wildlife and Habitat Management Section's WCPR Program (Appendix A). Specifics of the survey at BCWEA are described as follows.

Preliminary Sampling Setup

FWC provided an ESRI Geodatabase including a feature class for Florida mouse habitat within BCWEA based on FNAI mapping and other model parameters. Using the acreage totals for each habitat and the target of a minimum of one trap station (two traps per station) for every 2 acres of habitat we determined the minimum number of sample stations per habitat (Table 1). With the planned distance of 15 meters between sample stations we also determined the length of transect needed at each site. Transects were then laid out manually using ArcGIS, spreading the transects across the habitats in accessible areas to facilitate setup and checking of traps.

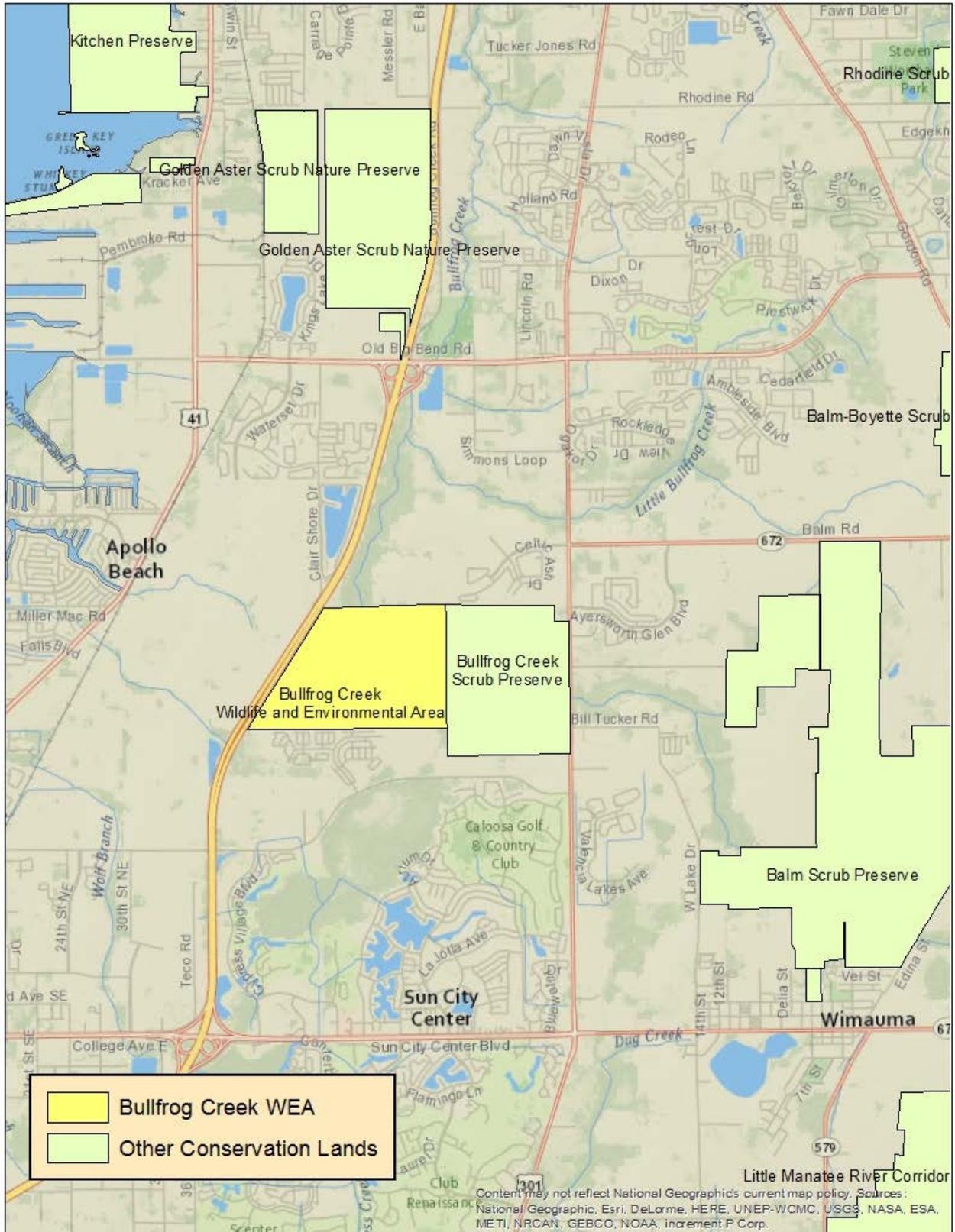


Figure 1. Location of Bullfrog Creek Wildlife and Environmental Area and nearby conservation lands.

