



A study of mink movements and populations on the lower Madison River, Montana
by James L Mitchell

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree
of Master of Science in Fish and Wildlife Management

Montana State University

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Abstract:

A mink (*Mustela vison energumenas*) live-trapping study was conducted on the lower Madison River near Three Forks, Montana, during various seasons of the year from 1955 to 1957, to determine movements and populations. Live-trapped minks were marked in each ear with numbered strap type tags. Fifteen of 42 tagged animals were live-trapped more than once. Different type traps and baits are evaluated. One adult female's home range was determined by several captures at different trap sites. Movements of other individuals are recorded. Only a small percentage of the area's total population of minks was thought to have been live-trapped.

By use of the Lincoln Index, the total population of the area was calculated for two different years. The adult female to juvenile ratio for the area was found to be lower than the statewide ratio. Average weights of the live-trapped minks were determined and weight variations are discussed.

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ON THE LOWER MADISON RIVER, MONTANA

by

JAMES L. MITCHELL

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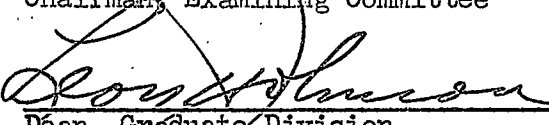
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ABSTRACT

A mink (Mustela vison energumenas) live-trapping study was conducted on the lower Madison River near Three Forks, Montana, during various seasons of the year from 1955 to 1957, to determine movements and populations. Live-trapped minks were marked in each ear with numbered strap type tags. Fifteen of 42 tagged animals were live-trapped more than once. Different type traps and baits are evaluated. One adult female's home range was determined by several captures at different trap sites. Movements of other individuals are recorded. Only a small percentage of the area's total population of minks was thought to have been live-trapped. By use of the Lincoln Index, the total population of the area was calculated for two different years. The adult female to juvenile ratio for the area was found to be lower than the statewide ratio. Average weights of the live-trapped minks were determined and weight variations are discussed.

INTRODUCTION

A mink (Mustela vison energumenos) live-trapping program was conducted on the lower Madison River near Three Forks, Montana, during various periods from the fall of 1955, to the spring of 1957, to obtain information on movements, populations and other biological factors. Apparently very little similar work has been done as attested by the paucity of literature on the subject. Marshall (1936) and McCabe (1949) were able to delimit the approximate sizes of home ranges of female minks, in certain habitats and seasons in Michigan and Wisconsin, respectively. Since home range is known to be influenced by habitat (Burt, 1940), it seemed desirable to secure information for this local population which is subjected to an annual harvest by commercial fur trappers.

The writer wishes to extend thanks to the Montana Fish and Game Department by whom he was employed during the investigation under Project W-49-R and to Kenneth R. Greer of that department for interest and guidance during the project. Also, thanks are extended to the landowners in the study area and to the commercial trappers who cooperated so willingly. The writer is indebted to Dr. Don C. Quimby, Montana State College, for his direction of the study and aid in preparing the manuscript.

DESCRIPTION OF THE AREA

The study area is a six mile (airline) section of the Madison River extending from a point six miles south of Three Forks to the Highway 10 bridge, one mile east of this city (Fig. 1). Within the area, the river varies in width from 40 yards in single channel, to over 100 yards where

