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SEASONAL MOVEMENTS OF PRAIRIE GOOSE IN SOUTH DAKOTA

BY

WARREN JACKSON

A thesis submitted  
in partial fulfillment of the requirements for the  
degree Master of Science, Major in  
Wildlife Management, South Dakota  
State University

1967

SEASONAL MOVEMENTS OF PRAIRIE GROUSE IN SOUTH DAKOTA

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

\_\_\_\_\_  
Head, Wildlife Management Department      Date

2011  
25/11



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## ACKNOWLEDGMENTS

Many individuals contributed their thoughts and time to this project for which I am grateful.

Dr. Donald R. Progulske, Head of the Department of Wildlife Management at South Dakota State University, gave encouragement and assistance throughout the study and in preparing the manuscript.

Information for this paper was collected while the author worked as an assistant biologist and District Game Manager for the South Dakota Department of Game, Fish and Parks. Work from April, 1962 through June, 1964 and from January through March, 1967 was financed by Pittman-Robertson funds (Projects W-75-R-4-6 and W-95-R-1). The remainder of the work was financed by State Game Management Division funds.

Several employees of the South Dakota Department of Game, Fish and Parks helped during the study. Robert Dahlgren, Assistant Chief of Game Research, gave advice and assisted in preparing reports. Robert Henderson, District Game Manager, assisted in compiling banding records and modifying the funnel traps that made collecting more efficient in 1964-1967. Ronald Hoffman, John Popowski, and the late Tom Rohwer of the Game Management Division, Eugene Dominiack and Floyd Gaarder of the Law Enforcement Division, and Roland Harnes of the Forestry and Parks Division assisted with the trapping and banding operation.

The cooperation of ranchers, farmers and numerous sportsmen who contributed information and offered assistance throughout the study is also greatly appreciated.

Warren Jackson

## ABSTRACT

From 1962 through 1966, 1,401 plains sharp-tailed grouse (Pediceetes phasianellus jamesi) and greater prairie chickens (Tympanuchus cupido pinnatus) were trapped in Gregory and Lyman Counties in south-central South Dakota. Cannon-projected nets and funnel traps were used to capture prairie grouse on breeding grounds and winter baitsites. Some birds were marked with backtags and leg-markers. Movement information was obtained from field observations, hunter reports, sharp-tailed grouse collections, and by recapturing banded birds. Male birds moved less than two miles from winter baitsites to breeding areas; most movements over five miles were made by immature female birds. Seventy-seven percent of the hunter reported birds were taken within three miles of winter baitsites. Prairie grouse used winter baitsites more than one year although some birds exchanged sites during the season and from one year to the next. The limited movement by most sharp-tailed grouse indicates that habitat requirements are adequate throughout the area studied. Improvement of existing habitat for food and cover will probably be the most productive management tool.

## SEASONAL MOVEMENTS OF PRAIRIE GROUSE IN SOUTH DAKOTA

## INTRODUCTION

A knowledge of the seasonal and annual movements of plains sharp-tailed grouse (*Pedioecetes nasianellus jamesi*)<sup>1</sup> and greater prairie chickens (*Tympanuchus cupido pinnatus*) is a requisite to proper management of these species.

South Dakota is among four states having the largest population of greater prairie chickens (Baker 1953) and among five states having the largest combined populations of sharp-tailed grouse and prairie chickens (Henderson 1965). Sharp-tailed grouse inhabit much of the western two-thirds of the State while prairie chickens occur in greatest numbers in the south-central part. Highest population densities of the birds, determined from breeding census surveys, are found in counties immediately west of the Missouri River.

The South Dakota Department of Game, Fish and Parks owns several tracts of game production and public hunting land near the Missouri River that vary in size from 160 to over 3,500 acres. Some tracts are located in favorable prairie chicken range and also in areas of high sharptail density.

A portion of Gregory County was once considered a possible site for a National Prairie Chicken Monument and this study was originated

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<sup>1</sup>Scientific nomenclature of birds according to American Ornithologists Union, Check-List of North American Birds. 5th Edition, 1957. The Lord Baltimore Press, Inc., Baltimore, Maryland.

to gather information on prairie chicken and sharp-tailed grouse movements within the proposed site. However, after the proposal was abandoned, the investigation was modified to determine movements of the birds in a larger area of their range.

Although some studies have been made of movements of prairie grouse (both prairie chickens and sharp-tailed grouse) little factual information has been gathered on grouse in the South Dakota range, especially by marking and recovering many hundreds of birds. During a previous study in South Dakota Janson (1950) marked two prairie chickens and 173 sharptails with aluminum legbands from 1947-1949. Thirteen bands recovered from sharptails were reported by hunters (seven the first fall after banding and six the second fall after banding) and revealed movements from approximately  $2\frac{1}{2}$  to 30 miles. Movements were of two major types: to and from wintering areas and continuous dispersal. Eight birds (62 percent) were shot less than five miles from the banding sites. Female birds moved the greatest distances.

Klett (1957) marked 523 sharp-tailed grouse in North Dakota from 1954-1956. All birds were banded with aluminum legbands and some were also marked with dye. He found 86 percent of the marked birds observed and 74 percent of the band recoveries were within  $1\frac{1}{2}$  miles of winter banding sites. Returns from fall-banded birds were all from within  $1\frac{3}{4}$  miles of the release site. Fall recoveries of winter-trapped birds showed females dispersed wider than males. The average annual cruising of all birds was less than two miles

although some individuals were found at much greater distances. Most nests were found within one-half mile of an established dancing ground.

Kobriger (1965) trapped 60 male sharptails on winter feeding areas and marked them with dye. Thirty-five (58 percent) were observed on dancing grounds and 89 percent had moved less than  $1\frac{1}{4}$  miles from the release sites. The mean dispersal distance was 0.9 miles and extremes ranged from approximately  $\frac{1}{4}$  to  $3\frac{1}{2}$  miles. Two prairie chicken males and one hybrid male were trapped on a winter feeding area, marked with dye and observed on a breeding ground 100 yards from the release site. A male sharptail, monitored by radio telemetry, moved  $2\frac{1}{2}$  miles from a dancing ground between May and August. A female sharptail fitted with a radio transmitter nested two miles from a dancing ground where it had been taken and released.

Ammann (1957) summarized that prairie chickens and sharptails are more mobile in winter than in other seasons but that most birds of both species remain within four or five miles of their summer haunts when proper food and cover are available. He reported that when winter food is insufficient prairie chickens may move as far as 30 miles to find a suitable wintering area. Sharptails were less likely to wander from the breeding area but occasionally flocks were found during the winter ten miles from summer habitat.

Investigators working in Wisconsin noted that male prairie chickens remain within restricted areas during the spring and summer.

They found that males used the same booming grounds for more than one spring and that the cruising radius during summer months was generally one mile or less (Hamerstrom and Hamerstrom 1949). Marshall and Jensen (1937) made 90 percent of their spring observations of male sharptails within one-half mile of dancing grounds.

Additional studies of marked prairie grouse have also confirmed that seasonal and yearly movements are generally restricted but that some individuals move several miles (Aldous 1943, Hamerstrom and Hamerstrom 1951, Peterle 1956).

