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Movement and seasonal ranges of the Burdette Creek elk herd and an investigation of sport hunting

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MOVEMENT AND SEASONAL RANGES OF THE BURDETTE CREEK ELK HERD, AND AN INVESTIGATION OF SPORT HUNTING

By

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Director: Dr. Robert R. Ream RRR

Locations of unmarked and 22 individually marked elk provided information concerning movement patterns and seasonal ranges of elk using the Burdette Creek winter range, located 25 miles (40 km) west of Missoula, Montana. Radio transmitters on 10 elk helped furnish data on fidelity to and size of seasonal use areas. Marked elk were located on 383 occasions and 1,428 unmarked elk were observed from April 1970 to May 1975. Data were also gathered on population structure, elk bio-activity centers, and sport hunting activity. Five hundred hunter questionnaires were distributed to sportsmen during fall 1974.

Winter range was the smallest and most homogeneous seasonal elk habitat used and use was concentrated on steep south and west-facing brush-covered slopes. During the first two weeks of June, most elk suddenly moved west onto summer range, up to 11 miles (19 km) distance. A small portion of the herd remained on winter-spring ranges during summer. Fall elk range, the largest of seasonal areas (270 sq mi; 700 sq km), was quite heterogeneous. Some radio-collared elk made erratic long distance moves in September and October that were attributed to hunting activity. All marked elk used the same winter-spring range and some returned to summer-fall areas used before; the average size of winter-spring and summer-fall range was 3.7 and 11.4 square miles (9.6 and 29.6 sq km), respectively, for 10 radio-collared elk. The winter-spring population of the Burdette Creek elk herd was estimated to be 225-300. Forty-eight percent were cows, 25 percent calves, 20 percent bulls, and 7 percent were unclassified. The herd had calf:cow ratios of 53 and 40 per 100 cows, respectively.

Game checking station data indicated that 67 elk were harvested in 1974; approximately 5 and 3 percent hunter success during early bull and general elk seasons, respectively. Fifty percent of the hunting parties expressed opinions against early bull seasons, 75 percent favored U.S. Forest Service policy of closing logging roads to four-wheeled vehicles, and 24 percent rated their hunting experience as excellent.

Recommendations included protecting winter range and elk bio-activity centers from further disturbance, burning portions of the winter range to improve browse conditions, and regulating the number of hunters in the Clearwater Crossing area to protect over-crowding.

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I remember with thanks and respect, the late Terry McCoy, who taught me how to locate instrumented elk from an airplane. Terry was killed in an airplane crash on 31 August 1974, while working on an elk study.

Special thanks go to all sportsmen and guides who supplied me with hunting information, their obvious interest in game management is appreciated. I also thank my friends and fellow graduate students, for assisting with trapping and marking elk.

Working with the above people and living on the study area, was a memorable experience I am grateful for.

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CHAPTER I

INTRODUCTION

From April 1974 to May 1975, I investigated movement patterns and seasonal ranges of the Burdette Creek elk (Cervus elaphus) herd, in western Montana. During fall 1974, sport hunting of this herd was also studied in detail.

Prior to 1970, specific biological information concerning the Burdette Creek elk herd, was generally unknown (Bohne 1974). During 1970, the Montana Department of Fish and Game, in cooperation with the University of Montana School of Forestry, initiated research to gather basic biological data needed for management purposes. From July 1970 to May 1972, Bohne (1974) studied big game history, habitat use and food habits of the Burdette Creek elk herd. Zahn (1974) studied elk movements from May to December 1973, using biotelemetry. Fish and Game Department personnel, operate game checking stations during the hunting season and, using aircraft, make annual population trend counts on the winter range. Licensed outfitters, operating in the area, must also report their hunting success to Fish and Game Department personnel (Hartkorn and Janson 1974).

The study area, located in the Lolo National Forest along the western border of Montana, lies within state hunting districts 202 and 203, formerly 220 and 230. These districts have received increased use by resident and nonresident sportsmen in recent years (Hartkorn and Janson 1974). Approximately

150 to 250 elk congregate on wintering areas in district 203, but are found throughout both districts during other seasons (Bohne 1974). Elk that winter together on district 203 are harvested in both districts during the fall (Zahn 1974). From a management standpoint, because elk are highly mobile animals, it is desirable to know their movements and seasonal ranges throughout the year.

Elk movements and distribution have been studied in detail in recent years. The work of Craighead et at. (1972, 1973), Knight (1970), and Boyd (1970) is probably best known. For some herds, extent and condition of seasonal habitat, particularly winter range, apparently regulate elk population size and productivity (Boyd 1970, Knight 1970). Seasonal elk ranges on the study area could be disturbed by future logging and road building (Bohne 1974). Key elk-use areas should be defined now, so detrimental effects may be recognized and avoided. Craighead et al. (1973), McLean (1972), Ream et al. (1972), Simmons (1974), and others have effectively used biotelemetry to locate important elk-use areas; I also relied on radio-collared elk for movement and distribution data.

The legal harvest of elk, the major mortality factor of most herds (Boyd 1970), is becoming more important as sport hunting increases. Game regulations, hunting methods, and sportsman ethics have become popular, controversial issues with the increase of hunting and decline of some wildlife populations (Morgan 1973). To satisfy public demand for quality

elk hunting and perpetuation of the species, current hunting practices and hunter attitudes must be understood. Information concerning hunting and hunter psychology can be gathered using hunter questionnaires and interviews (Stankey et al. 1973), Hendee 1974); I distributed 500 questionnaires during fall 1974, to investigate hunting activity on the study area.

My study was a continuation and expansion of Zahn's (1974) research on elk movements, conducted for the Montana Cooperative Elk-Logging Study. General study objectives were to determine what areas of hunting districts 202 and 203, elk use during non-winter months and to describe elk hunting activity on the area during 1974. Specific study objectives were to:

1. determine direction and extent of elk dispersal between winter and summer ranges;
2. describe seasonal ranges used by elk;
3. estimate population size, sex ratio, and herd productivity;
4. compare results with data gathered in previous studies; and
5. investigate sport hunting and hunter attitudes.

CHAPTER II

STUDY AREA

Location

The study area is located on the Ninemile and Missoula Ranger Districts, Lolo National Forest, along the western border of Montana, approximately 25 miles (40 km) west of Missoula (Fig. 1). For elk movements and distribution, the study area is defined as the country used by elk marked on the winter range, approximately 270 square miles (700 sq km). To investigate hunting activity, a larger area was considered, including most of hunting district 202 and a portion of district 203, approximately 420 swuare miles (1,092 sq km) (Fig. 2). The entire study area lies within Missoula and Mineral counties of Montana, except for one elk location in Clearwater County, Idaho.

On the study area, elk use a winter range of about 25 swuare miles (65 sq km), with the majority located in Wig, Burdette, and Lupine Creek drainages. Most elk winter in the Burdette Creek drainage, hence the term Burdette Creek elk herd; but, this term referes to all elk using the above winter range (Zahn 1974).

Two main gravel roads along Petty and Fish creeks, between Interstate 90 and U.S. Highway 12, and logging roads provide access. However, many roads are impassable from February to May. Some areas, particularly along the Idaho border, can only be reached on foot or horseback.

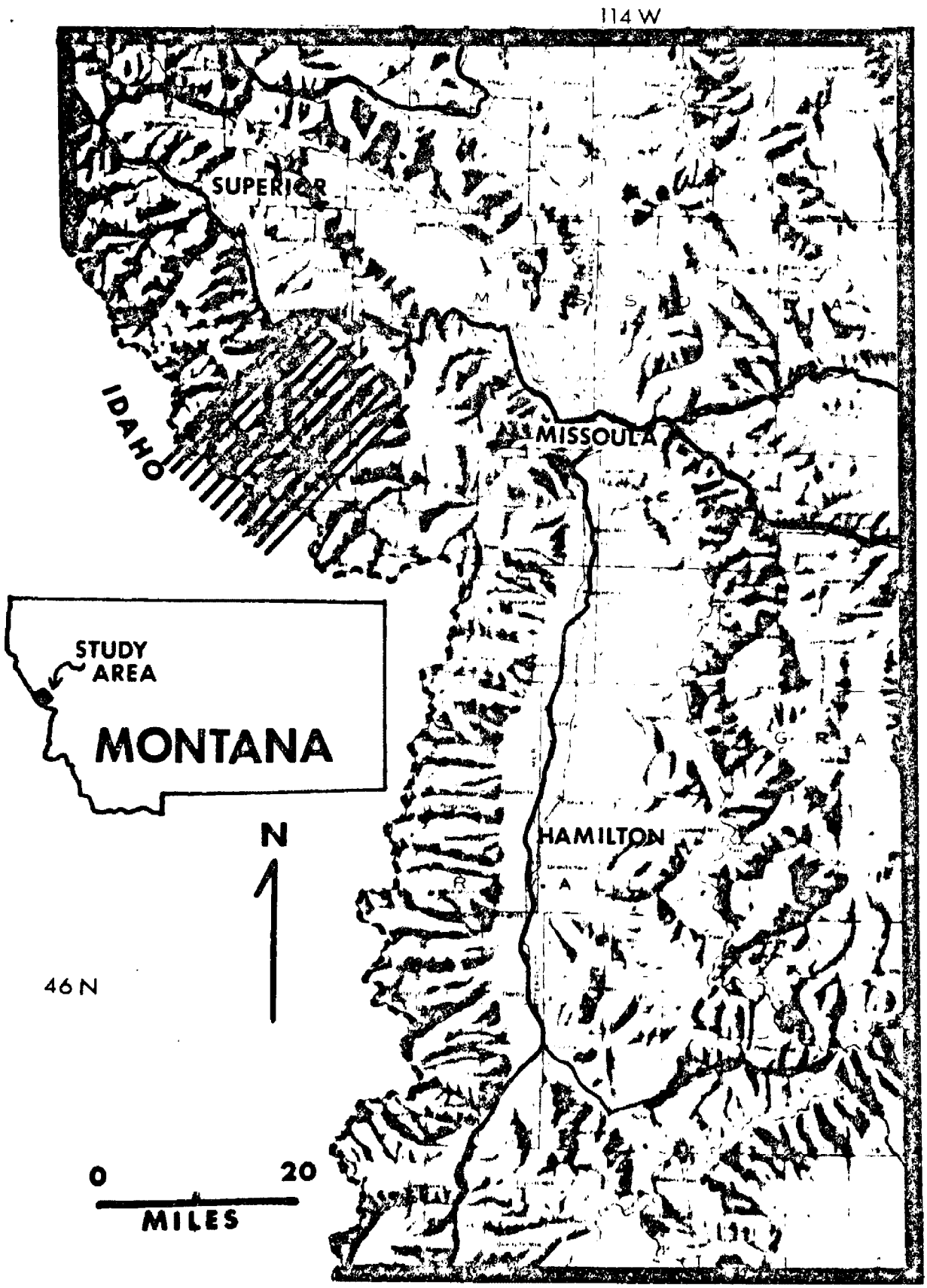


Fig. 1. Location of study area.

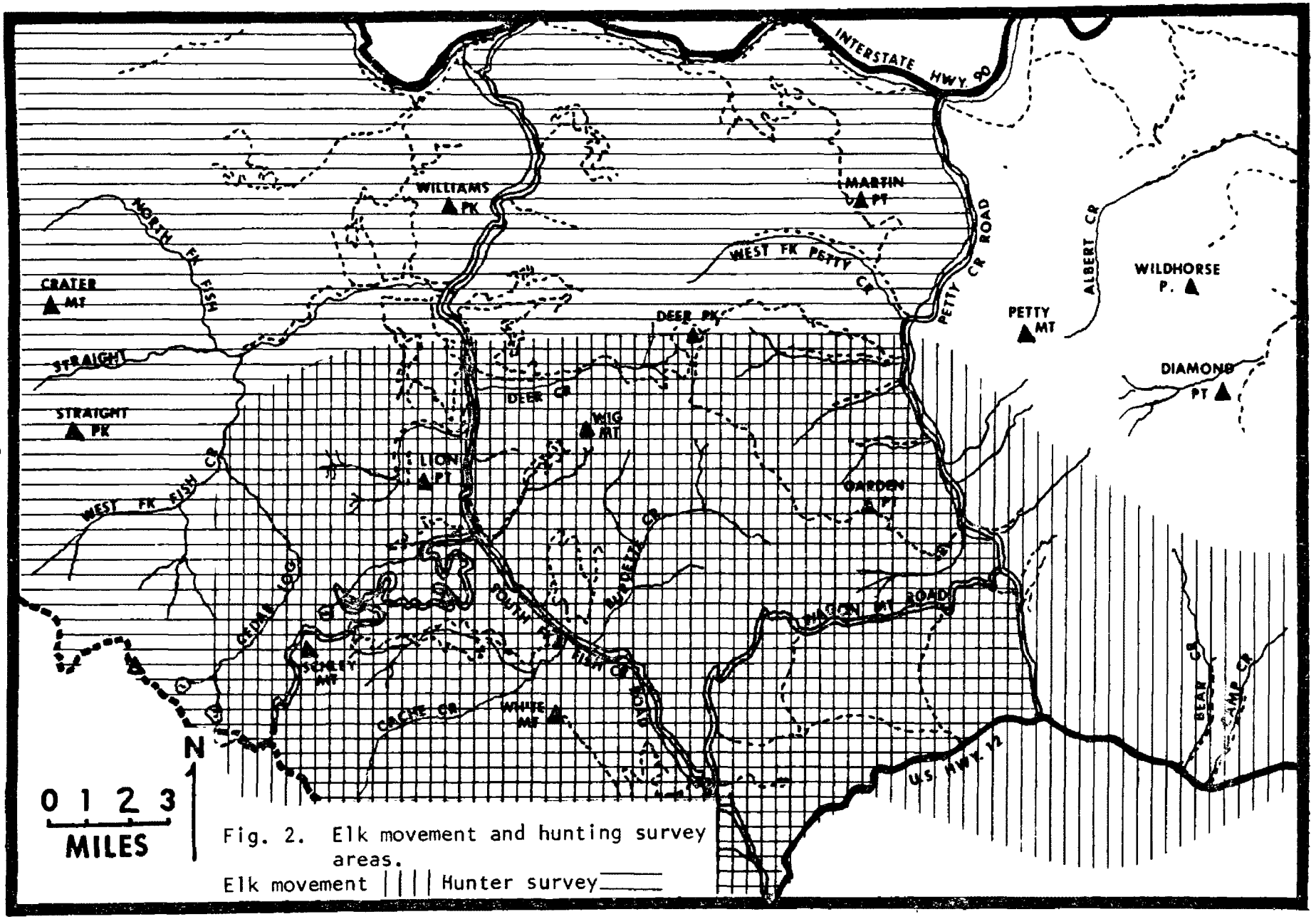


Fig. 2. Elk movement and hunting survey areas.

Elk movement |||| Hunter survey——

Physiography

Within the study area, portions of three major stream systems, Fish, Petty, and Lolo Creek, drain mountainous regions of the Bitterroot Range. Elevations range from less than 3,000 feet (915 m) at the mouth of Fish Creek, to over 7,600 feet (2,300 m) along the Idaho Divide. More than 50 named streams and 13 named lakes are dispersed among narrow valleys and steep ridges, that dominate the landscape. Three mountain divides, Petty Creek, Fish Creek, and Idaho, extend north and south across the area; the western most Idaho Divide is the highest. The Idaho Divide is marked by exposed peaks and glacial formations; the rest of the area is less rugged and more forested. Physiology, geology, and soils are described in detail by Bohne (1974).

Climate

Pacific weather systems and Canadian high pressure fronts dominate the local climate (Zahn 1974). Since 1961, personnel of the Lolo Hot Springs weather station, located 7 miles south of the winter range, have gathered climatological data applicable to the study area. From weather station information, I compiled a summary of temperature, precipitation, and snow depth data, for 1974 (Table 1). Bohne (1974) and Zahn (1974) discussed climatic parameters in some details including a summary of temperature-precipitation data since 1961.

Dates of first heavy snowfall, severity of winter temperatures, maximum snow depths, and dates of spring thaws are

TABLE 1. Summary of weather data, Lolo Hot Springs, 1974.

Month	Ave. daily max. temp. (°F)	Ave. daily min. temp. (°F)	Ave. daily mean temp. (°F)	Percip-itation (inches)	Total snow (inches)	Max. snow depth (inches)
January	27.9	11.3	19.6	2.03	19.6	*
February	40.1	19.8	30.0	1.67	*	*
March	43.7	20.6	32.2	4.32	*	*
April	56.1	28.0	42.1	.64	*	*
May	59.7	31.0	45.4	.99	2.0	2
June	80.8	40.1	60.5	1.55	.0	0
July	81.5	43.1	62.3	2.08	.0	0
August	81.1	41.1	61.1	1.04	.0	0
September	73.7	30.7	52.2	.39	.0	0
October	62.5	24.1	43.3	.49	Tr.	0
November	40.9	23.7	32.3	1.72	*	7
December	34.2	17.5	25.9	1.97	*	*
Annual	56.9	27.6	42.2	23.95	21.6	

*Indicates no records; Tr. Trace

From: U.S. Climatological Bulletins, U.S. Weather Bureau, Helena, Montana, 1974

important climatic factors affecting elk survival in the Rocky Mountains. Prolonged periods of deep snow and low temperatures, tax the animal's ability to maintain normal health, during this period of food scarcity.

Vegetation

Vegetation is predominantly coniferous forest with smaller areas of riparian plant communities, seral brush fields, and subalpine tundra. Vegetational distribution is dependent primarily on aspect, elevation, and fire history (Bohne 1974). Plant communities of the study area were described by Lyon (1973) using a classification system devised by Pfister et al. (1972). Pfister's system is based on ultimate climax plant communities; the basic unit being the habitat type, defined as "the aggregation of units of land capable of producing similar plant communities at climax. Since it is the end result of plant succession, the climax plant community reflects the most meaningful integration of the environmental factors affecting vegetation." Seventeen habitat types were described for the area (Bohne 1974) (Table 2). Lyon (1973), developed a habitat type model, based on variations in altitude and aspect, for the Burdette-Deer Creek area (Fig. 3). His scheme is probably applicable to most of the study area, except the Idaho Divide country.

Since 1910, forest fires burned over 39,000 acres (15,800 ha) of the study area (Bohne 1974). Forest fires, particularly the large ones of 1910 and 1917, created areas of fire-killed

TABLE 2. Habitat types found on the study area.

Douglas fir (*Pseudotsuga menziesii*) habitat types
Douglas fir/Bluebunch wheatgrass (*Agropyron spicatum*), DF/AGSP
Douglas fir/Beargrass (*Xerophyllum tenax*), DF/XETE
Douglas fir/Dwarf huckleberry (*Vaccinium caespitosum*), DF/VACA
Douglas fir/Kinnikinnic (*Arctostaphylos uva-ursi*), DF/ARUV
Douglas fir/Ninebark (*Physocarpus valvaceus*), DF/PHMA
Douglas fir/Snowberry (*Symphoricarpos albus*), DF/SYAL
Douglas fir/Pinegrass (*Calamagrostis rubescens*), DF/CARY
Douglas fir/Twin flower (*Linnaea broealis*), DF/LIBO
Douglas fir/Scree, DF/S
Ponderosa pine (*Pinus ponderosa*) habitat types
Ponderosa pine/Bluebunch wheatgrass (*A. spicatum*), PP/BLWH
Ponderosa pine/Pinegrass (*C. rubescens*), PP/CARU
Ponderosa pine/Scree, PP/S
Subalpine fir (*Abies lasiocarpy*) habitat types
Subalpine fir (*Abies lasiocarpa*)/Queen cup beadlilly (*Clintonia uniflora*), AF/CLUN
Subalpine fir (*Abies lasiocarpa*)/Beargrass (*X. tenax*), AF/XETE
Subalpine fir (*Abies lasiocarpa*)/Fool's Huckleberry (*Menziesia ferruginea*), AF/MEFE
Other Minor Habitat Types
Spruce (*Picea* spp.)/Twin flower (*L. borealis*), P/LIBO
Western red cedar (*Thuja plicata*)/Queen cup beadlilly (*Clintonia uniflora*), WRC/CLUN

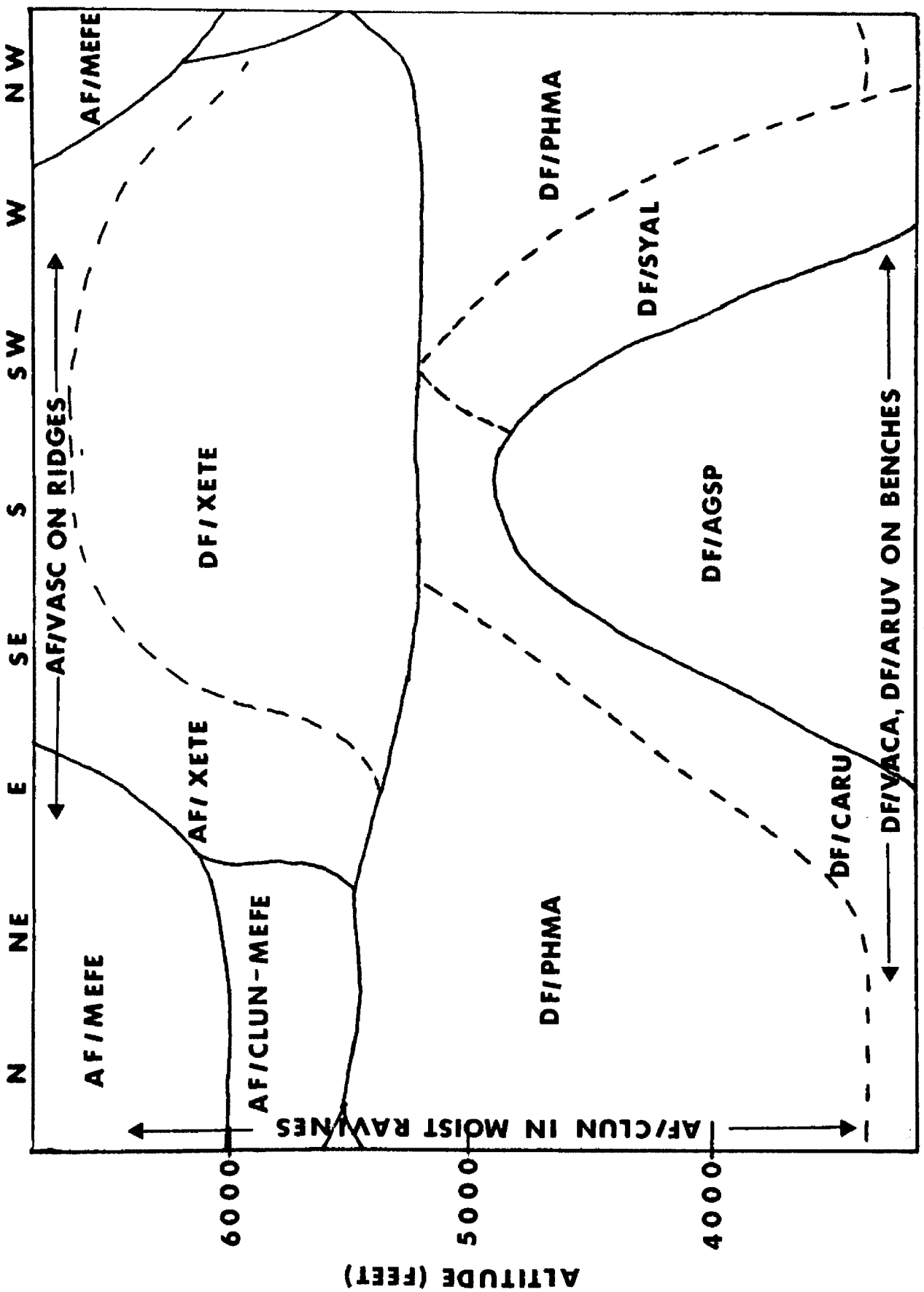


Figure 3. Habitat type model of the Burdette Creek-Deer Creek area.

trees and seral brush visible today. The most extensive brush fields are located on steep south and west aspects, where soil, temperature, and precipitation have reduced tree reproduction (Bohne 1974). Seral brush fields provide the bulk of deer and elk winter range; important forage species include: serviceberry (Amelanchier alnifolia), evergreen ceanothus (Ceanothus velutinus), ninebark, mountain maple (Acer glabrum), chokecherry (Prunus spp.), and willow (Salix spp.). Bohne (1974), described in detail dates, sizes, and locations of forest fires since 1910.

Zahn (1974) and Bohne (1974) reported extensively on vegetation of the study area, describing plant distribution, forage conditions, and seasonal use by elk.

Human Influence

Permanent influence by white man began in the 1890's with the homesteading of Petty Creek drainage, followed by the settlement of the Fish Creek area in the early 1900's. Valley bottom land was cleared, and cattle ranching attempted in both drainages, with limited success. At present ranching persists on Petty Creek bottom lands, but is discontinued in the narrower less-fertile Fish Creek valley, except for seasonal horse pasturing on private land. Recreational use of cabin sites, on state leased lands and subdivided homesteads, accounts for most human habitation of Fish Creek drainage. Land ownership is predominantly U.S. Forest Service

(over 70%), with smaller holdings owned by Burlington Northern Railroad, The State of Montana, Champion International, and private individuals (Bohne 1974).

Following large forest fires of the early 1900's, the Forest Service opened up large tracts of high-country in the Fish Creek drainage to sheep grazing; cattle and horse permits were allowed in valley bottoms. Thousands of sheep from other states, particularly Washington, were shipped in to use grazing allotments along the North and West forks of Fish Creek, Cache Creek, and the Idaho Divide. Sheep grazing was a short-lived venture; in the 1920's, the Forest Service phased out sheep allotments to protect big game winter range (Bohne 1974).

Recreational use of public land, on the study area, has increased rapidly in recent years (Anon. 1974). The primary recreational activities are hunting, fishing, hiking, horseback riding, and snowmobiling. The Forest Service provides one developed trailhead, Clearwater Crossing, and maintains approximately 100 miles (160 km) of hiking trails, primarily on the Idaho Divide. Fish and Game Department personnel maintain two fishing access sites on Fish Creek. Many undeveloped campsites are on Forest Service land adjacent to the Creek. Two commercial resorts, Bailey's Hunting Lodge and Hole-in-the-Wall Ranch, operate on the West Fork of Fish Creek. The latter resort changed hands in 1974 and now caters to youth groups, rather than private individuals and hunting parties (Mrs. Frank Askins pers. comm.). Due to weather

conditions most backcountry use occurs from July to November. In the past, several local ranches commercially guided big game hunters, but this business has declined (Bohne 1974). Four licensed outfitters operated in the area during 1974 (Gary Chambers pers. comm.).

Large scale logging began in Petty and Fish Creek drainages during 1945 and 1950, respectively. Operations varied from small selective cuts, on private property, to large clearcuts on Forest Service land in Montana and Deer Creek drainages. Small scale mining was conducted in the area, but the remaining gold and fluorspar mines have been inactive since 1973. Bohne (1974) discussed the history of logging and mining in detail. Human habitation and exploitation necessitated over 150 miles (258 km) of main access roads and many more miles of logging roads (Fig. 4). The first roads, along Petty and Graves Creeks, were constructed in 1890, but extensive roading did not start in either drainage until after 1950 (Bohne 1974). During 1974, two major logging roads along Deer and Montana creeks, were closed by the Forest Service to reduce the hazard of fire, and human impact on forest regeneration and wildlife activity (Anon. 1973).

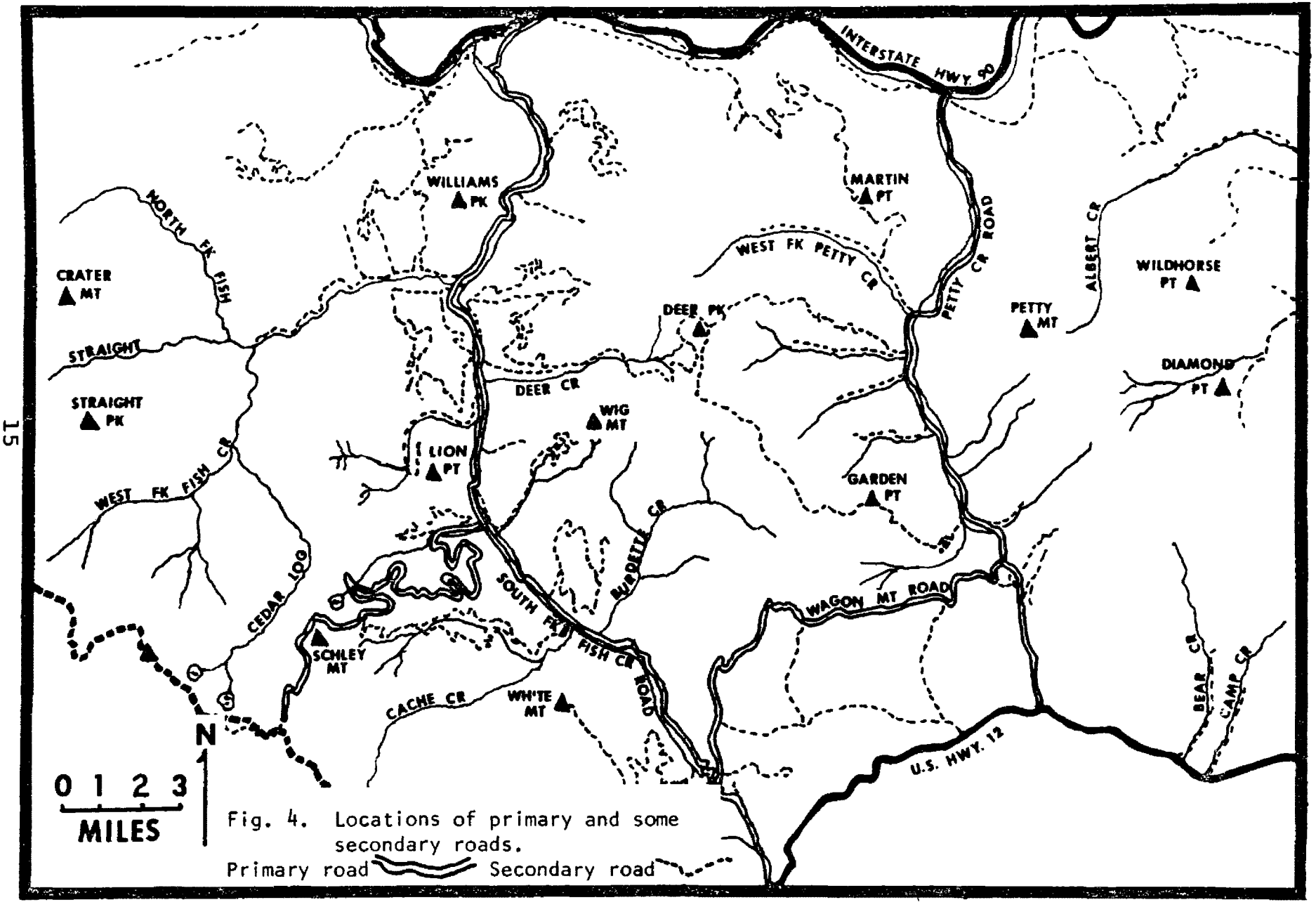


Fig. 4. Locations of primary and some secondary roads.

