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ANTS (HYMENOPTERA: FORMICIDAE) IN WET LONGLEAF PINE SAVANNAS IN LOUISIANA

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Longleaf pine savannas once dominated the Southeastern landscape and are now among the most threatened ecosystems in the United States (Noss et al. 1995). Remaining communities form a patchwork of disconnected sites. Little is known about invertebrates in these communities (Folkerts et al. 1993). The goal of our study was to describe the ant fauna of wet longleaf pine savannas, compiled from two independent surveys, at the western edge of the East Gulf Coastal Plain.

Between 1997 and 2001, we surveyed ants in two wet savannas in the early stages of restoration in Southeastern Louisiana. The two savannas were being restored from dissimilar starting community types. One, Abita Creek Preserve (Abita), was a dense slash pine flatwoods that was converted to an open pine savanna with clearcutting and prescribed fire. The other, Lake Ramsay Preserve (Ramsay), was a relatively open longleaf pine savanna restored by prescribed fire. The two preserves are approximately 30 km apart.

Abita in St. Tammany Parish, Louisiana (30°30'N, 89°58'W) contains 338 ha. In 1998, slash pines were removed from sections of the preserve and the first prescribed fire was applied in the winter of 1997-98. Abita was burned again in May 2000. Ants were collected here with a combined flight intercept (FIT) and malaise trap (MT) (J.C. Hock Co., www.johnwhockco.com) and by baiting. Six FIT/MT traps were divided between clearcut (open) and closed canopy (wooded) sites. Traps were run for one week per month beginning in May 1999 and ending in April 2001 for a total of 19 months. No trapping was done in January or February. Baiting was done in July 2000 by placing 50 baited vials (60-ml plastic hinged-top) 2 m apart in a transect near each of the six FIT/MT traps for a total of 300 vials. Vials were baited with honey and Spam and left open for approximately 30 min.

Ramsay in St. Tammany Parish, Louisiana (30° 30' N, 90° 10' W) contains 526 ha. Because Ramsay has a history of wildfires the ground cover is rich in native species. The last wildfire was thought to have occurred in 1988. During our study, all sites within Ramsay received prescribed fire in August 1997 and some sites were burned again in August 1998. Ants were collected at Ramsay with pitfall traps, FITs, and by baiting. Pitfall traps ($n = 144$) consisted of two 100-ml round centrifuge tubes paired by a metal barrier. Each pitfall tube with collecting preservative was covered by a square of metal flashing held above tubes by nails. Sampling was conducted twice per month for 48 h each time. Sampling began during

July 1996 and ended during August 1999 and resulted in 26 months of collecting. No sampling was done in four winter months of December-March. Twelve FITs were set up one week per month for 17 months starting in September 1997 continuing to August 1999 as above. Vials baited with peanut butter or honey were alternately placed 10 m apart ($n = 240$) along the same transects as pitfall traps for 1 h. We did this once per month for the 26 months pitfalls were run.

We collected 48 species of ants and 374,568 individuals in 5 subfamilies and 23 genera in the two wet savannas combined (Table 1). The number of ant species collected by all methods was similar at both sites with 38 species at Abita and 41 at Ramsay. Thirty-one species occurred at both locations. Sorenson's measure of species overlap between locations was high at 79%. Twenty-one species were newly reported for Louisiana (Table 1; Colby 2002; Dash 2004). Westward range extensions were detected for 4 native eastern or southeastern species (Table 1). No eastern extensions for western species were found.

We detected a large exotic component in the ant fauna. Seven or 15% of ant species collected were exotic (Table 1). Pooling across sites and collection methods, 98.5% of the ants collected were exotic when *S. invicta* was included and 43% were exotic when *S. invicta* was excluded. Baiting indicated extreme dominance by fire ants in open, grassy sites.

The majority of native ants collected were common, widespread species found throughout the southeastern region. Five species primarily associated with pine habitats are *Camponotus n. arcticus* Emery, *Crematogaster ashmeadi* Mayr, *Cr. pilosa* Emery, *Pheidole dentigula* M. R. Smith, and *Temnothorax bradleyi* (Wheeler) (Colby 2002 and Dash 2004 and references therein). Nine species have been reported from more open, grassy habitats and may be typical residents of savannas. These include *Camponotus castaneus* (Latreille), *Camponotus impressus* (Roger), *Formica pallidefulva* Latreille, *Monomorium viride* Brown, *Pheidole dentata* Mayr, *Polyergus lucidus* Mayr, *Pseudomyrmex pallidus* F. Smith, *Temnothorax pergandei* (Emery), and *Trachymyrmex septentrionalis* (McCook) (see Colby 2002 and Dash 2004 and references therein). These subsets likely contain the best target or indicator species for management and restoration in this habitat. *Polyergus lucidus* is listed on the ICUN Red List as vulnerable because it occurs in small populations. Its presence at Ramsay is noteworthy.

