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EFFECTS OF PRESCRIBED FIRE ON THE HERPETOFAUNA OF A SOUTHERN MISSISSIPPI PINE SAVANNA

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***Abstract*.—Despite the recent popularity of prescribed burns in the southeast USA, little research is available on the effects of prescribed fire on herpetofauna in the western coastal plain (Gulf Coast, USA). We assessed the effects of a restoration prescribed burn on herpetofauna and composed an inventory of amphibians and reptiles on the Grand Bay National Estuarine Research Reserve (GBNERR) and surrounding Grand Bay National Wildlife Refuge (GBNWR), Jackson County, Mississippi. We used visual encounter surveys (VES), minnow traps, and polyvinyl chloride (PVC) tubes to sample herpetofauna. We recorded 429 individuals and 29 species from January-June, 2004. We found greater numbers of herpetofauna in burned than unburned stands, while species diversity indices were equal between burn treatments. Our results provide the first herpetological survey of the reserve, providing a baseline for monitoring herpetofauna population and community trends.**

***Key Words*.—*Bufo quercicus*; herpetofauna; *Kinosternun subrubrum*; Mississippi; Mud Turtle; Oak Toad; pine savanna; prescribed fire**

INTRODUCTION

In some terrestrial habitats, fire exclusion is one of the greatest threats to biodiversity worldwide (Leach and Givnish 1996; Russell et al. 1999). Prescribed fire is a beneficial management tool that can maintain or restore desired, historic ecological conditions (Brockway and Lewis 1997; Carter and Foster 2004). Because of the benefits and historical association of fire in some ecosystems, prescribed burning has become the primary tool of ecosystem restoration in the United States (Pilliod et al. 2003). The southeast is one of the most fire dependent regions in the United States (Johnson and Hale 2002), and regional managers are experimenting with prescribed fire on many southeastern ecosystems (Greenberg 2002). With such an increase in prescribed fire, the effects on wildlife become increasingly important (Ford et al. 1999).

Unfortunately, little information exists about the effects of prescribed fire on amphibians and reptiles (McLeod and Gates 1998; Ford et al. 1999; Greenberg 2002; Pilliod et al. 2003). Herpetofaunal responses to prescribed fire are species specific and vary among habitats, and require further study (Pilliod et al. 2003). Therefore, research is needed that documents the effects of prescribed fire on herpetofaunal communities in many habitats and regions, allowing for proper regional management. No studies have addressed the effects of prescribed burns on the herpetofauna of wet slash pine savannas on the Coastal Plain west of Florida. Nationally, < 3% of wet pine savanna ecosystems remain relatively intact (Baggett et al. 2004). Because most pine savannas have experienced substantial negative impacts (e.g., fire exclusion, urbanization, farming) (Means 2005), the effects of local forest management practices on native fauna are relevant (Means 2005).

In southern pine savannas, researchers have concluded that frequent fire is needed to suppress hardwood encroachment and to remove ericaceous understory vegetation associated with anthropogenic fire exclusion (Stoddard 1962; Means and Campbell 1981; Johnson and Hale 2002; Robertson and Ostertag 2003). In the absence of frequent fires, hardwood and shrub species may establish themselves in otherwise historically pine-dominated (*Pinus* spp.) communities (Johnson and Hale 2002). This alters the natural ecosystem through gradual succession to hardwood-dominated forest stands. Deviations from historical fire frequencies may be detrimental to amphibians, especially species endemic to southeastern pine forests, e.g., Flatwoods Salamander (*Ambystoma cinculatum*), Oak Toad (*Bufo quercicus*; Landers and Speake 1980; Dodd 1995; Means et al. 2004). Similarly, some southeastern reptiles have adapted to the habitat mosaic created by frequent, low intensity burns, e.g., Southeastern Five-lined Skink (*Eumeces inexpectatus*; Mushinsky 1992).

Prescribed fire operates across multiple habitats (Pilliod et al. 2003), altering habitat structure and diversity (Campbell and Christman 1982; Mushinsky 1992; Litt et al. 2001; Greenberg 2002). Some of the microhabitat structures affected by fire include snags, decaying wood, and leaf litter (Greenberg et al. 1994; Smith et al. 1997). Fire also alters the structure of live vegetation, which in turn alters the availability of suitable habitat. Prescribed burns can cause an increase in solar radiation (Means and Campbell 1981) and water temperatures (Enge and Marion 1986; Pilliod et al. 2003). Furthermore, thermal alterations to the environment may be important to the maintenance of herpetofauna endemic to pine savannas.