CHAPTER III

METHODS AND MATERIALS

Trapping and Marking

Trapping was conducted during the spring and summer of 1974, using a corral-type trap, located near Wig Creek Lodge (Fig. 2). The trap was baited with hay and salt in the spring, and with salt alone during summer. In April 1974, three elk were immobilized from a helicopter and radio-collared by Fish and Game Department personnel in the Burdette Creek drainage.

The trap was operated weekly from 22 March to 26 May 1974, and sporadically thereafter until 14 July 1974 (Table 3). Four trapped elk were immobilized with succinylcholine chloride, a neuromuscular drug, administered from a Palmer Cap-Chur gun. Sex, age, and general condition of each animal was recorded, and numbered metal Fish and Game Department ear-tags were attached. Three types of identification collars were placed on elk: 1) a PVC irrigation pipe radio-collar described by Zahn (1974); 2) a 4- or 6-inch wide plastic coated, conveyor belt, neckband; and 3) a plastic flag and nylon rope-collar described by Craighead et al. (1969). My study also relied on observations of previously marked elk (Zahn 1974).

Biotelemetry

Six elk were instrumented with pulsing radio transmitters in the 164 (2) and 151 (4) MH_Z range. Radio locations were

TABLE 3. Summary of trapping success at the Wig Creek elk trap, 1974.

Date	Captures	Date	Captures
3/23/74	none	5/26/74	1 cow elk D, radio-collared
3/30/74	"	6/14/74	none
3/31/74	"	6/17/74	2 cow elk #9, radio-collared B-1, belt-collared
4/6/74	"	7/11/74	none
4/13/74	"	7/12/74	7 elk, 1 mule deer cow, #9, receptured cow, R-1, rope-collared cow, R-2, rope-collared ♀ calf, R-3, rope-collared ♀ calf, R-4, rope-collared cow, R-5, rope-collared spike, B-2, belt-collared mule deer, not marked
4/14/74	2 feral horses		
4/21/74	none		
4/27/74	"		
4/28/74	"		
5/4/74	"		
5/5/74	1 adult bull elk unable to collar	7/13/74	none
5/12/74	"	7/14/74	3 cow elk ♀ calf, R-3, recaptured ♀ calf, R-4, recaptured cow, R-6, rope-collared
5/18/74	1 cow elk #8, radio-collared		
5/19/74	none	7/15/74	none

made by on-the-ground triangulation, using a hand-held, three element Yagi antenna (Stehn 1973, Denton 1973); and from an airplane (Cessna 182), equipped with a whip antenna system (Denton 1973). Aerial locations were most accurate (Zahn 1974), but due to weather conditions and expense only 17 flights were made. Two AVM Model LA11-S and a noncommercial receiver, constructed at the University of Minnesota, Cedar Creek Natural Area, were used.

Elk Location Data

I located elk visually and with biotelemetry techniques during all months of the year. Most locations were made while hoking in search of radio-collared elk, I also hiked established routes to census elk during winter and spring. All elk locations were plotted on USGS topographic maps (scale 1:24,000 or 1:62,500); radio approximations were represented by circles of varying size, not exceeding 20 acres (9 ha).

Geographic location, type of observation (visual or radio), marked elk identification, and number-age-sex of elk present were recorded for each location (Fig. 5). Elk were identified, counted, and classified using 12-power binoculars and a 15-60-power telescope. Sex and age classification followed accepted physical and behavioral criteria (Table 4).

I gathered habitat data concerning type of overstory, canopy coverage, understory, aspect, slope, distances to water and roads, elevation, season, and cover type (Fig. 6). Over-

Fig.5 . Animal location data sheet.

BURDETTE CREEK ELK STUDY - Thomas O. Lemke

__ Observation Number
__ Date (Julian)
__ Location (Stream Drainage)

1. Burdette	12. Surveyor	23. Gus
2. Wig	13. Thompson	24. Eds
3. Lupine	14. Cedar Log	25. W.Fk.Petty
4. Deer	15. Indian	26. Bear
5. Wall Canyon	16. Straight	27. Bear-2
6. Beaver Slough	17. W.Fk. Fish	28. Camp
7. Cache	18. N.Fk. Fish	29. Graves
8. Irish	19. Howard	30. Printer
9. Pebble	20. S.Fk.Petty	31. Bill
10. White	21. Garden	32. E.Fk.Petty
11. Montana	22. Johns	33. S.Fk.Fish

_ Visual Location
1. Yes 2. No
_ Radio Approximation
1. Yes 2. No
__ Total Number of Elk Observed
__ Number of Marked Elk
_____ Radio-collared Elk Present

1. #1	9. #9
3. #3	10. A
6. #6	11. B
7. #7	12. C
8. #8	13. D

_____ Rope-collared Elk Present

1. #442	4. #450
2. #444	5. #452
3. #448	6. #454

____ Belt-collared and Old Radio-collared Elk Present

1. Red, White, and Blue	4. A'
2. Black and White	5. B'
3. Old #5	6. C'

__ Number of Cows Present
__ Number of Bulls Present
__ Number of Calves Present
__ Number of Elk Uncertain as to Sex or Age
__ Additional Information
___

Table 4. Characteristics used to distinguish age and sex of elk.[1]

Character	Mature Males	Yearling Males	Females	Calves
Antlers	Branched. 2 yr old, 4-5 points/side, narrow upward swept beam. 3 yr old, 5-6+ points/side, heavy swept back beam.	Unbranched. Single spikes on each side	None.	Bumps visible on males in late spring.
Body size and shape	Heavy. Short-legged in appearance.	Trim. Long-legged in appearance.	Adults heavy and short-legged. Yearlings trim and long-legged.	Smaller than other classes
Body color	Very light. Little contrast between rump patch and back. Dark legs and belly contrast with sides.	Similar to mature males.	Darker than males. Good contrast between rump patch and back.	Spotted in June and July. Other months similar to adults.
Head and neck region	Long Muzzle. Heavy mane. Light color.	Shorter head than mature male. Heavy mane. Light.	Adults-long head. Dark, long-haired mane. Yearlings-shorter head, mane sparser, dark.	Very short head and neck in proportion to body.
Behavior	Solitary or with small group of males, except during rut.	With family groups, in groups of other spikes, or with mature males.	With family group.	Remains close to a cow in family group. Playful, more easily disturbed than other classes.

[1]Modified from Harper et al. (1967).

story was described by tallest vegetation or physical feature and a percent category of its density. Heights of trees were measured with an Abney level until I could accurately estimate them; 6, 35, and 100 foot (1.8, 10.7, and 30.5 m) heights were significant in classifications. Percent canopy coverage was measured from 1972 aerial photographs, using a pocket stereoscope and a Timber Survey Aid No. 5, an overlay guide to tree stocking density; with experience I was able to estimate canopy coverage into correct categories. Understory vegetation was visually classified using Lyon's (1973) criteria. Aspect was read from a topographic map, as the downhill direction of a line perpendicular to contour lines; aspects were recorded as one of eight directions (Fig. 6). Slopes were determined to be less than 15, 15-30, or greater than 30 percent, using a stereoscope, a stereo-pair of aerial photographs, and a slope index overlay; after practice, slopes were also extimated. Straight line distance to water and roads were measured to the nearest 0.1 mile (0.16 km) from topographic maps, 0.05 mile (0.08 km) increments were rounded upward to the next 0.1 mile (0.16 km). I updated the maps to include new roads, and assumed that mapped intermittent streams contained water; this assumption was based on field experience. Elevations to the nearest 100 feet (30.5 km), were measured from maps; the average altitude of a radio approximation was used to estimate its elevation. Spring, summer, fall, and winter seasons were defined as calender months March-May,

Fig. 6. Habitat information data sheet.

BURDETTE CREEK ELK STUDY - Thomas O. Lemke

__ Tallest Vegetation or physical feature is:

1.	Trees 100 feet plus	7.	Wet meadow
2.	Trees 35 feet plus	8.	Rock
3.	Trees under 35 feet	9.	Talus
4.	Tall shrub 6 feet plus	10.	Water
5.	Low shrub-mixed veg.	11.	Road (primary)
6.	Dry meadow-grass-forb	12.	Road (secondary)

_ Canopy Coverage of Tallest Vegetation is:

1. Less than 15% 2. 15-60% 3. Greater than 60%

__ The Understory Vegetation is:

Go back to tallest vegetation and choose one or:

13. Untreated logging slash
14. Logged area (roaded and cleaned up)

_ Aspect is:

1.	azimuth 337½-22½	N	5.	azimuth 157½-202½	S
2.	azimuth 22½-67½	NE	6.	azimuth 202½-247½	SW
3.	azimuth 67½-112½	E	7.	azimuth 247½-292½	W
4.	azimuth 112½-157½	SE	8.	azimuth 292½-337½	NW

_ Slope is:

1. less than 15% 2. 15-30% 3. greater than 30%

__ Distance to Water (nearest 0.1 mile)

__ Distance to Primary Road (nearest 0.1 mile)

__ Distance to Secondary Road (nearest 0.1 mile)

__ Elevation (nearest 100 ft)

_ Season of Year

1.	Spring (Mar.-May)	3.	Fall (Sept.-Nov.)
2.	Summer (June-Aug.)	4.	Winter (Dec.-Feb.)

__ Cover Type

1.	Seral brush field (south slope)	8.	Fir-larch
2.	Seral bursh field (other slope)	9.	Alpine meadow
3.	Wet alder slope	10.	Pasture
4.	Lodgepole-vaccinium	11.	Clearcut
5.	Stream bottom	12.	Alpine ridge
6.	Lodgepole (seral draw)		
7.	Ponderosa pine-bunchgrass		

__ Additional Information

June-August, September-November, and December-February, respectively.

Based on dominant vegetation, geographic location, and aspect, I located 12 cover types on the study area (Fig. 6). These cover types were used to describe elk locations because they: 1) pertained specifically to my area; 2) provided a simple verbal description of habitat; and 3) were easy to quickly identify on the ground, from aircraft, and on aerial photographs. Habitat data were recorded during the observation or from subsequent interpretation of aerial photographs. Accuracy of field estimation was checked regularly using the appropriate instrument or technique mentioned above. Most data were transferred from data sheets to season charts, analyzed using a desk calculator or slide rule, and presented as figures or tables in this thesis. The areas, of land used by marked elk, were measured with a dot grid overlay on USGS topographic maps. Scientific names of plants were taken from Hitchcock and Cronquist (1973).

Bio-activity Centers

Bio-activity centers, areas of concentrated elk activity, were located and described from August 1974 to May 1975. I used a system devised by U.S. Forest Service biologist Gary Halvorson (1973) to gather information concerning location, size, depth, elevation, aspect, slope, habitat type, and status of use for two types of bio-activity centers; mineral licks

and elk wallows (Fig. 7). Location, aspect, and elevation were measured from USGS topographic maps; size and depth were measured with a steel tape and slope was determined using an Abney level. Dimensions of large clearings were paced or estimated and streams were described using the Strahler order system (Strahler 1960). Elk trail systems were defined as: 1) heavily-used, an obvious tread with little or no vegetation; 2) moderately used, an obvious tread with obvious vegetation (perrennial/annual); and 3) lightly-used, tread is not well defined. Sites were located from the ground and from an airplane.

Sport Hunting Data

During fall 1974, game checking stations in Fish, Petty, and Lolo Creek drainages, gathered hunting intensity and harvest data for early and general elk seasons. Approximately 500 hunter questionnaires, with self-addressed stamped envelopes, were distributed to elk hunters by checking station personnel and local outfitters. The questionnaire dealt with reasons for hunting the area, hunting activities, harvest success, and opinions concerning hunting attitudes and mangement policies (Fig. 8). Returns were compiled on charts, tabulated with a desk calculator, and presented as figures and tables in this thesis.

Fig 7. Bio-activity center data sheet.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District_____ Observer_____

Planning Unit_____ Date_____

Type	Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below	Habitat Type	Length/ Width

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3	3
4) No. and use of trails entering activity center --heavy-H, moderate-M, light-L.	4	4	4	4
5) Height of activity center banks (min.-max.).	5	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6			
7) Is the peripheral activity center vegetation disturbed?	7	7	7	7
8) Antler rubs adjacent to activity center area (yes, no).	8	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-0).*	9	9	9	9
10) Development status of activity center (permanent-P, temporary-T).	10	10	10	10
11) Percent canopy cover over activity center	11	11	11	11
12) Pellet groups (present-P, absent 0A); species (elk-E, deer-D, moose-M); fresh-F, old-0.	12	12	12	12
13) Photoes taken (yes, no).	13	13	13	13
14) Other comments (over).	14	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Fig. 8. Hunter questionnaire.

BURDETTE CREEK ELK STUDY
Montana Department of Fish & Game
School of Forestry - University of Montana
Montana Cooperative Wildlife Research Unit

RE: Hunter Questionnaire

Dear Sportsman:

This fall, in conjunction with a five year study of the Burdette Creek elk herd, we are conducting a hunter survey of elk hunters in the Fish Creek area of hunting districts 220 and 230. With your help we can gather important information concerning: hunter success, where people hunt, who hunts in the area, what type of hunting occurs, and how hunters feel about present game management and land use policies.

This information along with other data collected in the study will be used to guide future elk management in the area. If you are interested in helping to wisely manage our game resources, please take the time to accurately fill out this questionnaire.

The form is designed to be filled out by one member of each hunting party for one day's hunt. The form can, however, be used for more than a one day period if you would please indicate the number of days covered. Your name and address are desirable, but not necessary. More blank questionnaire are available upon request.

Thank you for your help and good luck hunting this fall.

Yours truly,
Thomas O. Lemke

Optional: Name_____Address_____
_____

Date of Hunt_____
1) How many hunters in your party?_____How many nonresident hunters?__
2) How far did you drive to come to this area?_____miles
3) Did you have a professional guide? yes___no___ If yes, who was he?
Name_____Address_____
_____

4) Why did you choose to hunt this area? (check one).
___at least one member a local resident (20 mile radius), familiar with area.
___not local, but at least one member of the party has hunted here before.
___have not hunted here before, area recommended by a friend.
___have not hunted here before, area recommended by:
___sporting goods dealer ___something I read ___other source
if other source, please explain_____

Fig. 8. (continued)

5) Where did you hunt? (what creek drainages or nearby map point).
_____

6) Were you driving a four-wheel-drive vehicle? yes___no___
7) Did you hunt with horses or have free access to horses? yes___no___
8) How many hours did each member of your party spend on foot or horseback? 1._____hours 4._____hours
2._____hours 5._____hours
3._____hours 6._____hours
9) What was the farthest distance any party member got from your starting point? _____miles
10) How many elk did your party see while on foot or horseback?
_____cows _____bulls _____calves _____uncertain as to sex or age
11) How many elk did your party see while driving in a vehicle?
_____cows _____bulls _____calves _____uncertain as to sex or age
12) Did any party member see a marked elk with a neck collar? yes___no___
If yes, we would like to contact that person.
Name_____Address_____
_____
13) How many members of your party took shots at elk?_____
14) Did anyone kill an elk? yes___no___ If yes, what sex?_____
an adult animal? yes___no___
15) How would you rate your hunting experience? exce-lent___fair___poor___
16) If you have hunted here before, how do you rate this year's experience?
better___ same___ not as good___as previous years
17) We would like your opinions on the following subjects:
A. Are you in favor of____ indifferent to____ or against____ an early bull elk season in this area? Why?_____
_____
_____
B. Are you satisfied with the dates, length, and regulations for the general elk season in this area? yes___no___ Why?_____
_____
_____
C. What is your opinion of closing roads to traffic in previously logged areas?_____
_____
_____
D. What is your idea of an ideal day of elk hunting?_____
_____
_____

Please return in the self-addressed stamped envelope.

THANK YOU VERY MUCH

CHAPTER IV

RESULTS AND DISCUSSION

Trapping and Marking

A total of 14 elk (2 bulls, 10 cows, 2 female calves) were marked during spring and summer 1974. Six elk (5 cows, 1 bull) were radio-collared, two (1 cow, 1 yearling bull) were belt-collared, and six (4 cows, 2 female calves) were rope-collared. On 4 April, a previously studied cow, Elk 4 (Zahn 1974), was immobilized by Fish and Game Department personnel. Her old radio-collar was replaced with a new one and she was designated Elk B, for the remainder of the study. Including Zahn's previously marked animals, there were 22 collared elk in the population. Radio-collared elk on the 151 MH_Z frequency were identified alphabetically, elk on the 164 MH_Z range were numbered; belt-collared and rope-collared elk were numbered and prefixed with B and R, respectively (Table 5). The elk trap was operated for 22 trap-days, a trap-day being a consecutive night and morning period; elk were captured on 6 days, 27 percent success (Table 3).

Biotelemetry

A maximum of 10 radio-collars, operated simultaneously during the study, 6 were still functioning when the study ended. When the study began, five of Zahn's radio-collars were still working, including the collar on Elk 4. Two of

TABLE 5. Record of marked elk.

Elk	Sex-Age[1]	Date & Location Marked	Collar Type & Color	Eartag No. Left	Eartag No. Right	Status
A'	♀adult	4/27/72 Burdette Cr.	Radio (PA)[2] Wide Yellow	RO555	RO554	Radio dead as of 6/72 Last sited 5/1/75
B'	♀adult	3/24/72 Burdette Cr.	Radio (PA)[2] Blue	RO551	RO552	Radio dead oa of 8/72 Last sited 4/18/75
C'	♀adult	4/20/72	Radio (PA)[2] White	none	RO553	Radio dead as of 8/72 Last sited 5/1/75
D'	♂2½ yr.	5/31/72 Wig Cr.	Radio (PA)[2]	6803-A	6804-A	Radio dead as of 8/72 Shot 10/31/72
A	♀adult	4/5/74 Burdette Cr.	Radio (PVC pipe) w/green tape	none	none	Last radio approximation 5/13/75
B	♀adult	4/5/74 Burdette Cr.	Radio (PVC pipe) w/black tape	6929-A	6930-A	Last sited 4/24/75
C	♂4 yr.	4/5/74 Burdette Cr.	Radio (PVC pipe) w/red tape	none	none	Last radio approximation 5/13/75
D	♀adult	5/26/74 Wig Cr.	Radio (PVC pipe) w/blue tape	6821-A	6822-A	Last sited 5/1/75
B-1	♀adult	6/17/74 Wig Cr.	Belt Red, white, & blue	6945-A	6946-A	Last sited 5/1/75
B-2	♂2 yr.	7/12/74 Wig Cr.	Belt Black & white	6910-A	6911-A	Last sited 5/1/75
R-1	♀adult	7/12/74 Wig Cr.	Rope #442 Red-red I.D. flags[3]	6901-A	6902-A	Last sited 7/12/74
R-2	♀adult	7/12/74 Wig Cr.	Rope #444 Green-green I.D.flags[3]	6903-A	6904-A	Last sited 4/10/75
R-3	♀1 yr.	7/12/74 Wig Cr.	Rope #448 Orange-orange I.D.flags[3]	6908-A	6909-A	Last sited 4/26/75
R-4	♀1 yr.	7/12/74 Wig Cr.	Rope #450 Blue-blue I.D.flags[3]	6907-A	6906-A	Last sited 4/24/75

TABLE 5. (continued)

Elk	Sex-Age[1]	Date & Location Marked	Collar Type & Color	Eartag No. Left	Eartag No. Right	Status
R-5	♀adult	7/12/74 Wig Cr.	Rope #452 Green-red I.D. flags[3]	6912-A	6913-A	Shot during fall 1975
R-6	♀adult	7/14/74 Wig Cr.	Rope #454 White-red I.D. flags[3]	6914-A	6915-A	Last sited 4/26/75
1	♀5-6 yr.	4/11/73 Wig Cr.	Radio (PVC pipe) Belt green & white	6811-A	6814-A	Radio dead as of 8/75 Last sited 4/26/75
2	♂1½ yr.	5/1/73 Wig Cr.	Radio (SA)[4] Belt green & white	6926-A	6813-A	Shot 10/6/73
3	♀10+ yr.	5/1/73 Wig Cr.	Radio (PVC pipe) Belt black,white,green	6927-A	6928-A	Radio dead as of 4/75 Last sited 4/24/75
4	♀4 yr.	5/1/73 Wig Cr.	Radio (PVC pipe)[5] w/black tape	6929-A	6930-A	Last sited 4/24/75
5	♀5-6 yr.	5/1/73 Wig Cr.	Radio (PVC pipe) Belt blue & white	6931-A	6932-A	Radio dead as of 11/73 Last sited 4/26/75
6	♀6-7 yr.	5/2/73 Wig Cr.	Radio (PVC pipe) Belt black & white	6934-A	6935-A	Radio dead as of 7/74 Last sited 3/22/75
7	♀5-6 yr.	5/13/73 Wig Cr.	Radio (PVC pipe) w/black stripe	6817-A	6819-A	Radio dead as of 4/75 Last sited 4/10/75
8	♀adult	5/18/74 Wig Cr.	Radio (PVC pipe) w/yellow tape	6942-A	6941-A	Last sited 5/13/75
9	♀adult	6/17/74 Wig Cr.	Radio (PVC pipe) w/tan tape	6947-A	6948-A	Last sited 5/13/75

[1]Age as of May 1975 or when shot.
[2]Partial acrylic radio collar (Zahn 1974).
[3]Two plastic identification flags in a series of 7 flags.
[4]Solid acrylic radio collars (Denton 1973).
[5]Animal recaptured on 4/5/74, old solid acrylic collar replaced, became Elk B.

Zahn's radio-collars, on Elk 1 and 6, failed during summer 1974 and two failed during spring 1975; they operated from 14 to 23 months each (Fig. 9).

Two hundred ninety-nine locations of radio-collared elk were made; 136 from airplanes (17 flights), and 163 from the ground. One hundred one (34%) were visual sightings, occurring primarily during winter and spring (Table 6).

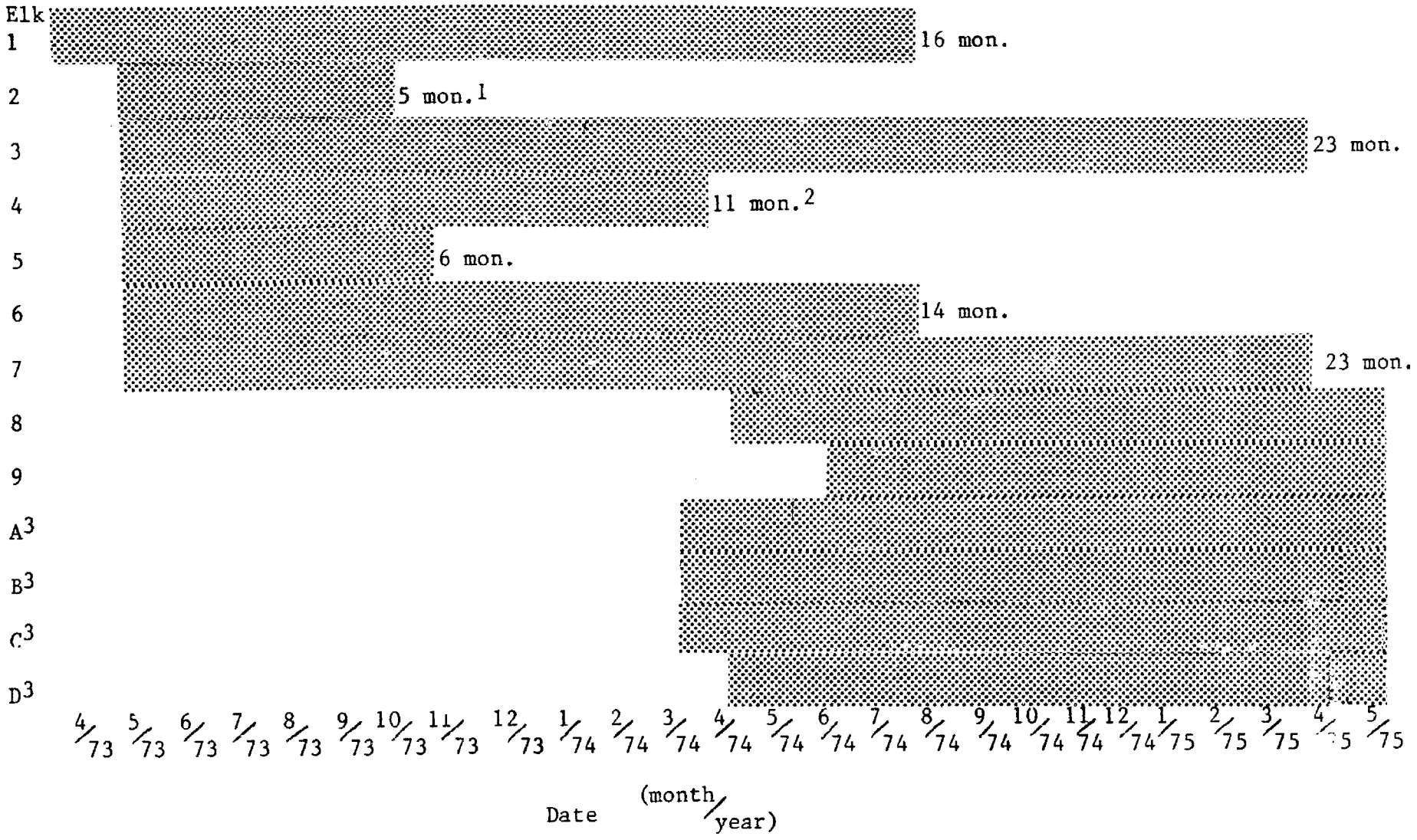
Seasonal Ranges

I described seasonal elk ranges with respect to; geographic location, elevation, aspect, tallest vegetation, canopy cover, cover type, and slope. My data are from 1,512 visual observations of belt-collared, rope-collared elk. When discussing which cover types were utilized, only locations of radio-collared elk were used; using visual locations would introduce a bias toward open habitats.

My study supports previous evidence from Bohne (1974) and Zahn (1974) that some elk remain on winter range during summer; at least 30 elk, including three radio-collared cows (Elk 1, 8, and 9) were located there during summer months. Eight elk were also trapped and marked on the winter range in June and July. During the summer, most elk moved to the west, toward the Idaho Divide; seasonal ranges of both groups are described below.

Winter range. Winter range was the smallest and most homogeneous seasonal elk habitat used. Geographically the

Fig. 9. Performance of radio transmitters placed on elk since 1973.



[1]Animal shot 10/6/73, transmitter still functioning.
[2]Animal immobilized 4/5/74, transmitter still functioning but replaced, became Elk B.
[3]151 MH_Z transmitters, all others 164 MH_Z.

TABLE 6. Monthly summary of elk observations.

Month	Number of Observations: Unmarked Elk (visuals)	Radioed Elk (visuals)	Radioed Elk (approx.)[1]	Other Marked Elk (visuals)	Total
Apr. '74	47	9	0	1	57
May '74	3	3	0	0	6
Jun. '74	13	12	18	2	45
July '74	95	4	33	12	144
Aug '74	19	0	25	0	44
Sept. '74	11	1	34	0	46
Oct '74	12	0	43	0	55
Nov. '74	3	1	15	0	19
Dec. '74	191	9	9	10	219
Jan. '75	179	12	0	9	200
Feb. '75	82	6	9	5	102
Mar. '75	217	13	3	14	247
Apr. '75	450	25	7	27	509
May '75	106	6	2	4	118
Total	1,428	101	198	84	1,811

[1] Elk located by radio approximation, rather than visual observation.

major winter range lies east of the Fish Creek road in Wig, Burdette, and Lupine Creek drainages, smaller areas of winter range are located in drainages of lower Owl, Deer, and Wall Canyon creeks (Fig. 10). Bohne (1974) reported that small groups of elk wintered near lower Gus, Eds, and West Fork of Petty Creek in 1971 and 1972. I also found evidence of a few elk wintering in lower Cache and Surveyor Creek drainages. The winter range, including browse conditions, were described by Bohne (1974) and Zahn (1974), much of Lyon's (1973) pellet count survey work was also done in this area.

