THE DAILY AND SEASONAL BEHAVIOR PATTERNS OF THE CLAPPER RAIL *(RALLUS LONGIROSTRIS) IN THE LOUISIANA COASTAL MARSHES*

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ABSTRACT

The objectives of this study were to determine: (1) daily and seasonal movements and activity patterns of clapper rails in Louisiana coastal marshes and (2) their seasonal food habits in different habitat types. We constructed 12 miniature radio transmitters and attached them to clapper rails to achieve the first objective of this study. The period of contact for the instrumented rails ranged from 7 to 47 days. The results of the radio telemetry study indicate that Louisiana clapper rails have an average minimum home range of 168 yards along canals and tidal ditches in the summer and 533 yards in winter. One instrumented rail was preyed upon by a mink. The food habits study on clapper rails collected in the salt and brackish marshes indicated that the bulk of their diet during the summer consists of fiddler crabs. In the winter fiddler crabs become less important while crayfish and snails become more important.

INTRODUCTION

Clapper rails are henlike birds which inhabit the salt and brackish marshes, and consequently, they are often called "marsh hens." These birds are very secretive in nature and are more often heard than seen. The voice of clapper rails is often described as a clattering kek-kek-kek-kek, etc. They are reluctant to fly, but when they do so they fly with legs extended. Distinguishing field marks of clapper rails are their henlike appearance, grayish color, long bill, black and white stripes on the flanks, and white patch under the short tail (Peterson 1947).

Adult clapper rails are about the size of a half grown chicken. A study by Bateman (1965) indicated that there may be some sexual dimorphism in this species. According to Bateman's findings adult male clapper rails would weigh more than 290 grams, have a bill length greater than 60 millimeters, and a middle toe length greater than 48 millimeters. On the average females would have values lower than those listed above.

In the past, a number of investigations have been conducted on clapper rails along the Atlantic Coast with the intention of improving management. Some of the more important studies were made by Kozicky and Schmidt (1949), and Schmidt and McLain (1951) in New Jersey; Stewart (1951) in Virginia, and Adams and Quay (1958) in North Carolina.

STUDY AREA

The field work for this investigation was conducted on Rockefeller Wildlife Refuge in Cameron Parish, Louisiana. Rockefeller Refuge, which encompasses about 85,000 acres of coastal marsh, is owned and operated by the Louisiana Wild Life and Fisheries Commission. It is bounded on the north by the Grand Chenier-Pecan Island stranded beach ridge complex and on the south by the Gulf of Mexico (Joanen and McNease 1970).

The majority of the field work was conducted near a canal which extends along the western boundary of Rockefeller Refuge. Bordering each side of this 100 foot wide canal was a levee which extended approximately 4 feet above the canal. The canal berm which was a strip of nearly level land 15 to 25 feet wide, was periodically inundated by high tide. The berm was dominated by wiregrass *(Spartina patens)* and buckbrush *(Baccharis halimifolia)*. The higher ground along the levees was covered with dense stands of buckbrush interspersed with dense stands of roseau cane *(Phragmites communis)*. Shallow, brackish, wiregrass marsh, punctuated by shallow lakes, dominated the areas away from the canal.

METHODS AND MATERIALS

Trapping

Rails were live-trapped using drop-door traps similar to those described by Bateman (1965). We constructed the traps from 1-by 2-inch mesh weld wire. A piece of weld wire was bent into a U-shape, and the ends secured in place with ¼-inch clips and hog rings. The drop-doors on each end and the two side access doors were secured in place with ¼-inch clips. External dimensions of the trap were as follows: length, 46 inches; width, 8 inches; height, 10 inches. To complete the tripping mechanism, 20-pound test monofilament line was looped through a hog ring attached to each side of the trap at the center point. A piece of monofilament line was attached to this center loop, threaded up through the top of the trap and attached to the drop-door hooks at each end of the trap.

The traps were used in conjunction with 18-inch high leads made of 1-inch mesh poultry netting. The poultry wire leads were strung out in a V-shape from both ends of the trap and secured in place with stakes.

Radio Telemetry

Description and Construction of Transmitters. Twelve transmitters were designed and constructed to emit a pulsating signal in the 150 megahertz range with an 8½-inch whip antenna. The cost of these transmitters was about $12 each, with the crystals comprising approximately half of the total cost.

This type of transmitter is relatively easy to construct. The circuit consists of nine parts (Figure 1). Lead length and component arrangement are not critical so these transmitters can be constructed in such a way as to provide the best shape for a particular animal. Components can be arranged much more compactly than those shown (Figure 2), but it requires more skill and work.

Each transmitter contains 11 parts, including battery and antenna (Figure 3). Following is a list and description of those parts:

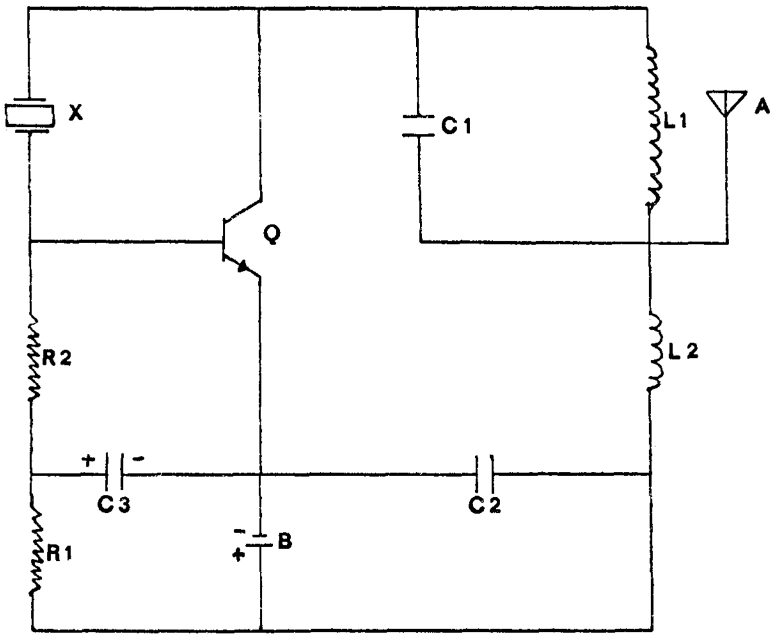

Figure 1. Basic transmitter circuit.

