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An Overlooked Hotspot? Rapid Biodiversity Assessment Reveals a Region of Exceptional Herpetofaunal Richness in the Southeastern United States

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Abstract - We conducted a competitive bioblitz survey in four Georgia counties to raise awareness of a unique and species rich herpetofauna in the Pine Mountain/Fall Line Sandhills Region of Georgia, and compared documented species of these counties to other herpetofaunas of the southeast that have known high richness and/or were subject to thorough collection efforts. Our results demonstrate the efficacy of bioblitzes for documenting large numbers of species in a limited amount of time (62 amphibian and reptile species in only seven days, including 36 new county records and documentation of three protected species). Compared to areas of similar size, this area is among the most species-rich herpetofaunas in North America north of Mexico, with only three areas having higher documented richness. However, all areas we compared our site to have experienced much higher collection effort and contain much larger tracts of protected land. Thus, our data suggest the Pine Mountain/Fall Line Sandhills region is among the most important regions for amphibian and reptile conservation in North America.

Introduction

Biodiversity hotspots—areas undergoing extensive habitat loss characterized by high species richness, diversity, and/or endemism—have garnered great attention from ecologists, land managers, and conservationists as interesting areas for research and practical targets for conservation (Myers et al. 2000). A range of factors influence patterns of species richness within a given area, including local environmental variables (Qian et al. 2007), historical climate (Araújo et al. 2008), latitude (Pianka 1966), topography and/or habitat heterogeneity (Kerr and Packer 1997), and productivity (Rodríguez et al. 2005). The first step in identifying and understanding hotspots is to accurately measure species distributions and richness. Not surprisingly, attention to hotspots is biased toward easily sampled taxa (e.g., plants; Myers 1988, 1990). Unfortunately, biodiversity hotspots do not always show great congruence among taxa, so characterizations of one set of organisms may not apply to other taxa (e.g., Daniels 1992, Grenyer et al. 2006). This lack of congruence presents a unique challenge in identifying biodiversity hotspots for cryptic taxa that are difficult to detect.

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Amphibians and reptiles (hereafter, "herpetofauna") are examples of taxa that can be difficult to systematically inventory (Heyer et al. 1994) and therefore may have regional hotspots that remain undocumented. Identification of herpetofaunal hotspots may require opportunistic or targeted inventories and long-term accumulation of records. For example, it took 45 years of incidental and opportunistic encounters to identify areas within the Savannah River Site (SRS) that contain as many as 90 reptile and amphibian species, and the SRS is arguably one of the most intensively studied areas for herpetofauna in the world (Gibbons et al. 1997). Even still, one amphibian species escaped detection for over 50 years until only recently being discovered on the site (Luhring 2008).

The southeastern United States is the center of herpetofaunal biodiversity in North America (north of Mexico), containing approximately half of its known species of amphibians and reptiles (Conant and Collins 1998, Gibbons and Buhlmann 2001, Tuberville et al. 2005). Therefore, the location of the most species rich herpetofaunal assemblage in North America presumably occurs in the southeastern United States, and it has been suggested that the Florida Panhandle has the most amphibian and reptile species for its size compared to any other region in North America (Blaustein 2008). However, due to the inherent difficulties involved in sampling these animals (Heyer et al. 1994), it is possible that other areas with equal or higher species richness exist.

The Fall Line along the Gulf and Atlantic Coasts of the United States has particularly high species richness due to the intermingling of species typical of the Coastal Plain and those restricted to other physiographic provinces (e.g., Piedmont, Ridge and Valley, etc.; Mount 1975). In particular, one section of the Georgia Fall Line appears to have notable species richness (see Griffith et al. 2001, Wharton 1978). In this zone (the Pine Mountain Ecoregion and nearby Fall Line Sandhills), certain northern/montane-associated species (e.g., *Rana sylvatica* LeConte [Wood Frog], *Gyrinophilus porphyriticus* Green [Spring Salamander]) reach the southernmost termini of their ranges (Conant and Collins 1998, Jensen et al. 2008), while Coastal Plain-associated species (e.g., *Rana capito* LeConte [Gopher Frog], *Crotalus adamanteus* Palisot de Beauvois [Eastern Diamondback Rattlesnake], and *Notophthalmus perstriatus* Bishop [Striped Newt]) occur in some of their inland-most populations (Jensen et al. 2008). Surprisingly, this area has not been subject to intensive study, although its significance relative to vertebrates has been briefly noted (e.g., Wharton 1978), and a botanical study has been conducted, documenting similar patterns of biogeographic intermingling of plant species (Jones 1974).