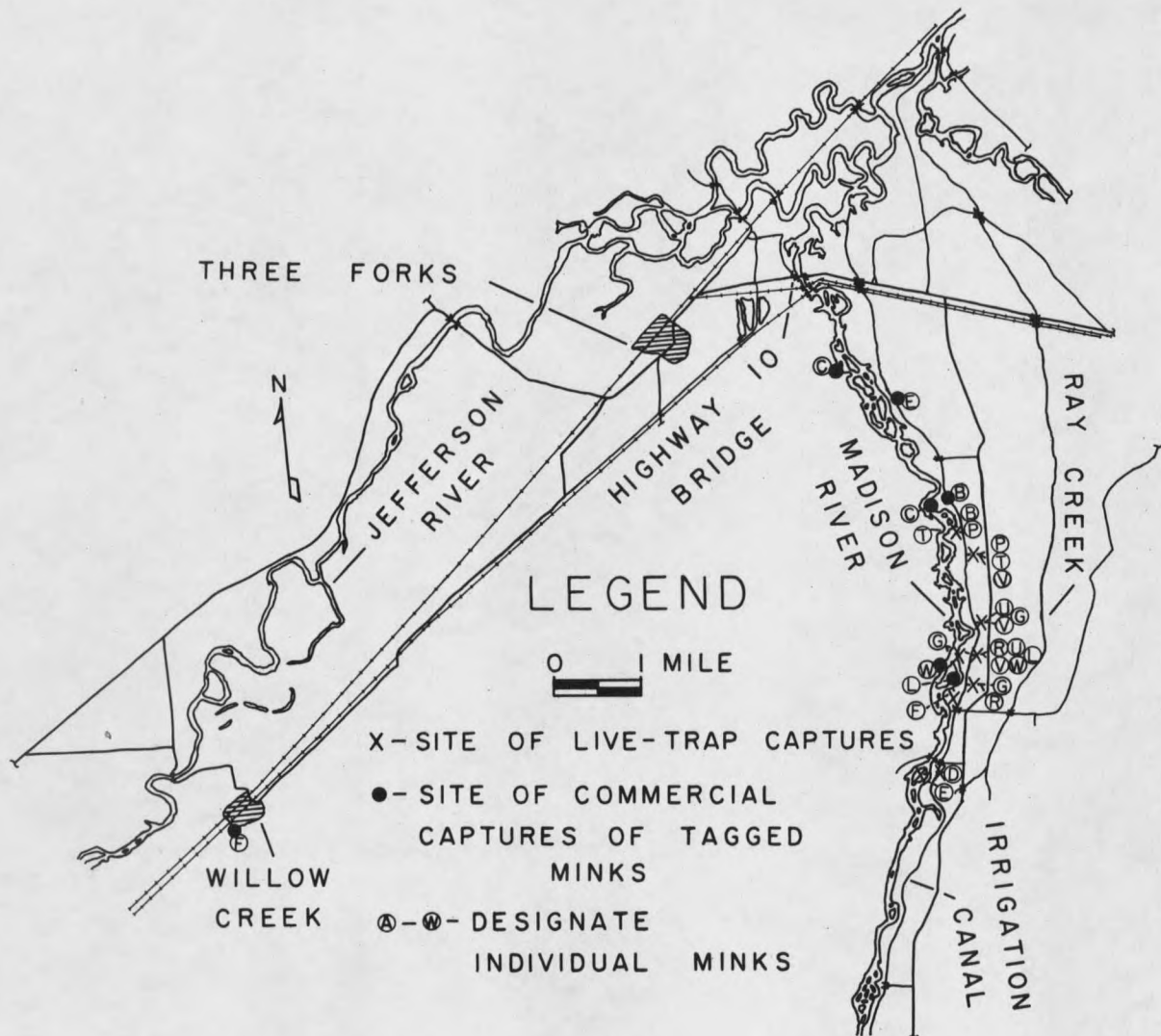


Fig. 1. A map of the study area.

the course is interrupted by numerous islands. Shallow, rapid areas less than a foot in depth are common. Depths of over five feet are rare. Severe gouging by ice-jams in winter forms new channels and obliterates old ones with debris or huge rock bars. The current is swift; the gradient being 16 feet per mile and the waterflow is kept almost constant by a dam located above the area, except during spring runoff. The main channel closely follows the western edge of the valley floor. An irrigation canal and Ray Creek parallel the river to the east (Fig. 1). There is no inflowing water from streams.

The riparian vegetation consists mainly of woody shrubs, with willow (Salix sp.) being the dominant type. Sparse to moderate cottonwood (Populus sp.) growths are also found (Fig. 2). Hydrophytic vegetation represented mostly by cattails (Typha sp.) and bullrushes (Scirpus sp.) in protected areas and filamentous algae (Cladophora sp.), elsewhere, is common.

METHODS

In the summer and early fall, the entire study area was traversed with a canoe-type boat. Icing conditions in winter made this type of transportation impractical, so a road was used along the top of the dike that parallels the irrigation canal to the west.

