

**Use of Gopher Tortoises (*Gopherus polyphemus*) in restoration of the
upland longleaf fauna on the Conecuh National Forest**

**A report to the Alabama Department of Conservation
State Wildlife Grants**

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INTRODUCTION

The longleaf pine ecosystem once covered 14,000,000 ha of the southeastern Coastal Plains. Today, less than 3% of this original extent is dominated by longleaf pine (Frost, 1993) and less than .002% is in old growth condition (Simberloff 1993), making this forest type one of the world's most imperiled ecosystems (Noss and Peters 1995). At least 36 vertebrate species adapted to this forest type are of conservation concern (Means 2006), many of which burrow in the loose soil (Guyer and Bailey 1993). Thus, for states, like Alabama, that have extensive coverage of the deep sandy soils favored by longleaf pines, restoration of longleaf pine forests is one of the most challenging conservation problems.

Fortunately, the Conecuh National Forest (CNF) in south central Alabama is poised to play a key role in conservation of longleaf forests. This area has received 15 years of proactive management that has moved forest structure closer to aspects expected of old-growth longleaf pine forests. Growing-season fires and aggressive stand thinning have created some compartments that have widely spaced trees and a lush, grass-dominated, understory. Additionally, careful placement of fire lanes has reconnected some wetland areas to upland habitat, providing extensive areas for conservation of sensitive species.

Despite success in improving habitat structure, several species of amphibians and reptiles previously documented from this area could not be documented in a recent survey (Guyer et al. 2007). Primary among these was the Eastern Indigo Snake (*Drymarchon couperi*), one of the largest snakes of North America and an important predator of other snakes, especially pit vipers. This species was once common throughout its range but is now federally protected as threatened under the Endangered Species Act because of habitat loss and fragmentation as well as losses to the pet trade and road mortality. In the case of the CNF, losses caused by gassing of gopher tortoise burrows by snake hunters participating in the Opp Rattlesnake Roundup likely played a crucial role in the extirpation of Eastern Indigo Snakes from the region and might have prevented a previous attempt to repatriate these snakes.

The primary objective of the current study was to create a series of large enclosures that can be used in an attempt to repatriate Eastern Indigo Snakes to the CNF. These enclosures needed to be large in size, include portions of the wetland sites preferred by juveniles during spring and summer, and incorporate upland portions with burrows of Gopher Tortoises (*Gopherus polyphemus*) used by snakes as over-wintering sites. In this report we list each objective of the original research proposal and then describe how the objectives were met.

OBJECTIVES AND ACCOMPLISHMENTS

1. Work with staff at the Conecuh National Forest to develop a plan for implementing the repatriation projects described in Guyer et al. (2007)

We met with Steve Lee (District Ranger for the CNF) and Mark Garner (District Biologist, CNF) on 3 April, 2008 to discuss possible repatriation sites on the CNF. After evaluating sites in the field, the area within compartments 23, 24, and 28 were selected as generally being best for the repatriation pens. This area is at least a mile from paved roads, is within the Blue Spring Wildlife Management area, contains sandy soils with resident Gopher Tortoises, and has headwaters to Pond Creek, a small stream that drains to Five Runs Creek. Because Five Runs Creek is the least disturbed and most protected stream within CNF boundaries, this area was judged to contain the best set of features for protecting released snakes while providing key resources. Other sites on CNF were reviewed on 16 April, 2008, including the compartments (5, 23, 34, and 49) recommended as a repatriation sites in Guyer et al. (2007). However, these sites were eliminated from further consideration because they did not have extensive areas of deep sands and, therefore, were unlikely to maintain sufficient populations of gopher tortoises required for successful repatriation. Therefore, we selected a release site in compartment 28, west of Hogfoot Road and next to a food plot occupied by Gopher Tortoises that could be used to populate the release pens (Figure 1). We met with Steve Lee and Mark Garner again on 1 May, 2008 and showed them the proposed study site, got their strong approval for it, and discussed general management needs for the project. Our management recommendations for maintaining the pens and preparing the surrounding area for released Eastern Indigo Snakes are given in Appendix 1.

