RECENT RECORDS OF THE SWIFT FOX (*VULPES VELOX*) IN SOUTH DAKOTA

Pfeifer and Hibbard (J. Mamm., 51:835, 1970) provided the first record of a swift fox in North Dakota since 1915. They noted an apparent recent increase in northern swift fox populations but stated that no recent, authenticated records of the species existed for South Dakota. This paper describes four such records obtained since 1970.

In December 1970, two swift foxes were trapped on the Elmer Morgan Ranch in eastern Fall River Co., South Dakota (Sec. 21, T.8 S, R.8 E). An adult male captured on 18 December was partly consumed by eagles. An adult female captured on 23 December was recovered by Leonard McDaniel, U.S. Bureau of Sport Fisheries and Wildlife, and donated to South Dakota State University where its skin and skull are preserved as SDSU 1892. Measurements (in millimeters) were as follows: total length, 771; length of tail, 286; length of hind foot, 105; and ear from notch, 57. Weight of the fox was 1.8 kilograms (kg).

In January 1972, Norman Hendrickson trapped an adult male swift fox at a locality 3 miles west of Millboro, Tripp Co., South Dakota. Subsequently, I examined and photographed the stretched skin whose owner elected to retain it.

In January 1974, Robert Meyer trapped an adult female swift fox 7 miles north of Harrold (Sec. 32, T.114 N, R.74 W), Sully Co., South Dakota. I recovered the fox (SDSU 1891) and recorded the following measurements (in millimeters): total length, 733; length of tail, 232; length of hind foot, 124; and ear from notch, 64. The fox weighed 2.4 kg. It is noteworthy that this fox was captured east of the Missouri River and represents the first such record in recent times.

These records, along with several recent observations reported to me of live swift foxes, suggest that a small but expanding swift fox population occurs in South Dakota. The apparent absence of this species in the state over the past 60 years and the South Dakota specimens collected recently in the Nebraska border area suggest an influx of swift foxes from the Nebraska Sand Hills and surrounding area. Blus *et al.* (J. Mamm., 48:471–472, 1967) reviewed the status of the species in that region, and suggested several public education measures necessary to insure the continued presence of low-density swift fox populations. Recent high fur prices for red foxes and coyotes have stimulated much trapping activity in the Dakotas and swift foxes there may be more vulnerable to accidental capture as a result. A determination of the welfare of swift fox populations in recently occupied, northern portions of their historical range where trapping pressures are intense awaits further study.—V. VAN BALLENBERGHE, *Department of Wildlife and Fisheries Sciences, Brookings, South Dakota 57006 (present address: State of Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, 99502).* *Submitted 19 April 1974. Accepted 6 November 1974.*

ASPECTS OF ACTIVITY FOR *PEROMYSCUS POLIONOTUS* USING A SAND-TRACKING TECHNIQUE

Many aspects of the biology of the old-field mouse (*Peromyscus polionotus*) have been studied although general activity patterns are poorly known. Blair (1951), utilizing sand-tracking, described environmental influences on activity. O'Farrell (1974) has reviewed the generalized activity patterns of rodents in relation to various environmental parameters, particularly as revealed by live-trapping. Sand-tracking has been used for a variety of taxa (Blair, 1951; Bider, 1968) but only to determine movement activity of individuals. We utilized a variation of the sand-tracking technique to study certain aspects of old-field mouse activity. Secondly, we examined this species' reaction to different baits.

TABLE 1.—*Summary of activity of* Peromyscus polionotus *in relation to time from sunset. Activity is the number of separate stations with fresh tracks. First activity is the number of occupied burrows or other stations with fresh tracks for the first time that night.*

Hours after sunset	27 February				28 February			
	First activity		Total activity	Number trapped	First activity		Total activity	Number trapped
	Burrows	Open			Burrows	Open		
0–2	4	5	9	1	6	1	7	1
2–4	1	2	10	1	0	1	4	1
		Moon set						
4–6	1	4	10	0	0	5	9	2
						Moon set		
6–8	0	6	18	0	–	–	–	–
8–10	0	0 (6)[1]	9 (19)[1]	0 (0)[1]	0	9	19	4
10–12	0	3	14	1	–	–	–	–
12–13	0	4 (7)[2]	13 (18)[2]	0 (1)[2]	0	7	15	2

[1] Value for 6–10 hours from sunset.
[2] Value for 10–13 hours from sunset.

