

FIRE ANT-MUSKRAT RELATIONSHIPS IN LOUISIANA COASTAL MARSHES¹

by

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ABSTRACT

The relationship between fire ants (Solenopsis spp.) and muskrats (Ondatra zibethicus) was investigated in Louisiana coastal marshes because of persistent reports of ant predation on young muskrats. Two different marsh types in southwestern and southcentral Louisiana were selected for study. During May-June of 1974 and 1975, 50 muskrat houses were opened on each study area; 50 additional houses were examined during January 1976 on the western study area. There were no significant year or area differences in the proportion of houses which were active or which contained ants. A significantly higher ($P < 0.10$) proportion of houses contained young in May-June than in January. Of the houses examined in May-June, there was no significant overall relationship between the absence and presence of ants and whether or not a house was either active or contained young. No antagonistic behavior between fire ants and muskrats was observed.

Imported fire ants (*Solenopsis saevissima*) were first reported in the United States near the Port of Mobile, Alabama around 1918 (Allen 1958). This ant began to attract attention about 1920 when it was considered to be an important pest of seedling corn and potatoes in Baldwin County, Alabama. *S. saevissima* initially occupied a limited area and presently appears restricted to a relatively small area in northeast Mississippi. Sometime after 1920 a different species, *S. invicta*, was introduced and, unlike its relative, spread rapidly throughout the southeastern United States. Presently *S. invicta* is known to infest more than 48 million hectares from North Carolina to Texas (Newsom 1973). This species is common throughout the Louisiana coastal marshes.

From 1955 to present, fire ant control has been controversial. Throughout the period of controversy there have been persistent reports of fire ant damage to wildlife (Mannix 1958, U.S. Department of Agriculture 1958, Johnson 1962, Hill 1970). On several occasions, the senior author has received reports of predation on young muskrats by fire ants in the Louisiana coastal marshes. These reports prompted the present study.

Fire ants in the Louisiana coastal marsh seek elevated areas as nesting sites, and usually the only elevated areas are muskrat houses and canal banks. This study was designed to evaluate the effects of fire ants on muskrats.

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MATERIALS AND METHODS

Study Areas

Two areas of differing marsh types were selected for study: Johnsons Bayou Area and Pointe Au Chien Wildlife Management Area. Johnsons Bayou is in the extreme southwestern portion of Louisiana in western Cameron Parish. Most of Cameron Parish lies within the prairie marsh as described by O'Neil (1949). The study area was characterized by a relatively firm substrate overlaid with a shallow layer of organic matter. Dominant vegetation was jointgrass (*Paspalum vaginatum*) and wiregrass (*Spartina patens*) with scattered clumps of three-cornered grass (*Scirpus olneyi*). Rattlebox (*Daubentonia texana*) was found along the permanently-watered depressions. The muskrat population in the area was low, averaging about 1 house per hectare.

Pointe Au Chien Wildlife Management Area lies in the sub-delta marsh region of the Deltaic Plain, primarily in the southwestern portion of Lafourche Parish between Bayou Lafourche and Bayou Pointe Au Chien. The area was characterized by a highly unstable substrate of organic material. Water levels throughout the area were subject to tidal fluctuations. Freshwater areas were dominated by alligatorweed (*Alternanthera philoxeroides*), sagittaria (*Sagittaria* sp.), bulrush (*Scirpus californicus*), and wiregrass; black willow (*Salix nigra*) and baccharis (*Baccharis halimifolia*) dominated elevated areas along canal banks. The muskrat population approximated that of Johnsons Bayou.

Sampling

During May-June of 1974 and 1975, 50 muskrat houses chosen at random were opened on each of the 2 study areas. Information recorded included: status of muskrat use (active or inactive as determined by sign in the house), presence or absence of fire ants, presence or absence and size of young muskrats, and any obvious antagonistic relationships between muskrats and fire ants. An additional 50 houses were opened in January 1976 at Johnsons Bayou to evaluate seasonal differences that might exist in fire ant use of muskrat houses. Analyses of variance were utilized to assess year and area differences with respect to house, young, and ant status (Steel and Torrie 1960:132-146). Fire ant-house and fire ant-muskrat relationships were evaluated by Chi-square analyses (Siegel 1956:104-111).

RESULTS AND DISCUSSION

Of the 250 muskrat houses examined during the study, 86.4 percent were active, 12.8 percent contained young, and 19.2 percent were infested with ants (Table 1). Although a large percentage of houses were in use, apparently most houses were examined between reproductive peaks. O'Neil (1949:60) reported that Louisiana muskrats reach a peak of sexual activity in November and March; only 25.7 percent of the 70 houses examined by O'Neil in May, June, and January contained young. There were no significant seasonal differences (May-June vs. January) in the percentage of houses which were active or in the proportion of houses which contained ants (Table 2). As expected, however, a significantly higher ($P < 0.10$) percentage of houses contained young in May-June than in January; therefore, the remaining discussion concerns only data collected from the 200 houses examined in May-June.