Table 1. Acres of habitat to be surveyed for Florida mouse at Bullfrog Creek WEA and number of trap stations.

Habitat	ACRES	MINIMUM # OF STATIONS	ACTUAL # OF STATIONS
scrubby flatwoods	44.3	22	41
mesic hammock (restoration - scrubby flatwoods)	34.0	17	20
mesic flatwoods	21.7	11	18
clearing/regeneration	13.3	7	16
Totals	113.3	57	95

Site boundaries, habitat polygons, and planned transects were loaded onto a Trimble Geo 7 GPS datalogger along with background imagery for navigating to transect locations. The number of sample stations for each transect was included in the transect data file for field reference. A hard copy map with the transects and associated number of trap stations was printed for field use.

Field Surveys

Small (2" x 2.5" x 6.5") folding aluminum HB Sherman live traps were used for this survey. A pair of traps baited with approximately 0.5 tbs of rolled oats were set at each trap station spaced at approximately 15 meters along the predesigned transects. A GPS trail as well as the location of each trap was recorded during the setup. Each trap station was flagged to facilitate relocation. Trap setup was initiated approximately three hours prior to sunset with the goal of completing the setup by sunset. Traps were checked starting at approximately sunrise with the goal of completing the check of all traps within two hours of sunrise. Georeferenced data was recorded for each small mammal capture. Data recorded at the point of capture included the date, transect number, trap number, surveyor, species, and notes. If the captured individual could not be identified in the trap it was transferred into a plastic specimen bag for inspection. All captured individuals were released following identification or handling. Traps that held captured mice were cleaned the day of captures using a diluted bleach and liquid soap solution and sun-dried before being placed back in rotation for use. Empty traps left in the field for later resetting were placed in shrubs well above the ground to prevent attracting fire ants.

Data Management

FWC provided an ESRI Personal Geodatabase containing feature classes for trap and transect locations and tables for capture results to be populated with data from the field survey. Structure of the Geodatabase is described in Appendix B. GPS points and data were recorded using a Trimble GPS/datalogger and transformed into ArcGIS shapefiles using GPS Pathfinder Office, version 5.3. Shapefiles from each surveyor were merged, edited for completeness, and appended to the appropriate

feature class or table in the Geodatabase. The capture results table (trap_visit) within the Geodatabase contains a record for each trap for each night of the survey.

The projection parameters for all spatial data are as follows:

Projection: Albers Datum: HPGN Units: Meters

Parameters
 1st standard parallel: 24 0 0.000
 2nd standard parallel: 31 30 0.000
 central meridian: -84 0 0.000
 latitude of projection's origin: 24 0 0.000
 false easting (meters): 400000.00000
 false northing (meters): 0.00000

RESULTS

Trapping was conducted over a 4 night period between March 26, 2018 and March 30, 2018. Ninety-five trap stations were set for a total of (660 trap-nights) among the 4 habitat types at BCWEA. Three of the transects were terminated after the second night because Florida mice were captured at those locations. Three rodent species were captured in a total of 98 individuals captures (Table 2). A total of 7 Florida mice were captured at BCWEA within scrubby flatwoods and adjacent restoration-scrubby flatwoods (last mapped as mesic hammock, but soon to be revised). Total trap nights and Florida mouse captures for each habitat are shown in (Table 3). Figure 2 shows the survey habitats, locations of transects, and Florida mouse capture locations at BCWEA. Figure 3 shows the transects and Florida mouse capture locations on 2017 aerial photo imagery. The geodatabase containing these data is presented with this report.

