Gopher Tortoise Response to Site Preparation in Northern Florida

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Abstract: The response of gopher tortoises (*Gopherus polyphemus*) to chopper-type forest site preparation was investigated. Of 5 burrows presumed to have been occupied prior to treatment, 2 were reopened by tortoises following chopping, and the other 3 showed various signs of tortoise emergence. Three additional radio-instrumented tortoises emerged from their collapsed burrows during the eighth week following site preparation. Also, several hatchling tortoises apparently survived the treatment.

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Within the last decade, concern has arisen over the decline of the gopher tortoise throughout its range. Human predation and habitat modification, chiefly urbanization and agriculture, have been cited as major reasons for this trend (Landers 1980, Auffenberg and Franz 1982). However, certain forestry practices and fire exclusion have more subtly degraded many xeric communities (Auffenberg and Franz 1982).

In recent years, the use of heavy machinery to reduce logging debris in preparation for pine planting has been deemed detrimental to tortoises (Auffenberg 1978, Lohoefener and Lohmeier 1981, Wright 1982, Auffenberg and Franz 1982). Only 2 studies have directly addressed this issue. Landers and Buckner (1981) reported that tortoises dug out from collapsed burrows within 3 weeks following a September chopping treatment in southern Georgia. Tanner and Terry (1981) cited burrow destruction during an August chopping treatment in southern Florida, but the fate of the tortoises was not determined. The objective of our study was to determine the initial response of tortoises to site preparation.

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for his cooperation. We also thank the new owner, T. Baker, for allowing continued access. M. Bush assisted in capturing the tortoises.

Methods

This study was conducted on a 97-ha tract located approximately 10 km northeast of Branford, Suwannee County, Florida. Characterized by deep (sand depth >3 m), excessively drained soils of the Blanton series (Houston et al. 1965), this site originally supported a longleaf pine-scrub oak (*Pinus palustris-Quercus* spp.) habitat. The tract was converted to slash pine (*Pinus elliottii*) in 1959. The resulting plantation was subsequently clear-cut during the summer of 1980 and burned in January 1982.

On 5 February 1982, 3 adult tortoises (2 males and 1 female) were obtained from the site by the use of a tortoise hook (Taylor 1982). The 3 tortoises' burrows were then triple-flagged; 5 additional burrows with signs of tortoise activity were also marked for future monitoring.

Each tortoise was marked with a series of small holes drilled into the marginal scutes. An AVM Instrument Company SM-1 transmitter and battery were potted in dental acrylic and attached with pop rivets to the posterior marginal scutes. The antenna was secured along the costal scutes with additional dental acrylic.

The 3 tortoises were returned to their respective burrows approximately 48 hr after capture. On 8 February, 1982, the tract was site-prepared with a Case 4890 tractor pulling a 7700-kg, double-offset, tandem chopper. The radio-instrumented tortoises were subsequently monitored weekly with a Telonics receiver and H-antenna.

Results and Discussion

Tortoise burrow entrances were completely obliterated by the chopper, but at least 1 of the multiple flags at each burrow was recognizable following site preparation. The only evidence for the previous existence of unflagged burrows was a slight difference in soil coloration. Tanner and Terry (1981) reported a 71.5% burrow destruction by chopping in southern Florida; saw palmetto (*Serenoa repens*) rhizomes maintained the integrity of the entrance in some cases.

For the first 3 weeks following site preparation, there was no change in burrow status at the 8 flagged burrows. On 12 March, 1 of the burrows originally presumed to be occupied showed evidence of tortoise emergence. As had been reported by Landers and Buckner (1981), the soil collapsed behind the tortoise, leaving minimal sign of an exit. Two shallow burrows (25 cm and 56 cm) had been initiated within 3 m of the original burrow; although

neither was occupied, tortoise tracks were discovered between burrows and leaving the area.

During the fourth and fifth weeks following the chopping treatment, a subadult tortoise and an adult female were captured in shallow (<60 cm), freshly-dug burrows on the site. An additional adult tortoise was observed approximately 2 m down in a new burrow.

The remaining 4 pre-treatment occupied burrows exhibited signs of tortoise emergence during April and May. Two burrows were completely reopened and maintained. This reutilization of collapsed burrows differs from earlier findings by Landers and Buckner (1981) and Tanner and Terry (1981).

All 3 radio-instrumented tortoises emerged during the eighth week following site preparation, and each utilized at least 2 burrows following its initial emergence. On 8 April, the female tortoise was observed 4 m from her original burrow, where she remained inactive for some 30 minutes despite a heavy rainfall. Five days later, she had moved 104 m and was observed approximately 1 m down in a newly-created burrow. In late April, the female's radio failed. We excavated her most recently known burrow, but it was not occupied. Her original burrow had been reopened and showed signs of activity into the summer. The 2 males initially moved 94 m and 73 m and established new burrows. Each subsequently relocated 54 m and 66 m respectively to sites closer to their original burrows. Although multiple burrow use is not uncommon (McRae et al. 1980), Douglass (1976) speculated that tortoise relocations occurred more frequently in disturbed areas.

In late April and early May, 3 hatchling tortoises (48.4, 48.9 and 49.4 mm carapace length) were discovered in shallow burrows on 2 widely-separated areas of the chopped site. Landers (1980) reported a 3-year-old ("about 9 cm in carapace length") as the smallest tortoise in his sample to emerge post-treatment. Wright (1982) speculated on hatchling mortality during logging activity, and Landers and Buckner (1981) reported infrequent juvenile mortality from heavy equipment. Although it is possible that these hatchlings moved into the study area following site preparation, previous studies reporting restricted juvenile movements (Auffenberg and Iverson 1979, McRae et al. 1980) suggest that this is unlikely.

In conclusion, this study substantiates earlier findings by Landers and Buckner (1981) that tortoises are able to dig out following chopper-type site preparation in deep sandy soils. Tortoise response, however, may vary markedly in different soil types or with more intensive treatment methods.

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