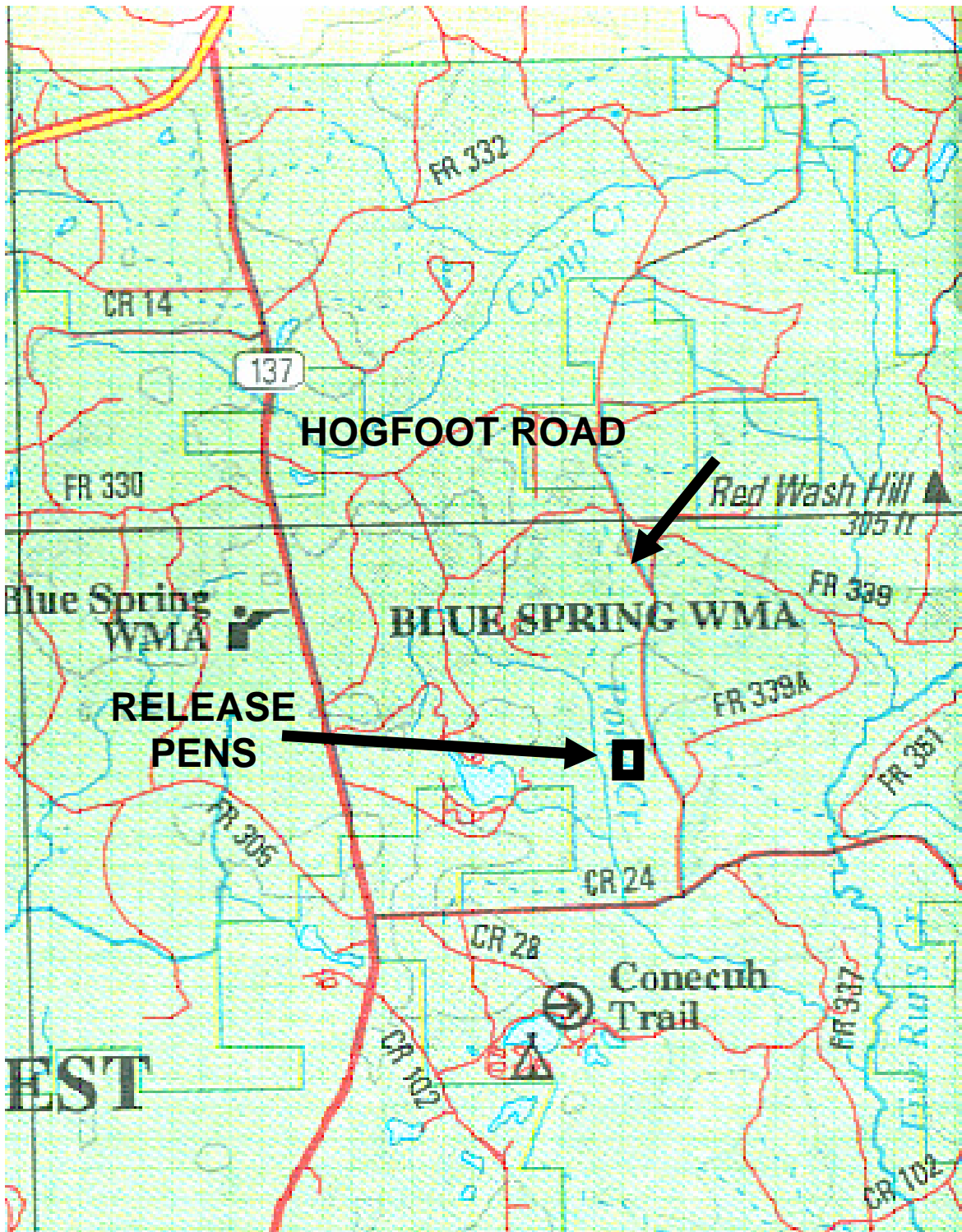


Figure 1. Map of Conecuh National Forest showing approximate location of release pens. North is towards the top of the map. Large yellow road in NW corner is US Hwy 29.