During winter, elk locations ranged in elevation from 3,900 to 6,000 feet (1,190 to 1,830 m), 72 percent were below 5,000 feet (1,530 m); this was the narrowest and lowest of seasonal elevations (Fig. 11). Most elk locations (61%), were on south slopes and the tallest vegetation was usually tall shrub (31%) or trees 35-100 feet (10.7-30.5 M) tall(37%) (Fig. 12 and 13). Forty-six percent of winter locations occurred in areas of less than 15 percent canopy cover, the most open of seasonal ranges (Fig. 14); cover types most often used, by radio-collared elk, were seral brush fields (56%) and stream bottoms (24%) (Fig. 15). Slopes of most locations were in the 15-30 percent (59%) and over 30 pcercent (28%) catagories, indicating the steepness of winter range; only spring range locations show similar steepness (Fig. 16). Zahn (1974) discussed typical daily elk movements on the winter range; I found that during a period of below zero

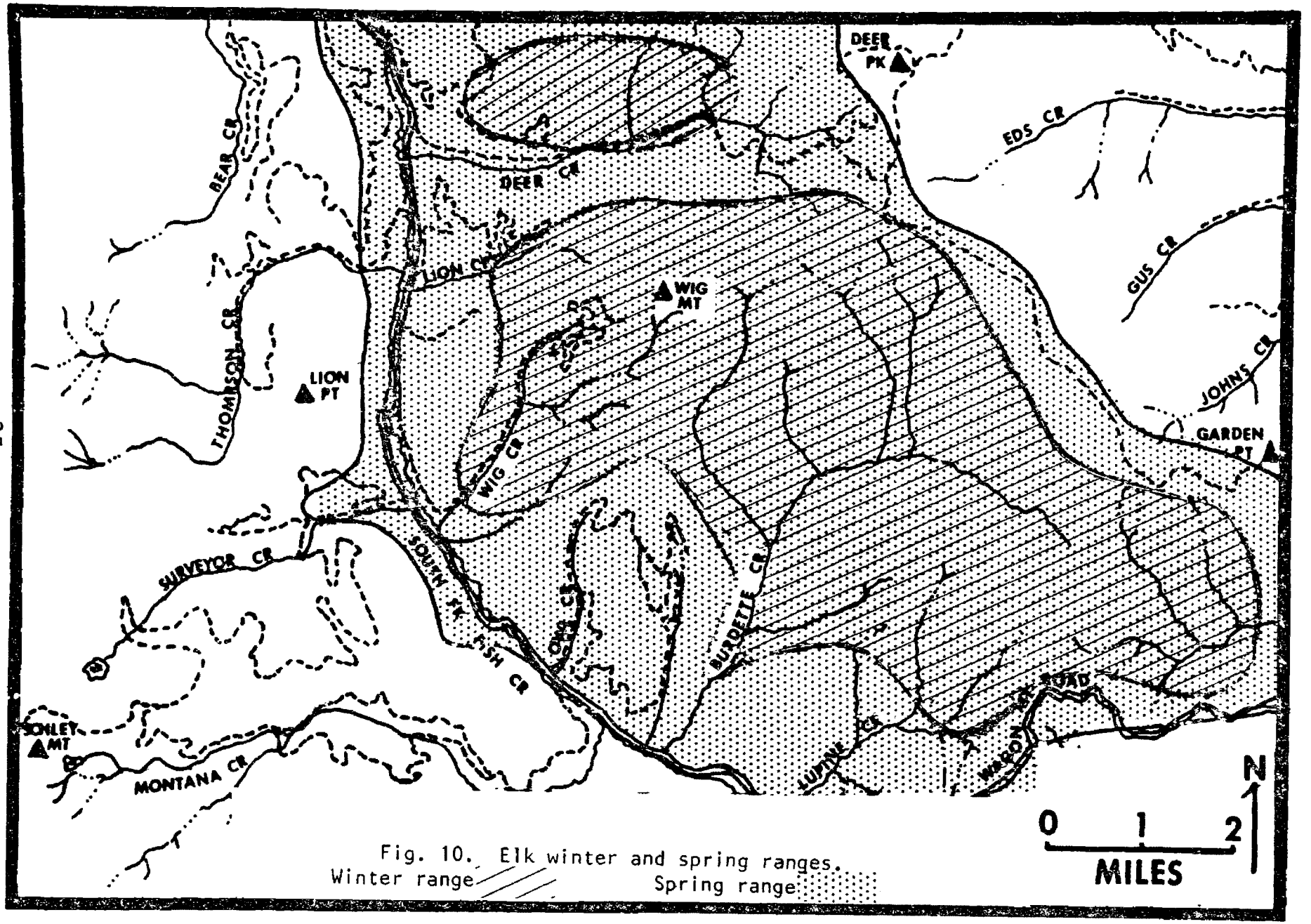


Fig. 10. Elk winter and spring ranges.
Winter range
Spring range

Fig. 11. Elevations of elk locations.

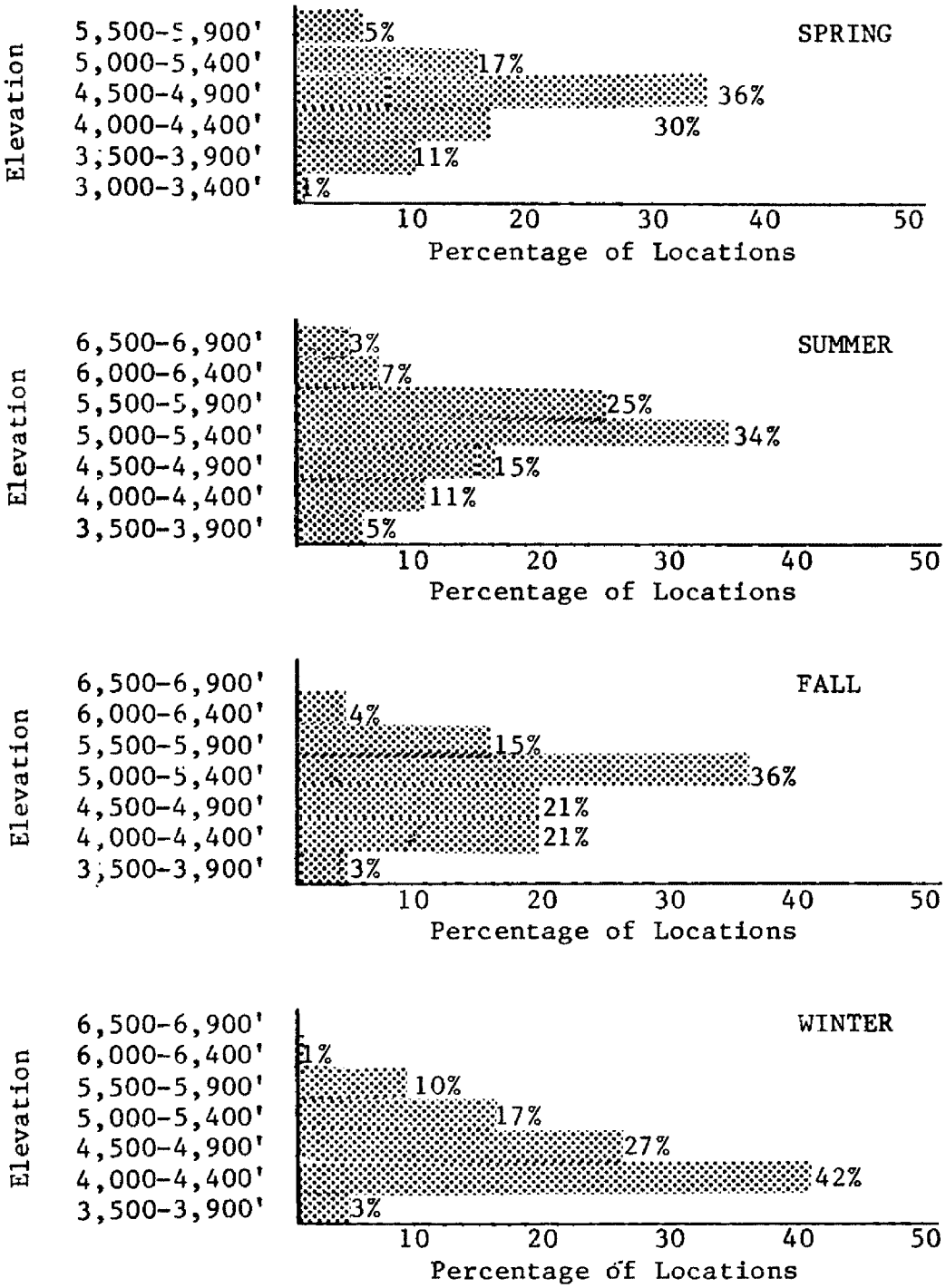


Fig. 12. Aspects of elk locations.

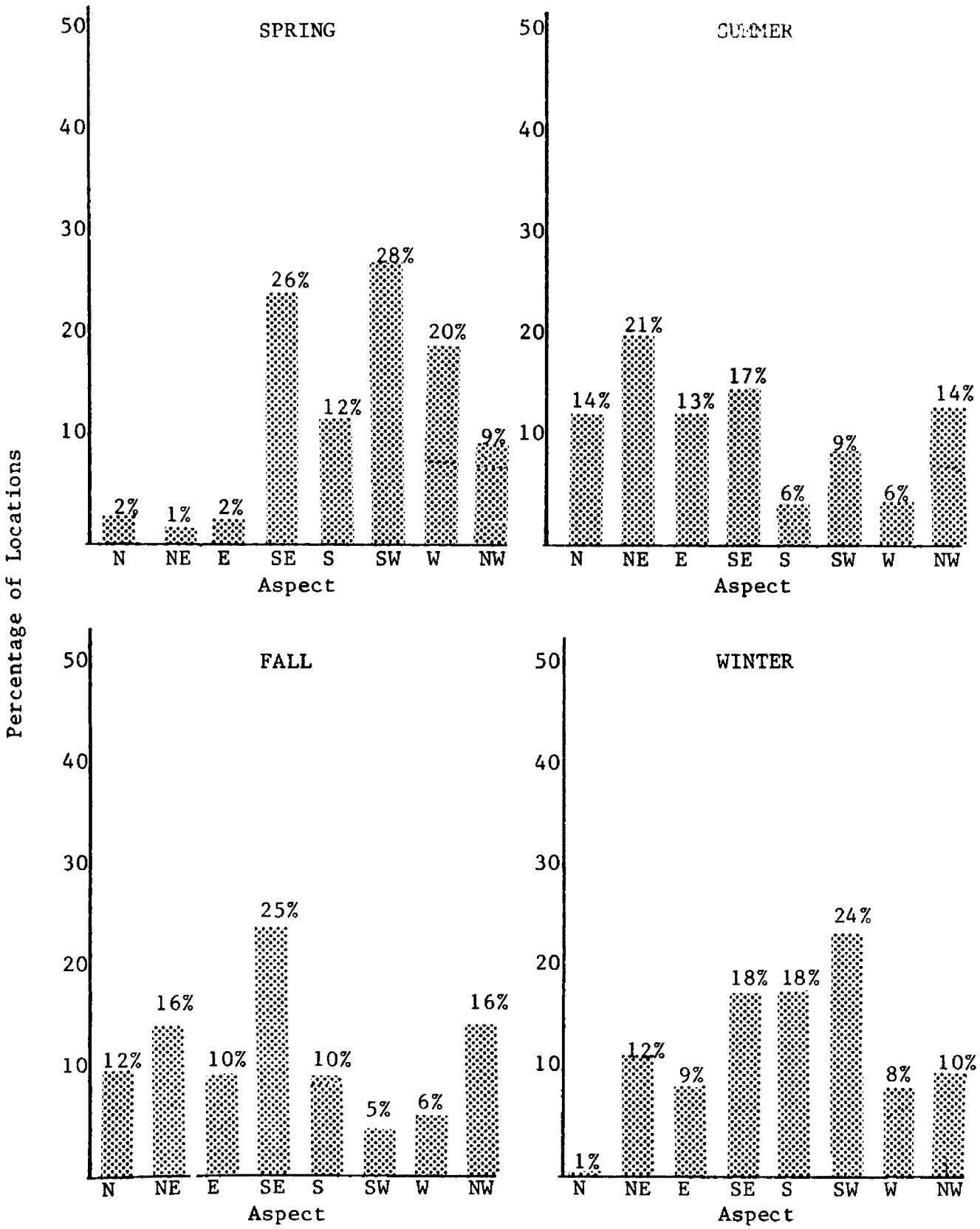


Fig. 13. Tallest vegetation at elk locations.

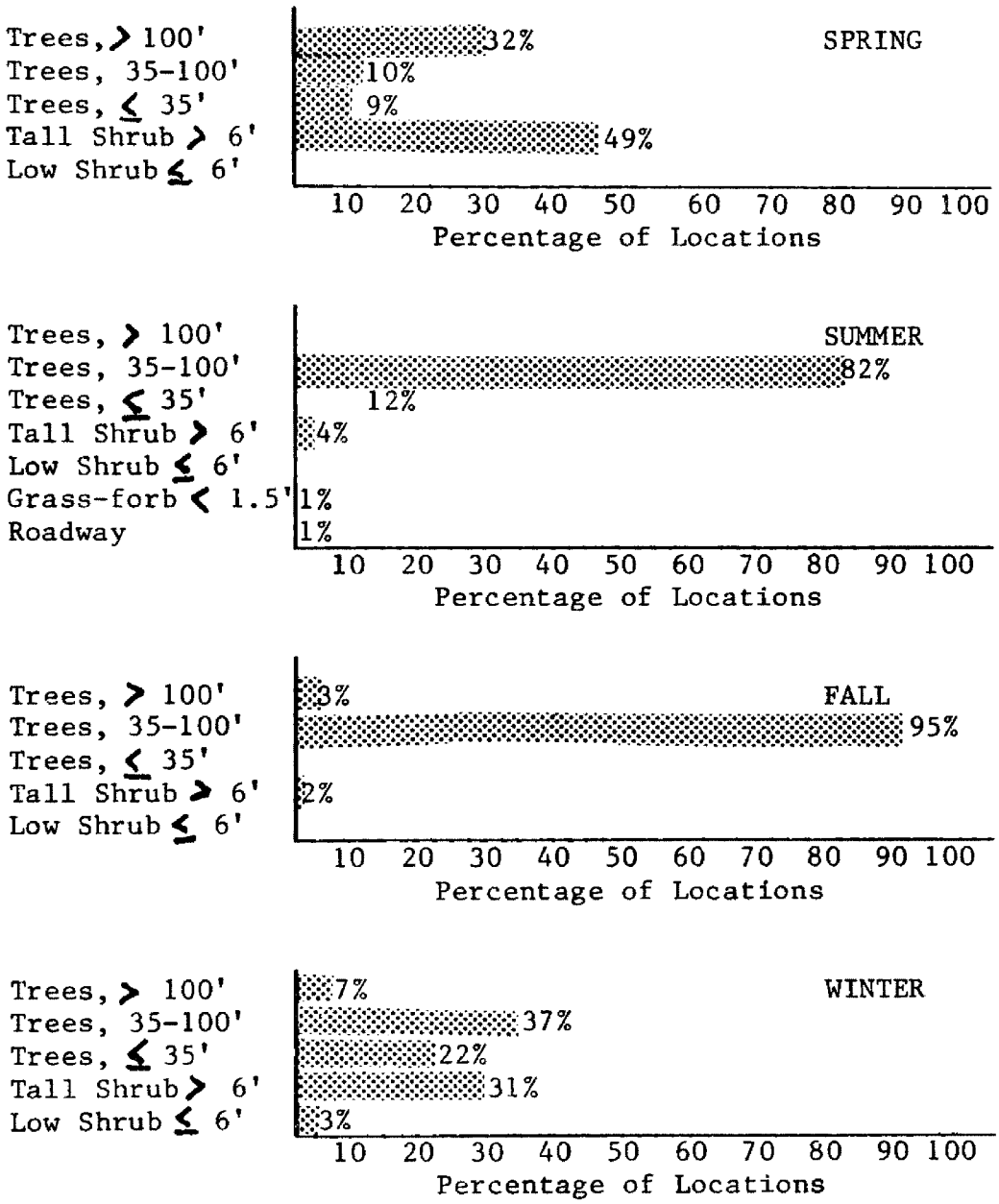


Fig. 14. Canopy coverages of elk locations.

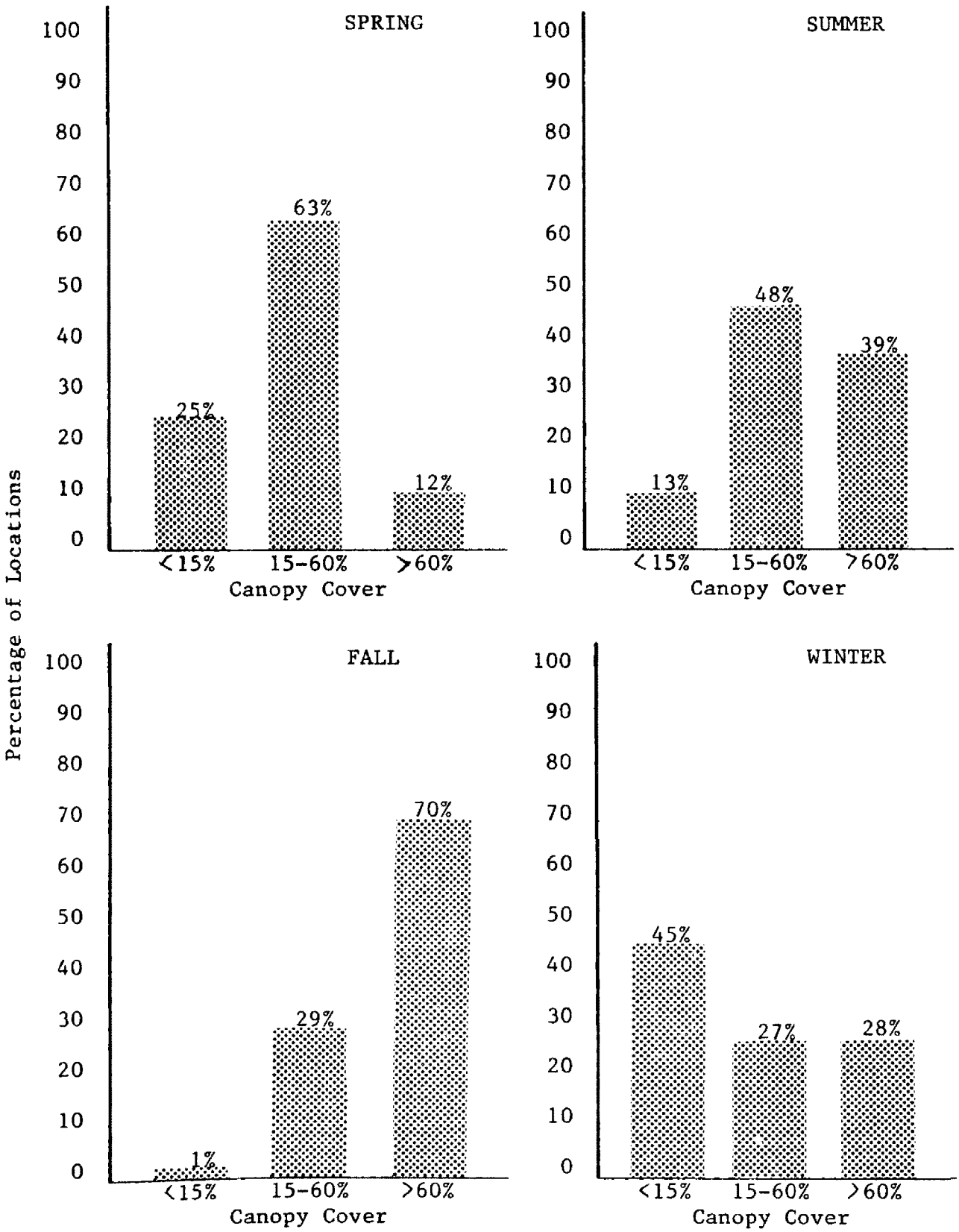


Fig. 15. Cover types at locations of radio-collared elk.

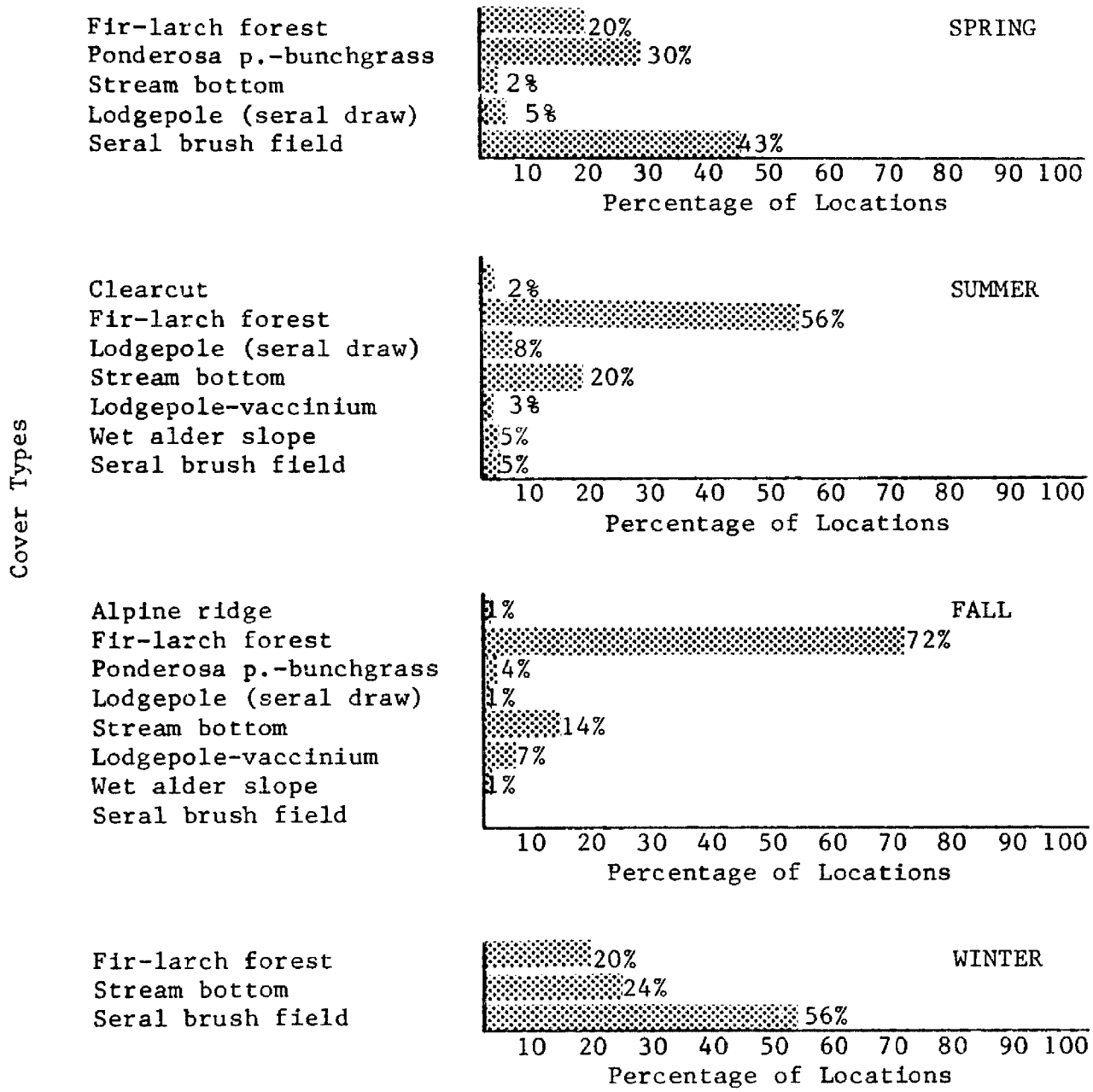
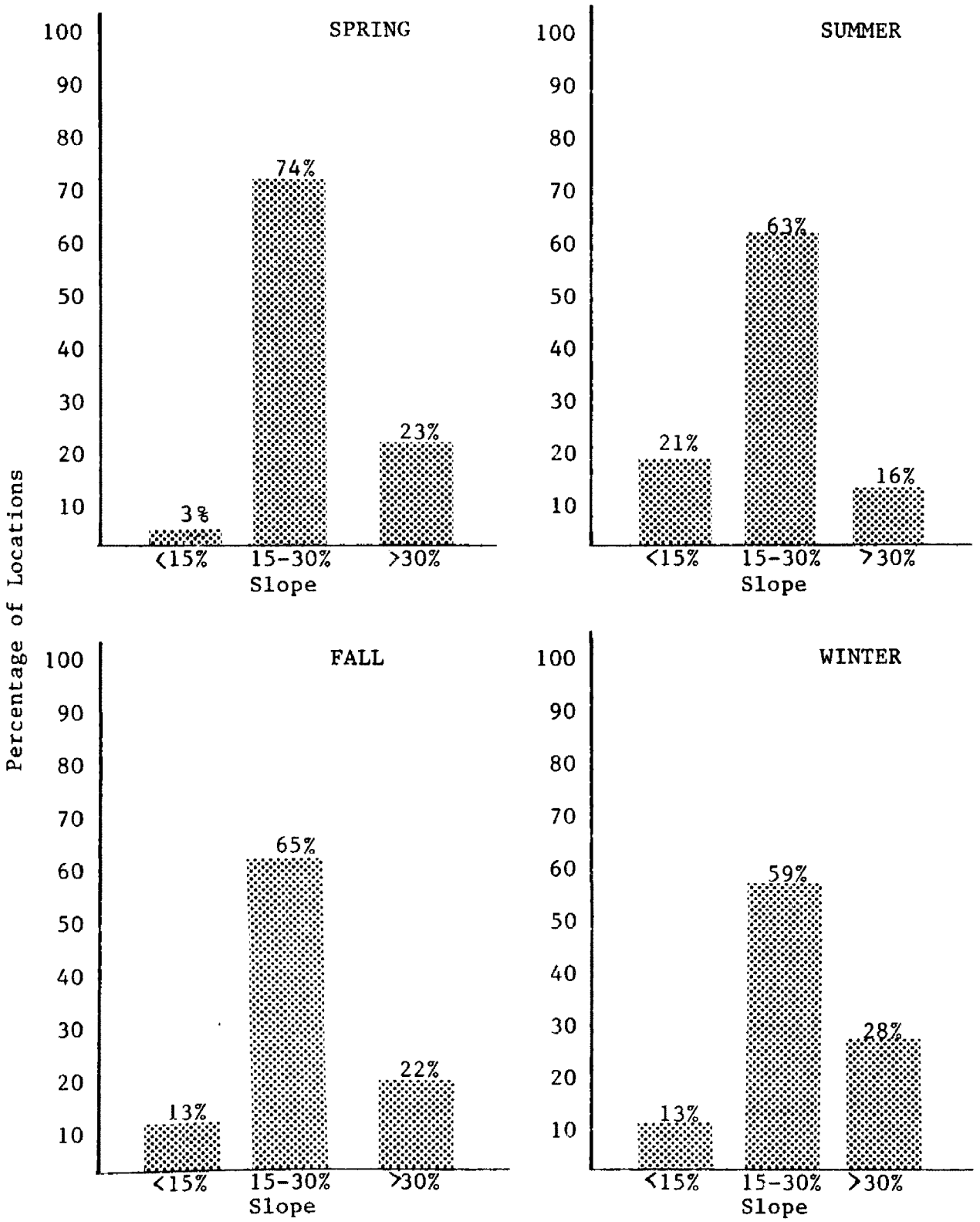


Fig. 16. Slope at elk locations.



temperatures and deep crusty snow, 20-28 February, elk moved from south slope feeding and bedding areas, into thick stream bottom vegetation. There they fed on willow, hanging lichens, and aquatic vegetation, until they could return to brush field slopes. During this period, elk could not be located visually, but on 22 February all radio-collared elk were located in stream bottom cover types.

Winter range, on the study area, is the most limited of elk habitats and, therefore, of crucial concern to elk survival; certain slopes that receive heavy winter use, are or particular importance and should be protected from disturbance (Fig. 10).

Spring range. Spring range corresponded close to the winter elk range; geographically it is a short extension of winter range margins (Fig. 10). The range of elevations increased during spring, 3,200 to 5,900 feet (980 to 1,800 m), with 22 percent above 5,000 feet (1,530 m) (Fig. 11). Most locations (95%) were still on south and west slopes, which were usually snow free (Fig. 12). Tallest vegetation continued to be primarily tall shrub (49%) and trees over 100 feet (30.5 m) (32%) (Fig. 13); canopy cover indicated use of open country, 25 percent of locations were in areas of less than 15 percent canopy cover (Fig. 14). Radio-collared elk were most often located in seral brush fields (43%) and Ponderosa pine-bunchgrass cover types (30%) (Fig. 15); use of Ponderosa pine slopes, during spring green-up, accounted for much of the

range extension mension mentioned above. Slopes again reflected the steepness of the winter-spring range; 74 percent of locations were on 15-30 percent slopes, 23 percent on slopes in excess of 30 percent (Fig. 16). Bohne (1974) and Zahn (1974) described the spring range as a transitional range and define it in terms of Pfister et al. (1972) habitat types.

Summer range. Summer elk range was the most diverse of the seasonal habitats. Geographically, summer range extended from the high Idaho Divide to the Petty Creek drainage (Fig. 17). Elk were found at the highest of seasonal elevations during the summer; elevations ranged from 3,800 to 6,600 feet (1,160 to 2,010 m), 69 percent were over 5,000 feet (1,530 m) (Fig. 11). Aspects of summer locations were more diverse than during winter or spring; most radio-collared elk locations (54%) were on north slopes, possibly in response to warm weather (Fig. 12). The tallest vegetation, recorded for locations, reflects a move to forested habitats; 94 percent of locations were in trees of 35 feet (10.7 m) or taller (Fig. 13); canopy cover also increased, 39 percent of locations had canopies of greater than 60 percent coverage (Fig. 14). Cover types most often used by radio-collared elk, were fir-larch forest (56%) and stream bottoms (20%) (Fig. 15). Terrain used by elk in summer, varied widely in steepness, but was less rugged than winter or spring ranges (Fig. 16).

Elk that remained on the winter-spring range during summer, including marked elk, used high ridges and stream bottoms of the winter-spring range and areas slightly to the east (Fig. 17). Spring dispersal for these elk, may mean movements to nearby habitats that were previously inaccessible, rather than long distance migrations. Summer range, on the study area, covers a wide variety of habitats commonly found over many square miles; it does not appear that summer range is a limiting factor in elk distribution, this is true in many areas (Knight 1970, Simmons 1974, Craighead et al. 1972).

Fall range. Like summer range, fall elk range is quite diverse and extensive (Fig. 17). The activity of hunters may cause major elk movements during fall (see page 52); this behavior probably affects selection of fall habitats. Elk were secretive and seldom observed at this time, only seven visual sightings were made; most data are from 93 radio-collar locations.