As part of a large study on *P. polionotus* populations, we have periodically sampled at a large field in Ocala National Forest, approximately 50 kilometers (km) E of Ocala, Florida. The present paper encompasses trapping conducted from 26 to 29 February 1974. On an earlier trapping trip, we encountered an unusually low trap response attributed to unseasonably warm weather (Kaufman *et al.*, 1974). On the contrary, during the February trapping nightly temperatures dropped to about 0°C. On 26 February, 450 Museum Special traps baited with peanut butter were set along approximately 6.5 km of roadway. Only five *P. polionotus* were captured, but many burrows showed signs of activity (for example, tracks, fresh digging). For this reason we selected 109 trap stations along one roadway to examine general activity as well as behavior of the mice in relation to the traps. An area of 25 to 30 centimeters in diameter was brushed smooth and a trap placed in the center of this clearing. Stations were categorized as burrow, probe-hole, or open space. Traps were checked seven times on 27 February but only five times on 28 February (Table 1). This procedure was followed on the last night except that traps at activity stations were baited with bacon in addition to peanut butter to determine the animals' response to a different bait.

Activity of *P. polionotus* in relation to time from sunset is given in Table 1. It is apparent that activity was subdued until the moon had set. On 27 February, 60 percent of initial activity for all stations occurred after the moon had set; on 28 February, 55 percent of initial activity occurred after moonset. The same trend is exhibited by total activity. The increase in number of stations exhibiting new activity after moonset can be used as an index of increased area traveled by individuals. This agrees with the observation that *P. polionotus* (Blair, 1951) and rodents in general (O'Farrell, 1974) exhibit reduced activity in the presence of moonlight and increased activity with dark, cloudy, or overcast conditions.

Two-hour intervals between trap checks reveal a bimodal pattern of activity during the night (Table 1). These oscillations are reminiscent of live-trap activity data (O'Farrell, 1974). A major criticism of activity patterns determined by live-trapping is that temporal changes in intensity of activity may reflect short-term changes in trap response. This may not be a valid criticism since animals in the present study were not subjected to capture-release-recapture disturbance and activity patterns are not dependent upon trap response.

TABLE 2.—*Summary of* Peromyscus polionotus *activity at burrow entrances, probe holes, and open spaces.*

Activity	Burrows	Probe holes	Open spaces
Number examined	24[1]	9	76
Number with activity	20	3	17
Number with activity			
Both nights	14	1	4
First night			
Number with activity	18	3	9
Total activity			
Seven periods	62	3	16
If five periods[2]	45	3	16
Mice captured	0	1	2
Second night			
Number with activity	16	1	12
Total activity			
Five periods	39	1	14
Mice captured	7	0	3

[1] From excavations on 29 February, six of the 24 burrows were occupied at the start of trapping.
[2] Corrected to be comparable to five periods on the second night.

The summary of activity by station type is presented in Table 2. Of the 20 active burrow sites, only six burrows were occupied as revealed by excavation on 29 February. No captures occurred at these occupied burrows until the last day when five adult mice were trapped. We then excavated these burrows and collected an additional four adults and 14 juveniles.

Activity of the mice (Table 2) indicates that the low capture rate was due to low trap response and not to a lack of mice. Because trap response was the major factor in capture success, we added bacon to traps at activity stations for the last night. At the 341 stations which were baited with peanut butter all three nights, the captures were as follows: first day 4; second day 4; third day 3. At the 109 activity stations which had peanut butter bait the first two nights and bacon and peanut butter the third, the captures were as follows: first day 1; second day 3; third day 10. A Chi-square analysis of these data, days 1 and 2 versus day 3, indicates that significantly more *P. polionotus* were captured with bacon and peanut butter bait than expected ($\chi^2 = 4.812$; $P < 0.05$).

