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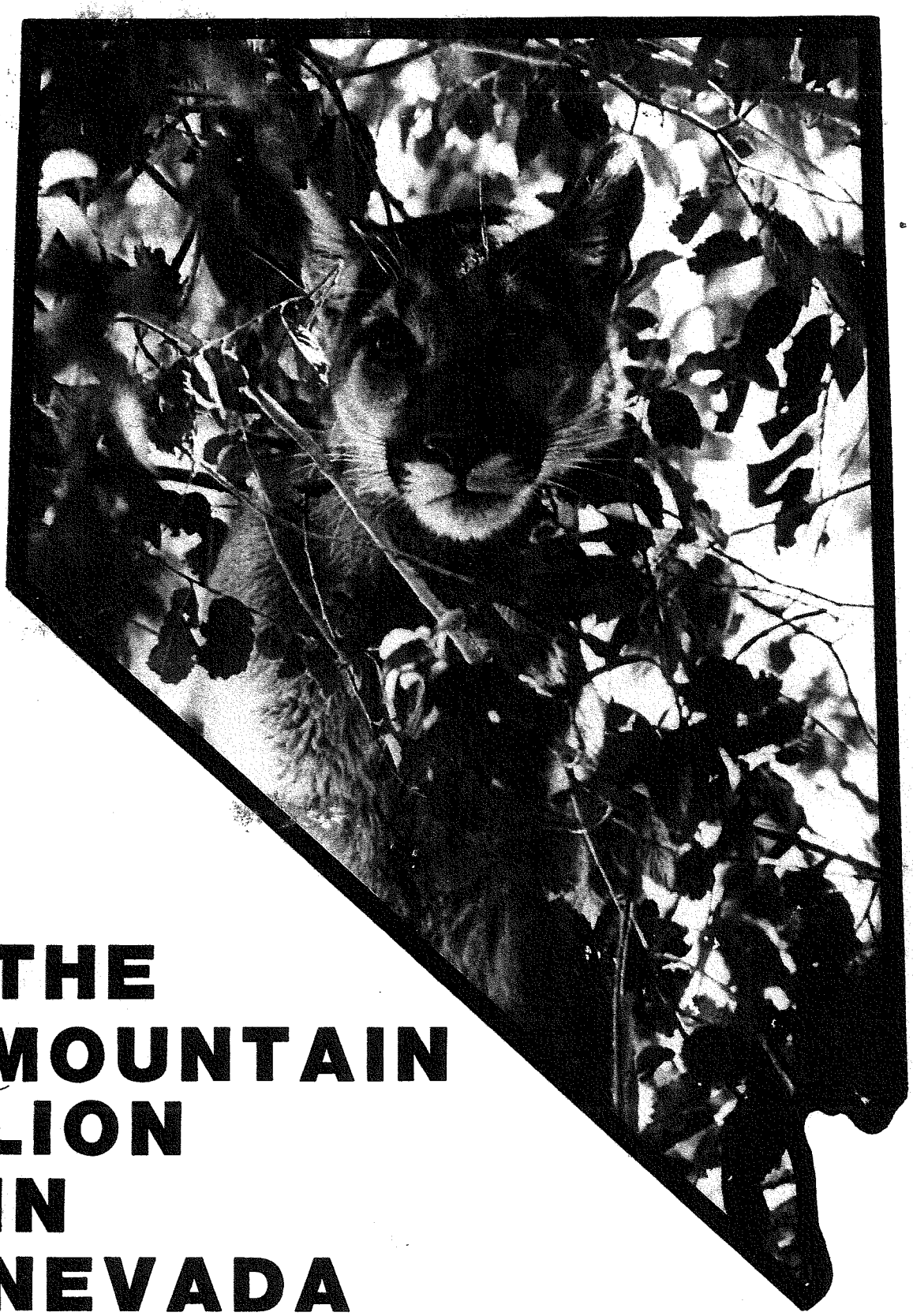

THE MOUNTAIN LION IN NEVADA

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THE MOUNTAIN LION IN NEVADA

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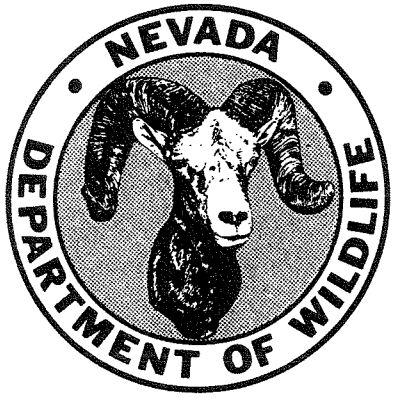

This publication is the result of studies undertaken with Federal Aid to Wildlife Restoration funds under Pittman-Robertson Projects and is specific to W-48-15, Study S&I 1, Job 5 and Study R-V, Job 1, Final Report. Under Title VI of the 1964 Civil Rights Act, the U.S. Department of the Interior prohibits discrimination on the basis of race, color, or national origin.

1983

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INTRODUCTION

The mountain lion (Felis concolor) is one of the most intriguing large game species in Nevada and the controversies surrounding this great cat have often become embroiled in a battle between fact and fiction, love and hate, and conservation and exploitation.

In its simplist interpretation the lion has been merely laying claim to the land it has freely roamed since the Pleistocene epoch. The recent invasion of its realm by the modern American and his livestock, followed by the bounty hunter, the fur hunter, and the sport hunter, contradicted that claim and resulted in a reduction of Nevada's mountain lion populations, as well as a conflict in ideologies among the people of the state. Hopefully, now, in a more enlightened period, we may, in some way, find a means of compromising the forces which have been working against the mountain lion's survival. In order to do this a basic understanding of the lion's life history is required so identified conflicts can be resolved or mitigated. If the myths are separated from the facts, and people are willing to try and resolve their differences, then a management plan which will provide for sustained mountain lion populations can be implemented.

In March 1972, the Nevada Department of Wildlife initiated a study of the mountain lion as a part of the Ruby-Butte deer project (Papez 1976) in eastern Nevada. The objective was to determine the status of lion populations within this highly valuable deer area and evaluate them in relation to deer populations. Within two years this objective was changed to: a) establish population estimates of mountain lions by mountain range or management area statewide, b) establish basic habitat requirements, 3) establish a harvest management program. From that period on, increased emphasis was placed upon lion capture and marking with the more sophisticated telemetry devices which were being manufactured. This program involved lion monitoring from both land and air and was instrumental in expanding our life history data base as well as providing an approach toward estimating the annual population status of key mountain ranges. The findings which resulted from this study were then utilized in formulating an approach toward estimating statewide lion populations.

In doing this, the Department was essentially moving toward the development and implementation of a Unit Harvest Management scheme. This management approach was a direct result of pressures arising from three distinct groups of people, all of whom had different interests:

1. The livestock industry which wanted stringent predator control.
2. The professional mountain lion guide who wanted the freedom of taking clients where he desired, with minimum restrictions in season length, harvest, or area of hunt.
3. The protectionist who basically wanted no harvest of the mountain lion.

The role of the Department of Wildlife was, therefore, one of attempting to develop a plan which satisfied most interests as well as meeting the legislative mandate of preserving viable mountain lion populations for the future. In the latter years of the study, while developing a Unit Management approach, Department personnel throughout the state were assigned to pertinent jobs in their local areas, the study areas, or both.

ACKNOWLEDGMENTS

Dave Ashman was the principal investigator assigned to the mountain lion study during most of its ten year duration. A rough draft, which was partially used in the preparation of this manuscript, was written by Dave prior to his resignation from the Department in 1982.

Personnel from the United States Fish and Wildlife Service cooperated in this study from its initiation by providing experienced lion hunters with trained hounds and much of the necessary equipment. The late Dick Hall, a U.S. Fish and Wildlife Service lion hunter in Nevada from 1956-79, unselfishly provided a vast storehouse of knowledge, time and experience during the first 7 years of the study. Jim Buhler and Richard Holcomb, also government lion hunters, provided able assistance in capturing lions during the last 3 years of study.

Many Department of Wildlife employees assisted in the field work, some of which was done under the most adverse winter conditions. A listing of them would include almost the entire Game Division staff and most of the Regional game personnel, all of whom willingly assisted in study design, equipment procurement, and endless hours of field work. Allan Flock, Jim Jeffress and Gregg Tanner provided help beyond the normal call of duty.

Dave Beatty of Telonics, Inc. was instrumental in designing and manufacturing the telemetry equipment which was used so successfully during the later years of the study. A phone call to Dave saved many a day when there were equipment crises.

Glen C. Christensen was responsible for data analysis, rewriting and editing of this manuscript. In doing so he drew freely upon the talents of George Tsukamoto, Mike Hess and Mike Wickersham of the Nevada Department of Wildlife and Harley Shaw of the Arizona Game and Fish Department.

DESCRIPTION OF THE STUDY AREAS

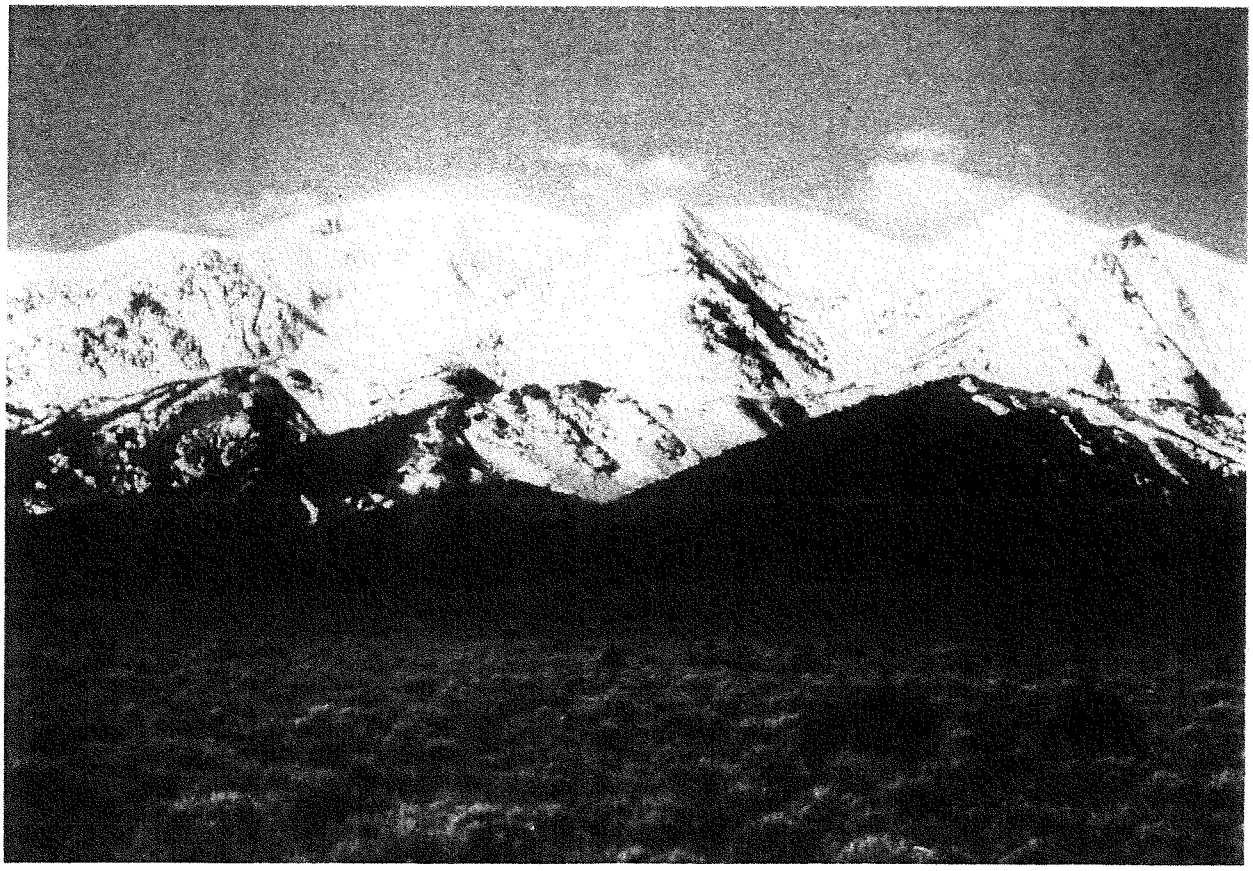
Location

The principle study areas were located in the Ruby Mountains (eastern Nevada) and in the Monitor Range (central Nevada). Additional, but less extensive work was conducted in the following ranges: Schell Creek, Cherry Creek-Egan, Spruce, White Pine, Toana, Maverick Springs, Snake, Jarbidge and Antelope-Fish Creek, all of them being grouped in Northeastern and Central Nevada (Figure 1).

RUBY MOUNTAINS--The Ruby Mountains are composed of three distinct divisions: the East Humboldt Range, Ruby and South Ruby (Figure 2). The East Humboldt Range, which comprises the northern portion, is located north of Secret Pass and south of Wells encompassing an area of 221 square miles. This division embraces extensive summer range for both mule deer (Odocoileus hemionus) and lions. Winter range is limited due to deep snow which forces the deer to migrate considerable distances south and east (Papez 1976).

The Ruby division, located between Secret Pass and Harrison Pass, is the largest unit and contains 362 square miles of mule deer and mountain lion summer and winter range.

The South Ruby division is primarily winter range for mule deer and lions, although some fair to good summer range is present on the west slopes between Harrison Pass and Overland Pass. This area embraces 270 square miles, but generally lacks good water distrubution and high quality deer habitat.



South Ruby Mountain Range Lion Habitat

The entire Ruby study area encompasses approximately 853 square miles. The northern third of the Ruby Range and the majority of East Humboldt Range are composed of intermixed private and public lands.

MONITOR RANGE--The Monitor Range extends 97 miles north to south between the general vicinity of Eureka and Tonopah, Nevada. Most of the field work was conducted on the northern 25 miles of the range, primarily from Dobbin summit north, which included an area of 335 square miles (Figure 3), nearly all of which is on public lands.

General Characteristics of the Environment

Detailed descriptions of the topography, soil, climate and vegetation, which are applicable to the study areas, are presented in the Nevada Department of Wildlife publication titled "The Ruby-Butte Deer Herd" (Papez 1976). Generally, these descriptions also apply to mountain lion habitat throughout the state, with some local modifications, which are well covered by Billings (1951).

In brief, the physiographic characteristics are typical of the Great Basin. The mountains and valleys trend in a north-south direction with elevations ranging from 5,500 feet in the valleys to heights of 9,000-11,000 feet for the mountain peaks. The exceptional Wheeler Peak, in the Snake Range, crests at over 13,000 feet.

Monitor Range Lion Habitat

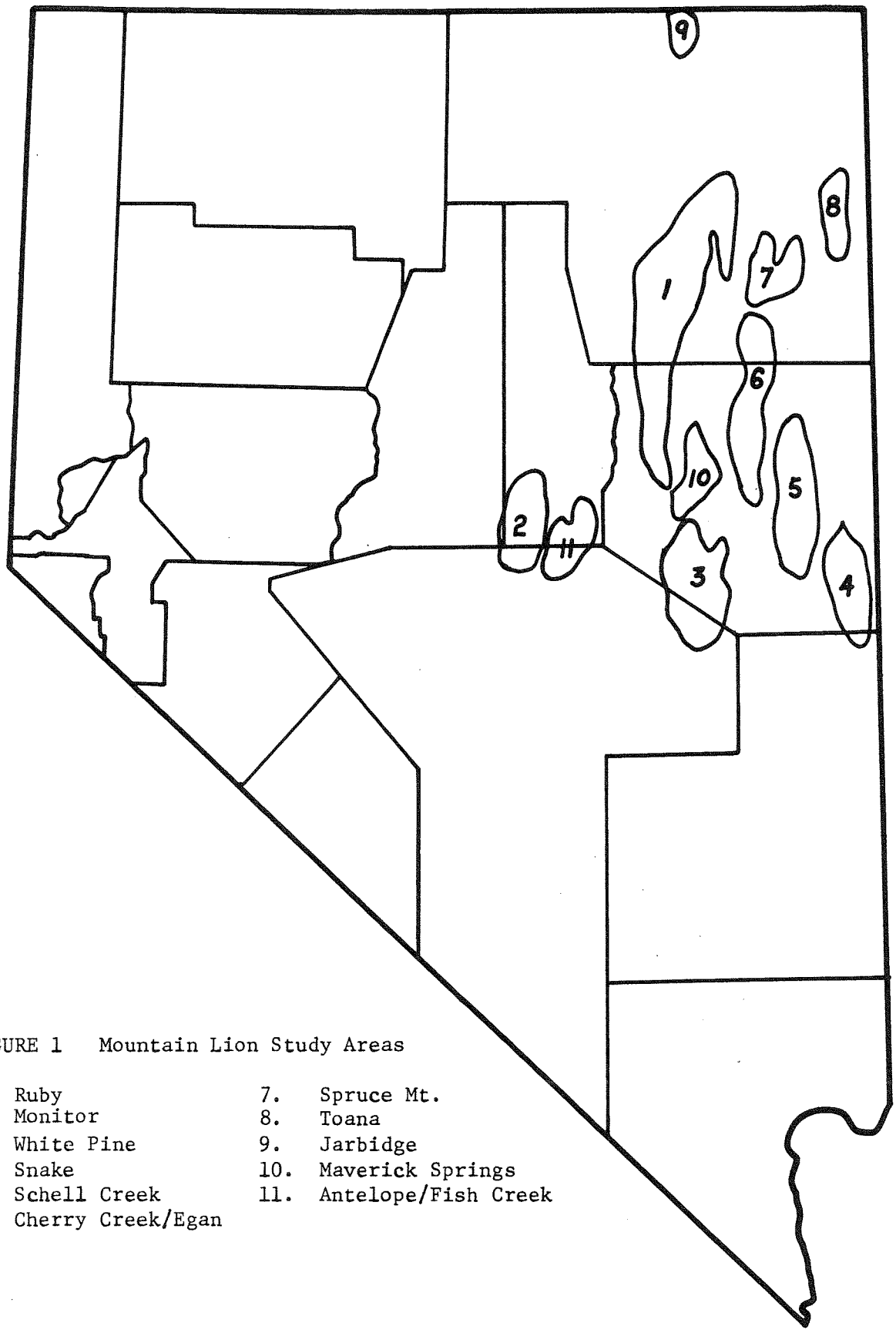


FIGURE 1 Mountain Lion Study Areas

1. Ruby
2. Monitor
3. White Pine
4. Snake
5. Schell Creek
6. Cherry Creek/Egan
7. Spruce Mt.
8. Toana
9. Jarbidge
10. Maverick Springs
11. Antelope/Fish Creek