The presence of mink sign near the water's edge served as a basis for positioning traps. A record of trap locations was kept on a map of the area prepared from aerial photographs. Only the east side of the river and the irrigation canal were trapped in winter. Trap positions were

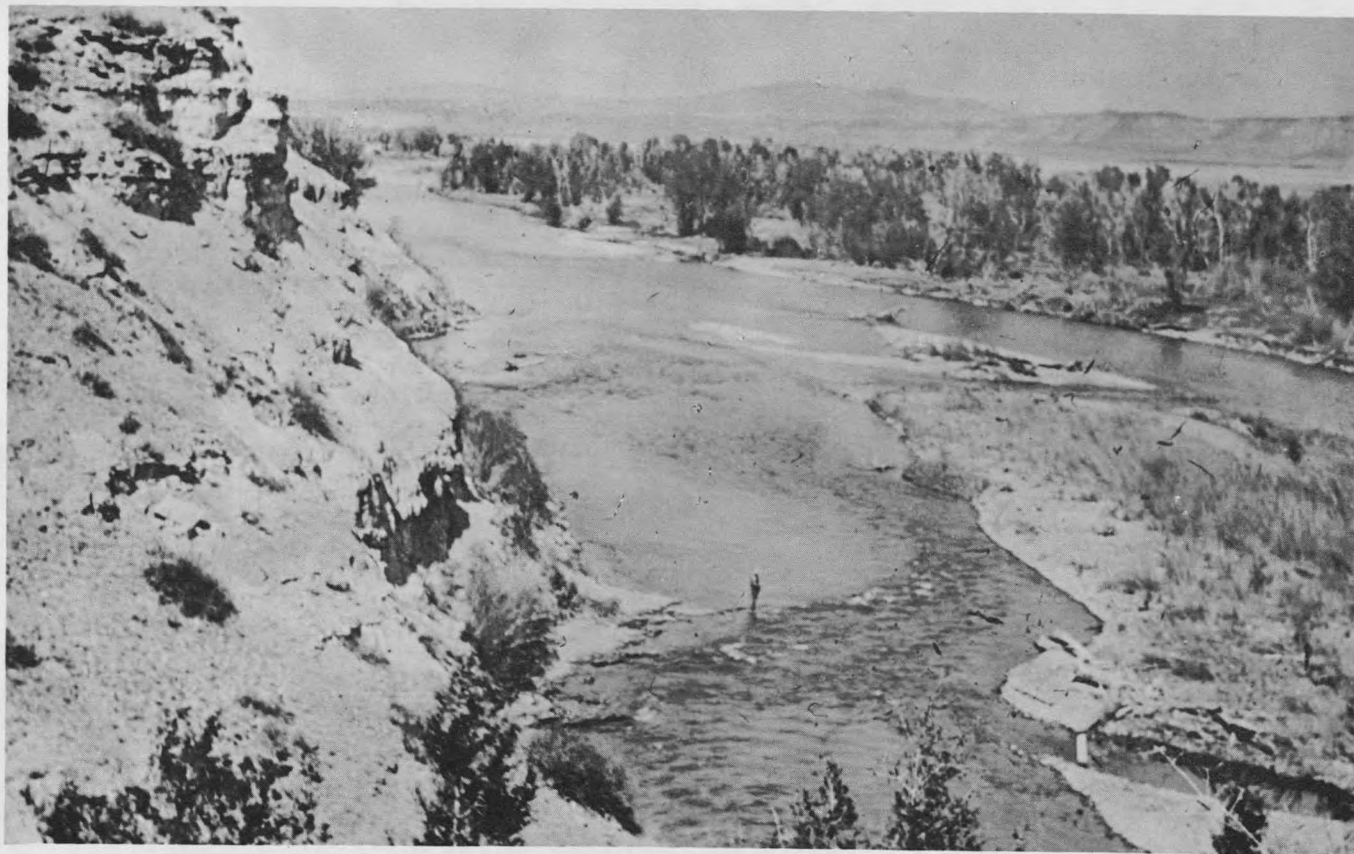


Fig. 2. A view of a section of the study area from the west side of the Madison River. The tip of an island is seen to the right.

changed frequently if unproductive. Sets were made under caved dirt banks, in rock rip-rap walls, or on level ground and all were loosely covered with grass, sticks or sod. Collapsible metal live traps produced by the National Live Trapping Company, Tomahawk, Wisconsin were most effective. They were of two types. Most success was gained using the 6" x 6" x 24" double-door model set in runways with both doors open. The 6" x 6" x 19" single-door type was somewhat successful when placed as a blind set in dirt banks or rock walls. Also used, but with little reward, was a wooden treadle-type trap.