Our objective was to assess the effects of a restoration burn on an amphibian and reptile community within a wet pine savanna in Grand Bay National Estuarine Research Reserve (GBNERR; Fig. 1) and surrounding U.S. Fish and Wildlife Service's (USFWS) Grand Bay National Wildlife Refuge (GBNWR). We were interested in measuring the abundance, species diversity, evenness, and species richness of amphibians and reptiles within the reserve to assess the herpetofaunal community. We predicted prescribed fire would have a positive effect on amphibian and reptile community parameters given the historic association with fire at our field site. Our second objective was to provide a herpetological survey of the area to provide a baseline for monitoring herpetofauna on the reserve.

FIGURE 1. Entrance to the Grand Bay National Estuarine Research Reserve, Mississippi, USA with burned habitat on the left and unburned habitat on right. (Photographed by Gabriel J. Langford)

MATERIALS AND METHODS

Study area.—We conducted the study on the GBNERR and surrounding GBNWR, Jackson County, Mississippi (herein jointly referred to as the Grand Bay Reserve [GBR]). The 7,284 ha GBR represents some of the largest, relatively undisturbed pine savanna, pitcher plant bog, and marsh habitats remaining along the northern Gulf Coast (Baggett et al. 2004). The terrain is extremely flat, with elevations ranging from 1-2.5 m. GBR has a humid coastal climate with average monthly temperatures ranging from 10-27°C. Average total annual precipitation is 166 cm. Local soils are sandy with a hard layer of clay just below the surface, creating wet, acidic soils of poor agricultural quality and numerous seasonal wetlands (Baggett et al. 2004).

A mosaic of pine flatwoods and southern wiregrass savannas dominates the inland regions of the GBR. Open canopies of Slash Pine (*Pinus elliottii*) are interspersed with open moist savannas dominated by herbaceous cover reaching 100% in most areas. Herbaceous openings are dense and dominated by Beyrich Threeawn (*Aristida beyrichiana*). Representative tree species present at our research sites were Slash Pine, Longleaf Pine (*Pinus palustris*), Red Bay (*Persea borbonia*), and Pond Cypress (*Taxodium disticitum* var. *imbricarium*). Commonly encountered understory species consisted of Beyrich Threeawn, Wax Myrtle (*Myrica cerifera*), Inkberry (*Ilex glabra*), Buckwheat Tree (*Cliftonia monophylla*), Titi (*Cyrilla racemiflora*), Greenbrier (*Smilax* spp.), Broomsedge Bluestem (*Andropogon virginicus*), Featherbristle Beaksedge (*Rhynchospora oligantha*), Panic Grass (*Panicum* spp.), Sabatia (*Sabatia* spp.), Sundews (*Drosera* spp.), and Pitcher Plants (*Sarracenia* spp.). As a result of past fire exclusion, the understory was noticeably more dense in unburned sections. Isolated, depressional wetlands were common throughout the study sites; wetlands evaporated and filled twice during our study, depending on rainfall.

In March 2003, the USFWS conducted a low intensity prescribed burn along a large portion of the GBR as one of the first attempts to restore historically appropriate fire regimes (low intensity spring/summer burns every 2-5 years) in more than 30 years. For discussions of historical fire regimes, see Means (1981); Frost (1999); Johnson and Hale (2002); and Van Lear and Harlow (2002). The intent of prescribed burning by USFWS is to prevent succession of natural pine savanna into a hardwood-dominated community. The GBR is one of the last intact pine savannas west of the Mobile River (Alabama); numerous native species are dependent on pine savannas for their survival (Means and Campbell 1981; Greenberg 2002; Johnson and Hale 2002). No large-scale fires have occurred at GBR in the past 30 years (Mississippi Department of Marine Resources. 2002. Grand Bay National Estuarine Research Reserve Fire Management Plan. Technical Report. The Nature Conservancy. 28p.). Burn scars on trees are present, however, in small, isolated areas within unburned treatment, indicating small fires (e.g., accidental, arson, lightening) occurred in the recent past. The large scale prescribed burn conducted in 2003 provided us with the opportunity to study effects of a community restoration fire in a historically fire dependent community and provide the first herpetological survey of the GBR.