The effects of bait on trap response have been summarized by Smith *et al.* (1974). Patric (1970) presents evidence that sexual and species differences exist for a variety of baits. Fitch (1954) indicated that small mammals showed seasonal preferences for bait in general. However, no studies have been designed to test for bait preference only, and none have examined seasonal response to specific baits. It would seem that such a study for a variety of baits and a variety of habitat types would be warranted so that trap response changes could be better understood.

The use of the sand-tracking technique around burrows has potential in examining activity patterns without disturbance to the animal. In addition, sand-tracking at trap sites also offers potential in studying trap response in small mammals.

This study was supported by Contract AT(38-1)-319 between the U.S. Atomic Energy Commission and the University of Georgia.

LITERATURE CITED

BIDER, J. R. 1968. Animal activity in uncontrolled terrestrial communities as determined by a sand transect technique. Ecol. Monogr., 38:269–308.

BLAIR, W. F. 1951. Population structure, social behavior, and environmental relations in a natural population of the beach mouse (*Peromyscus polionotus leucocephalus*). Contrib. Lab. Vert. Biol., Univ. Michigan, 48:1–47.

FITCH, H. S. 1954. Seasonal acceptance of bait by small mammals. J. Mamm., 35: 39–47.

KAUFMAN, D. W., S. E. FULLER, M. J. O'FARRELL, AND M. H. SMITH. 1974. Trap response in *Peromyscus polionotus*. Acta Theriol., in press.

O'FARRELL, M. J. 1974. Seasonal activity patterns of rodents in a sagebrush community. J. Mamm., 55:809–823.

PATRIC, E. F. 1970. Bait preference of small mammals. J. Mamm., 51:179–182.

SMITH, M. H., R. H. GARDNER, J. B. GENTRY, D. W. KAUFMAN, AND M. J. O'FARRELL. 1974. Density estimations of small mammal populations. *In* Small mammals: their productivity and population dynamics (F. B. Golley, K. Petrusewicz, and L. Ryszkowski, eds.), Cambridge Univ. Press, London, in press.

MICHAEL J. O'FARRELL AND DONALD W. KAUFMAN, *Savannah River Ecology Laboratory, Drawer E, Aiken, South Carolina 29801 (present address of O'Farrell: Department of Biological Sciences, University of Nevada, Las Vegas, 89154; present address of Kaufman: Department of Zoology, University of Arkansas, Fayetteville, 72701).* *Submitted 29 July 1974. Accepted 8 November 1974.*

TERRITORIALITY AND MATING BEHAVIOR IN PRINCE WILLIAM SOUND SEA OTTERS

Observations of sea otter (*Enhydra lutris*) behavior were made in a small lagoon on the south side of Stockdale Harbor, Montague Island (60° 16′ N, 147° 12′ W), during the months of July and August 1971.

The lagoon is made up of three arms and a large central area with a small island. The total water surface area is about 2 square kilometers (km). The single entrance is about 30 meters (m) wide.

Observation distances ranged from 50 m to 300 m. Starting in June, observations of sea otters were made intermittently in the lagoon until 2 July, when it was noticed that a male sea otter was continually present in the lagoon accompanied by a female and pup. Observations were then made continuously, beginning between 6:00 AM and 10:00 AM and ending between 3:00 PM and 9:00 PM until 13 July, when the female and pup left the lagoon. After this, intermittent observations were made in the lagoon until 1 September. Two male otters in the lagoon could be identified by specific characteristics such as very light head, scars on the nose, and general size. One male (M1) occupied and defended the entrance and central part of the lagoon as well as one arm. The female and pup remained within this area of 1.25 square km. The second male (M2) occupied the other two arms of the lagoon, an area of 0.75 square km.

Territoriality was manifested in several ways. The first male actively defended his area by chasing M2. This usually involved swimming under the surface to within 2 m of M2, upon which M2 fled back towards his area. During the chases, characteristic "porpoising" was employed by both otters. These chases usually ended along a well defined boundary zone separating the two territories. Auto-grooming was typically performed by both males after chases. The second male was never observed to chase M1.