#### THE STUDY AREA

The study area was established in Gregory and Lyman Counties, the two southern-most counties in South Dakota that lie just west of the Missouri River (Figs. 1 & 2), which have substantial populations of prairie chickens and sharp-tailed grouse (Fig. 3). Podoll (1961) pointed out that essential habitat features necessary to maintain a prairie chicken population (mainly large acreages of grasslands) are present in south-central South Dakota. Baker (1953) and Hamerstrom et al. (1957) emphasized the importance of having at least one-third of the land area in grass to maintain a prairie chicken population. Gregory and Lyman Counties have 41 and 65 percent of the non-federal land in native grass respectively (Podoll 1961). Federal land constitutes less than six percent of the combined acreages of these counties.

The area lies in the chernozem soil region formed from Pierre shale. The grayish-brown clay soils are well to excessively drained. Annual rainfall averages 19 inches and vegetation is composed of

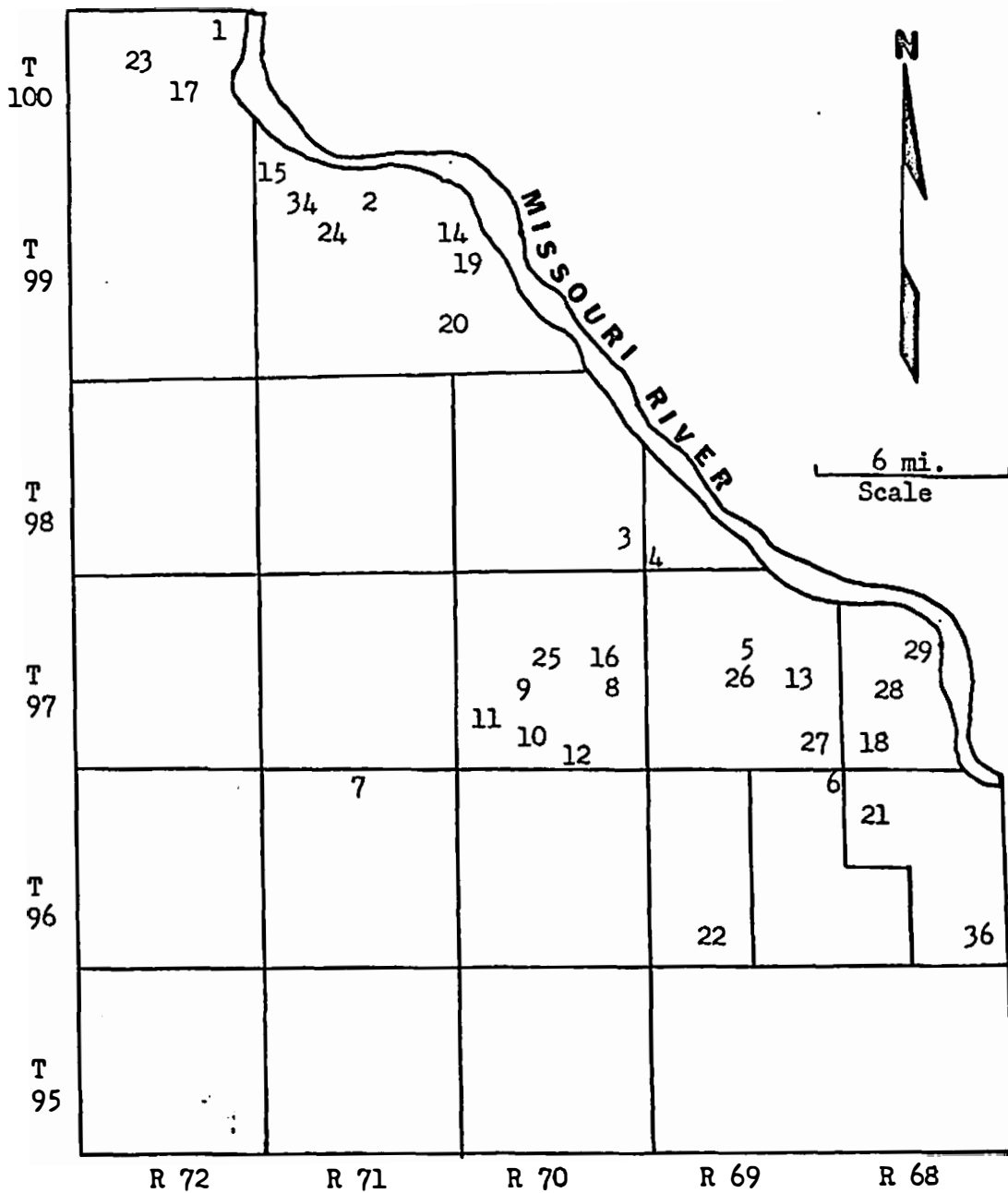


Fig. 1. Gregory County portion of the study area showing banding sites by number (see Appendix).



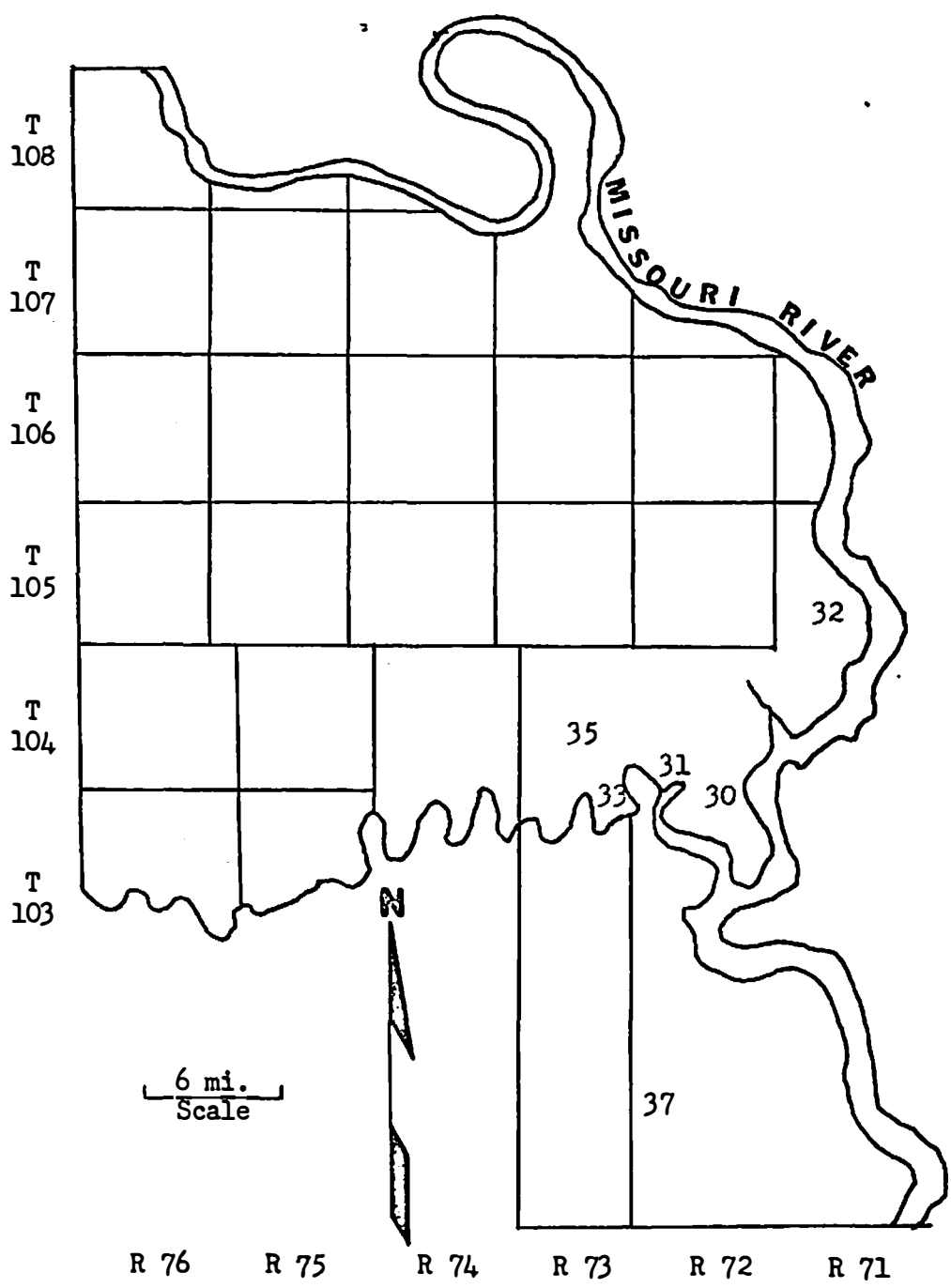
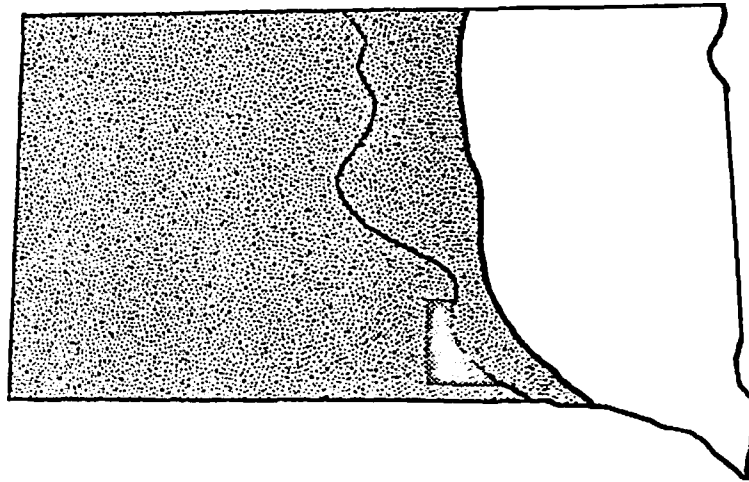


