SEASONAL DISTRIBUTION PATTERNS OF WHISKEY MOUNTAIN BIGHORN SHEEP[1]

Kurt Becker[2], Tom Varcalli[3],
E. Tom Thorne[4], and Gary B. Butler[5]

INTRODUCTION

Mountain sheep have been shown to use distinct seasonal home ranges and well defined migration routes. Knowledge of home ranges and migration routes is passed on from generation to generation and is a function of tradition. Previous studies have indicated that sheep are very loyal to their ranges and use them during the same season year after year (Geist 1971, Morgan 1971). During three years of intensive study on Wyoming's Whiskey Mountain bighorn sheep (Ovis canadensis canadensis) populations, information substantiating and possibly broadening these concepts was gathered.

STUDY AREA

The Whiskey Mountain bighorn sheep winter range lies on the northern fringe of the Wind River Mountains near Dubois, Wyoming. The topography is characterized by steep mountainous slopes of up to 13,000 feet in elevation interspersed with numerous cliffs. The mountains rise over 6,000 feet above the adjacent Wind River drainage. Lower slopes are semi-arid with coniferous vegetation limited primarily to north and east exposures; sagebrush and bunch grasses grow on the other exposures. Timberline is approximately 11,500 feet above which only grasses and forbs persist. In the early 1950's the Wyoming Game and Fish Department became concerned about poor lamb production among bighorn sheep wintering in the area and established the Whiskey Basin Game Winter Range, primarily to benefit sheep. Pittman-Roberston funds were used to purchase land and Federal land management agencies removed or reduced domestic livestock grazing allotments on neighboring Federal lands. Through cooperative and intensive management, the forage available for wintering sheep increased and

1 This work was supported by Federal Aid in Wildlife Restoration, Wyoming Project FW-3-R.
2 Current address: U.S. Forest Service, Salmon, Idaho
3 Wyoming Game and Fish Department, Casper, Wyoming
4 Wyoming Game and Fish Department, Research Laboratory, Laramie, WY
5 Wyoming Game and Fish Department, Whiskey Basin Winter Range, Dubois, WY

sheep responded by increasing in numbers from an estimated 400 sheep to the 800-1,000 animals present now. During the same interval, a greater number of sheep has been removed by trapping and transplanting or hunting (Crump 1976).

Prior to initiation of the study reported here, Game and Fish Department reports and discussions with personnel associated with the winter range revealed that three key winter ranges were present. These were Trail Lake Meadows and Torrey Rim on the east side of Whiskey Mountain, BLM Ridge on the north side of Whiskey Mountain, and Sheep Ridge which is north of BLM Ridge. Three lambing areas, one near each key wintering area, had also been located. Sheep wintering on Whiskey Mountain and Sheep Ridge were generally considered to be a single population and they were believed to inhabit a large portion of the northern Wind River Mountains. It is the purpose of this paper to present additional bighorn sheep distribution knowledge gained as a part of an extensive three-year study of the Whiskey Mountain sheep which was initiated during the winter of 1974-1975.

METHODS

During the winters of 1974-75, 1975-76, and 1976-77, 50 to 75 color coded and individually numbered neckbands were placed on yearling and mature ewes. In addition, between five and eight radio transmitter collars were placed on mature ewes each winter. Sheep were captured for neckbanding using a drop-net trap baited with apple pulp and alfalfa hay (Schmidt 1976). Those that received radio transmitters were chemically immobilized (Thorne 1974). Approximate equal numbers of neckbands and transmitters were placed on sheep from each of the three key wintering areas each winter.

Biweekly fixed-wing aircraft flights were made from May through September each summer to locate as many sheep as possible. During the same period each summer, continual ground observations were made which concentrated on sheep from one of the three key wintering areas with occasional observations on sheep from the other areas. Winter observations were made by management and research personnel assigned to the Whiskey Basin Unit, to trapping operations, or the research project.

A mapping system based upon U.S.G.S. topographic maps and legal land descriptions was devised which allowed locating and recording sheep observed to within a quarter of a quarter-section (40 acres). Since all neckbands and transmitters were on ewes, the data presented here deals primarily with the ewe-lamb segments of the populations.

RESULTS

Seasonal Movements of BLM-Sheep Ridge Sheep.

Sheep wintering on BLM Ridge and Sheep Ridge intermingled freely on both winter and summer ranges and were identified as the same sheep population with two sub-units.

Sheep wintering on BLM Ridge and Sheep Ridge were present on the winter ranges from late November to mid-May. Key wintering ranges for BLM-Sheep Ridge bighorn sheep are presented and average percent of annual forage production utilized by sheep is shown in Figure 1. These areas had been accurately described in earlier Department records. The precipitous slopes of Jakey's Fork Canyon and the rocky slope on the west of BLM Ridge seemed to serve as important bedding grounds and escape areas. There was a frequent and free interchange between sheep on BLM and Sheep Ridge as they crossed Jakey's Fork Canyon in a day or less.

Pregnant ewes began to leave the winter ranges in mid-May. Those leaving from BLM Ridge traveled in small scattered groups to the Wasson Fork (1)[1], Rollie Brown (2), or Ross Lake (3) lambing grounds and those leaving from Sheep Ridge traveled to the Sheep Ridge (4) or Jakey's Fork (5) lambing grounds (our location names, Figure 2). During a late May peak, large numbers of ewes had their lambs in isolation in the relatively small lambing grounds. After several days in isolation, ewes and their lambs moved to adjacent nursery areas (6) where they remained for several weeks. Barren ewes, yearlings and two year olds left the winter ranges later and remained in herds separate from ewes and lambs, but near nursery areas. Areas used by the barren groups were generally more open, more productive, and less precipitous and were classified as spring-fall range (7). Rams were frequently seen during this period in scattered bands near nursery areas and below the Wasson Fork spring-fall range in more precipitous and wooded habitat.

