Gopher Tortoise Survey at Chassahowitzka Wildlife Management Area

Final Report to the
Florida Fish and Wildlife
Conservation Commission

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Dan Hipes
Kim Gulledge
Katy NeSmith
Carolyn Kindell
Kieran Gibson

FLORIDA
Natural Areas
INVENTORY

Photo Credits:

Top: Gopher tortoise basking at the entrance of a burrow; Dan Hipes, FNAI

Middle: View of sandhill and transition to flatwoods in a hardwood removal treatment area at Chassahowitzka WMA; Jennifer Roberts

Bottom: View of high quality sandhill habitat at Chassahowitzka WMA; Jennifer Roberts

Acknowledgments

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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) on inventory and monitoring projects throughout Florida. The goal of this project was to determine a baseline tortoise burrow estimate or index at Chassahowitzka Wildlife Management Area through a comprehensive survey of all potentially suitable habitats. Approximately 7,910 acres of potentially suitable habitat at Chassahowitzka WMA was identified using natural community landcover maps produced by FNAI. This includes approximately 3992 acres of sandhill, 1406 acres of pine plantation (former sandhill, and mesic flatwoods), 1500 acres of mesic flatwoods, 494 acres of xeric hammock, 443 acres of scrub, 55 acres of ruderal areas, and 17 acres of scrubby flatwoods.

Methods

A shapefile grid of 10 m x 10 m polygons was created for the extent of potential habitat using Hawths Analysis Tools. Transects covering approximately 22 percent of the area were then selected systematically from this grid to evenly cover the area (manually stratified). Although start and end points of the transects were placed close to access points, the transects were unbiased with regard to placement within the potentially suitable habitat. This was generally done by turning off the background aerial photograph during the drawing of transect lines. The resulting transects resemble a maze through suitable habitat that maximizes area covered in the survey habitat while minimizing the travel time between start and end points of the transects. The transect file was loaded onto Trimble Nomad (with Pathfinder XB GPS) or Trimble GeoXT dataloggers, which have a map screen that allows the surveyor to see his/her location in relation to the preselected survey transects. GPS locations were corrected in real time using a WAAS satellite based augmentation signal to ensure that surveyors stayed within the transects. Each transect was searched for tortoise burrows. The path of each surveyor was recorded on the dataloggers to ensure full coverage of the entire survey transect. The location, size (juvenile < 5 in; subadult 5-8 in; adult >8 in), and apparent activity status of all active, inactive, and recently abandoned burrows observed were recorded on an electronic form developed in Trimble Pathfinder Office software for use with Trimble TerraSync software on the dataloggers. Active burrows are characterized by open burrow entrances and clear signs of recent tortoise activity, such as tracks or slide marks in the sand (fresh digging alone may not be attributable to tortoises). Inactive burrows do not show clear signs of very recent tortoise activity but appear to have been maintained within the last few weeks, as evidenced by a clean, passable, flat-bottomed entrance, with leaf litter either absent or appearing to have been deposited recently. Active and inactive burrow were later combined in a "potentially occupied" category; this category may be used in other projects because of potential differences among surveyors in assigning burrows to the active and inactive categories. Abandoned burrows represent a broad range of deterioration: Toward the inactive end of the spectrum, there may be decaying leaf litter in a burrow that otherwise retains functional shape (i.e., tortoise cross-sectional shape); there also may be erosion or evidence of digging by mammals (U-shaped or V-shaped bottom) at the mouth of the burrow. If a burrow showed evidence of armadillo use (higher dome, more rounded in cross-section), it was categorized as abandoned. Burrows that were not clearly made by a tortoise or old burrows that were filled by sediment or debris were not recorded.