This paper presents the findings of a bioblitz to raise awareness of this potentially important area of reptile and amphibian biodiversity. Bioblitz competitions are events in which teams of biologists compete to document and voucher the most species in a particular area (Graham et al. 2007a; Graham et al., in press). Our goals were to: 1) document new county records to

supplement the list of known species and demonstrate the incompleteness of sampling for this region, 2) document the presence or persistence of rare and protected species, and 3) compare the species list for this region to well-studied herpetofaunas in the southeast known for their high diversity.

Methods

Study area

The core area of our survey included the four Georgia counties of Talbot, Taylor, Marion, and Schley, although participants were encouraged to locate new records in adjacent counties as well. Many terrestrial and aquatic environments are found in this region; for complete descriptions of these plant and animal communities, consult Wharton (1978). The Fall Line—the physiographic boundary between the Piedmont and Coastal Plain—transects southern Talbot and northern Taylor counties (Fig. 1). Areas north of this boundary contain heavy, clay soils derived from crystalline metamorphic rocks, whereas deep sands of the Coastal Plain are found south of it (Griffith et. al. 2001, Wharton 1978). Southern portions of the Pine Mountain ridges terminate in Talbot County (Fig. 1), and are composed of ancient (e.g., >1 billion years old) "basement" (e.g., continental shield) metamorphic rocks (Steltenpohl et al. 2008). These ridges are topped with xeric mountain Longleaf Pine-Blackjack Oak forests, and their north-facing slopes contain mesic hardwood forests. Streams of this area often have high gradients and contain larger, cobble substrates than those found elsewhere in the Piedmont (Griffith et al. 2001). Typical oak-hickory assemblages are found in the Piedmont hills surrounding these ridges.

The Fall Line Sandhills in this area once contained excellent tracts of xeric Longleaf Pine-Turkey Oak forests which are now heavily fragmented, with much of the original *Pinus palustris* Mill (Longleaf Pine) removed (Wharton 1978). Within these sand ridges are black-water creeks and a few remaining isolated wetlands. Whitewater Creek, a unique, clear, black-water creek, is one of the sole locations in Georgia for *Chamaecyparis thyoides* L. (Atlantic White Cedar) and many other plants (Patrick et al. 1995). The Flint River is the largest stream flowing through this area and contains numerous shoals, riffles, and gorges in its Piedmont section. Its floodplain widens extensively after entering the Coastal Plain to form Magnolia Swamp (Fig. 1). Most of the remaining tracts of natural forests and wetlands are in private ownership (including Magnolia Swamp), and are surrounded by agriculture, old fields, pine plantations, and rural development.

Bioblitz competition

Twenty-five individuals in two teams participated in the survey. However, daily effort ranged widely. The two teams competed to find undocumented species throughout the region, seeking suitable habitat (with landowner's permission on private tracts), conducting visual encounter surveys, and thoroughly turning cover objects searching for herpetofauna. Limited trapping

(using hoop and minnow traps) was conducted in ponds and creeks. Our survey was divided into spring (21–23 March 2008) and fall (8–10 October 2008 and 26 Oct 2008) portions, a strategy previously demonstrated to maximize results by accommodating diverse reptile and amphibian activity seasons (Graham et al., in press; Todd et al. 2007). New records were vouchered as