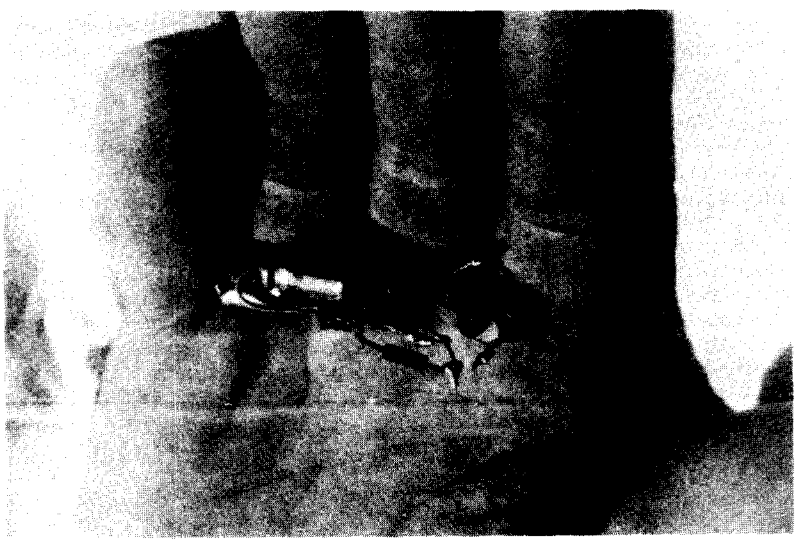

Figure 2. The basic transmitter without the whip antenna.

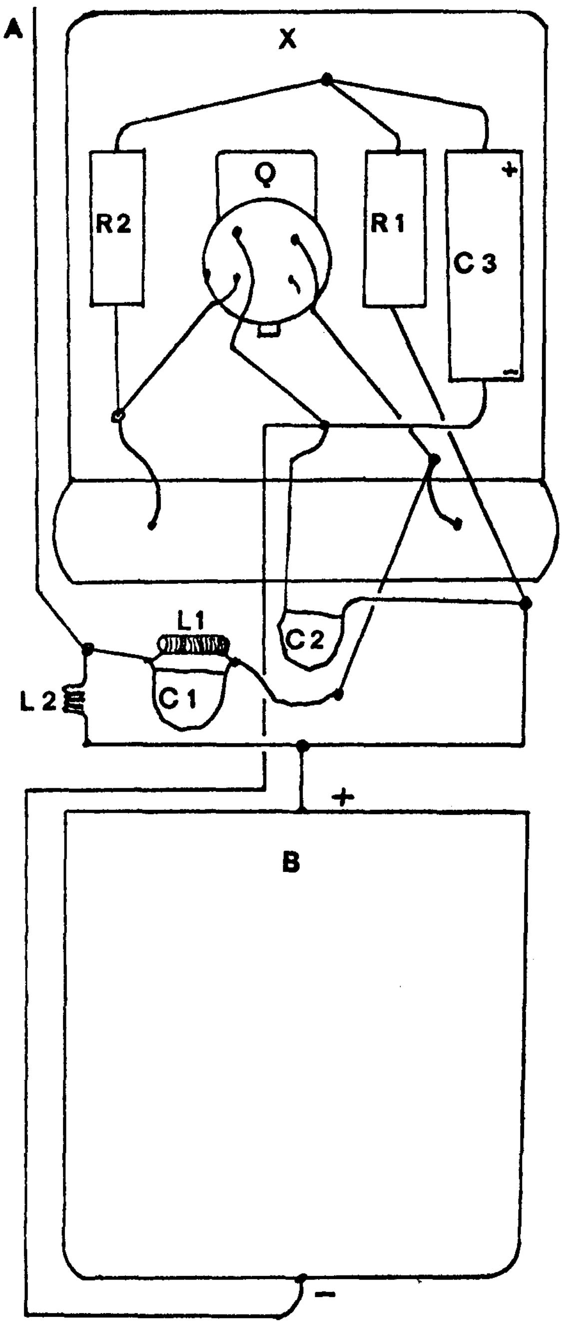

Figure 3. Pictorial view of component placement.

This transmitter design is similar to that given by Cochran (1967). For his transmitter Cochran used a 12-turn coil for L1. We found that a 20-turn coil works better for L1. Cochran also stated that in ordering third-overtone crystals one must multiply the transmitter frequency by 0.3 to get the correct crystal frequency. We divided the transmitter frequency by three to get the crystal frequency. Either method of selecting the crystal frequency is all right if L1 is altered accordingly.

The entire transmitter package weighed approximately 12 grams. It was attached to the rail's back using soft, ⅛-inch plastic tubing which was looped around each wing and secured to the transmitter. The transmitter rode on the rail's back between his wings (Figure 4).

Treatment and Identification of Food Contents. During the fall of 1971 and winter of 1972, we ran a laboratory food analysis on the stomach contents of 142 rails. Of this total, 103 were collected in a previous study in Cameron Parish in January 1966. We collected 39 clapper rails on the study area for food habits analysis.

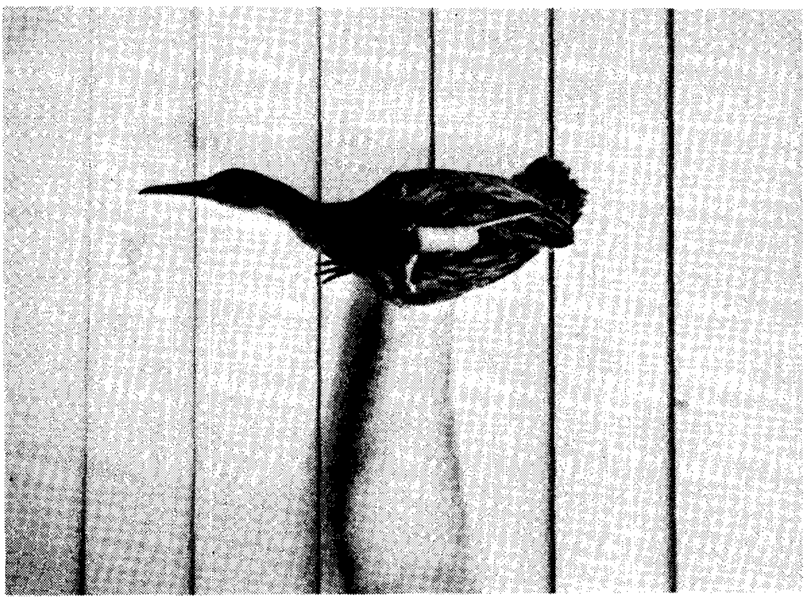

Figure 4. Side view of rail showing the position of the transmitter.

