

MOVEMENTS OF RELOCATED RACCOONS (*PROCYON LOTOR*) IN WESTERN TENNESSEE

FARROKH R. TABATABAI and MICHAEL L. KENNEDY

*Memphis State University
Memphis, Tennessee 38152*

ABSTRACT

Movements of raccoons (*Procyon lotor*), taken in an urban area (Memphis, Tennessee) and released in rural areas (unfamiliar territory) in Tennessee, were assessed during 1979 to 1986. A total of 450 raccoons was live-trapped, tagged, and released. Twenty-five (5.5%) of the relocated animals were recovered. There was no difference between the movements of males and females. The average distance traveled by all individuals was 32.4 km. Maximum distance moved was approximately 295.0 km by an adult male. There was no significant difference between the distance traveled and number of days between release and recovery. Additionally, no significant differences were found among directions traveled after release.

INTRODUCTION

The raccoon (*Procyon lotor*) has been the subject of numerous studies (Lotze and Anderson, 1979; Kaufmann, 1982). However, little information is available concerning relocated raccoons. Giles (1943), Lynch (1967), Wright (1977), and others have summarized the available literature relating to movement patterns of raccoons released in unfamiliar territory. However, with the exception of Taylor (1979), no studies of relocated *P. lotor* have been conducted in Tennessee. It is well known that raccoons exist in urban-suburban areas (Seton, 1929; Kieran, 1959; Gill and Bonnett, 1973; Hoffmann and Gottschang, 1977). For various reasons (e.g., pests to residents, unruly pets, rehabilitation programs), animals in urban-suburban areas may require relocation to rural areas. The fate of released individuals is essential for evaluating the success of various programs involving relocations. The purpose of this study was to assess movements of *P. lotor* taken in urban areas and released in rural areas (unfamiliar territory).

MATERIALS AND METHODS

During October 1979 to January 1986, 450 *P. lotor* were collected from urban areas in Memphis, Shelby County, Tennessee. Most animals were taken from residential areas of the city, and removal was normally at the request of a resident. Raccoons were usually captured using Havahart or folding Tomahawk live traps. At the time of capture, animals were immobilized with ketamine hydrochloride and acetylpromazine and tagged in both ears using #3 or #4 Monel ear tags from the National Band and Tag Company. Sex was recorded, and raccoons were released at various sites in western Tennessee (Appendix 1). Movement data were collected by the return of tags from hunter-killed animals, road kills, or recaptured individuals. Distances traveled by raccoons were measured as straight lines between the points of release and recovery. Differences in distances moved between sexes and between distance traveled and time (male and female data combined) were tested using the Student's *t*-test. Differences in distance moved (male and female data combined) were assessed by Chi square. The relationship between distance traveled and time was examined using a Pearson's product-moment correlation coefficient. Biometric routines were employed from the Statistical Package for the Social Sciences (SPSS) or Nie et al. (1975).

RESULTS

Twenty-five (5.5%) relocated animals were recovered, and descriptions of their movements are given in Table 1. There was no difference between the movements of males and females ($P > 0.05$). The average distance traveled by all individuals was 32.4 km. Maximum distance moved was 295.0 km by male number 13; least distance traveled was 0.8 km by male number 1

Table 1. Capture and recovery information on released and recovered raccoons during a period from 1979 to 1986.

No.	Age ¹	Released			Recovered			
		Site ²	Date	Site	Date	Direction Moved	Distance Moved ³	Days
MALE								
1	1	1	26 Jul 1984	1	1 Jan 1986	south	0.8	524
2	1	2	10 Nov 1979	7	11 Dec 1979	east	4.8	31
3	3	3	12 Apr 1980	8	7 Apr 1981	north	5.5	360
4	1	2	12 Sep 1980	5		east	9.7	
5	2	9	9 Oct 1980	10	15 Oct 1980	east	10.1	6
6	1	3	6 Oct 1979	11	4 Jan 1980	east	19.0	90
7	1	12	9 Oct 1983	13	7 Dec 1983	west	26.4	59
8	2	12	20 Sep 1982	14	15 Dec 1983	south	39.6	451
9		15	23 Jul 1984	16	1 Dec 1984	west	44.8	131
10		3	17 Aug 1983	17	30 Dec 1985	east	48.0	866
11	2	13	27 Oct 1983	18	10 Dec 1983	south	79.2	44
12		8	25 Jul 1983	19	1 Jan 1985	south	91.2	526
13	2	8	21 Jun 1983	20	15 Jan 1985	south	295.0	574
FEMALE								
14		1	6 Jul 1984	1	1 Jan 1986	south	0.8	544
15	2	8	5 Jan 1983	8	6 Jun 1985	west	1.0	883
16	1	3	25 Sep 1979	21	11 Dec 1979	east	3.2	77
17	1	22	7 Sep 1983	23	15 Dec 1983	north	5.2	99
18	1	12	13 Sep 1983	13	15 Dec 1985	east	8.0	824
19	2	4	11 Sep 1980	6	12 Oct 1980	east	8.1	31
20	1	2	23 Jul 1983	23	15 Dec 1983	north	10.4	145
21	1	24	19 Jan 1981	25	20 Jan 1981	east	11.3	1
22	2	9	10 Oct 1980	10	22 Oct 1980	east	16.1	12
23	2	26	8 Jun 1980	27	11 Sep 1980	south	23.4	95
24	1	8	25 Jul 1983	28	8 Aug 1983	south	23.5	14
25	2	24	11 Sep 1980	29	3 Mar 1986	west	26.1	1940