A variety of scents and lures were employed. Female scats obtained from local mink ranchers were apparently quite successful during the breeding season. Musk glands procured from wild mink carcasses during the commercial trapping season were also suitable. Edible baits produced poor results, although many were tried. McCabe (1949) had most success with freshly killed rabbit, whereas Ritcey (1956) obtained best trapping results when using fresh fish.

A numbered fish strap tag (size, 8 x 2 mm) with the inscription M.F.G.D. (Montana Fish and Game Department) was placed in each ear of trapped minks (Fig. 4). They were quite satisfactory, for only one known loss of a tag by an animal occurred, this on animal (E) within a 388 day period. Each animal's ventral white spot pattern was recorded as additional aid in future identification (McCabe, 1949).

A collapsible wire cone (Newby et al., 1954) made handling of trapped animals by one man comparatively easy. To the cone was attached a canvas sleeve that fitted over the end of the live trap for convenient animal



Fig. 3. A mink in a single-door metal live-trap. The canvas sleeve that is used for transfer to the cone and the cone itself are shown to the right.

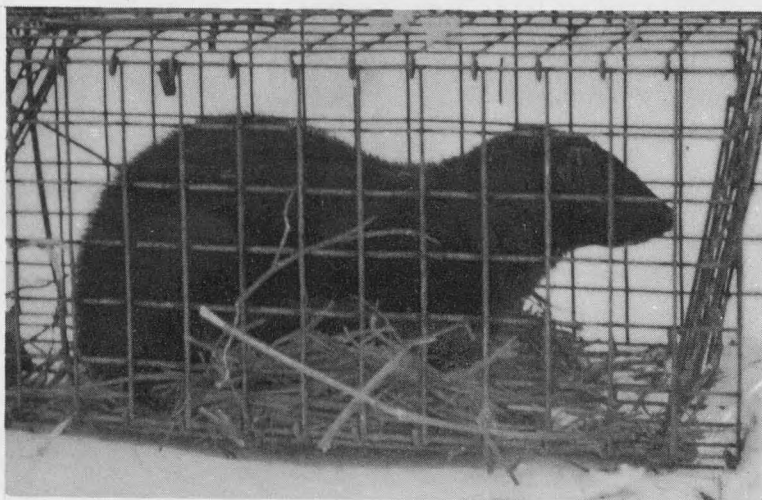


Fig. 4. A mink with an identifying fingerling fish tag in its right ear.

transfer (Fig. 3). Each animal was aged (juvenile or adult), sexed, weighed (to nearest 25 grams), examined for injuries, and breeding status determined while confined in the cone. Aging of males was accomplished by palpation of the baculum (Petrides, 1950). Age determination of females was more difficult. The presence of gray hairs on the napes of their necks was considered characteristic of adults (local trappers and mink ranchers said this was due to injury of the tissue by the male's clasp during intercourse). Presence of enlarged mammae made adult identification positive in summer and early fall, or as long as the young were suckling.

Commercial trappers were given maps for plotting positions where they captured tagged minks.

RESULTS

Trapping Success

A total of 5840 trap nights (one trap set for 24 hours) captured 42 animals 78 times (Table I). Fifteen animals (35.7 percent) were recaptured. It required an average of 74.9 trap nights to capture one mink. The highest trapping success was recorded for fall, 1955; 25.8 trap nights per individual. The best success in recapturing tagged minks was realized during the winter. Four minks were captured from 23 trap units on March 21, 1957. Lowest success was realized in late summer. From August 9th, to September 10th, 1956, no minks were captured. Sex and age class of trapped animals were: 21 juvenile males, 10 juvenile females, four adult males and seven adult females.

Four animals died during the study as a direct result of live-trapping. Two succumbed in the traps due to cold, one from over-exhaustion in hot weather and one from being squeezed by the door of a wooden trap. Further deaths due to cold were probably prevented by placing cotton and hay for bedding in all traps.

Table I. Mink live-trapping success by seasons.