The total volume of food contents in each stomach was determined by water displacement. With the aid of a dissecting microscope individual food items were identified. An estimate was made of the percentage of total volume comprised by each food item.

RESULTS AND DISCUSSION

Radio Telemetry

Transmitter Performance. Of the 12 transmitters which we constructed the range varied from a few hundred yards to ½-mile. The average range of these transmitters was about ¼-mile. One transmitter ceased to function within 24 hours after being attached to a rail. The life of the other 11 transmitters varied from 7 to 47 days with 5.5 gram batteries attached to them.

Individual Movements and Behavior. Clapper rails seemed to adapt quickly to the transmitter attachment. One of the first instrumented rails which was retrapped did show some signs of chafing along the leading edge of the wing base. The modified transmitter base designed to more closely fit the form of the rail's back solved this problem.

We successfully radio-tracked 11 rails for a total of 197 days. During this period enough data were collected on the rails to give some idea of their movement patterns and minimum home ranges (Tables 1 and 2).

Several times all night surveillance was conducted on the summer rails. Even though the nights of observation were bright moonlight nights, no movement was detected.

It is our contention that Rails Number Two and Three were brood mates. Although they both were adult size they had a large number of pinfeathers which indicated that they were immatures. Rails Two and Three were both captured in the same trap, on the same day, and their ranges were superimposed.

Table 1. Summer movement of clapper rails as determined from telemetry studies on Rockefeller Wildlife Refuge, August, 1971.

Rail	Transmitter life	Movement		
		Maximum Total	Daily	Ave. daily
Number	Days		Yards	
1	7	220	100	33
2	10	130	100	51
3	16	140	75	80
4	25	180	130	70
Mean		168	101	58
Standard deviation		41	22	21

Table 2. Winter movement of clapper rails as determined from telementry studies on Rockefeller Wildlife Refuge, , December 22, 1971 to February 7, 1972.

Rail	Transmitter life	Movement		
		Maximum Total	Daily	Ave. daily
Number	Days		Yards	
5	8	90	40	30
6	47	470	330	118
7	18	469	450	200
8	11	180	140	62
9	11	400	260	110
10	12	390	290	276
11	32	1740	500	290
Mean		533	287	155
Standard deviation		511	150	94

During the summer tracking period none of the four rails moved more than 120 yards from their trap and release site. The average movement per day of these four rails was approximately 58 yards.

There was one case of predation during the winter study period. Rail Number Seven moved an average of 200 yards per day until January 9, 1972 when all movement stopped. The situation was investigated, and the transmitter was discovered lying beside a pile of rail feathers. All of the rail had been eaten except the wings and legs, and relatively fresh mink tracks were discovered near the site.

Rail Number Eleven had perhaps the most unusual and interesting movement patterns of all the rails during the study. After being instrumented it remained within 100 yards of the trap site for three days. Rail Eleven was located 680 yards south of the trap site on the fourth day and 940 yards south of the trap site on the fifth day. Two weeks later Rail Eleven was located 800 yards north of the trap site. It remained within 200 yards of this location until the transmitter ceased functioning 18 days later. Rail Eleven was probably disturbed by a predator or some other factor.

Blanding (1963) reported that results of banding data indicate that clapper rails in South Carolina are restricted to a home range not greater than 200-300 yards in radius. The data which we collected indicated that this is also generally true for clapper rails along the Gulf Coast.

Information obtained in this investigation reveals that clapper rails on the average have a home range about 168 yards in length along the canals and tidal ditches in summer. Clapper rails on the average have a home range about 533 yards along canals and tidal ditches in winter. The average daily movement for the winter rails was 155 yards as compared to 58 yards for the summer birds. This seasonal difference in movements may be due to the fact that rails have to forage harder for food during the winter months.

Food Habits Study

The finely ground nature of part of the food contents made exact identification and measurement very difficult. Bateman (1965) also encountered this problem in his food habits study. The volume of stomach contents was determined by water displacement. The volume of individual food items was estimated. To improve upon his estimation the volume of individual food items was determined by water displacement whenever possible. The results are presented as percent by occurrence and percent by volume (Tables 3, 4, and 5).

Of the 142 rail digestive tracts examined, 103 of them were collected in 1965 along the intermediate marsh of Cameron Parish, Louisiana. Some of the rails in the 1965 sample may possibly have been king rails *(Rallus elegans)* since they are also found in this area. The 39 rails collected during this investigation were taken in the salt and brackish marshes of Rockefeller Wildlife Refuge.

Analysis of the food contents of the 39 clapper rails collected on Rockefeller Refuge indicates that they have a rather simple diet in the salt and brackish marshes. During the summer fiddler crabs (*Uca* sp.) comprised over 95 percent of their diet by volume and snails *(Melampus bidentatus)* made up four percent. Fiddler crabs became less important in winter, making up 23 percent of the total volume, while crayfish *(Procambarus* sp.), and snails *(Melampus bidentatus* and *Helisoma trivolvus)* made up 42 percent and 25 percent respectively.

Table 3. Foods found in the digestive tracts of 15 clapper rails collected in the salt and brackish marshes of Rockefeller Refuge, July and August 1971.

Food items	By occurrence	By volume
	Percent	
Crabs		
Uca sp.	100	95
Snails		
Melampus bidentatus	30	4
Insects		
Undetermined	6	Trace a
Fish		
Undetermined	12	Trace
Mud and Rocks	18	Trace

a Less than 1 percent

Table 4. Foods found in the digestive tracts of 24 clapper rails collected in the salt and brackish marshes of Rockefeller Refuge, December 1971 and January 1972.

Food items	By occurrence	By volume
	Percent	
Crabs		
Uca sp.	24	23
Crayfish		
Procambarus sp.	36	42
Snails		
Melampus bidentatus	4	2
Helisoma trivolvis	12	23
Insects		
Undetermined	4	Trace a
Frogs		
Undetermined	4	4
Mud and Rocks	4	Trace
Undetermined	12	4

a Less than 1 percent.