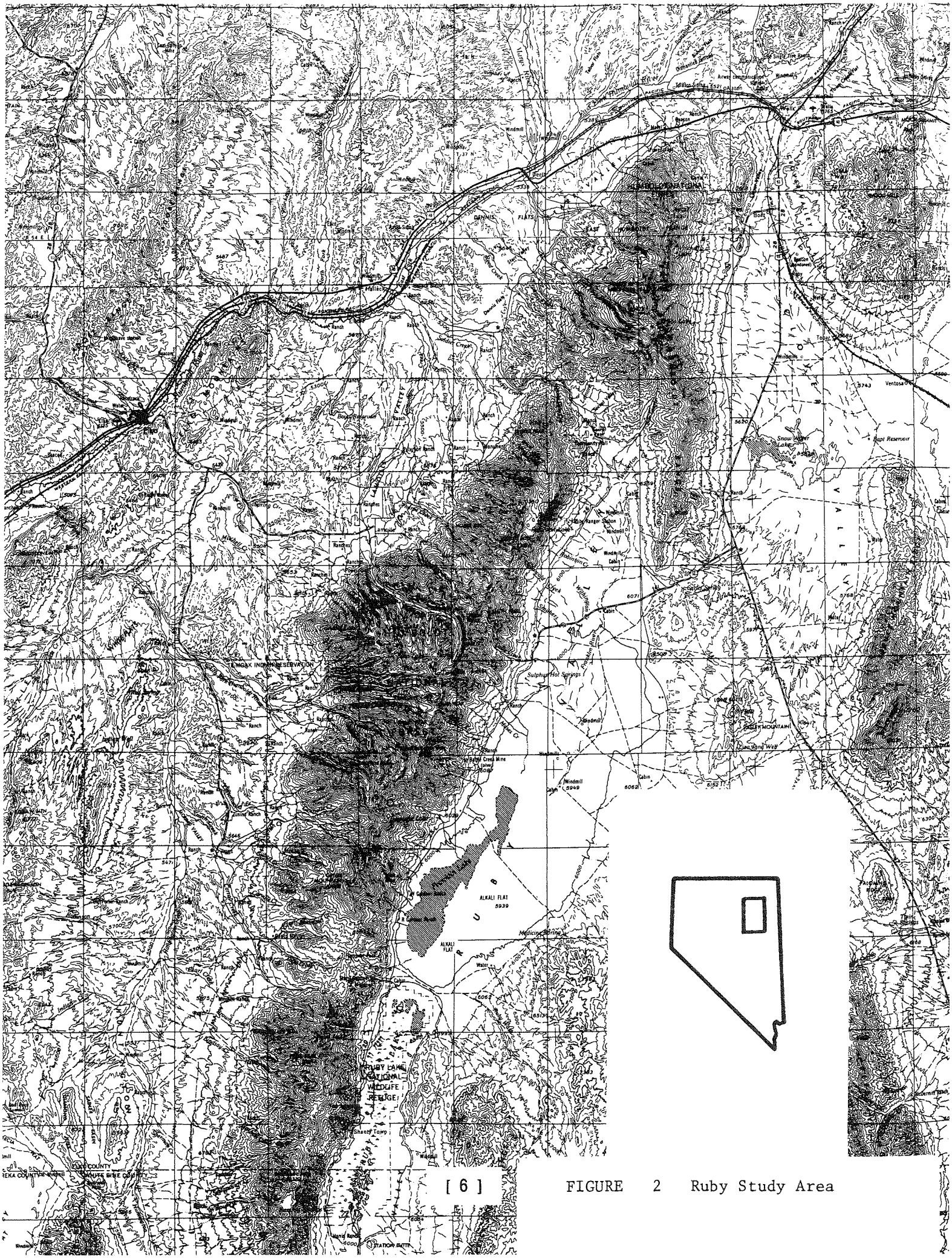


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FIGURE 2 Ruby Study Area

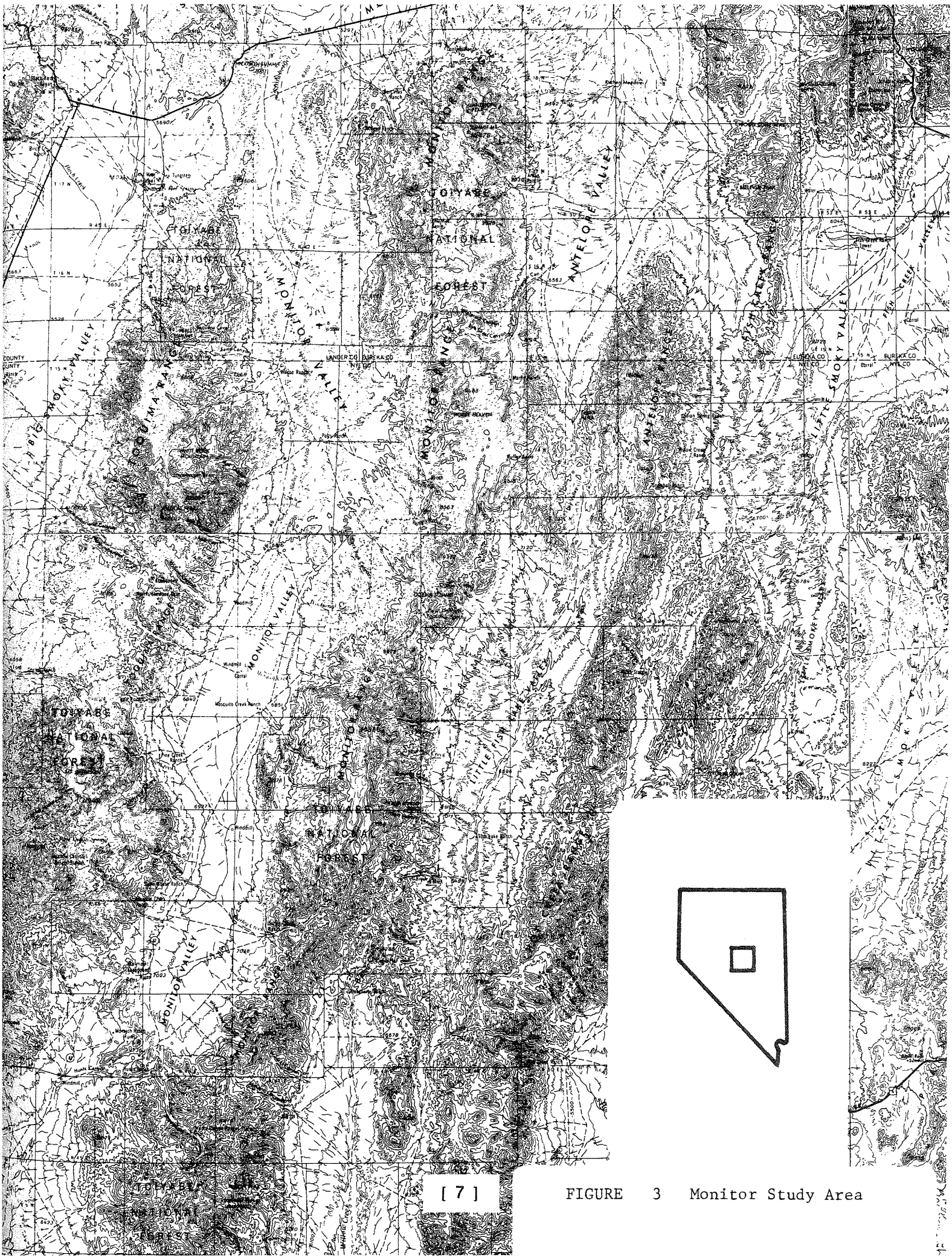


FIGURE 3 Monitor Study Area

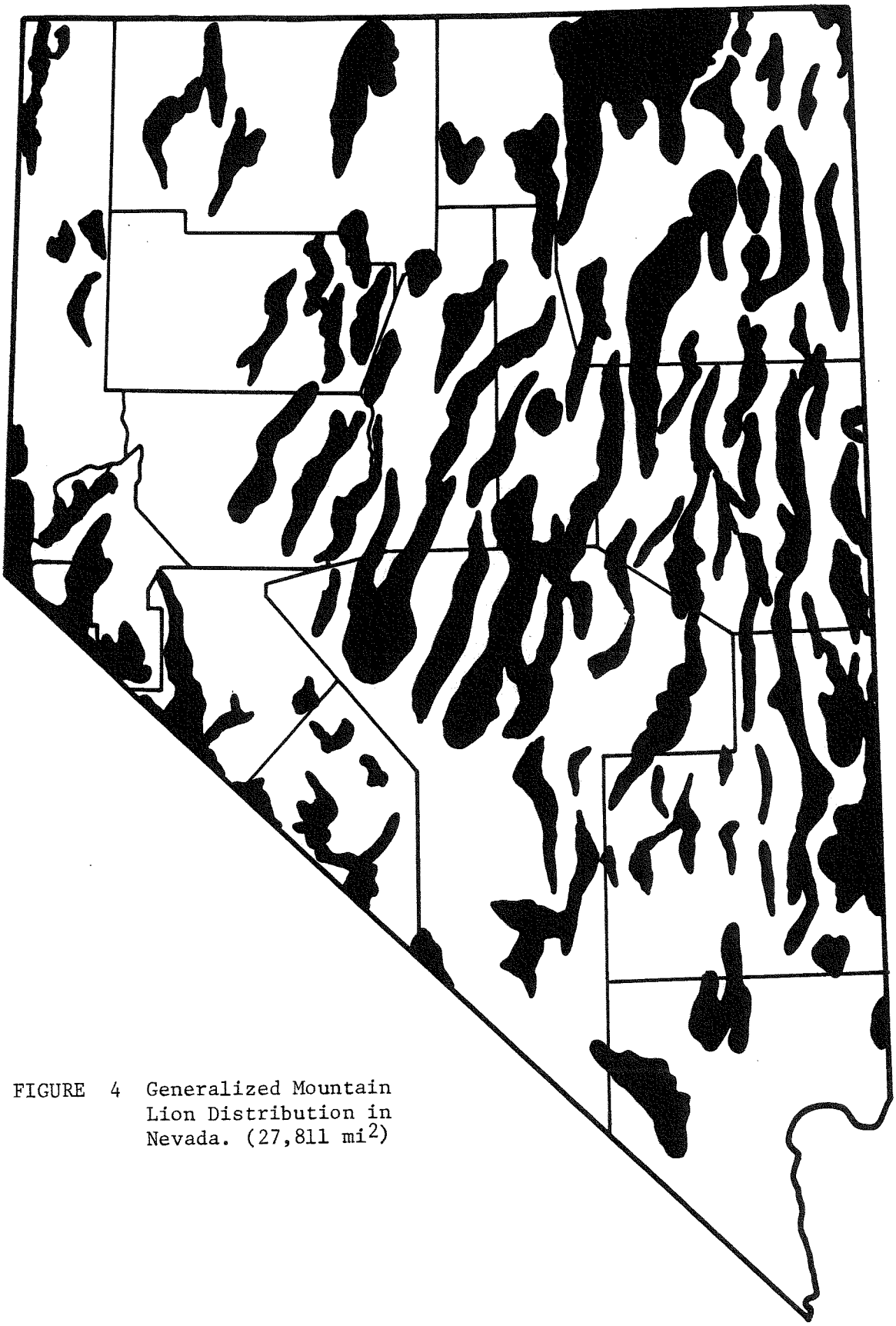


FIGURE 4 Generalized Mountain Lion Distribution in Nevada. (27,811 mi^2)

Time of Birth -- The month of birth was calculated for 135 litters by projecting forward for prenatal litters and backdating for postnatal litters. No kittens older than 12 months (estimated age) were included in the calculations (see section on aging for criteria). The majority of reproductive tracts examined were from females in the latter stages of pregnancy. Prenatal young were aged based on crown-rump measurements or by the overall size of the fetuses in the case of U.S. Fish and Wildlife Service records. The following measurements are believed to be a reasonably accurate means of determining prenatal monthly age classes:

(1) First month ------ 25 mm or less
(2) Second month ----- 26-125 mm
(3) Third month ------ 126 mm or larger

Kittens were born in every month of the year with a peak occurring during the months of June-July (Figure 5). During April-September a total of 94 litters were recorded (70%) as compared to 41 litters (30%) during the remainder of the year. Robinette et al. (1961) computed birth months for 145 litters in Nevada and Utah and found the peak months to be June-September. In central Idaho Seidensticker et al. (1973) reported most births occurred during late spring and early summer.

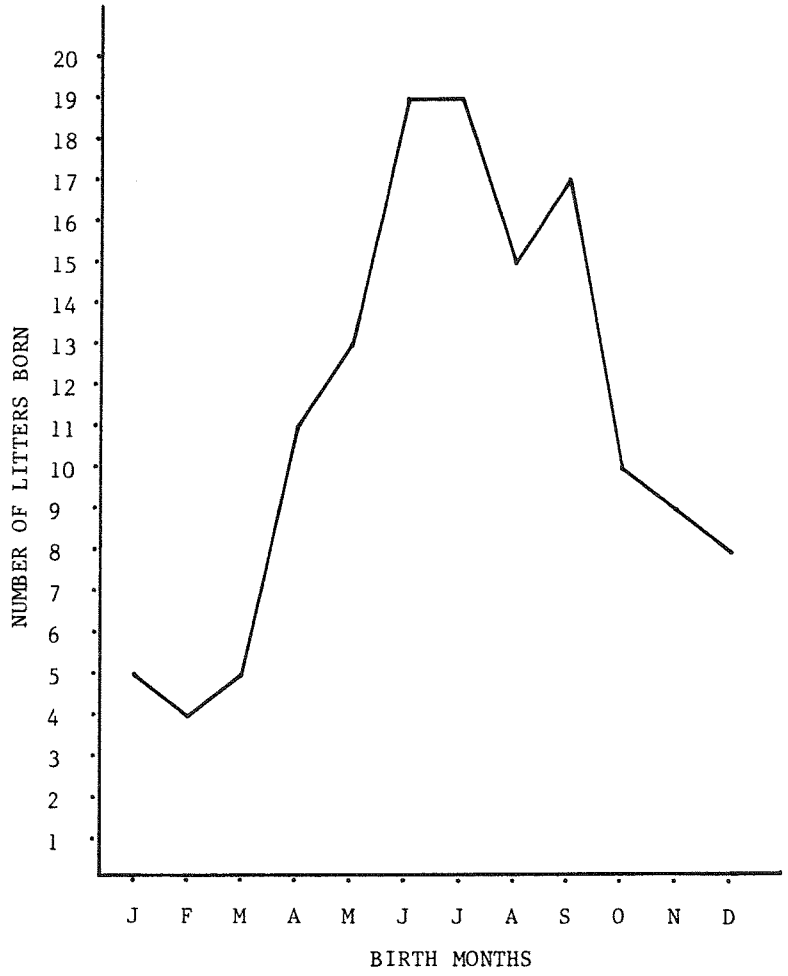


Figure 5. Birth Months for 135 Mountain Lion Litters in Nevada, 1956-82.

Frequency of Litters -- Data from 12 adult female lions indicated that the reproductive cycle (time between litters) ranged from 11.5-24 months and averaged 17.4 months.

Litter Size and Survival -- Examination of 36 prenatal litters revealed an average litter size of 3.08 kittens. The number of kittens per litter varied from 1 to 5 as shown in Table 3.

As the kittens grew there was a gradual loss and the number of kittens observed with their mothers declined to an average of 2.23 by the 12th month. Table 4 shows this loss by estimated age group. In analyzing Tables 3 and 4 it would appear that the prenatal litter size of 3.08 kittens is probably higher than the actual number of kittens born. Furthermore, the litter size for the 4-month age group (2.59) would reflect losses from birth to that time. Therefore, it is felt that the actual birth rate lies somewhere between the two and 2.8 kittens was used as the average litter size when calculations requiring this were needed.

TABLE 3. PRENATAL LITTER SIZES OF MOUNTAIN LION KITTENS.

	Number of Kittens per Litter					Total Sample	Average Litter Size
	1	2	3	4	5		
Number of Litters	1	7	18	8	2	36 litters (111) kittens	3.08

TABLE 4. MOUNTAIN LION KITTEN SURVIVAL BY AGE GROUPS.

	Number Kittens with Mother				Total Sample Families Observed	Kittens Observed	Average Litter Size
	1	2	3	4			
Estimated Age							
4 months	3	14	21	3	41	(106)	2.59
5-11 months	6	19	15	2	42	(97)	2.31
12 months	6	25	15	1	47	(105)	2.23
TOTAL	15	58	51	6	130	(308)	2.37

Currier (1976) reported the average litter sizes for Colorado as 1.6 (13)*, California 2.0 (8)*, Arizona 2.2 (11)*, and Idaho 2.4 (33)*, while captive lions in Washington averaged 2.6 (92)*. The sample size in all of these states, except Washington, was very small.

The rate of kitten survival in Nevada is good and when coupled with the lions' high reproductive potential it can be speculated that mountain lions are capable of rapidly replacing individuals that are removed from the population.

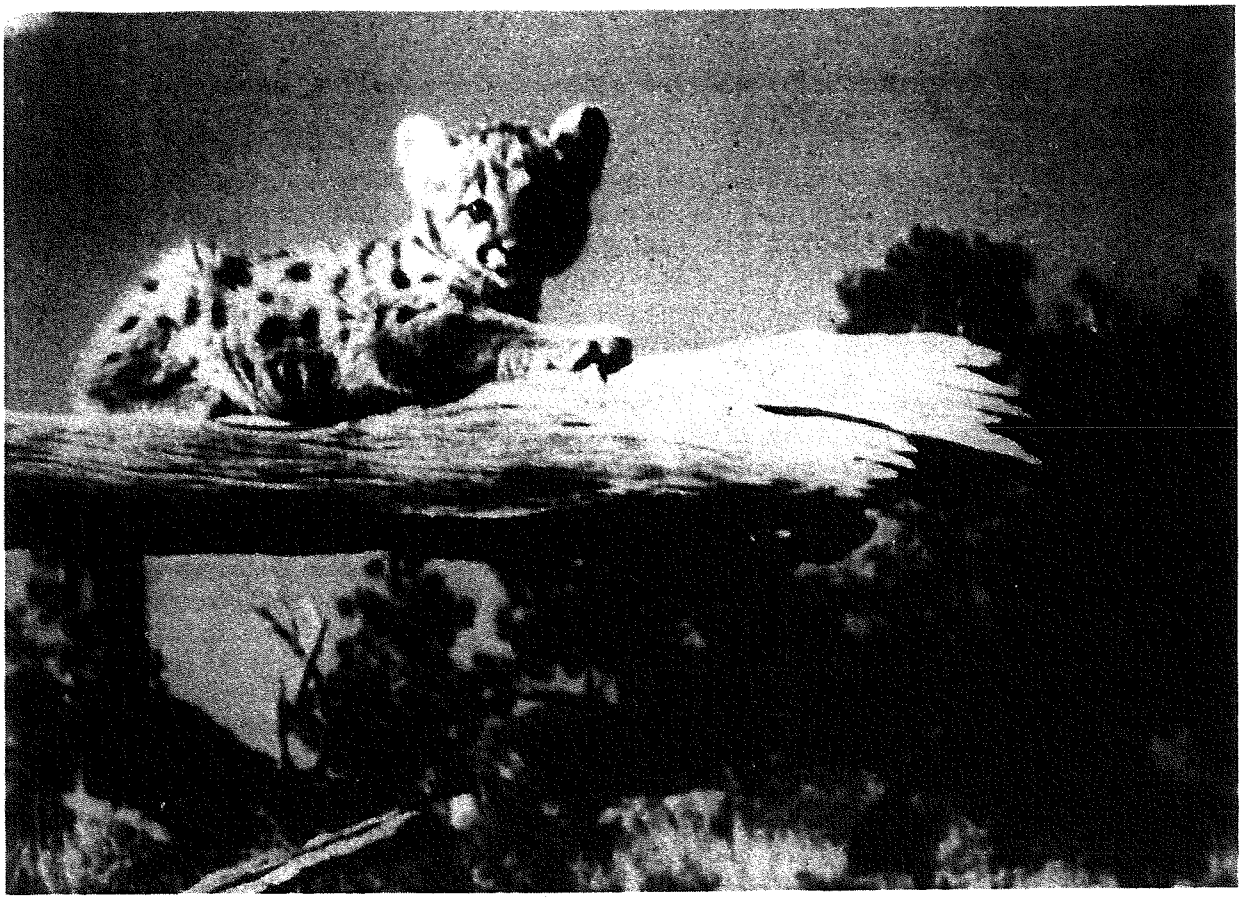
*Number of kittens in sample shown in parenthesis

Population Turnover -- Data relating to population turnover was restricted primarily to the Ruby Division, where records from track counts, captures and recaptures, and radio-telemetry locations indicated that the lion population consisted of approximately 35 animals. During the period of 1954-60 there was a sustained mortality on this population of at least 11 lions per year (30% of total). In 1974 and 1975 thirty lions were known to have been removed from the population, with sport hunting accounting for the highest percentage. Yet, three years later (1978), following the initiation of very restrictive sport hunting regulations, this population appeared to have recovered to its former level. This conforms with the findings of Robinette, et al. (1977) who felt that the annual recruitment and mortality of cougars in their Utah study area was 32%.

It appears that under moderate to heavy exploitation (30%-50% removal) Nevada lion populations have the recruitment capability of rapidly replacing annual losses.

Sex Ratios -- U.S. Fish and Wildlife Service and Nevada Department of Wildlife records for the period between 1954 and 1982 show that 83 litters containing 198 kittens had a sex composition of 89 females and 109 males (100 F; 125.5 M). The data clearly shows an unequal sex ratio, in favor of males; however, a large number of litters recorded by the U.S. Fish and Wildife Service were not sexed and the data base to date may not be representative of true conditions.

Aging -- The terminology used for classifying mountain lion age groups has been confusing to say the least. The term kitten is commonly applied to young lions and in some instances this appellation is used until the youngster finally leaves its mother (approximately 2 years old). Under this connotation the kitten can be newborn, with obvious kitten-like characteristics, or an immature lion which, on superficial examination, cannot be differentiated from an adult -- a broad category indeed. Shaw (1980) not only uses the term kitten but also classifed lions in the age group of 0-2 years as subadults. This probably can be attributed to "lion talk" between the professional hunter and the researcher, where they recognize a difference but have not defined it. Seidensticker (1973) related that "as a lion grows older, it passes through a series of relatively discrete behavioral stages: kitten, transient adult, resident adult." He also referred to small kittens and big kittens (over a year old). In this case behavioral stages and age groups could become confusing. Hornocker (1970) refers to kittens, juveniles and adults but offered no criteria for distinguishing them, other than calling a 1 year old a



A Mountain Lion Kitten at Less than 4 Months Showing Distinct Spotting.

kitten. Currier (1976) did set up a rudimentary classification for three age groups: kitten, adolescent and adult, but it is very generalized and there is some major overlap in criteria. The term yearling has also popped up in the literature and in lion discussions and could be interpreted as being interchangeable with kitten or subadult, but also has the connotation of distinguishing a large kitten from a small one. The need for some approach toward standardization of terminology and relating it to criteria has been evident for some time (Mountain Lion Workshop 1976).