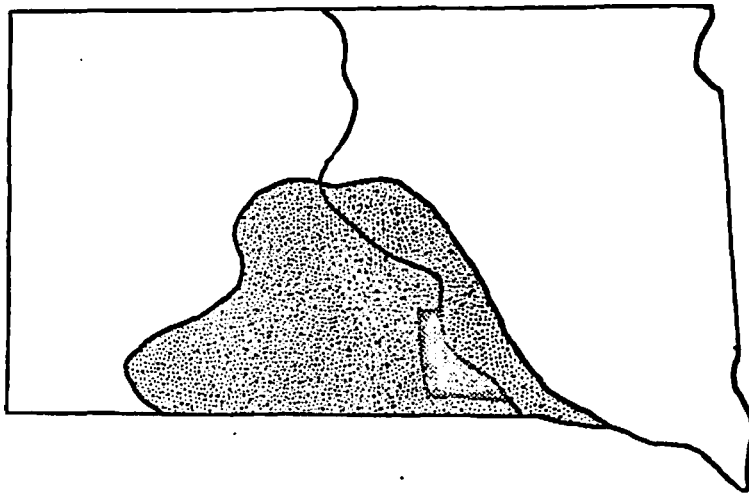



Fig. 2. Lyman County portion of the study area showing banding sites by number (see Appendix).



 Plains sharp-tailed grouse (Pedioecetes phasianellus jamesi)

 Study area



 Greater prairie chicken (Tympanuchus cupido pinnatus)


 Study area

Fig. 3. Prairie grouse distribution in South Dakota.

tall-, mid- and short-grass species. Annual temperature averages 47 degrees Fahrenheit. Elevation varies from 1,800 to 2,800 feet with the topography being undulating to steep (Westin et al. 1959).

Nearly all of the study area is pasture and hayland. Pasture rotation is being commonly practiced by most ranchers. Accessible portions of winter pastures are mowed and the hay left, either loose or baled, for livestock during winter months. Areas inaccessible for mowing retain much residual vegetative cover until spring. A small portion of the area is planted with crops, mainly alfalfa, wheat, corn, sorghum and oats.

Dominant native grasses are big bluestem (Andropogon gerardi)<sup>1</sup>, little bluestem (A. scoparius), western wheatgrass (Agropyron Smithii), blue grama (Bouteloua gracilis), Indiangrass (Sorghastrum nutans), switchgrass (Panicum virgatum), dropseeds (Sporobolus spp.) and needlegrasses (Stipa spp.).

In the southern part of the study area woody cover is limited primarily to north- and west-facing slopes and creek bottoms, but in the north it is almost entirely along drainages. Trees most common include American elm (Ulmus americana), bur oak (Quercus macrocarpa), green ash (Fraxinus pennsylvanica), cottonwood (Populus spp.) and willow (Salix spp.). Abundant shrubs include choke-cherry

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<sup>1</sup>Scientific nomenclature of plants according to Merritt L. Fernald, Gray's Manual of Botany. 8th Edition, 1950. American Book Co., New York.

(Prunus virginiana), sumac (Rhus spp.), snowberry (Symphoricarpos spp.), plum (Prunus spp.) and buffaloberry (Shepherdia spp.).

Mammals commonly found in the area include white-tailed deer (Odocoileus virginianus),<sup>1</sup> mule deer (O. hemionus), antelope (Antilocapra americana), prairie dogs (Cynomys ludovicianus), coyotes (Canis latrans), red foxes (Vulpes fulva), and badgers (Taxidea taxus). Common resident birds include wild turkeys (Meleagris gallopavo), ring-necked pheasants (Phasianus colchicus), and bob-white quail (Colinus virginianus).

Water is generally available in stock dams on many branch drainages and in dugouts on flat areas. Prominent drainages are Burnt Rock, Whetstone and Landing Creeks in Gregory County and Bull Creek and the White River in southern Lyman County. These large drainages are free of man-made water control structures. Numerous artesian wells occur throughout the area (Fig. 4).

#### METHODS

Prairie chickens and sharp-tailed grouse were trapped and marked in the spring of 1962 and 1963, during the fall of 1962 and during the winters of 1963-1966. Trapping was continued during the winter of 1967 but information on birds banded then is not included in this paper. Weights were recorded for many of the birds. Several

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<sup>1</sup>Scientific nomenclature of mammals according to E. R. Hall and K. R. Kelson, The Mammals of North America. 1959. The Ronald Press, New York.

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Fig. 4. Typical terrain on the study area.

broods of both grouse species were located by driving over roads, trails and accessible grassland at speeds from 10-15 miles per hour as suggested by Tweet (1959). An English setter dog was also used to locate young and adult birds in 1963. Records were kept for each brood sighting.