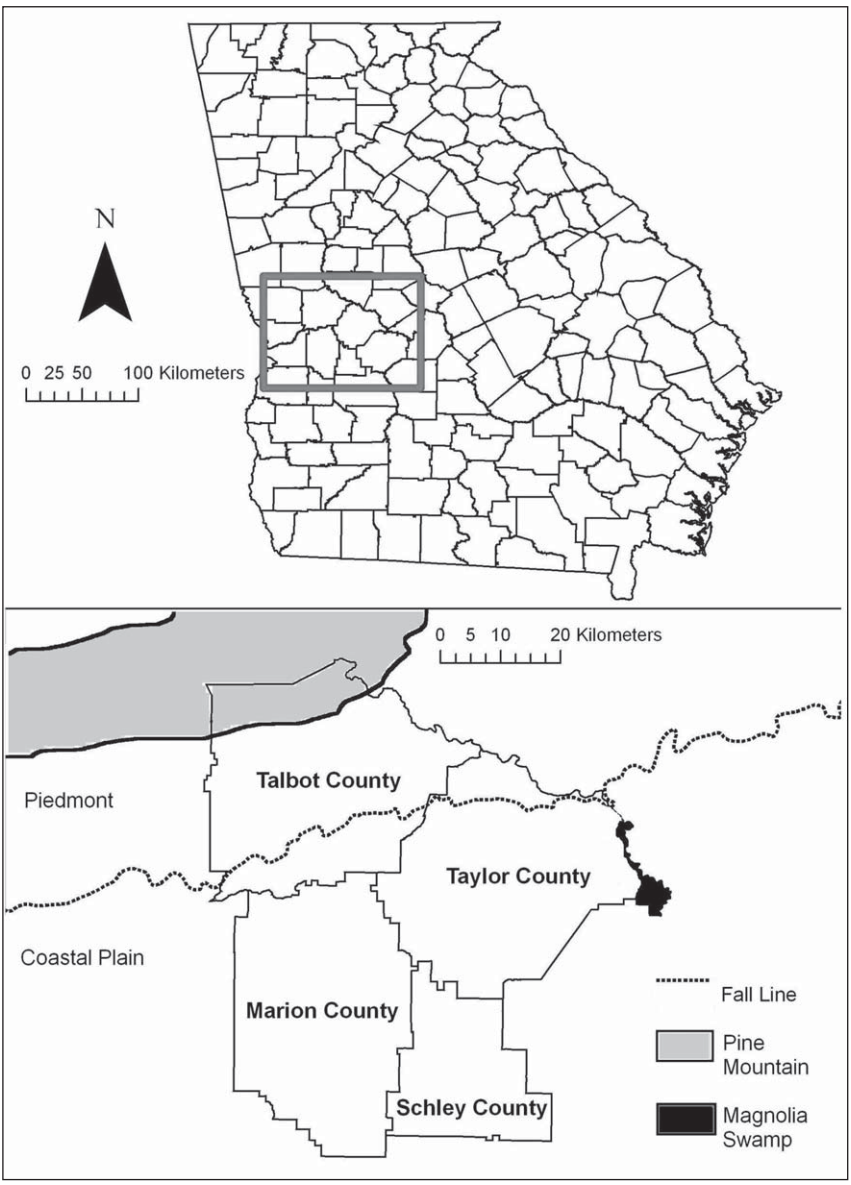

Figure 1. Map of area surveyed for amphibians and reptiles over seven total days in March and October 2008. Insert: four county center of our survey area, with key physiographic features indicated.

digital photographs or specimens, verified by experts (see Appendix 1), and deposited in the Auburn University Herpetological Collections (AUM).

Comparison to other southeastern US herpetofaunas with high species richness

We compiled lists of herpetofaunas in the Southeast from published reports combined with museum records. We chose areas of known high species richness based on overlapping ranges in published range maps (Mount 1975; Conant and Collins, 1998; Jensen et al., 2008), our own experience with this region, and suggestions in Gibbons et al. (1997) and Blaustein (2008). We focused on regions with 80 to >100 potential species based upon overlapping ranges (Conant and Collins 1998), then chose localities within these zones that have been well-studied and have published species lists (e.g, Apalachicola National Forest [Means 1976], Savannah River Site [Gibbons et al. 1997], Ichauway [Smith et al. 2006]). Our method resulted in 12 locations of high species richness, varying area, and variable collection effort, to which we compared our area of interest. It is likely that these represent some of the most species rich herpetofaunas (of similar size) in North America (Blaustein 2008). These areas ranged from small national forests (Tuskegee National Forest, Macon County, AL; 45 km^2) to large counties (Mobile and Baldwin County, AL; 9508 km^2). We chose these areas since they are high in amphibian and reptile species richness and also fairly well studied (e.g., they have a long history of sampling due to repeated visits by university biologists), and thus they have been sufficiently sampled. Since our goal was not to provide an exhaustive analysis of species richness patterns in the Southeast, we argue this is an appropriate approach and a heuristic exercise to put our focal region in perspective.