¹Age was determined following Grau et al. (1970), 1=0-14 months; 2=15-38 months; 3=39-57 months.

²See Appendix I for explanation of locality numbers.

³Distances in km.

and female number 14. There was no significant relationship between distance traveled and number of days between release and recovery. Additionally, no

significant differences were found among directions traveled after release ($P > 0.05$).

A female (number 23; lactating when released) was

recaptured 95 days after her release at a location 3 km south of the original capture site. She had traveled 23.4 km, and her travel was the only movement which might suggest an ability or desire to return to the vicinity of the original capture site.

One female (an albino; number 21) was killed on a road 11.3 km from its release site one day after its release. One female (number 15) and two of her young offspring were taken by a hunter in a tree one km from her release site 883 days after capture. However, most raccoons moved a considerable distance from their release site (see Table 1).

DISCUSSION

Similar studies undertaken to assess dispersal and survival of raccoons have reported a small percentage of animals or tags recovered (see Giles, 1943; Stuewer, 1943; Kellner, 1953; Nelson, 1955; Johnson, 1970; Wright, 1977; Taylor and Pelton, 1979). Additionally, studies (e.g., Giles, 1943; Frampton, 1974; Wright, 1977; Taylor and Pelton, 1979) have reported little differences in distances of dispersal between males and females and have indicated that the direction of dispersal was random.

Reports of distances dispersed by raccoons vary among investigators (Giles, 1943; Stuewer, 1943; McLaughlin, 1953; Kellner, 1953; Nelson, 1955; Johnson, 1970; Clements, 1972; Frampton, 1974; Wright, 1977; Taylor and Pelton, 1979). The least distance reported for raccoons released in unfamiliar territory is about 0.1 km (Frampton and Webb, 1973), and the greatest distance moved is about 265.0 km (Priewert, 1961; Lynch, 1967) to 288.0 km (see Kaufmann, 1982). The movement of raccoon number 13 in the present study represents (by a few km) the greatest known distance moved by a raccoon.

The movement of raccoon number 23 is of interest since no indication of homing instinct has been reported for *P. lotor*. Additionally, the movement of raccoon 21 indicates that raccoons will move several km during a short period of time. General patterns of dispersal reported for raccoons released in unfamiliar territory are similar (see Giles, 1943; Johnson, 1970; Taylor and Pelton, 1979). The majority of raccoons released disperse randomly, and only a few individuals remain in the area of the release site. Some investigators (e.g., Frampton and Webb, 1973; Taylor and Pelton, 1979) have suggested that relocation of raccoons into areas in which low populations exist can be successful. Additionally, Stuewer (1943) reported pen-reared raccoons were more likely to remain near their release site than raccoons with other origins. Apparently, relocation of raccoons in certain areas may be a valid management technique as Taylor and Pelton (1979) suggested. Additional study is needed to understand properly the circumstances under which

raccoons can be successfully released into unfamiliar territory.

ACKNOWLEDGEMENTS

Appreciation is extended to R.H. Shannon and F.B. Barnes, Jr., and other personnel of the Tennessee Wildlife Resources Agency for their help in many aspects of this study. Additionally, appreciation is extended to sportsmen who returned tags and provided information relating to tagged raccoons. M.L. Beck, G.A. Heidt, J.F. Payne, and B.A. Simco critically read an earlier draft of the manuscript. This study was financed in part by Federal Aid to Wildlife Restoration, Tennessee Wildlife Resources Agency, W-46 R Pittmann-Robertson.