Season	No. of trap nights	No. Captured		No. Recaptured							
				1x	2x	3x	4x	5x	6x	7x	8x
1955		Initial	Repeat*								
Fall	283	9		2							
1956											
Summer	2248	7	0								
Fall	2035	13	1**	1	4						
1957											
Winter	926	12	1	4	2		1		1		
Spring	348	1	3***	1							
(To April 24)											
Total (All seasons)	5840	42		7	4	2	0	0	0	1	1

* Captured during a previous season.

** Captured three times during this season and five times during the winter of 1957 (Mink - G, 9 total captures).

*** All three taken initially in the winter, one having seven captures in that season and one in this season (Mink - V).

Movements and Home Ranges

Combining the live-trapping and commercial trapping data gave indications of distances traveled by tagged minks. Figure 1 shows locations of trap sites for those animals captured in at least two different traps.

Sex and age of these minks are given in Table II.

The longest distance between captures of an individual (a juvenile male - F), was 7.9 miles, airline, or 15 miles by water and the interval between captures was 129 days. This is the only known mink to have left the study area and it probably moved along the water route (Fig. 1).

Of the remaining 19 animals, extreme movements of 0.2 (7 days) and 4.8 (388 days) miles between captures are indicated.

Data on one mink were sufficient for home range determination. The trapping record of adult female (G) indicated movement of 0.6 miles, once in nine days and once in one day. From the initial capture on the river in August, 1956, this female traveled 0.2 miles in 59 days from the river to the canal and then was taken four consecutive times in the same trap in 149 days. After March 5, 1957, the animal was captured four times in traps on the canal 0.3 miles above and below the middle trap site. Figure 5 shows an enlarged view of the trap sites where this animal was captured and nearby traps where she was not taken. The minimum foraging area, as determined by connecting the outside points of capture and using a planimeter to measure the enclosed area, was 53.1 acres. The females of Marshall's (1936) study region remained in an area of approximately 20 acres. McCabe (1949) reported that the greatest distance females moved in his study area was 400 yards.

Longer movements are indicated for juvenile males than for others but the data are too few for definite conclusions. Movements between the canal and the river were more common than movements restricted to either

Table II. Number of captures, days between captures, distance traveled, and weight changes of tagged minks.

Mink	Age	Sex	Captures	Days between captures	Distance traveled between captures (Airline miles)	Weight (Grams)	
						Initial	Changes
A	J*	F	2	4	0	500	-25
B	J	F	2**	55	0.3	525	?
C	J	M	2**	55	1.7	795	?
D	J	M	2	7	0.2	1100	-50
E	J	M	2**	388	4.8	850	?
F	J	M	2**	129	7.9	750	?
G	A	F	9	59, 11, 12, 112, 14, 4, 1, 9	0.2, 0, 0, 0, 0, 0.3, 0.6, 0.6	625	-25, +25, +25, +50 -25, -25, -25, -50
H	J	M	3	4, 5	0, 0	1025	-100, +25
J	J	F	3	6, 7	0, 0	550	+100, 0
K	J	F	3	6, 4	0, 0	600	+75, -25
L	J	M	3**	4, 17	0, 0.6	875	-25, ?
M	A	F	2	4	0	600	+25
N	J	M	2	1	0	1225	-75
P	A	M	4	6, 13, 21	0, 0, 0.3	1300	+50, 0, -200
R	J	M	3	11, 1	0.3, 0.3	1000	0, 0
S	J	M	2	16	0	1360	-110
T	A	F	4	17, 3, 3	0, 0, 0.3	700	-50, -50, -50
U	J	M	2	4	0.3	1350	0
V	J	M	8	1, 1, 1, 2, 1, 4, 4	0, 0, 0.3, 0.8 0.8, 0, 0	1250	-75, +50, +25 -75, -50, +50, +50
W	J	M	2***	21	0.4	1325	?

* J - Juvenile; A - Adult.