---

1 Numbers in parenthesis correspond with the same numbers showing locations in the various figures.

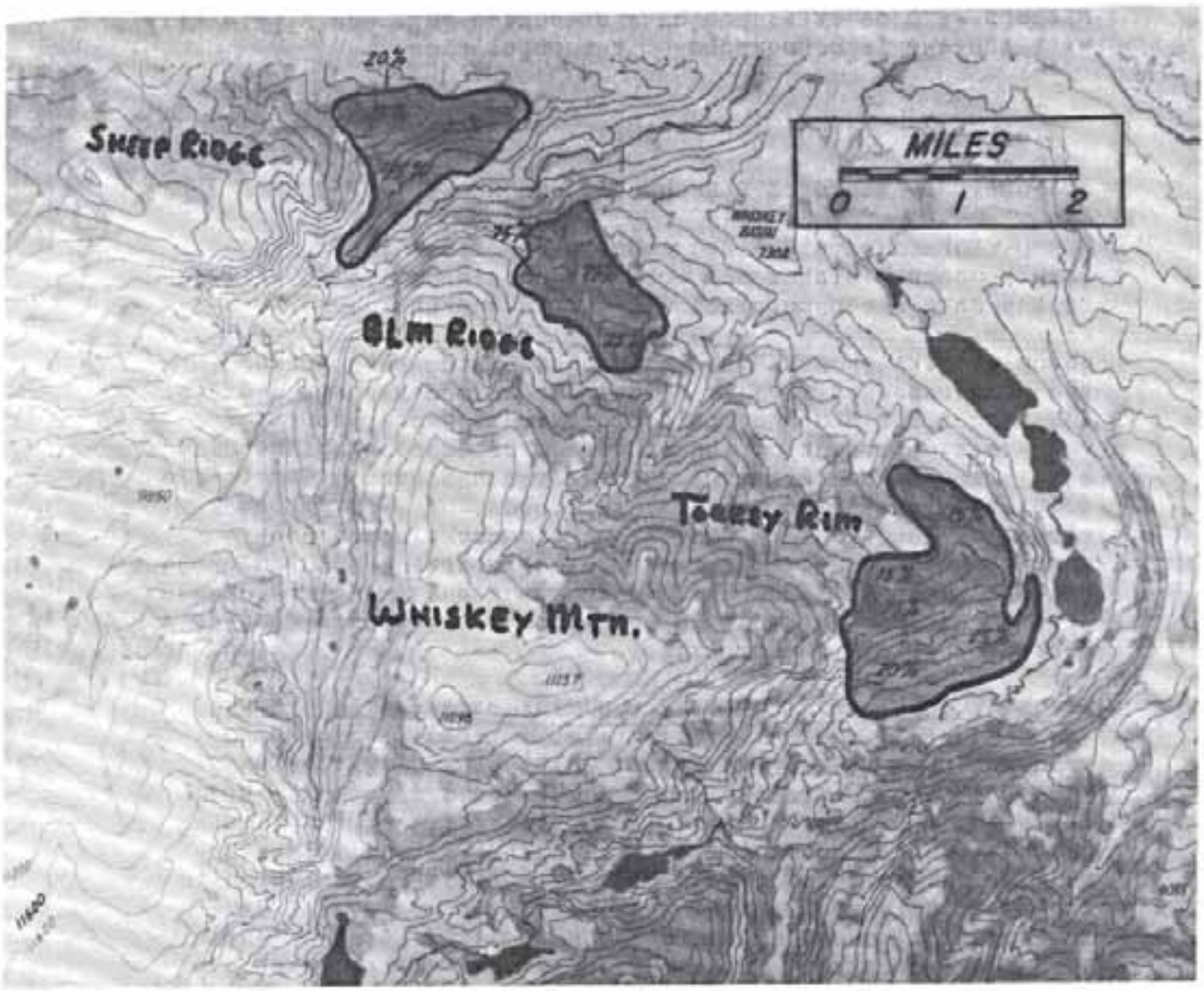

Figure 1. Sheep Ridge, BLM Ridge, and Torrey Rim bighorn sheep winter ranges.