### Trapping

Various methods have been used to capture game birds for study. Cannon-projected nets (Kobriger 1965, Klett 1957 and Peterle 1956), funnel traps (Klett 1957), mist nets (Johnson 1964), dropnets (Jacobs 1959) and tip top traps (Aldous 1943 and Peterle 1956) have been employed to capture prairie chickens and sharp-tailed grouse.

In this study nylon nets (55 x 75 feet) projected with five Miller-type cannons were used to capture both grouse species on breeding grounds in 1962 and 1963 (Fig. 5). A smaller net (25 x 75 feet) projected by three cannons was used on winter baitsites in 1963. Cannons were loaded with round pill boxes that contained 5.5 grams of DuPont bulk shotgun powder. A DuPont electric squib with four-foot copper wires was imbedded in the powder charge, and the box was sealed shut with pressure tape.

Trapping activities in 1962 and 1963 were conducted on courtship grounds previously located by State Game Department biologists. The grounds were observed to determine the species using the ground, accessibility to the area by vehicle and the center of activity. The grounds used for trapping were generally on elevated portions of



Fig. 5. Cannon net set to capture prairie grouse.

alfalfa fields or winter and summer pastures. One exception was a prairie chicken ground (Site 19, Fig. 1) located on a mud flat at the edge of the Missouri River (Fort Randall Reservoir).

Nets were set on courtship grounds during the day then fired on the following morning. Catches were made from one-half hour before sunrise to two hours after sunrise. One evening catch in the spring was made approximately one hour before sunset. Wind interference made netting impossible on several mornings and lowered success on others. Strong wind blowing into the net from the front or side slowed the speed and caused the net to fall short of the target area. When this happened, birds escaped before the net settled to the ground.

Areas frequented by prairie chickens and sharptails during winter months were baited with ear corn for several days then a cannon net was set when the birds established a feeding pattern. Winter trapping was most successful at corn-storage sites where area farmers piled their crops each year. Successful catches were made during both morning and evening hours.

Birds marked during 1964-1966 were caught in baited funnel traps. Flock concentrations were located on cropland during the winter months and the general feeding areas were then baited with approximately five bushels of ear corn. Feeding platforms similar to those designed by Ammann (1957:34) were constructed on five areas in 1964, the main purpose being to keep bait out of reach of deer.



When birds began to use the feeders regularly, bait was placed on the ground and a funnel trap was set around it (Fig. 6). Only sharp-tailed grouse were observed at the feeders. Hamerstrom et al. (1957) found that prairie chickens are reluctant to bunch closely while feeding which means that large flocks will rarely take food from hoppers.

Funnel traps were eight feet wide, ten feet long, and three feet high and framed with 2 x 2-inch lumber. The sides were covered with 2 x 4-inch welded wire. Funnels made of poultry mesh and having dimensions of one foot square at the outside opening, tapered to a six-inch hole at the inside and 30 inches long were used on only three sides of the trap to provide adequate room inside for captured birds. The trap top was made of one-inch cotton fish netting. Sides of the trap were attached together with soft wire, thus they were very portable and two could be easily hauled in a pickup truck at one time. One man could unload and assemble a trap in less than 15 minutes.

Trapping was most successful on winter baitsites when the temperature was well below freezing and the ground was covered with snow. Two or three baitsites were trapped on the same day. A trap was operated at each baitsite for at least one entire day and was emptied after the morning feeding period and just prior to dusk. Some sites were trapped a second time at a later date if the first attempt resulted in a poor catch. Sharp-tailed grouse were easily

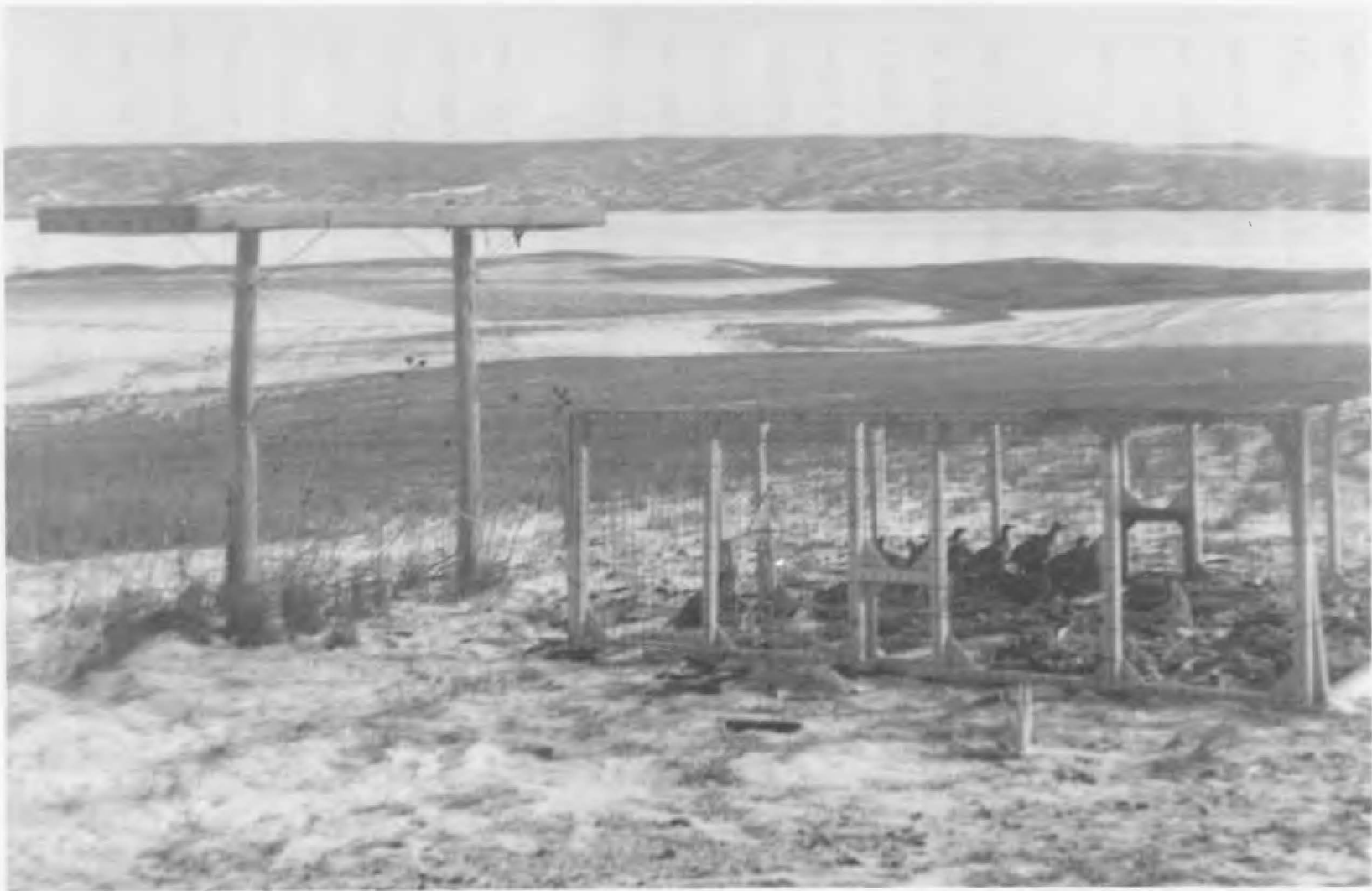


Fig. 6. A successful catch of sharp-tailed grouse in a funnel trap.

taken in funnel traps but prairie chickens were seldom caught in them. When a sharp-tailed grouse flock had established a feeding pattern on bait it was possible to set up a trap just before sunrise and catch much of the flock on its next visit to the bait.