Of the houses that contained young, most houses (48.4 percent) contained only one young (Table 3); the average number of young per house containing young was 2.0. O'Neil (1949:58) reported an average litter size of 3.0 for beds he examined in May-June. Approximately 29 percent of the young examined in this study were less than 10 cm long and 16 percent were longer than 20 cm.

There were no significant year or area differences in the proportion of houses which were active or which contained ants (Tables 4 and 5). Nevertheless, significantly more houses at Johnsons Bayou contained young than at Pointe Au Chien ($P < 0.10$). The area by year interaction for proportion of houses containing young was also significant ($P < 0.05$),

indicating that area differences were not consistent over the 2 years of study. The proportion of houses containing young at Johnsons Bayou increased from 10 to 30 percent from 1974 to 1975, whereas the proportion of houses with young at Pointe Au Chien decreased from 14 to 8 percent (Table 1). Such fluctuations are not surprising in view of the cyclical and oscillatory nature of natural muskrat populations (O'Neil 1949).

There was no significant overall relationship between the absence and presence of ants and whether or not houses were active ($X^2 = 0.627$ with 1 df) (Table 6). Of the houses which did not contain ants, 87.0 percent were active; similarly 82.1 percent of the ant-infested houses were active. Therefore, it appears that the presence or absence of ants had no effect upon whether or not a house was actively utilized by muskrats. There was also no significant overall relationship between the absence and presence of ants and whether or not houses contained young ($X^2 = 0.0005$ with 1 df) (Table 7); 19.4 percent of the houses with young contained ants and 19.5 percent of the houses without young were ant infested. Apparently the presence of ants had no significant overall effect on the presence or absence of young in the nest. In fact, no antagonistic behavior between fire ants and muskrats was observed, and on one occasion the center of a fire ant nest was found less than 15 cm from the natal chamber containing young without any apparent adverse effects.

Table 1. Relative percentages by status of muskrat houses examined at Johnsons Bayou and Pointe Au Chien, Louisiana in 1974-76 (50 observations per area per year).

Percent houses	Johnsons Bayou			Pointe Au Chien		Overall
	1974 ^a	1975 ^a	1976 ^b	1974 ^a	1975 ^a	
Active	80	80	88	84	92	86.4
With young	10	30	2	14	8	12.8
With ants	20	28	18	24	6	19.2

^aMay-June.

^bJanuary.

Table 2. Relationship of house, young, and ant status between May-June and January, Johnsons Bayou and Points Au Chien, Louisiana, 1974-76.

Time	Number	Mean percentages of houses		
		Active ^a	With young ^b	With ants ^a
Average May-June	200	86.0	15.5	19.5
January	50	88.0	2.0	18.0

^aMay-June not significantly different from January.

^bMay-June significantly higher ($P < 0.10$) than January.

Table 3. Relative number of young per house found by an examination of 200 muskrat houses at Johnsons Bayou and Pointe Au Chien, Louisiana in May-June, 1974-75.

Number of Young	Percent houses
0	84.5
1	7.5
2	2.5
3	3.5
4	1.5
5	0.5
Total	100.0

Table 4. Analyses of variance for house, young, and ant status of 200 muskrat houses examined at Johnsons Bayou and Pointe Au Chien, Louisiana in May-June, 1974-75.

Source of variation	Degrees of freedom	House		Young		Ants	
		Mean square	F	Mean square	F	Mean square	F
Total	199	0.121		0.132		0.158	
Year	1	0.000	0.00	0.245	1.94	0.125	0.82
Area	1	0.080	0.66	0.405	3.21*	0.405	2.64
Year x area	1	0.320	2.65	0.845	6.71**	0.845	5.52**
Error	196	0.121		0.126		0.153	

*P<0.10.

**P<0.05.

Table 5. Summary year and area percentages for muskrat houses examined at Johnsons Bayou and Pointe Au Chien, Louisiana in May-June, 1974-75 (50 observations per year per area).

Year/area	Percentage of houses		
	Active	With young	With ants
1974	86	12	22
1975	86	19	17
Johnsons Bayou	84	20	24
Pointe Au Chien	88	11	15

Table 6. Relationship between muskrat house status and presence or absence of ants, Johnsons Bayou and Pointe Au Chien, Louisiana, May-June, 1974-75.

Houses	Houses		Total	Percent active
	Inactive	Active		
Without ants	21	140	161	87.0
With ants	7	32	39	82.1
Total	28	172	200	86.0
Percent with ants	25.0	18.6	19.5	

$X^2 = 0.627$ with 1 degree of freedom; $P > 0.05$

Table 7. Relationship between muskrat young within a house and presence or absence of ants, Johnsons Bayou and Pointe Au Chien, Louisiana, May-June, 1974-75.

Houses	Young		Total	Percent with young
	Not present	Present		
Without ants	136	25	161	15.5
With ants	33	6	39	15.4
Total	169	31	200	15.5
Percent with ants	19.5	19.4	19.5	

$X^2 = 0.0005$ with 1 degree of freedom; $P > 0.05$

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