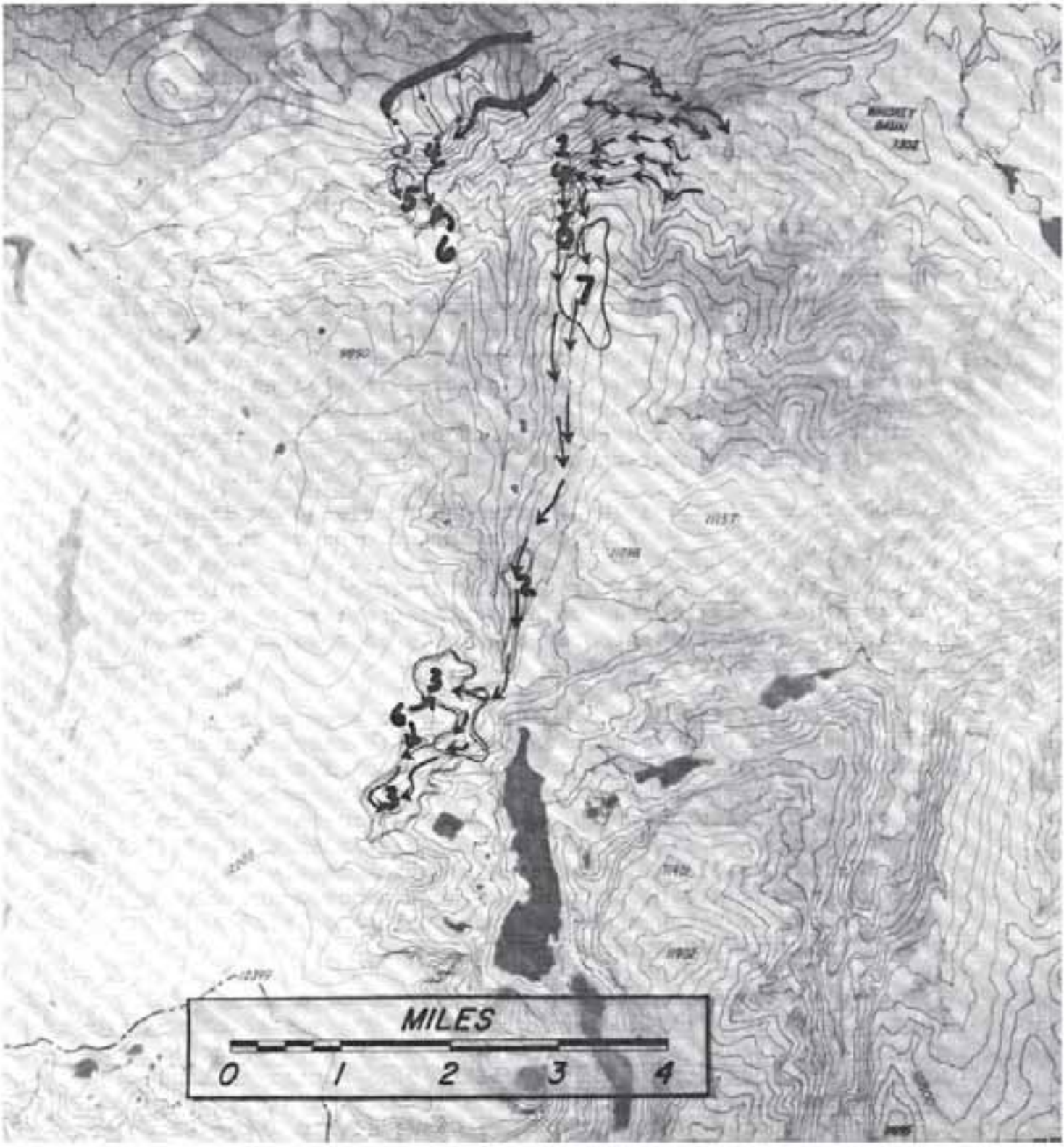

Figure 2. Lambing grounds of BLM-Sheep Ridge bighorn sheep and travel routes to them from winter ranges.

Beginning in early July, BLM-Sheep Ridge sheep began migrating to summer range. This range (8) was an extensive area across the Continental Divide at the head of the Roaring Fork drainage and around Bear and Faler (13) Lakes (Figure 3). Two migration routes led to the summer range with some sheep summering at various locations along the migration routes. Sheep using lambing grounds associated with Sheep Ridge crossed Jakey's Fork Creek (9) and traveled to Shale Mountain on the west side of Wasson Fork Creek. Crossing run-off swollen Jakey's Fork was apparently difficult for young lambs which were observed to cross on log jams. The movement from Jakey's Fork to the cliffs on the west side of Shale Mountain was rapid; but from there to the Bear Lake summer range travel was leisurely. Ewes and lambs seemed to be taking advantage of lush new forage and precipitous escape cover as they moved higher and further away from the winter ranges.

Sheep from BLM Ridge lambing grounds traveled on Whiskey Mountain east of Wasson Fork Creek and crossed to the east side of Shale Mountain on a narrow pass (10) between the Wasson Fork and West Torrey Creek drainages. Migration routes were limited and used by almost every sheep through the Rollie Brown lambing area and the pass between Wasson Fork and West Torrey Creek.

By late July, the BLM-Sheep Ridge sheep had reached the full extent of their summer range. This range was used through August. Sheep formed small bands and moved frequently during the time they were on their summer range. One ewe with a transmitter was observed to move (Figure 3) from Bear Basin (11) to the head of Wasson Fork Creek (12) to Faler Lake (13) (a distance of approximately 15 air miles) during a period of 5 days. Most movements were not as extensive, but the sheep seemed not to be tied to any restricted summering area.

In early September, the sheep returned to the spring-fall range over the same migration routes. These movements were slow and leisurely and seemed to be influenced predominantly by weather conditions. They remained on spring-fall ranges until snow conditions forced them to move to winter ranges in late October or early November. Rams joined the ewes and rut took place on winter ranges.