For each region, lists included only native species that can be unequivocally assigned to a species using morphology alone, and lists included members of species complexes separable by molecular characters alone only once (e.g., the *Plethodon glutinosus* Green [Slimy Salamander] complex). This was a conservative approach that likely underestimated the species pool for our own area by at least three species (i.e., the ranges of three members of the *P. glutinosus* complex overlap in our study area [Jensen et al. 2008], as well as the *Elaphe allegheniensis* Holbrook [Eastern Ratsnake]/*Elaphe spiloides* Duméril, Bibron, and Duméril [Grey Ratsnake] contact zone [Burbrink et al. 2000]). We did not include undescribed species known or rumored to occur in an area. We included all species reported within the past 100 years as still present in each area.

Species richness is likely related to both study area size and collection effort. To determine if species richness was associated with the area of each location, we used linear regression, and calculated the per-area species richness of each location. We then took residuals from this analysis to rank locations above and below the mean richness of our sample of sites. Since collection effort varied between localities, we determined a qualitative estimate of effort for each area prior to this study, with no

surveys and/or collection efforts from university herpetologists considered to be a "low" collection effort, one herpetofaunal survey and/or collection effort from university herpetologists considered to be a "moderate" collection effort, and localities with long-term collection data from university herpetologists and/or numerous surveys considered to be "high" collection efforts. Similarly, we qualitatively estimated the amount of protection for each locality, with national forests, parks, and wildlife refuges considered "highly" protected, military reservations and other federal properties (e.g., Department of Energy) considered "moderately" protected, and areas with mostly private lands (e.g., counties) with "low" protection. We used SPSS for statistical analyses, with α set at 0.05.

Results and Discussion

In seven days (disjunct between spring and fall periods), we documented 62 total species of amphibians and reptiles, including 36 new county records (for 5 counties; Appendix 1), surpassing totals achieved during previous bioblitz competitions conducted in other areas (Graham et al. 2007a; Graham et al., in press). Twenty-three of the new records we report were from our core area (the rest from adjacent counties; see Appendix 1), with 54 species documented from Talbot, Taylor, Schley, and Marion counties. By comparison, it took several decades to document 60 reptile and amphibian species in most areas on the Savannah River Site (SRS), and we documented approximately 2/3 the total number of species known from the SRS (Gibbons et al. 1997) in seven days using limited trapping techniques. However, it is important to mention that a more concerted effort using a single drift fence documented 59 species at the SRS in just months (Todd et al. 2007). A recent survey of species richness patterns in southeastern national parks documented a maximum park species richness of 64, with 25 new county records after two years of detailed surveys using a variety of standard methods (Tuberville et al. 2005). Our results illustrate the value and utility of bioblitz competitions for generating baseline species lists in general, as well as the extraordinary richness of the herpetofauna in this area. Combined with previously documented species for these counties (Jensen et al. 2008), our results indicate 104 documented amphibians and reptiles for this region.

The comparison among localities in the Southeast demonstrated a positive correlation between locality size and species richness ($R^2 = 0.349$, $F = 5.351$, $P = 0.043$), with our area exhibiting richness comparable to sites noted for their herpetofaunal abundance and/or collection effort (Fig. 2, Table 1). Our area had the fourth highest residual richness of our sample of localities (Table 1). However, this can be considered one of the first surveys of this area, and thus collection effort has presumably been much lower for this area than any of the other sites we compared it to (Table 1). To compensate for this lack of collection effort, we analyzed predicted species richness for our area based on range maps in Jensen et al. (2008). Including these species would raise our

pool to 111 species and result in the highest residual richness of our sample (Fig. 2). It is likely that at least nine more species await documentation from this region, such as the widespread *Bufo americanus* Holbrook (American Toad), *Plethodon serratus* Grobman (Southern Redback Salamander), and *Regina septemvittata* Say (Queen Snake), as well as the more secretive *Farancia erytrogramma* Palisot de Beauvois (Rainbow Snake), *Ophisaurus attenuatus* Cope (Slender Glass Lizard), and others. If these are documented in our area, the Pine Mountain/Fall Line Sandhills region may possibly deserve status as the most species-rich herpetofauna in North America.