Geographically, fall locations overlapped much of the summer range, but in November locations were closer to the winter range. Elevations were generally lower than during summer; ranging from 3,800 to 6,200 feet (1,160 to 1,890 m), with 46 percent below 5,000 feet (1,530 m) (Fig. 11). All aspects were frequented during fall, 45 percent of locations were on north slopes (Fig. 12). Almost all locations (97%), were in forested areas (Fig. 13) with thick canopy covers;

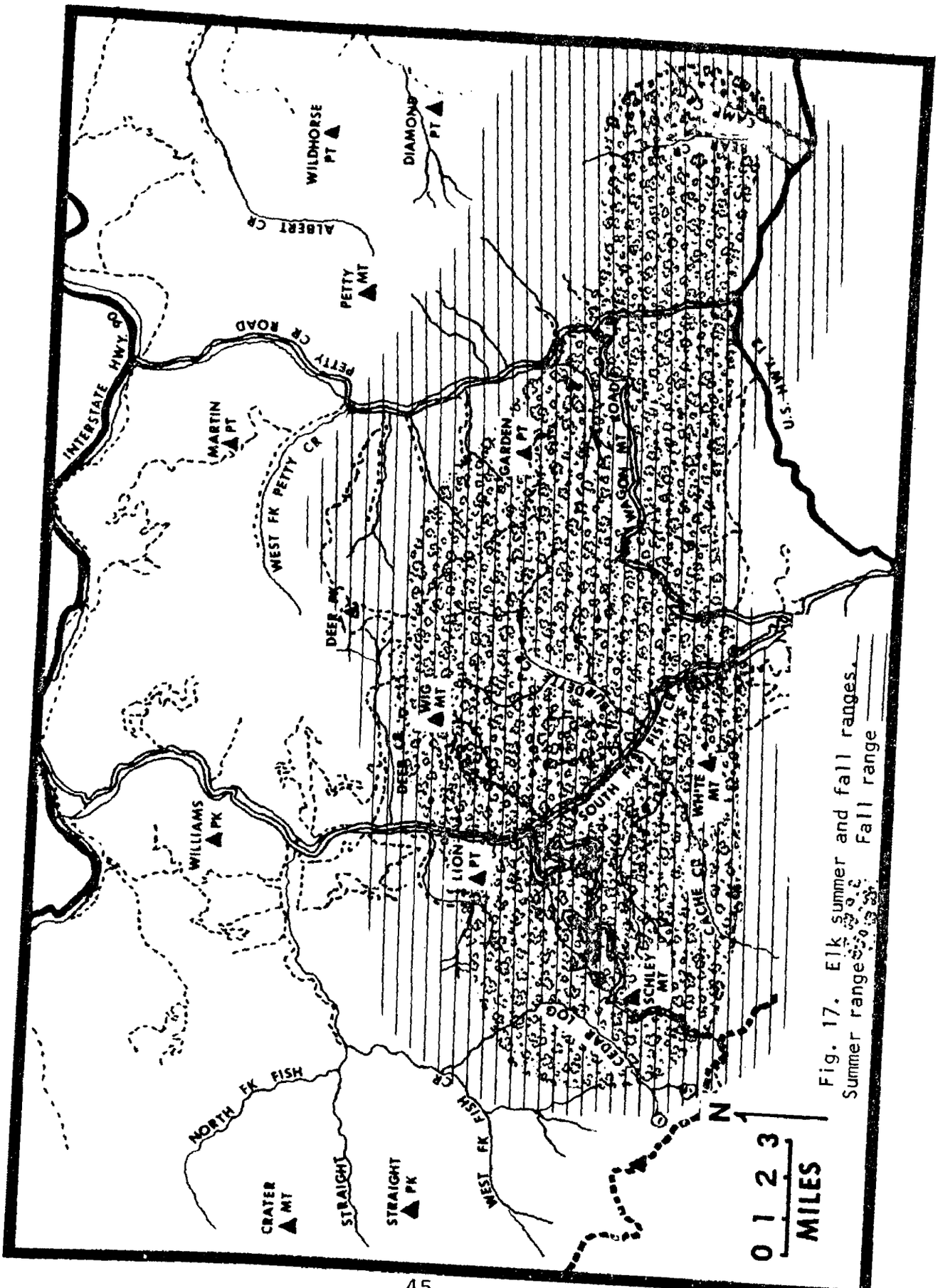


Fig. 17. Elk summer and fall ranges.

70 percent of locations were in areas that exceeded 60 percent canopy coverage, making fall range the densest of seasonal habitats (Fig. 14). Most radio locations (92%) were in lodgepole pine (Pinus contorta), fir-larch, and stream bottom cover types (Fig. 15); Zahn (1974) also noted increased use of stream bottoms in the fall. Slopes of fall locations were mostly in the medium range of 15-30 percent (Fig. 16). Suitable fall habitat is common on the study area; dense vegetation used as escape cover, during the hunting season, is an important component of fall range and should be maintained.

Size of Seasonal Ranges of Radio-Collared Elk

From 299 locations, I plotted winter-spring and summer-fall ranges for 10 radio-collared elk (see appendix A). Winter-spring ranges were much smaller than summer-fall areas; the averages for the two were 3.7 and 11.4 square miles (9.6 and 29.6 sq km), respectively (Table 7). Accuracy of these estimates depended largely on the number of locations and size of the area used. Summer-fall range for Elk 6 was plotted using only 3 locations; her radio-collar failed during July 1974. This plotted area probably does not represent her true range, and was not used in computing the average summer-fall range.

Based on locations of 10 radio-collared elk, Zahn (1974) calculated an average of 9.8 square smiles (25.8 sq km) for elk summer-fall range; 1.6 square miles (4.2 sq km) less than

TABLE 7. Sizes of seasonal areas used by radio-collared elk.

Seasons	Radio-Collared Elk										Mean
	1	3	6	7	8	9	A	B	C	D	
Sex-Age	♀5-6	♀10+	♀6-7	♀5-6	♀adult	♀adult	♀adult	♀adult	♂4	♀adult	
Winter-spring											
No. of locations	9	10	5	17	9	18	10	14	19		
Area (sq mi)	2.2	3.2	3.4	4.6	1.8	2.2	5.0	5.2	3.4	5.6	3.7
Summer-fall											
No. of locations	10	17	3	20	22	20	11	19	23	5	
Area (sq mi)	1.6 (5.6)[1]	18.4 (4.9)[1]	*	1.6 (7.1)[1]	10.6	12.2	18.0	3.6 (~19)[1]	31.2	6.8	11.4

*Not enough locations to delineate an accurate seasonal area.

[1]Area of summer-fall ranges during 1973 (Zahn 1974), all other data from 1974-75.

my average. In both studies, bull elk had the largest summer-fall ranges; ranging from 16.0 to over 35 square miles (41.6 to over 91 sq km). Elk that were radio-collared during both studies, used ranges of different sizes each year (Table 7).

Seasonal Movement Patterns

Major seasonal movements were dispersal from spring range and movements back to winter range. Winter and spring ranges so nearly overlap that movements between them is not extensive nor dramatic; the same is true for summer and fall ranges. Elk that spend virtually the entire year on or near the winter-spring range, have short seasonal movements oriented more to elevation and cover type than geographical distance.

Spring dispersal and calving. In 1974, spring dispersal of radio-collared elk, occurred during a short period in early June; about 1 week later than the previous year (Zahn 1974). On 9 June, radio-collared elk were located west of Fish Creek for the first time in 1974; all radioed elk, that migrated to the west (Elk 3, 7, A, B, and D), had left the spring range by 15 June. Cache, Montana, and Surveyor Creek drainages were major routes to summer areas west of Fish Creek (Fig. 18). Distance traveled to reach summering areas, for radio-collared elk, ranged from approximately 4 to 11 miles (6.5 to 17.8 km) from the last spring range location. Length of time to reach these areas varied from

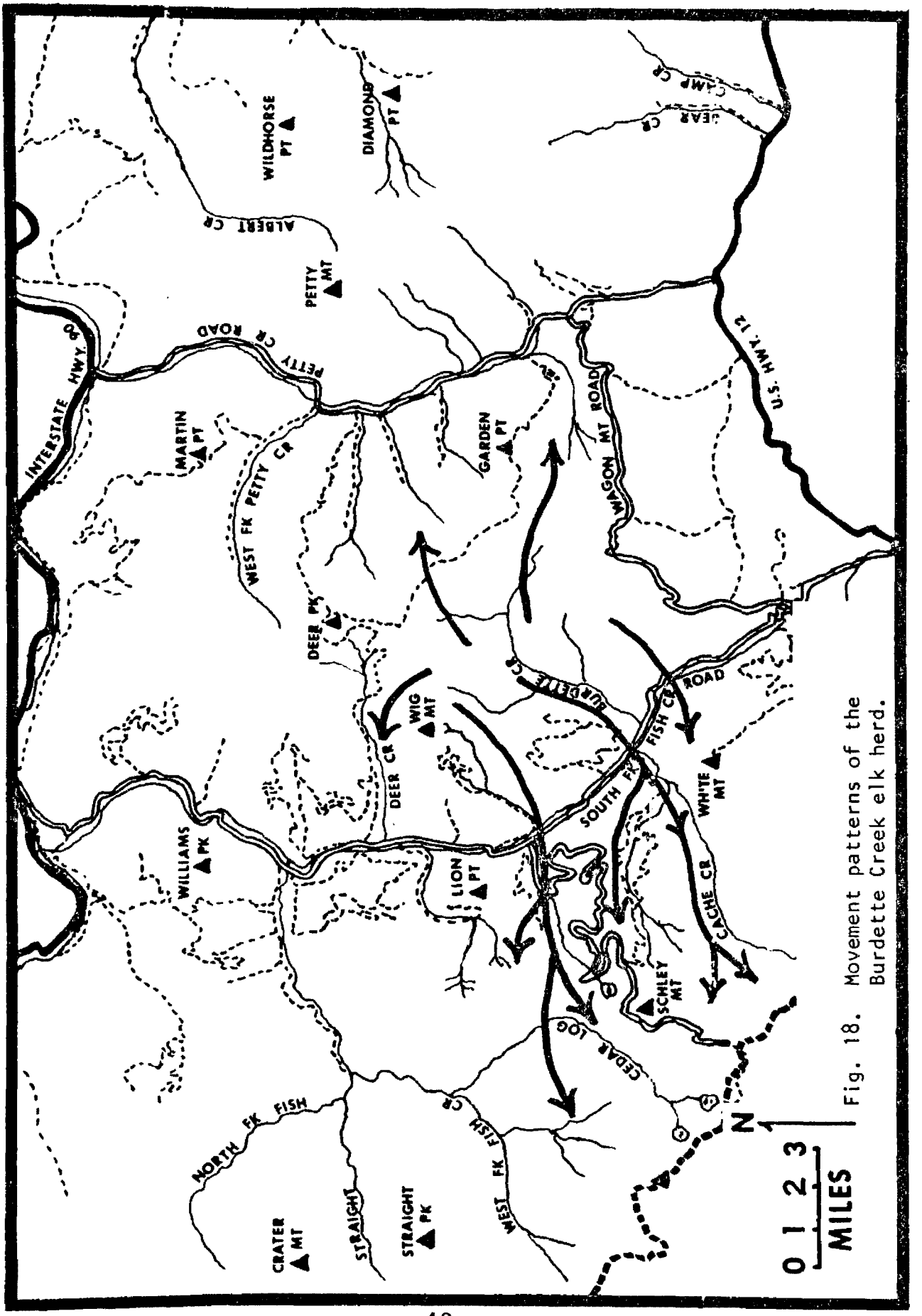


Fig. 18. Movement patterns of the Burdette Creek elk herd.

3 to 20 days. Dispersal of elk, radio-collared during 1974, from marking sites to summer range varied from 7 to 11 miles (11.3 to 17.8 km) (Fig. 19). Dates of spring dispersal are largely dependent on weather conditions and plant phenology (McLean 1972); this may account for the yearly fluccuation observed.

The peak of calving activity probably occurred about 1 June (Zahn 1974), coinciding closely with spring dispersal. Sightings of radio-collared elk, indicated that two cows (Elk 1 and 8), gave birth on the winter-spring range, and two others (Elk 7 and A) had their young west of Fish Creek, on summer-fall range. Bohne (1974) thought that calving occurred on the upper limits of the winter range and on adjacent spring range, but he did not have marked animals. Using data from marked elk, Zahn (1974) showed that calves were born on winter range, on summer-fall range, and enroute to summer range. He also suspected that Elk 1 calved on the winter range in 1973; my data indicates that she did so in 1974. From the above data, calving activity does not appear to occur only on well defined, traditional, calving grounds such as those reported by Johnson (1951).

Movements to winter range. During the first 2 weeks of December, large numbers of elk began appearing on the winter range; approximately one month later than in 1973 (Zahn 1974). The first radio-collared elk that returned to winter range from the west, was located in Burdette Creek drainage

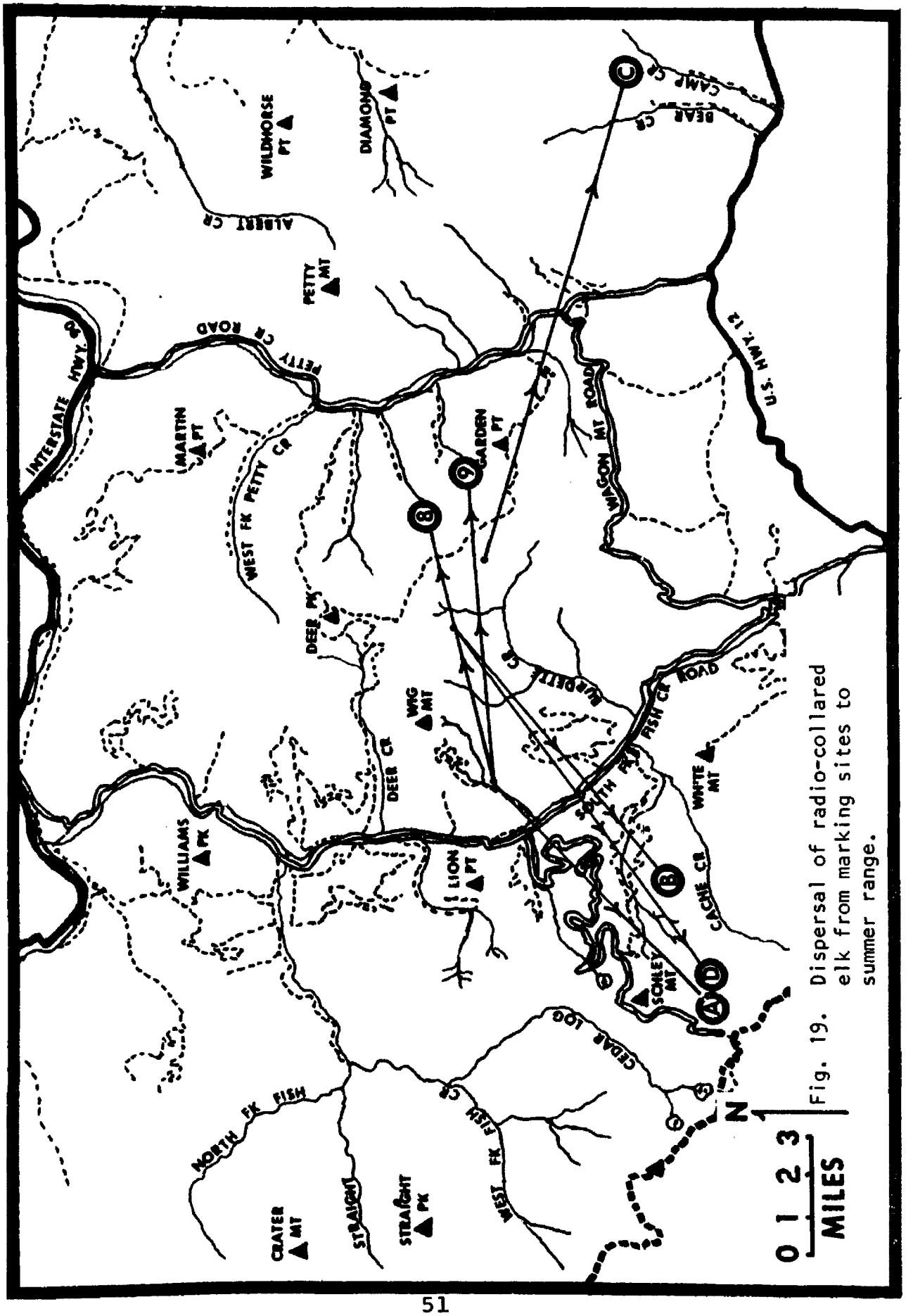


Fig. 19. Dispersal of radio-collared elk from marking sites to summer range.

on 10 December; all elk with working transmitters were on the winter range by 18 December. Elk from the west returned along Cache, Montana, Surveyor and Deer creeks, those from the east, returned along South Fork of Petty and Howard creeks. Heavy snow accumulation on summer-fall range reduces food availability and initiates movement to winter range (Zahn 1974). In years of early snow, elk are more easily shot by hunters and use of the winter range is extended. Snow conditions and length of hunting season are major factors in determining harvest success. Snow storms may prompt final movement onto winter range (Zahn 1974; fresh elk tracks crossing Fish Creek road, near Surveyor and Cache creeks, indicated that many elk moved onto winter range during snow storms on 18 and 21 December. As Zahn (1974) and Simmons (1974) stated, movement to winter range is more gradual than the dramatic movements of spring dispersal.

Fidelity to Seasonal Areas

Movement data from radio-collared elk, for periods of up to 2 years, provided information on repeated use of seasonal ranges. Radio transmitters on five elk (Elk 1, 3, 6, 7, and B) collared in 1973, operated for at least 4 months during my study; visual observations of other marked elk provided additional data.

Two elk (Elk 7 and B), used basically the same summer range for two consecutive summers; three elk (Elk 1, 3, and 6) summered in different areas each year. Elk 7 showed

strong fidelity to her small summer range near Cedar Log Creek (Fig. 35). Elk B, previously Elk 4, summered along the Cache-Montana Creek divide in 1973 and 1974 (Fig. 39). Elk 1, spent the summer near Indian Creek in 1973, but remained on spring range, near Wig Creek, during summer 1974 (Fig. 32). Elk 3, spent the summer of 1973 between Indian and Cedar Log creeks, the following year she stayed in Montana and Surveyor Creek drainages (Fig. 33). When the transmitter on Elk 6 failed in July, she was near Surveyor Creek instead of Irish Basin, her summer range in 1973. All elk, marked for longer than a year, returned to the same winter-spring range drainages; some (Elk 1, 7, and 3) showed fidelity to particular slopes. Calves and yearlings usually travel with their mothers; knowledge of seasonal movements and ranges is probably acquired during these first 2 years of life (Altmann 1952). Apparently some elk, on the study are, follow similar patterns each year and others do not, similar findings were reported by Simmons (1974), McLean (1972), and Ream et al. (1972).

Elk Movements During Hunting Seasons

Data from eight radio-collared elk documented some unusual movements during the early bull and general elk seasons; such behavior was probably due to human activity. Many sportsmen used the study area during hunting seasons; at the Fish Creek game checking station, 182 hunters were checked during the early season and over 1,100 during the

general elk season (Table 8). Movement data were based on radio locations made shortly before hunting seasons, shortly after the 5-day early season, and during the first 10 days of the general season; time between locations did not exceed 15 days and was often less than 10 days.

Early bull season. During the 5-day early bull season, three of the eight radio-collared elk (Elk 8, 9, and C) made movements of over 3.5 miles (5.6 km); this greatly exceeded normal activity of the previous weeks. Elk C, the only marked elk that could be legally shot, traveled the farthest, approximately 6 miles (9.7 km). Elk 3, 7, A, B, and D did not make long-distance moves, but were often found in thick vegetation, inaccessible to most hunters.

General elk season. Hunting activity varied to a large extent during the 28-day season; most hunting occurred during the first week and on subsequent weekends (Table 8). Unusual movements during the first 10 days can probably be attributed to hunting, but movements thereafter are less conclusive and were not considered. Zahn (1974) also noted that hunting activity is greatest during the first week of the season.

Three of the eight instrumented elk (Elk 3, 7, and D) made movements of over 2 miles (3.2 km) during the first portion of the season; Elk 3 traveled 5.5 miles (8.9 km) during the first 10 days of hunting. Elk 7 and Elk D moved from their small summer ranges for the first time in months; Elk D crossed the steep Idaho Divide into Kelly Creek, becoming the

TABLE 8. Hunting data from Fish Creek checking station, state hunting districts 202 and 203.

Early Bull Season 1974[1]

Date	No. of Hunters Checked	No. of Successful Hunters	No. of Hunters by District 202	203
9/15*	117	5	93	24
9/16	40	2	39	1
9/17	25	2	21	4
Total	182	9 (4.9%)[2]	153	29

General Elk Season 1974[3]

Date	No. of Hunters Checked	No. of Successful Hunters	No. of Hunters by District 202	203
10/20*	145	3	112	33
10/21	67	6	44	23
10/22	50	5	40	10
10/23	49	8	44	5
10/24	63	0	40	23
10/25	54	2	27	27
10/26*	110	6	82	28
10/27*	98	2	78	20
10/28	48	0	43	5
10/31	29	0	13	16
11/1	20	2	18	2
11/2*	30	0	25	5
11/3*	38	0	26	12
11/9*	71	0	52	19
11/10*	87	0	69	18
11/16*	60	0	53	7
11/17*	82	0	46	36
Total	1,101	34 (3.1%)[2]	812	289

[1]A 5-day season in 1974, 15-19 September.
[2]Percent of hunters killing elk.
[3]A 28-day season in 1974, 20 October through 17 November.
*Indicates a Saturday or Sunday.

only marked elk to enter Idaho (Fig. 41). Elk 8 and 9 extended their range to its eastern most edge during this period. Elk that remained in small areas were in thick vegetation typical of the fall range. Elk C, an adult bull, spent the early portion of the hunting season less than 0.5 miles (0.8 km) from U.S. Highway 12, approximately 1 miles (1.6 km) from a house (Fig. 40). Data from the 1973 hunting season (Zahn 1974), indicated that Elk 6 made a sudden 5 mile move in response to placement of a hunting camp; his four other radio-collared elk moved very little during the 1973 hunting season. Hunting activity is only a temporary disturbance and many marked elk soon returned to preseason areas.

Elk Distribution with Respect to Roads and Available Water

Straight line distances from 461 elk locations, to the nearest primary road, secondary road, and stream or lake were measured from topographic maps. Proximity of elk to roads and water, during all season, is discussed below.

Roads. Roads were classified into primary and secondary types (Fig. 4). Major roads receiving heavy use during summer and fall, from two-wheel-drive vehicles, were classified as primary roads; Fish Creek, Petty Creek, Surveyor Creek, and Wagon Mountain roads are primary roads, approximately 85 miles of roadway. Roads seldom used, including logging, private, and administrative Forest Service roads, were classified as secondary roads; over 300 miles of road are in this category.

Eight elk locations (2%) were 0.1 miles (0.2 km) or less from a primary road, the greatest distance was 4.5 miles (7.3 km); 9 percent of all ocations were within 1 mile (1.6 km) of a primary road. Average distance to primary roads, was greatest during winter (2.0 mi; 3.2 km), and least during summer and fall (1.4 mi; 2.3 km) (Fig. 20). Expected distance determined from 100 random points was 2.3 miles (3.7 km) (Fig. 21). Elk were usually closer to secondary roads than primary roads (Fig. 22); 35 percent of locations were within 0.1 mile (0.2 km), and 56 percent were within 1 mile (1.6 km). Average distance to secondary roads during the year was 1.0, 1.1, 1.2, and 1.0 miles (1.6, 1.8, 1.9, and 1.6 km) for spring, summer, fall, and winter, respectively. Expected distance to secondary roads from 100 random points was 1.3 miles (2.1 km) (Fig. 21). Both primary and secondary roads were crossed and used as travel lanes by elk. During the hunting seasons, when traffic was heaviest, 1 out of 178 hunting parties (<1%), saw elk from their vehicle.

Road construction is continuing in Thompson Creek drainage, the main road will be estended to the Cedar Log Creek divide to facilitate logging. Montana and Deer Creek roads were closed to four-wheeled vehicles by the Forest Service (Anon, 1973); Elk 3 and B were often located less than 0.5 miles (0.8 km) from the closed road, Elk B was observed on the road one morning.

Streams and lakes. Elk were located in an area contain-

Fig. 20. Distance from elk locations to primary roads.

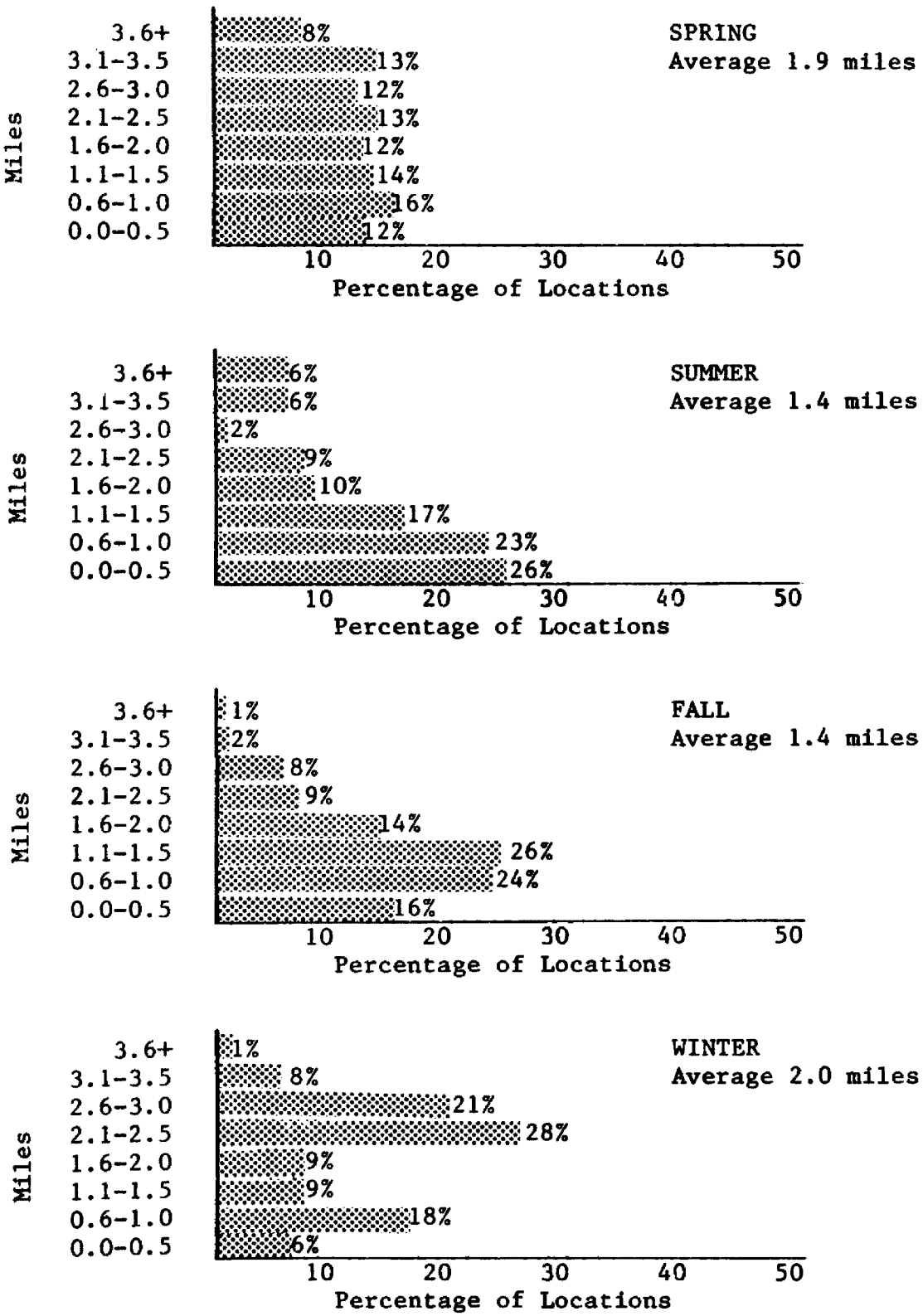


Fig. 21. Expected distances to primary roads, secondary roads, and water as determined from 100 random points.

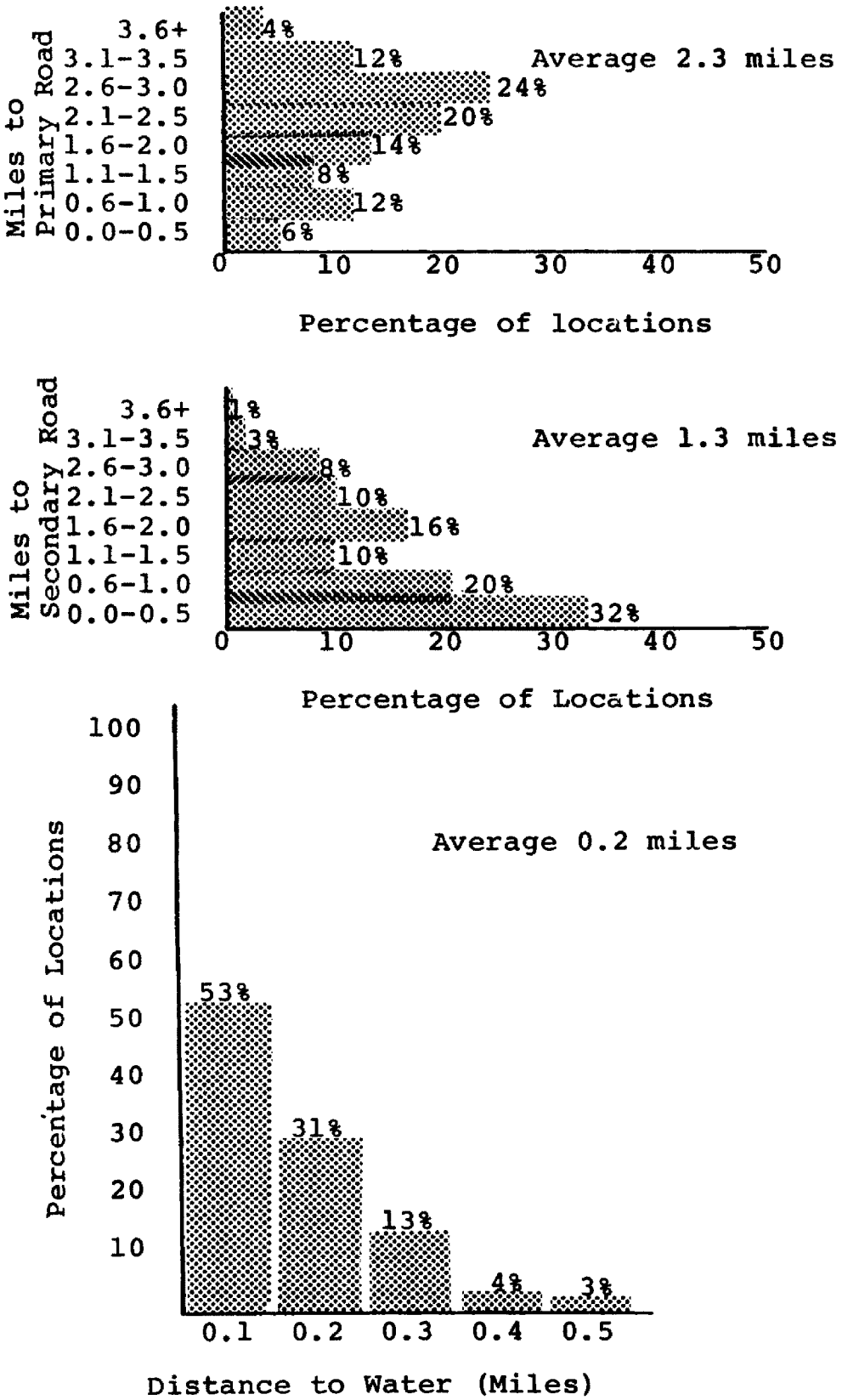
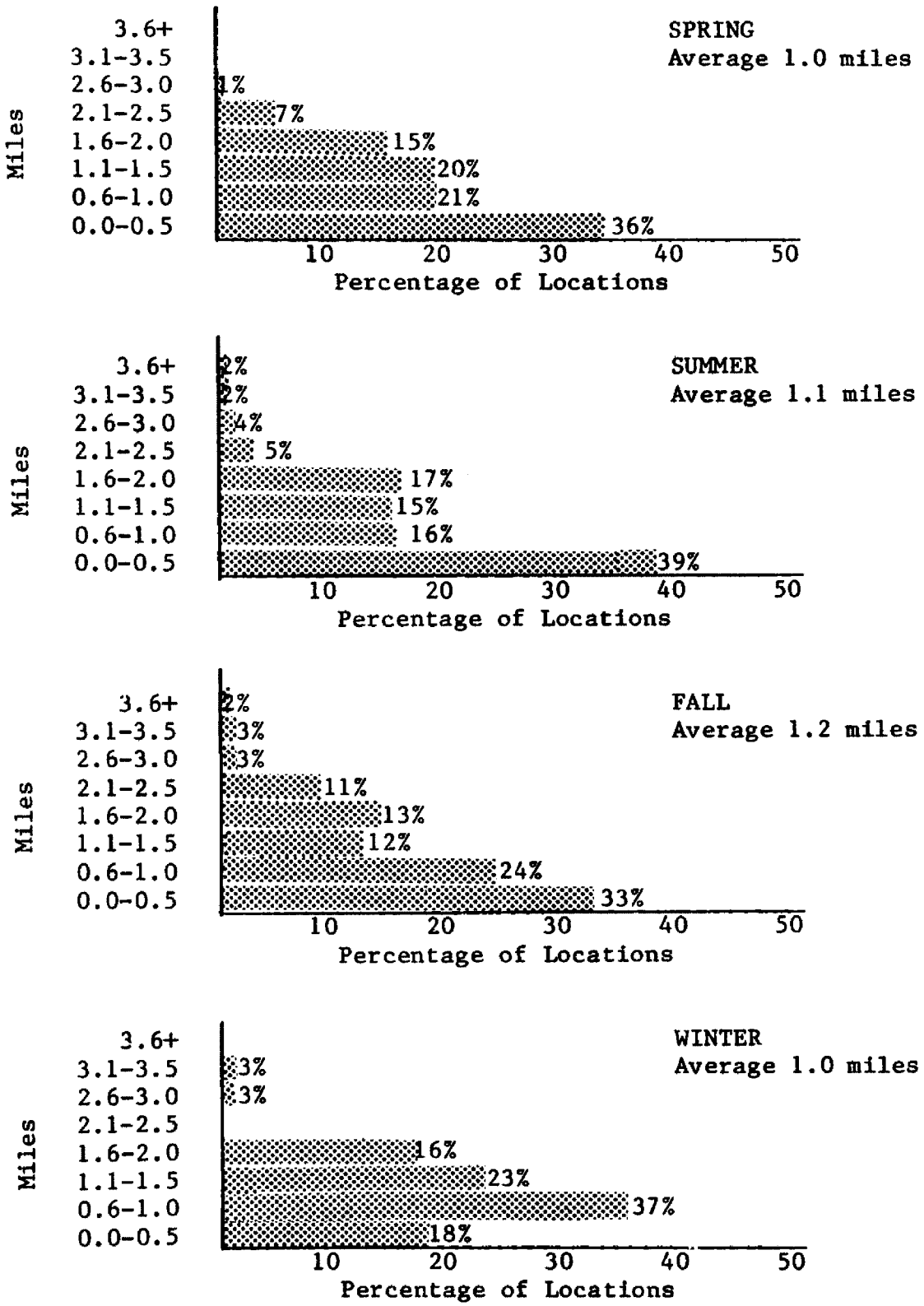


Fig. 22. Distances from elk locations to secondary roads.



ing over 50 named streams and 5 mountain lakes; hundreds of intermittent streams and several poinds added to the supply of water. During much of the year, snow provided water for elk.