When this study was initiated some broad criteria for the general classification of age groups was adopted. As the study progressed additional criteria, primarily relating to tooth eruption and growth, were incorporated into the key. Even now the distinction between the three proposed age groups (kittens, subadults and adults) often requires a subjective evaluation. However, the criteria presented in Table 5, if used, certainly will help eliminate some of the general age classification confusion.

A further refinement, for aging juveniles by months and adults by year, was explored through the use of tooth eruption sequences, growth, stain and wear. Sufficient data was not collected to be statistically sound, and initial ages had to be estimated; however, this information could be a starting point for additional research toward determining ages more accurately.

Teeth from 94 kittens and subadults were examined to develop the eruption

TABLE 5. CRITERIA FOR A GENERAL CLASSIFICATION OF MOUNTAIN LION AGE GROUPS.

KITTENS (0- 16 months)

* 1. Body weight.
  2. Pelage spotting; fading by 3rd or 4th month.
  3. Still with mother.
  4. Deciduous teeth present or permanent teeth erupting. (See Table 6 for a guide to estimating kitten ages).
  5. If all teeth are permanent then canines are not fully extended. Canine length is less than 28 mm in males and 23 mm in females.

SUBADULT (17 - 23 months) - Has passed through juvenile period but not yet attained typical adult characteristics.

* 1. Body weight.
  2. Pelage spotting still present on insides of front legs.
  3. Not sexually mature. Females not nursing (small teats and no areola).
  4. May or may not be with mother.
  5. Full extension of canines. Canines measure 28-31 mm in males and 23-25 mm in females.
  6. Teeth ivory white in color, not stained.

ADULTS (24 months or over)

* 1. Body weight.
  2. Independent of mother.
  3. No spotting on pelage or very faint.
  4. Sexually mature. Evidence of nursing in females, large teats and presence of areola (may not be evident in young females just entering this age group).
  5. Tooth wear and/or stain. (See Table 8 for a guide to estimating adult ages.)

* The following standards are based on weights from Table 1.

Kittens
Males - up to 123 lbs.
Females - up to 81 lbs.
Weight differences between kittens and subadults are obvious up through approximately 9 months. From this age on there can be an overlap and other criteria must be used in conjunction with weight.

Subadults
Males - 115-140 lbs.
Females - 79-105 lbs.

Adults
Males - 112-162 lbs.
Females 84-115 lbs.

TABLE 6. A GUIDE FOR ESTIMATING AGES OF MOUNTAIN LION KITTENS BY TOOTH ERUPTION SEQUENCES.

Age (Months)	Sequence of Permanent Tooth Eruption
2	Complete set of deciduous teeth; permanent P^2 and M^1 erupted
3	Permanent incisors erupted
4	Upper canines and P^4 erupt
5	M_1 and lower canines erupt
6	P^3 erupts
7	P_4 erupts
8	P_3 erupts; upper canines 50-60% extended from gum lines (males: 16-18 mm, females: 12-14 mm)
9 & 10	P^4, M_1, and P^3 become fully extended
11 & 12	P_4 and P_3 fully extended; upper canines 70-80% extended (males: 20-22 mm, females: 15-17 mm)
13 & 14	Upper canines 80-90% extended (males: 24-27 mm, females: 19-21 mm)
15 & 16	Upper canines fully extended by 16th month (males: 28-31 mm, females: 23-25 mm)

TABLE 7. CRITERIA FOR ESTIMATING AGES OF ADULT MOUNTAIN LIONS.

2 YEARS OLD

1. Canines white, no staining.
2. No wear on incisors 1 and 2. Third incisor may show slight wear.
3. Tips of canines show little or no wear.

3 and 4 YEARS OLD

1. Canines lightly stained.
2. Slight wear on highest point of crown of third incisor. Area of wear 1-4 mm across.
3. Incisors 1 and 2 with little or no wear.
4. Tips of canines with little or no wear (2 mm or less).

5 and 6 YEARS OLD

1. Canines moderately stained.
2. Third incisor worn to within 1-4 mm of crest of incisors 1 and 2.
3. Incisors 1 and 2 have slight to moderate wear along crown.
4. Tips of canines with obvious wear (3-5 mm worn off).

7-9 YEARS OLD

1. Canines darkly stained.
2. Third incisor worn level with incisors 1 and 2 and to within 1-4 mm of gum line.
3. Tips of canines flattened to nearly rounded.
4. Dentine exposed on incisors.

10 + YEARS OLD

1. All incisors worn nearly to gum line, or missing.
2. Canines worn rounded to blunt, darkly stained.

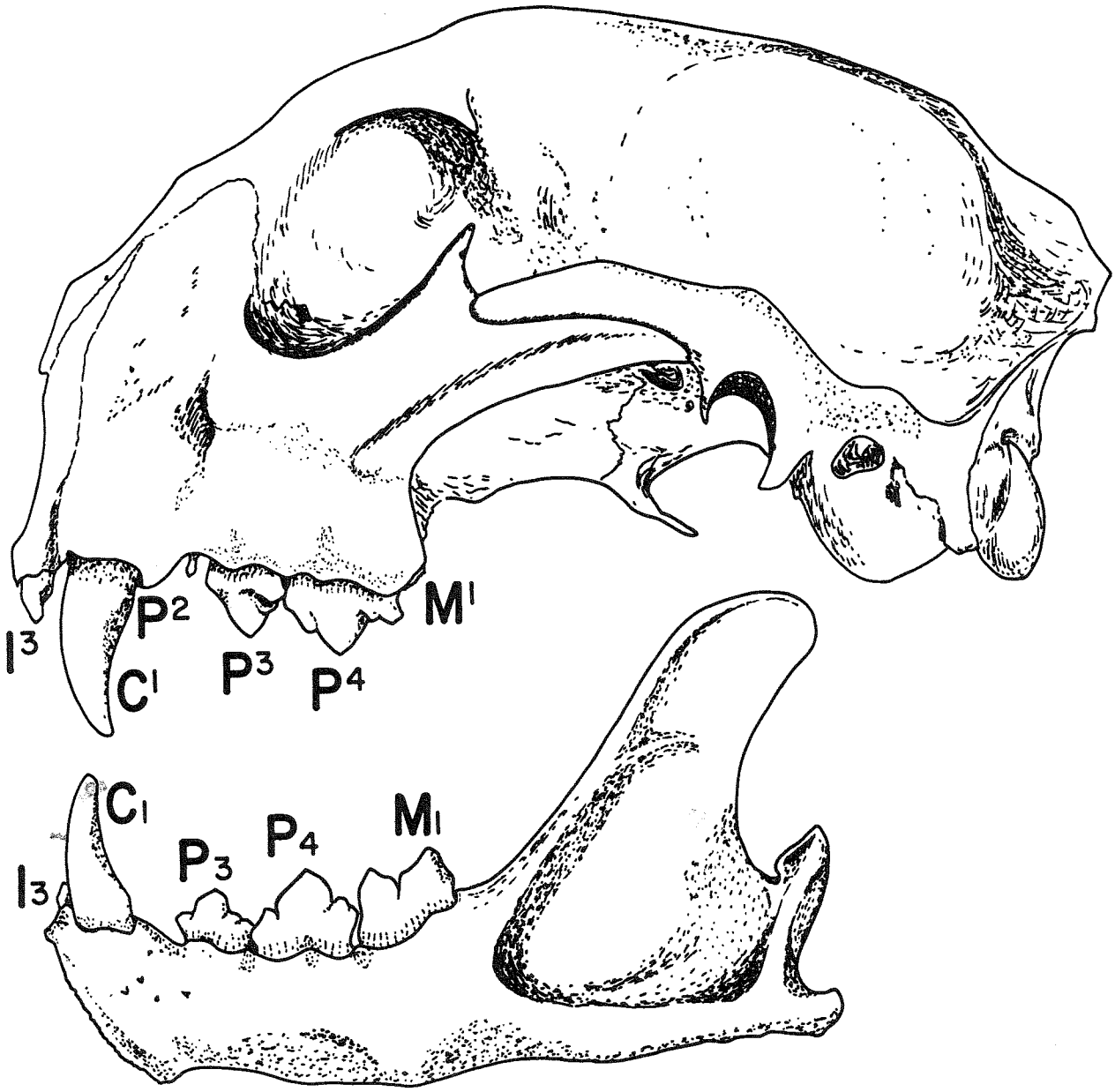


FIGURE 6 Lateral view of a mountain lion skull with letter/number designations for permanent dentition. Drawing by M. Alderson.

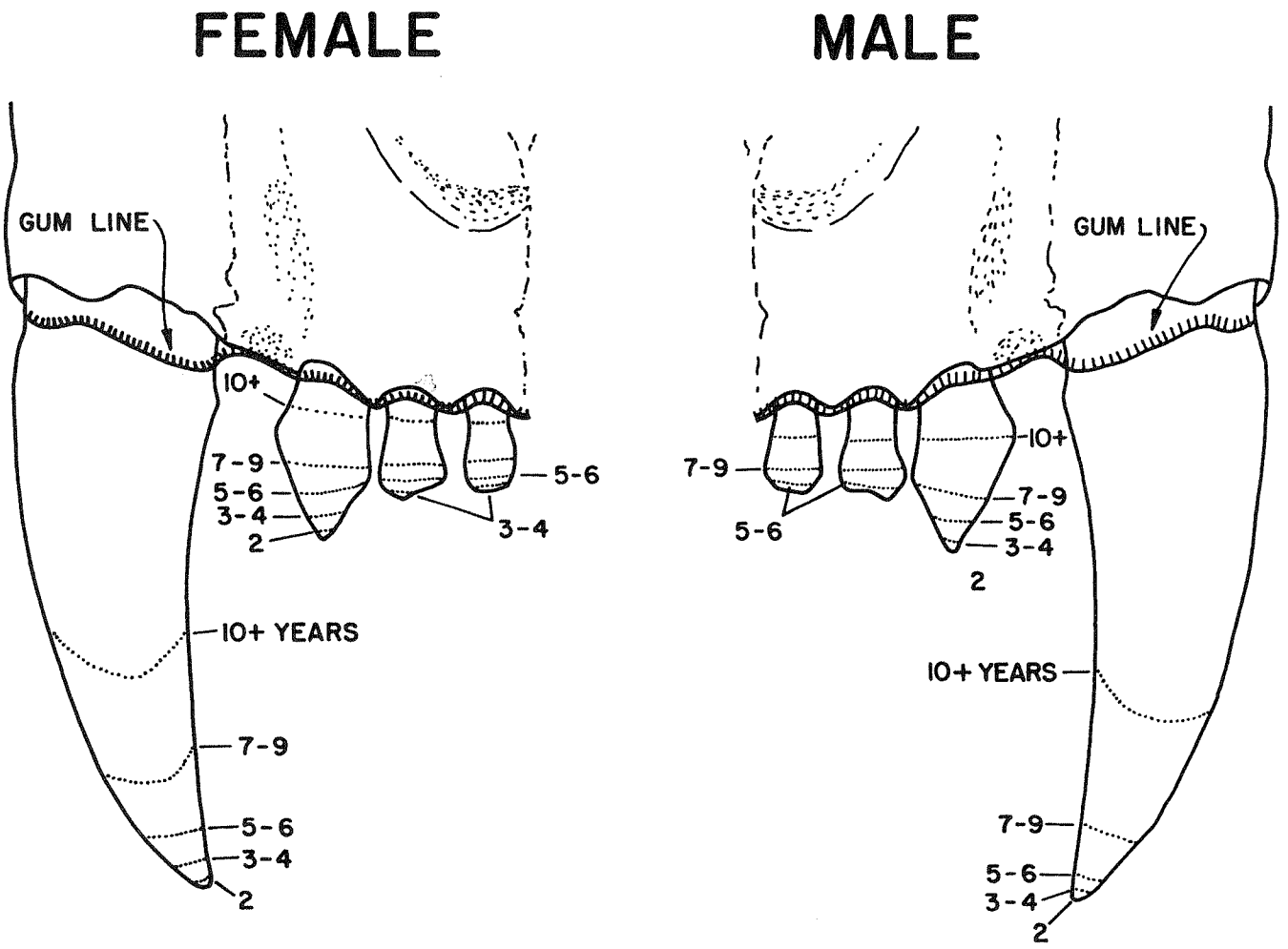


FIGURE 7 Frontal view of upper teeth of female and male mountain lions displaying relative wear by adult age classes.
Drawing by M. Alderson.

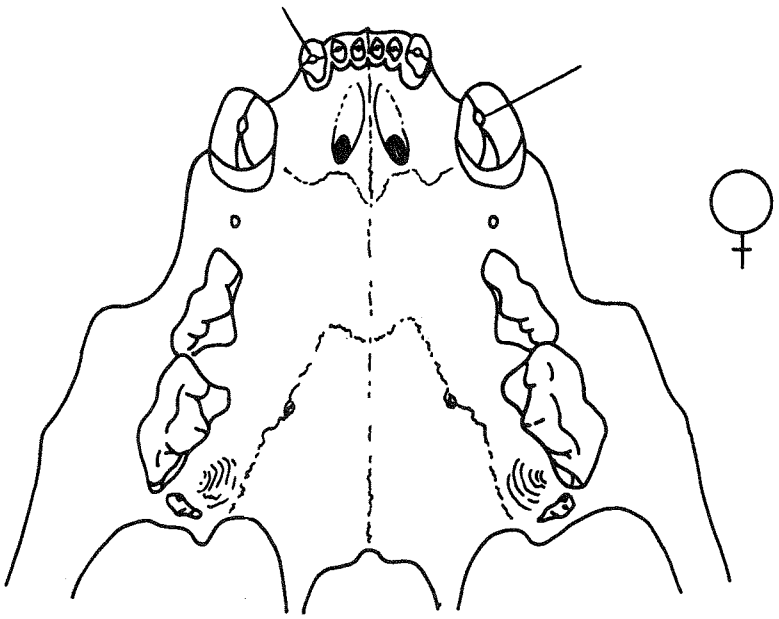


FIGURE 8 Ventral view of the upper dentition of a 3-4 year old female mountain lion showing wear points on apex of third incisor and canine teeth.
Drawing by M. Alderson

sequences and to formulate the aging guide shown in Table 6. Of this number 21 were kittens or subadults which had been captured, marked, their age estimated, and then released. When these animals moved into the adult age group they provided information concerning tooth stain and wear which was used to help develop Table 7. Figures 6, 7 and 8 illustrate permanent dentition and adult lion tooth wear patterns.

Although not shown in Table 7 there is some evidence available to show that there is differential wear on the canines and incisors of males versus females.

Weights -- Only limited data was collected on the weights of newborn kittens. Nine fetuses, judged to be in the last 2 weeks before birth, had a weight range of 0.77-1.17 pounds. Two kittens estimated to be 1-3 days of age weighed 1.06 and 1.17 pounds.

The weights of all captured lions are provided in Table 1. Based on 21 lions the adult males ranged from 112 to 162 pounds and had an average weight of 137 pounds. Thirteen adult females ranged from 84 to 115 pounds and averaged 98 pounds. The average weights recorded for lions in California was 105.8 pounds for males and 76.5 pounds for females; in Arizona, 114.5 pounds for males and 72.6 pounds for females; and in Utah, 136.9 pounds for males and 92.5 pounds for females (Sitton, 1977).

Movements

Dispersal of Juveniles -- Data was obtained from 8 family groups as to the approximate age of the kittens when they separated from their mothers. The range in ages was 10.5 months to 19 months with an average of 14 months. It was observed on several occasions that following separation from their mothers the young frequently remained in their home range for a time before finally dispersing.

To become established as part of the breeding population a newly independent mountain lion normally progresses through three phases:

(1) Independent kitten or subadult -- upon leaving its mother.
(2) Transient - when searching for a new home range.
(3) Resident - upon establishment of a new home range.

This behavioral pattern is similar to that observed by Seidensticker, et al. 1973, with the important exception that Seidensticker called all transient and resident lions adults. In contrast, the data from this study shows that when using the age classification groups in Table 5 transients can be kittens, subadults or adults and residency can be established by subadults. Behavioral patterns do not necessarily establish the age of the lion.

The transient phase can be very limited, particularly with females, as was observed with lion number 13 who stayed in the mountain range of her birth, was bred at the approximate age of 24 months, and established a home range immediately adjacent to her mother's (number 14).

Documented movements recording the dispersal of 16 young mountain lions in the Ruby Mountains and vicinity are shown in Figure 9. Eleven of these lions stayed within the mountain range where trapped (and believed to have been born) and 8 left to become established in another mountain range. Travel routes were unknown for the lions that left their home range but it is presumed they sometimes had to cross wide, barren valleys to reach their new residence. Of the 8 males tracked only 2 remained in the mountain range where first captured and presumably born. Females generally did not move as far as males (averaging 18 miles as compared to 31 miles for males) and they tended to remain in the mountain range where they appeared to have been born. Extreme movements of 36 miles for a female and 57 miles for a male lion were noted. The initial dispersal of independent kittens or subadults from their home ranges appears to be an important characteristic which contributes towards maintaining viable populations throughout their habitat. For example, in areas where mountain lions are heavily exploited (see Mortalities), such as in the Ruby Mountains, the influx of transient lions is essential in order to maintain a population.

Home Range -- Sufficient data was obtained from radio-tracking, recaptures and track sightings to at least partially construct the home range size of 13 lions. This data covered a time period which ranged from 15-77 months per lion and involved anywhere from 17-116 locations per lion (Table 8). Male lions had home ranges three times as large as females averaging 224 square miles as compared to 69.5 square miles (Figures 10-22). It is believed that smaller home ranges in the Ruby Mountains were due to higher deer densities compared with the other mountain ranges. Females occupying the South Ruby portion had considerably larger estimated home ranges than females living in higher deer density habitat in the North Rubies.

Home range overlap was documented for both adult females and adult males; however, sufficient long-term data was not collected to determine if resident lions were being recorded in all cases. In fact, the high lion turnover rate in the study area made it very difficult to distinguish between transients and residents, and in determining resident home ranges some judgements had to be made. Male home ranges either partially or completely overlapped those of neighboring adult females. Less overlap was found between members of the same sex, although on occasion there was considerable overlap during certain seasons. This occurred most frequently during the middle of winter when both deer and lions were concentrated and again during the spring and early summer (primary breeding season).

Both adult males and females tended to use the same areas month after month and year after year within their home ranges. This behavior was similar to that described by Hornocker (1969) and Seidensticker et al. (1973) in Idaho. However, there were some differences between characteristics recorded in Idaho lion populations and those observed in Nevada: (1) males were observed to fight and were not generally tolerant of each other in regard to intrusions into their home ranges, and (2) there was no obvious differences, in regard to home range size, between unexploited and exploited lion populations.

Seasonal Movements -- With the advent of winter snows in late fall the deer move to lower elevations or migrate to traditional winter ranges. The mountain lion normally follows, but may go to the wintering grounds of another

herd. In doing so there may be a movement to a different mountain range and long distances can be traversed (Figures 12 and 13).

Lions usually avoided north-facing slopes in the winter when snow was deep and crossed from one drainage to another by descending to the mouth of the canyon. South-facing slopes received the most use because of less snow and the presence of greater numbers of deer. Snow, however, did not always deter the mountain lion, and they have been noted to cross over mountain passes covered with 3 to 5 feet of snow with little difficulty.

During the summer months the lions' movements were not restricted by environmental factors. North-facing slopes, which were cooler and had more vegetation than south-facing slopes, were preferred. The vegetative cover in the Ruby Mountains is sparse above 9,000 feet (subalpine zone) and lions tended to use these areas much less than the lower elevations where aspen, mountain mahogany and taller shrubs were prevalent. The highest elevation at which a lion was located was 10,400 feet and the lowest was 6,100 feet. The elevational zone of highest use by lions in eastern and central Nevada is between 6,500 and 8,500 feet where deer and other prey species are most abundant.