### Marking Techniques

Some techniques in addition to aluminum legbands have been used to mark game birds for field observation. Dyes have been used by Edminster (1938) to mark ruffed grouse (*Bonasa umbellus*), by Klett (1957) and Kobriger (1965) to mark sharp-tailed grouse, and by Leopold et al. (1938) and Wadkins (1948) for marking pheasants. Schwilling (1961) used backtags to mark sharp-tailed grouse in Nebraska. Blank and Ash (1956) successfully used backtags for marking partridges (*Perdix* spp.), but Gill (1965) found backtags to be of limited value for marking sage grouse (*Centrocercus urophasianus*).

In this study all birds caught and released during the five-year period were marked with serially numbered, butt-end aluminum legbands. Birds caught in 1962 and 1963 were also marked with colored, numbered backtags designed after those of Labisky and Mann (1962) and were made of U. S. Rubber Naughahyde material and strips of buckskin leather. An Ace clipper stappler was used to bind the leather and material. Backtags were made six inches long and  $1\frac{1}{2}$  inches wide and buckskin strips were cut 13 inches long and three-eighths inch in width (Fig. 7).

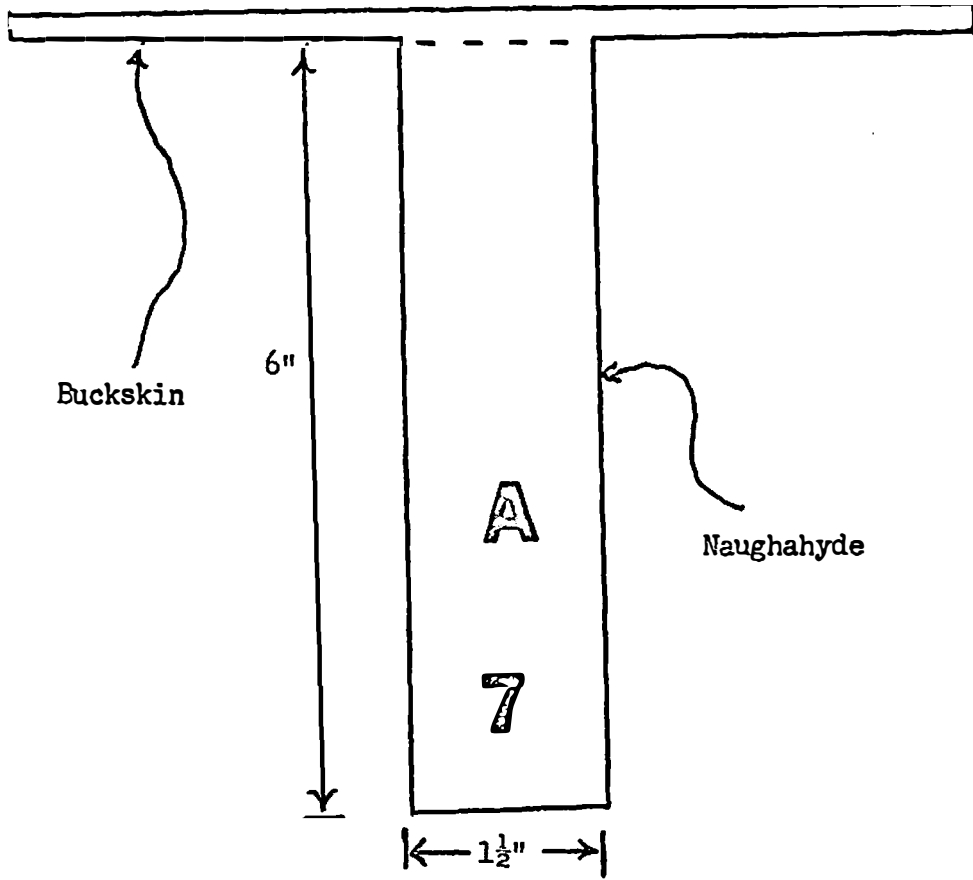


Fig. 7. Backtag marker.

The backtags proper were made from four colors of material and identifying marks were painted on them with Ramcote vinyl plastic paint. Numbers zero through nine, thirteen letters and two symbols were used. The tag was placed on the back of the bird and the buckskin strip adjusted around the anterior edge of the wings and up over the posterior edge of the wings where the strip was stapled to the backtag a second time. The backtag weighed approximately three-tenths of an ounce.

Some birds trapped during 1964 and 1965 were also marked with colored plastic legbands. Two bands three-eighths inch in width and of the same color were put on the right leg of males and the left leg of females.

A strip of Safabric (available from: Safety Flag Company of America, Box 1005, Pawtucket, Rhode Island) material was used as a leg-marker on some birds in 1964 and 1965. Strips of orange, green, black and white material  $2\frac{1}{2}$  inches by three-fourths inch were loosely attached to the right lower leg of males and the left leg of females with an Ace stapler. Other birds were marked with a strip of the material attached to the plastic legband.

Orange food dye applied with a paint brush was used to mark the tail and breast feathers of male birds at one banding site in 1964.

Data on prairie chicken and sharp-tailed grouse movements were collected by continuous field work from 1962-1964. Information collected from 1965-1967 was only from hunter bag checks, winter trapping, non-hunting season collections of sharptails, and sightings of marked birds.

## RESULTS

### Definition of Terms

Terms used to discuss findings are as follows:

(1) Winter, Spring, Summer and Fall seasons. Each season is a three-month period with Winter beginning January 1.

(2) Recapture. A prairie grouse caught one or more years after being banded or one caught at a different trap site during the same season.

(3) Repeat. A bird caught more than once at the same trap site during the same season.

(4) Movement. Any move of one-half mile or more determined after the bird was marked and released. Distances were determined by straight-line measurement.

(5) Recovery. Information collected from a hunter report, recapture, non-season collection or an observation of a marked bird.

### Counts of Breeding Prairie Grouse

A census of breeding prairie grouse is made each year along established routes by Department of Game, Fish and Parks personnel who count male birds on courtship grounds during April and May. The route in Lyman County covers 40 square miles and the Gregory County route covers 25 square miles. Data from recent years indicate the density of prairie grouse in the study area (Table 1).

Table 1. Counts of prairie grouse in the study area, 1963-1966.

Route	Year	Number of Grounds Counted	Males/Ground	Males/Sq.Mile
<u>Sharp-tailed Grouse</u>				
Lyman	1963	7	10.57	1.85
Lyman	1964	6	11.50	1.72
Lyman	1965	8	11.12	2.23
Lyman	1966	9	8.67	1.95
Gregory	1965	4	9.00	1.44
Gregory	1966	4	8.75	1.40
<u>Prairie Chicken</u>				
Lyman	1963	8	7.40	1.47
Lyman	1964	9	7.11	1.60
Lyman	1965	7	5.60	0.98
Lyman	1966	6	6.00	0.90
Gregory	1965	17	5.29	3.60
Gregory	1966	16	4.56	2.92

### Trapping and Marking

Fifty-nine prairie grouse (37 percent of birds observed using the courtship grounds) were captured during the spring of 1962. Included were 53 sharptails (49 males, 4 females) and six prairie chickens (5 males, 1 female). Fourteen male sharptails were captured during the fall of the same year (30 percent of birds observed using the areas) on two sites where spring trapping attempts were successful. Five were young-of-the-year as determined by primary wing feather development (Ammann 1944, Plate 9; Thompson 1958). The remainder of the birds trapped during 1962 were not aged. The catch for each cannon-netting attempt averaged 2.7 birds.