Field data were downloaded and secondarily corrected (post processed) using base station data available from Florida Department of Environmental Protection to further improve the accuracy and precision of the locations recorded. The shapefiles of potentially suitable habitat were edited to correct boundary inconsistencies based on updated boundary information. Transect shapefiles also were edited to exclude area not surveyed. Tortoise burrows located outside of the transects were excluded from the data using an ArcGIS selection. Area of transect within each to the survey habitats was determined by using the "clip" tool in ArcGIS, clipping the habitat shapefile with the transect shapefile to produce a separate shapefile of habitat covered by the transects for which area (acres) was then calculated. Densities of active, inactive burrows and alternatively potentially occupied burrows (the combined active and inactive burrows) were calculated for each habitat. Burrow densities were then multiplied by acres of corresponding habitat to develop an estimate for the total number of active, inactive and the combined potentially occupied burrows for a site.

Results and Discussion

FNAI staff surveyed 1636 acres within transects totaling 21percent of 7752 acres of potential gopher tortoise habitat at Chassahowitzka WMA. This habitat includes 3970 acres of sandhill, 1406 acres of pine plantation (former sandhill, and mesic flatwoods), 1487 acres of mesic flatwoods, 458 acres of xeric hammock, 376 acres of scrub, 66 acres of pasture, and 20 acres of scrubby flatwoods. Table 1 summarizes the transect data for each of the seven habitats. A total of 359 active, 223 inactive, and 187 abandoned tortoise burrows were observed. Of these there were 632 large or adult (>8 in), 99 medium or subadult (5-8 in), and 38 small or juvenile burrows. The high percentage of large burrows is typical for this long-lived animal. The high percentage (relative to other tortoise populations) of both subadult and juvenile burrows is indicative of a growing population. Table 2 summarizes the activity status by habitat of burrows within the transects. Separate active and inactive categories are shown as well as the potentially occupied category (the combined active and inactive burrows). Table 3 shows the calculated burrow density for each habitat. This density was then multiplied by the corresponding habitat acreage to calculate an estimate for the total number of active and inactive burrows, or alternatively potentially occupied burrows for the WMA (Table 4). The distribution of gopher tortoise burrows, survey transects and and potentially suitable habitats are show in figures 1 through 4. The following shapefiles were appended to a Geodatabase provided to FNAI by FWC: Surveyed habitat; survey transects; and tortoise burrows within transects. This geodatabase is provided along with this report as the final products for this project.

Table 1. Total gopher tortoise habitat and transect acreage at Chassahowitzka WMA

Habitat	Total acres	Transect acres	Percent
sandhill	3969.81	867.40	21.85
mesic flatwoods	1486.73	297.37	20.00
pine plantation	1376.35	293.52	21.33
xeric hammock	457.92	82.31	17.97
scrub	375.61	77.36	20.60
pasture	65.81	13.43	20.41
scrubby flatwoods	20.05	4.83	24.07
Total	7752.27	1636.21	21.11

Table 2. Summary of burrow status by habitat within transects at Chassahowitzka WMA

Habitat	Active	Inactive	Potentially Occupied*	Abandoned	Total
sandhill	281	184	465	156	621
mesic flatwoods	11	11	22	7	29
pine plantation	36	19	55	17	72
xeric hammock	8	1	9	2	11
scrub	13	2	15	5	20
pasture	7	5	12	0	12
scrubby flatwoods	3	1	4	0	4
Total	359	223	582	187	769

*Potentially Occupied is the combination of active and inactive burrows.

Table 3. Summary of active and inactive burrow density within transects by habitat at Chassahowitzka WMA

Habitat	Active	Density (per acre)	Inactive	Density (per acre)	Potentially Occupied	Density (per acre)
sandhill	281	.324	184	.212	465	.536
mesic flatwoods	11	.037	11	.037	22	.074
pine plantation	36	.123	19	.065	55	.187
xeric hammock	8	.097	1	.012	9	.109
scrub	13	.168	2	.026	15	.194
pasture	7	.52	5	.372	12	.893
scrubby flatwoods	3	.621	1	.207	4	.828

Table 4. Total burrow estimates for active and inactive burrows by habitat at Chassahowitzka WMA