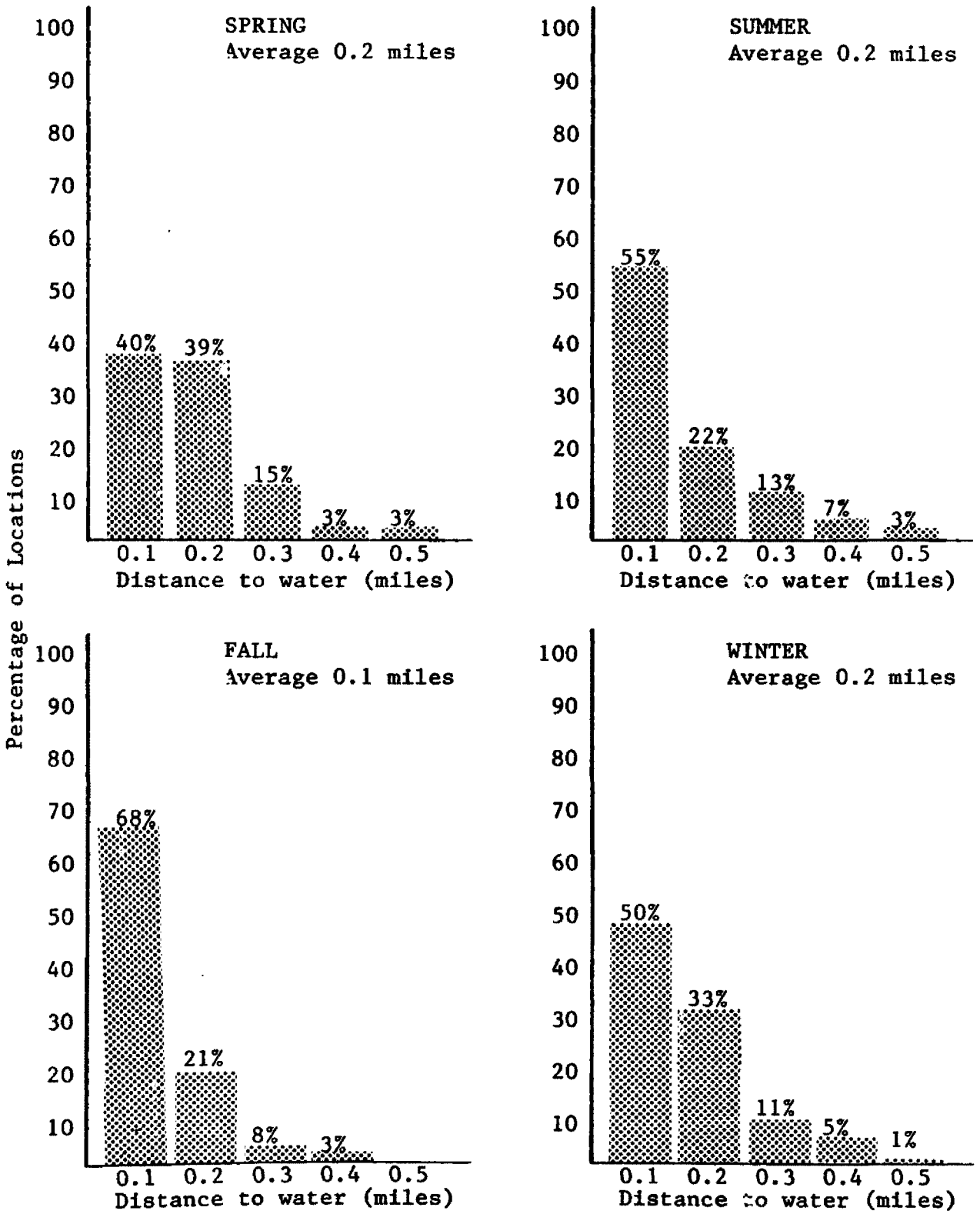
All locations were less than 0.6 miles (1.0 km) from water, most locations (51%) were within 0.1 mile (0.2 km) of water. Distances varied little with seasons; indicating a similar availability of water on all seasonal ranges (Fig. 23). Elk were closest to water during fall, 67 percent of locations were within 0.1 mile (0.2 km), corresponding to an increased use of stream bottoms. Expected distance to water from random points was 0.2 miles (0.3 km), which was the seasonal average for elk locations during spring, summer, and winter (Fig. 21). Streams did not impede elk movement, they were crossed at will with little hesitation. Elk also waded in mountain lakes, wallowed in shallow puddles, and fed upon aquatic vegetation. Considering the abundance of available water, a critical shortage does not seem probable.

Population Data

Population data were gathered from visual observations, checking station records, and hunter questionnaires. Visual data was sometimes difficult to obtain because elk inhabited dense vegetation, ranged over large areas, and were difficult to age during late winter and spring.

Reproductive success. In wildlife studies, the winter ratio of calves per 100 cows, is often used to express the

Fig. 23. Distances from elk locations to water.



fecundity of elk herds (Rognrud and Janson 1971). From 28 June 1974, when the first calf was observed, to 15 April 1975, most cows and calves were distinguished using physical and behavioral criteria (Table 4); after 15 April, calves closely resembled cows, and accurate identification was impossible. The calf:cow ratio prior to the hunting season was 51 calves: 100 cows, the post-season ratio, based on a larger sample (701 elk), was 53 calves:100 cows (Table 9). The harvest of over four times as many cows as calves probably accounts for the larger post-season ratio (Fig. 24). Calf:cow ratios determined by Bohne (1974) and Zahn (1974) were 30 and 42 calves:100 cows, respectively, for 1970-72 and 1973; my data indicate a higher reproductive success in 1974 than in the previous 3 years. This ratio of 53 calves;100 cows is comparable to elk herds in the Missouri Breaks and Little Belt mountains of Montana (Table 10).

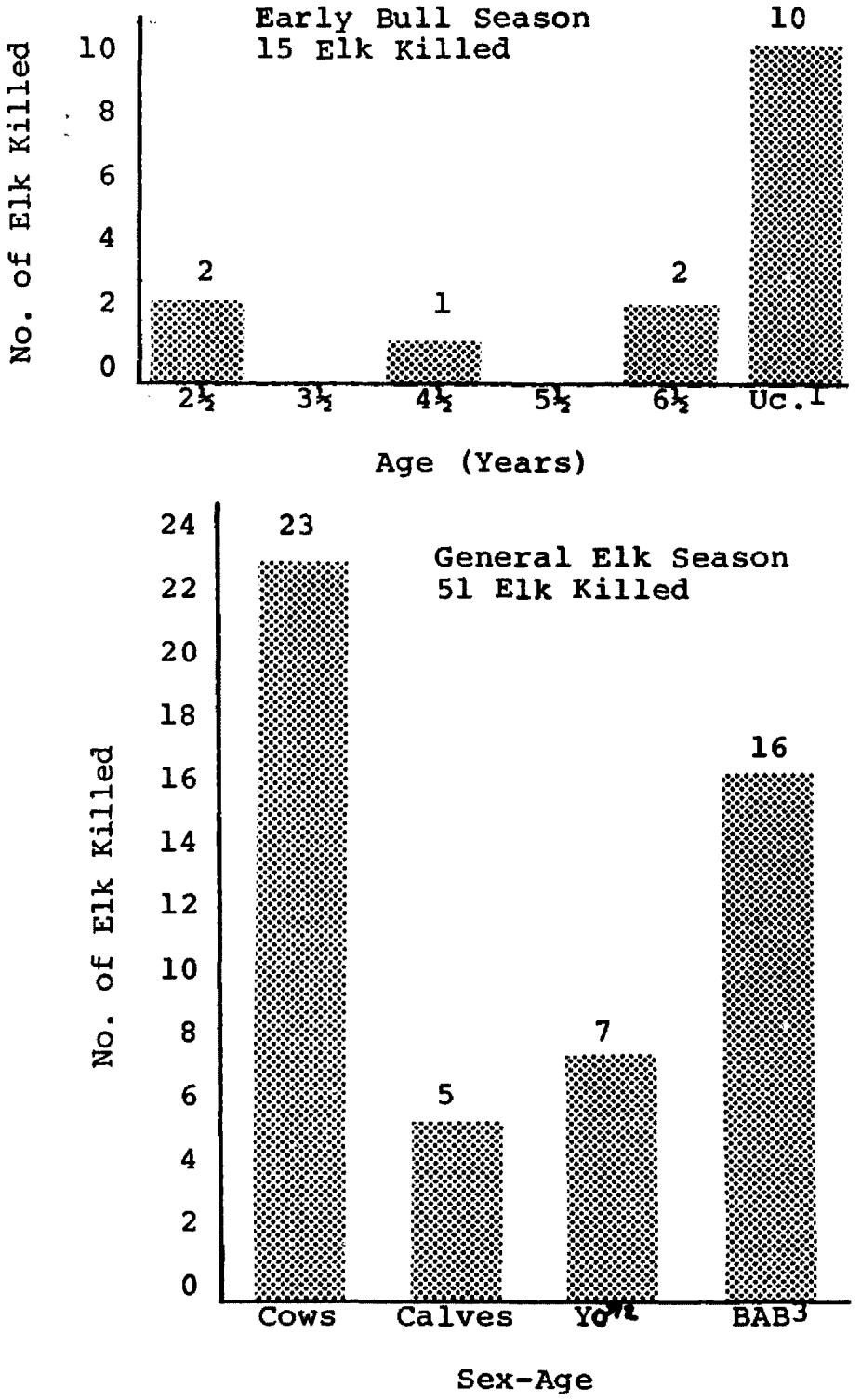
Twenty-three cows and five calves were killed during the general elk season. This indicates a ratio of only 22 calves: 100 cows, assuming equal vulnerability to harvest, but cows are usually preferred to calves and selected for by sportsmen, creating a bias toward a lower than actual reproductive ratio. Bohne (1974) discussed this and similar limitations of harvest data for determining population structure. Hunters who returned questionnaires saw 14 calves and 84 cows, a ratio of 17 calves:100 cows. Accuracy of this figure depends largely on the ability of hunters to classify animals in the

TABLE 9. Elk observations before and after the general hunting season.

	Before Hunting (28 Jun.-19 Oct. 1974)		After Hunting (18 Nov. 1974-15 Apr. 1975)	
	No.	Percent	No.	Percent
Cows	116	66.0	459	47.8
Calves	56	31.8	242	25.2
Y♂[1]	2	1.1	60	6.3
BAB[2]	2	1.1	129	13.4
Uc.[3]	0	0.0	70	7.3
Total	176	100.0	960	100.0
Calves:100 cows		51		53
Bulls:100 cows		3		40

[1]Yearling or spike bulls.
[2]Branch-antlered bulls.
[3]Unclassified animals, usually cows and calves that could not be distinguished.

Fig. 24. Reported elk harvest, from checking station data, 1974.



[1]Unclassified elk, jaws not available.
[2]Yearling bulls.
[3]Branch-antlered bulls.

Table 10. Winter population ratios of elk herds in Montana.

Area	Calves:100 Cows	Bulls:100 Cows
Study area 1955	41	-
Study area 1970-71	36	17
Study area 1971-72	44	20
Study area 1972-73	42	24[1]
Study area 1974-75	54	40
Bitterroot	54	-
Flathead	25	-
Gallatin	30	-
Gravelly Range	61	-
Little Belts	43	-
Missouri Breaks	53	-
Sun River	31	-

From: Rognrud and Hartkorn (1956), Bohne (1974), Zahn (1974), and Rognrud and Janson (1971).

[1]Data collected from June to November 1973, and only included adult bulls.

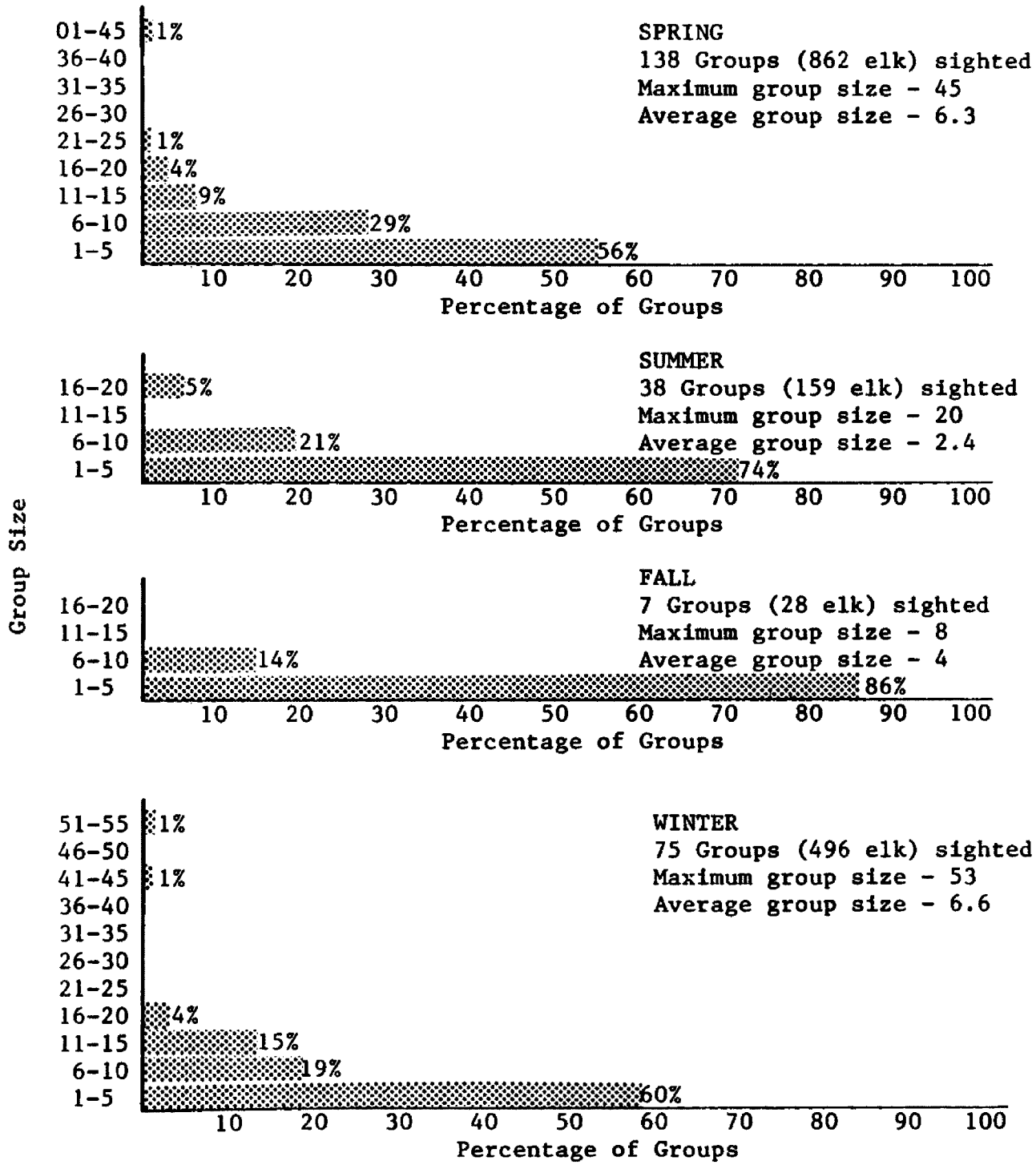
field; 34 elk were not classified, indicating the difficulty encountered. Of these three sources, my visual observations are probably the most reliable index of post-season calf:cow ratio, resulting in an estimate of 53 calves:100 cows.

Group size and composition. Number of elk per group varied during the year; average group size was largest during winter (6.6 elk) and smallest during fall (4 elk). The largest group was 53 elk, sighted near Burdette Creek on 24 December; three groups of over 40 elk each were recorded during winter and spring (Fig. 25). The largest group observed by Zahn (1974) was 38 on 16 April 1973.

During winter and spring, adult bulls were usually segregated from cow-calf groups; on only six occasions were adult bulls observed with cows and calves. Yearling bulls associated with both cow-calf groups and adult bulls. Bull elk were found singly and in groups of up to 18; they used slopes that were not shared temporally with cows and calves. Certain drainages had more bull elk locations than others; Lupine Creek drainage had a large proportion of bulls (55%), but adult bulls were never located in Wig Creek drainage. This type distribution of distribution occurs elsewhere (Peek and Lovass 1968) and may be related to density of cover, presence of preferred feeding sites, or traditional patterns of use.

During June, when most elk left the winter range and cows gave birth, elk were difficult to locate. For the remainder of the summer, cows and calves were in groups of up

Fig. 25. Elk group size data.



to 20 and bulls were seldom seen, but usually as singles. Fall observations of either sex were very rare; only seven sightings (28 elk) were made. During the fall rut, adult bulls herded estrous females and their young into small groups, called harems. Young males travel alone for long distances at this time (Harper 1964, Martinka 1969). During late November and December, harems dispersed and elk again appeared on the winter range in small bull and larger cow-calf groups.

Males composed only a small portion of the elk observed (17%) indicating they are in the minority, are more secretive than cows, or both (Bohne 1974). Three bulls:100 cows were observed prior to the general hunting season; after the season, from 18 November 1974 to 15 April 1975, more bulls were observed and the ratio was 40 bulls:100 cows (Table 9). Bohne (1974) reported preseason ratios of 34 and 36 bulls: 100 cows for 1970 and 1971, but only 17 and 20 bulls:100 cows after the hunting season; a large portion of both harvests were bulls. Zahn (1974) had preseason ratios of 20 and 24 adult bulls:100 cows for 1972 and 1973; respectively; he did not include spike bulls or make post-season estimates (Table 10). My data indicate that the proportion of bulls surviving the hunting season increased dramatically in 1974 or that bulls were less secretive and seen more often than during previous years. The increased proportion of spike bulls in 1974-75 may partially account for the increase; 13 spike bulls:

100 cows compared to 6 and 9 spikes:100 cows in 1970-71 and 1971-72. Bohne indicated that he may have misidentified spike bulls as cows during aerial counts. Due to the observed differential distribution of elk by sex during winter, sex ratio estimates are dependent largely on what areas of the winter range are sampled (Peek and Lovaas 1968). It is interesting that the proportion of bulls increased in 1974, a year of an early bull season, when compared to 1970 before early seasons were held. During the 1974 general season, hunters killed an equal number of bulls and cos, 23 of each; 7 of the 23 bulls were yearlings (Fig. 24). Sportsmen select bulls, creating a false impression of population composition (Bohne 1974). Hunters who returned questionnaires saw 46 bulls and 84 cows during the general season, a ratio of 55 bulls:100 cows; but once again, a large number of elk (34) were unclassified. My most reliable ratio of 40 bulls:100 cows is much higher than previously reported (Table 10).

Population estimate. Based on observations of elk and elk sign, I estimated that there were 225-300 elk in the Burdette Creek elk herd during late winter and early spring 1975. Largest counts were made during winter from the ground, and in the spring from an airplane. On 15 and 16 February, I accounted for 120 elk in Burdette and Wig Creek drainages, and on 1 May, Fish and Game Department personnel counted 201 elk from the air. During winter, elk tracks and beds indicated that additional elk were present, and undoubtedly some

elk were not seen.

The largest count reported by Zahn (1974) was 150 elk, counted from the air, on 4 December 1973; Bohne (1974) estimated there were 250 elk on the Wig-Burdette-Lupine Creek winter range in 1971 and 1972, but the largest number he counted was 151 in April 1971. Estimates based largely on aerial counts have several biases; weather, time of day, experience of the observer, speed and altitude of the plane affect the accuracy of the count (Caughley 1974). A controlled aerial survey of elk in Washington counted only 64 percent of the elk present (Buechner et al. 1951). Despite these problems, aerial survey is the most practical method of counting elk over large areas of mountainous terrain. The fall population of the Burdette Creek herd may have been as large as 290-370 if all harvested elk (67) were numbers of this winter group.

Bio-activity Centers

I located and described 15 bio-activity centers, relatively permanent areas, where elk activity is concentrated in time and space (Halvorson 1973). Fourteen sites were located while hiking, and one was spotted from the air. Halvorson initially defined and studied four types of bio-activity centers, wallows, mineral licks, loafing and trampled areas; he now concentrates on wallows and trampled areas. I collected information on wallows and mineral licks because of time restrictions and personal interests. I located 10 wallows and

5 mineral licks from 25 August 1974 to 12 May 1975.

Elk wallows. Elk wallows are muddy depressions covered with a trace to several inches of water. During summer and fall, elk wade and lie in these muddy puddles. Most wallows I located were dug by elk, but old stream beds and ponds were also used. Seven were located in or near first order streams, and three were next to second order streams (Strahler 1960).

Wallows ranged inside from 4.5 x 6 feet (1.4 x 1.8 m) to 64 x 76 feet (19.5 x 23.2 m) contained 0 to 8 inches (0 to 3.2 cm) of water, 0 to 4 inches (0 to 1.6 cm) of mud, and were located in stream bottom clearings 12 x 30 feet (3.7 x 9.2 m) to 300 x 400 feet (92 x 122 m) in size. Fresh elk sign, well used trails, and antler rubs were often nearby (see Appendix B). Plants common to wallow sites included western coneflower (Rudbeckia occidentalis), false hellebore (Veratrum viride), willow, red top grass (Agrostis alba), and sedge (Carex spp.).

Earliest recorded wallowing was on 23 July when 6 cows and 4 calves were observed in Wallow 1 (Fig. 26). The last recently used wallow was visited on 25 September, but wallows were probably used in October. The function of wallowing is obscure, possibilities include escape from heat, relief from insects or parasites, social grooming, and sexual displacement for males during the rut (Murie 1951). My observation of wallowing cows and calves indicates that this behavior,

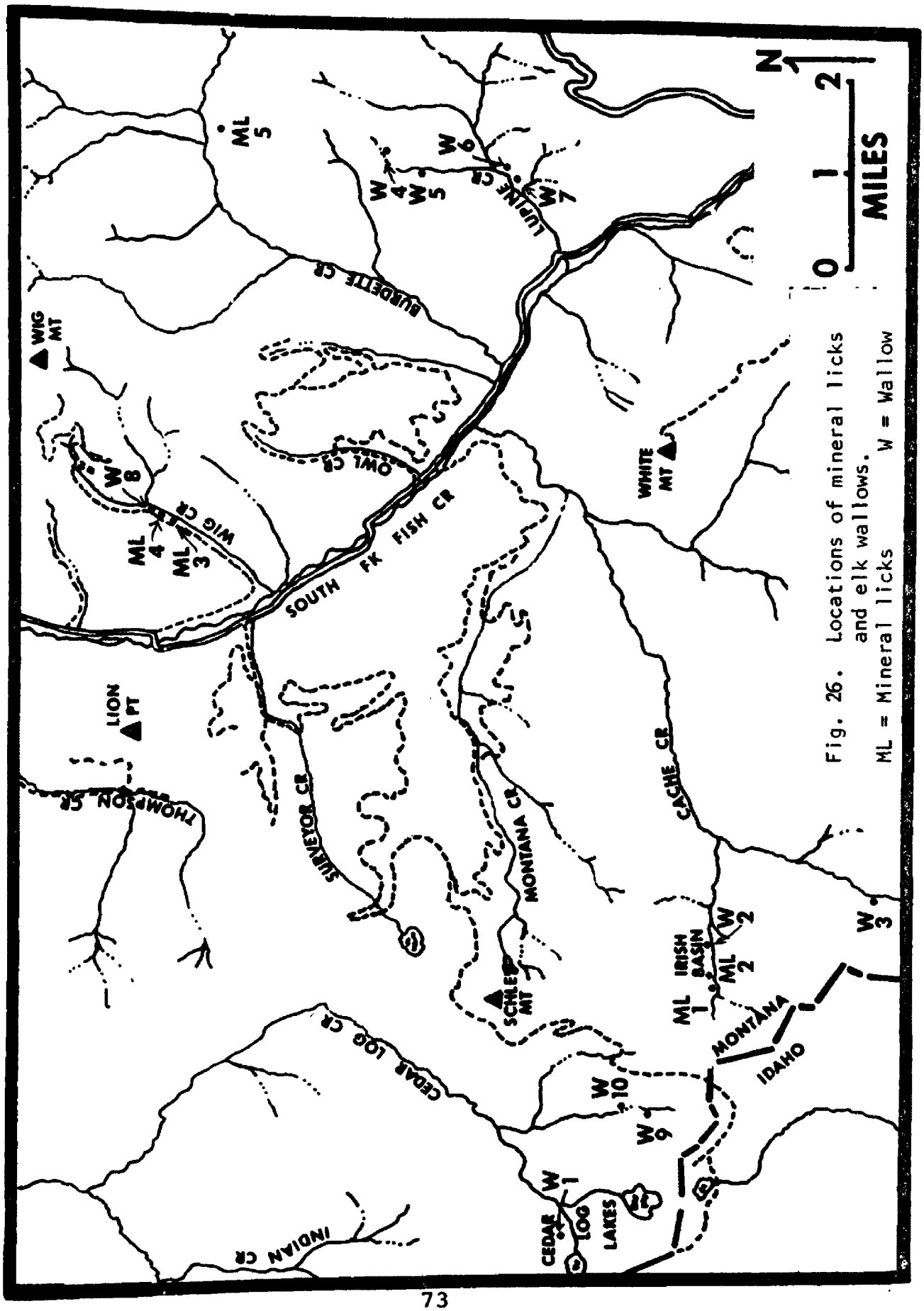


Fig. 26. Locations of mineral licks and elk wallows.
ML = Mineral licks W = Wallow

whatever its function, is not restricted to males. The study area contains many acres of suitable wallowing habitat, and wallowing is probably more widespread than this small sample indicates. If wallowing areas are essential for good elk habitat, the study area meets this requirement.

Mineral licks. Mineral licks are dry mineralized ground depressions where ungulates lick the substrate to obtain mineral salts. The substrate is usually composed of fine soil particles compacted by licking activity. Four of the five mineral licks I located were created artificially by man, as livestock salting areas; Mineral Lick 5, near Burdette Creek, may be a natural lick (Fig. 26). During 1974, I successfully used Mineral Lick 4, in Wig Creek drainage, as an elk trapping site; Zahn (1974) also trapped elk there in 1973. Licks ranged in size from 4 x 4.5 feet (1.2 x 1.4 m) to 52 x 94 feet (15.9 x 28.6 m) were located in openings from 50 x 100 feet (15.3 x 30.6 m) to 300 x 600 feet (91.5 x 183.0 m), and were from 6 to 23 inches (2.4 to 9.1 cm) deep. Pellet groups, tracks, and game trails were associated with licks; two sites had antler rubs nearby (see Appendix B). All licks were within 0.1 miles (0.2 km) of streams with trails leading to them. Mineral Lick 4 was used by elk during every month of the year; heaviest use occurred during May and June when their diet was changing from dry browse and grass to succulent grasses and forbs. Studies in Idaho (Dalke et al. 1965) documented the same period of salt use. Artificial salt-

ing was used there, with little success, to redistribute elk over their winter-spring range. Because the elk remain in a relatively small area during times of high salt requirements, adequite salt is apparently available.