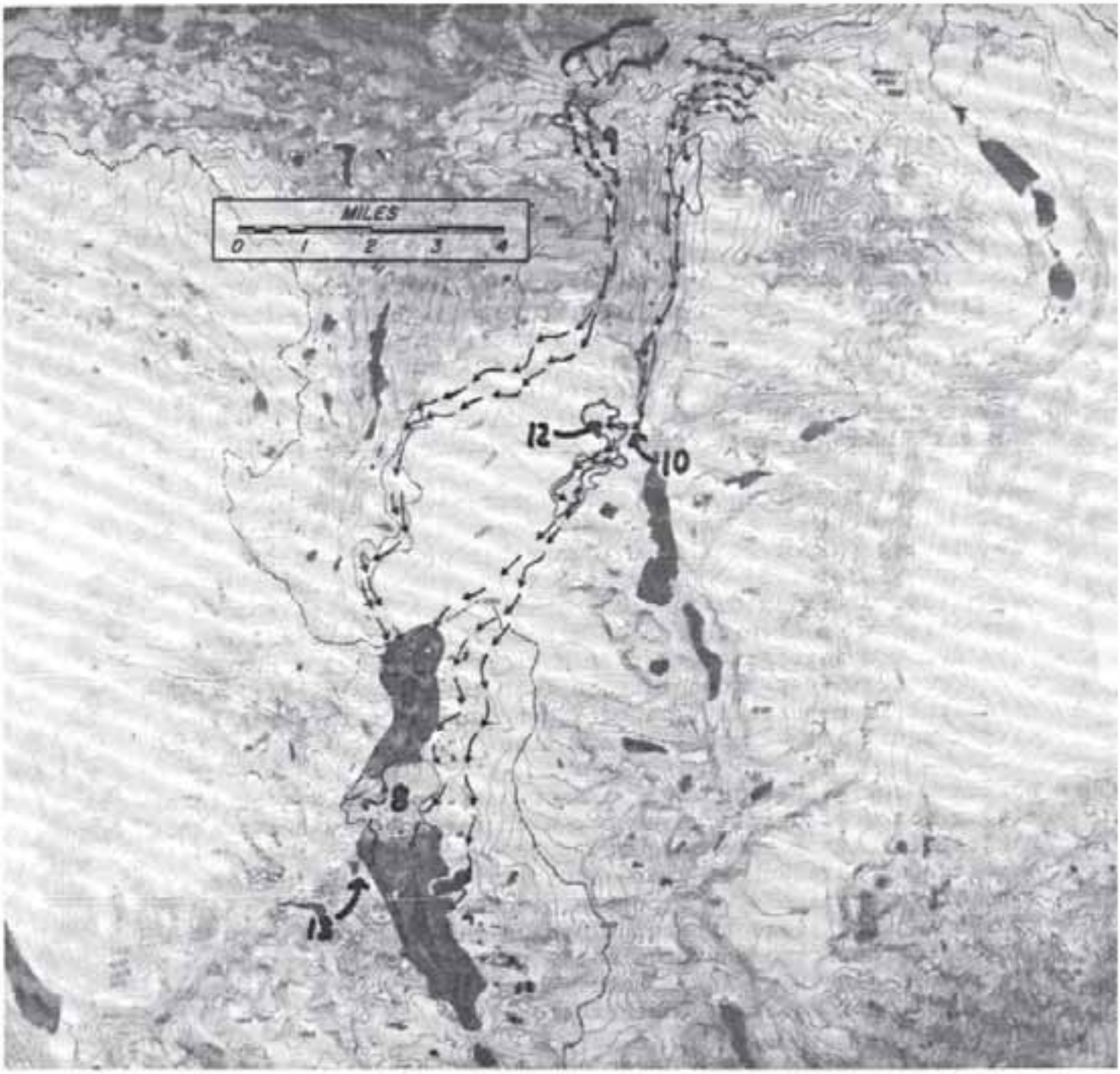

Figure 3. BLM-Sheep Ridge bighorn sheep summer range and migration routes.

Seasonal Movements of Torrey Rim Sheep.

The Torrey Rim sheep remained on winter range (Figure 1) until mid-May at which time they traveled up the southeast side of Whiskey Mountain to spring-fall range (14) (Figure 4). This travel route was very limited and followed the corridor above the steep rocky bluffs that connect the two ranges (15). The strip of timber along the top of the bluffs and the bluffs themselves provide for maximum security.

While most barren ewes, yearlings and two year olds remained on the spring-fall range until mid-June, pregnant ewes stayed for only a short time before continuing to lambing grounds (Figure 5). The rugged granite outcrops (16) on the south side of Whiskey Mountain in the vicinity of Lake Louise and the west-facing cliffs (17) of Middle Mountain were used as lambing grounds. Bands of rams were frequently seen on or near spring-fall range until mid-June, but as with BLM Ridge-Sheep Ridge rams, they did not associate with ewe bands.

Sheep from the barren group left spring range in mid-June and, following the same route as did pregnant ewes, traveled to the west-facing slopes of Middle Mountain above the lambing grounds (Figure 6). During the latter part of June, barren ewe groups utilized the broad open slopes (18) with lush vegetation on the west side of Middle Mountain while ewes with lambs were restricted to a nursery area (19) which was a narrower, less productive zone just above the cliffs which offered more security. They did not venture far from the cliffs until lambs became more mobile.

During early July, nursery and barren groups began to intermingle and gradually move to the higher south end of Middle Mountain. This movement seemed to be in response to decreased forage supplies and scarcity of water on the lower northern portion of the mountain. They remained on the higher nursery areas through mid-July and occasionally moved back to the north end of the range in response to severe weather (high winds, hail storms, high intensity rainstorms) and returned when the weather improved.