Movements of Deer in Relation to Lions -- On one occasion deer were observed fleeing in response to a lion's presence, while in other instances they tended to either ignore the lion or they appeared only slightly nervous, often looking in the direction of the lion. Most of these observations were made when deer were in open areas which lacked suitable stalking cover for lions. In one instance several deer were seen to wander into a dense grove of mahogany trees where a lion was present. Within a few minutes the deer walked out of the trees, seemed to be uneasy and frequently looked back in the direction of the lion but did not run. On another occasion several deer were noted to be fearful of a nearby lion and they ran approximately 300-400 yards until they reached an open hillside where they stopped and began to feed.

Food Habits -- The most comprehensive study on food habits of the mountain lions in Nevada was made by Robinette, et al. (1959). Although the emphasis in this study was not directed toward food habits, data was collected when possible. These findings showed that mountain lions ate a variety of prey species ranging in size from wood rats (Neotoma spp.) to elk (Cervus canadensis). The staple food was the mule deer. In some areas feral horses rated second in importance if deer densities were low. In the Ruby Mountains, beaver (Castor canadensis) were a favorite food source and were readily available. Another prey species not listed, but of local importance in southern Nevada, was the bighorn sheep (Ovis canadensis).

Two hundred lion scats were examined during the ten years of field effort and the following food items (listed in approximate order of importance) were found: mule deer, porcupine (Erithizon dorsatum), cottontail rabbit (Sylvilagus spp.), jackrabbit (Lepus californicus), feral horse, beaver, domestic sheep, wood rat, blue grouse (Dendragapus obscurus), coyote (Canis latrans), bobcat (Lynx rufus), unknown rodents, and elk.

In addition to scats, the contents of 14 lion stomachs were examined. This information is presented in Table 9.

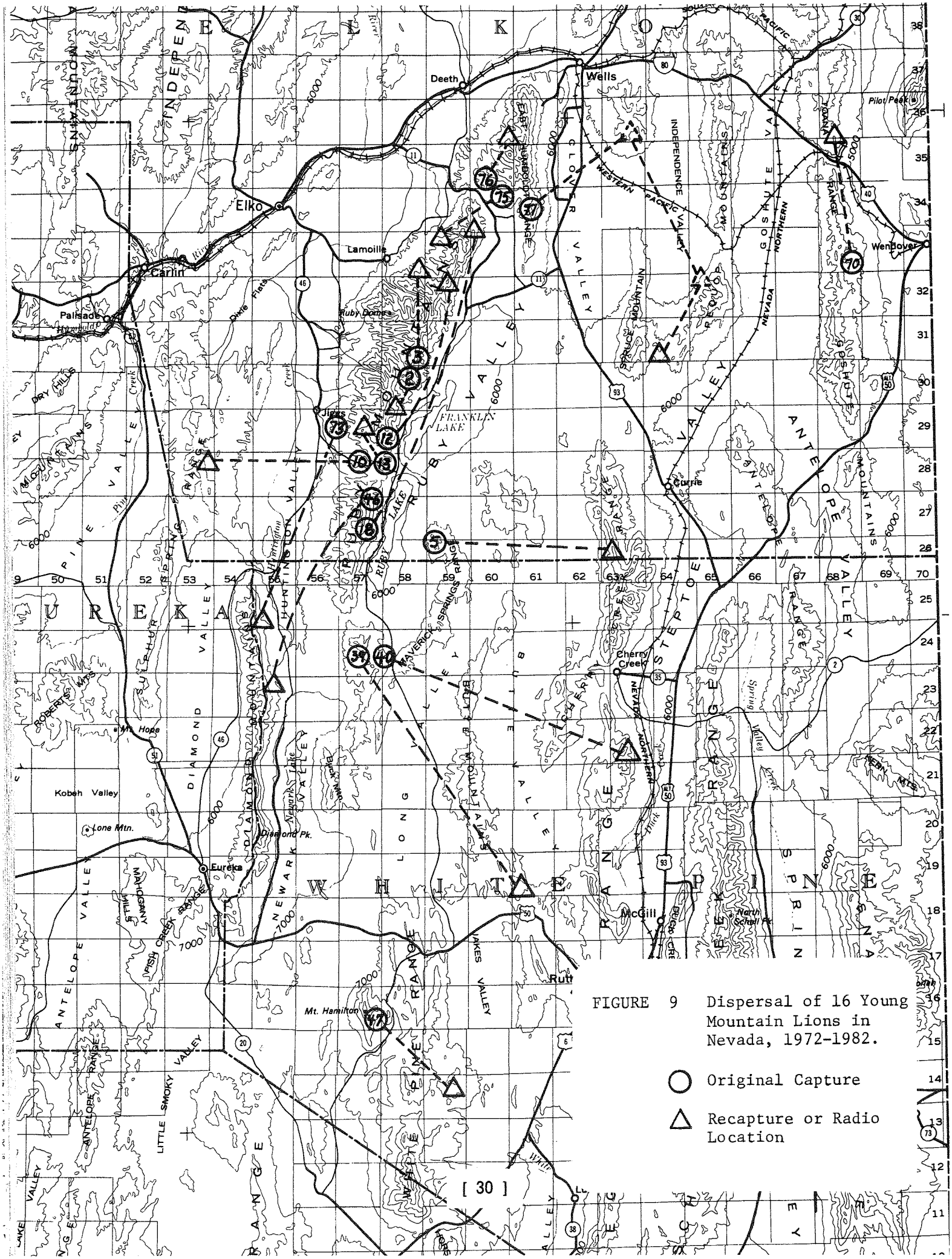


FIGURE 9 Dispersal of 16 Young Mountain Lions in Nevada, 1972-1982.

○ Original Capture

△ Recapture or Radio Location

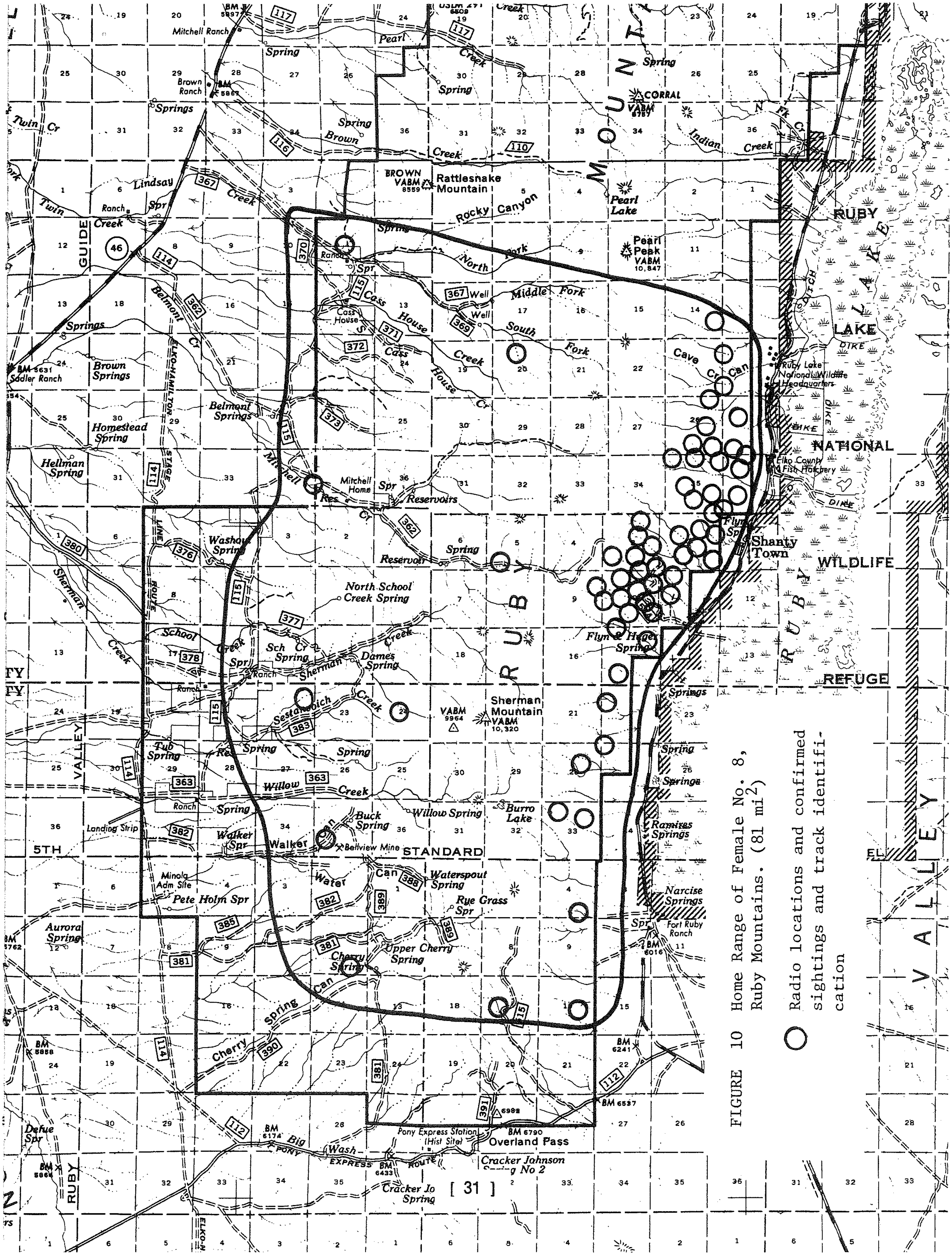


FIGURE 10 Home Range of Female No. 8, Ruby Mountains. (81 mi^2)

○ Radio locations and confirmed sightings and track identification

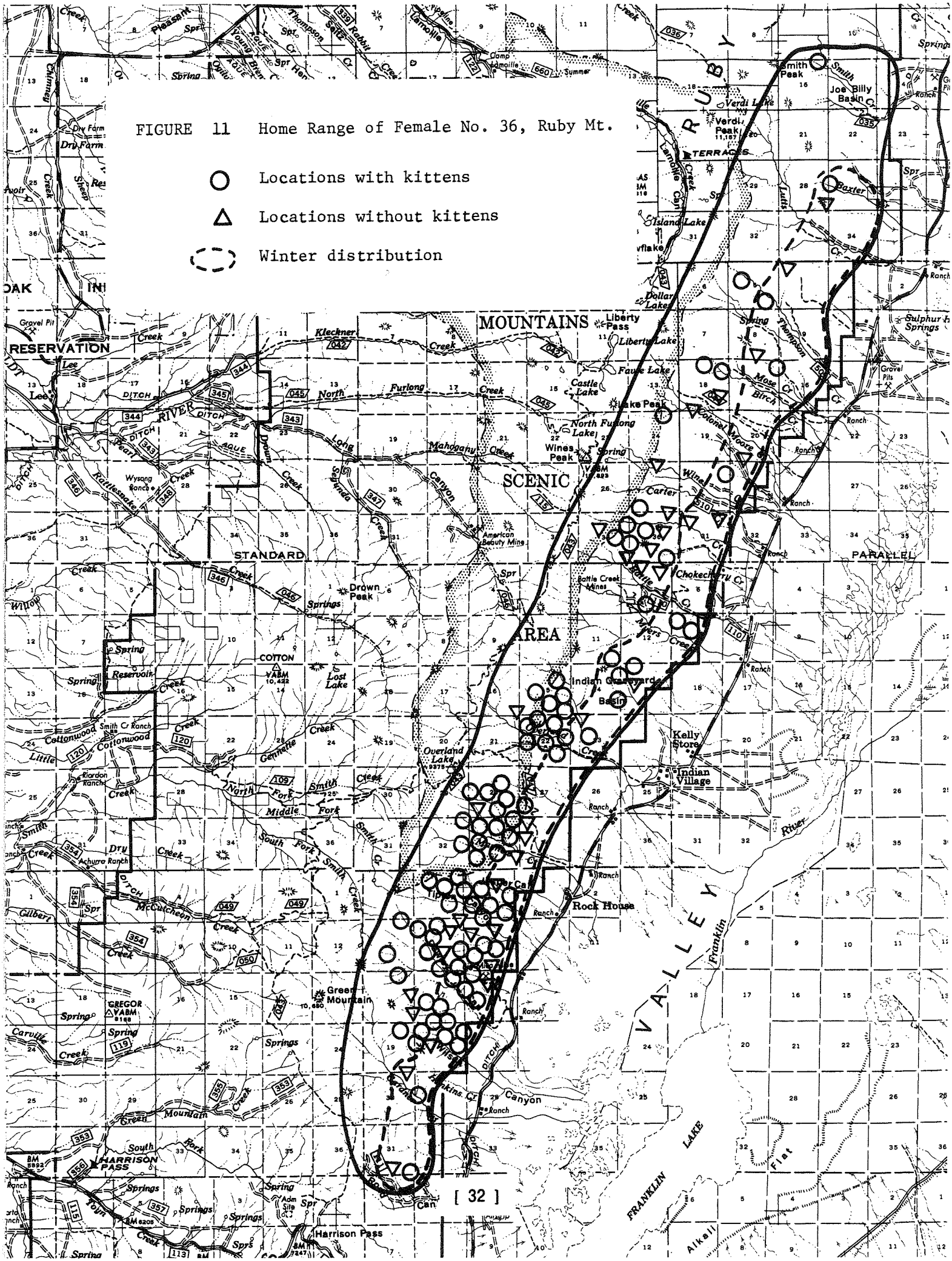


FIGURE 11 Home Range of Female No. 36, Ruby Mt.

○ Locations with kittens

△ Locations without kittens

⬭ Winter distribution

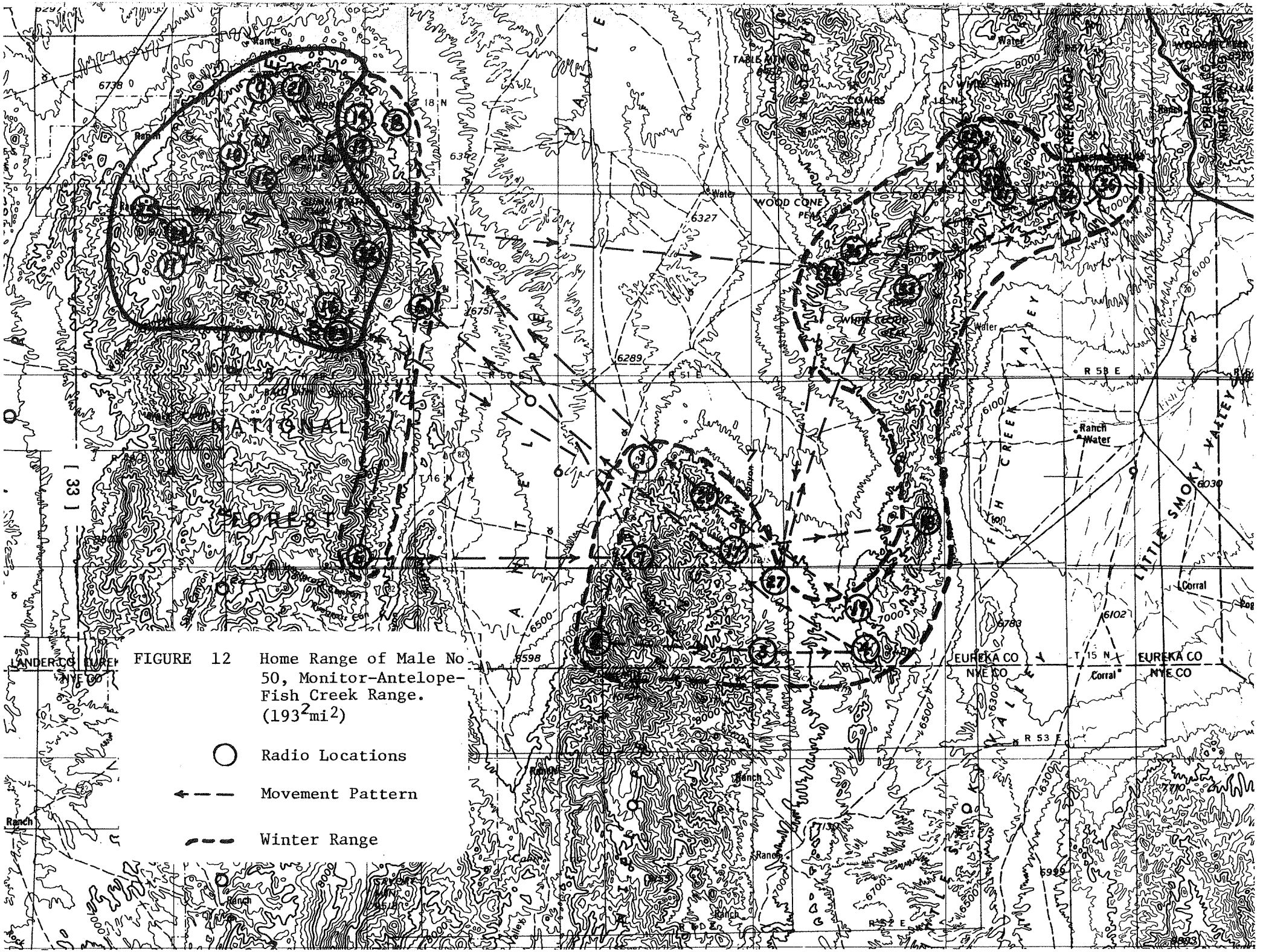


FIGURE 12 Home Range of Male No 50, Monitor-Antelope-Fish Creek Range. ($193^2 mi^2$)

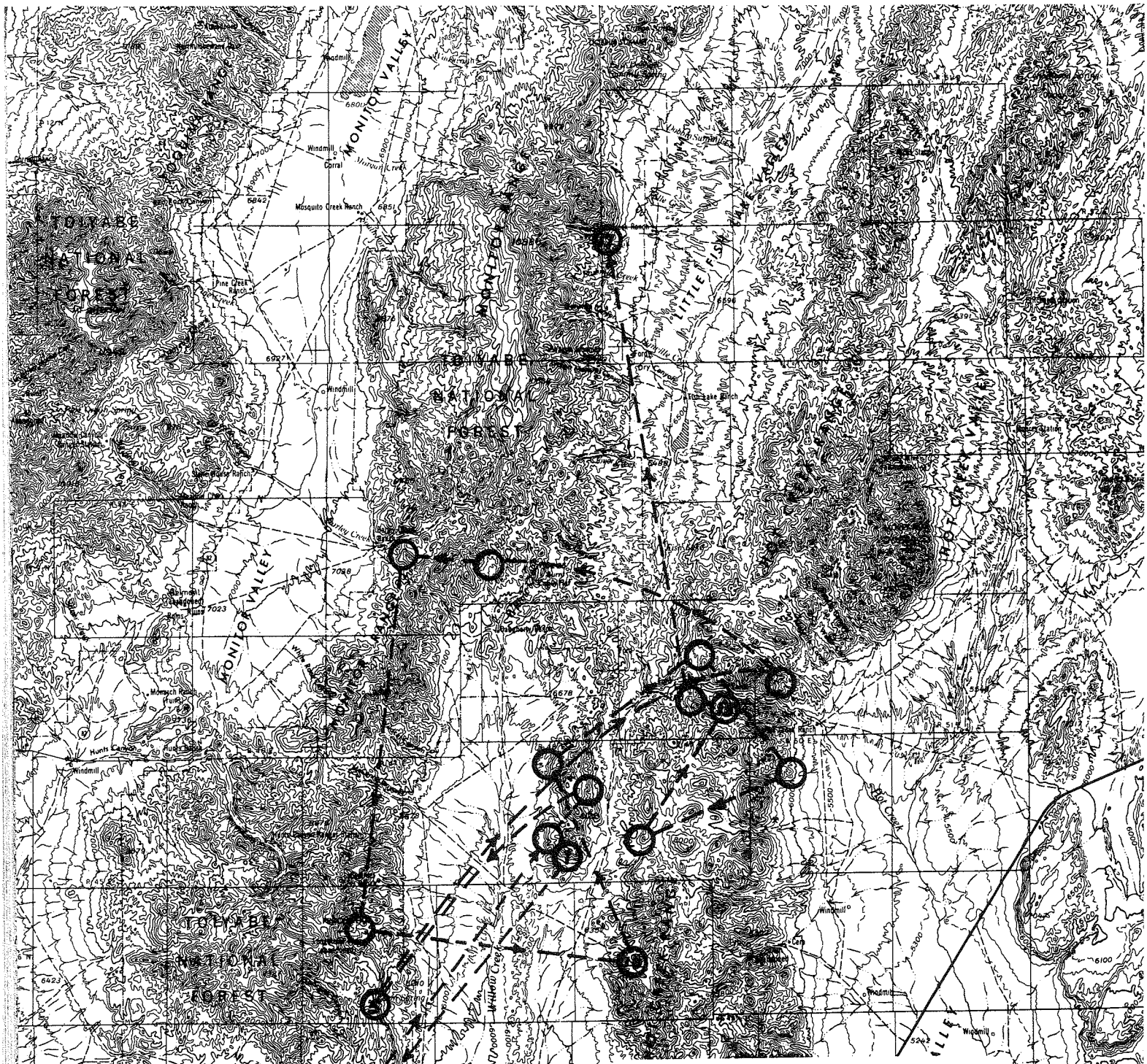


FIGURE 13 Home Range of Male No. 57, Monitor-Hot Creek Ranges. (265 mi^2)