Sport Hunting

Three elk hunting seasons were held on the study area during 1974: archery season from 7 September through 12 October; early bull season 15-19 September; and a general elk season from 20 October through 17 November. Elk of either sex or any age could be killed during the archery season and from 20 through 31 October of the general season; only branch-antlered bulls were legal for the early season, and any antlered bull could be killed from 1 to 17 November of the general season. Each hunter was allowed to kill one elk; to my knowledge no elk were taken by bow hunters.

Information concerning sport hunting was gathered at three game checking stations and from hunter questionnaires. More elk were probably harvested than were reported at checking stations. Stations were not operated during the archery season nor every day of the rifle seasons; however, checking stations were open on opening-days, weekends, and several weekdays. The major station, at Fish Creek, was operated for 20 of the 33 rifle season days (Table 8). Fifty hunting parties responded to my questionnaire for the early bull season and 130 parties for the general season; a 36 percent return on 500 questionnaires.

Early bull season. An early bull elk hunting season has been held three times since 1971 (Janson pers. comm.) Early hunts occur during the rutting season, when bull elk can be attracted by courtship vocalizations. This hunting technique, called bugling, probably originated in Europe for hunting red deer stags.

In Montana, early elk seasons have been controversial issues (Janson 1973). Some people support the early season as a unique opportunity for a high-quality wilderness hunt that incurs a small harvest and has little effect on breeding activity; others oppose this view saying that an early season disrupts breeding activity, scatters elk prior to the general season, results in wasted meat due to warm weather, and discriminates against hunters who cannot afford a backcountry hunting trip. The issue has political, biological, and economic implications. Hunting seasons, in Montana, are set by a five-member Fish and Game Commission, politically appointed by the Governor. Special interest groups exert pressure on commissioners regarding hunting seasons. Biologically, game managers must justify early hunts against charges that they reduce pregnancies by disrupting mating or removing too many breeding males. In Montana, early seasons are held prior to the peak of elk breeding activity, about 2 October (Morrison et al. 1959): only a small portion of the mature males are removed from the population and pregnancy rates tend to remain normal in populations subjected to early hunting (Janson 1973),

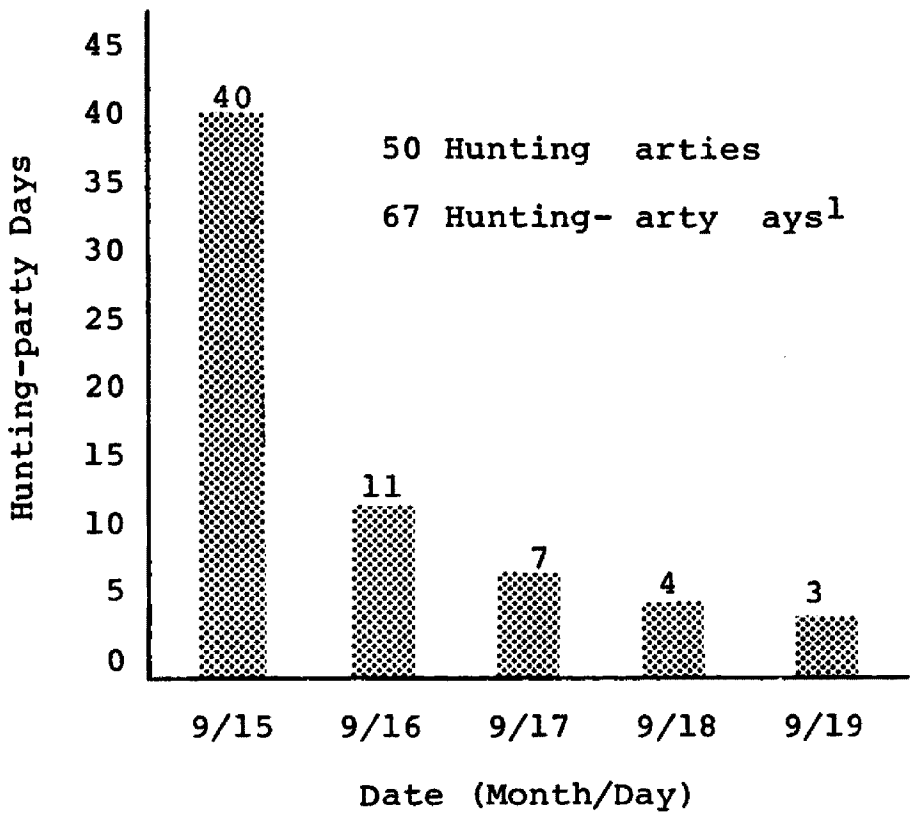
but actual behavioral effects of hunting during the rut are unknown. Economically, the early elk season may mean substantial income for outfitters, sporting-goods dealers, and small-town businessmen. In Montana, sportsmen can hunt both rifle seasons with the same license, so additional state revenue from the early season is minimal. Montana game regulations state, "It is unlawful for any nonresident to hunt game animals on any land within any national forest, wilderness area, national game refuge, or state game range unless accompanied by a licensed outfitter, professional guide employed by a licensed outfitter, or resident guide, all of whom must hold an appropriate hunting or fishing license." Early hunts extend the outfitter's season, but it is doubtful that nonresident hunters are significantly attracted by an early hunt of short duration and low success (Tony Gully pers. comm.).

The checking station at Fish Creek was operated for the first 3 days of the 5-day early elk season. Nine of the 182 hunters reporting to the station were successful (Table 8). A group of four hunters, living on the study area, killed elk, not checked at the station, that I visually authenticated. Success rate for this sample was 10 elk killed by 186 hunters or 5.4 percent. Personnel from Lolo and Petty Creek checking stations reported 5 elk killed on the study area. For the Fish Creek sample, hunting district 202, an area of high elevation and rugged roadless terrain, was favored by sportsmen (153 hunters) over the lower, more roaded district 203 (29

hunters) (Table 8). Fourteen of the 15 elk (93%) recorded at check stations were killed in district 202.

Fifty hunting parties, representing 147 hunters, returned hunter questionnaires for the early elk season. This sample hunted for 67 hunting-party days; most groups (40 parties) hunted the opening day with activity diminishing thereafter (Fig. 27). The average party was comprised of three hunters who each spent 9 hours hunting. Thirty parties (60%) traveled from 30 to 60 miles to reach their hunting area and five parties (10%) traveled over 100 miles; the maximum distance traveled was 370 miles by hunters from eastern Montana (Fig. 28). None of the hunting parties contained nonresident sportsmen or professional guides. A large majority of the parties were familiar with the area before. Approximately half of the parties (56%) hunted in district 202 and half (44%) hunted district 203. Fifty percent of the hunting parties were equipped with four-wheel-drive vehicles, and 13 parties (26%) hunted with or had free access to horses (Table 11). Twenty-six parties (54%) walked or rode horses 1 to 3.9 miles (1.6 to 6.3 km) from point of departure, 22 parties (44%) traveled 4 to 9.9 miles (6.8 to 15.8 km) and two groups (4%) penetrated 10 miles (16 km) or more into hunting country (Fig. 29). None of the parties reported seeing elk from vehicles, although 22 parties (44%) saw elk while hunting and 20 hunters from 14 parties (28%) shot at elk. Hunters saw 99 elk (46 cows, 28 bulls, 20 calves, 5 unclassified) and killed 11 bulls. For

Fig.27. Hunting activity during early bull season, from Questionnaire returns.



[1]Two hunting parties, hunting 1 day each, did not indicate dates.

Fig. 28. Distance sportsmen traveled to the hunting area, from questionnaire returns.

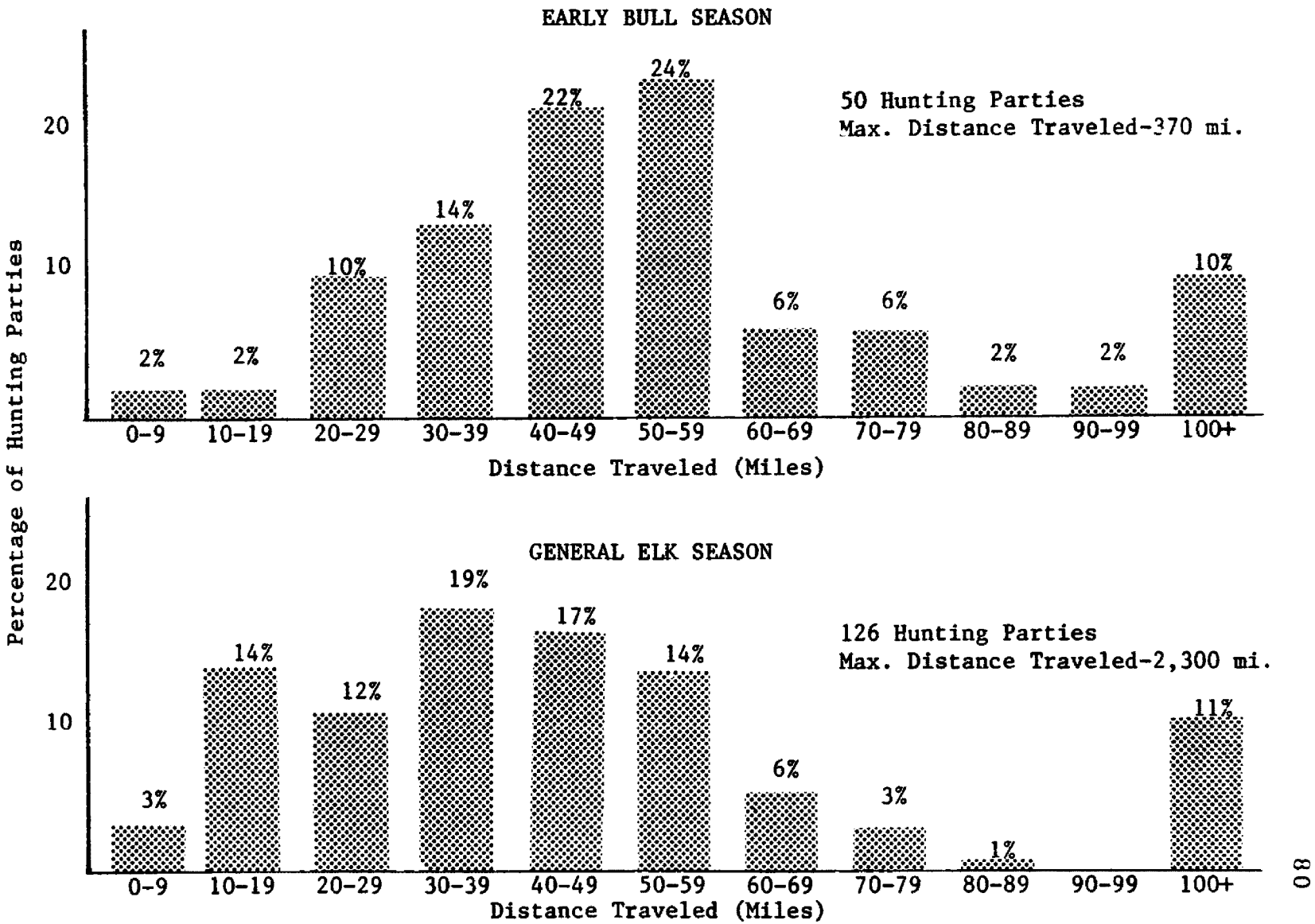
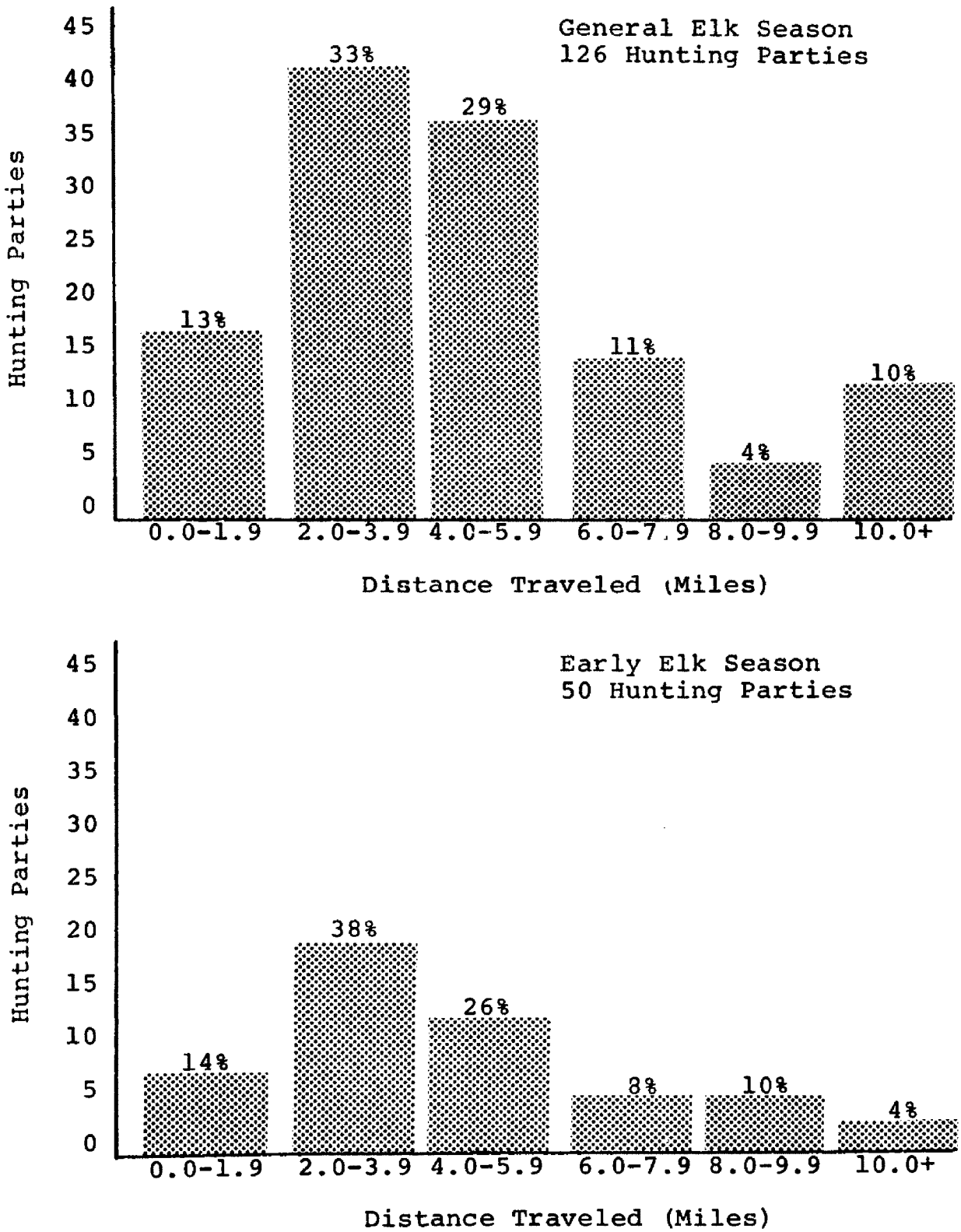


TABLE 11. Hunter questionnaire data.

	Early Bull Season	General Elk Season
Number of hunting parties	50	130
Number of hunters	147	396
Average size of hunting party	3.0	3.0
Average size of successful hunting party	3.7	5.1
Number of hours spent hunting/party	27	43
Number of hours spent hunting/successful party	26	100
Number of parties that hunted in district 202	28(56%)[1]	66(54%)[1]
Number of parties that hunted in district 203	22(44%)[1]	56(46%)[1]
Number of parties that saw elk	22(44%)[1]	39(31%)[1]
Number of parties that saw elk from a vehicle	0(0%)[1]	1(1%)[1]
Number of elk seen by hunters	99	178
Number of parties that shot at elk	14(28%)[1]	24(19%)[1]
Number of hunters that shot at elk	20(14%)[2]	47(12%)[2]
Number of parties that killed elk	9(6%)[1]	16(13%)[1]
Number of hunters that killed elk	11(7.5%)[2]	25(6.3%)[2]
Number of parties that employed professional guides	0(0%)[1]	3(2%)[1]
Number of parties that used 4-wheel-drive vehicles	25(50%)[1]	65(52%)[1]
Number of parties that used or had free access to horses	13(26%)[1]	34(27%)[1]
Number of parties familiar with the area	41(82%)[1]	115(89%)[1]

[1] Percentage of hunting parties in the sample
[2] Percentage of hunters in the sample

Fig.29. Farthest distance traveled, on foot or horseback, while hunting.



the survey samples of 147 hunters, the success ratio was 7.5 percent.

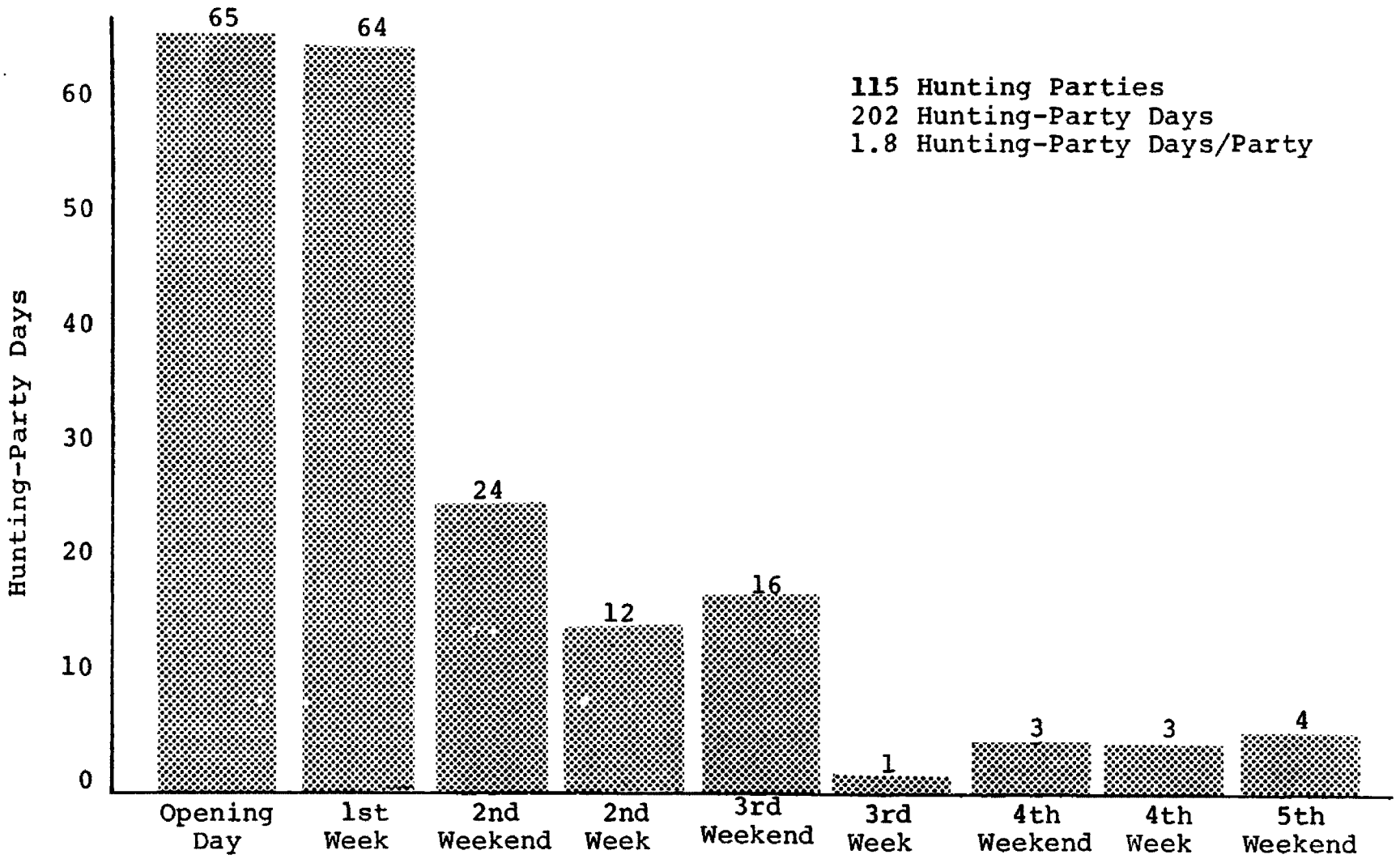
Successful parties, on the average, were of larger size (3.7 hunters/party) than unsuccessful groups (2.8 hunters/party). When compared to unsuccessful parties, successful hunters were less likely to have four-wheel-drive vehicles and more likely to have horses, were more often familiar with the area and preferred, to a greater extent, to hunt district 202 (Table 11). Successful groups saw 52 elk (20 legal bulls) while unsuccessful parties reported seeing 47 elk, (8 legal bulls). Fourteen hunters from successful groups (38%) and six hunters (5%) from unsuccessful parties shot at elk.

General elk season. Data from three game checking stations indicate that 51 elk (23 cows, 23 bulls, 5 calves) were taken during the general season (Fig. 24). One marked cow, R-5, was also killed during the general season but not recorded at a checking station. The major station, at Fish Creek, was operated for 17 days of the 28-day season, including the opening day and weekends. One thousand one hundred and one hunters reported through the station; 812 hunters (74%) hunted in district 202, and 289 (26%) hunted district 201. Thirty-four hunters (3.1%) killed elk (Table 8).

One hundred thirty hunting parties, representing 396 hunters, responded to my questionnaire for the general season. This group hunted for 202 hunting-party days, concentrating their efforts on the opening day (32%) and subsequent weekends

(23%) (Fig. 30). The average party size was three hunters, who hunted for an average of 43 hunter-hours per party. Distance traveled to the hunting area, ranged from less than 5 miles (8.5 km) to 2,300 miles (3,720 km), the majority (65%) traveling less than 50 miles (81 km) (Fig. 28). Sixteen parties (13%) contained a total of 67 nonresident hunters and three parties (2%) employed professional guides. The majority of groups (89%) contained at least one person familiar with the area. Hunting was almost equally divided between districts 202 (54%) and 203 (46%). Approximately half (52%) of the parties used four-wheel-drive vehicles and a fourth (27%) hunted with or had free access to horses (Table 11). Fifty-nine parties (47%) walked or rode horses 1 to 3.9 miles (1.6 to 6.3 km) from their departure point, 55 (43%) ventured from 4 to 9.9 miles (6.5 to 15.8 km) distance, and 12 (10%) went 10 miles (16 km) or more from their starting point (Fig. 29). Only one party (<1%) reported seeing elk from a vehicle; a total of 39 parties (31%) saw 178 elk, no one observed marked elk. Forty-seven hunters (12%) from 24 parties (19%) shot at elk; 16 parties (13%) were successful in killing 25 elk (7 cows, 14 bulls, 4 calves). For this sample of 396 hunters, the success ratio was 6.3 percent, slightly lower than for the early bull season survey (7.5%) (Table 11). Successful parties were larger, on the average (5.1 hunters/party), than unsuccessful groups (2.8 hunters/party), tended to rely on horses more, and showed a greater preference for

Fig. 30. Hunting activity during general elk season, based on questionnaire returns.



hunting in district 202.

Hunter attitudes. In my hunter questionnaires, sportsmen had the opportunity to give their opinions on hunting quality and management issues. The same trends of thought were shown by early and general season hunters; the combined sample size was approximately 180 hunting parties, depending on the number of no responses for each question (Table 12).

One hundred seventy-six hunting parties rated their hunting experience as excellent (24%), fair (36%), and poor (40%). The majority of returning hunters (67%) felt that the 1974 hunt was not as good as previous years; 27 percent and 8 percent of returning hunters rated their experience the same or better than previous years. Half (50%) of all huntint parties were against having an early bull elk season; 13 percent were indifferent and only 37 percent were in favor of an early season (Table 12). Even a substantial portion (34%) of the early season hunting parties were opposed to such a season. People in opposition felt that the early season disrupted mating and normal movements, wasted meat, and resulted in over-harvest of bulls. Others supported the early season saying that it is a challenging hunt, does not affect breeding, and offers excellent recreation. Sixty percent of 177 hunting parties were satisfied with the general hunting season regulations, the remainder (40%) were dissatisfied primarily with the date and length of seasons. A

TABLE 12. Hunter attitude data, based on questionnaire returns.

	Excell.	Fair	Poor
How do you rate your hunting experience?	41(24%)	34(36%)	71(40%)
	Better	Same	Not as good
How did this year compare with the hunting here in previous years?	8(6%)	39(27%)	96(67%)
	Favor	Indiff.	Against
What is your opinion of the early bull elk season?	66(37%)	24(13%)	89(50%)
	Yes		No
Are you satisfied with the general season regulations?	106(60%)		71(40%)
	Favor	Indiff.	Against
What is your opinion of logging road closures?	130(75%)	21(12%)	23(13%)
	Yes		No
Does an ideal day of elk hunting include killing an elk?	25(15%)		140(85%)

majority (75%) supported the Forest Service policy of closing old logging roads to vehicles having four wheels. People supported road closures as a necessity to protect game habitat from human disturbance, and to reduce forest littler problems. There was a strong feeling that roads should be closed to all motor vehicles, not just four-wheeled ones. People opposed to road closures felt that the public has a right to all possible access. A Fish and Game Department survey (Hartkorn and Janson 1974) indicated that 91 percent of 501 hunters questioned in western Montana also advocated at least partial closure of logging roads during the hunting season.

Hunters were asked to describe their idea of an ideal day of elk hunting; only 15 percent felt that killing an elk was important to a good hunting experience. Many hunters felt that it was rewarding just to get out for a good hike and possibly see fresh elk sign; hunting after a fresh snowfall was described as ideal. Hunters felt that crowded hunting conditions detracted from the quality of their experience and should be avoided if possible.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

My data, based on observations of marked and unmarked elk, indicate that the Burdette Creek elk herd, depending on the season, uses different portions of a 270 square mile (700 sq km) area. Most elk migrate west from winter-spring ranges to summer-fall areas west of Fish Creek, but a small segment of the herd remains on or near the winter range throughout the year.

I agree with Zahn (1974) and Bohne (1974), that the winter range is the most-limited critically-important seasonal area, and it should be protected from logging and road building. Bohne reported that the winter range, based on utilization of five key browse species, was in fair to very poor condition because most shrubs were over-mature and lacked regenerative vigor. The quantity of winter range vegetation has also declined because of invasion by coniferous trees; conifers out-compete and replace desirable browse plants. Prescribed burning has been successful in rejuvenating similar winter ranges in Idaho by reducing plant competition, killing conifer reproduction and stimulating resprouting and seedling establishment of browse plants (Leege 1968, 1969). I think prescribed burning could improve the winter range, particularly in Lupine Creek drainage, where conifers have invaded brushy areas. The effects of prescribed burning could

be studied in a graduate thesis project done in cooperation with the U.S. Forest Service and Montana Department of Fish and Game; results could be compared with studies conducted in Idaho. If logging were used to improve the Lupine Creek winter range, threes should be cut on south and west slopes, where growth of browse species is favored. All logging roads should be closed near the Fish Creek Road when logging activity is finished.

Locations of three radio-collared elk and visual observations of elk and elk sign near Montana Creek road, indicate that closing logging roads, may encourage elk to use previously logged areas. I recommend that the Forest Service keep Montana and Deer Creek roads closed tc four-wheeled vehicles. Close Owl Creek road, and close Thompson Creek road upon completion of current logging operations. Public opinion, expressed in my hunter questionnaires, was strongly in favor (75%) of road closures; many also advocated closure to motor bikes.

I located and described bio-activity centers on the study area. The importance and distribution of these sites is poorly understood; Gary Halvorson, U.S. Forest Service biologist is continuing to gather information, in 1975 he will be working in my study area. I believe that important bio-activity centers, such as mineral licks and permanent wallows, should be located and protected from human disturbance.

Most hunting activity occurred during the first week of

general elk season; 636 hunters reported through the Fish Creek checking station during that period. The density of hunters was greatest in the West and North Fork of Fish and Straight Creek drainages. Clearwater Crossing, a Forest Service trailhead, provides access to this area, it was over-crowded with 65 vehicles during the opening day of hunting. Hunters complained, verbally and on questionnaires, that the density of sportsmen was too great for the area, degrading the hunting experience and creating unsafe conditions. I believe that regulations, limiting access to a reasonable number (40) of hunters, is warranted at Clearwater Crossing. During the first week of elk season, the Forest Service could regulate access on a first come, first serve basis, the same way it operates some camp grounds.

My data indicate that 67 elk were legally taken during the early bull and general elk seasons. This represents 18-21 percent of the estimated 320-370 pre-hunting season population. An annual harvest this large is not unreasonable for a healthy, reproductive elk herd (Boyd 1970). Calf-cow ratio of 54 calves:100 cows for the Burdette Creek herd, indicates that reproduction is high. Considering both the percentage killed and the reproductive success, over harvesting, during the study period, seems unlikely.

Hunting success, based on checking station data, was 4.9 and 3.1 percent for early bull and general elk season, respectively. Hunting success appears to be dependent largely upon

snow conditions and availability of escape cover (Bohne 1974). Longer season, past mid-November, would increase the possibility of heavy snow during the hunting period. Heavy snow would force the elk onto open winter ranges where they could be readily shot. Extending the general season would probably increase hunting success greatly, but it could also create an over-harvest situation; I recommend a season ending near the middle of November.

Fifteen bull elk were killed during the 1974 early bull season. The effects of killing 15 elk from a fall population of 320-370 are probably negligible. Even though early bull seasons appear to be biologically acceptable, they are surrounded by controversy (see page 72). Half of the hunting parties, from the questionnaire sample, were opposed to early hunts. I do not believe it is in the interest of the Fish and Game Department to promote unpopular hunts, in this matter public opinion should be respected, and early hunts held only when desired by the majority of sportsmen.

CHAPTER VI

SUMMARY

Using biotelemetry and individually-collared elk, I studied the movements and seasonal ranges of the Burdette Creek elk herd from April 1974 to May 1975. Using a corral-type trap and a Cap-Chur gun, 14 elk (10 cows, 2 bulls, 2 female calves) were marked in 1974; including 8 previously marked elk (Zahn 1974), 10 had functional radio-collars during most of my study. 1,811 elk were observed, 383 locations of marked elk provided information concerning movements, distribution, and fidelity to seasonal ranges.

Movements of marked elk indicate that a small portion of the wintering population remain on or near the winter-spring range year-round; the majority move to summer-fall ranges west of Fish Creek. Movements to summer range, for this later group, varied from 6 to 11 miles (9.7 to 17.8 km), and occurred during a two week period in early June. Elk calves were born during this period, on spring and summer ranges. Return to winter range occurred over a 3-4 week period during late November and December; snow depths appear to initiate this return movement. Two elk showed strong fidelity to summering areas and three used different summer ranges each year. All radio-collared elk returned to the same drainages during winter; some to the same feeding areas.