By late July the sheep had reached summer range (20) which was primarily on the high south end of Middle Mountain (Figure 6). Approximately 10-20 percent of the ewes and lambs from the Torrey Rim herd traveled on from Middle Mountain to Goat Flat (21). They followed a well defined route (22) between these two ranges. Like BLM-Sheep Ridge

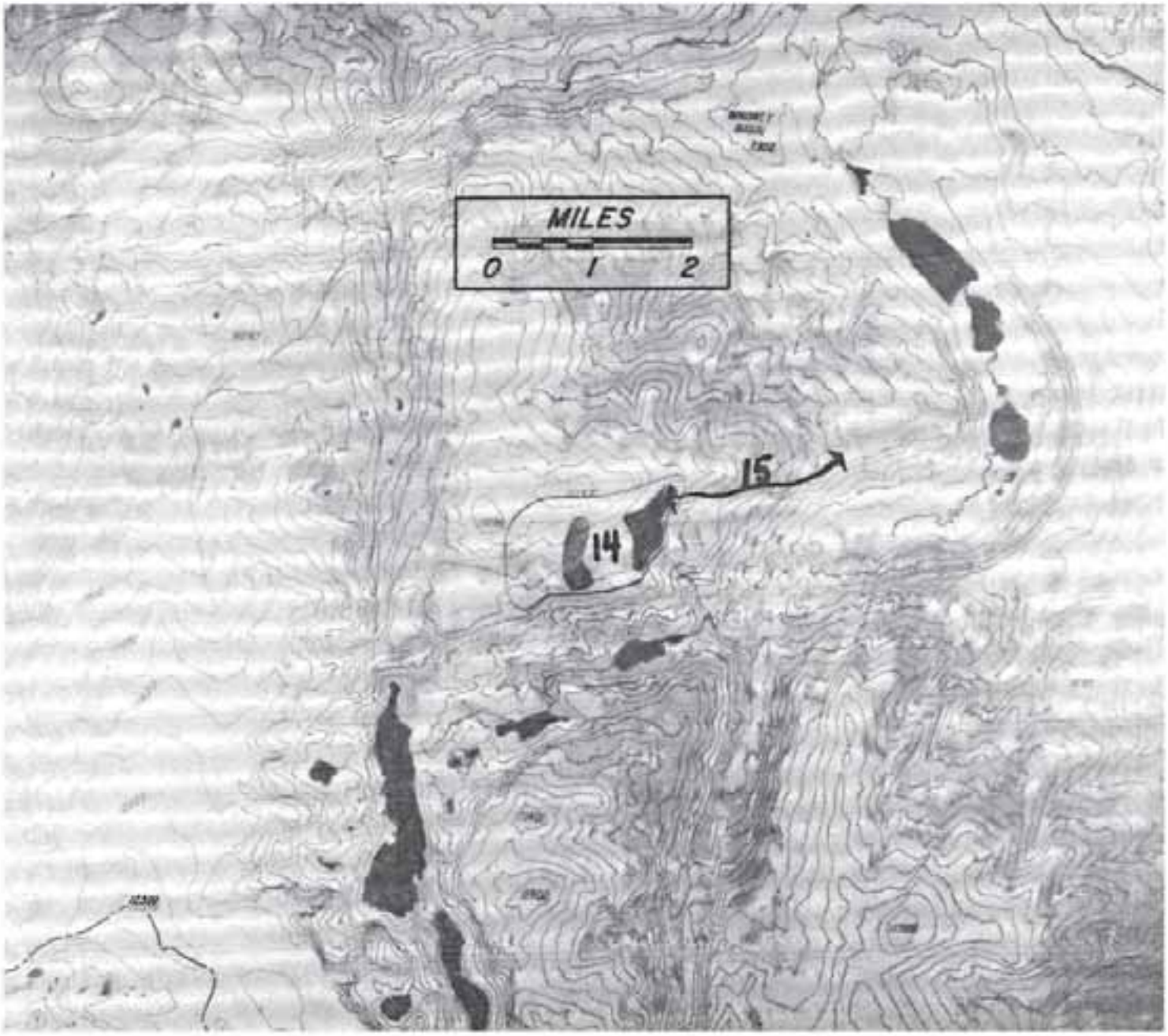

Figure 4. Spring-fall range of Torrey Rim bighorn sheep and migration route to and from the winter range.