Habitat	Acres of habitat	Active burrows per acre	**Estimated active burrows**	Inactive burrows per acre	**Estimated inactive burrows**	Potentially Occupied burrows per acre	**Estimated Potentially Occupied burrows**
sandhill	3969.81	.324	**1286**	.212	**842**	.536	**2128**
mesic flatwoods	1486.73	.037	**55**	.037	**55**	.074	**110**
pine plantation	1376.35	.123	**169**	.065	**89**	.187	**257**
xeric hammock	457.92	.097	**44**	.012	**5**	.109	**50**
scrub	375.61	.168	**63**	.026	**10**	.194	**73**
pasture	65.81	.52	**34**	.372	**24**	.893	**59**
scrubby flatwoods	20.05	.621	**12**	.207	**4**	.828	**17**
Total			**1663**		**1029**		**2694**

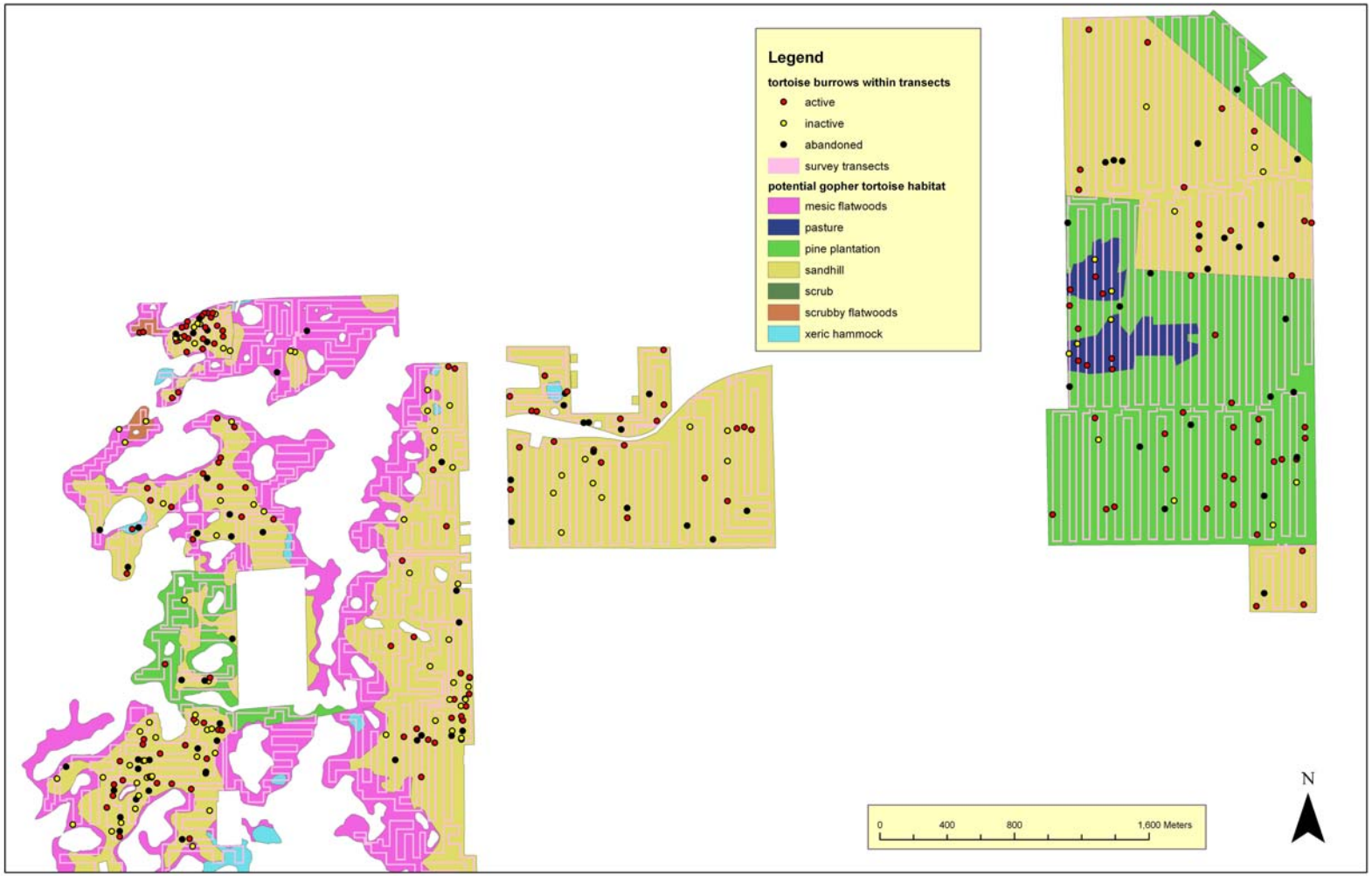

Figure 1. Distribution of gopher tortoise burrows, survey transects, and potentially suitable habitat at Chassahowitzka WMA: northern section