A brief consideration of other herpetofaunas in the United States demonstrates the high species richness of this region. For example, the 3242-km^2 Big Bend National Park, which boasts more documented birds, bats, and cacti (National Park Service 2009) than any other national park, has 67 documented amphibians and reptiles (56 of which are reptiles; National Park Service 2009). The 370-km^2 Saguaro National Park has only 54 species (National Park Service 2009). Although the southwestern United States is known for its reptile (especially lizard) diversity (Ricketts et al. 1999), the Pine Mountain/Fall Line Sandhills region, with 60 species, still outranks the reptile total for both of these southwestern national parks.

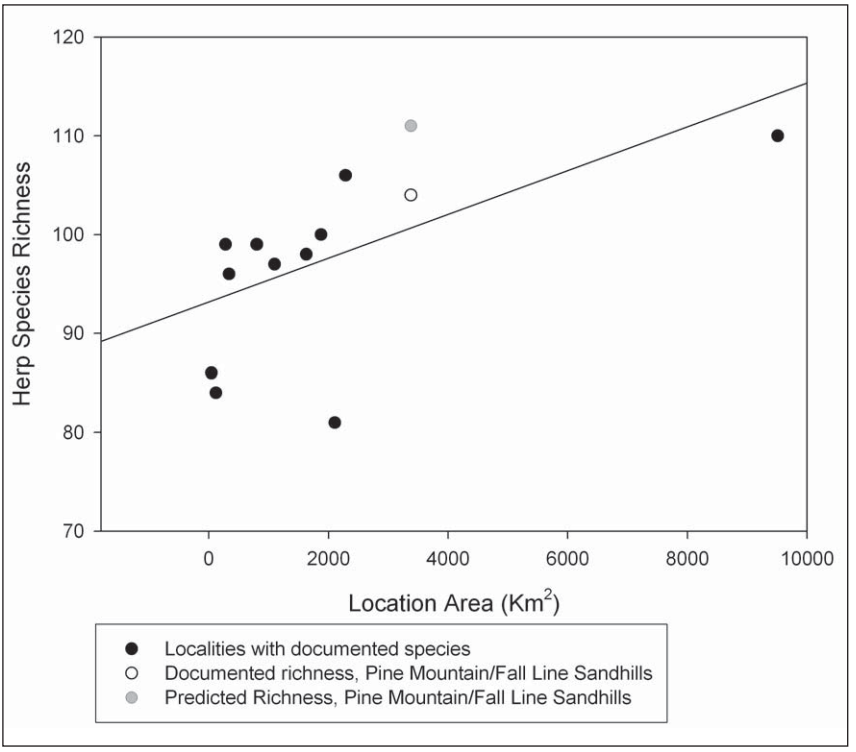

Figure 2. Relationship between amphibian and reptile species richness and size of study area for regions with documented high species richness/and or extensive collection effort in the southeastern United States.

Great Smoky Mountains National Park is heralded for its amphibian diversity with 44 documented species (Dodd 2004, Tilley and Huheey 2001), yet our focal area has the same number of documented amphibians. In sum, one could combine the reptile species richness of Big Bend National Park and the amphibian species richness of Great Smoky Mountain National Park, and the herpetofauna species list would still be surpassed by our study area. The herpetofaunal species richness observed at our study area and elsewhere in the southeastern United States approaches the richness documented for the tropics (Zug 1993:286–287).

Unfortunately, construction of a species-accumulation curve was not practical due to daily fluctuations in sampling effort (Gotelli and Colwell 2001), and therefore we cannot estimate how many total species may be present. However, the number of new records we documented confirms that sampling has been incomplete in this region, and that increased sampling would likely result in documentation of additional species in the study area. Recent discoveries of range extensions for *Rana sylvatica* (Graham et al. 2007b), and cryptic species such as *Micrurus fulvius* L. (Coral Snake) (Klaus and Jensen 2009) in Talbot County are illustrative examples. While this paper was under review, one of us (S.P. Graham) discovered a *Desmognathus aeneus* Brown and Bishop (Seepage Salamander) on Rockhouse Mountain in Talbot County (Graham 2009). This is yet another species with montane affinities discovered in the Pine Mountain ecoregion. This species was not included in our analysis.