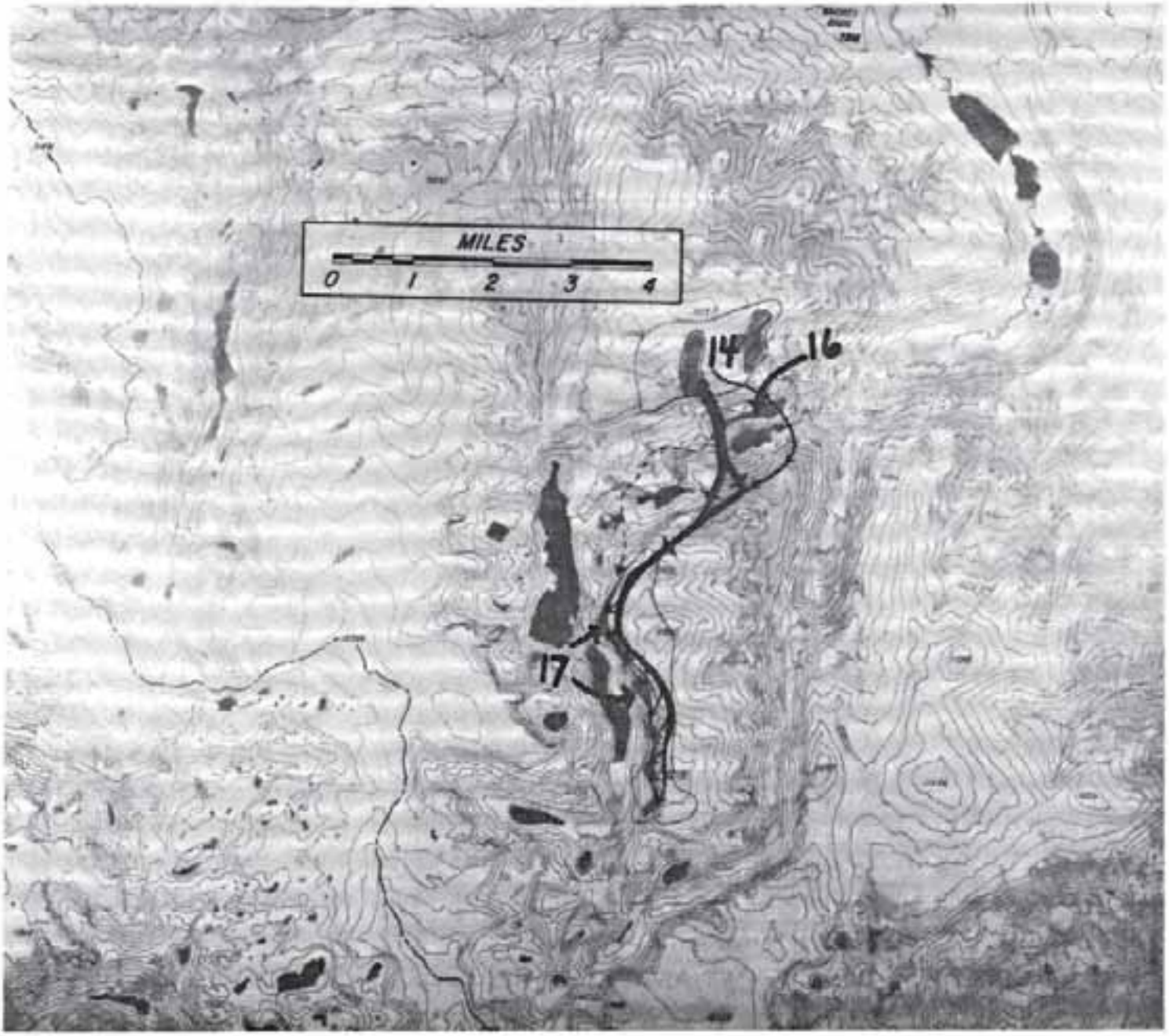

Figure 5. Torrey Rim bighorn sheep lambing grounds and migration routes to and from spring-fall range.

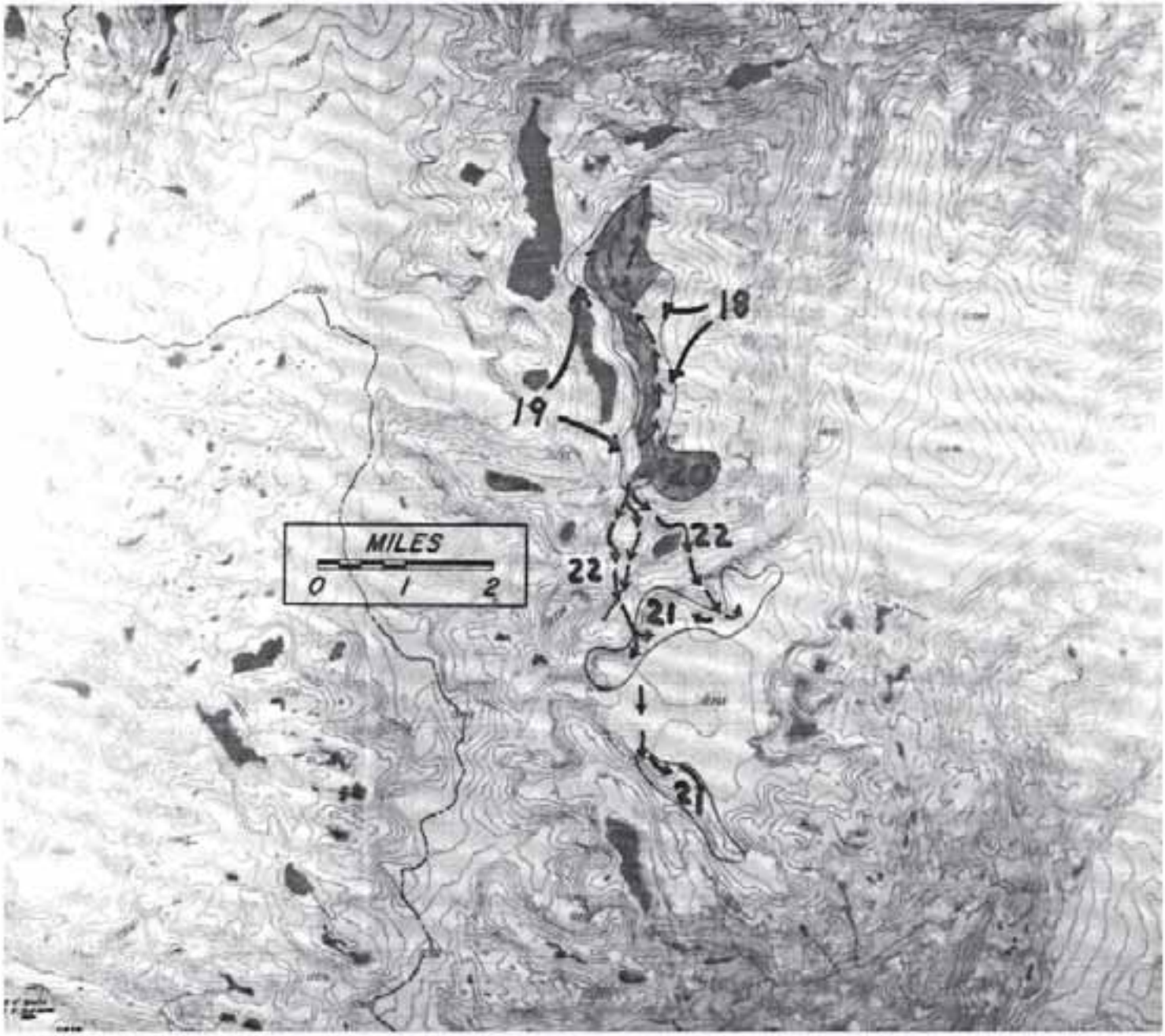

Figure 6. Areas used by Torrey Rim bighorn sheep nursery and barren groups, summer ranges, and migration routes.

sheep, Torrey Rim sheep also scattered into small mobile bands, but they did not travel as extensively because their summer range was much smaller.