Winter trapping in 1963 resulted in a catch of 61 sharp-tailed grouse (23 males, 38 females) and 13 prairie chickens (9 males, 4 females). The age ratio for both species was two young per adult after excluding five prairie chickens that were not aged. The average catch for each netting attempt was 6.1 birds.

Spring trapping in 1963 caught 69 birds (44 percent of those observed using the courtship grounds) with 66 being sharptails (60 males, 6 females) and three male prairie chickens. The average catch for each netting attempt was 4.6 birds. Ages of the birds were not determined (Table 2).

Twelve birds were killed or severely injured by cannon nets (6 percent). Seven died at the trapsite and five suffered dislocated leg-joints. Klett (1957) experienced heavy mortality of sharp-tailed



Table 2. Prairie grouse banding summary, 1962-1966.

Year	Total Banded	Sharp-tailed Grouse		Prairie Chicken		Hybrid	
		Males	Females	Males	Females	Males	Females
1962	73*	63	4	5	1	0	0
1963	143*	83	44	12	4	0	0
1964	357	176(142)**	163(135)	12(9)	5(4)	1	0
1965	386	135(90)	234(146)	11(4)	2(1)	0	4(4)
1966	442	177(141)	246(198)	7(5)	10(5)	1(1)	1(1)
Totals	1,401	634	691	47	22	2	5

\*Ages were determined for only a portion of the sample.

\*\*Number in parenthesis represents young-of-the-year birds in sample.

grouse using cannon nets, while Gill (1965) felt that a great amount of shock and injury resulted when the technique was used. Because of the mortality experienced early in this study, the use of cannon nets was discontinued in 1963.

A total of 1,185 prairie grouse was banded from 1964-1966, the years following cannon net trapping. Included were 1,131 sharp-tailed grouse, 47 prairie chickens and 7 hybrids (Table 2). Leg-markers were attached to 624 of the birds using the three methods previously described: colored plastic legbands (156), Safabric around the leg (368) and Safabric attached to legband (100). Twenty-five male birds marked with the Safabric strip around the leg were also marked with orange dye on the tail and breast feathers.

Less than one percent of the prairie grouse caught in funnel traps died or were badly injured. Some losses occurred when avian predators entered the traps. Other birds were found dead in the traps from unknown causes. Klett (1957) likewise reported very little mortality using funnel traps.

Repeat catches in 1962 included a male prairie chicken and a male sharptail caught one and two days respectively after being marked. Two sharptail females were caught at the release site in 1963, 21 and 32 days after being banded. Forty-three repeat catches were made in 1964, 109 in 1965 and 133 in 1966. Some birds were caught more than once. Occasionally, a bird banded in the morning would be caught that evening at the same site. Aldous (1943),

Johnson (1964) and Koberger (1965) commonly made repeat catches in their studies.

A sharptail male trapped May 2, 1962 and recaptured on April 16, 1963 was the only bird (frontispiece) marked with a backtag and recaptured during this study. Sharp-tailed grouse banded from 1964-1966 were commonly recaptured in following years. Sixteen percent (187 birds) were recaptured the first year after being released, 3.5 percent (41 birds) two years after being released and 0.2 percent (2 birds) three years after being marked (Table 3).

Wildlife attracted to the traps in addition to grouse included: white-tailed jackrabbits (Lepus townsendii), a porcupine (Erethizon dorsatum), cottontail rabbits (Sylvilagus floridanus), a badger, a bald eagle (Haliaeetus leucocephalus), a great horned owl (Bubo virginianus), mallard ducks (Anas platyrhynchos) and ring-necked pheasants.

#### Evaluation of Markers

All prairie grouse marked with backtags and later examined retained the marker. Symbols painted on backtags were clearly visible up to one year after the backtag was attached and harnesses of leather also appeared in good condition after this length of time.

Although care was exercised in attaching backtags to prairie grouse, some birds were unable to fly from the release site. When backtags were first used they were attached loose enough to allow space for two fingers under the harness. Only five of the first 14

Table 3. Sharp-tailed grouse recaptured, 1965-1967.

Year Banded	Year Recaptured	Number Recaptured				Total
		Immature Male	Adult Male	Immature Female	Adult Female	
1964	1965	24	5	13	3	45
	1966	5(4)*	1(1)*	2(1)*	1(1)*	9
	1967	0	0	2(1)*	0	2
1965	1966	12	6	35	26	79
	1967	2(2)*	3(3)*	13(11)*	14(10)*	32
1966	1967	24	5	29	5	63
Totals		67	20	94	49	230

\*Number in parenthesis indicates birds that were also recaptured the previous winter.

birds so marked flew from the release site. Additional slack was then left when backtags were attached to the remaining 59 birds and 50 flew from the release site. The birds that walked from the sites probably did so because backtags may have been attached too tightly or the net may have frayed primary wing feathers and restricted a bird's flight as described by Gill (1965). Also, heavy dew may have dampened the wing feathers enough to prevent a bird from flying.

Positive identification of backtagged prairie grouse was difficult in the field because a bird had to be standing and looking or walking away from the observer. When a bird was flushed or was in flight the marking was difficult to identify.

Only three birds (1.4 percent), a male prairie chicken and two male sharp-tailed grouse, were known to be alive one year after being marked with a backtag. Heavy mortality or wide dispersal may have occurred in the marked population. Schwilling (1961) recommended using a different technique after marking 375 sharp-tailed grouse with backtags (a modification of those described by Blank and Ash 1956) as he felt the backtags may have caused increased mortality to marked birds because only one bird was known to live through one complete year.

The marking technique was not entirely accepted by residents of the study area and by hunters. One rancher denied the author trapping privileges after finding a marked prairie chicken tangled in a plum bush. Another rancher removed the backtag from a sharptail that was unable to fly. A male sharptail was caught by hand after

a sportsman had flushed it three times. Hunters were not enthusiastic about the marking when they reported shooting backtagged birds.

Colored plastic legbands were the best markers used during 1964 and 1965. All birds examined up to two years after being released had retained the marking. It was possible to attach the markers under all field conditions and no special tools were needed for application. Yellow bands seemed most easily identified.

Colored fabric strips attached to a leg of some prairie grouse were retained by 92 percent of the birds examined after one year and by 73 percent of those examined two years after being marked. The means of attachment was satisfactory but the material frayed on cut edges after one year. Orange and white strips were the most visible colors.

The strip of fabric on a plastic legband was the poorest leg-marker used. All grouse examined one and two years after the marker was attached had lost the strip of fabric, but all legbands were retained (Table 4).

All leg-markers were easily identified at a distance of 100 yards when ocular aids were used. The markings were visible during winter and spring months until new vegetation prevented observation. Very little fading had occurred on markers examined up to two years after being attached. Leg-markers served a two-fold purpose: they enabled an observer to identify birds in the field and helped the hunter to notice the numbered aluminum legband.