Field Methods.—We captured herpetofauna from six sites at GBR from January to June 2004 (Fig. 2). We visited each site 23 times and sampled two times per week. We established line transects, minnow traps, and polyvinyl chloride (PVC) tubes (Heyer et al. 1994) to sample herpetofauna in three burned and three unburned sites on

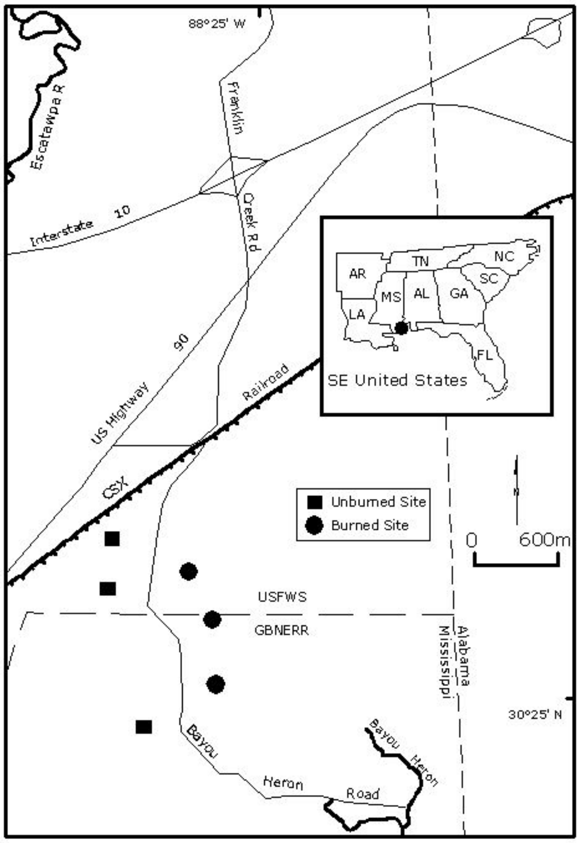

FIGURE 2. Location of burned and unburned sites at the Grand Bay National Estuarine Research Reserve (GBNERR) and surrounding United States Fish and Wildlife Service (USFWS) Grand Bay National Wildlife Refuge (GBNWR) in Jackson County, Mississippi.

the GBR. Each transect we established was 200 m long and located along an abandoned dirt road, with an average width of 5 m. Dirt roads were overgrown with grasses and small shrubs, but provided accessible walkways for transects. Unburned habitat was impassable without using dirt roads, thus we established these transects out of necessity. All transects traversed similar habitat within treatment, and each ended in separate shallow wetlands. We conducted visual encounter surveys (VES) for 30 minutes along each transect; searching with "intermediate-intensity," a nondestructive method, and counting exposed animals and those hidden under objects (i.e., logs, tires, plastic tarps, vegetation) (sensu Heyer et al. 1994). During the VES we searched 2,000 m^2 within each transect, for a total of 6,000 m^2 in each treatment. We placed unbaited plastic minnow traps in shallow wetlands near the terminus of each transect. To prevent drowning of captives, we placed a small plastic float inside each trap, allowing the top of the trap to remain above water. We deployed six minnow traps at each site, for a total of 576 trap-days, where one trap-day is considered one opened minnow trap for one night. During periods of drought we removed minnow traps, and returned them after rainfall events. We sampled tree frogs (*Hyla* spp.) by randomly installing 5-60 cm long x 2.5 cm diameter (interior) PVC pipes at breast height to overstory trees adjacent to each transect. We trapped for a total of 880 trap-days, where one trap-day is considered one pipe open for one night. We did not consider PVC pipes open when pipe openings were blocked by spider webs, preventing entrance by tree frogs. We identified herpetofauna in this study to species according to Conant and Collins (1998). We sampled without replacement, with the exception of turtles and alligators. We used several animals in a separate parasitological survey (Langford and Borden, unpubl. data). Animals not used in our parasitological survey were kept until the end of the study and released near point of capture.