During August, and generally earlier than BLM-Sheep Ridge sheep, Torrey Rim sheep began migrating back to spring-fall range (14) on Whiskey Mountain. We felt that utilization by sheep of much of the summer forage may have precipitated the earlier return to spring-fall range. During the year these sheep were observed closely there were two occasions when the majority of the sheep moved down to the Torrey Rim winter range because of periods of inclement weather and moved back up after the storms receded and snow melted. They used the same route (15) for these movements as they did during the spring. These movements were made in a matter of hours and on one occasion the trip from spring-fall range to winter range was made at night. The permanent migration to winter range occurred in late November and was also in response to snow storms which resulted in continuous snow cover at higher elevations.

DISCUSSION

Frequent intermingling of BLM Ridge and Sheep Ridge sheep on both winter and summer range showed these animals to be a single population utilizing two migration routes to the same destinations (Figure 7). Torrey Rim sheep, on the other hand, did not intermingle with the BLM-Sheep Ridge population. During three years of study, only one ewe marked on Torrey Rim was seen to join BLM-Sheep Ridge sheep and then only for one day (September 1976).

Torrey Rim sheep summer in a completely separate area and have different migration routes than the BLM-Sheep Ridge population. This summer time isolation is probably due to steep topographical barriers which effectively separate the two populations. Steep walled gorges (23), partially filled by extensive lakes, prevent the two populations from intermingling during summer. To cross the single readily traversable route between the two summering populations (No Man's Pass (24) and Downs Mountain (25)) would mean traveling for many miles through an area which is almost completely devoid of vegetation (Figure 7).

During winter the two populations are not separated by great distances, lakes or remarkable cliffs. However, to intermingle they would have to pass through extensive stands of

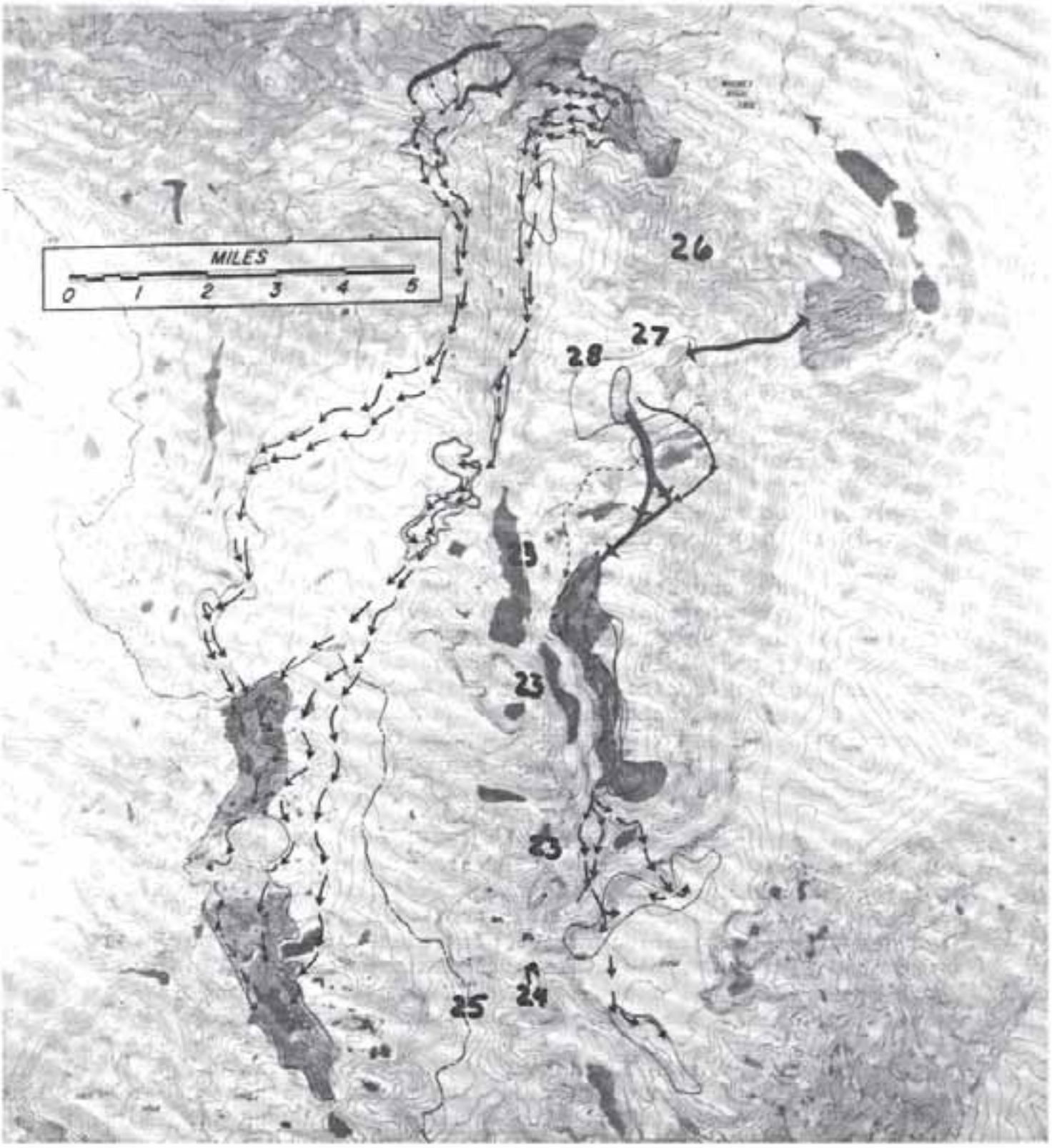

Figure 7. Year round distribution of the BLM-Sheep Ridge and Torrey Rim sheep herds.