○ Radio Locations

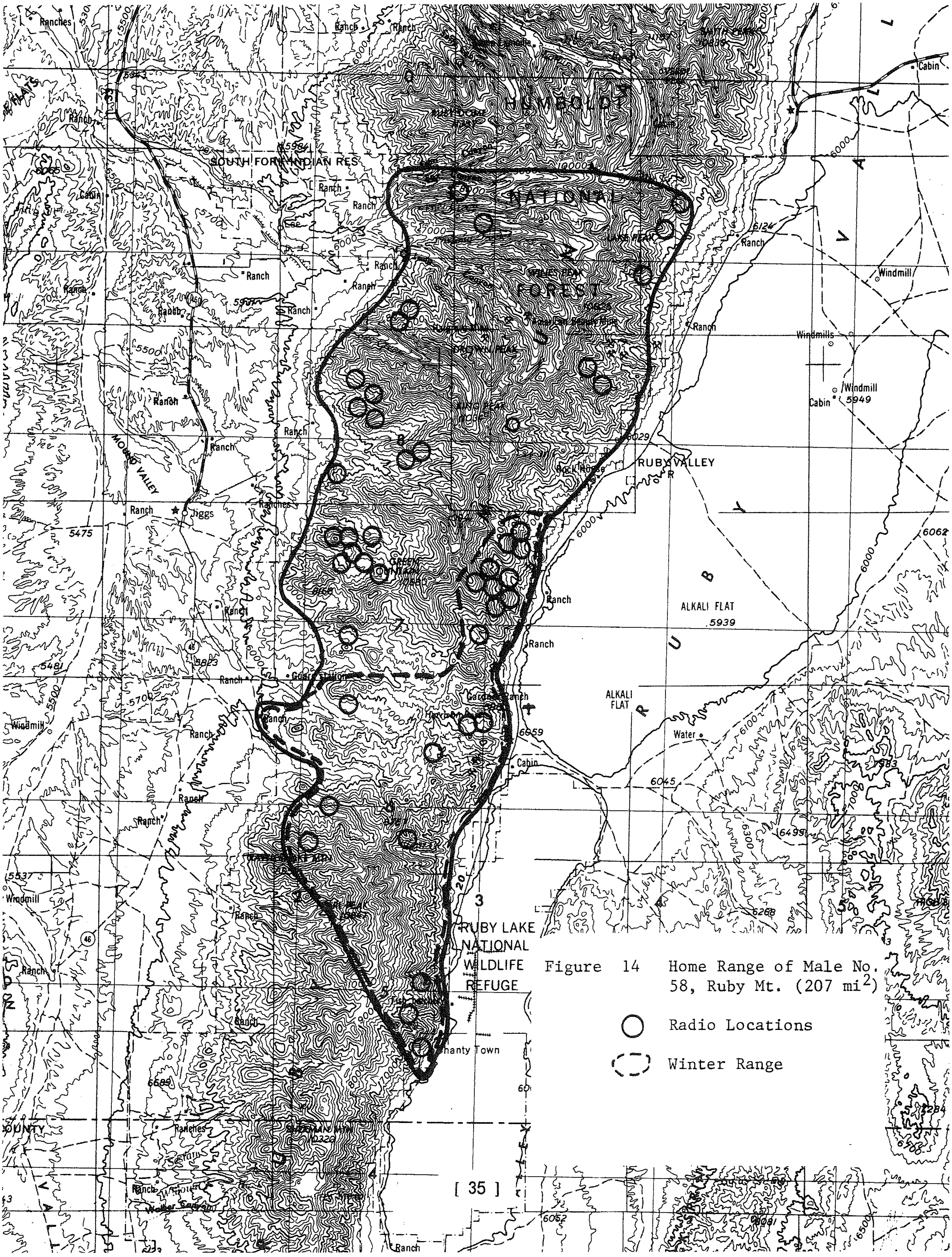


Figure 14 Home Range of Male No. 58, Ruby Mt. (207 mi^2)

Radio Locations

Winter Range

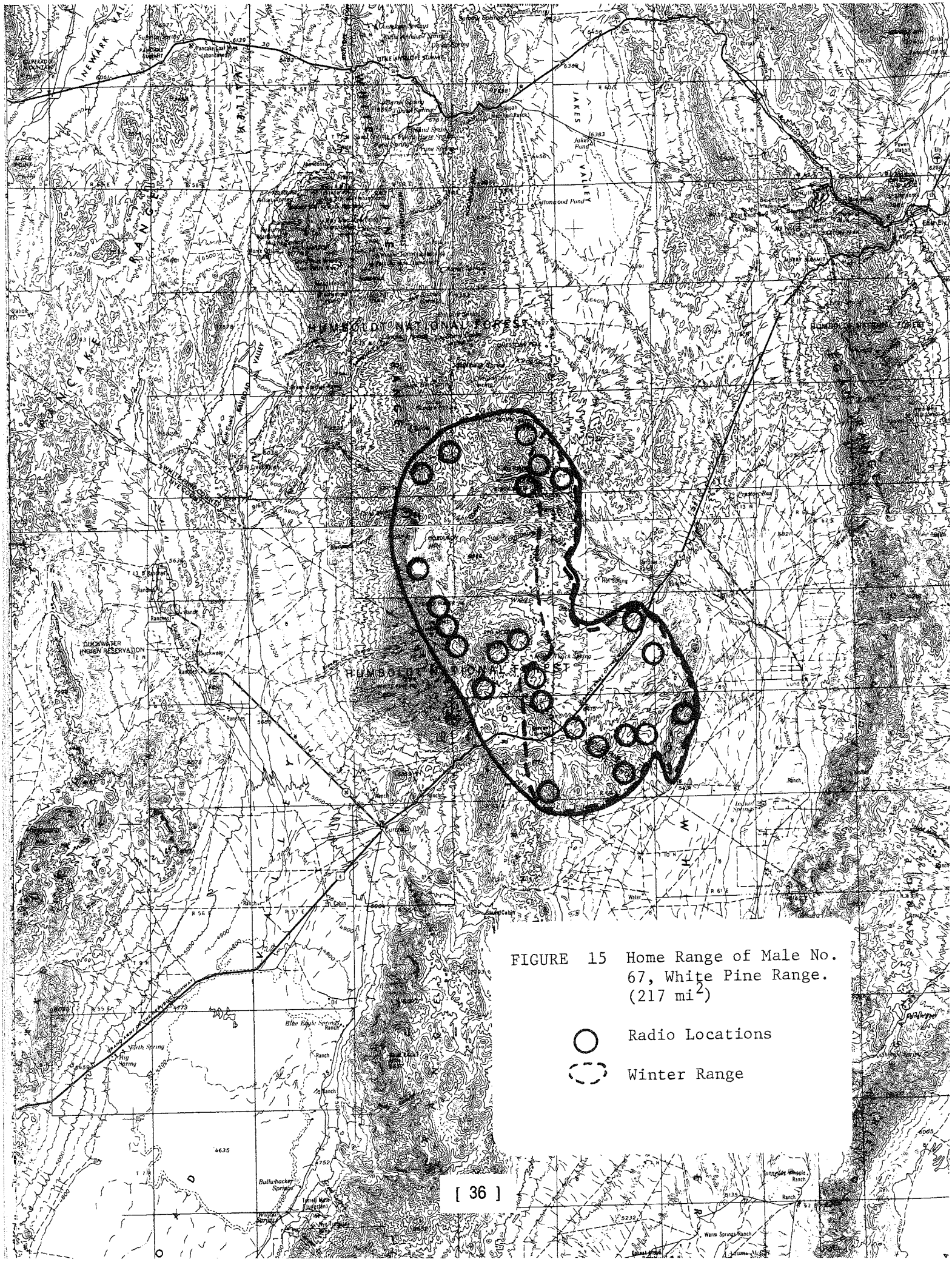


FIGURE 15 Home Range of Male No. 67, White Pine Range. (217 mi^2)

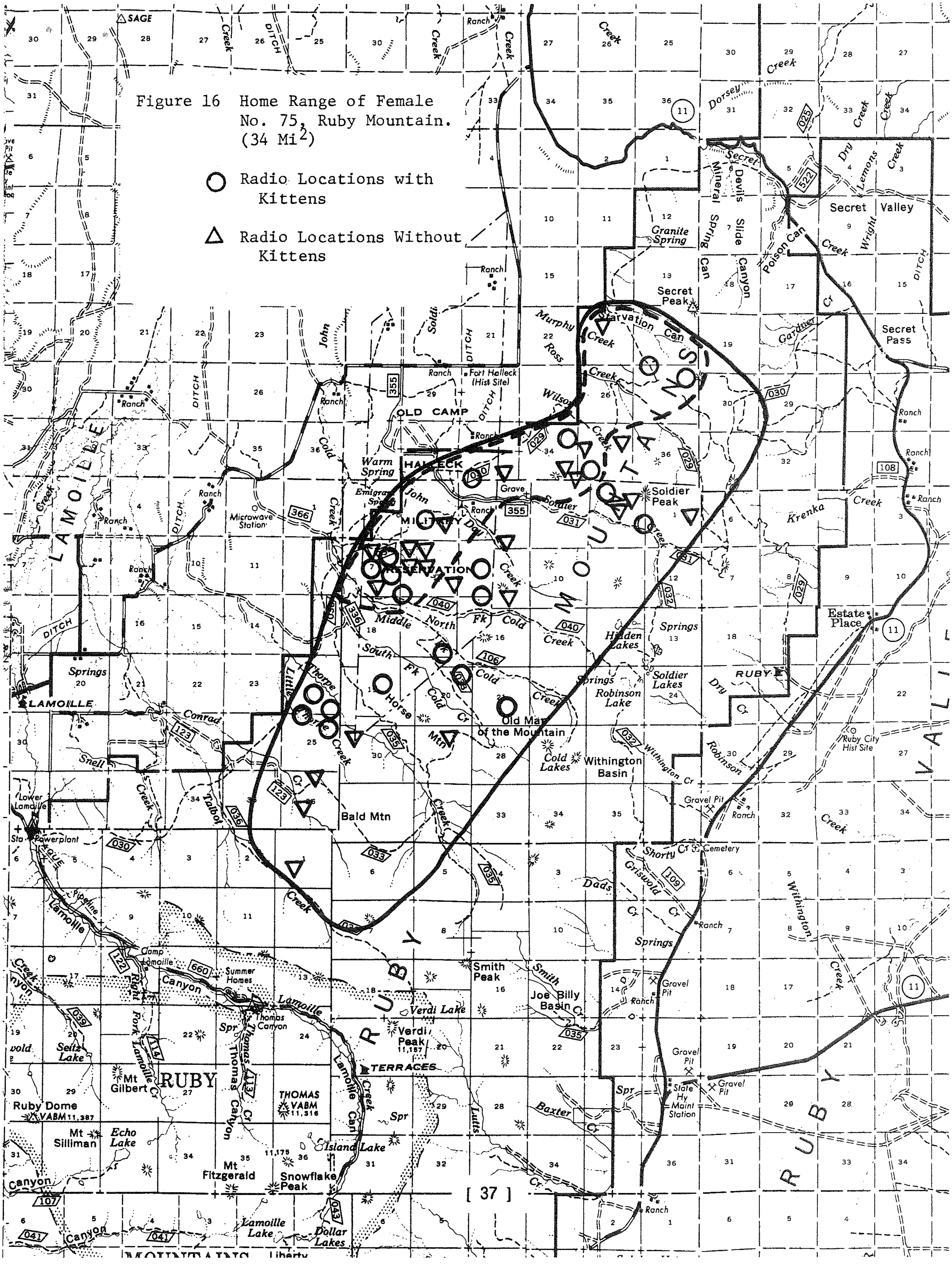


Figure 16 Home Range of Female No. 75, Ruby Mountain. (34 Mi^2)

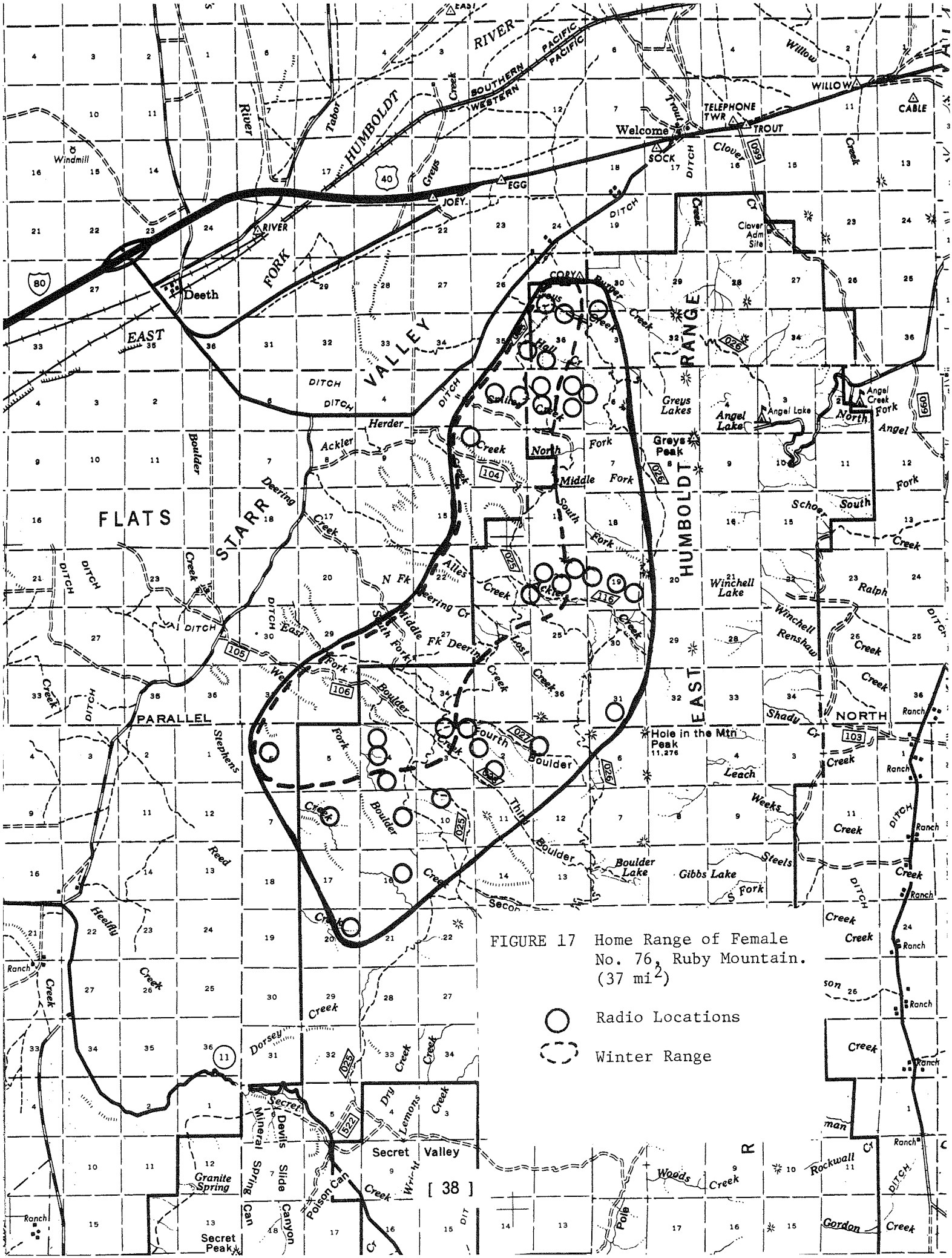


FIGURE 17 Home Range of Female No. 76, Ruby Mountain. (37 mi^2)

Radio Locations

Winter Range

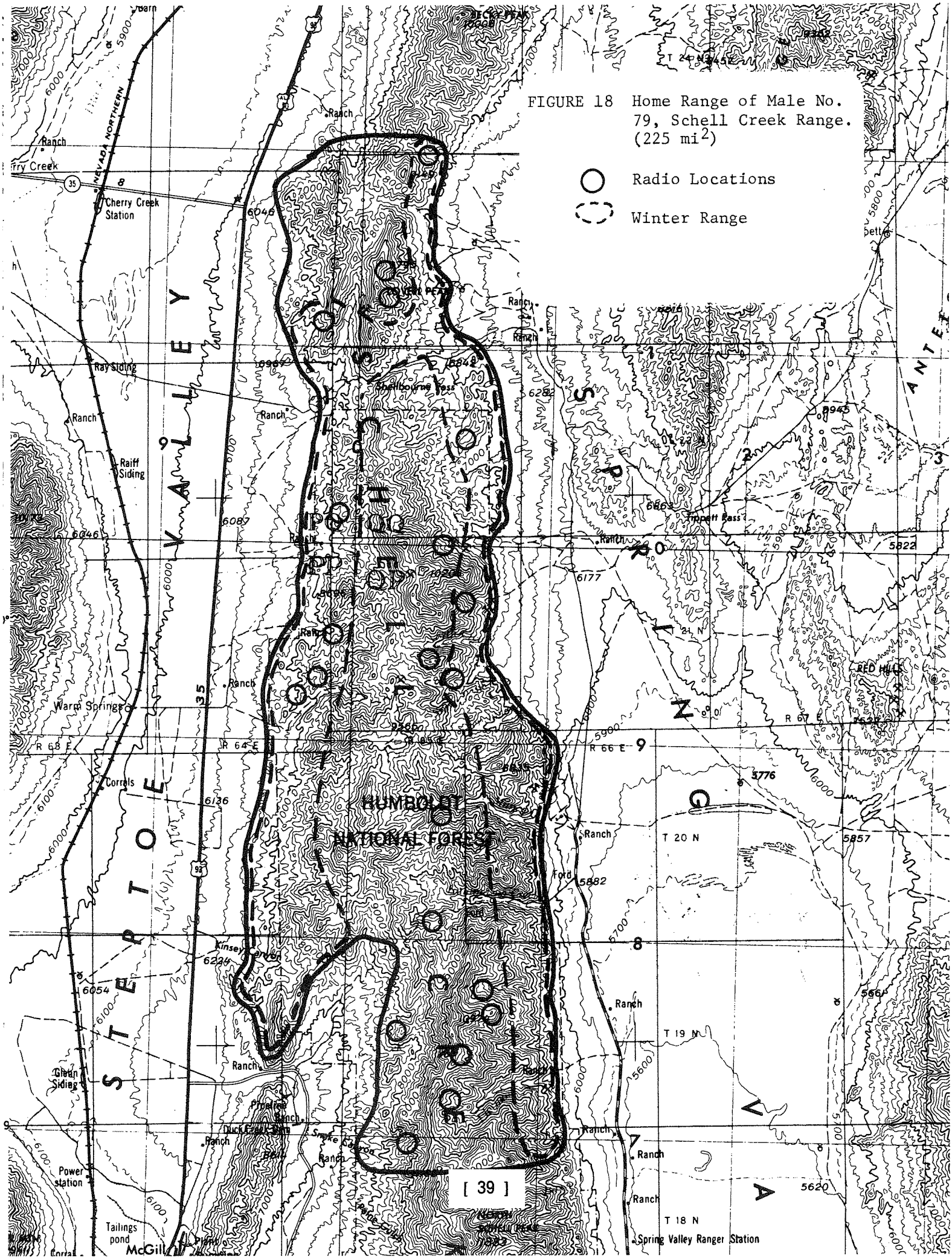


FIGURE 18 Home Range of Male No. 79, Schell Creek Range. (225 mi^2)