Table 2. Species captured during a Florida mouse presence survey at Bullfrog Creek WEA.

Species	Common name	Number of captures
<i>Podomys floridanus</i>	Florida mouse	7
<i>Peromyscus gossypinus</i>	cotton mouse	41
<i>Sigmodon hispidus</i>	cotton rat	50

Table 3. Acres of habitat surveyed, number of trap stations, and number of Florida mouse captures at specific tracts of the Lake Wales Ridge WEA.

Habitat	Acres	Stations	Trap-nights (stations x traps x nights)	Florida mouse captures
scrubby flatwoods	44.3	41	308	3
mesic hammock (restoration- scrubby flatwoods)	34.0	20	80	4
mesic flatwoods	21.7	18	144	0
clearing/regeneration	13.3	16	128	0
Totals	113.3	95	660	7

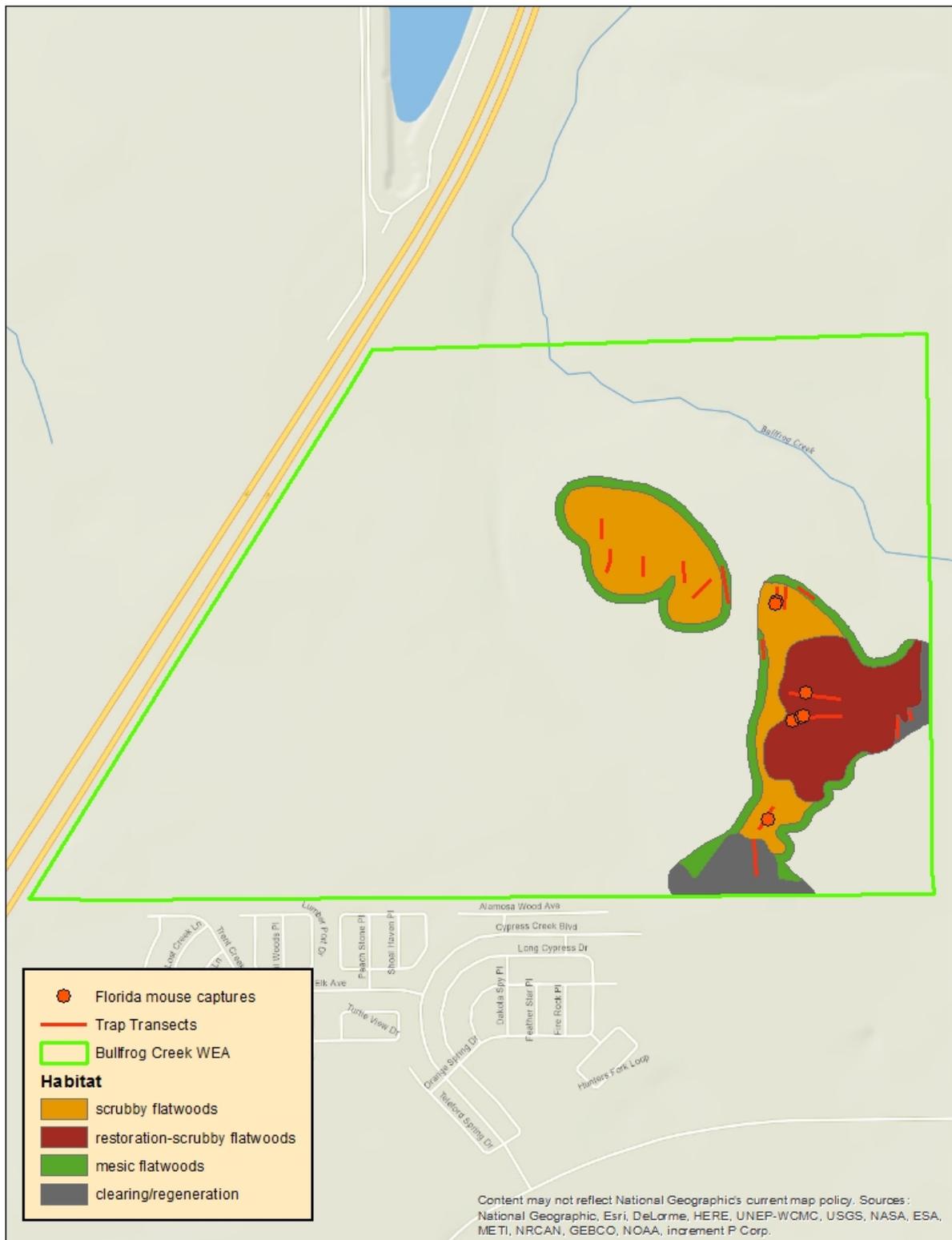


Figure 2. Survey habitats, locations of transects, and Florida mouse capture locations at Bullfrog Creek WEA

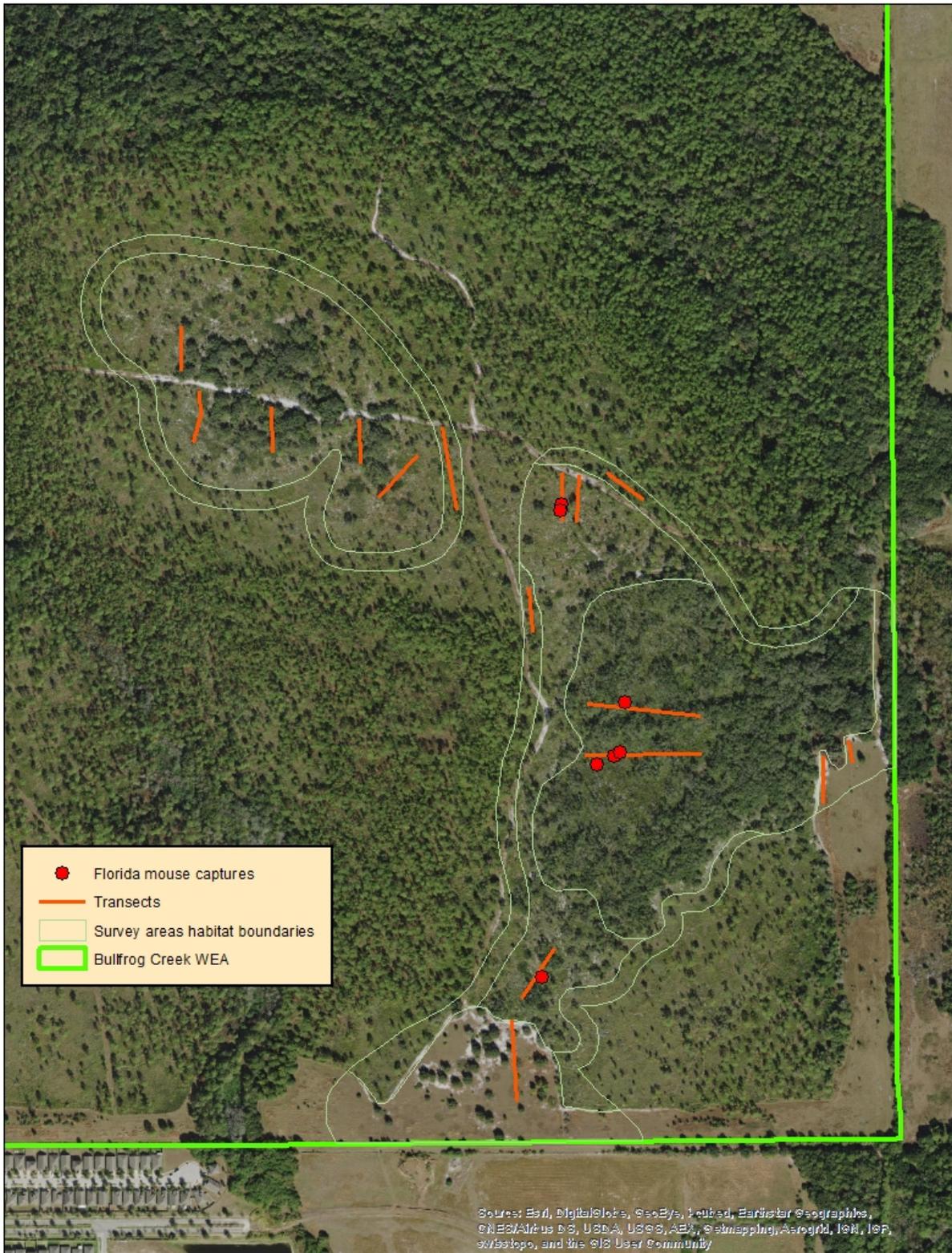


Figure 3. Transects and Florida mouse capture locations at Bullfrog Creek WEA on 2017 aerial photo imagery