We measured habitat within a 10 x 10 m (100 m^2) plot randomly placed adjacent to each transect. We identified three dominant trees, shrubs, and vines to species according to Tiner (1993), and percentage cover of each species was visually estimated by one of us (C.S.M.) within each plot. We measured the average diameter (> 3 cm) at breast height for the two largest species in each plot. We systematically selected smaller plots (1 x 1 m) in the southwest corner of each 100 m^2 plot to estimate visually: herb ground cover, woody debris, bare ground, hardwood litter, pine litter, and herb litter. From the smaller plot, we collected samples to measure soil moisture, soil mass, leaf-litter moisture, and leaf-litter mass. In each smaller plot, we collected soil with a probe (2 cm diameter) to a depth of 10 cm to measure soil moisture (weighed initially and then weighed after dried for 24 hours at 60° C). We recorded soil mass as dry weight. Similarly, we collected leaf litter from the smaller plots, dried and weighed it to determine leaf litter moisture and dry litter mass. We measured habitat variables at each site on 27 May 2004. We were unable to collect pre-burn data for habitat variables (or herpetofauna). However, we did estimate overall pre-burn habitat variables by overlaying pre-burn aerial photographs with post-burn photographs using ArcGIS 8.3 (Environmental Systems Research Institute, Redlands, California, USA). In brief, we simply made visual comparisons at the landscape scale by measuring area of woody vegetation vs. grasslands pre and post-burn. Aerial photos were compared between spring 2001 (pre-burn) and spring 2004 (post-burn). We found pre- and post-burn aerial photographs to be very different using this method, thus we did not perform further delineation. We calculated abundance (mean of amphibians or reptiles per transect), species diversity (Shannon Index), evenness, and species richness (number of species collected) (Heyer et al. 1994) for amphibians and reptiles for each treatment by combining available data from VES, minnow traps, and PVC tubes from each site.

TABLE 1. Amphibians and reptiles captured from three burned and three unburned sites at the Grand Bay Reserve, Mississippi. Collected from January to June, 2004 following a prescribed burn conducted in March 2003. Taxa are listed in order of total abundance.

Species	Common Name	Burned	Unburned	Total
Amphibians				
Bufo quercicus Holbrook	Oak Toad	125	9	134
Acris gryllus (LeConte)	Southern Cricket Frog	63	50	113
Rana utricularia Harlan	Southern Leopard Frog	51	2	53
Hyla femoralis Bosc	Pine Woods Treefrog	19	8	27
Rana grylio Stejneger	Pig Frog	2	13	15
Gastrophryne carolinensis	Eastern Narrowmouth Toad	2	3	5
Hyla cineria (Schneider)	Green Treefrog	3	2	5
Hyla squirella Bosc	Squirrel Treefrog	3	1	4
Pseudacris nigrita LeConte	Southern Chorus Frog	3	0	3
Bufo terrestris (Bonnaterre)	Southern Toad	1	1	2
Amphiuma means Garden	Two-toed Amphiuma	1	0	1
Bufo fowleri Hinckley	Fowler's Toad	1	0	1
Rana clamitans Latreille	Bronze Frog	0	1	1
Siren intermedia Barnes	Lesser Siren	1	0	1
	TOTAL	**275**	**90**	**365**
Reptiles				
Kinosternon subrubrum (Lacépède)	Eastern Mud Turtle	13	2	15
Terrapene carolina (Linnaeus)	Eastern Box Turtle	5	2	7
Anolis carolinensis Voigt	Green Anole	5	1	6
Coluber constrictor Linnaeus	Black Racer	3	2	5
Scincella lateralis (Say)	Ground Skink	4	1	5
Ophisaurus ventralis Linnaeus	Eastern Glass Lizard	4	1	5
Agkistrodon piscivorous (Lacépède)	Cottonmouth	1	4	5
Lampropeltis getula Stejneger	Speckled Kingsnake	3	0	3
Opheodrys aestivus (Linnaeus)	Rough Green Snake	3	0	3
Eumeces inexpectatus Taylor	Southeastern Five-Lined Skink	0	3	3
Nerodia fasciata (Linnaeus)	Banded Watersnake	0	2	2
Thamnophis sauritus (Linnaeus)	Eastern Ribbon Snake	0	2	2
Alligator mississippiensis (Daudin)	American Alligator	1	0	1
Deirochelys reticularia Latreille	Chicken Turtle	0	1	1
Trachemys scripta Wied	Red-eared Slider	0	1	1
	TOTAL	**42**	**22**	**64**

RESULTS

We captured 429 individuals of 29 species, of which 365 were amphibians (14 species) and 64 were reptiles (15 species; Table 1)). Amphibians comprised 85% of individual herpetofauna captures, yet an equal number of amphibian and reptile species were present on GBR. The four most common species collected (Oak Toad; Fig. 3), Southern Cricket Frog [*Acris gryllus*], Southern Leopard Frog [*Rana utricularia*], and Pinewoods Treefrog [*Hyla femoralis*]), accounted for 76.4% of all captures.