Radio Locations

Winter Range

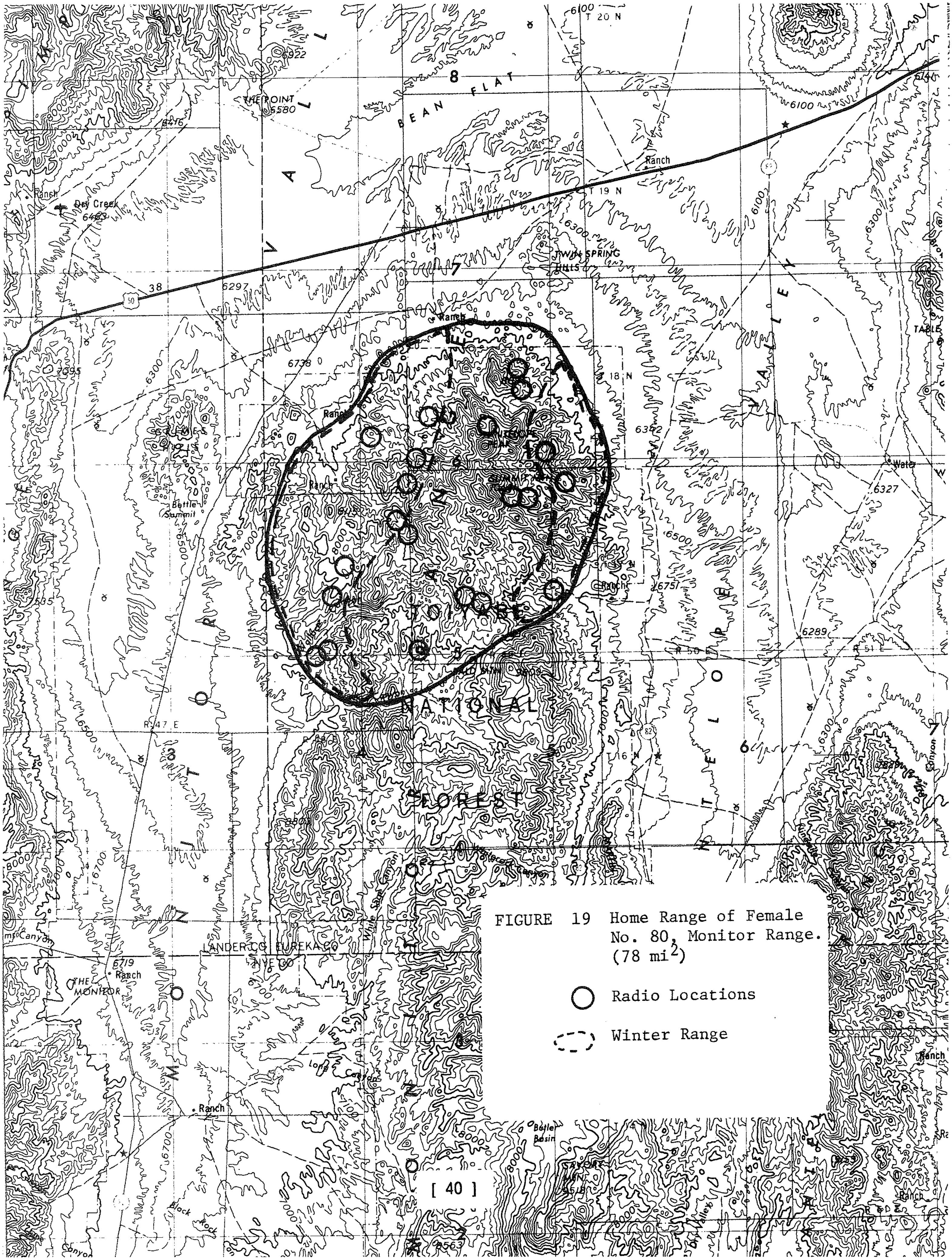


FIGURE 19 Home Range of Female No. 80, Monitor Range. (78 mi^2)

○ Radio Locations

Winter Range

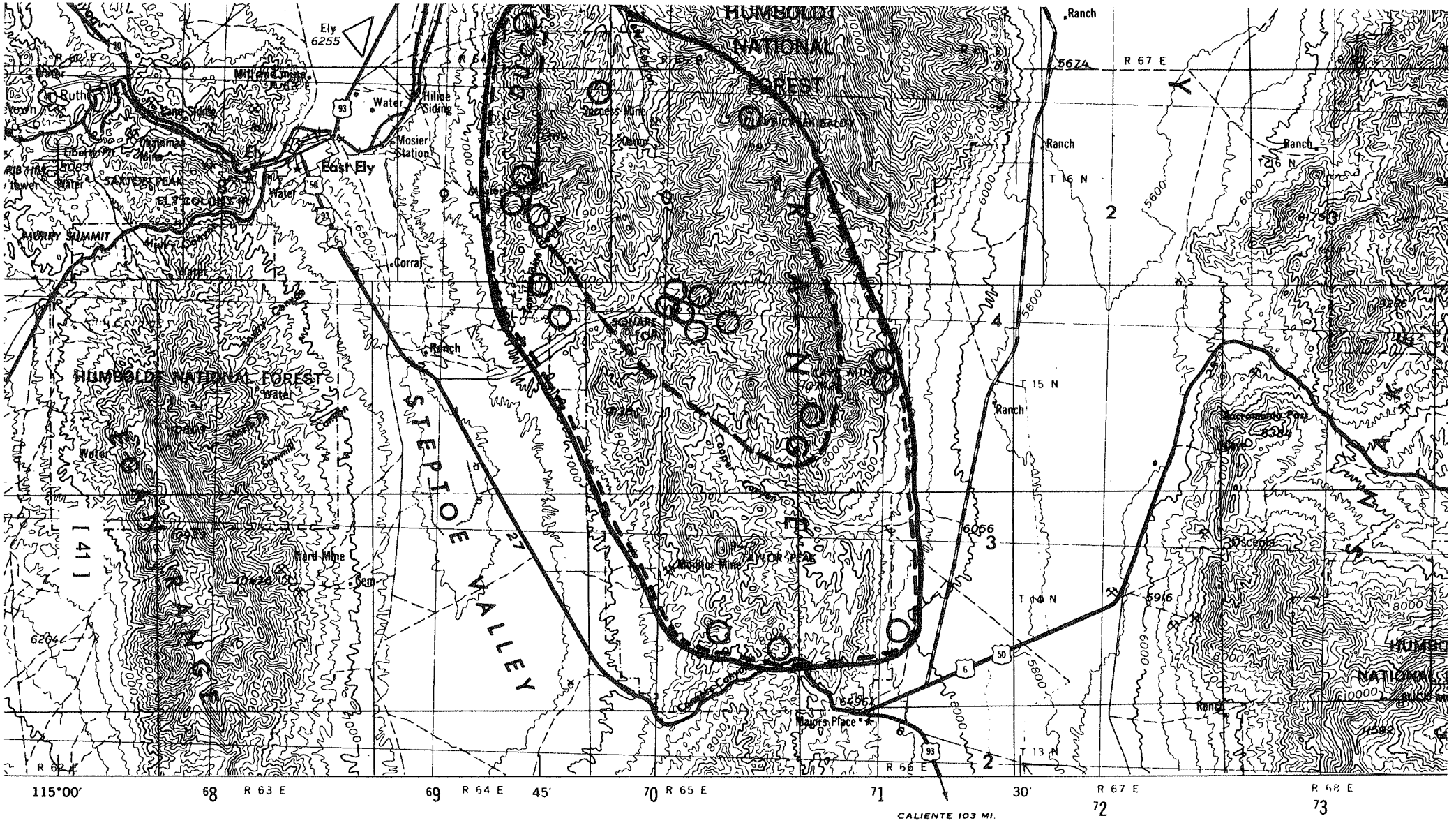


FIGURE 20 Home Range of Female No. 82, Schell Creek Range . (130 mi^2)

○ Radio Locations

⬭ Winter Range

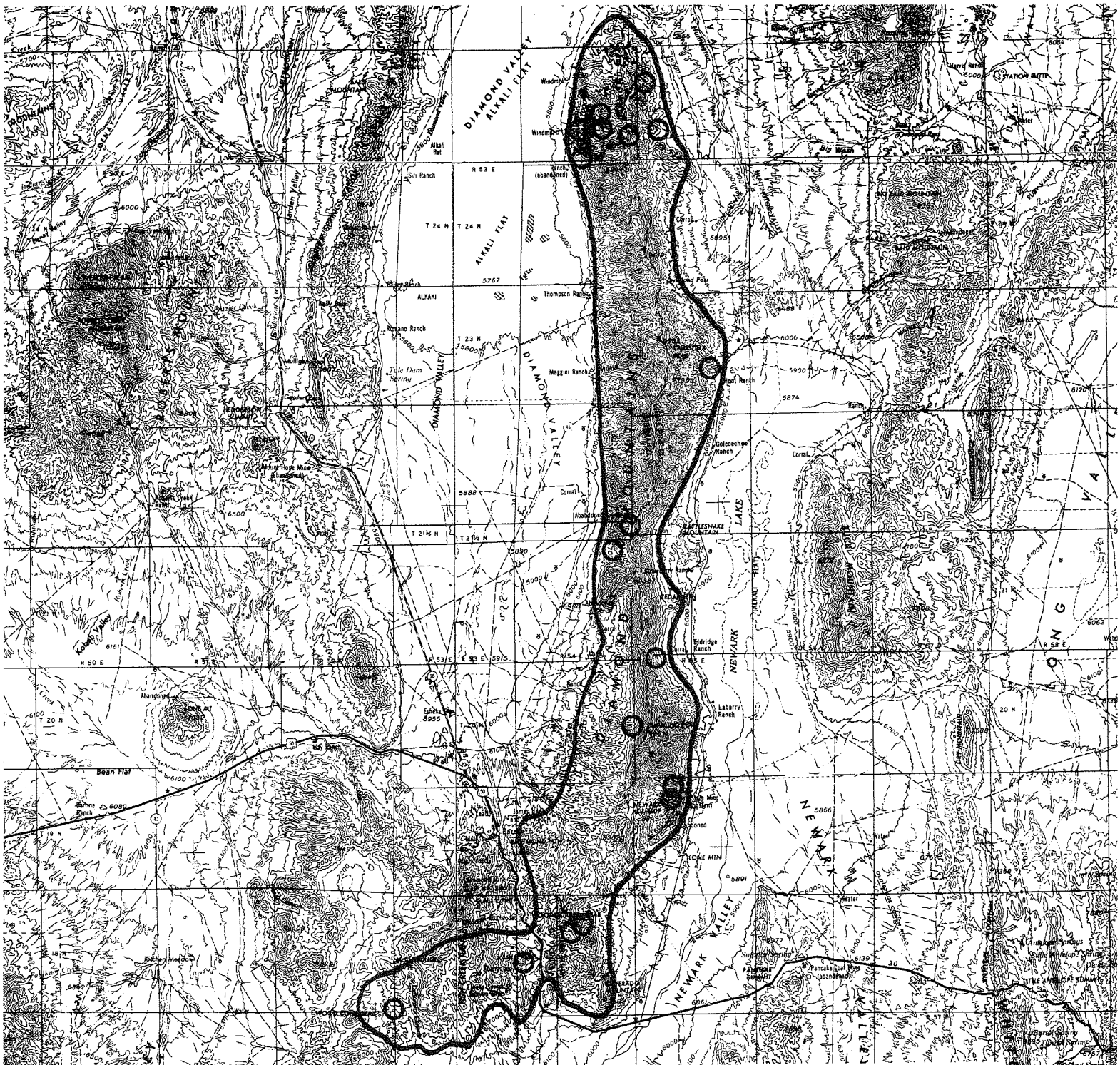


FIGURE 21 Home Range of Male No. 87, Diamond and Fish Creek Range. (253 Mi^2

○ Radio Locations

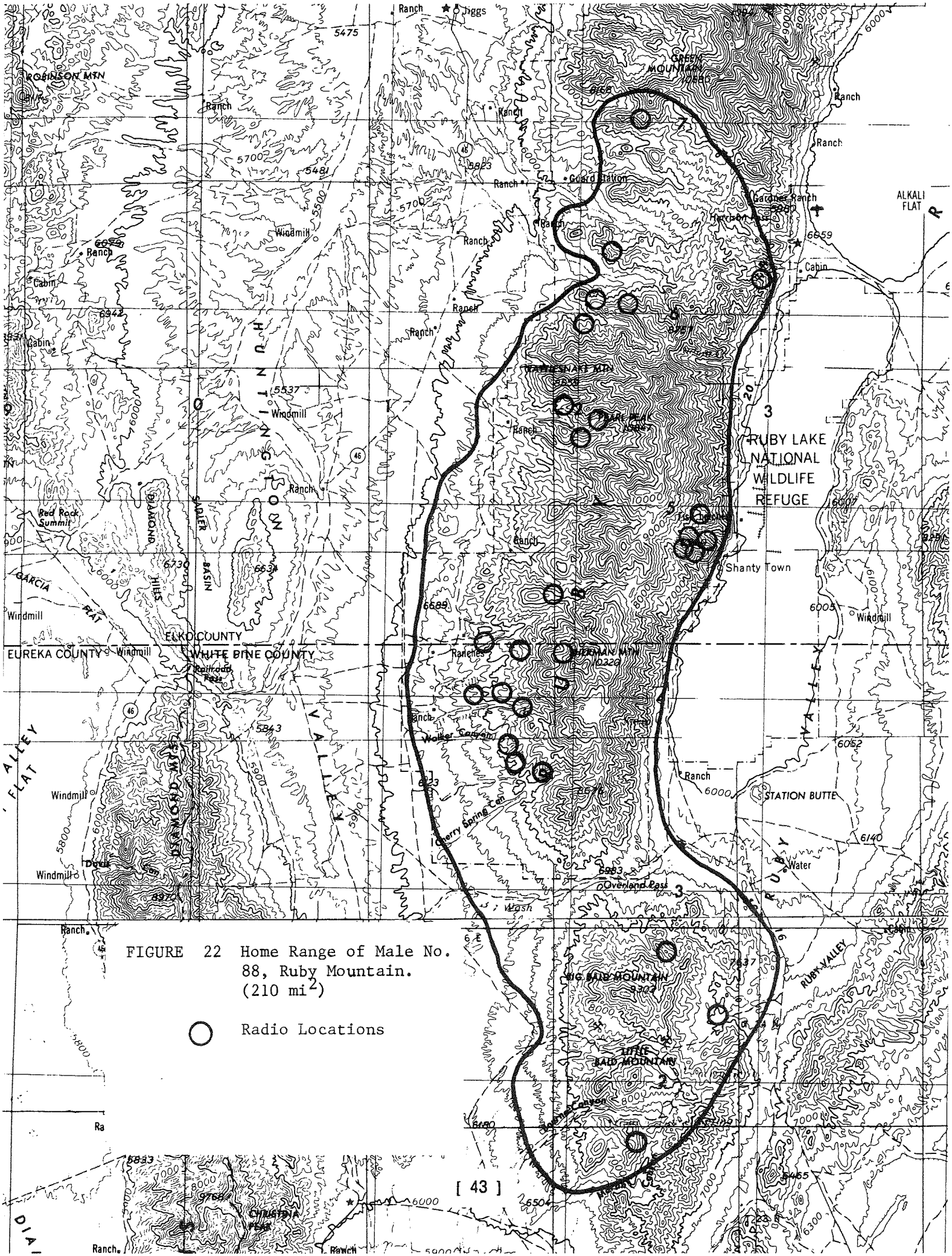


FIGURE 22 Home Range of Male No. 88, Ruby Mountain. (210 mi^2)

○ Radio Locations

TABLE 8. NUMBER OF RECORDED LOCATIONS AND HOME RANGE SIZE OF 13 ADULT MOUNTAIN LIONS IN NEVADA, 1972-82.

Lion No.	Sex	Initial Age	Mountain Range	No. of Radio Locations	Home Range Size (mi^2)	Period Covered
8	F	3 yr.	Ruby	54	81	1/73-1/75
36	F	13 mo.	Ruby	116	57	3/78-2/82
50	M	10 yr.	Monitor-Antelope	36	193	1/78-8/80
57	M	6 yr.	Monitor-Hot Creek	16	265	2/78-8/79
58	M	3 yr.	Ruby	43	207	3/78-7/79
67	M	2 yr.	White Pine	27	217	1/79-12/81
75	F	9 mo.	Ruby	62	34	5/79-12/81
76	F	9 mo.	Ruby	46	37	5/79-9/81
79	M	6 yr.	Schell Creek	21	225	1/80-12/81
80	F	9 yr.	Monitor	21	78	1/80-12/81
82	F	3 yr.	Schell Creek	21	130	2/80-12/81
87	M	10 yr.	Diamond-Fish Creek	17	253	5/80-6/82
88	M	6 yr.	Ruby	28	210	4/80-7/81

TABLE 9. ANALYSIS OF 14 MOUNTAIN LION STOMACHS COLLECTED IN EASTERN NEVADA.

Food Item	Number of Stomachs	Percent Occurrence	Percent Volume
Mule Deer	9	64.3	52.0
Porcupine	4	28.5	18.8
Domestic Sheep	2	14.3	15.5
Jackrabbit	1	7.1	2.3
Bobcat	1	7.1	3.8
Mountain Lion	1	7.1	3.8
Coyote	1	7.1	3.8
			100.0

Mortalities

Livestock Depredations -- Since 1916 the U.S. Fish and Wildlife Service has attempted to control mountain lion populations in those states where livestock depredations were considered a problem. The Service still maintains this posture in Nevada, although they recognize that mountain lions are resident wildlife, classified as game animals, and that the State has authority for overall management of the species. However, the Service, under the terms of a cooperative agreement, has the authority for control of mountain lion depredations. This agreement states that mountain lions may be taken:

1. When they are causing or are about to cause damage to personal property. This will be coordinated with the respective State wildlife agency on a case-by-case basis; or

2. During nongrazing seasons in specific geographical areas where they have been causing damage and could not be captured during the depredation season and continuing damage is expected during the ensuing grazing season. This post-grazing season corrective control on mountain lions may be done after consultation with and concurrence of the respective State wildlife agency on a case-by-case basis; or

3. Under preventive control measures in a historically, serious, documented depredation area. Preventive control may be authorized by the Area Manager when previous steps have failed and after consultation with and concurrence of the State wildlife agency.

As a compliment to this cooperative agreement, and also as a guide for the Department, the Nevada Department of Wildlife Board of Commissioners has adopted Commission Policy No. 14 which relates to Animal Damage Control. This policy is attached in Appendix A.

SHEEP - In Nevada, mountain lion depredations upon domestic sheep has always been a controversial issue. Since domestic sheep summer use areas often coincide with occupied mountain lion habitat most depredations occur during this time. After the lambs are sold in the fall the adult and replacement ewes are usually trucked or trailed to winter ranges. Some bands of sheep in eastern Nevada are trailed as far as 400 miles (round trip) to and from winter and summer ranges. The winter sheep bands are not normally preyed upon by mountain lions to any significant degree. However, if sheep are allowed to move into tree cover or near rock outcrops, depredations are likely to occur.

The pregnant ewes are trailed or transported from the winter ranges to lambing grounds which are used during the spring months until higher elevations are free of snow and the forage has made its initial growth. These staging areas are located on public (B.L.M.) or occasionally private lands. Lion depredations on lambing grounds, although not normally as severe as on summer ranges, do occur on occasion.

Fifteen lambs killed by a mountain lion overnight.
The carcasses were gathered together to take the photo.

Although the number of sheep grazed in Nevada 20 or 30 years ago is not accurately known, it has been estimated that there were 3 to 4 times as many then as today. As recently as 1978 there was an estimated 80,000-90,000 adult sheep utilizing summer ranges in eastern Nevada. Total numbers, including lambs, were approximately 160,000-180,000 head. Since 1980 the summer ranges in eastern and central Nevada have been stocked with approximately 130,000-150,000 head of sheep (adults and lambs) per year. Table 10 lists the mountain ranges (or geographic areas) in these summer ranges and also depicts the number of domestic sheep and estimated lion populations for each area. Assuming these estimates are reasonable there is a ratio of one lion for each 1,346 sheep on these summer ranges.

The confirmed sheep losses to lions in eastern and central Nevada for the years 1978-81 are as follows:

YEAR	MINIMUM NUMBER SHEEP LOST	APPROXIMATE DOLLAR VALUE
1978	230	$16,100
1979	231	14,300
1980	380	28,700
1981	234	16,600

In some cases unconfirmed kills (those reported by herders but not verified) occurred in addition to the confirmed losses. However, these losses are believed to be less than 20% of the confirmed losses. Even if the number of sheep killed by lions was double the confirmed loss the percentage would be small compared to the total number of sheep grazed. For example, in 1982 (Table 10) an estimated 140,000 sheep were grazed in eastern and part of central Nevada. If lions killed 500 sheep the loss would amount to only 0.35% of the total number grazed. Even though total losses are not significant to the livestock industry as a whole, impacts to an individual operator are, at times, quite significant. For example, in 1978 one operator in the Ruby Mountains lost sheep valued at $6,100 during a 3-month period and another operator, in the Schell Creek Range, sustained losses of $8,000 during the same year.