Table 4. Retention of leg markings used in 1964 and 1965. .

Type of Marking	Retention After One Year (%)	Retention After Two Years (%)	Retention After Three Years (%)
Plastic Spiral Legbands	100(23)*	100(7)	(0)
Safabric Strip	92(93)	73(33)	100(1)
Safabric Strip on Plastic Legband	0**(11)	0**(2)	(0)

\*Number in parenthesis indicates number of markers examined.

\*\*Plastic legbands were retained by all birds.

An orange food dye used on male grouse at one winter baitsite was of value in determining movements to spring breeding grounds. The marking was easily visible at distances of over 200 yards when ocular aids were used and was effective for approximately one month.

Aluminum butt-end legbands were satisfactory for marking prairie grouse although two birds recaptured a year after being banded had lost the marker.

#### Prairie Grouse Movements

Movement information was collected from 43 different prairie grouse trapped in 1962 and 1963 (20 percent of 216 birds marked) and from 360 different birds trapped from 1964-1966 (30 percent of 1,185 prairie grouse marked). Twelve percent (168 birds) marked from 1962-1966 were reported by hunters, the major source of most movement information. Movements of birds marked in 1962 and 1963 are shown in Tables 5 and 6, and reports of prairie grouse banded from 1964-1966 are shown in Table 7. Additional movement information was obtained by recapturing birds, from field observations of color-marked prairie grouse, and from sharp-tailed grouse that were shot for research studies (Table 8).

Most information obtained was for sharp-tailed grouse thus data discussed in the following sections pertains to this species unless otherwise noted.

Fall Recoveries of Winter-banded Birds.--Eighty-six (54 percent) of the prairie grouse banded from 1964-1966 were shot by hunters



Table 5. Movements of sharp-tailed grouse determined by backtag markers in 1962 and 1963.

Sex	Site Number Where Marked	Source of Data	Movement (in miles)	Time After Banding (in days)
Males (30)*	3	Shot	0.0	170
	4	Shot	7.0	159
	4	Shot	0.0	167
	4	Recaptured	0.0	349
	6	Shot	1.0	158
	8	Shot	1.0	155
	14	Observed	0.5	8
	14	Observed	0.5	8
	14	Observed	0.5 (0.45)**	8
	14	Observed	0.5	8
	14	Observed	0.5	8
Females (7)*	14	Observed	0.5	23
	14	Shot	0.0	185
	15	Observed	0.5	33
	18	Observed	1.0	64
	6	Observed	2.5	6
8	Shot	1.0 (1.36)**	155	
15	Shot	6.0	214	

\*Number of backtagged birds observed and examined; only those showing movements, shot or recaptured are shown in table. The remaining birds were observed at the release site.

\*\*Average movement.

Table 6. Movements of prairie chickens determined by backtag markers in 1962 and 1963.

Sex	Site Number Where Marked	Source of Data	Movement (in miles)	Time After Banding (in days)
Males (3)*	13	Found Dead	1.5	46
	13	Observed	1.0 (0.83)**	391
	19	Shot	0.0	162
Females (3)*	10	Shot	2.5	177
	13	Found Tangled	8.0 (3.50)**	63

\*Number of backtagged birds observed and examined; only those showing movements, shot or recaptured are shown in table. The remaining bird was observed at the release site.

\*\*Average movement.

Table 7. Prairie grouse band recoveries reported by hunters, 1964-1966.

Age and Sex at Banding	Number of Birds Recovered	Recovery Distance from Banding Site (Miles)								Average Distance from Trapsite to Recovery (Miles)	Percent Re-covered within Three Miles of Banding Site
		0-1	1-2	2-3	3-4	4-5	5-10	10-20	Over 20		
Adult Male	15	10	0	4	0	1	0	0	0	1.47(0.0-5.0)*	93
Adult Female	20	9	3	2	0	2	1	0	3**	7.80(0.0-48.0)***	70
Immature Male	61	39**	8	6	2	2	3	1**	0	1.89(0.0-12.0)***	87
Immature Female	62	28	9	3	5	4	5	6	2	4.35(0.0-37.0)	65
Totals	158	86	20	15	7	9	9	7	5	3.56(0.0-48.0)	77

\*Figures in parenthesis indicates range.

\*\*Includes one prairie chicken recovery.

\*\*\*Prairie chicken moved greatest distance.

Table 8. Sharp-tailed grouse banded on winter baitsites that were collected (shot) for research studies.

Age and Sex When Banded	Distance Moved (in miles)			Month Collected	Time Lapse (months)
	0-1	1-2	Over 3		
Adult Male	1 ---	--- 1	--- ---	January April	22 3
Immature Male	--- --- 2 1 ---	1 1 --- --- 1	--- --- --- --- ---	April July May December April	3 6 4 11 3
Adult Female	1 2 1	--- --- ---	--- --- ---	December March May	22 12 4
Immature Female	--- 3 2	--- --- ---	1(9)* --- ---	November March November	23 1 10

\*Number in parenthesis indicates the actual miles moved.

within one mile of the banding site and 121 (77 percent) were shot within three miles. All birds shot further than 12 miles from banding sites were females. Three prairie chickens were reported taken. Two of them (an adult female and an immature male) had moved 48 and 12 miles respectively, the greatest distances of all birds in those age and sex groups. Movements were varied in distance and direction, but some similarity was noted when hunters harvested several birds in a westerly direction from some baitsites, especially from those located near the Missouri River (Sites 14, 30, and 32). Extensive grassland areas occur west of these sites. Most bands were recovered early in the hunting seasons held from mid-September to mid-October (Table 7).

One female trapped during the winter of 1963 was shot six miles northwest of Site 15. This was the only winter-banded bird marked with a backtag that was shot by a hunter.

Four birds (2 young females, 1 old female, 1 young male) shot for research studies were taken within a mile of the release site (Table 8). A young female banded at Site 32 was collected at Site 31.

Fall Recoveries of Spring-banded Birds.--Hunters reported shooting nine prairie grouse that had been marked with backtags during spring breeding seasons. A male was shot seven miles from a dancing ground, while all other sharptails were shot less than a mile from where they were released. A female prairie chicken was

shot  $2\frac{1}{2}$  miles from the breeding ground and a male was taken at the release site.

Winter Movements.--Data collected from recaptured birds showed that movements during a winter season were restricted to some exchange between baitsites. Six birds (4 young females, 1 old female, 1 young male) moved between Sites 31 and 33 in less than a month. All other observations and collections of marked birds were made at the release site.

Some birds moved between baitsites from one year to the next. Two young females, an old female and a young male had moved to sites less than four miles distant. Two other young females moved nine miles from Site 32 to 31, and 13 miles northeast from Site 31. An additional 225 birds were recaptured at the release site. An adult male and two adult females were shot for research studies at the release sites, one and two years later.

Movements from Winter Baitsites to Spring Breeding Grounds.--Thirty-two male sharptails observed on dancing grounds had moved less than two miles from winter feeding areas. In addition, five males (4 young, 1 adult) and an adult female were collected within two miles of marking sites. One female was observed in April, 14 miles southeast of the site where it had been marked a month earlier.

Three prairie chicken males banded at Site 23 were observed on three different breeding grounds all within a mile from the site.

A female prairie chicken was observed feeding near Site 13 on two occasions in April and a male was seen on a booming ground one-half mile away.