DISCUSSION

Although there is less than 120 acres of habitat for Florida mouse at BCWEA, captures during this survey confirm that the population is maintaining itself. Because there appears to be limited potential for immigration, the habitat on site will have to be managed to continuously maintain suitability of all or most of the habitat in order to maximize the long-term persistence of Florida mice on site. Burning the area previously mapped as mesic hammock (soon to be revised as “restoration-scrubby flatwoods”) has recently expanded the area of suitable Florida mouse habitat along the western edge of the former hammock. This area may have attracted mice from the central scrubby flatwoods island, where Florida mice have been captured in the past, but not during this effort. The island appears to be somewhat suitable in small peripheral patches, but overall may be marginally suitable because of the extent of tall scrub oaks and sparse cover within 1 meter of the ground. Improvements to this habitat island, as well as continued restoration efforts in the restoration-scrubby flatwoods, would help maximize the suitability of the habitat on BCWEA to help ensure long-term persistence of Florida mice on site and in the region.

No Florida mice were captured in the mesic flatwoods adjacent to the scrubby flatwoods. The low cover or lack of scrub oaks likely explains their absence. No small mammals were captured in the ruderal habitat, which at BCWEA is former pasture maintained by mowing. Recent mowing had reduced the vegetative cover to apparently unsuitable levels for rats and mice. Because there are no scrub oaks (other than a few large sand live oaks) in the ruderal habitat, it is not likely ever suitable regardless of timing of mowing. Although likely outside of the scope of planned management, the area could be planted in scrub oaks to increase potential Florida mouse habitat.

BCWEA is an island of natural habitat that is part of a patchwork of conservation lands within a landscape of rural and suburban development in southern Hillsborough County and beyond. Many of these sites have xeric uplands that potentially support Florida mice. Individually, many of these sites are not likely to support long-term populations; but as a group, each plays an important role in maintaining the regional meta-population. Gene flow within the meta-population may be critical for long-term health and persistence. If maintaining the regional meta-population of the Florida mouse is a goal, translocation may need to be considered if sites are determined to be genetically isolated or if local extinctions occur. Vigilance in habitat management at BCWEA and throughout the region will maximize local populations and prevent or reduce the need for augmentations.

Appendix A. FWC Terrestrial Habitat Conservation and Restoration Wildlife Conservation, Prioritization, and Recovery Program: Standard Monitoring Protocol for Florida Mouse (*Peromyscus floridanus*) Occupancy Surveys.

Purpose: The purpose of this monitoring protocol is to determine **occupancy and general spatial distribution** of Florida mouse within potential habitat patches on Wildlife Management Areas (WMAs) throughout the state of Florida. This monitoring will not provide **density, abundance, or other population estimates** that allows for determination of changes in population over time. This protocol does include estimates of detection probability to allow managers to estimate the actual number of habitat patches (including some patches that did not trap mice) containing Florida mice. This protocol will allow managers to periodically confirm that Florida mice remain on an area, examine spatial distribution of Florida mice on the WMA, and document presence of this species to a unit once restoration activities have occurred.

Seasonality: Trapping for Florida mouse should occur during November – March to reduce the likelihood of heat stress on capture individuals. When nighttime temperatures are forecast to be less than 60°F, a small ball (i.e., slightly smaller than a tennis ball) of cotton or polyester fiber-fill should be placed in the back of each trap for insulation. Trapping should not occur when nighttime temperatures are forecast to be less than 45°F whenever possible. Trapping should be discontinued during periods of heavy or persistent rainfall.