CATTLE AND HORSES - For some unexplained reason cattle are not preyed upon by lions in Nevada to a significant degree. Both lions and cattle use the same areas during the summer months. Cattle are as available or even more so than are domestic sheep. The basic difference between cattle and sheep operations is the sheep are herded in large dense groups while cattle are allowed to roam individually within an allotted area. Cattle can become somewhat concentrated at times when they must congregate around a water supply or along a stream where succulent vegetation is available. The large size of cattle may preclude some attacks by lions but calves usually weigh less than 400 pounds and can easily be killed by an adult lion. Counts which are made when cattle are turned out in the spring and again when rounded up in the fall show losses from all causes are small. This indicates that lion depredations on cattle in Nevada is probably not significant in most areas.

Occasionally there are reports of lions attacking, injuring or killing domestic horses. Since most horses are kept within the confines of a corral or fenced pasture and away from lion habitat, depredations are infrequent.

TABLE 10. SUMMER USE AREAS FOR DOMESTIC SHEEP, AND MOUNTAIN LION POPULATION ESTIMATES IN EASTERN AND CENTRAL NEVADA, 1982.

Mountain Range	Number of Domestic Sheep[1]	Estimated Number of Adult Lions Present[2]
Jarbidge, Copper Basin, Tennessee Mountain	25,000	14
Independence, Bull Run	17,000	9
Stag Mountain	1,000	0
Ruby Mountains	22,000	20
Simpson Park	4,000	7
Roberts Mountain	10,000	4
Diamond Mountains	6,000	7
Butte Mountains	6,000	3
Cherry Creek	6,000	7
North Egan-Ward Mountain	12,000	10
North Schell Creek	22,000	12
Antelope	1,000	2
Kern Mountain	4,000	3
Snake (White Pine County)	4,000	6
TOTALS	140,000	104

[1]In most cases the number of sheep includes lambs, calculated at 1 lamb per each adult ewe. Some bands, e.g., Stag Mountain, are dry ewes.

[2]See population section for information on arriving at lion population estimates.

Depredation Harvest Reports

The U.S. Fish and Wildlife Service first began keeping records of the number of lions taken by government trappers and hunters in 1917 (Table 11). The sex of lions killed was recorded for the years 1917-1956 and again from 1969-1981. More males (527) were taken than females (438) with a ratio of 100 F : 120 M. During 1917-1968 many lions were removed in anticipation of future problems and the lion hunters were particularly active from 1956 through 1961. This preventative treatment resulted in lions being killed that were not responsible for depredations. In recent years (1969-1981) most of the lions which were harvested were known to be killing sheep and this was confirmed by examination of stomach contents.

Lion Mortalities in Eastern Nevada

The highest deer populations, the greatest number of lions, and the heaviest use of lion habitat by domestic sheep all center in eastern Nevada. Furthermore, eastern Nevada has historically been one of the better lion sport hunting areas and, consequently, became a favorite area of guides and their clientele. It is no wonder then that most conflicts revolving around the mountain lion occur in this portion of the state.

In analyzing data from the Ruby Mountains, the Cherry Creek-Egan area, and the Schell Creek Range, all of which have a long history of domestic sheep depredations, it was found that there were 146 documented lion mortalities during the period of 1972-81 (Table 12). Of this number 61 (41.8%) were directly associated with domestic sheep depredations.

From 1969-1982, when both sport hunting and depredation harvest have been recorded, there has been 645 lions killed for sport and 272 for depredations statewide (Table 13). The depredating lion harvest of less than 30% clearly shows that on a statewide basis the sheep depredation problem is not nearly as serious as in the study area and again demonstrates the conflict that arises from placing sheep in lion country. Over a similar period of time (1972-82) depredating lions comprised 54% of the mortality recorded from the 97 lions which were marked for this study (Table 14). So once again it becomes apparent that lions and sheep do not mix well. However, an important point to recognize is that the reverse side of the coin shows that there are many lions in the State that are not involved in depredations and that the present agreement between the Department of Wildlife and the U.S. Fish and Wildlife Service concerning livestock depredations, and restricting lion kills to the offending animal, is a great advancement in proper lion management.

Sport Harvest

The lion's classification was changed by regulation from unprotected (predator) to game animal in 1965. The initial impact of this classification was the requirement of a valid hunting license to hunt mountain lion and some restriction in the method of taking. This provision precluded the taking of lions at any time other than from sunrise to sunset and also defined legal weapons as shotgun, rifle, or bow and arrow. The season was defined as either sex, year-round and no limit was set nor was a tag required.

TABLE 11. U.S. FISH AND WILDLIFE SERVICE MOUNTAIN LION REMOVAL IN NEVADA, 1917-81.

Fiscal Year	Female	Male	Sex Unknown	Total
1917	5	3	--	8
1918	2	3	--	5
1919	3	3	--	6
1920	1	1	--	2
1921	1	2	--	3
1922	2	0	--	2
1923	0	0	--	0
1924	0	3	--	3
1925	1	3	--	4
1926	1	0	--	1
1927	1	1	--	2
1928	2	3	--	5
1929	3	0	--	3
1930	1	1	--	2
1931	2	2	--	4
1932	0	0	--	0
1933	2	0	--	2
1934	0	0	--	0
1935	0	0	--	0
1936	0	0	--	0
1937	0	0	--	0
1938	2	1	--	3
1939	6	2	--	8
1940	3	7	--	10
1941	1	4	--	5
1942	3	7	--	10
1943	3	1	--	4
1944	1	2	--	3
1945	1	0	--	1
1946	3	3	--	6
1947	0	2	--	2
1948	3	2	--	5
1949	2	3	--	5
1950	23	31	--	54
1951	33	44	--	77
1952	27	31	--	58
1953	30	36	--	66
1954	38	43	--	81
1955	52	40	--	92
1956	75	80	--	155
1957	--	--	116	116
1958	--	--	181	181
1959	--	--	108	108
1960	--	--	133	133

TABLE 11. U.S. FISH AND WILDLIFE SERVICE MOUNTAIN LION REMOVAL IN NEVADA, 1917-81. (cont.)

Fiscal Year	Female	Male	Sex Unknown	Total
1961	--	--	116	116
1962	--	--	69	69
1963	--	--	87	87
1964	--	--	97	97
1965	--	--	99	99
1966	--	--	50	50
1967	--	--	51	51
1968	--	--	70	70
1969	19	28	28	61
1970	9	11	26	46
1971	10	8	2	20
1972	5	8	1	14
1973	7	4	0	11
1974	4	8	0	12
1975	10	10	0	20
1976	5	14	0	19
1977	7	10	1	18
1978	7	17	0	24
1979	8	16	0	24
1980	11	12	0	23
1981	3	17	0	20
TOTALS	438	527	1,221	2,186

TABLE 12. LION MORTALITIES FROM 3 MOUNTAIN RANGES IN EASTERN NEVADA CONTAINING DOMESTIC SHEEP, 1972-81.

Mountain Range	No. Sheep Killed[1]	Avg. Kill/ Incident	No. Lions Removed on Depredations			No. Lions Removed by Hunters & Others		
			F	M	Total	F	M	Total
Ruby Mountains	205	10.25	8	12	20	8	16	24
Cherry Creek-Egan Range	294	9.19	10	22	32	10	11	21
Schell Creek	305	9.84	1	8	9	19	21	40
TOTALS	804	9.76	19	42	61	37	48	85

[1]Number of sheep killed includes only those sheep found and confirmed by District Field Assistants (trappers) or lion hunters.

TABLE 13. STATEWIDE SPORT AND DEPREDATION HARVEST FY 1970 THROUGH 1982.

Year	Tags	Sport Harvest	Depredation Harvest	Total Harvest
1969-70	436	42	47	89
1970-71	377	55	20	75
1971-72	259	43	20	63
1972-73	363	76	14	90
1973-74	428	91	11	102
1974-75	327	87	12	99
1975-76	261	54	20	74
1976-77	106	10	19	29
1977-78	145	22	18	40
1978-79	181	26	24	50
1979-80	272	33	24	57
1980-81	374	39	23	62
1981-82	459	67	20	89
		645 (70.4%)	272 (29.6%)	917

TABLE 14. CAUSE OF 48 MORTALITIES FROM A MARKED SAMPLE OF 97 MOUNTAIN LIONS IN NEVADA, 1972-82.

Cause of Mortality	Sex		Total	% of Total
	M	F		
Sport Hunting	10	3	13	27.1
Depredation (sheep)	22	4	26	54.2
Study Related	2	2	4	8.3
Natural	4	1	5	10.4
TOTAL	38	10	48	100.0

In 1968, a tag requirement was imposed, and although no limits were established, it became possible to record sport hunter harvest. A major change occurred in 1970 when a limit of one lion per person was set and a six month season established. During this period, the requirement that all harvested lions be validated by a representative of the Department of Wildlife within five days after the kill was also established. This regulation presented the Department the first real opportunity to collect biological data.

In 1976, twenty-six mountain lion management areas were described statewide and a harvest quota established for each to control the sport harvest. This Controlled Quota Hunt was the most restrictive season ever established for mountain lion in Nevada.

In 1979, the Controlled Quota Hunt was modified for six of the management areas, whereby a kill objective was established which allowed the hunting of lions in the area assigned until the predetermined harvest objective was reached. In 1981 this Harvest Objective hunting season concept was applied to all 26 management areas.

Sportsman participation in lion hunting has fluctuated considerably through the decade of the 1970's as a result of the many and varied season frameworks and regulations. Despite the increase in human population the sport harvest of mountain lion has not increased during the past 10 years. The sales of resident lion tags have never exceeded 500 and averaged 275 over the 1968-81 period. The resource is presently meeting the demand for sport harvest. Table 15 presents the sport harvest data from the years 1969-70 and

Sport Harvest of Mountain Lion Is Almost Exclusively Accomplished with the Aid of Trained Hounds.

TABLE 15. MOUNTAIN LION - TAG SALES, HARVEST AND HUNTER SUCCESS.

	TAG SALES			HARVEST*			HUNTER SUCCESS %		
Year	Resident	Non-Res	Total	Resident	Non-Res	Total	Resident	Non-Res	Total
1969-70	414	22	436	30	12	42	7.2	54.5	9.6
1970-71	341	36	377	37	18	55	10.9	50.0	14.6
1971-72	220	39	259	29	14	43	13.2	35.9	16.6
1972-73	289	74	363	40	36	76	13.8	48.6	20.9
1973-74	314	114	428	52	39	91	16.6	34.2	21.3
1974-75	281	46	327	57	30	87	20.3	65.2	26.6
1975-76	221	40	261	37	17	54	16.7	42.5	20.7
1976-77	98	8	106	18	2	10	8.2	25.0	9.4
1977-78	129	16	145	16	6	22	12.4	37.5	15.2
1978-79	146	36	181	18	8	26	12.3	21.0	14.1
1979-80	225	47	272	20	13	33	9.0	27.6	12.2
1980-81	313	61	374	25	14	39	7.9	22.9	10.4
1981-82	421	38	459	44	23	67	10.4	60.5	14.6

*Sport Hunter Harvest Only

1981-82. A summary of the sport hunting seasons and regulations in Nevada since the lion was classified as a game animal in 1965 is presented in Appendix B.

Population Estimates

The mountain lion is a low density predator of secretive nature whose traits make it very difficult to monitor. Several methods were used to estimate mountain lion populations and after experimenting with a number of census techniques it was determined that there were three methods which, depending on local circumstances, were best suited for use in Nevada. These were: 1) Analysis of harvest data, 2) Track counts, and 3) Home range size.

Harvest Data -- The annual harvest can reflect the population level and the analysis of historical and current harvest data provides a base which can be used in making judgements concerning population trends. Hunter success measures the ease with which the sport hunter obtains his quarry and, barring unusual circumstances which must be taken into account, will reflect availability.

In examining both sport harvest and depredation harvest records from the time that they were both recorded statewide (1969-70 through 1981-82) it is obvious that the harvest rate has never been high (Table 13). The greatest influence on the sport harvest appears to have been the initiation of the hunter quota system in 1976-77. This resulted in over a 50% decrease in harvest when comparing the 7 years prior to the quota system and the 6 years following it. However, as hunters are becoming adjusted to the system, and refinements have been made to encourage them into the quota areas, the harvest is again climbing to what appears to be normal levels. Depredations harvest, for the most part, has remained relatively constant (Statewide) with a seven year harvest average of 20 lions annually before the hunter quota system and a six year average of 21 lions annually following the quota system. On an overall basis the statewide lion population trend between 1969-82 appears to be stable.

Track Counts -- Two track count methods have been used: ground surveys and aerial surveys. The ground surveys were begun 3-6 days after a fresh snowfall and were made on foot, with snowmobiles, or by driving roads with pick-up trucks. Each track was classified, if possible, as to sex and estimated age using criteria similar to that recently described by Shaw (1979). The ground count required sampling a large area in a short time frame in order to provide a representative sample. Due to man-time commitments annual ground count surveys are not possible to implement on a statewide basis.

Aerial surveys were done with a helicopter and in a manner similar to the ground surveys except that nearly every drainage in a predetermined geographic area was flown. Each drainage was flown twice, once following the bottom and again following the south exposures where lions were most likely to be found during the winter months. Once a track was sighted the helicopter was landed or hovered over the track while one observer disembarked and the track was classified and recorded. All helicopter surveys were completed in 2 days or less so accuracy could be maintained. Snow, air and light conditions had to be optimum in order to observe tracks, land, and record data. This is the preferred method and was utilized in the major mountain lion areas during the later years of the study. Since the termination of the study this method has not been used because of the high cost.

Home Range -- It was found in eastern Nevada that adult female lions had an average home range of 69.5 square miles and males 224 square miles. However, it was also noted that the home range size for individual lions varies considerably from one mountain range to another. It was recognized that the data available on home range sizes was not as comprehensive as desired; however, it was the most accurate data available for use in computing lion densities.

Mountain Lion Population Estimates by Mountain Range -- When the Harvest Quota system was implemented in 1976 (this was a Department of Wildlife recommendation to resolve controversies over lion management between protectionists, depredation harvest proponents, and sport harvest proponents) it was necessary to define mountain lion management areas, estimate the number of lions (all age classes) in each, and set a harvest quota which would not exceed the annual recruitment to the population.

It was found that track count information was simply too limited in nature to provide a statewide approach toward determining lion populations. However, long-term harvest data did provide a general idea as to the lion population status on a statewide basis. In utilizing this information, as well as the available deer density data, Regional personnel were able to form opinions as to the general quality of the lion habitat in their areas of concern. These judgements and data were then coupled with the basic lion home range parameters from the study area and utilized to formulate lion density factors for the inhabited mountain ranges in Nevada (Table 16). Field personnel then computed the square miles of occupied habitat (based on long-term distribution records) and with this information in hand they then calculated the estimated lion populations. Population estimates have been made since 1976 and in carrying these forward to 1982 it has been computed that 792 mountain lions occupy 27,811 square miles in 104 mountain ranges in Nevada (Table 16).

Harvest Quota Calculations -- The Department of Wildlife's mountain lion harvest objective is to harvest the number of lions which can safely be removed by both depredation and sport hunting and still maintain a viable breeding population (sustained yield). The estimated annual recruitment for lion populations in Nevada is believed to be about 30% (see Population Turnover). Therefore, a harvest objective for 1982 would be 0.3 x 792 (estimated lion population) = 237 lions. However, this objective was tempered on the conservative side by using a factor of 0.25 rather than 0.3 and instead of using the population estimate of 792 lions the number 550 (which represented the estimated lion population in areas opened to hunting) was used. This resulted in a harvest quota of .25 x 550 = 138 lions. Some local adjustment was made to this quota by area biologists and the final quota for 1982 was 135 lions.

This system of arriving at a harvest quota clearly denotes the maximum number of lions which could be harvested. It then reflects a conservative attitude by slightly reducing the recruitment factor for making computations, and it makes allowances for areas of concern by individual biologists who can request further reasonable reductions or increases.

TABLE 16. MOUNTAIN LION POPULATION ESTIMATES BY MANAGEMENT AREA AND MOUNTAIN RANGE IN NEVADA, 1982.

Management Area	Mountain Range	Estimated Miles[2] Occupied Habitat	Density Ratio; 1 Lion per Mi[2] of Habitat	Average No. of Lions[2] Present
1	Buffalo Hills	128	1/40	3
	Fox Mountain	104	1/40	3
	Granite	155	1/40	4
	Hays Canyon	426	1/40	10
	Subtotal	813		20
2	Virginia	-	-	0
	Fox	-	-	0
	Peavine	-	-	0
3	Sheldon Refuge	121	1/40	3
	Blackrock-Pine Forest	558	1/40	14
	Jackson	215	1/40	4
	Subtotal	894		21
4	Humboldt	369	1/40	9
	Sonoma	178	1/40	4
	Tobin	139	1/40	3
	Subtotal	686		16
5	Santa Rosa	578	1/25	23
6	Independence-Bull Run	712	1/40	18
	Tuscarora	378	1/40	9
	Subtotal	1,090		27
7	Bear Mountain - L & D	180	1/40	5
	Jarbidge	464	1/25	19
	Merritt-Mahoganies-Tennessee Mountain	378	1/40	9
	Snake	265	1/40	7
	Granites	216	1/40	5
	Pequop	441	1/40	11
	Pilot	48	1/40	1
	Toana	487	1/40	12
	Subtotal	2,479		69
8	Goose Creek-Delano	495	1/40	12

[1]High Density = 1 lion/25 mi^2, low-moderate density = 1 lion/40 mi^2 of occupied habitat.

[2]No. of lions present includes all age classes with 60% as adults and subadults and 40% as kittens still with their mothers. Estimates are for yearlong or summer ranges.

TABLE 16. MOUNTAIN LION POPULATION ESTIMATES BY MANAGEMENT AREA AND MOUNTAIN RANGE IN NEVADA, 1982. (cont.)

Management Area	Mountain Range	Estimated Miles[2] Occupied Habitat	Density Ratio; 1 Lion per Mi[2] of Habitat	Average No. of Lions Present[2]
10	Buck & Bald	234	1/40	6
	Maverick-Medicine	218	1/40	5
	Ruby	850	1/25	34
	Dolly Varden	50	1/40	1
	Wood Hills	87	1/40	2
	Butte	219	1/40	5
	Subtotal	1,658		53
11	Kern	156	1/40	4
	Moriah	255	1/25	10
	Schell Creek-Antelope	672	1/40	27
	Snake	302	1/25	12
	Subtotal	1,385		53
12	Cherry Creek-Egan	594	1/25	24
13	Timpahute	305	1/40	8
	Grant-Quinn	618	1/40	15
	Seaman	106	1/40	3
	White Pine-Horse	614	1/40	15
	Worthington	27	1/40	1
	Subtotal	1,670		42
14	Cortez	234	1/40	6
	Diamond	359	1/40	9
	Roberts Mountain	210	1/25	8
	Fish Creek	207	1/40	5
	Subtotal	1,010		28
15	Shoshone	268	1/40	7
	Simpson Park	337	1/40	8
	Sulfur Springs	296	1/40	7
	Toiyabe	396	1/40	10
	Battle Mountains	77	1/40	2
	Fish Creek-Augusta	209	1/40	5
	Subtotal	1,583		39
16	Toquima	553	1/40	14
	Monitor-Hot Creek-Antelope	1,812	1/25	72
	Pancake	133	1/40	3
	Subtotal	2,498		89

[1]High Density = 1 lion/25 mi^2, low-moderate density = 1 lion/40 mi^2 of [2]occupied habitat.

[2]No. of lions present includes all age classes with 60% as adults and subadults and 40% as kittens still with their mothers. Estimates are for yearlong or summer ranges.

TABLE 16. MOUNTAIN LION POPULATION ESTIMATES BY MANAGEMENT AREA AND MOUNTAIN RANGE IN NEVADA, 1982. (cont.)

Management Area	Mountain Range	Estimated Miles[2] Occupied Habitat	Density Ratio; 1 Lion per Mi[2] of Habitat	Average No. of Lions Present[2]
17	Paradise	210	1/40	5
	Toiyabe-Shoshone	977	1/25	39
	Subtotal	1,187		44
18	Clan Alpine	392	1/40	10
	Desatoya	346	1/40	9
	Stillwater-East Range	325	1/40	8
	Subtotal	1,063		27
19	Carson-Peavine	266	1/40	7
	Virginia	161	1/40	4
	Subtotal	427		11
20	Wellington-Pine			
	G.-Sweetwater	279	1/40	7
	Wassuk	468	1/40	12
	Excelsior-Anchorite	298	1/40	7
	Pilot Peak	91	1/40	2
	Subtotal	1,136		28
21	Monte Cristo	152	1/40	4
	Silver Peak-Montez	354	1/40	9
	Magruder-Sylvania	230	1/40	6
	White Mountains	149	1/40	4
	Subtotal	885		23
22	Egan	950	1/40	24
	Schell Creek	448	1/40	11
	Fairview-Bristol	187	1/40	5
	Highland Peak	111	1/40	3
	Subtotal	1,696		43
23	Fortification	129	1/40	3
	Wilson-White Rock	679	1/40	17
	Subtotal	808		20
24	Delamar	336	1/40	8
	Clover-Cedar	650	1/40	16
	Pahroc	97	1/40	2
	Subtotal	1,083		26

[1]High Density = 1 lion/25 mi^2, low-moderate density = 1 lion/40 mi^2 of [2]occupied habitat.