Table 5. Foods found in the digestive tracts of 103 rails collected in the intermediate marshes of Cameron Parish, Louisiana (January 1965).

Food items	By occurrence	By volume
	Percent	
Crabs		
Uca sp.	13	5
Sesarma sp.	2	1
Crayfish		
Procambarus sp.	32	20
Snails		
Polygyra sp.	13	6
Mesodon thyroidus	1	Trace a
Undetermined	4	3
Claims		
Ragina sp.	21	4
Insects		
Coleoptera (adults)		
Spenophorus venatus	2	Trace
Spenophorus sp.	1	Trace

Food items	By occurrence	By volume
Dyscinetus morator	43	18
Cybister sp. (larvae)	1	Trace
Listronotus sp.	1	Trace
Tropisternus striolatus	1	Trace
Coleoptera (larvae)	1	Trace
Cantharidae		
Belostoma flumineum	1	Trace
Belostoma testaceum	1	Trace
Undertermined	13	10
Rodents		
Undetermined	5	3
Reptiles and Amphibians		
Snakes		
Thamnophis sp.	1	Trace
Natrix sp.	1	Trace
Skinks		
Eumeces sp.	4	2
Frogs		
Pseudacris sp.	2	1
Undetermined	4	2
Feathers	4	Trace
Worms	1	Trace
Plant		
Vigna repens (seeds)	27	9
Undetermined	6	2
Stones and Mud	10	5

a Less than 1 percent.

Data from the food contents of the 103 rails collected in 1965 reveal that they have a much more complex diet in the intermediate marsh. A total of 28 different food items was identified from this sample. Insects represented over 35 percent of the total food volume, with over half of this comprised of one insect species *(Dyscinetus morator)*. The next largest component of the food content was crayfish *(Procambarus* sp.), which represented more than 20 percent of the total food volume. Deer pea *(Vigna repens)* seeds occurred in 27 percent of all rail stomachs and comprised nine percent of the total volume.

Only two comprehensive investigations on food habits have been conducted on clapper rails, one by Oney in Georgia in 1954 and a more recent one (1965) by Bateman on the Gulf Coast of Louisiana. Neither of these previous studies agree closely with the results of the present investigation. Both Bateman and Oney indicated that periwinkle snails *(Littorina irrorata)* were eaten quite frequently by clapper rails. Although we found periwinkle snails to be quite abundant in some parts of the study area, none were found in the digestive tracts of collected rails.

CONCLUSIONS

There is currently a move to gain more information on the less important game birds such as the clapper rail (MacDonald and Evans 1970). Radio telemetry may be one valuable technique which could be used in this quest. Clapper rails appear to be ideal candidates for radio telemetry studies. We have found that small transmitters such as those described in this report are adequate for use on clapper rails.

The results of food habits studies presented in this report and that presented by Bateman (1965) show much valuable information about this segment of clapper rail behavior. The results presented by Bateman and that presented here are not in complete agreement, and for this reason more research on the food habits of Gulf Coast clapper rails is needed.

A Antenna. Guitar "E" string.
B Battery. Any voltage from 1.3 volts to 4.2 volts can be used. A 1.3 volt RM-450 battery was used in this study.
C1 Subminiature 15 pf capacitor.
C2 Subminiature 0.001 mf capacitor
C3 Subminiature 2 mf capacitor. Tantalum capacitors are best. Increasing the value of C3 will increase the pulse duration, but it will also reduce transmitter life.
L1 This coil should be close wound. Wind 20 turns on ⅛-inch plastic rod. Use #36 enameled wire and tack the ends of the wire to the plastic rod with a soldering iron. Before soldering the leads of coils into the circuit, the enamel must be scrapped from them to insure good electrical contact.
L2 Coil wind #32 enameled wire on a ⅛-inch diameter form and then remove it. Use four and one half turns for an 8½-inch antenna. This coil is strong enough to be self-supporting with an air core.
Q Transistors A415, SK3018 and GE17 can all be used in this circuit.
R1 Resistor values from 100,000 to 500,000 ohms will suffice for 1.4 volt batteries. Larger resistance values will be required for higher voltages. Increasing the value of R1 will reduce the number of pulses per minute and thus increase transmitter life.
R2 Resistor value 1500 ohms. All resistors used in this transmitter should be ¼-to ⅛-watt to minimize size and weight.
X Third-overtone, subminiature crystal.

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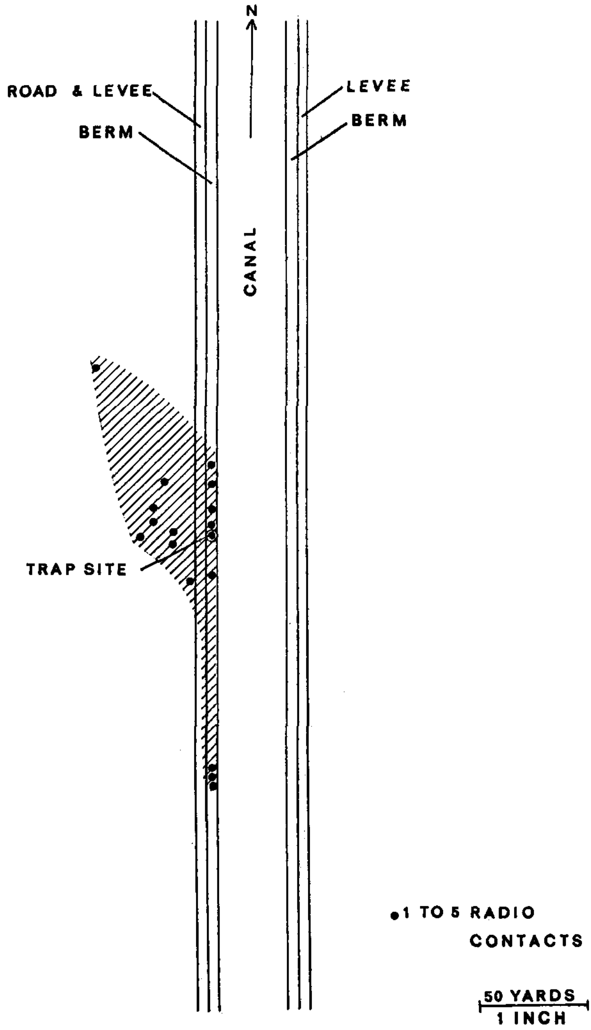