2. Survey and map burrows of Gopher Tortoises on a large site selected for eventual release of Eastern Indigo Snakes.

Burrows of Gopher Tortoises were surveyed from 20 – 23 September, 2008 in compartments 28. Surveys were performed by 1-3 people who traversed the compartment in parallel lines that allowed discovery of all burrows of adult tortoises. A total of 37 burrows, 24 of which were judged to be active (shape of a tortoise, scrapings or foot prints on apron) were discovered and mapped to the nearest meter with a GPS unit (Figure 2).

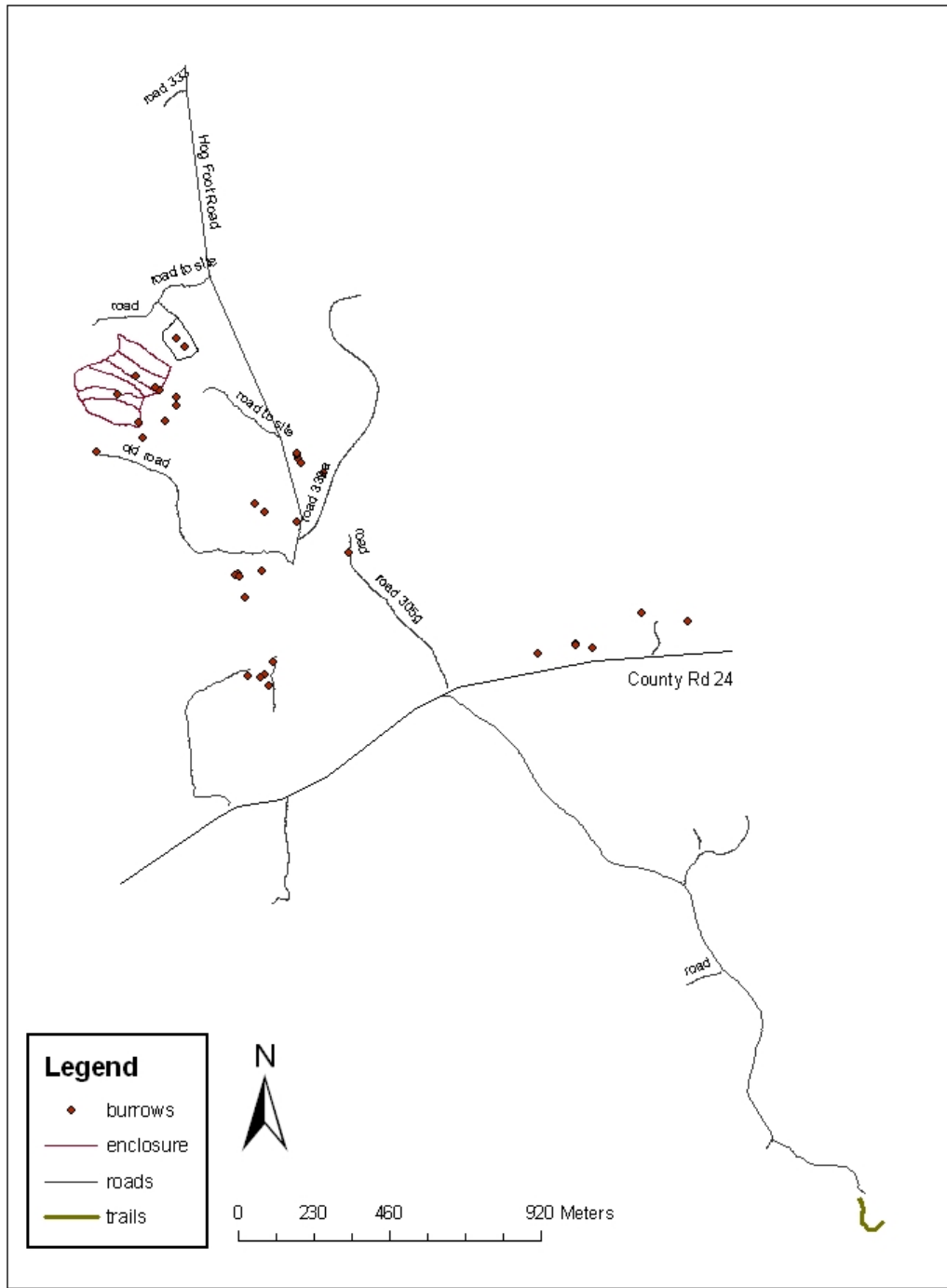


Figure 2. Map of burrow locations in compartment 28. North is towards top of map. Hogfoot road and the location of the pens are shown.