LITERATURE CITED

- Clements, R.J. 1972. Raccoon movements as an indicator of transplant stocking effectiveness and socio-economic aspects of raccoon hunting. Unpubl. M.S. thesis. Virginia Polytechnic Inst. and State Univ., Blacksburg, 172 pp.
- Frampton, J.E. 1974. Movement, physical change, and mortality of raccoons released in unfamiliar territory. South Carolina Wildl. and Marine Res. Dept., Div. Game and Freshwater Fish. Statewide Wildl. Res. Proj. No. W-38-10, 110 pp.
- Frampton, J.E., and L.G. Webb. 1973. Preliminary report on the movement and fate of raccoons released in unfamiliar territory. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies, 27:170-183.
- Giles, W. 1943. Evidences of raccoon mobility obtained by tagging. *J. Wildl. Mgmt.*, 7:235.
- Gill, D., and P. Bonnett. 1973. Nature in the urban landscape—a study of city ecosystems. York Press, Baltimore, Maryland, 209 pp.
- Grau, G.A., G.C. Sanderson, and J.P. Rogers. 1970. Age determination of raccoons. *J. Wildl. Mgmt.*, 34:364-372.
- Hoffmann, C.O., and J.L. Gottschang. 1977. Numbers, distribution, and movements of a raccoon population in a suburban residential community. *J. Mamm.*, 58:623-636.
- Johnson, A.S. 1970. Biology of the raccoon (*Procyon lotor varius* Nelson and Goldman) in Alabama. Bull. Agric. Exp. Stat., Auburn Univ., 402:1-148.
- Kaufmann, J.H. 1982. Raccoon and allies. P. 567-585, in Wild mammals of North America (J.A. Chapman and G.A. Feldhamer, eds.). The John Hopkins University Press, Baltimore, Maryland, 1147 pp.
- Kellner, W.C. 1953. Factors influencing the raccoon and its management in Southwest Virginia. Unpubl. M.S. thesis. Virginia Polytechnic Inst., Blacksburg, 81 pp.
- Kieran, J.F. 1959. A natural history of New York City.

- Houghton Mifflin, Boston, 428 pp.
- Lotze, J.H., and S. Anderson. 1979. *Procyon lotor*. *Mamm. Species*, 119:1-8.
- Lynch, G.M. 1967. Long-range movement of a raccoon in Manitoba. *J. Mamm.*, 48:659-660.
- McLaughlin, J.H. 1953. Factors influencing the raccoon and its management in Southwestern Virginia. Unpubl. M.S. thesis. Virginia Polytechnic Inst., Blacksburg, 56 pp.
- Nelson, F.P. 1955. The place of stocking in game management. *South Carolina Wildl.*, 2:2-3.
- Nie, N.H., C.H. Hull, J.G. Jenkins, K. Steinbrenner, and D.H. Bent. 1975. *Statistical package for the social sciences*, Second ed. McGraw-Hill Inc., New York, 675 pp.
- Priewert, F.W. 1961. Record of an extensive movement by a raccoon. *J. Mamm.*, 42:113.
- Seton, E.T. 1929. *Lives of game animals* (vol. 2). Garden City, New York, 367 pp.
- Stuewer, F.W. 1943. Raccoons: their habits and management in Michigan. *Ecol. Monogr.* 13:203-257.
- Taylor, C.I. 1979. Movements, activities, and survival of translocated raccoons in East Tennessee. Unpubl. M.S. thesis, Univ. Tennessee, Knoxville, 178 pp.
- , and M.R. Pelton. 1979. Evaluation of a raccoon translocation attempt in East Tennessee. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies*, 33:187-194.
- Wright, G.A. 1977. Dispersal and survival of translocated raccoons in Kentucky. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies*, 31:285-294.

LOCATIONS REPORTED IN A STUDY OF *PROCYON LOTOR* IN WESTERN TENNESSEE.

TENNESSEE: *Shelby Co.*: 1) Loosahatchie Island (Mississippi River); 2) Island-40 Road, Shelby Forest Wildlife Management Area (SFWMA); 3) Hunter Check Station, SFWMA; 7) Jct. Watkins Road and Fite Road; 8) River Bluff Road, north of SFWMA; 9) Meeman Biological Field Station, east of SFWMA; 10) northwest of Millington; 11) Big Creek, Millington; 14) north of Arlington; 17) east of Eads; 18) south of Memphis; 21) Lyle Lake, east of SFWMA; 22) Preacher's House Road, SFWMA; 23) Boat Ramp, River Road, SFWMA; 24) Jct. Walnut Grove Road and Germantown Road; 25) Bailey Station Road, west of Collierville; 26) Fawn Lake, south of SFWMA; 27) Park Avenue, 1.6 km west of Highland Street, Memphis; 28) Jct. Egypt Central and Austin Peay, Memphis; 29) Jct. Millington Road and Loosahatchie River; *Gibson Co.*: 4) southeastern Gibson Co. near Humboldt; 5) southeast of Humboldt; 6) southeastern Gibson Co. near Carroll Co.; *Haywood Co.*: 12) Hatchie National Wildlife Refuge; 13) Hatchie River, west of Hatchie National Wildlife Refuge; ARKANSAS *Craighead Co.*: 15) Brandywine Island, Mississippi River; 16) north of Pointsett; MISSISSIPPI: *Tate Co.*: 19) north of Senatobia; *Sharkey Co.*: 20) 2.4 km east of Car near Sunflower River.