Figure 5. Minimum home range of rail number one as determined by radio telemetry (Minimum home range 0.52 acres)

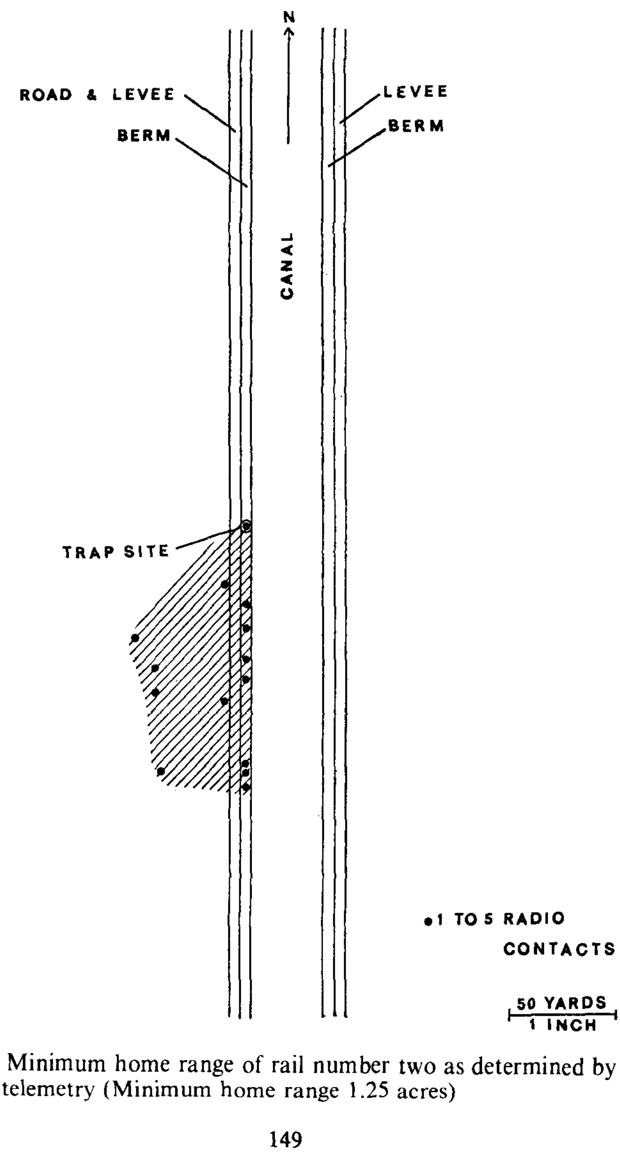

Figure 6. Minimum home range of rail number two as determined by radio telemetry (Minimum home range 1.25 acres)

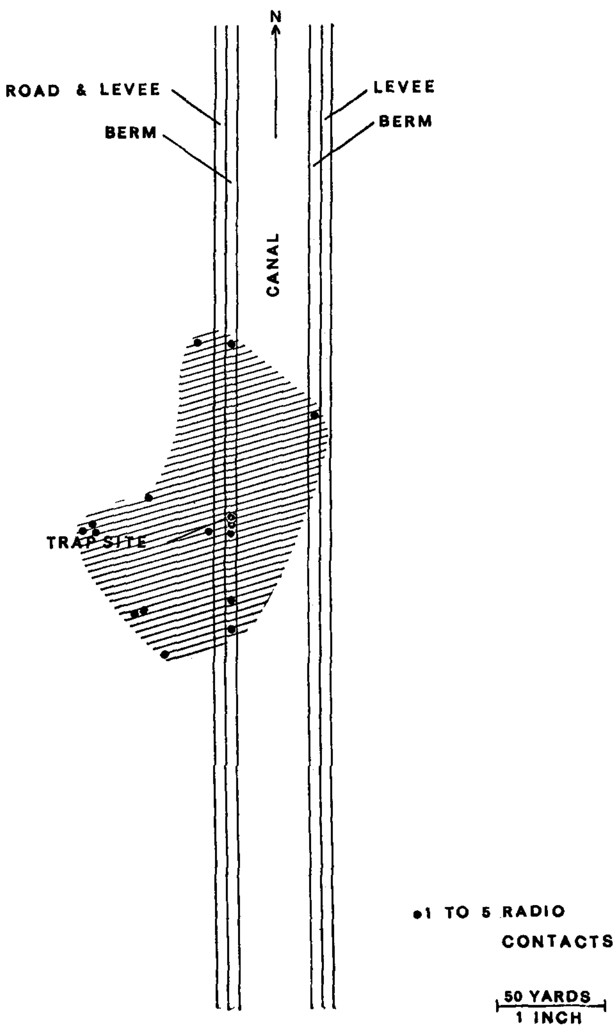

Figure 7. Minimum home range of rail number three as determined by radio telemetry (Minimum home range 1.35 acres)