Spring Movements.--Fifteen male birds were observed within 100 yards of the breeding grounds where they had been released earlier in the season. A female banded on April 26 was observed feeding on May 1, three miles from the dancing ground where it was marked. The bird had moved from the breeding ground in rolling grassland to the edge of cropland.

Movements from Winter to Summer, and from Spring to Summer and Fall.--One young male banded on a winter baitsite was shot for study two miles east of the site and two males banded on a spring breeding ground were observed at the release site the first summer. Three additional males trapped on spring breeding areas were seen that fall in the same place.

Movements across the Missouri River.--Flocks of prairie grouse are commonly seen during the winter months in Brule, Buffalo and Charles Mix Counties on the east side of the Missouri River. There is a resident population of prairie grouse in these counties but it is not known how many birds from the study area move to these east-river counties for winter habitat requirements. Persons living near the Missouri River have seen prairie grouse fly from one side to the other, a distance of more than a mile. Two banded sharp-tailed

grouse from the study area moved across the river. A young female moved 13 miles northeast of Site 31 and was recaptured a year later at a winter baitsite in Brule County. Another young female moved 12 miles southeast of Site 14 to Charles Mix County and was shot 19 months after being banded.

It is possible that frequent movements from one side of the river to the other occurred but they were not detected. Hunting seasons east across the river from the study area have been localized and short with light hunting pressure. Also, most grouse probably move to wintering areas after the hunting season ends. Efforts to catch and mark or collect large numbers of prairie grouse east of the Missouri River have been unsuccessful.

#### CONCLUSIONS

Cannon-projected nets were successful for capturing prairie grouse on courtship grounds during spring and fall seasons and on winter baitsites, but several birds were killed or injured by the nets. Baited funnel traps were most efficient for capturing sharp-tailed grouse on winter baitsites, but prairie chickens were seldom caught in them. Funnel traps are recommended for capturing sharptails at winter baitsites but a more efficient method should be employed for capturing prairie chickens.

Aluminum legbands, backtags, dye, plastic legbands and Safabric strips were used to mark birds. Backtag markers are not recommended for prairie grouse research because: (1) marked birds were difficult to identify in the field, (2) heavy mortality may have occurred in



the marked population, and (3) the marking technique was not entirely accepted by area residents and hunters. Colored plastic legbands were the most permanent leg-marker used while a dye solution was a sufficient short-term marker.

This study indicates that most sharp-tailed grouse have a small home range and the findings are similar to results of work done in previous studies. Spring, summer and fall habitat requirements were generally present within three miles of wintering sites. The small amount of information collected on prairie chickens during this study suggests that this species also has a small home range. All movements of over 12 miles were made by female birds that were mostly young-of-the-year. Movements were not similar in distance or direction in most instances. Extensive movements out of the area probably did not involve enough birds to affect the initial breeding population the following year.

Marked birds shot and reported by hunters probably reflected the areas used by prairie grouse during spring, summer and fall seasons. Birds were generally shot in grassland areas adjacent to winter feeding sites.

Banding showed that very little movement of birds occurred during the winter season and from one winter to the next, as 97 percent of prairie grouse recaptured used the same winter feeding areas where they were originally trapped and marked. Nearly all of the movements noted were by female birds. Flocks of prairie grouse fed

on cropland areas during winter months and dispersed to breeding areas. All sharptail males were observed on breeding grounds within two miles of baitsites and prairie chicken males were found within a mile of them. Spring, summer and early-fall movements of sharptails were confined to local moves in the vicinity of breeding areas.

Some sharp-tailed grouse move to areas on the east side of the Missouri River. A future study should determine: (1) the extent of movement across the river, (2) when the movements occur, (3) if prairie chickens make these moves, and (4) if management can be improved in regards to possible extensive movement. Since data collected on prairie chickens during this study were very limited, future research effort should be directed toward this species.

Improvements of existing breeding, nesting and brood-rearing habitat for sharp-tailed grouse and prairie chickens will be the most productive management tool on State-owned lands at the present time.

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APPENDIX

Appendix. Prairie grouse trapping sites, Gregory and Lyman Counties, South Dakota, 1962-1967 (See Text Figures 1 and 2).

Site Number	Name of Area	Legal Description			Seasons Trapped
		Section	Township	Range	
1	Drews Ranch	SW of 11	100	72	Spring, 1962, 1963
2	Faust Ranch	NE of 10	99	71	Spring, 1962
3	Hooksma Ranch	SE of 25	98	70	Spring, 1962, 1963 Fall, 1962
4	Sutton Ranch	NE of 31	98	69	Spring, 1962, 1963
5	Marts Ranch	SE of 16	97	69	Spring, 1962
6	Silliams Ranch	NW of 6	96	68	Spring, 1962, 1963
7	Drey Ranch	NW of 4	96	71	Spring, 1962, 1963
8	Norris Ranch	NW of 24	97	70	Spring, 1962, 1963
9	Gnirk Ranch	NW of 22	97	70	Spring, 1962
10	Smikle Ranch	NE of 29	97	70	Spring, 1962
11	" "	NE of 30	97	70	Spring, 1962
12	" "	SE of 34	97	70	Spring, 1962 Fall, 1962
13	Baldwin Ranch	SE of 22	97	69	Winter, 1963
14	Buryanek Area	SE of 7	99	70	Winter, 1963, 1964, 1965, 1966, 1967
15	Stukel Ranch	NW of 6	99	71	Winter, 1963, 1967
16	Pense Ranch	NE of 14	97	70	Winter, 1963
17	Drews Ranch	SW of 22	100	72	Spring, 1963
18	Williams Ranch	NE of 31	97	68	Spring, 1963
19	Buryanek Area	NW of 17	99	70	Spring, 1963
20	" "	NE of 30	99	70	Spring, 1963
21	Qualm Ranch	SE of 6	96	68	Spring, 1963
22	Kehn Ranch	NE of 29	96	69	Spring, 1963

Appendix continued.

Site Number	Name of Area	Legal Description			Seasons Trapped
		Section	Township	Range	
23	Drews Ranch	NE of 21	100	72	Winter, 1964, 1965, 1966, 1967
24	Bailey Ranch	NE of 16	99	71	Winter, 1964
25	Gnirk Ranch	NW of 14	97	70	Winter, 1964
26	Marts Ranch	SW of 22	97	69	Winter, 1964, 1965, 1966
27	Williams Area	NE of 36	97	69	Winter, 1964, 1965, 1966, 1967
28	Whetstone Bay	SW of 20	97	68	Winter, 1964
29	Haisch Area	NE of 21	97	68	Winter, 1964, 1965
30	Carpenter Area	SW of 4	103	72	Winter, 1964, 1965, 1966, 1967
31	Neugebauer Area	NE of 30	104	72	Winter, 1964, 1965, 1966, 1967
32	Kiowa Area	SW of 27	105	71	Winter, 1965, 1966, 1967
33	White River Area	NW of 36	104	73	Winter, 1965, 1966
34	Kime Ranch	NW of 8	99	71	Winter, 1965, 1966
35	Graves Ranch	NE of 22	104	73	Winter, 1966
36	Hertz Ranch	NW of 30	96	67	Winter, 1966, 1967
37	Hammerbeck Area	SW of 19	102	72	Winter, 1967