Table 1. Species richness patterns in selected southeastern sites with high species richness. Sites are represented in ascending order of residual richness. NF = National Forest, NWR = National Wildlife Refuge, and AFB = Air Force Base. SR = species richness, RR = residual richness, and CE = collection effort, AP = area preserved. H = high collection effort/preservation, M = moderate collection effort/preservation, L = low collection effort/preservation.

Site	Area (km^2)	SR	Species/area	RR	CE	AP	Source
Apalachicola NF, FL	2286	106	0.04636920	1.21	M	H	Means 1976
St. Marks NWR, FL	280	99	0.35357143	0.81	H	H	USFWS 1998b
Savannah River Site, SC	803	99	0.12328767	0.66	H	M	Gibbons et al. 1997
Taylor, Talbot, Schley, and Marion counties, GA	3379	104	0.03077834	0.63	L	L	This study, Jensen et al. 2008
Eglin AFB, FL	1875	100	0.05333333	0.49	M	M	Printiss and Hipes 1999; HerpNET
Conecuh NF, AL	340	96	0.28235294	0.37	H	H	Guyer et al. 2007, Graham 2008, AUM records
Fort Stewart, GA	1100	97	0.08818182	0.30	H	M	Stevenson 1999
Okefenokee NWR, GA	1627	98	0.06023356	0.28	H	H	USFWS 1998a
Mobile and Baldwin Counties, AL	9508	110	0.01156920	-0.67	M	L	Mount 1975; Palmer 1987; Carey 1984, 1985
Tuskegee NF, AL	45	86	1.91111111	-0.97	H	H	AUM records
Ichauway, GA	117	84	0.71794872	-1.28	H	H	Smith et al. 2006
Great Smoky Mountains National Park, TN and NC	2108	81	0.03842505	-2.26	H	H	Tilley and Huheey 2001

In addition to increasing the documented species pool for counties in this region, we documented the persistence of three rare/protected species. *Gopherus polyphemus* Daudin (Gopher Tortoise) were observed at two sites, a *Macrochelys temminckii* Gray (Alligator Snapping Turtle) was trapped in a farm pond, and Gopher Frog egg masses were located at a historic locality not resurveyed for this species since 1975 (based on Auburn University Museum records).

Two historical and topographical factors appear to be responsible for the high species richness in the region. First, the Apalachicola drainage is a known biogeographic corridor and refugium that has facilitated historical migrations during recent glacial advances and retreats (Blaustein 2008). The Apalachicola Ravines region of the Florida Panhandle is a recognized global hotspot with many endemics thought to have relict distributions (e.g., the critically endangered, *Torreya taxifolia* Arn [Florida Torreya]; Blaustein 2008). The Pine Mountain/Fall Line Sandhills area is also bisected by Apalachicola drainages, and shares some of the same endemics with the ravines further south (e.g., *Silene polypetala* Walter [Eastern Fringed Catchfly]). Therefore, this region probably harbored flora and fauna (including herpetofauna) from higher latitudes during climatic fluctuations, and they likely migrated through the Apalachicola corridor. In addition, the Pine Mountain Ridges trend east–west rather than north–south as most Appalachian ranges do—similar topography has been suggested to have increased diversity and endemism in Asian forests relative to North American ones during the Pleistocene (Qian and Ricklefs 1999).

Second, the nearness of the Pine Mountain ecoregion to a rich and almost complete Coastal Plain fauna results in the proximity of species usually found much farther apart. Thus, this region represents an ecotone at the ecoregion scale. Almost all southeastern habitat types (with the exception of caves, high elevation cove/boreal forests, and coastal/marine ecosystems) are available. The southernmost breeding population of Wood Frogs (Graham et al. 2007b) occurs <30 km from a population of Gopher Frogs and Striped Newts (Jensen 2000; Jensen and Klaus 2004), both Coastal Plain endemics. We documented Spring Salamanders and *Siren lacertina* L. (Greater Siren) during the same survey in nearly adjacent counties (≈80 km apart). Future considerations of hotspots—regardless of taxon of interest—should scrutinize border areas between distinctive ecoregions. Additional studies are needed to determine if other taxa exhibit similarly high richness in this region.