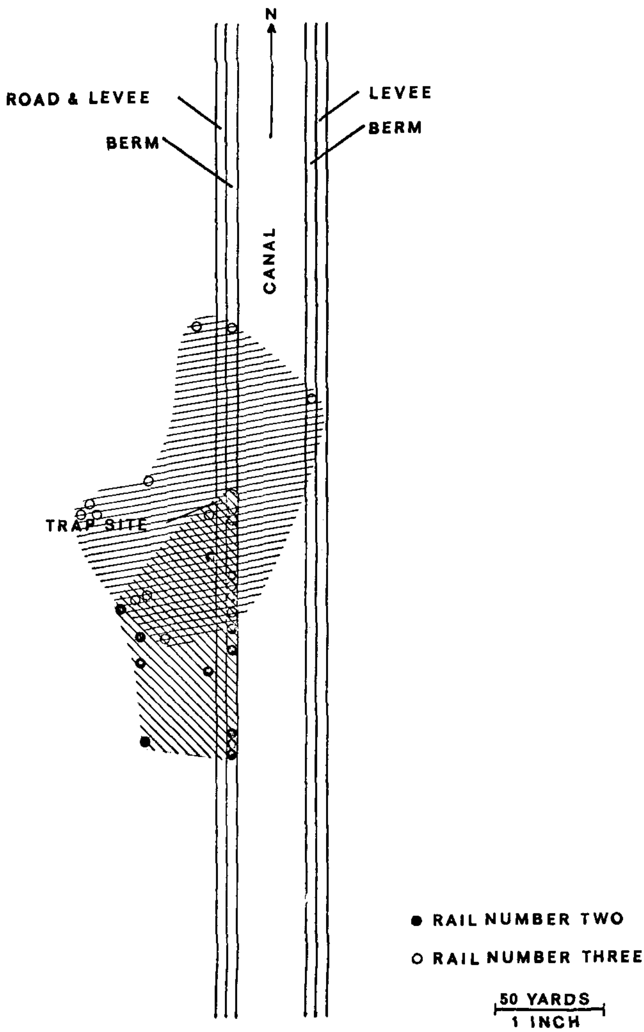

Figure 8. The superimposed home ranges of rails two and three.

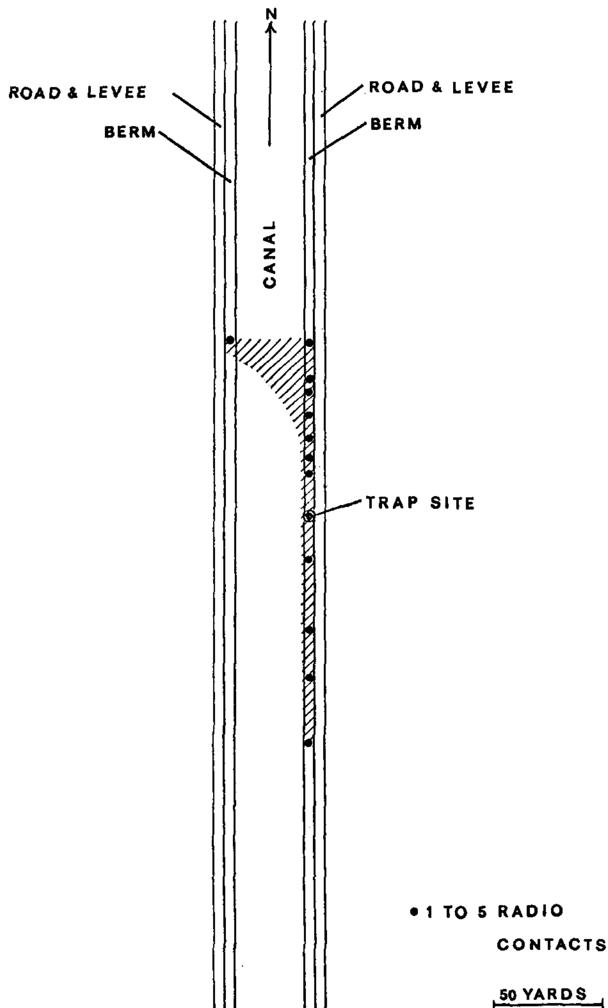

Figure 9. Minimum home range of rail number four as determined by radio telemetry (Minimum home range 0.21 acres)

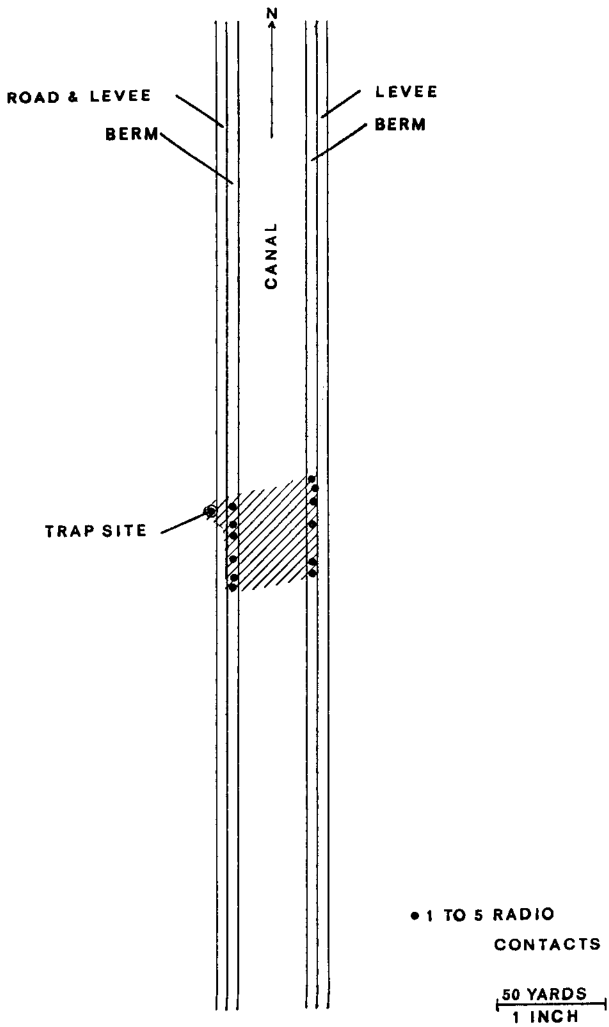

Figure 10. Minimum home range of rail number five as determined by radio telemetry (Minimum home range 0.10 acres)