Repetition: An initial baseline survey using this protocol should be completed as soon as possible once an individual WMA determines there is the need to monitor the status of Florida mouse. After this initial survey, the recommendation is to repeat the effort on a five (5) year basis, pending resource availability. If no Florida mice are detected anywhere on a WMA after two repetitions of this survey (10 years), surveys can be discontinued.

Suggested Equipment: Sherman small-mammal traps (8 x 9 x 23 cm), cotton pillowcase (for handling captured mice), gloves, datasheets on write-in-the-rain paper, pencil, bait (stored in cardboard Quaker oats container), GPS unit, flagging tape, measuring tape (with meter increments).

Protocol:

Habitat Patch Selection: Florida mice primarily occur in scrub, scrubby flatwoods, sandhills, upland oak and hardwood hammocks, and disturbed/ruderal habitats containing xeric soils. Areas that contain a cluster or colony of active and inactive gopher tortoise burrows have the best potential to be occupied by Florida mice. Using the WMA's potential habitat map for Florida Mouse (or another technique if this has not been completed), all patches of potential Florida mouse habitat should be identified and prioritized for surveying. **Patches of habitat that are contiguous but divided by artificial means (i.e., roads, firebreaks, etc) or narrow bands of unsuitable habitat (i.e., a small creek, hammock, or cypress strand) should be treated as a single patch of habitat and surveyed accordingly.** Habitat patches to be surveyed should be identified by the management unit that contains the largest

amount of acreage within the patch (i.e., a surveyed patch with 75% of its area within management unit 15 would be Habitat Patch 15).

Surveys should focus on trapping within the largest habitat patches within a particular WMA. Patches of greater size (>20 acres) have the best potential to hold a resident population of Florida mice and should be preferred over smaller, isolated pieces. Smaller, isolated patches may contain Florida mice but presence of mice here may be highly variable. Focusing on the largest habitat patches will increase the likelihood of detecting mice if they are present and provide more reliable long-term information about the presence of the species on an a WMA. If extra resources are available (**or if potential habitat patches are less than 20 acres**), trapping in small patches may be useful for determining how these isolated areas function to connect larger patches of habitat.

Trapping Design: When surveys occur within habitat patches containing gopher tortoise burrows, trapping stations should be placed within 1 meter of a burrow to increase likelihood of capture. Trapping stations should be well distributed throughout the habitat patch near tortoise burrows with a frequency of 10 stations (20 traps) per 20 acres of habitat. Some trapping stations may be placed along the edges of roads/firebreaks where tortoise burrows often occur, but effort should be made to also put stations around burrows within the interior of the habitat patch. Trapping stations may be placed randomly within the habitat patch if there are not enough burrows present.

When surveys occur within habitat patches not known to contain gopher tortoise burrows, transects are recommended. Transects should be run with a frequency of 10 trapping stations (20 traps) per 20 acres of habitat. When using transects, **a spacing of 15 meters between trapping stations is recommended**. A transect of 10 trapping stations placed every 15 meters will cover a sampling area of 2,250 m² or 0.55 acres. **Portions of each transect can be run parallel to a road or firebreak edge (about 1-2 meters into the habitat patch), but a portion of the transect (at least 50%) should also turn 90 degrees into the habitat patch's interior**. Placement of some traps along edges should reduce total survey time for surveyors because it will be easier to locate, check, and remove traps. The beginning, end, and any 90 degree turns within each transect should be recorded with a GPS unit. Each trapping station should be marked with flagging tape for easy identification.

Trap placement: **Two (2)** traps should be placed at each trapping station. Traps at each station should be placed within one meter of the flagging tape, and be placed near stumps, fallen logs, gopher tortoise burrows, or pathways whenever possible. **To increase the likelihood of capturing Florida mice, traps should be placed under shrubs or logs to maximize cover**. If possible, traps should be placed on the west side of cover to maximize the amount of shade available throughout the day. All traps should be labeled with identification of ownership (i.e., WMA name or FWC).