TABLE 1. SPECIES AND ABUNDANCES OF ANTS COLLECTED AT ABITA AND RAMSAY BY TRAPPING METHOD.

Species ¹	Abita		Ramsay			Totals
	FIT/MT	Baits	FIT	Baits	Pitfalls	
<i>Aphaenogaster carolinensis</i> Wheeler ²	3	30			2	35
<i>Brachymyrmex depilis</i> Emery	2		8		2	12
<i>Brachymyrmex musculus</i> Forel	82		662	359	121	1,224
<i>Camponotus castaneus</i> (Latreille)	252				9	261
<i>Camponotus nearcticus</i> Emery ²			2			2
<i>Camponotus pennsylvanicus</i> (DeGeer)	2	9				11
<i>Camponotus impressus</i> (Roger)	2					2
<i>Cardiocondyla wroughtonii</i> (Forel)²	2					2
<i>Crematogaster ashmeadi</i> Mayr ²	203	3	19	15	5	245
<i>Crematogaster missouriensis</i> Emery ²	1			16		17
<i>Crematogaster pilosa</i> Emery ^{2,3}	119		36	412	122	689
<i>Cyphomyrmex rimosus</i> (Spinola)	70		101	14	590	775
<i>Formica pallidefulva</i> Latreille ²			32	92	33	157
<i>Hypoponera opaciceps</i> (Mayr)	21		98		213	332
<i>Hypoponera opacior</i> (Forel)	259		71		30	360
<i>Lasius alienus</i> (Foerster) ²	8	1				9
<i>Monomorium minimum</i> (Buckley) ²	5	2		32		39
<i>Monomorium viride</i> Brown ²					2	2
<i>Myrmecina americana</i> Emery ²	8		3		26	37
<i>Paratrechina faisonenensis</i> (Forel)	114	5	66	1,172	376	1,733
<i>Pheidole dentata</i> Mayr ²	11	40	4	61	81	197
<i>Pheidole dentigula</i> Smith				106	2	108
<i>Pheidole flavens</i> Roger	30	112	140	1,523	438	2,243
<i>Pheidole metallescens</i> Emery	70	260	1	346	26	703
<i>Polyergus lucidus</i> Mayr ²					6	6
<i>Ponera pennsylvanica</i> Buckley	8		2		12	22
<i>Proceratium croceum</i> (Roger)	1		2			3
<i>Proceratium pergandei</i> (Emery)	5					5
<i>Proceratium silaceum</i> Roger ²	2					2
<i>Pseudomyrmex ejectus</i> (Smith)	6		2			8
<i>Pseudomyrmex pallidus</i> (Smith)	3		3	1		7
<i>Pyramica clypeata</i> (Roger)	1		2			3
<i>Pyramica hyalina</i> Bolton ^{2,3}			2			2
<i>Pyramica margaritae</i> (Forel)	2		6		19	27
<i>Pyramica membranifera</i> (Emery)	23		18		3	44
<i>Pyramica metazytes</i> Bolton ^{2,3}			2			2
<i>Pyramica reflexa</i> (Wesson & Wesson) ²			2			2
<i>Pyramica rostrata</i> (Emery)			15			15
<i>Pyramica talpa</i> (Weber)	1		4		7	12
<i>Solenopsis carolinensis</i> Forel ^{2,3}	67	2	42	173	4	288
<i>Solenopsis invicta</i> Buren	3,285	11,249	1,797	307,650	40,625	364,606
<i>Solenopsis picta</i> Emery	25		164			189
<i>Strumigenys louisianae</i> Roger ²	24		7		27	58
<i>Tapinoma sessile</i> (Say) ²	10	22		15		47
<i>Temnothorax bradleyi</i> (Wheeler)			1			1

¹Exotic species indicated in bold.²New Louisiana Record.³Westward range extension.⁴Trapping effort was estimated for FIT/MT by number of traps multiplied by number of days traps were open (t.d.), pitfalls for number of pitfall traps multiplied by number of days (p.d.), and for baits by number of bait vials used.

TABLE 1. (CONTINUED) SPECIES AND ABUNDANCES OF ANTS COLLECTED AT ABITA AND RAMSAY BY TRAPPING METHOD.