Physical characteristics of 461 elk locations were used

to describe seasonal ranges. Winter and spring ranges were similar, as were summer and fall areas. Major winter and spring ranges were located in Lupine, Burdette, and Wig Creek drainages, east of Fish Creek. During winter, elk used steep south and west-facing brush areas, and dense timber located on north slopes and in stream bottoms; 56 percent of radio-collared elk locations were in seral brush cover types and 24 percent were in stream bottoms. Group size was largest during winter (6.6 elk) and the largest group (53) was observed in December. Spring range comprised an extension of winter range margins into nearby areas; seral brush and Ponderosa pine-bunchgrass cover types were most often used. The majority of winter and spring locations (73%) occurred below 5,000 feet (1,530 m) in open areas.

Fall range was the largest seasonal area, covering approximately 270 square miles (700 sq km), on both sides of Fish Creek. During summer, elk used thick stands of fir-larch timber and stream bottoms. Group size ranged up to 20, with an average of 4.2 Elk that remained on winter-spring range used high ridges and densely vegetated stream bottoms. Most summer elk locations (69%) were at elevations in excess of 5,000 feet (1,530 m).

Fall range overlapped much of the summer range, but was generally lower in elevation and denser in vegetation; 46 percent of locations were below 5,000 feet (1,530 m) and 70 percent had canopy covers of over 60 percent. Ninety-two percent

of radio-collared elk locations were in lodgepole pine, fir-larch, and stream bottom cover types; and group sizes were small (4.0 elk). During fall, some marked elk made unusual movements, attributed to hunting activity. Sudden long moves of up to 6 miles (9.7 km) and movements into thick vegetation occurred during hunting seasons.

Distribution of elk with respect to roads and water was determined using straight line map distances from 461 elk locations to the nearest roads and water source. Nine percent of all elk locations were within 1 mile (1.6 km) of a primary road, 56 percent were within 1 mile (1.6 km) of a secondary road, and 51 percent were within 0.1 mile (0.2 km) of water. Average distance to a primary road was greatest during winter (2.0 mi; 2.3 km), and least in summer and fall (1.4 mi; 2.3 km). Distance to secondary roads averaged 1.0 mile (1.6 km) in spring and winter, 1.1 mile (1.8 km) during summer, and 1.2 mile (1.9 km) in fall. Average distances to water during spring, summer, fall, and winter were 0.2, 0.2, 0.1, and 0.2 miles (0.4, 0.4, 0.2, and 0.4 km), respectively.

Age and sex classifications of 701 elk from 18 November 1974 to 15 April 1975, indicated ratios of 53 calves and 40 bulls:100 cows. The population compostion was: 47.8 percent cows, 25.2 percent calves, 13.4 percent adult bulls, 6.3 percent yearling bulls, and 7.3 percent unclassified. Based on aerial and ground observations, the wintering population was estimated at 225-300 elk; prior to the hunting season the

Burdette Creek herd may have been as large as 290-370 elk.

Fifteen bio-activity centers, 10 wallows and five mineral licks, were located and described. Descriptions included: size, depth, location, status of use, slope, exposure, elevation, adjacent vegetation, and stream order. Wallows ranged in size from 4.5 x 6 feet (1.4 x 1.8 m) to 64 x 76 feet (19.5 x 23.2 m), contained 0 to 8 inches (0 to 3.2 cm) of water, were usually close to first order streams, and received use from July to late September. Four of the five mineral licks, were created by man as livestock salting areas. Licks ranged in size from 4 x 4.5 feet (1.2 x 1.4 m) to 52 x 94 feet (15.9 x 28.6 m), were 6 to 23 inches (2.4 to 9.1 cm) deep, and were used most often in May and June.

Sport hunting during early bull and general elk seasons accounted for a harvest of at least 67 elk. During early bull and general elk seasons, 182 and 1,101 hunters reported through the Fish Creek game checking station, respectively; 9 hunters (4.9%) killed elk during the early season, and 34 (3.1%) were successful during the general elk season. Most sportsmen (70%) hunted in district 202, a higher, more roadless area than district 203.

Five hundred hunter questionniares were distributed, by checking station personnel and local guides, to investigate hunting activities and hunter attitudes; 180 (36%) were returned. The typical early season elk hunter was in a party of three, drove 40-60 miles (65-97 km) to hunt, spent 9 hours

hunting, traveled 2-6 miles (3.2-9.7 km) from his starting point, did not employ a guide, and was not in favor of early season hunts. During the general season, the average hunter came from closer by (30-50 miles; 48-81 km) and hunted longer (14 hr) than early season hunters. Approximately half of all hunting parties used 4-wheel-drive vehicles, and 25 percent used or had free access to horses. Over 80 percent of the hunting parties contained members familiar with the area. Successful parties tended to be larger and hunted longer than average groups.

Concerning hunter attitudes, most parties (76%) rated their experience as poor or fair, were against early bull seasons (75%), were satisfied with general season regulations (60%), and were infavor of closing logging roads (75%). Only 25 (15%) out of 165 hunting parties, felt that killing an elk was necessary for an ideal day of elk hunting.

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APPENDIX A

MOVEMENTS OF RADIO-COLLARED ELK

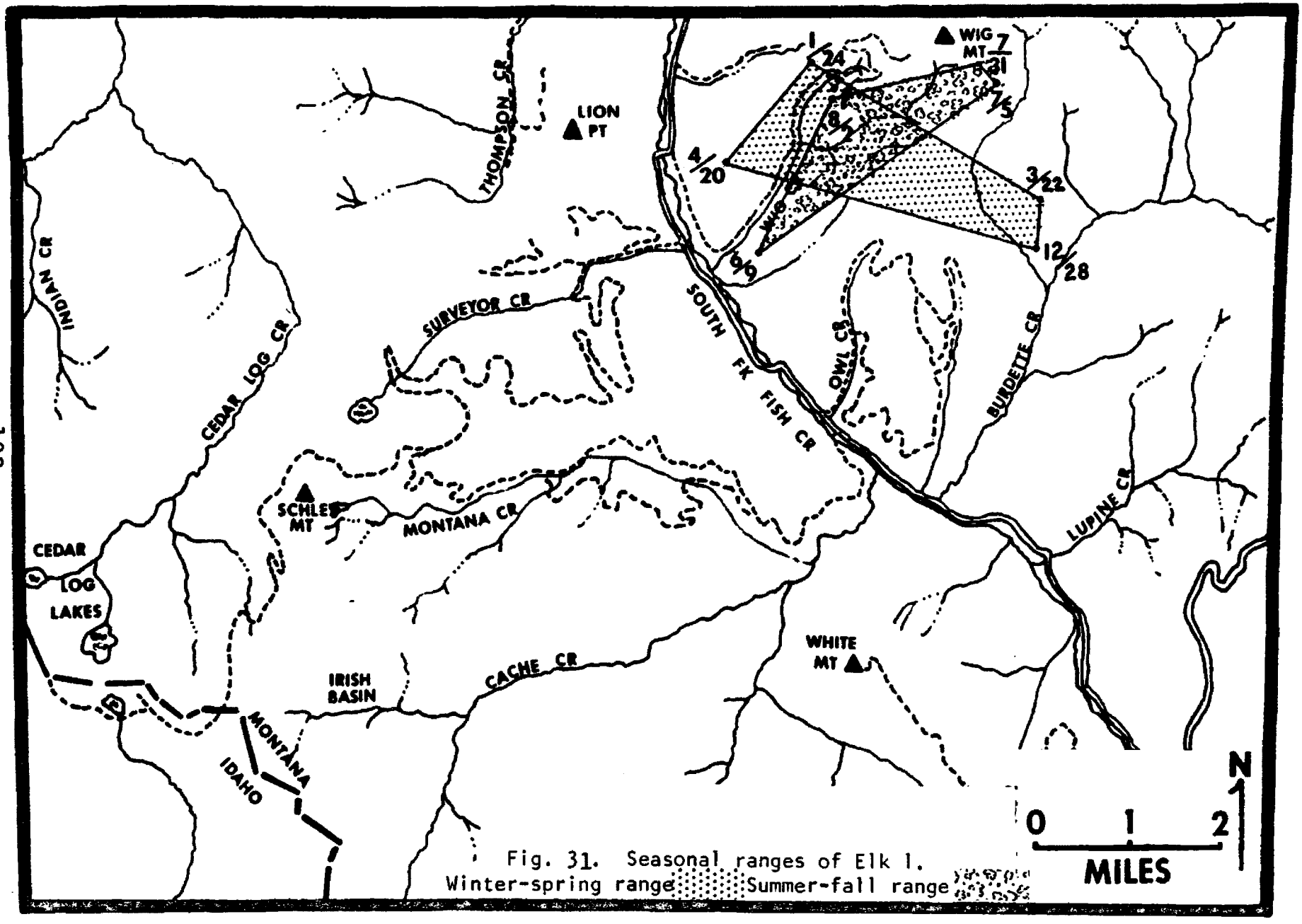

Fig. 31. Seasonal ranges of Elk 1.
Winter-spring range Summer-fall range

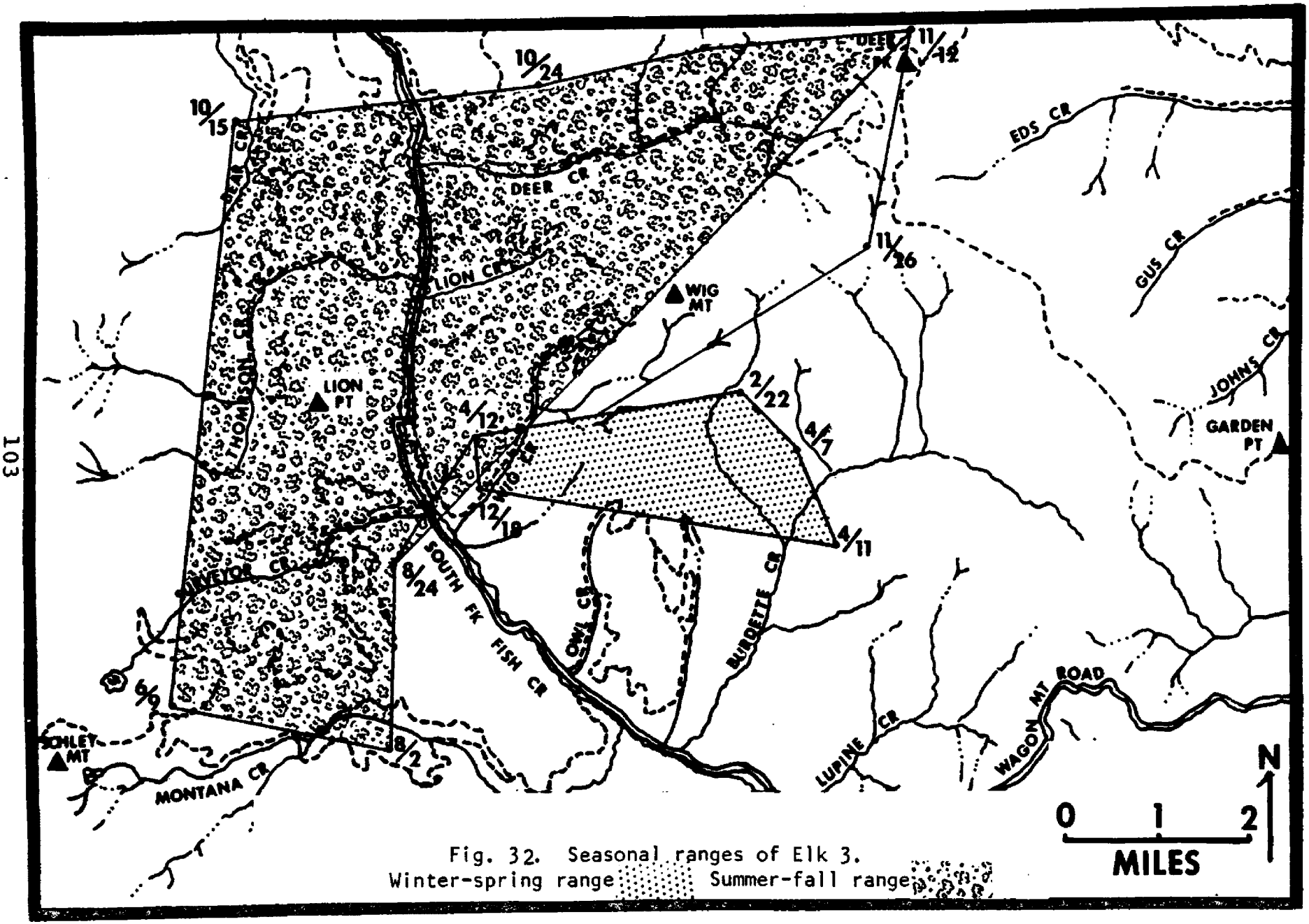

Fig. 32. Seasonal ranges of Elk 3.
Winter-spring range ▨ Summer-fall range

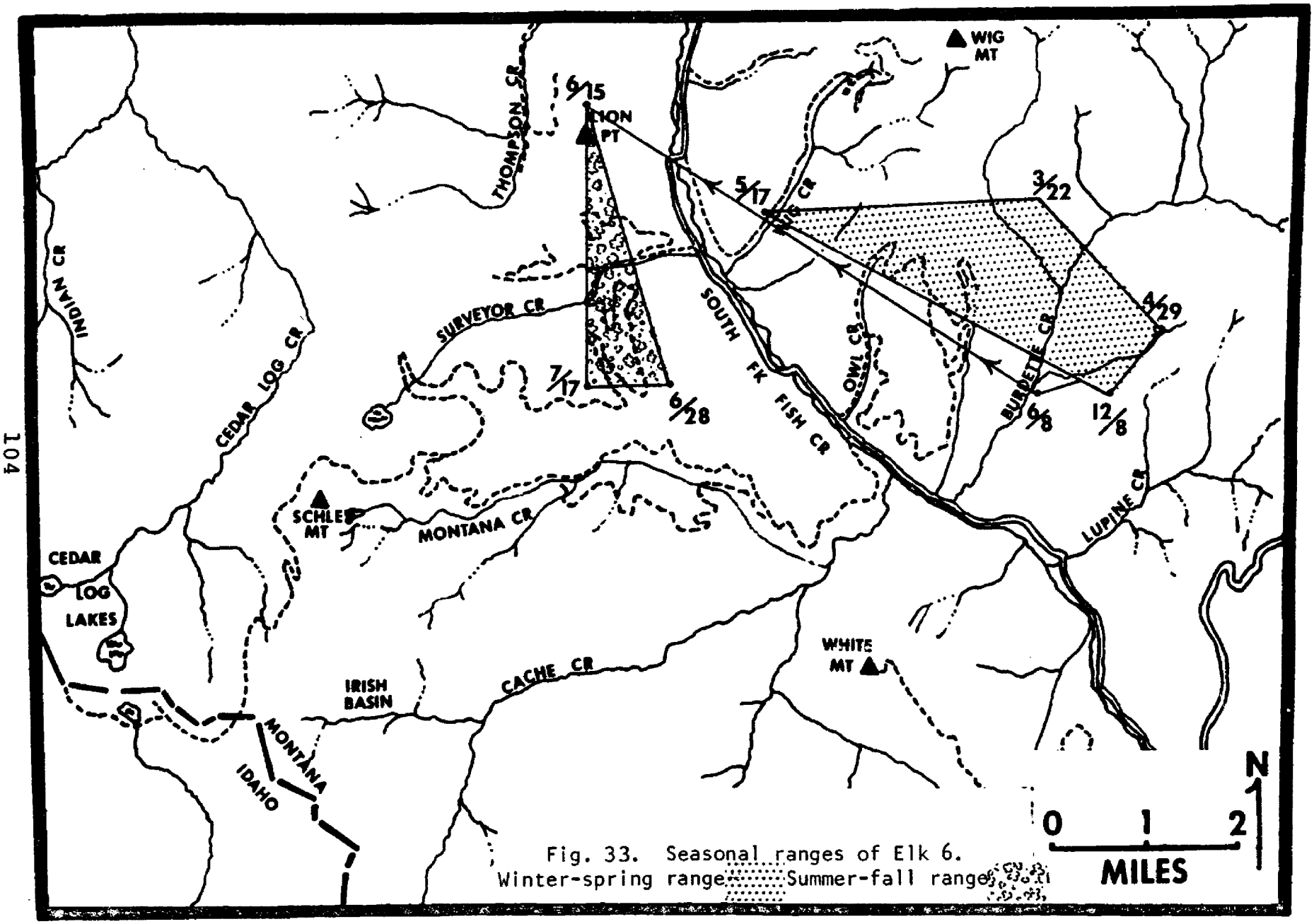

Fig. 33. Seasonal ranges of Elk 6.
Winter-spring range ..... Summer-fall range

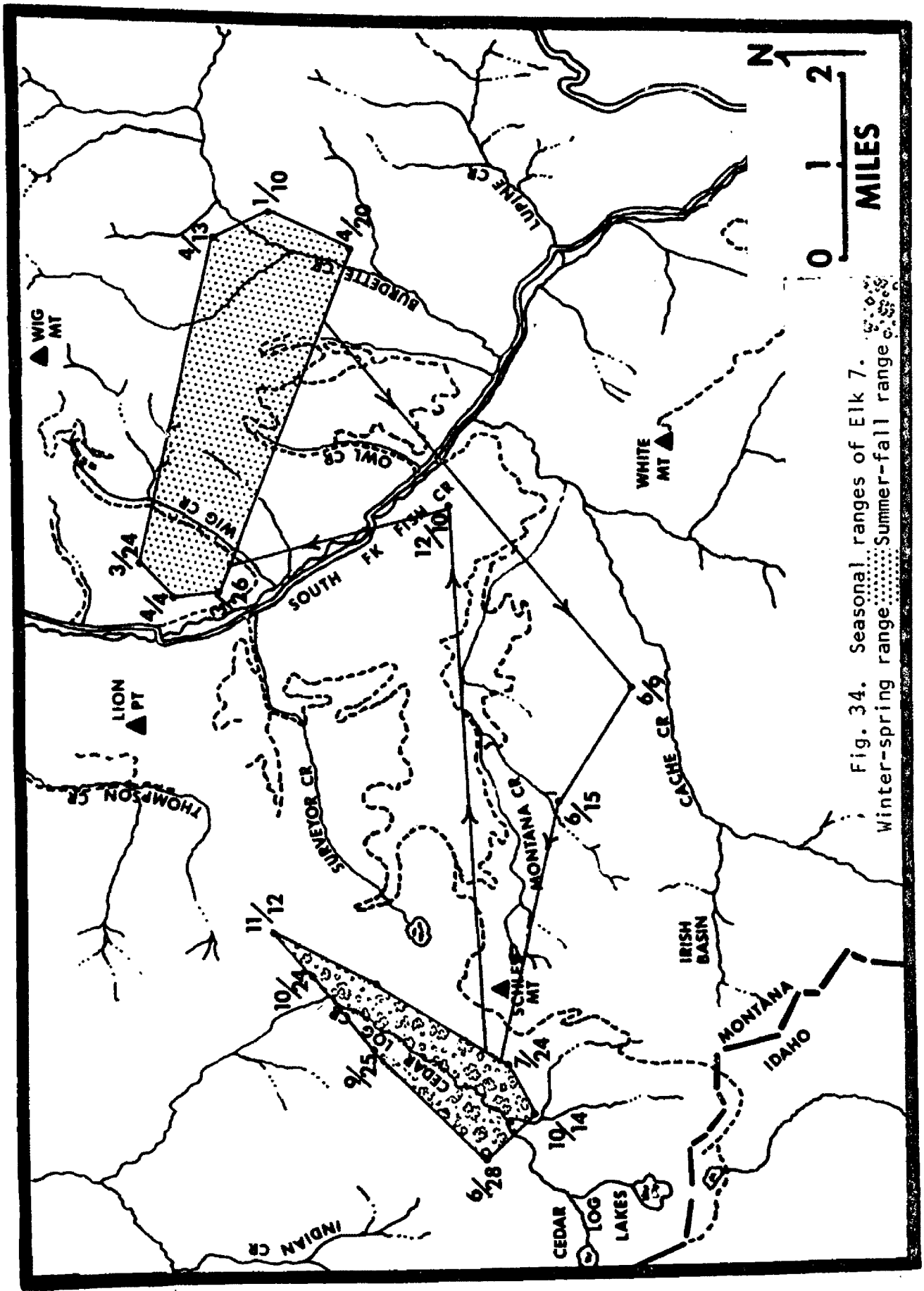

Fig. 34. Seasonal ranges of Elk 7.
Winter-spring range ..... Summer-fall range

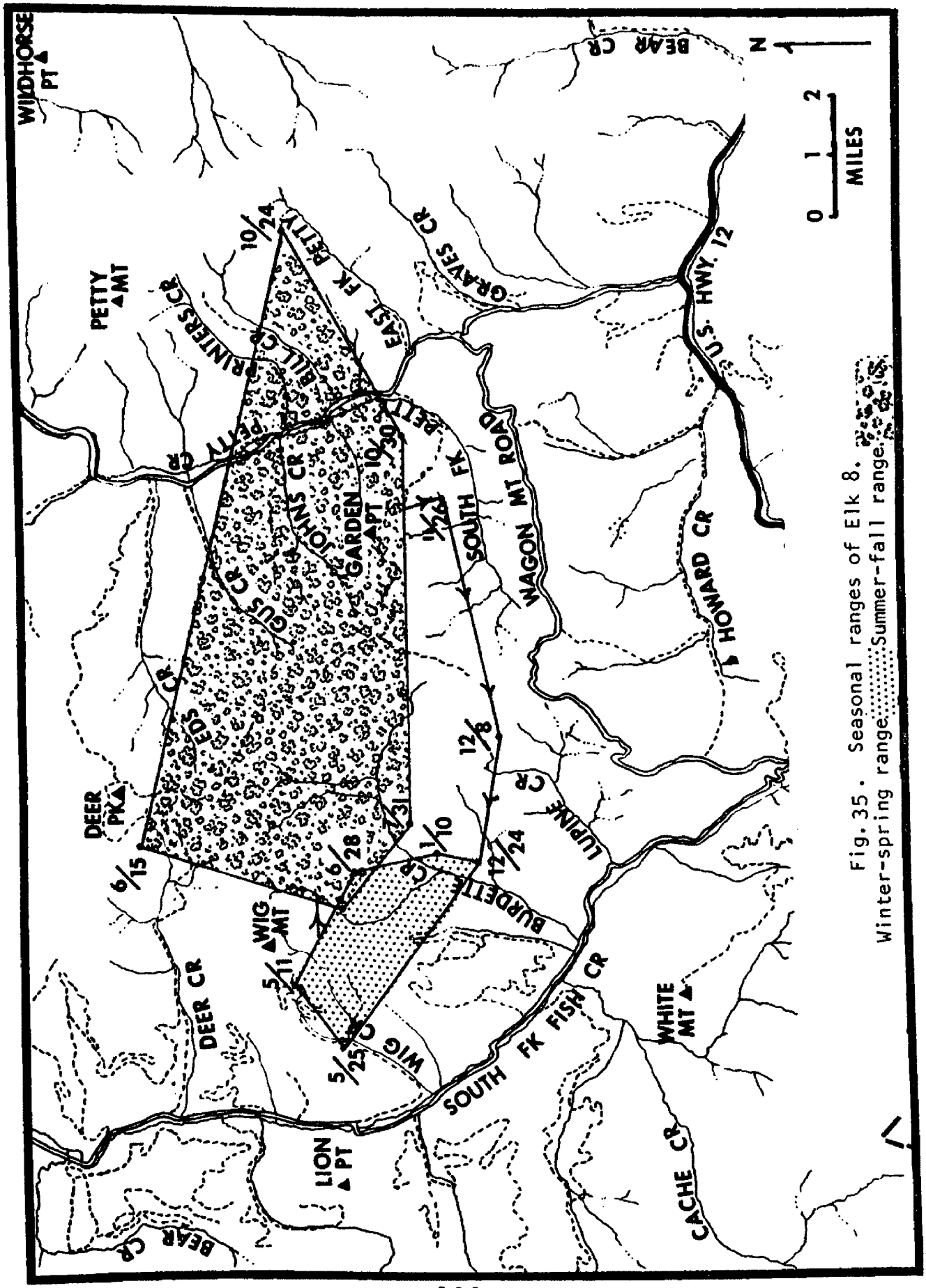

Fig. 35. Seasonal ranges of Elk 8.
Winter-spring range.....Summer-fall range.