In addition to the captures in this study (Table 1), we also collected the Diamondback Terrapin (*Macroclemys terrapin*) and the Gulf Salt Marsh Snake (*Nerodia clarkii*). These species were not collected as part of our burned vs. unburned study. Instead, they were captured in brackish water during random searches of salt marsh habitat within the GBR. The addition of these two species brings the total number of herpetofauna we captured at GBR to 31 species. These two species were not included in data analysis.

Our most effective trapping method, VES, captured 24 (83%) of the 29 species, and was the sole technique in capturing 12 (41%) species. Minnow traps caught 10 species, including the only salamanders captured during our survey, the Two-toed Amphiuma (*Amphiuma means*) and the Lesser Siren (*Siren intermedia*). As we expected, the PVC tubes only captured treefrogs, four species in total.

When considering species with more than two captures, seven of nine (78%) amphibian species displayed higher abundances in burned habitat. Likewise, we found eight of ten (80%) reptile species, with more than two captures, had higher abundances in burned habitat. We captured 90 (10 species) individual amphibians in unburned habitat and 275 (13 species) individuals in burned treatments, and 22 (12 species) individual reptiles in unburned habitat and 42 (12 species) individuals in burned regions. While abundances (abundance of amphibians or reptiles per transect) were greater in burned habitat (Table 2), we found that species diversity (Shannon Index), evenness, and species richness (number of species collected) were not different between burned and unburned areas.

Our review of pre- and post-burn habitat variables in

FIGURE 3. Adult Oak Toad (*Bufo quercicus*) from Grand Bay National Estuarine Research Reserve in southeastern Jackson County, Mississippi, USA. (Photographed by Gabriel J. Langford)

TABLE 2. Means (± 1 SD) of amphibian and reptile abundance (mean number of amphibians or reptiles per transect), Shannon diversity and evenness indices, and species richness (number of species captured) between three burned and three unburned sites from the Grand Bay Reserve, Mississippi. A total of 429 individuals were collected from January to June, 2004 following a prescribed burn conducted in March 2003.

	Burned	SD	Unburned	SD
Amphibians				
Abundance	11.36	± 4.67	4.26	± 3.45
Shannon diversity	1.52	± 0.69	1.50	± 0.61
Evenness	0.60	± 0.23	0.70	± 0.57
Species richness	7.67	± 5.98	4.67	± 5.39
Reptiles				
Abundance	1.33	± 1.58	0.86	± 1.36
Shannon diversity	1.99	± 0.90	2.33	± 1.67
Evenness	0.78	± 0.81	0.94	± 1.15
Species richness	5.00	± 7.61	5.33	± 6.89

ArcGIS indicated that pre-burn vegetation composition was similar between burned and unburned treatments. Prior to prescribed fire, our burned treatments had an average of 15% (n = 3) grasses, while the unburned section had an average of 19% (n = 3) grasses. Following the burn, we found burned and unburned treatments to have an average of 68% (n = 3) and 16% (n = 3) grasses, respectively. We found the prescribed burn had a varied effect on habitat variables (Table 3).

DISCUSSION

Our study provides the first herpetological survey of GBR and provides mixed evidence for the effects of prescribed fire on the herpetofauna of GBR. We observed a greater abundance of herpetofauna (with more than two captures) captured on GBR wet pine savannas that were recently burned. However, all other herpetofaunal community indices suggest prescribed fire had little, if any, effect on amphibians and reptiles of the GBR. We attributed these differences to a handful of fire adapted amphibian and reptile species that appeared to thrive, in terms of individual captures, in recently burned habitat.