Areas such as Apalachicola National Forest, Great Smoky Mountains National Park, and the Savannah River Site are known for their high diversity, and their protection as public lands has maintained historical levels of richness. Unfortunately, our focal region (especially in areas below the Fall Line) has not enjoyed this advantage. Although this region has high local herpetofaunal species richness, little of this area is protected as public land, and habitat in the Fall Line Sandhills is generally degraded for much

wildlife. Most of the area is heavily fragmented and under intensive agriculture or silviculture (see Wharton 1978:183). The region may still be suitable for the acquisition and restoration of large areas as conservation easements. Fortunately, a nearby military base (Fort Benning) utilizes conservation management, parts of the Pine Mountain Ridges are protected as state lands (FDR State Park in Harris and Meriwether Counties, Big Lazar Creek WMA in Talbot County, and Sprewell Bluff State Park in Upson County), and the recent designation of Fall Line Sandhills Natural Area by the Georgia Department of Natural Resources (which protects an isolated wetland used by rare Coastal Plain amphibians) is progress toward this goal.

The number of endemic species in the area and the extent of habitat loss may be insignificant on a large scale, not qualifying this region as a global hotspot (Myers et al. 2000). However, on a more local scale, we suggest that its high species richness and diversity, coupled with heavy habitat modification and lack of protected land in the area, may qualify the Pine Mountain/Fall Line Sandhills ecotone as one of the most important areas for herpetofaunal conservation within the United States and Canada.

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Appendix 1. Amphibian and reptile species documented during a seven day survey in west-central Georgia in 2008, including new county records, locality data, and voucher information. AU = Auburn University, UGA = University of Georgia. T = team responsible.

Species	New record	Locality	Date	Verified by	T	Museum number
Amphibians						
Anura						
Bufo terrestris Bonnaterre						
Rana catesbeiana Shaw						
Rana sphenocephala	Webster Co.	32.051804°N, 84.548490°W	8-Oct-08	C. Guyer	AU	AHAP-D 135
R. clamitans Latreille						
R. heckscheri Wright						
R. capito LeConte						
Hyla cinerea Schneider	Webster Co.	32.051804°N, 84.548490°W	8-Oct-08	C. Guyer	AU	AHAP-D 134
	Stewart Co.	32.141480°N, 84.753142°W	21-Mar-08	C. Guyer	AU	AHAP-D 113
H. squirella Bosc						
H. gratiosa LeConte	Webster Co.	32.107753°N, 84.492906°W	8-Oct-08	C. Guyer	AU	AHAP-D 133
H. avivoca Viosca	Stewart Co.	32.034373°N, 84.890252°W	22-Mar-08	C. Guyer	AU	AHAP-D 120
Pseudacris crucifer Wied-Neuwied						
P. feriarum Baird						
P. ornata Holbrook						
Acris crepitans Baird						
A. gryllus LeConte						
Scaphiopus holbrookii Harlan						
Gastrophryne carolinensis Holbrook	Webster Co.	32.051804°N, 84.548490°W	8-Oct-08	C. Guyer	AU	AHAP-D 136
Caudata						
Eurycea cirrigera Green						
E. guttolineata Holbrook	Talbot Co.	32.795118°N, 84.398492°W	10-Oct-08	C. Guyer	AU	AHAP-D 125
E. chamberlaini Harrison & Guttman	Stewart Co.	32.034373°N, 84.890252°W	21-Mar-08	C. Guyer	AU	AUM 37748
	Marion Co.	32.526694°N, 84.569986°W	22-Mar-08	C. Guyer	AU	AUM 37751
Plethodon glutinosus Green						
P. websteri Highton						
Desmognathus apalachicolae Means & Karlin						