Species ¹	Abita		Ramsay			Totals
	FIT/MT	Baits	FIT	Baits	Pitfalls	
<i>Temnothorax curvispinosus</i> (Mayr)	2					2
<i>Temnothorax pergandei</i> (Emery) ²	1		13			14
<i>Trachymyrmex septentrionalis</i> (McCook)	2				6	8
Total Number of Species	38	12	32	16	26	48
Total Number of Individuals	4,721	11,726	3,327	311,987	42,787	374,568
Trapping Effort ⁴	399 t.d.	300 baits	1,428 t.d.	5,040 baits	14,976 p.d.	

¹Exotic species indicated in bold.
²New Louisiana Record.
³Westward range extension.
⁴Trapping effort was estimated for FIT/MT by number of traps multiplied by number of days traps were open (t.d.), pitfalls for number of pitfall traps multiplied by number of days (p.d.), and for baits by number of bait vials used.

TABLE 2. SEASONALITY OF FEMALE REPRODUCTIVE FLIGHTS BY MONTHS POOLED ACROSS ALL SITES AND YEARS (DATA ARE NUMBERS OF ALATES CAUGHT IN FIT AND FIT/MT TRAPS).

Species ¹	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
<i>Aphaenogaster carolinensis</i>				1			1				2
<i>Brachymyrmex depilis</i>				2		3					5
<i>Brachymyrmex musculus</i>			3	43	109	13	1	3		27	199
<i>Cardiocondyla wroughtonii</i>						2					2
<i>Crematogaster ashmeadi</i>				1							1
<i>Cyphomyrmex rimosus</i>			6	31	79	8	6	2	2		134
<i>Hypoponera opaciceps</i>		3		42	11	3	13	22	4		98
<i>Hypoponera opacior</i>				261	20	24	16	2			323
<i>Lasius alienus</i>				4							4
<i>Myrmecina americana</i>							1	8	1		10
<i>Paratrechina faisonensis</i>	60	8					2				70
<i>Pheidole flavens</i>	1		48	10	14	22	6			8	109
<i>Pheidole metallescens</i>				4	12					6	22
<i>Ponera pennsylvanica</i>							1	6	3		10
<i>Proceratium croceum</i>						1	1	1			3
<i>Proceratium pergandei</i>					5						5
<i>Proceratium silaceum</i>								1	1		2
<i>Pseudomyrmex ejectus</i>				1		2					3
<i>Pseudomyrmex pallidus</i>				3	1	1		1			6
<i>Pyramica clypeata</i>							2	1			3
<i>Pyramica hyalina</i>							2				2
<i>Pyramica margaritae</i>				2	3	1				1	7
<i>Pyramica membranifera</i>				21	11	5	2	1	1		41
<i>Pyramica metazytes</i>							1	1			2
<i>Pyramica reflexa</i>							1	1			2
<i>Pyramica rostrata</i>							13	2			15
<i>Pyramica talpa</i>							1	3	1		5
<i>Solenopsis carolinensis</i>				34	72	3					109
<i>Solenopsis invicta</i>		11	4	1	1						17
<i>Solenopsis picta</i>				107	46	12	2			2	169
<i>Strumigenys louisianae</i>				19	10					2	31
<i>Tapinoma sessile</i>				1		1					2
<i>Temnothorax bradleyi</i>					1						1

¹Exotic species indicated in bold.

TABLE 2. (CONTINUED) SEASONALITY OF FEMALE REPRODUCTIVE FLIGHTS BY MONTHS POOLED ACROSS ALL SITES AND YEARS (DATA ARE NUMBERS OF ALATES CAUGHT IN FIT AND FIT/MT TRAPS).

Species ¹	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
<i>Temnothorax pergandei</i>				11				1	1		13
<i>Trachymyrmex septentrionalis</i>					1		1				2
Total number of species	2	3	4	20	16	15	19	16	8	6	
Total number of individuals	61	22	61	599	396	101	73	56	14	46	1,429

¹Exotic species indicated in bold.

Our FIT/MT traps allowed us to obtain rarely reported data on alate seasonality. Alates of most species were collected during warmer months of summer into early fall with a few species flying during all three seasons (Table 2). Alates of nine species were only collected in fall months. These were *Myrmecina americana* Emery, *Ponera pennsylvanica* Buckley, *Proceratium silaceum* Roger, and all but two *Pyramica* species (*P. margaritae* (Forel) and *P. membranifera* (Emery)). The two summer flying *Pyramica* were both exotics. *Paratrechina faisonensis* alates were collected primarily during early spring. Oddly, very few reproductives of the most abundant species, *S. invicta*, were captured in these traps.

SUMMARY

Forty-eighty species of ants were collected from two wet longleaf pine savanna sites in Southeastern Louisiana. Twenty-one were newly recorded species for Louisiana, 4 were westward

range extensions, and 7 were exotics. The vast majority of ants captured (97%) were *Solenopsis invicta*.

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