We frequently encountered Oak Toads and Southern Cricket Frogs at the base of Beyrich Threeawn clumps, which apparently provided a moist microhabitat and an escape from the increased solar radiation associated with recently burned forests. Our study demonstrated that grasses were more common in burned habitat than unburned habitat based on ArcGIS analysis. We suggest Beyrich Threeawn and other naïve grasses may provide an ideal microhabitat for these two anurans, which regularly seek refuge in vegetation (Mount 1975). Beyrich Three awn clumps and associated shallow wetlands appear to provide filtered sunlight, a thermal gradient, and high hydration levels that are required by these two species (Hamilton 1955; Walvoord 2003).

We captured no terrestrial salamanders, which could cause a bias in amphibian abundance and species diversity trends in our study. Terrestrial salamanders are an important component of many ecosystems (Burton and Likens 1975), and a few species are endemic to Longleaf Pine ecosystems (Dodd 1995). Our sampling occurred during the later half of the winter breeding migrations of ambystomid salamanders. Therefore, the lack of terrestrial salamanders was unexpected. Our sampling methods lacked one major passive capturing technique, i.e., drift fences with pit-falls, which could have captured terrestrial salamanders. Unfortunately, our study sites prevented the use of pit-falls. Low elevations and saturated soils caused pit-falls to fill immediately with water. Thus, we elected to use VES as a substitute for pit-falls.

Overall, terrestrial salamanders probably are not abundant in GBR pine savannas because these savannas are low, wet and frequently flooded, sometimes with saltwater. The lack of salamanders is supported by their intolerance of saltwater (Pough et al. 2003) and their general slow colonization of disturbed or newly formed habitat (Pechman et al. 2001; Brodman et al. 2006). A study conducted in 1997 did not locate terrestrial salamanders at our study sites (Studenroth, K. 1998. Results of ecological surveys conducted within the Grand

TABLE 3. Means (± 1 SD) for habitat variables measured within 100 m^2 plots adjacent to three burned and three unburned sites at the Grand Bay Reserve, Mississippi; measured 27 May 2004 following a prescribed burn conducted in March 2003.

Habitat Variable	Burned		Unburned	
Dominant tree (% cover)				
Pinus palustris	23.3	± 2.8	16.6	± 11.5
Pinus elliottii	1.6	± 0.4	15.0	± 8.6
Dominant shrub (% cover)				
Cliftonia monophylla	30.0	± 0.0	45.0	± 13.2
Myrica cerifera	0		16.0	± 16.8
Dominant vine (% cover)				
Smilax spp.	2.3	± 2.3	4.3	± 4.9
Dominant herb (%cover)				
Arestida beyrichiana	72.7	± 21.4	90.0	± 8.6
Sabatia spp.	0		2.6	± 2.5
Panicum spp.	1.1	± 0.8	0.6	± 0.5
Scleria spp.	1.6	± 0.6	0	
DBH (stems >3cm)				
Pine	19.5	± 12.5	8.5	± 2.2
Hardwood	0		2.1	± 3.6
Ground cover (%)				
Pine litter	0		4.6	± 0.6
Hardwood litter	0.6	± 0.5	2.3	± 2.5
Herb litter	73.3	± 5.7	89.3	± 4.0
Bare ground	16.6	± 10.4	0.2	± 0.1
Woody debris	2.0	± 2.0	3.3	± 1.5
Litter depth (cm)	1.3	± 0.6	3.6	± 1.1
Moisture (%)				
Soil	20.8	± 4.3	23.6	± 4.5
Leaf litter	1.6	± 2.9	22.0	± 5.1
Substrate (g)				
Soil	56.0	± 1.5	38.5	± 6.7
Leaf litter	3.1	± 2.8	16.1	± 4.2

Bay savanna bioreserve region. Technical Report. Grand Bay National Estuarine Reserach Reserve, Grand Bay, Mississippi, USA. 98 p.). Studenroth (1998, *ibid*) did locate terrestrial salamanders (Southern Dusky [*Desmognathus auriculatus*] and Dwarf Salamander [*Eurycea quadridigitata*]) in similar habitat, albeit 2-m higher in elevation and 3-4 km to the northeast of our study sites within the township of Grand Bay, Alabama. Given the close proximity and similarity in habitat between GBR and Grand Bay, Alabama there is potential for terrestrial salamanders to colonize portions of GBR. Future prescribed burns at GBR should improve the quality of habitat for salamander species adapted for life in fire dependent pine savannas. Hopefully, future burns will allow terrestrial salamander populations to adjust to their abundances and distributions prior to exclusion of fire as suggested by Means et al. (2004).