** Mink trapped in commercial trapping season (Nov. 10 - Dec. 31 of each year).

*** Mink taken by commercial beaver trapper in April, 1957.

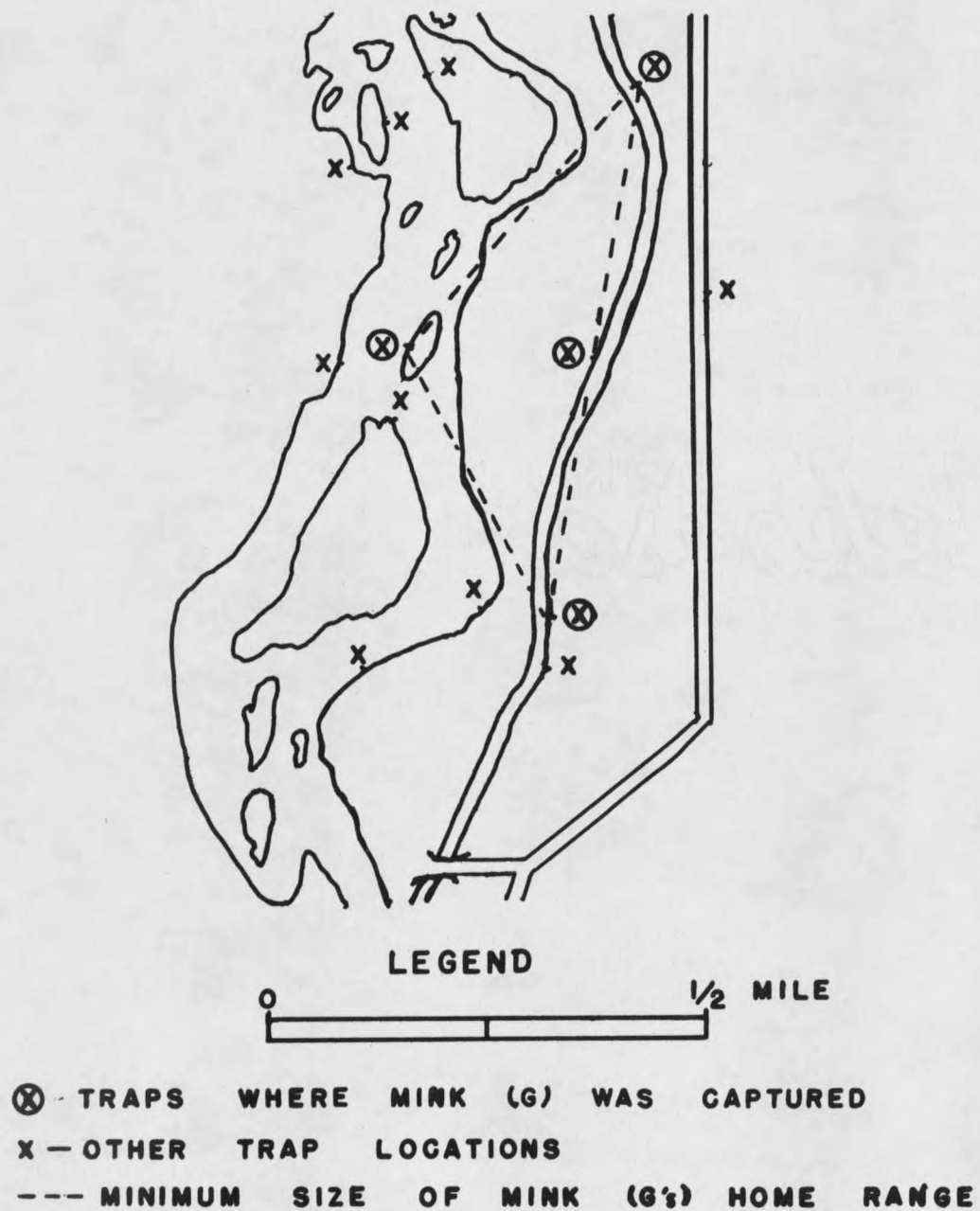


Fig. 5. An enlarged section of Fig. 1 showing the minimum home range of mink (G).

the canal or the river.

Populations

Dice (1931), Burt (1940), Blair (1940), Evans (1942) and others used live-trapping data to calculate populations of various types of rodents. The assumption was that all animals on the area had been captured.

The live-trapping data of the present study do not indicate that all minks on the area were caught, unless the populations were highly unstable, which may be suggested by the behavior of mink (F), previously discussed. Thus, none of nine minks caught in the fall of 1955 were captured in the summer of 1956, but two were taken commercially the same fall as marked. Only one of seven summer-trapped animals was caught the following fall. Similar data for other seasons are indicated in Table I. On the other hand, the long movement of mink (F) is more logically explained by the presence of a stable population, and intraspecific strife (Errington, 1943) forced this juvenile to leave the area. Inability to recapture tagged minks between seasons would then be expected. The data are apparently too few for population calculation by the above method.