timber (26) with their accumulated snow and/or cross extensive open wind-blown slopes (27) far from precipitous escape cover. During the rut, movement of a few rams from one population to another was documented, but no ewes made such movements.

Only on the spring-fall ranges are the two herds not separated by inhospitable terrain or habitat. Here, there is an open easily traversed saddle (28) on the southwest side of Whiskey Mountain where sheep from the two herds could intermingle with no difficulty. In fact, on several occasions during fall, large herds from both populations were observed within less than one-half mile and within visual contact of each other, yet there was no significant interchange.

These two populations seemed reluctant to stray from their own home ranges which agrees with the research conducted by Geist (1971). This trait may keep the two herds isolated from one another and strongly suggests that the two herds should be managed as separate populations.

There was an obvious difference in the size of the total home ranges of the two populations. This was most evident in the summer range of the Torrey Rim herd which was much smaller than that of the BLM Ridge-Sheep Ridge herd. The topography surrounding the migration routes and summer ranges of the Torrey Rim herd was thought to be the main factor limiting their range. Those few sheep which ventured from Middle Mountain to Goat Flat crossed deep precipitous canyons four times enroute to and from their summer range.

The movement of this small number (30-40) of sheep from Middle Mountain eased slightly the utilization of the limited amount of forage on Middle Mountain to the benefit of those which remain. Care should be taken to protect this segment of the herd and their migration route. There are other routes which, although difficult, would allow the Torrey Rim sheep to expand their summer range, but they are reluctant to use them, or, as Geist (1971) has suggested, they are unaware of them.

Our observations on the fidelity of Whiskey Mountain bighorn sheep to migration routes agreed with those of other researchers (Geist 1971, Morgan 1970). The sheep observed used the same migration routes each year while traveling to and from seasonal home ranges. Many of the routes have well worn sheep trails

indicating generations of repeated heavy use. Even rocks and tree roots are polished where they have been crossed by sheep. Geist (1971) has stated that sheep learn migration routes and seasonal ranges from their elders.

Although Whiskey Mountain sheep demonstrated a high degree of fidelity to migration routes, they did not demonstrate this high degree of loyalty to certain of the seasonal ranges along the routes, especially lambing and nursery areas. The choice of lambing grounds and associated nursery areas appeared to be more a function of prevailing environmental conditions, such as snow melt and vegetation growth, and not previous years' usage or inheritance. It seemed that the migration routes were of the most importance and any of several lambing grounds along the routes were suitable for use, depending upon year to year circumstances. Lambing and nursery areas which were used extensively during one year were frequently unused the following year.

Lambing grounds and nursery areas were characterized by precipitous terrain as described by Geist (1971). Each migration route passed through several such areas, and areas suitable for lambing were probably an important consideration during establishment of migration routes long ago. Management implications point to the need to recognize the possibility of more than one lambing area existing for each herd of sheep and to protect those areas and their inter-connecting routes.

Spring-fall ranges, as the name suggests, were used twice each year. Because of their double use, these areas seem to be of great importance. They were susceptible to excessive grazing by bighorn sheep and are areas which should be protected from livestock grazing. Although we have no supporting data, it appears that spring-fall ranges may be some of the more important areas in which sheep could come in contact with or acquire parasites. They spend more total time on these ranges when it is warm enough for parasite intermediate stages or their intermediate hosts to be active than on any other ranges. There were some areas on spring-fall ranges which had the physical characteristics of Protostrongylus spp. laden snail hotspots as described by Lange (1974).

SUMMARY

The use of radio transmitters and neckbands on large numbers of sheep and almost continual spring, summer, and fall field observations allowed us to better describe and define the distribution of the Whiskey Mountain bighorn sheep population. Many of the concepts of previous investigators regarding seasonal home ranges and migration routes of bighorn sheep were confirmed and knowledge was added to that known about the distribution of the Whiskey Mountain bighorn sheep populations.

Literature Cited

Crump, W., 1976. Bighorn Sheep Update, Wyoming Wildlife. 40 (1):20-24.

Geist, V., 1971. Mountain Sheep - A study in behaviour and evolution. The Univ. of Chicago Press, Chicago. 383 pp.

Lange, B., 1974. Cause and nature of mortality in bighorn sheep, Proc. Northern Wild Sheep Council. pp. 104-107.

Morgan, J. K., 1970. Ecology of the Morgan Creek and East Fork of the Salmon River bighorn sheep herd and management of bighorn sheep in Idaho. Res. Comp. Report, Ida. Fish and Game Dept. Project W-142-R-1, 155 pp.

Schmidt, R., 1976. Baiting bighorn sheep with apple pulp and trapping with a drop net. Proc. Northern Wild Sheep Council. pp. 26-34.

Thorne, T., 1971. The use of M99 etorphine and acetylpromazine in the immobilization and capture of free ranging Rocky Mountain bighorn sheep. Proc. N. Am. Wild Sheep Conf. 1:127-134.