While many reptile species were captured more often in burned habitat, our low capture rates prevented us from making stronger conclusions concerning reptiles and prescribed fire. Their greater vagility and reduced dependence on aquatic habitats made reptiles harder to capture using our sampling techniques. The Eastern Mud Turtle was the one exception, with 13 of 15 (87%) captures occurring in burned habitat we are confident in this turtle's preference for recently burned habitat. This turtle was often seen basking at the edge of shallow ponds in burned habitat. We visually recorded over 30 additional Eastern Mud Turtles in burned habitat vs. only three in unburned. These turtles were not included in our study because they escaped physical capture. However, these visual observations support our conclusion that Eastern Mud Turtles were very abundant in burned habitat. Of the 13 Eastern Mud Turtles captured in burned treatments, we found eight (62%) partially buried at the base of Beyrich Threeawn clumps. We suggest the grass provides a refuge for the turtle, similar in nature to the refuge grasses provide the Oak Toad and Southern Cricket Frog.

Our choice of placing VES transects along old dirt roads was made out of necessity, due to impassable vegetation among the burned treatments. It is possible our selection of old dirt roads as transects may have biased our results. Many herpetofauna species on the northern coastal plain have been shown to respond differently to edge habitat (Langford 2005). Our capture rates may represent a disproportionate number of "edge loving" species by sampling along abandoned roads. This potential sampling bias may have been exacerbated within unburned treatments due to a lack of open, grassy habitat along burned habitat, forcing herpetofauna in unburned habitat to seek basking opportunities along roadways and other human-made easements (e.g., powerline right of ways). However, without a major passive trapping technique (e.g., drift-fences with funnel traps) we were unable to determine if this phenomenon was occurring at our sites.

Based on ArcGIS analysis, we determined that burned (15% grasses) and unburned (19% grasses) sites were similar in vegetation composition prior to the burn. Based on this information and close proximity of all sites we assumed burned and unburned treatments harbored similar herpetofauna prior to the prescribed burn. Our post-burn analysis revealed that burned (68%) treatments had much greater quantities of grasses than did unburned (16%) habitat. We found measuring the percentage of grasslands a simple way to examine effects of prescribed fire on vegetation at the landscape scale. Given the purpose of most prescribed fire in pine forests is to remove hardwood vegetation and create an open, sparse canopy with plenty of grassland (Means and Campbell 1981), our method provided a quick way to determine if this goal was accomplished. Overall, prescribed fire at our site was very effective in removing hardwood vegetation and allowing numerous herbs to establish themselves in burned habitat.

In conclusion, our study suggests low intensity prescribed fire increased the number of individual herpetofauna captures in pine savannas within GBR. Other herpetofaunal community indictors suggested prescribed fire had no effect on herpetofauna. In addition, our study provides a much needed herpetofaunal survey of the GBR and an opportunity to use this survey as baseline data for a future monitoring program at the reserve. This study was designed to be an initial investigation into the *aposteori* reactions of herpetofauna to prescribed burning within an under sampled region of the Gulf Coast. However, further studies on the effects of prescribed fire on wildlife are needed in the western Gulf coast states before specific management recommendations can be made for GBR and other wildlife reserves. We hope this study will draw attention to this need and encourage future research.

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Errata in Table 2 corrected on 18 September 2007.

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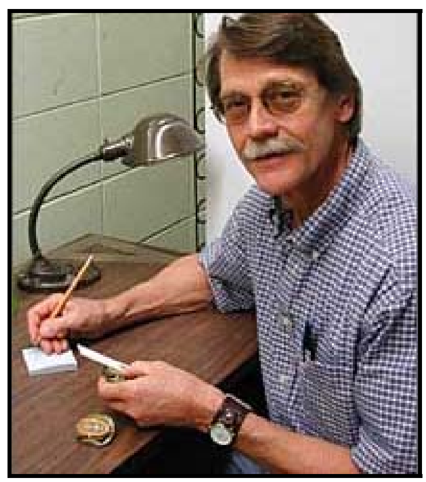

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