An estimate of the population was provided by use of the Lincoln Index. Nine animals were tagged on the area previous to the 1955 commercial trapping season. Two were taken during that season. Seventeen individuals were tagged in 1956. Thus, there was a potential of 24 marked animals on the area during the 1956 commercial trapping season. Three were steel-trapped. The 1955 population was calculated to be 103 minks (9×23) with 256 (24×32) in 1956. There were approximately 12.75

sections in the study area, giving 8.1 minks per section, or 3.6 females per section in 1955. Marshall (1936) estimated 1.5 females per section after a heavy trapping season.

In 1955 the total number (23), age, and sex of all known animals taken commercially off the study area were available, but in 1956, only the total number (32) taken was obtained. Table III shows sex and ages of the animals taken off the area by live-trapping during the entire study; those taken off the area by commercial trappers in 1955, and a sample of 985 of the minks taken during the 1955 statewide trapping season. The statewide ratio 1:5.2 (Greer, 1957) of adult females to juveniles is somewhat higher than the live-trapping ratio (1:4.4) and commercial trapping ratio (1:3.8) for the area. This indicates that the reproduction may not be maximum on the area and an increased harvest might be advisable.

Table III. Ages and sexes of mink live-trapped and commercially trapped on the study area and a sample of 985 minks taken statewide.

Period	Adults		Juveniles	
	Male	Female	Male	Female
Live-trapping (1955-57)	4	7	21	10
Commercial Trapping on the Area (1955)	4	4	12	3
Commercial Trapping; Statewide (1955)	136	137	438	274

Weights

Weights of four adult males averaged 1245 grams, ranging from 1100 to 1400 grams. Weights of seven adult females averaged 560 grams, ranging from 275 to 700 grams. McCabe (1949) reports the wild minks he captured in Wisconsin to average as follows: adult males, 1055 grams; adult females, 574 grams. In the present study, the female weights averaged 45 percent of the males.

Examination of Table II indicates no apparent correlation between distances traveled, days between captures and weight losses of tagged minks. The extremes showed a gain of 100 grams in six days between captures with no apparent movement and a loss of 200 grams while traveling 0.3 miles. The former was a female and the latter a male, but no correlation is found between the sexes on weight variations with respect to number of captures and days between captures. The two larger weight losses were both by males. Even during the breeding season, there was no general trend of weight losses, by males or females.

SUMMARY

1. A study of minks with emphasis on movements and populations was conducted on a section of the lower Madison River that extends from a point six (airline) miles south of Three Forks, Montana, to the Highway 10 bridge, one mile east of this city, during the fall of 1955, summer and fall of 1956, and the winter and part of the spring of 1957.

2. Numerous islands dot the swift-flowing river channel, so that water surface widths vary from 40 to 100 yards within the area. Depths

of under one foot were common and over five feet, rare. Woody shrubs, represented mainly by willow was the predominate riparian vegetation, with a sparse to moderate cover of cottonwood. Submerged, floating and emergent aquatics were common.

3. Access to the area for live-trapping was gained by using a boat in summer and fall and a nearby road in winter. Metal, two-door live-traps with either mink scats or musk as scent were most successful in capturing minks. Trapped animals were handled with the use of a specially made wire cone.

4. Forty-two animals were captured 78 times; 15 were recaptured. Eleven adults and 31 juveniles were taken. Age of live-trapped males was determined by palpation of the baculum. Adult females were recognized by presence of well-developed mammae and gray hairs on the napes of their necks. Trapping success was best in late fall and winter, poorest during the late summer.

5. Juvenile males were indicated to have moved the greatest distances during the study; one moving 7.9 airline miles, and another 4.8. One female showed a home range of 53.1 acres.

6. The total population of the area was estimated to be 94 mink in 1955 and 232 in 1956 by use of the Lincoln Index. The adult female to juvenile ratios of 1:4.4 and 1:3.8 as determined from live-trap captures and commercial trapping data, respectively, were lower than the 1:5.2 statewide ratio.

7. Live-trapped adult males averaged 1245 (1100-1400) grams and adult females 560 (275-700) grams. No apparent correlation was found

between distances traveled, days between captures and weight variations of minks.

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