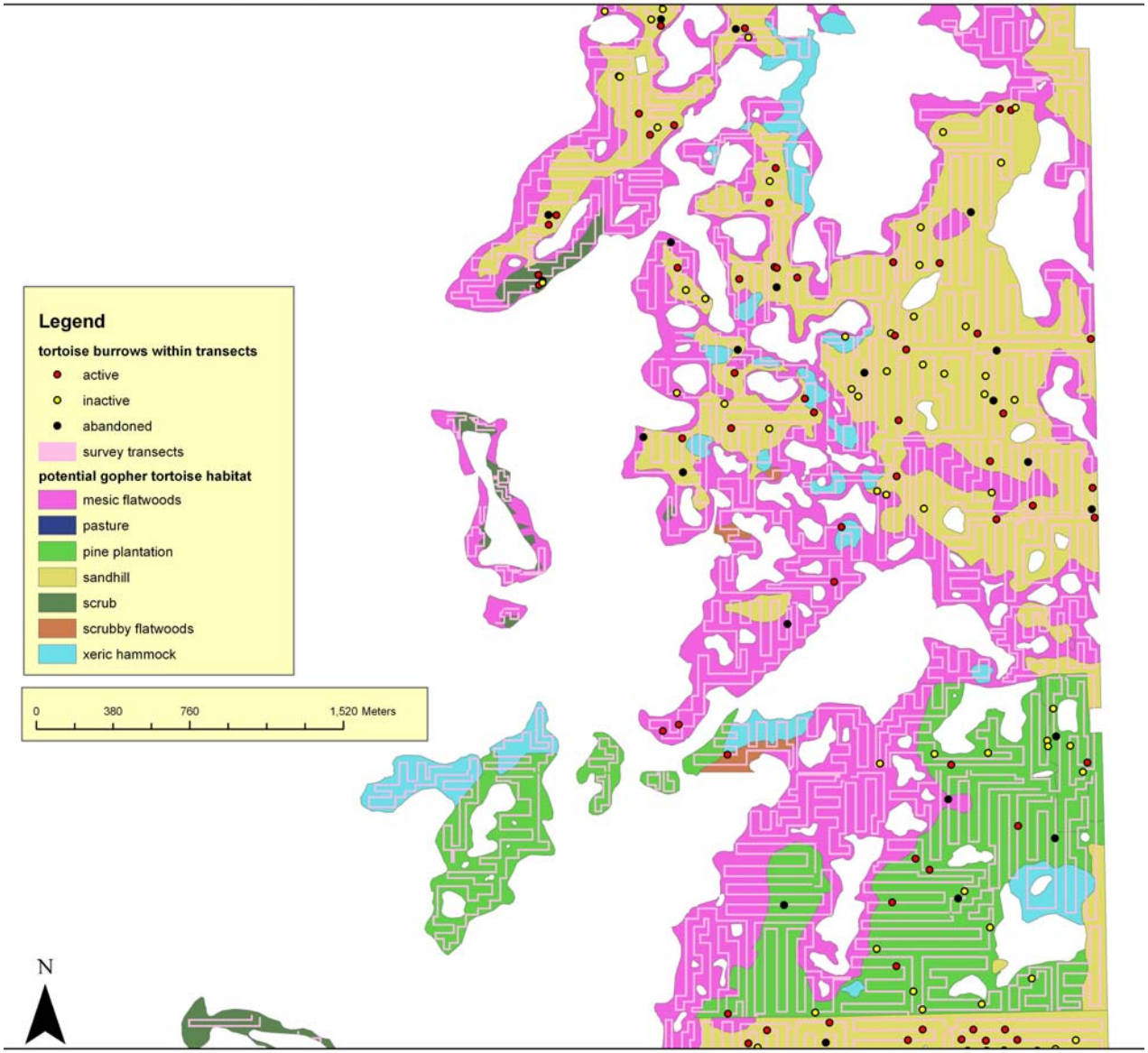

Figure 2. Distribution of gopher tortoise burrows, survey transects, and potentially suitable habitat at Chassahowitzka WMA: northcentral section