Species	New record	Locality	Date	Verified by	T	Museum number
D. conanti Rossman						
Pseudotriton ruber Latreille						
Gyrinophilus porphyriticus Green	Talbot Co.	32.854411°N, 84.546829°W	26-Oct-08	C. Camp, J. Jensen	AU	AHAP-D 195-196
Ambystoma opacum Gravenhorst	Schley Co.	32.308811°N, 84.293997°W	11-Oct-08	C. Guyer	AU	AHAP-D 126
A. talpoideum Holbrook	Stewart Co.	32.139461°N, 85.041513°W	22-Mar-08	J.C. Godwin	AU	AUM 37759
A. maculatum Shaw	Talbot Co.	32.795118°N, 84.398492°W	23-Mar-08	C. Guyer	AU	AHAP-D 117-118
Notophthalmus viridescens Rafinesque	Webster Co.	32.051804°N, 84.548490°W	8-Oct-08	C. Guyer	AU	AHAP-D 137
Siren lacertina Linnaeus	Schley Co.	32.174857°N, 84.371463°W	23-Mar-08	C. Guyer	AU	AUM 37760
Reptiles						
Testudines						
Chelydra serpentina Linnaeus	Talbot Co.	32.622125°N, 84.634668°W	23-Mar-08	C. Guyer	AU	AHAP-D 116
Macrochelys temminckii Harlan						
Sternotherus minor Agassiz	Schley Co.	32.174857°N, 84.371463°W	21-Mar-08	C. Guyer	AU	AHAP-D 194
S. odoratus Latreille						
Kinosternon subrubrum Lacépède						
Trachemys scripta Schoepff						
Chrysemys picta Schneider						
Pseudemys concinna LeConte						
Deirochelys reticularia Latreille						
Gopherus polyphemus Daudin						
Terrapene carolina	Schley Co.	32.215076°N, 84.371364°W	10-Oct-08	C. Guyer	AU	AHAP-D 122-123
Lacertilia						
Anolis carolinensis Voigt	Schley Co.	32.174857°N, 84.371463°W	21-Mar-08	C. Guyer	AU/UGA	AHAP-D 108
	Talbot Co.	32.786769°N, 84.422183°W	23-Mar-08	C. Guyer	AU	AHAP-D 200
Sceloporus undulatus Bosc & Daudin	Schley Co.	32.174857°N, 84.371463°W	21-Mar-08	C. Guyer	AU	AHAP-D 192
Eumeces fasciatus Linnaeus	Stewart Co.	32.181526°N, 84.824247°W	21-Mar-08	C. Guyer	AU	AHAP-D 110-112
E. laticeps Schneider	Talbot Co.	32.799730°N, 84.400077°W	22-Mar-08	C. Guyer	AU	AUM 37761
Scincella lateralis Say	Schley Co.	32.174857°N, 84.371463°W	21-Mar-08	C. Guyer	AU	AHAP-D 115
Serpentes						
Elaphe obsoleta Holbrook						
Coluber constrictor Linneaus	Talbot Co.	32.799730°N, 84.400077°W	23-Mar-08	C. Guyer	AU/UGA	AHAP-D 119

Species	New record	Locality	Date	Verified by	T	Museum number
Masticophis flagellum Shaw	Schley Co.	32.206008°N, 84.317817°W	10-Oct-08	C. Guyer	AU	AHAP-D 121
Opheodrys aestivus Linnaeus	Talbot Co.	32.750672°N, 84.419732°W	10-Oct-08	C. Guyer	AU	AHAP-D 124
Cemophora coccinea Blumenbach						
Tantilla coronata Baird & Girard	Schley Co.	32.308811°N, 84.293997°W	21-Mar-08	C. Guyer	AU	AUM 37758
Nerodia sipedon Linnaeus	Talbot Co.	32.782546°N, 84.405132°W	22-Mar-08	C. Guyer	UGA	AHAP-D 201-202
N. erythrogaster Forster	Schley Co.	32.174857°N, 84.371463°W	10-Oct-08	C. Guyer	AU	AHAP-D 127-128
Storeria dekayi	Talbot Co.	32.782546°N, 84.405132°W	21-Mar-08	C. Guyer	AU	AHAP-D
Virginia valeriae Baird & Girard						
Thamnophis sirtalis Linnaeus	Webster Co	32.055479°N, 84.546561°W	8-Oct-08	C. Guyer	AU	AHAP-D 138
Diadophis punctatus Linnaeus	Stewart Co.	32.181526°N, 84.824247°W	21-Mar-08	C. Guyer	AU	AHAP-D 109
	Talbot Co.	32.799477°N, 84.502491°W	22-Mar-08	C. Guyer		AHAP-D 114
Agkistrodon contortrix Linnaeus	Stewart Co.	32.054132°N, 84.735728°W	8-Oct-08	C. Guyer	AU	AHAP-D 139
A. piscivorus Lacépède	Schley Co.	32.174857°N, 84.371463°W	21-Mar-08	C. Guyer	AU	AHAP-D 193
Crotalus horridus Linnaeus						
C. adamanteus Palisot de Beauvois						