3. Establish five large penned sites for relocation of adult Gopher Tortoises and juvenile Eastern Indigo Snakes

Pen construction occurred from 9 June – 27 June, 2008. A total of six pens were constructed. This was possible because the terrain required us to follow a bend in Pond Creek. The initial design was for a set of three adjacent pens and a second set of two adjacent pens that converged with the first set at the upland area. Because we purchased extra hardware cloth for the walls, we created a sixth pen that was large and triangular in shape and that connected the two groups of rectangular pens (Figure 3). Because no cutting of trees was allowed within the enclosed area, the pens were not uniform in size (0.52 – 1.01 ha). Most were smaller in size than the target of 1.0 ha, because it was impossible to dig trenches that were precisely linear. Two pens were known to have a Gopher Tortoise and a third pen has an active burrow that likely has a tortoise. Two additional pens were populated with single gopher tortoises, both waifs turned in to personnel at Auburn University. Thus, five of six pens likely currently have tortoises and the sixth pen can be populated with a tortoise from the food plot.

Vegetation within the pens is diverse and extensive. Wiregrass (*Aristida beyrichiana*) is present in the lower portions of the pens and other *Aristida* species are present in the uplands (Figure 4). Plants with leaves or fruits known to be favored by Gopher Tortoises (e.g. *Rubus*, *Licania*, *Cnidoscopus*, *Tephrosa*, *Rhynchosia*) are plentiful. Therefore, no enhancement of forage within the pens was necessary. However, two plastic wading pools were embedded into the soil at the lowland end of each pen so that the pools were flush with the ground. These filled with rain water and will be used to provide water for tortoises. Each pool has a pile of bricks that will allow tortoises and other animals that fall into the pool to escape.