[2]No. of lions present includes all age classes with 60% as adults and subadults and 40% as kittens still with their mothers. Estimates are for yearlong or summer ranges.

TABLE 16. MOUNTAIN LION POPULATION ESTIMATES BY MANAGEMENT AREA AND MOUNTAIN RANGE IN NEVADA, 1982. (cont.)

Management Area	Mountain Range	Estimated Miles[2] Occupied Habitat	Density Ratio; 1 Lion per Mi[2] of Habitat	Average No. of Lions Present[2]
25	Armagosa	20	1/40	1
	Reveille	56	1/40	1
	Stonewall	30	1/40	1
	Sheep Range	295	1/40	7
	Groom Range	63	1/40	2
	Kawich	227	1/40	6
	Belted-Paiute Mesa	342	1/40	9
	Subtotal	1,033		27
26	Spring Range	518	1/40	13
27	Virgin	47	1/40	1
	Morman	67	1/40	2
	Subtotal	114		3
29	Pine Nut	428	1/40	11
	GRAND TOTAL	27,811		792

[1]High Density = 1 lion/25 mi[2], low-moderate density = 1 lion/40 mi[2] of occupied habitat.

[2]No. of lions present includes all age classes with 60% as adults and subadults and 40% as kittens still with their mothers. Estimates are for yearlong or summer ranges.

MANAGEMENT

The most controversial area of mountain lion management has been the harvest of lions either through depredation activities or sport hunting. The recent demands of people who are vitally concerned with the future of the mountain lion has made it mandatory that personnel of the Department of Wildlife demonstrate that they can devise and implement a harvest management plan which assures viable mountain lion populations in the state.

The Department's past (and successful) experience with quota hunts on deer, bighorn sheep, antelope and elk gave impetus towards utilizing the same approach on mountain lions. An ongoing mountain lion study in eastern and central Nevada made it possible to utilize the information obtained from 1972 to 1976 as a basis for implementing a quota system, and to gear the study during its later years (1977-82) towards refining the techniques and in training Regional personnel.

It is difficult for anyone to argue with a harvest system which is based on removing less animals than the number equal to the annual recruitment. Basically this is the system which was adopted, and it considers both sport hunting and depredations harvest. The successful implementation of this system depends on a reasonable determination of the annual status of the lion population and in assigning the harvest quotas. It is felt that the quotas have been conservative to date but, with experience and additional study, will become more realistic.

As far as lion depredations are concerned the agreement that the Department has with the U.S. Fish and Wildlife Service works when coupled with the Board of Wildlife Commissioners Depredating Animal Policy. Both of these documents have been revised until they now seem to meet the needs of the situation.

Overall management of the mountain lion can now be best expressed from the Policy Plan that will shortly be presented to the Board of Wildlife Commissioners for approval:

Policy

1. Depredating lions will be removed when necessary to protect private property, human life and wildlife. The Department will cooperate fully with the U.S. Fish and Wildlife Service Animal Damage Control to address mountain lion depredation problems.

2. Mountain lion populations will be managed to maintain harmony in predator-prey relationships.

3. Although mountain lion harvest strategies allow the taking of either sex, the taking of females with kittens is discouraged.

4. Mountain lion hunting seasons will begin on the first day of October.

Goals

Goal: Maintain Nevada's mountain lion populations.

1. Problem: Changing and differing public attitudes about the mountain lion's worth and role in the ecosystem make it a difficult species to manage.

   a. Strategy: Continue to closely monitor lion populations and the affects of sport hunting, and depredation removal. Maintain comsumptive use levels consistent with the lion's ability to sustain that use.

2. Problem: Lion depredations on livestock and wildlife represents an ongoing problem.

   a. Strategy: Continue a cooperative agreement with the U.S. Fish and Wildlife Service and insure that only offending depredating lions are removed.

   b. Strategy: Where mountain lion depredations are found to be responsible for suppressing the segment of a wildlife population at or below the "threshold" level the mountain lion population involved may be reduced temporarily to allow the suppressed wildlife prey population to increase thereby ultimately resulting in a potential increase in the mountain lion population due to the larger prey base.

3. Problem: Human-lion conflicts can be anticipated in the future with continuing urban growth.

   a. Strategy: Develop a program to rapidly and safely handle lion complaints in urban areas.

RECOMMENDATIONS

There are several areas where further study could provide answers and direction for mountain lion management in Nevada. Some of these are:

1. More refined population estimates are needed, especially for low to moderate lion densities.

2. Additional investigations should be made in regard to home range overlap.

3. Lion population turnover should be determined more precisely for both exploited and unexploited populations.

4. Additional data is needed on the effects of lion predation on deer. This was an area that was not adequately investigated during this study. Do lions, in fact, exert control over low-moderate density deer populations?

5. Lion aging techniques should be pursued with an effort to obtain adequate information to supplement and validate the keys presented in this publication.

6. It is felt that lion density ratios should be modified slightly in order to provide more latitude for the field biologist when developing his lion harvest quota recommendations. The following changes are recommended:

   1/25 should be changed to 1/20-30
   1/40 should be changed to 1/31-45

7. It is apparent to the editor that there were many lost opportunities during the conduct of this study. The plan for achieving the study objectives and the monitoring system for seeing that the annual work program was accomplished, even though in place, was not adhered to. Consequently the researcher often strayed from the study plan and at times data was not collected or was recorded incorrectly. Such failings are not uncommon in Fish and Wildlife research where the dilution of manpower, because of pressing everyday needs, often results in insufficient supervision and/or monitoring. However, since Nevada is still faced with becoming even more involved with mountain lion research, past inadequacies should be recognized and every effort made to strengthen the supervision and monitoring of future studies.

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APPENDIX A

STATE OF NEVADA
BOARD OF WILDLIFE COMMISSIONERS

Number: 14(1)

Title: Animal Damage Control

Commission Policy No. 14

Ammendment No. 1

References: NRS 501.105, 501.110, 503.470, 503.595, 567.010 through 567.090, CGR No. 1(8) and CGR No. 4(2).

First Reading: March 13, 1981
Second Reading: April 17, 1981
Effective Date: April 17, 1981

PURPOSE

To inform the public and guide the Department of Wildlife in actions relating to animal damage contol.

In accordance with NRS 501.181, the Board of Wildlife Commissioners shall establish policies for the protection, propagation, restoration, transplanting, introduction and management of wildlife in this state. Further, the Commission shall establish policies for areas of interest including animal damage control.

POLICY

1. Major mammalian predators (coyote, mountain lion, bobcat) will be managed to minimize livestock losses from predation and minimize excessive wildlife losses from predation without endangering the existence or natural role of these predators in the ecosystem.

2. Nonpredatory wildlife will be managed to minimize their vulnerability to excessive predation. Animal damage extension efforts will be encouraged to assist private operators in husbandry practices to minimize the vulnerability of domestic livestock predation.

3. Support continued federal leadership in the Animal Damage Control program because of the national need for development and use of more efficient and humane control methods.

4. Recognize the U.S. Fish and Wildlife Service, Division of Animal Damage Control, as the authority for predator control under cooperative agreement with the Department of Wildlife, where the Department of Wildlife is an active participant in documenting the need for control programs, in planning and execution of control programs, and in enhancing public understanding of these programs.

The Department shall prepare an annual work program for predator control needed for the management of wildlife and recommend that a maximum of $20,000 annually be forwarded from the wildlife account in the state general fund to the state predatory animal and rodent committee for predatory animal control work as provided in Chapter 567 of NRS.

5. Initiate predator control efforts on the basis of the best biological information available.

6. Direct predator control efforts including sport hunting and trapping, whenever possible to prevent damage before it occurs in specific areas known to be recurring problem areas or alleviate damage as soon as possible after it occurs.

7. Direct predator control efforts at the offending animal, in so far as possible and feasible.

8. Employ predator control methods which are selected on the basis of the species involved, utilizing currently approved methods in the proper mix according to the needs. These methods may include aerial hunting, M-44, trapping, snares, denning and predacides.

   a. Predacides should only be used in certain preventative and corrective damage control operations using a delivery system which is selective, effective and efficient.

   b. Aerial hunting will be conducted only under Department of Wildlife damage control permit and limited to bobcats and coyotes. Such permits shall be issued only to the U.S. Fish and Wildlife Service or to landowners or tenants of land or property that is being damaged by wildlife.

9. The Department upon issuance of a depredation permit and with the aid and cooperation of the complainant, may take all available professional and economically feasible measures to alleviate or lesson the depredation problem.

PROCEDURE

NRS 503.595 provides that after the owner or tenant of any land or property has made a report to the Department indicating that such land or property is being damaged or destroyed, or is in danger of being damaged or destroyed, by wildlife, the Department may, after thorough investigation and pursuant to such regulations as the Commission may promulgate, cause such action to be taken as it may deem necessary, desirable and practical to prevent or alleviate such damage or threatened damage to such land or property.

The Commission has adopted regulations authorizing the Director or his designee to issue wildlife depredation permits. Specific permit programs include:

1. An annual wildlife depredation permit may be issued to the State Supervisor, U.S. Fish and Wildlife Service, Division of Animal Control, to take depredating mountain lion or bobcat in the immediate vicinity of threatened livestock.

    a. Any report of livestock depredation received by the Department of Wildlife shall be forwarded immediately to the permittee for action in accordance with subsection (b) of this section.

    b. Upon receipt of a report from a livestock owner or the Department indicating that a mountain lion or bobcat is causing or about to cause damage to livestock, the permittee shall conduct an on-site investigation. If the results of the investigation support the complaint, the permittee may take the animal. If the permittee cannot determine if the complaint is valid, he shall notify a representative of the Department, who shall conduct a joint investigation to make the final determination.

    c. During November through April, the permittee shall slavage and give the hide and skull of depredating mountain lion or bobcat to the Department within 72 hours. During May through October, the permittee shall completely destroy the animal, except the skull which shall be delivered to the Department.

2. An annual wildlife permit may be issued to State Supervisor, U.S. Fish and Wildlife Service, to take the minimum number of mountain lions, bobcats, foxes, cottontail rabbits, pigmy rabbits, white-tailed jack rabbits, bears and squirrels as necessary to control damage to persons and property.

3. Upon receipt of a valid mountain lion or bobcat complaint from an individual livestock owner, the Department may issue a limited permit to the owner to take an animal that is in the act of killing his livestock.

    a. The permittee shall notify a Department representative within 72 hours after taking a mountain lion and arrangements will be made for examining the skull and sealing the hide.

b. Mountain lion or bobcat hides, after being properly sealed, may be retained by the permittee to defray the cost of handling the depredation complaint.

4. The Department may issue permits authorizing the hunting or killing of coyotes or bobcats from an aircraft.

5. Fur-bearing animals injuring any property may be taken or killed at any time in any manner, provided a permit is first obtained from the Department. The Department is authorized to enter upon the lands of a landowner and remove beaver or otter for the relief of other landowners and the protection of the public welfare.

6. The Department may issue permits consistent with Federal law to take bald eagles or golden eagles whenever it determines that they have become seriously injurious to wildlife or agriculture or other interests that the injury can only be abated by taking some of the offending birds.

7. The State Predatory Animal and Rodent Committee shall enter into agreements with the U.S. Fish and Wildlife Service covering cooperative control of crop-destroying birds in addition to predatory animals and rodents to assure maximum protection against losses of livestock, poultry, game birds, animals and crops on a statewide basis. The State Department of Agriculture in accordance with NRS 555.010 and 555.021 responds to complaints involving vertebrate pests (excluding predators) that are injurious to agriculture or public health.

8. The Department may issue a wildlife depredation permit to a landowner if needed for the prevention or alleviation of damage to standing or stored agricultural crops.

This policy shall remain in effect until amended, repealed or superseded by the Board of Wildlife Commissioners.

BY ORDER OF THE BOARD OF WILDLIFE COMMISSIONERS IN REGULAR SESSION, APRIL 17, 1981.

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Marvin A. Einerwold, Chairman
Board of Wildlife Commissioners

APPENDIX B

MOUNTAIN LION HUNTING SEASONS 1965-1982

1965-1966

Type of Season: Either sex, statewide.
Season Length: Open year-round.
Limit or Quota: None.
License and Tag Requirement: Hunting license only.
Special Regulations: Unlawful to hunt with revolver or by use of artificial light.

1967

Type of Season: Either sex, statewide.
Season Length: Open year-round.
Limit or Quota: None.
License and Tag Requirement: Hunting license only.
Special Regulations:
1. Unlawful to use a revolver.
2. Unlawful to use artificial light.
3. Unlawful to trap lions.

1968

Type of Season: Either sex, statewide.
Season Length: Open year-round.
Limit or Quota: None.
License and Tag Requirements: Hunting license and tag.
Special Regulations:
1. Unlawful to use revolver.
2. Unlawful to use artificial light.
3. Livestock operator can take lions with proper permit.

1969

Type of Season: Either sex, statewide.
Season Length: Open year-round.
Limit or Quota: None.
License and Tag Requirement: Hunting license and tag.
Special Regulations:
1. May be hunted anytime day or night.
2. Lawful to use any weapon except crossbow.
3. Livestock operator can take depredating lions at any time.

1970

Type of Season: Either sex, statewide.
Season Length: October 10, 1970 - March 31, 1971 (171 days).
Limit or Quota: 1 per person.
License and Tag Requirement: Hunting license and tag.
Special Regulations:

1. Mandatory check-in of lion hide, skull and stomach contents within 5 days of harvest.
2. Hide must be sealed by a Department representative within 5 days of harvest.
3. Lions may be hunted anytime day or night.
4. Lawful to use any weapon except crossbow.
5. Livestock operator can take depredating lions at any time after issuance of a permit.

1971-1975

Type of Season: Either sex, statewide.
Season Length: Open year-round (1974 & 1975, 6 month season).
Limit or Quota: 1 per person.
License and Tag Requirement: Hunting license and tag.
Special Regulations:

1. Mandatory check-in of lion hide and skull within 48 hours of harvest (1973, 72 hours of harvest).
2. Hide must be sealed by a Department representative within 48 hours of harvest.
3. Lions may be hunted anytime day or night.
4. Lawful to use any weapon except crossbow.
5. Livestock operator can take depredating lions at any time after issuance of a permit.

1976-1978

Type of Season: Either sex, statewide.
Season Length: 1976 - October 1, 1976 - March 31, 1977 (6 months).
1977,1978 - October 1, 1977 - April 30, 1978 (7 months).
Limit or Quota:

1. One lion per person.
2. Resident and nonresident quotas by management area and through application only.

License and Tag Requirement: Hunting license and tag.
Special Regulations:

1. Mandatory check-in of lion hide and skull within 72 hours of harvest.
2. Hide must be sealed within 72 hours of harvest.
3. Lions may be hunted any time day or night.
4. Lawful to use any weapon except crossbow.
5. Livestock operator can take depredating lions any time after issuance of a permit.
6. Accidentally trapped lions are the property of the State of Nevada and shall be reported within 48 hours of capture.

1979-1980

Type of Season: Either sex, statewide.
Season Length: October 1, 1979 - April 30, 1980 (7 months).
Limit or Quota:

1. One lion per person.
2. Resident and nonresident "Trophy General Hunt" with quotas by management area, application only.
3. Resident and nonresident "Controlled Trophy Hunt" with quotas (allowable harvest) by management, application only.

License and Tag Requirements: Hunting license and tag.
Special Regulations:

1. Any person holding a valid tag for lion in management area 7, 8, 9, 10, 19, 20 or 21 (1980) obtain a 15-day controlled hunt permit at no cost before hunting.
2. Permit will be valid in a specified management area for 15 days. Unsuccessful hunters may reapply for the same or another management area if the harvest quota has not been filled. Hunters holding a 15-day permit will be notified by the Department when the harvest quota is filled for that area. The hunter may then reapply for another open area.
3. Mandatory 72 hour check-in and hide sealing required.
4. Accidentally trapped lions are the property of the State of Nevada and shall be reported within 48 hours of capture.

1981

Type of Season: Either sex, statewide.
Season Length: October 1, 1981 - April 30, 1982 (7 months).
Limit or Quota:

1. One lion per person.
2. Unlimited tag quota by application only.
3. Harvest quota by management area.

License and Tag Requirement:

1. Hunting license and tag.
2. 15-day permit.

Special Regulations:

1. Hunting permit reservations may be made by mail, telephone or appearing in person at the designated Department offices.
2. Hunting permits will be valid in a specified management area for a period of 15 days from the date of issue. If a hunter fails to harvest a lion in the specified period and management area, he may reapply as many times as he desires for a permit to hunt in any of the open management areas as long as the harvest quotas remain unfilled.
3. When the harvest quota is filled in any of the management areas, either by sport hunting or by depredation harvest, that area will be closed to mountain lion hunting, and no further permits will be issued for that area. Hunters holding a valid permit for a management area at the time that the harvest quota is filled will be notified by the Department that the area is closed, and that their permit is no longer valid. Hunters may then reapply for any other management area where the harvest quota has not been filled.

4. Department representatives will retain final judgement on issuance of permits and distribution of hunters in order to preclude a harvest quota or the over-loading of hunters in any one management area.
5. Unless otherwise specified by regulation of the Commission or Title 45 of NRS, any resident of Nevada, nonresident or alien is eligible to apply once for a mountain lion tag in any year.
6. A person who harvests a mountain lion shall, within 72 hours after harvesting it, present the skull and hide to a representative of the Department of Wildlife for inspection. The representative shall affix the seal of the Department permanently to the hide. It is unlawful for any person to transport such a hide from this state without a seal permanently affixed to the hide.
7. Except as provided in subsection 2, it is unlawful to possess the hide of a mountain lion without a seal permanently attached to it.
8. If a mountain lion is accidentally trapped or killed, the person trapping or killing it shall report the trapping or killing within 48 hours to a representative of the Department of Wildlife. The animal must be disposed of in accordance with the instructions of the representative.

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Limit: One.
Sex/Age Class: Either sex.
Hunting Hours: Any time of the day or night.
Season Dates:
October 1, 1982 through September 30, 1983, except as provided in sections 5 and 6 of this regulation.
Tag Quota: Unlimited.
Harvest Quota:
The harvest quota is the allowable harvest for each listed management area. When the harvest quota has been filled in any management area that area will be closed to hunting.

Area	Objective	Area	Objective
1	0	14	6
2	0	15	5
3	3	16	6
4	5	17	3
5	3	18	9
6	6	19	6
7	8	20	10
8	13	21	6
9	7	22	3
10	8	23	3
11	6	24	3
12	6	25	3
13	5	26	2
Total			135

Special Regulations

1. There is no quota on the number of tags that will be issued for the mountain lion management areas.

2. Tags will be available to residents and nonresidents by application only.

3. Hunters who are awarded tags for this mountain lion hunt must secure a hunting permit before they can hunt under the authority of this tag in any single management area. A valid lion hunting permit and tag must be in possession while hunting mountain lion.

4. Hunting permits will be authorized by mail, telephone, or by appearing in person only at the following department offices:

   For Management Areas 3, 4, 12, 13, 14 and 15:
   Region I Office, 380 W. "B" Street, Fallon, Nevada 89406
   (702) 423-3171

   For Management Areas 5, 6, 7, 8, 9, 10, 11, 19 and 20:
   Region II Office, 1375 Mountain City Highway, Elko, Nevada 89801
   (702) 738-5332

   For Management Areas 16, 17, 18, 21, 22, 23, 24, 25 and 26:
   Region III Office, 4747 Vegas Drive, Las Vegas, Nevada 89109
   (702) 385-0285

5. Hunting permits will be valid in the specified management area until the harvest objective for that management area is reached, or the general season closure, whichever is first. Upon attainment of the harvest objective, the management area will be closed to lion hunting.

6. Hunters holding a valid permit for a management area at the time that the harvest objective is filled will be notified by the Department that the area is closed and that their permit is no longer valid. Hunters may then reapply for any other management area where the harvest objective has not been filled.

7. Department representatives in the Fallon, Elko and Las Vegas Offices will retain final judgement on issuance of permits and distribution of hunters.

8. A hunting permit may be invalidated by the Department and reissued for another mountain lion management area.