Running the Traps: Within each habitat patch, traps should be placed at stations on Monday afternoon and checked on each consecutive morning, if needed, for up to 4 nights, and traps checked/removed on Friday. Each trap night is considered a separate sampling period for the overall habitat patch and should be recorded as a "0" if no mice are detected and a "1" if a mouse is captured in **any** trap. If a mouse is detected after the first night of trapping (i.e., Tuesday morning), these traps

should be left out for **ONLY** one more evening in order to record another sampling period. After that second night, traps should be removed. If mice are **first** detected after the second or third night of trapping, traps should be removed and placed in a new habitat patch. Trapping habitat patches in this manner will give the following options in sampling histories;

- 0,0,0,0 – Mice are never detected during the entire week of trapping.
- 0,0,0,1 – Mice are detected on Friday (after 4 nights of trapping)
- 0,0,1 – Mice are detected on Thursday (after 3 nights of trapping)
- 0,1 – Mice are detected on Wednesday (after 2 nights of trapping)
- 1,0 – Mice are detected on Tuesday (1 night of trapping), and NOT detected on Wednesday
- 1,1 – Mice are detected on Tuesday (1 night of trapping), and detected again on Wednesday

Information from trapping in this manner will be used to “calibrate” the survey results based on detection probability to estimate how much of the WMA’s potential habitat patches are actually occupied after correcting for areas that did not catch mice but actually contain Florida mice. This is important because it is not possible to accurately conclude that a habitat patch is absence of mice simply because none are captured during the one-week trapping effort. Mice during the trapping session may have avoided the traps, or not been active due to other environmental factors. Unfortunately, it will not provide information on which specific habitat patches did not trap mice but are actually occupied. However, over time, it will provide general trend information about the proportion of habitat patches containing mice that can be used as an index of the status of Florida mice on the WMA.

Traps should be baited with a mixture of seeds (e.g., sunflower seeds), grains (e.g., crimped oats or scratch grain), and rolled oats. **DO NOT USE PEANUT BUTTER OR FRUIT.** Avoid placing traps in areas where fire ants are likely to enter, and traps should be moved whenever fire ants are present. If fire ants are in a trap, the trap should be moved to new location and cleaned of ants. If ants continue to be a problem, the trap should be closed to prevent mortality. Traps should be set in the late afternoon, and all mice **RELEASED** by 2 hours after sunrise the following morning. During a trapping session, traps should remain closed during the day, and reset late in the afternoon to minimize captures (and mortality) during the day. **To reduce the occurrence of fire ants in traps, traps can be closed and placed in oaks/shrubs above the ground during the day.**

All traps should be visually inspected before closing to assure no small mammals are accidentally left in the trap. Captured mice and other native small mammals should be released at the point of capture. Exotic species (i.e., house mice) should not be released back into habitat.

When the survey is complete, all traps should be thoroughly cleaned using water to remove bait, feces, and other material within the trap. After this cleaning, traps should be placed in a diluted bleach solution (i.e., one capful per gallon of water) for 10-15 minutes to further sanitize them. After resting in the bleach solution, traps should be rinsed one more time with water. Traps should be allowed to air dry before being placed back into storage.

Data Collection:

Trapping data should record the total number of Florida mice captured during the trapping session and all other species captured. As mentioned above, a "1" or "0" should be recorded for each night during the trapping session depending on whether or not mice were captured. Enter a "-" into the datasheet if there was no need to trap during those nights (i.e., if mice are detected after the first trap night). Data should be entered into the datasheet provided (see attached).

Data Summarization:

At the end of the complete survey, the following information should be recorded;

1. Number of habitat patches (and their respective acreage) surveyed for Florida mice & number of management units with presence of Florida mice
2. Total acreage of suitable habitat surveyed for Florida mice & total acreage with presence of Florida mice
3. Total number of Florida mice captured
4. Inventory of other small mammals captured during the survey

Data Submission: Observers should create a backup copy (photocopy) of all datasheet as soon as possible after completing the survey. The original datasheets should be kept on file at each WMA. Copies of all datasheets should be submitted to the regional THCR conservation biologist for data management and analysis within 2 weeks of survey completion. Once the THCR species monitoring database is fully developed, the original datasheets will still be retained at the WMA, but observers will enter data directly into this database system, and there will be no need for backup copies.