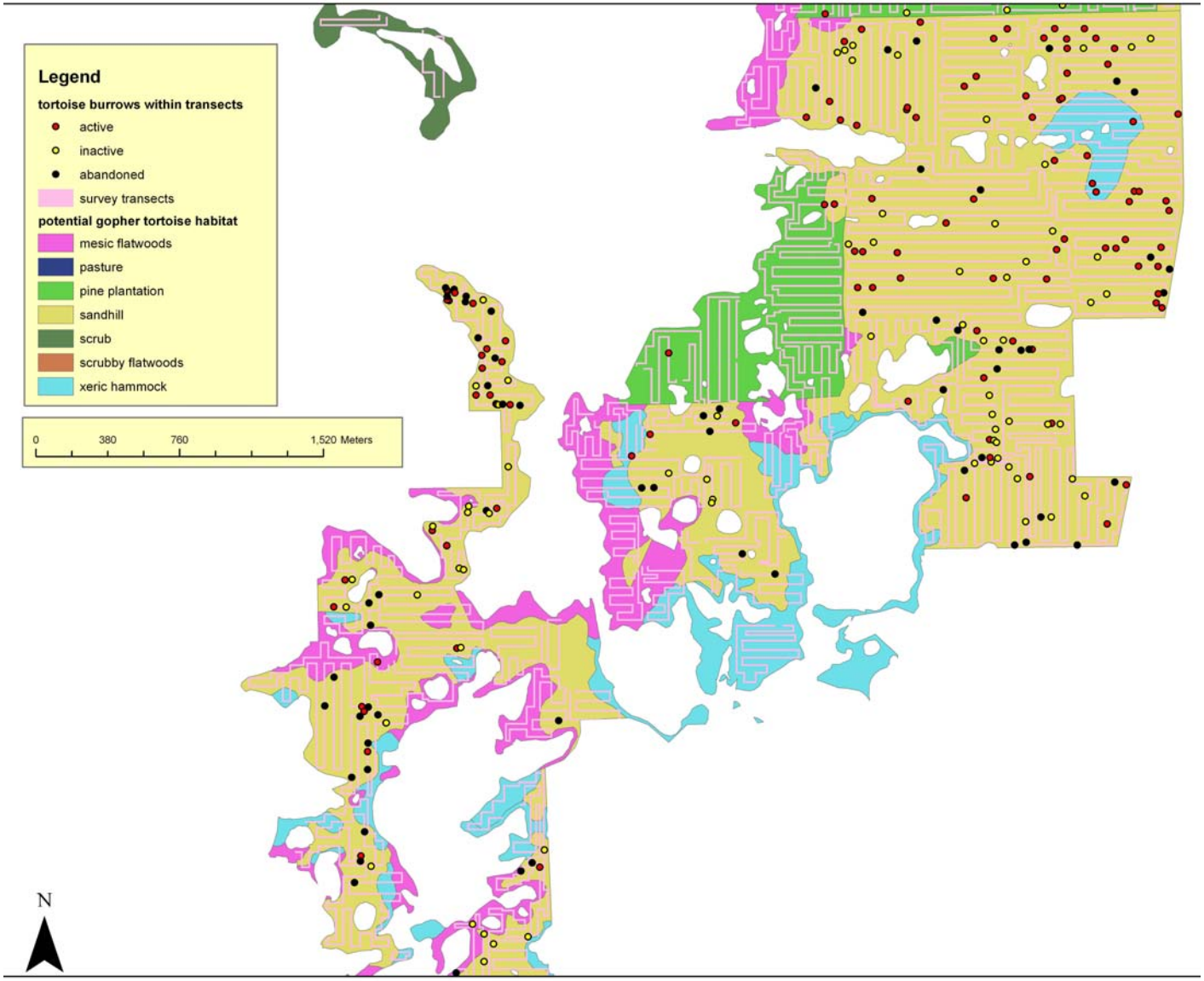

Figure 3. Distribution of gopher tortoise burrows, survey transects, and potentially suitable habitat at Chassahowitzka WMA: southcentral section