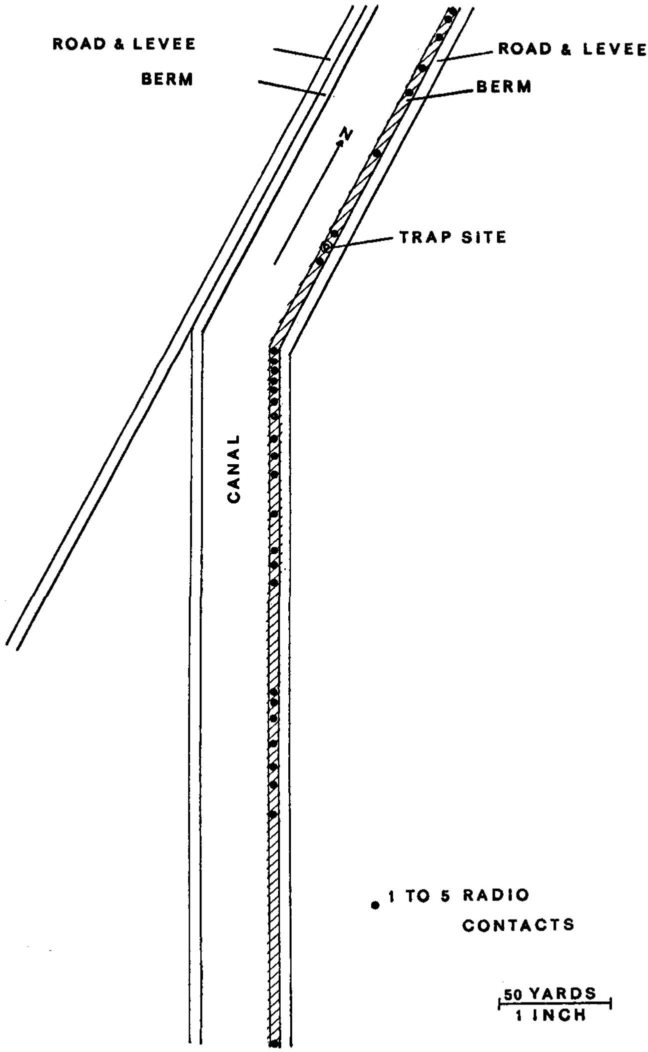

Figure 11. Minimum home range of rail number six as determined by radio telemetry (Minimum home range 0.46 acres)

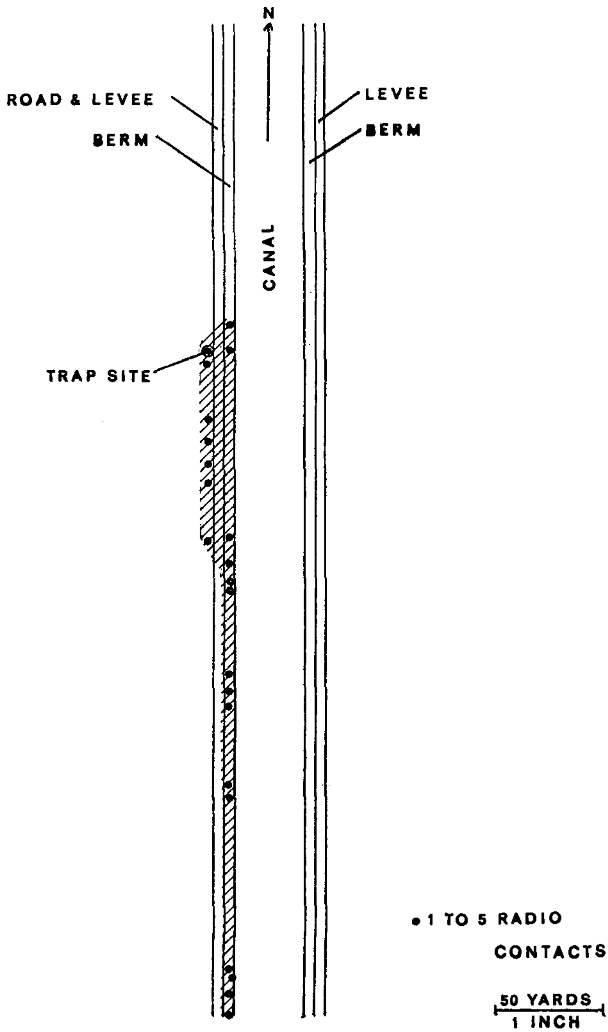

Figure 12. Minimum home range of rail number seven as determined by radio telemetry (Minimum home range 0.52 acres)

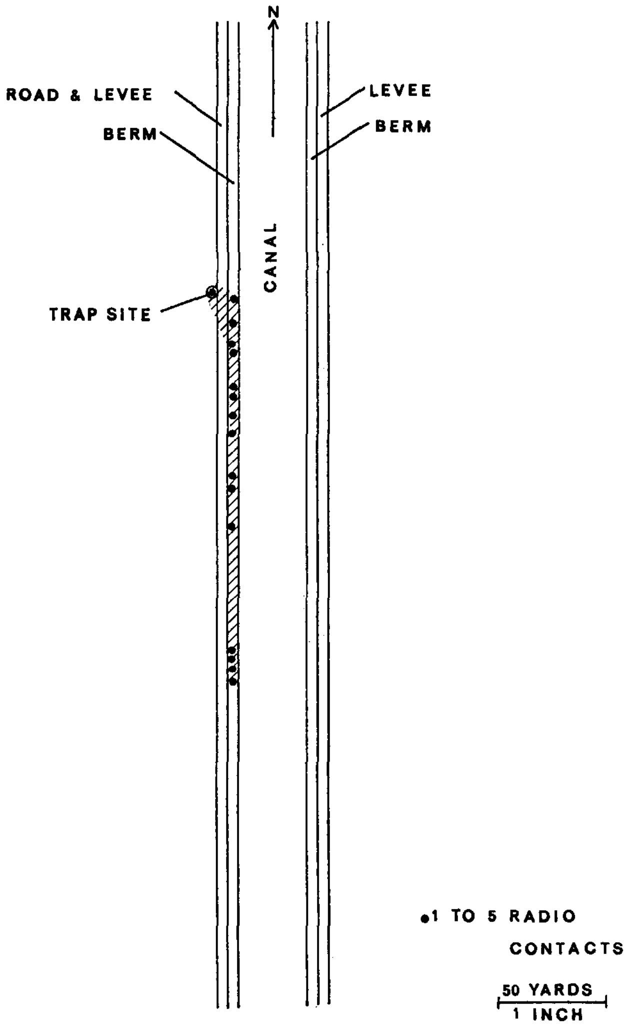

Figure 13. Minimum home range of rail number eight as determined by radio telemetry (Minimum home range 0.21 acres)