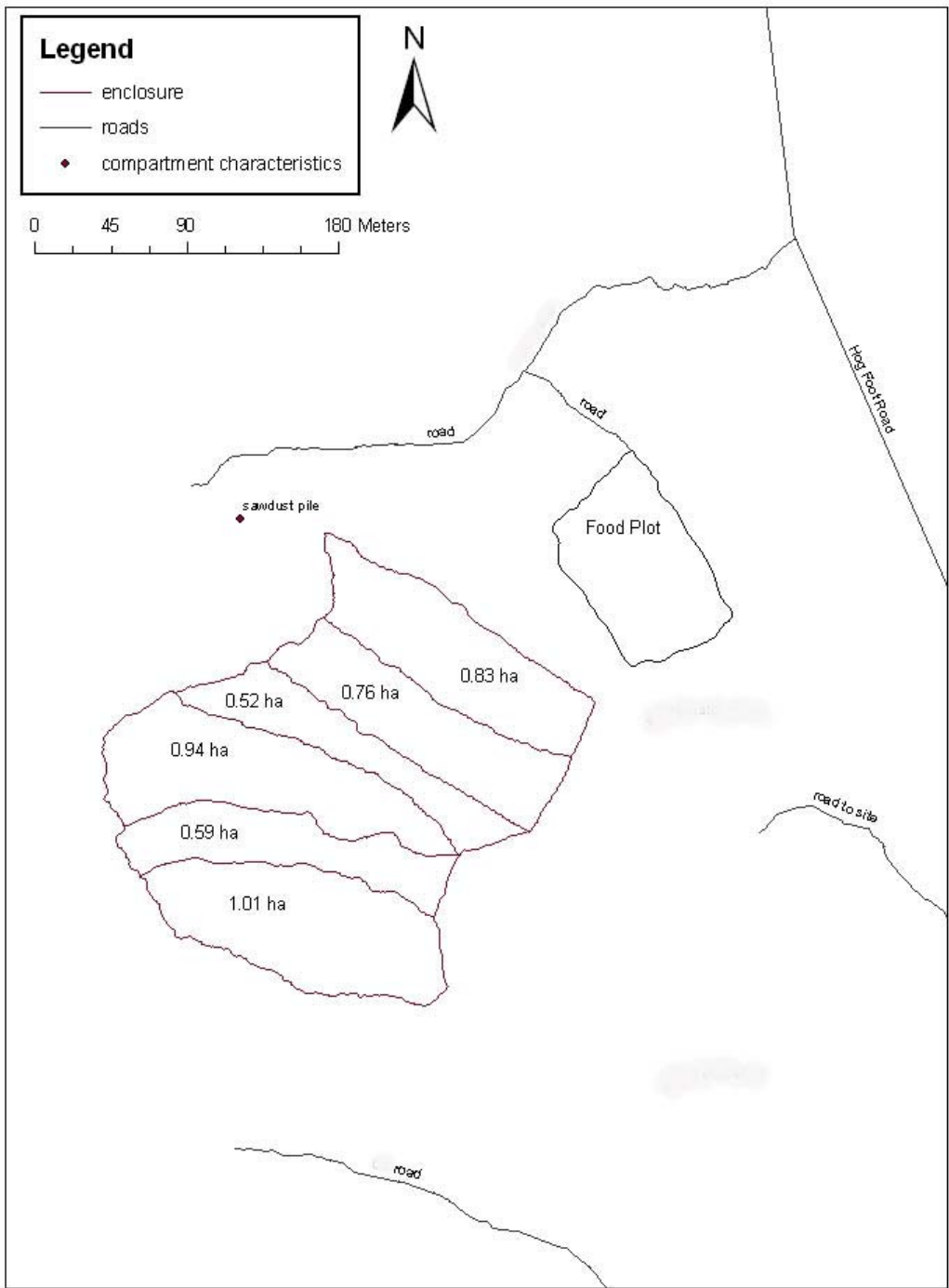


Figure 3. Outline map of pens. Landmarks are a food plot located west of Hogfoot Road and two unmarked Forest Service access roads.



Figure 4. Habitat quality associated with release pens. A) Upland area showing active tortoise burrow and extensive understory vegetation. B) Lowland areas at headwaters of Pond Creek showing water flow during summer.

FUTURE PLANS

A group of 24 juvenile snakes is currently in residence at Auburn University. Funds have been procured to place radio transmitters in several of these so they can be released during spring of 2009. We are in contact with Linda LaClair (USF&WS) and are working out details for the release. Half the snakes will be penned (2 per pen) and the other half will be released just outside the pens.

At the moment, each pen has a gap in the wall in the uplands. The pens were inspected by Dagmar Thurmond (USFS in Alabama), Steve Lee (CNF), Mark Garner (CNF), Mark Sasser (AL Dept. of Conservation), and Dan Everson (USF&WS) on Nov. 5, 2008 and all collaborating agencies approved use of the pens for the proposed releases. The pens will be inspected by the Auburn University IACUC in February, 2009, at which time the gaps will be completed and the pens will be available for use. We hope these pens can be used as the focus of snake releases over the next 10 years.

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APPENDIX 1
Management recommendations for Compartment 28.

Within Pens –

1. Twice year apply herbicide along inside edge of each wall to prevent growth of vines and other vegetation up walls.
2. Trim limbs of trees within pens that have limbs overhanging pen wall.
3. Burn through pens every 2-3 years

Outside Pens –

1. Thin stands to 40 ft²/acre
2. Require timber crew to mark and avoid use of heavy equipment with 50 ft of all burrows of gopher tortoises. If possible, have timber removal occur during winter when snakes are below ground.
3. Burn, when possible during the growing season, every 2-3 years.
4. Avoid use of herbicides since they are known to affect amphibian reproduction and frogs are an important diet item.