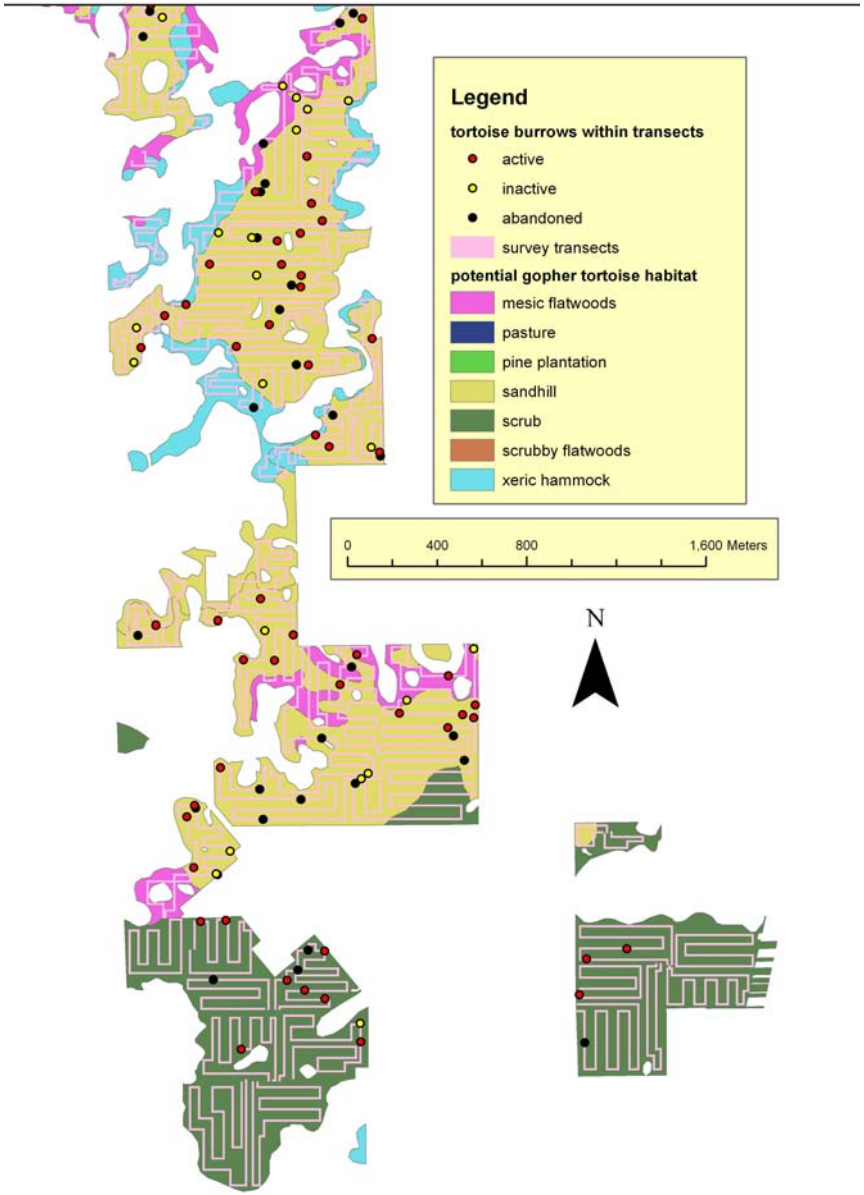

Figure 4. Distribution of gopher tortoise burrows, survey transects, and potentially suitable habitat at Chassahowitzka WMA: southern section