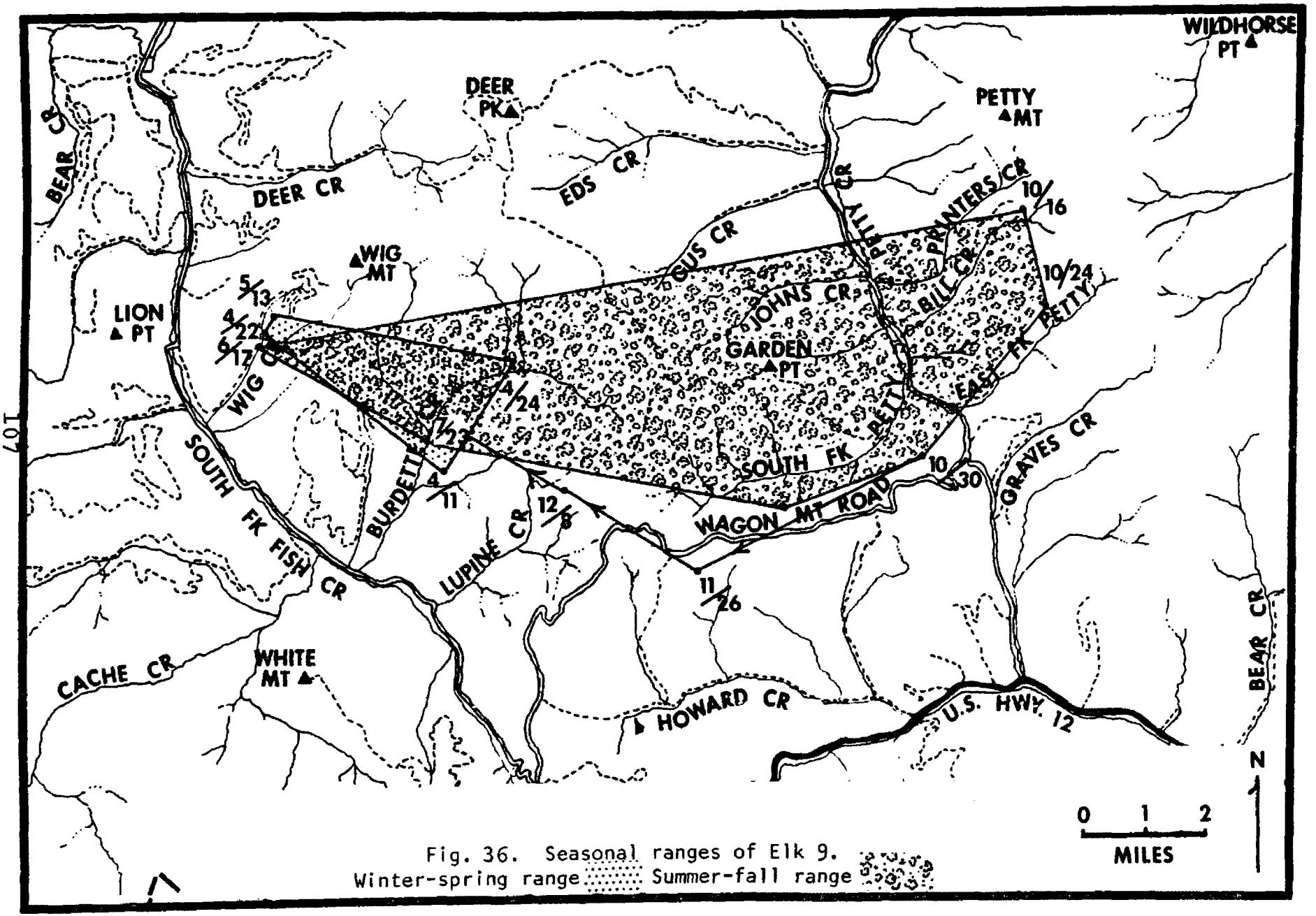

Fig. 36. Seasonal ranges of Elk 9.
Winter-spring range ⋰⋰⋰ Summer-fall range

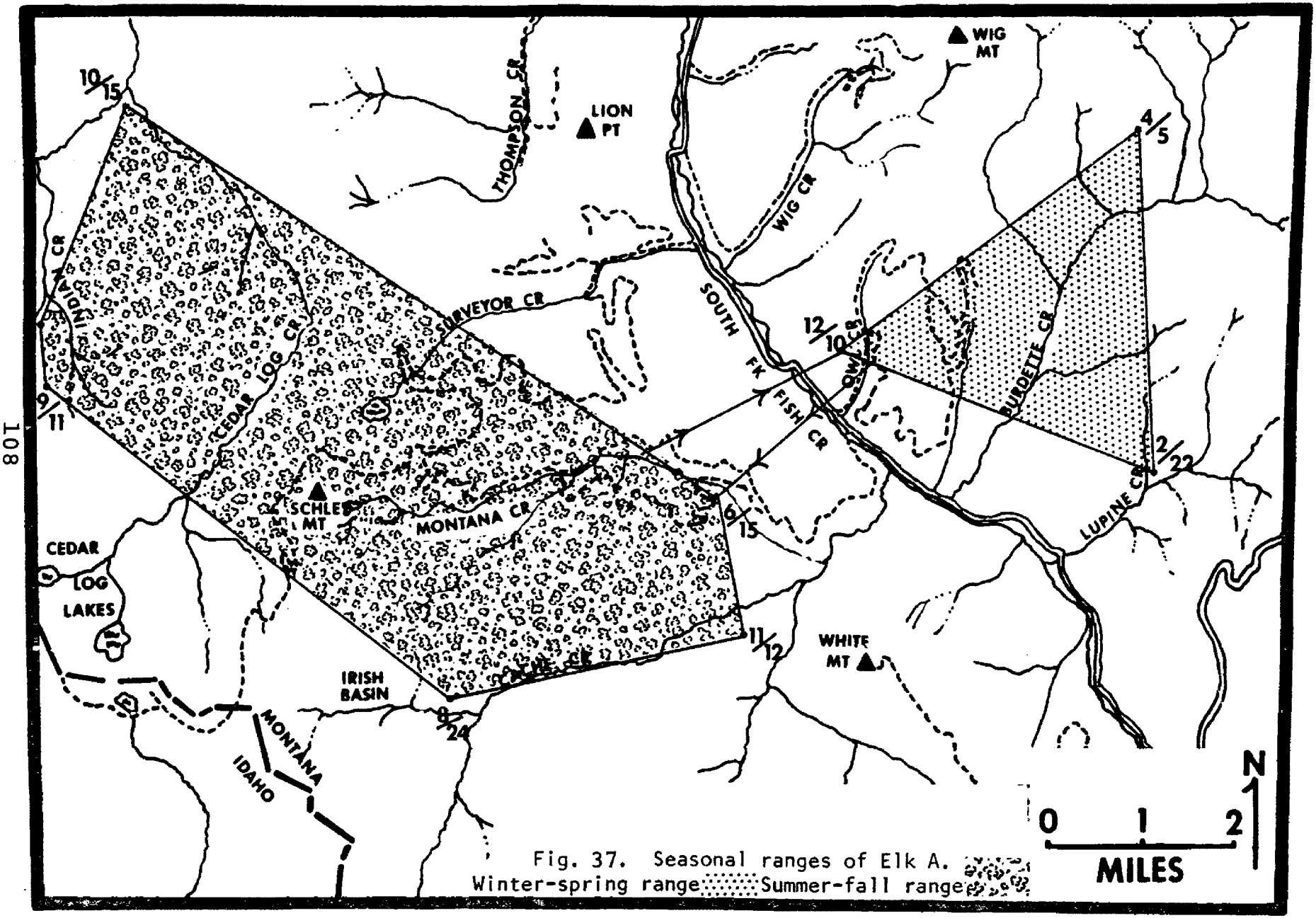

Fig. 37. Seasonal ranges of Elk A. Winter-spring range Summer-fall range

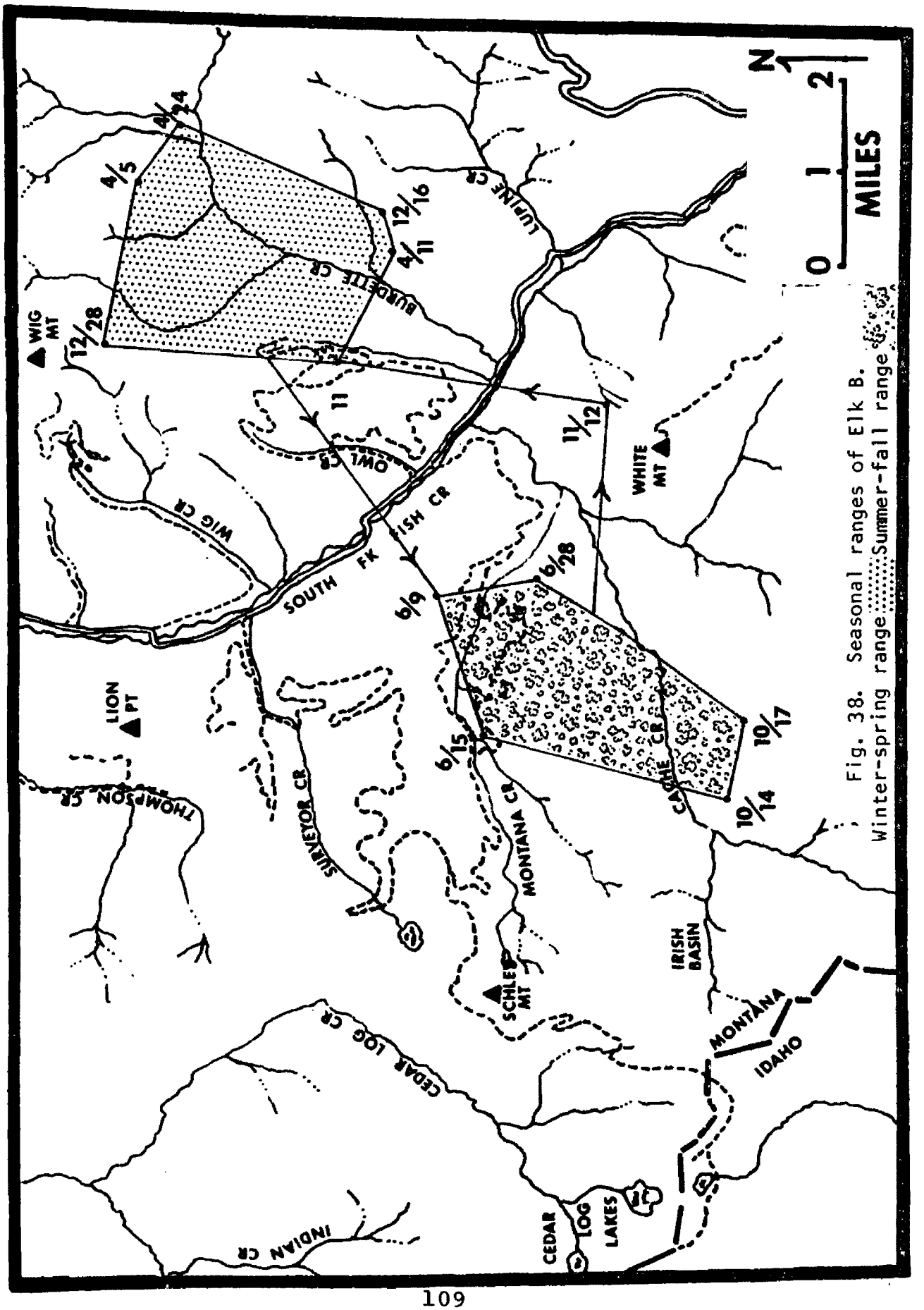

Fig. 38. Seasonal ranges of Elk B. Winter-spring range.....Summer-fall range

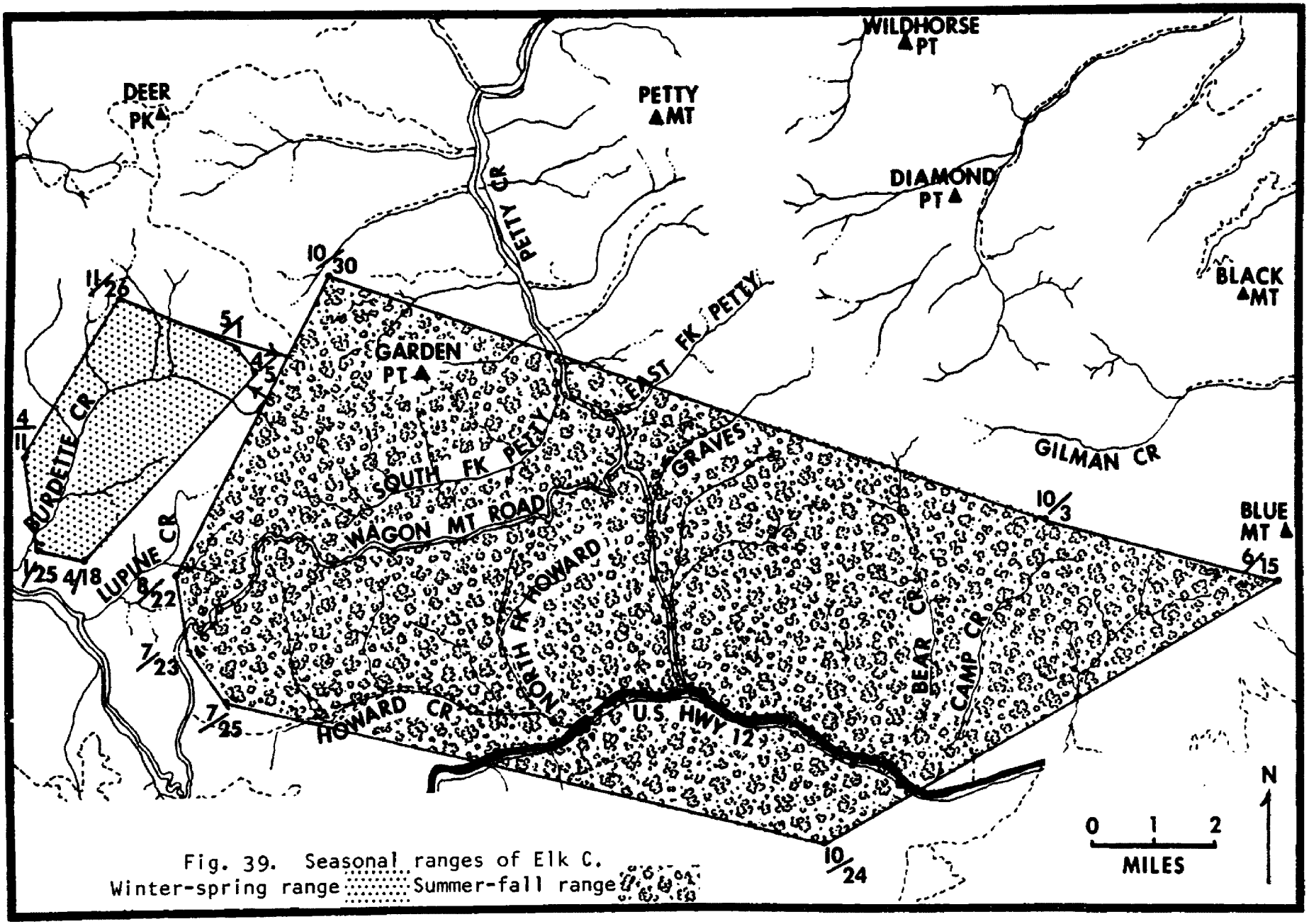

Fig. 39. Seasonal ranges of Elk C.
Winter-spring range ..... Summer-fall range

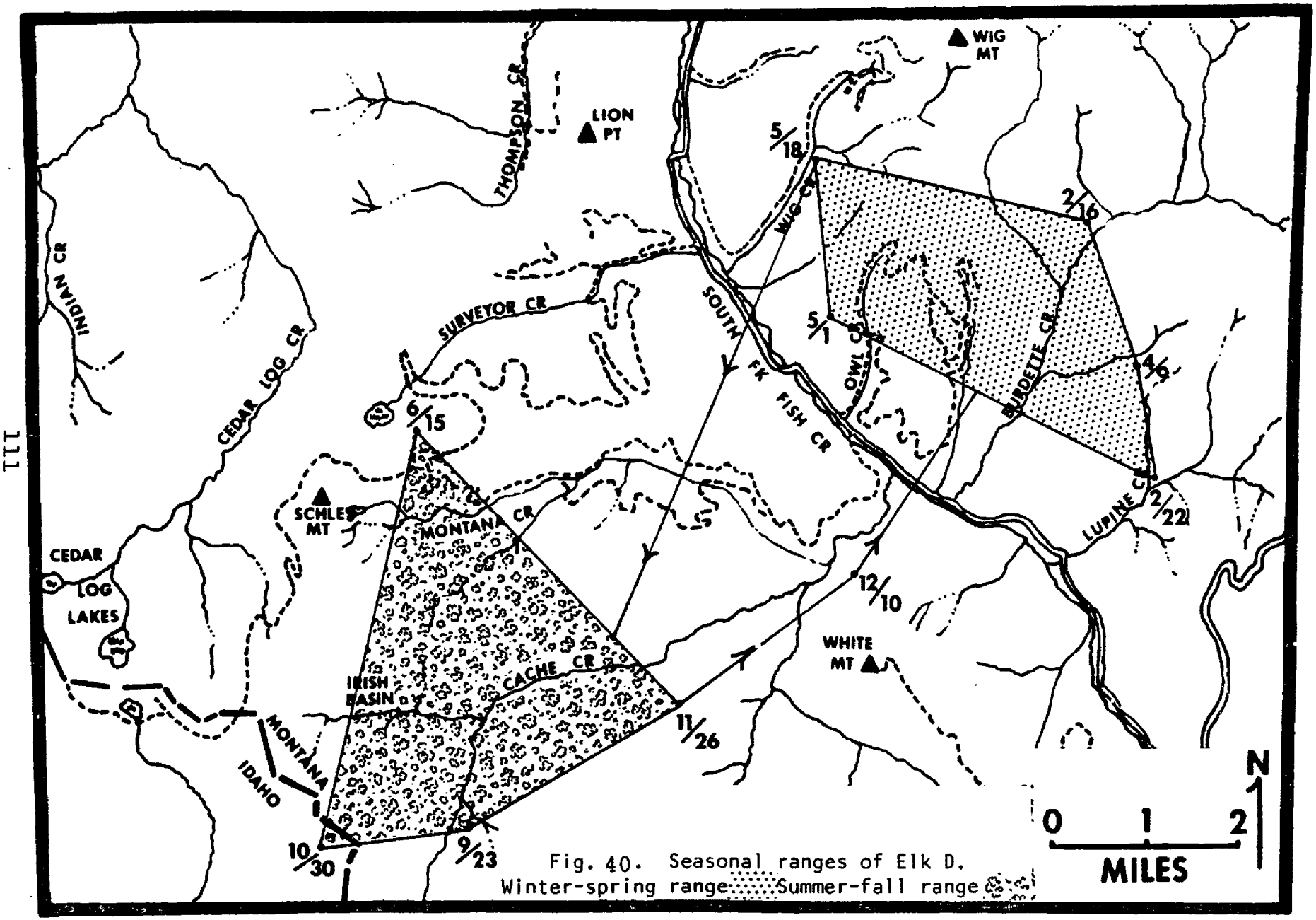

Fig. 40. Seasonal ranges of Elk D.
Winter-spring range ..... Summer-fall range

APPENDIX B

BIO-ACTIVITY CENTERS

Table 13. Data on Elk Wallow 1.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo N.F. — Observer T. Lemke

Planning Unit --- — Date 25 August 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Straight Pk. Quad.	No legal description available	5,600'	SE	1st	12%	18%	Wet alder slope	75' x 3'

Lower Cedar Log Lake

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2) depth of activity center	1 dry			
2) Mud depth of activity center	2 dry			
3) Size of opening if canopy absent	3 125'x75'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L.	4 1H, 3L	4	4	4
5) Height of activity center banks (min.-max.)	5 5"-19"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no).	8 no	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O).*	9 R?	9	9	9
10) Development status of activity center (permanent-P, temporary-T).	10 T	10	10	10
11) Percent canopy cover over activity center.	11 <5%	11	11	11
12) Pellet groups (present-P, absent-A); species (elk-E, deer-D, moose-M); fresh-F, old-O.	12 PEF	12	12	12
13) Photos taken (yes, no).	13 no	13	13	13
14) Other comments (over).	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

A portion (75 ft) of a small stream was used as a wallow as it flows through an alder brush opening. Area is trampled with elk beds present, 2 spruce and 2 alpine fir are located in the center of the opening. Cone flower (R. occidentalis), false hellebone (V. viride), and sedge (Carex spp.) were present. Ten elk observed wallowing here on 23 July 1974.

Table 14. Data on Elk Wallow 2.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 27 August 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W1	Straight Pk. Quad.	No Legal description available	5,400'	SE	1st	4%	10%	Stream Bottom	9½' x 6½'

Irish Basin

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1 3"			
2) Mud depth of activity center	2 4"			
3) Size of opening if canopy absent	3 20'x30'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 1M	4	4	4
5) Height of activity center banks (min.-max.)	5 2-14"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 no	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 no	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9 O	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Small wallow in thick alder brush, near a trail that leads to mineral licks 1 and 2. Surrounded by alder (Alnus rubra),coneflower (R. occidentalis), red top grass (A. alba), and sedge (Carex spp.). Wallow filling in with soil from a small seep that flows into it.

Table 15. Data on Elk Wallow 3.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF

Observer T. Lemke

Planning Unit ---

Date 6 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	White Mt. Quad.	No legal description available. Cache Creek, 1 mile Above Pebble Creek	4,600'	NE	2nd	1%	4%	Stream Bottom	76' x 64'

		W^1	TA^2	ML^3	LA^4
1)	H_2) depth of acitivty center	1 8"			
2)	Mud depth of activity center	2 3"			
3)	Size of opening if canopy absent	3 180'x90'	3	3	3
4)	No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 1M, 4L	4	4	4
5)	Height of activity center banks (min.-max.)	5 12"-26"	5	5	5
6)	Is the peripheral wallow vegetation mud sprayed?	6 no			
7)	Is the perihperal activity center vegetation disturbed?	7 yes	7	7	7
8)	Antler rubs adjacent to activity center area (yes, no)	8 no	8	8	8
9)	Use status of activity center (current-C, recent-R, not this season-O)*	9 R	9	9	9
10)	Development status of activity center (permanent-P, temporary-T)	10 P	10	10	10
11)	Percent canopy cover over activity center	11 0%	11	11	11
12)	Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13)	Photos taken (yes, no)	13 no	13	13	13
14)	Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Old partially drained beaver pond, receiving heavy use by deer and a few elk. Bear tracks also present. Surrounded by willow (Salix spp.) and dogwood (Cornus spp.), dry mud bank around pond - no vegetation.

Table 16. Data on Elk Wallow 4.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF
Planning Unit ---

Observer T. Lemke
Date 12 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Lupine Cr. Quad.	SW, NE Sec 2, T12N, R24W	4,700'	SW	1st	17%	22%	Stream Bottom	6' x 4'8"

	W^1	TA^2	ML^3	LA^4
1) H_2O depth of activity center	1 2½"			
2) Mud depth of activity center	2 1"			
3) Size of opening if canopy absent	3 30'x12'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 2M	4	4	4
5) Height of activity center banks (min.-max.)	5 0"-4"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 yes	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9 R	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 PEF	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

A small wallow, in narrow shaded opening. Water is held in by a log across a small stream. Elk beds near wallow; vegetation includes thimble berry (Rubus spp.), cone-flower (R. occidentalis), snowberry (S. alba), ninebark (P. malvaceus), mountain maple (A. glabrum), red top grass (A. alba), and sedge (Carex spp.).

Table 17. Data on Elk Wallow 5.

Elk Bio-Activity Centers

Lolo Temp. 7/2/72

Ranger District Ninemile - Lolo NF

Observer T. Lemke

Planning Unit ---

Date 12 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W1	Lupine Cr. Quad.	SE, SW, Sec 2, T12N, R24W	4,300'	S	1st	5%	5%	Stream Bottom	11' x 6'6"

		W[1]	TA[2]	ML[3]	LA[4]
1)	H_2O depth of activity center	1 3"			
2)	Mud depth of activity center	2 1"			
3)	Size of opening if canopy absent	3 30'x50'	3	3	3
4)	No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 2M	4	4	4
5)	Height of activity center banks (min.-max.)	5 2"-8"	5	5	5
6)	Is the peripheral wallow vegetation mud sprayed?	6 no			
7)	Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8)	Antler rubs adjacent to activity center area (yes, no)	8 no	8	8	8
9)	Use status of activity center (current-C, recent-R, not this season-O)*	9 R	9	9	9
10)	Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11)	Percent canopy cover over activity center	11 0%	11	11	11
12)	Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13)	Photos taken (yes, no)	13 no	13	13	13
14)	Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Small wallow on same stream tributary as Wallow 4, created by a log across the stream. Vegetation: moss, red top grass (A. alba), alder (A. rubra), coneflower (R. occidentalis), snowberry (S. alba), and dogwood (Cornus spp.).

Table 18. Data on Elk Wallow 6.

Elk Bio-Activity Centers — Lolo Temo. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 12 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Lupine Cr. Quad.	SE, SW, Sec 11. T12N, R24W	4,000'	SW	2nd	1%	2%	Stream Bottom	8'6" x 6'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1 1½"			
2) Mud depth of activity center	2 1"			
3) Size of opening if canopy absent	3 100'x50'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 3L	4	4	4
5) Height of activity center banks (min.-max.)	5 2"-5"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 no	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-0)*	9 R	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent 0A); species (elk-E, deer-D, moose-M); fresh-F, old-0	12 0A	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Medium size wallow, located in wet meadow adjacent to Lupine Creek. Freshly dug in a dense stand of grass, red top grass (A. alba) and Timothy (Phleum pratense).

Table 19. Data on Elk Wallow 7.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF

Observer T. Lemke

Planning Unit ---

Date 12 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Lupine Cr. Quad.	SW, SW, Sec 11. T12N, R24W	4,000'	SW	2nd	1%	3%	Stream Bottom	17' x 15'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1 8"			
2) Mud depth of activity center	2 2½"			
3) Size of opening if canopy absent	3 300'x400'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 4L	4	4	4
5) Height of activity center banks (min.-max.)	5 0"-5"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 yes	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9 C	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 P	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

A large wallow near Wallow 6, near Lupine Creek. Very fresh elk sign, water was muddy from use. Vegetation: red top grass (A. alba), timothy (P. pratense), and sedge (Carex spp.). Alder (A. rubra) bushes in clearing.

Table 20. Data on Elk Wallow 8.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF

Observer T. Lemke

Planning Unit ---

Date 12 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W[1]	White Mt. Quad.	NW, NE, Sec 29 T13N, R24W	3,900'	SW	1st	5%	7%	Stream Bottom	6½' x 5'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1 1"			
2) Mud depth of activity center	2 ½"			
3) Size of opening if canopy absent	3 100'x100'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 1M, 1L	4	4	4
5) Height of activity center banks (min.-max.)	5 3"-8"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 yes	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-0)*	9 R	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Small wallow, freshly dug in wet meadow near Wig Creek. Clumps of sod (2"-3" sq) scattered about from digging. Vegetation: aster (Aster spp.), red top grass (A. alba), sedge (Carex spp.), and alder (A. rubra).

Table 21. Data on Elk Wallow 9.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 25 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Straight Pk. Quad.	No legal description available	5,500'	N	1st	8%	10%	Stream Bottom	6' x 4½'

Near Upper Cedar Log Lake Creek

	W^1	TA^2	ML^3	LA^4
1) H_2O depth of activity center	1 2"			
2) Mud depth of activity center	2 2"			
3) Size of opening if canopy absent	3 30'x20'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 1M, 1L	4	4	4
5) Height of activity center banks (min.-max.)	5 0"-6"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed:	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 no	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9 R	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0"	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Small wallow near Cedar Log Creek, in thick fool's huckleberry (Menziesia glabella) vegetation. Freshly dug, temporary wallow. Cone flower (R. occidentalis), aster (Aster spp.), sedge (Carex spp.), and false hellebone (V. viride).

Table 22. Data on Elk Wallow 10.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 25 September 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
W_1	Straight Pk. Quad.	No legal description available	5,400'	N	1st	6%	8%	Stream Bottom	9' x 6'

Near Upper Cedar Log Lake Creek

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1 1½"			
2) Mud depth of activity center	2 2"			
3) Size of opening if canopy absent	3 40'x35'	3	3	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4 2L	4	4	4
5) Height of activity center banks (min.-max.)	5 2"-4"	5	5	5
6) Is the peripheral wallow vegetation mud sprayed?	6 no			
7) Is the peripheral activity center vegetation disturbed?	7 yes	7	7	7
8) Antler rubs adjacent to activity center area (yes, no)	8 yes	8	8	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9 R	9	9	9
10) Development status of activity center (permanent-P, temporary-T)	10 T	10	10	10
11) Percent canopy cover over activity center	11 0%	11	11	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-M); fresh-F, old-O	12 OA	12	12	12
13) Photos taken (yes, no)	13 no	13	13	13
14) Other comments (over)	14 below	14	14	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Medium size wallow near Upper Cedar Log Lake Creek, 50 feet east of stream. Coneflower (R. occidentalis), sedge (Carex spp.), and aster (Aster spp.) present. Used this year, but appears to be a temporary wallow.

Table 23. Data on Mineral Lick 1.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 27 August 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
ML_3	Straight Pk. Quad	No legal description available In Irish Basin	5,600'	SE	1st	5%	7%	Stream Bottom	94' x 52'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3 300'x150'	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4	4	4 2H,1M,3L	4
5) Height of activity center banks (min.-max.)	5	5	5 0"-18"	5
6) Is the peripheral wallow vegetation mud sprayed?	6			
7) Is the peripheral activity center vegetation disturbed?	7	7	7 yes	7
8) Antler rubs adjacent to activity center area (yes, no)	8	8	8 no	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9	9	9 R	9
10) Development status of activity center (permanent-P, temporary-T)	10	10	10 P	10
11) Percent canopy cover over activity center	11	11	11 0%	11
12) Pellet groups (present-P, absent-A); species (elk-E, deer-D, moose-M); fresh-F, old-O	12	12	12 PEF	12
13) Photos taken (yes, no)	13	13	13 no	13
14) Other comments (over)	14	14	14 below	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Large mineral lick in grassy clearing near Irish Creek. Heavy use by elk and some deer. Reported to be an old sheep lick, then used by packers for their horses. Elk beds (6) nearby, vegetation present: timothy (Phleum pratenses), coneflower (R. occidentalis), and false hellebone (V. viride).

Table 24. Data on Mineral Lick 2.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF
Planning Unit ---

Observer T. Lemke
Date 27 August 1974

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
ML_3	Straight Pk. Quad.	No legal description available	5,600'	SE	1st	5%	7%	Stream Bottom	38' x 34'

In Irish Basin

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3 300'x225'	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4	4	4 6L, 1M	4
5) Height of activity center banks (min.-max.)	5	5	5 0"-4"	5
6) Is the peripheral wallow vegetation mud sprayed?	6			
7) Is the peripheral activity center vegetation disturbed?	7	7	7 yes	7
8) Antler rubs adjacent to activity center area (yes, no)	8	8	8 no	8
9) Use status of activity center (current-C, recent-R, not this season-0)*	9	9	9 R	9
10) Development status of activity center (permanent-P, temporary-T)	10	10	10 P	10
11) Percent canopy cover over activity center	11	11	11 0%	11
12) Pellet groups (present-P, absent 0A); species (elk-E, deer-D, moose-M); fresh-F, old-0	12	12	12 0A	12
13) Photos taken (yes, no)	13	13	13 no	13
14) Other comments (over)	14	14	14 below	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

This lick is 600 feet from Mineral Lick 1, with a trail connecting them. Vegetation includes red top grass (A. alba), coneflower (R. occidentalis), false hellebone (V. viride), and sedge (Carex spp.). Probably originated as a salting area for sheep, same as Mineral Lick 1.

Table 25. Data on Mineral Lick 3.

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF

Observer T. Lemke

Planning Unit ---

Date 20 April 1975

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
ML_3	White Mt. Quad.	SE, NW, Sec 29 T13N, R24W	3,800'	SW	2nd	3%	5%	Stream Bottom	10'x9'; 25'x19'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3 300'x600'	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4	4	4 9H, 3L	4
5) Height of activity center banks (min.-max.)	5	5	5 2"-22"j	5
6) Is the peripheral wallow vegetation mud sprayed?	6		0"-16"	
7) Is the peripheral activity center vegetation disturbed?	7	7	7 yes	7
8) Antler rubs adjacent to activity center area (yes, no)	8	8	8 yes	8
9) Use status of activity center (current-C, recent-R, not this season-0)*	9	9	9 C	9
10) Development status of activity center (permanent-P, temporary-T)	10	10	10 P	10
11) Percent canopy cover over activity center	11	11	11 0%	11
12) Pellet groups (present-P, absent OA(; species (elk-E, deer-D, moose-M); fresh-F, old-O	12	12	12 PEF.POF	12
13) Photos taken (yes, no)	13	13	13 no	13
14) Other comments (over)	14	14	14 below	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

This area contains 2 adjacent mineral licks, 40 feet apart. Located close to Wig Creek Lodge. Originated as a salt lick for horses. Used heavily by deer, elk, and 2 feral horses. Timothy (P. pratense) and spotted kwapweed (Centaurea spp.) present.

Table 26. Data on Mineral Lick 4

Elk Bio-Activity Centers

Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF
Observer T. Lemke
Planning Unit ---
Date 20 April 1975

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
ML_3	White Mt. Quad.	NE, NW, Sec. 29 T13N R24W	3,900'	SW	2nd	4%	5%	Stream Bottom	46' x 33'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3 50'x100'	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4	4	4 7H, 2M	4
5) Height of activity center banks (min.-max.)	5	5	5 0"-23"	5
6) Is the peripheral wallow vegetation mud sprayed?	6			
7) Is the peripheral activity center vegetation disturbed?	7	7	7 yes	7
8) Antler rubs adjacent to activity center area (yes, no)	8	8	8 yes	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9	9	9 C	9
10) Development status of activity center (permanent-P, temporary-T)	10	10	10 P	10
11) Percent canopy cover over activity center	11	11	11 0%	11
12) Pellet groups (present-P, absent OA); species (elk-E, deer-D, moose-MO; fresh-F, old-O	12	12	12 PEF,POF	12
13) Photos taken (yes, no)	13	13	13 no	13
14) Other comments (over)	14	14	14 below	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral Lick
[4]Loafing area

This mineral lick was used as a trapsite for elk. Use by elk occurred during every month from April 1974 to May 1975. Virtually no vegetation near lick because of trapped elk activity. Alder (A. rubra) and several grasses close by. Originated as a salt lick for horses.

Table 27. Data on Mineral Lick 5.

Elk Bio-Activity Centers — Lolo Temp. 7/2/74

Ranger District Ninemile - Lolo NF — Observer T. Lemke

Planning Unit --- — Date 13 May 1975

Type	Map Number	GLO ¼, ¼ Sec. T.R.	Elev.	Exp.	Stream Order	% Slope Above/Below		Cover Type	Length/ Width
ML_3	Lupine Cr. Quad.	SE, SE, Sec. 25 T13N R24W	4,800'	NW	2nd	20%	30%	Fir-larch Forest	4.5' x 4'

	W[1]	TA[2]	ML[3]	LA[4]
1) H_2O depth of activity center	1			
2) Mud depth of activity center	2			
3) Size of opening if canopy absent	3	3	3 300'x200'	3
4) No. and use of trails entering activity center -- heavy-H, moderate-M, light-L	4	4	4 2H, 1M	4
5) Height of activity center banks (min.-max.)	5	5	5 2"-6"	5
6) Is the peripheral wallow vegetation mud sprayed?	6			
7) Is the peripheral activity center vegetation disturbed?	7	7	7 yes	7
8) Antler rubs adjacent to activity center area (yes, no)	8	8	8 no	8
9) Use status of activity center (current-C, recent-R, not this season-O)*	9	9	9 R	9
10) Development status of activity center (permanent-P, temporary-T)	10	10	10 P	10
11) Percent canopy cover over activity center	11	11	11 0%	11
12) Pellet groups (present-P, absent-A); species (elk-E, deer-D moose-M); fresh-F, old-O	12	12	12 PEF	12
13) Photos taken (yes, no)	13	13	13 no	13
14) Other comments (over)	14	14	14 below	14

*Current - in use today, Recent - used within past week

[1]Wallow
[2]Trampled area
[3]Mineral lick
[4]Loafing area

Small mineral lick on the edge of an open ridge; located on the winter range, near Burdette Creek. Rocky substrate, snow covering nearby vegetation. Recent use by elk. Probably a natural mineral lick.