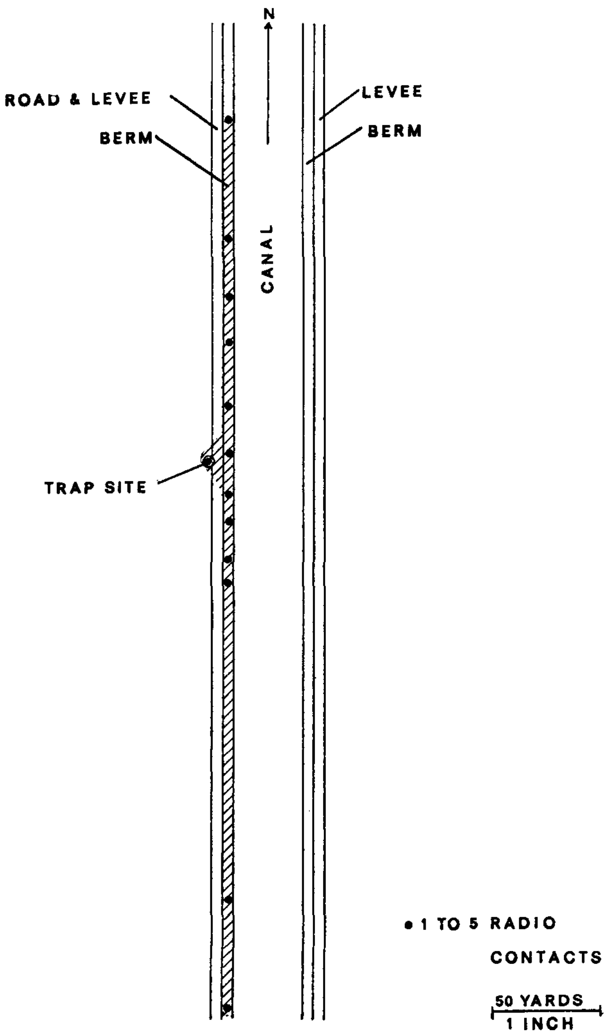

Figure 14. Minimum home range of rail number nine as determined by radio telemetry (Minimum home range 0.44 acres)

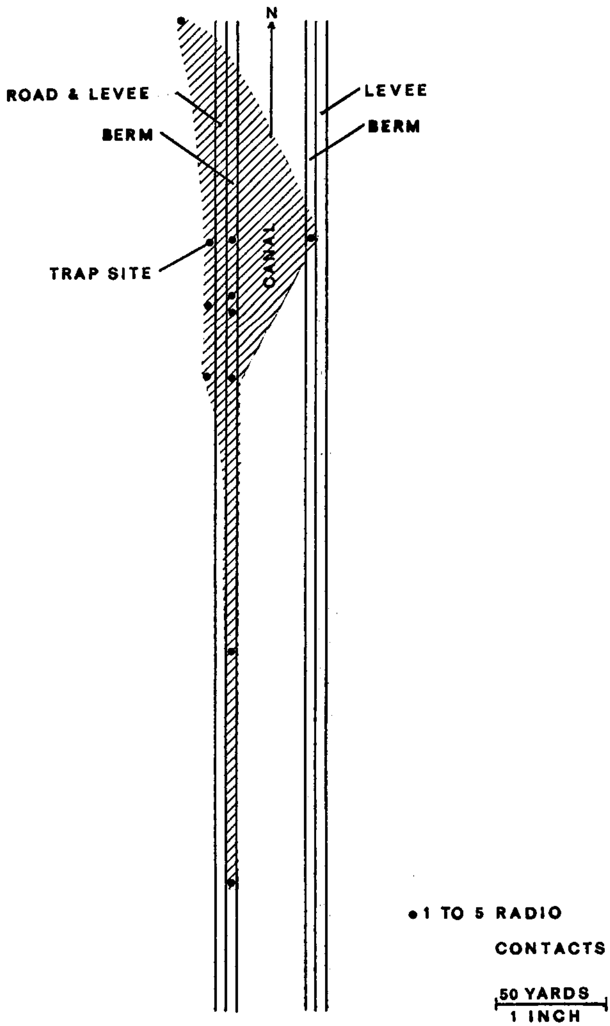

Figure 15. Minimum home range of rail number ten as determined by radio telemetry (Minimum home range 1.06 acres)

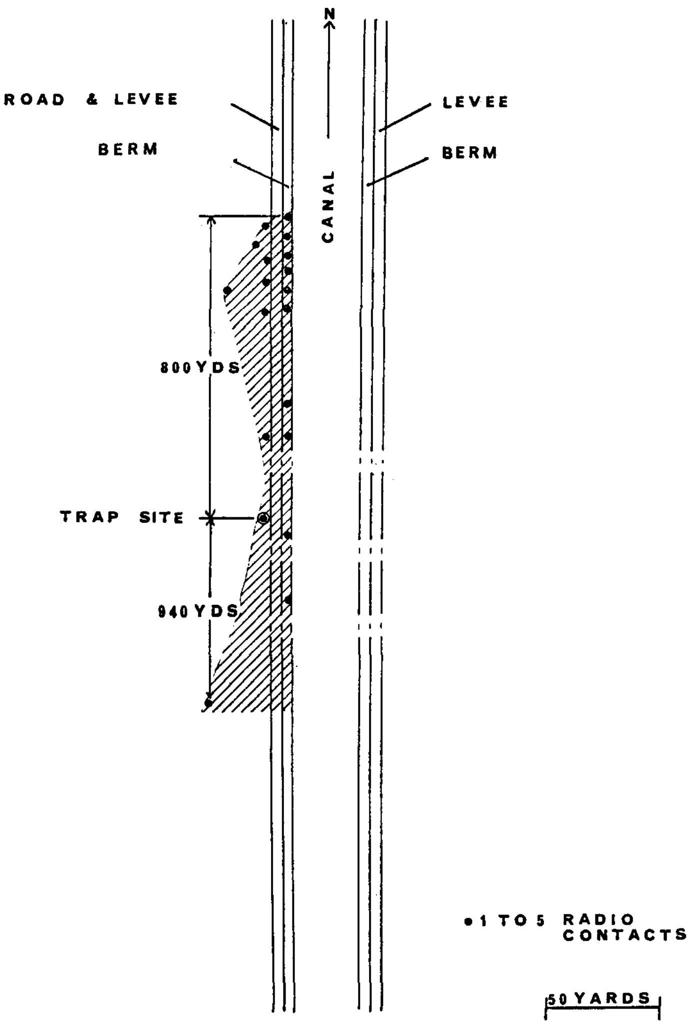

Figure 16. Minimum home range of rail number eleven as determined by radio telemetry (Minimum home range 2.00 acres)