SNOWCREEK SKI AREA DEER MIGRATION STUDY
1993 FALL MIGRATION REPORT

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CHAPTER 1. INTRODUCTION AND METHODS

INTRODUCTION

On October 9, 1992, Dempsey Construction Corporation (DCC) was issued a Special Use Permit (SUP) by the Inyo National Forest (INF) for the development of a Master Development Plan (MDP) for the proposed Snowcreek Ski Area (SSA) located near the Town of Mammoth Lakes (TML), California. The proposed ski area is largely transitional range for mule deer (Odocoileus hemionus) from the Sherwin and Buttermilk herds which migrate from winter ranges in Round Valley to summer ranges located on the west slope of the Sierra Nevada.

A Deer Herd Monitor Plan, which is currently being prepared by the permitee, is required by the SUP to assess the effectiveness of mitigation measures designed to minimize impacts of the SSA on migratory mule deer, and to determine the overall effect of the development on the deer herd (FEIS, page II-30). The major objectives of the monitoring plan as defined in the FEIS (page IV-53) are as follows: 1) track the implementation of wildlife mitigation; 2) determine the effectiveness of the mitigation; and 3) monitor the overall condition (population) of the Sherwin Grade/Buttermilk deer herds.

This present study was conducted during fall 1993 as part of an ongoing effort to monitor baseline conditions and to continue to develop and refine the study techniques that will be used in the monitoring program. Specific objectives of the fall work were to: 1) determine, through use of remote counters and radio telemetry, the amount, timing and specific locations of migratory deer use of the SSA and surrounding lands during the fall migration of 1993; 2) determine from ground classification of deer the sex and age composition of different herd segments that migrate through the project area and surrounding lands; and 3) provide recommendations to improve the accuracy of study techniques used to determine the number of deer in the individual herd segments.

Data collected during the fall 1993 field investigations include radio telemetry studies, use of remote counters, and deer herd composition counts. This report focuses on the results of deer migration studies conducted between September and November 1993.

PROJECT AREA

The proposed Snowcreek Ski Area (SSA) is situated within the Town of Mammoth Lakes in sections 2, 3, 9-15, 23, and 24 of T. 4 S., R. 27 E., in the Mammoth Ranger District, Inyo National Forest, California (Figure 1-1). It comprises approximately 3,100 acres of steep, generally north-facing, mountainous terrain at elevations ranging from 7,960 to 11,730 feet. The site is bordered on the southwest by the Sherwin crest, which includes Pyramid Peak, Red Peak, and Fingers Peak; on the east by the Sherwin Creek drainage; and on the north by the U.S. Forest Service Mammoth Meadows and the Dempsey Construction Corporation's Snowcreek development (FEIS page I-2).

Vegetation within the project area is composed of eight major

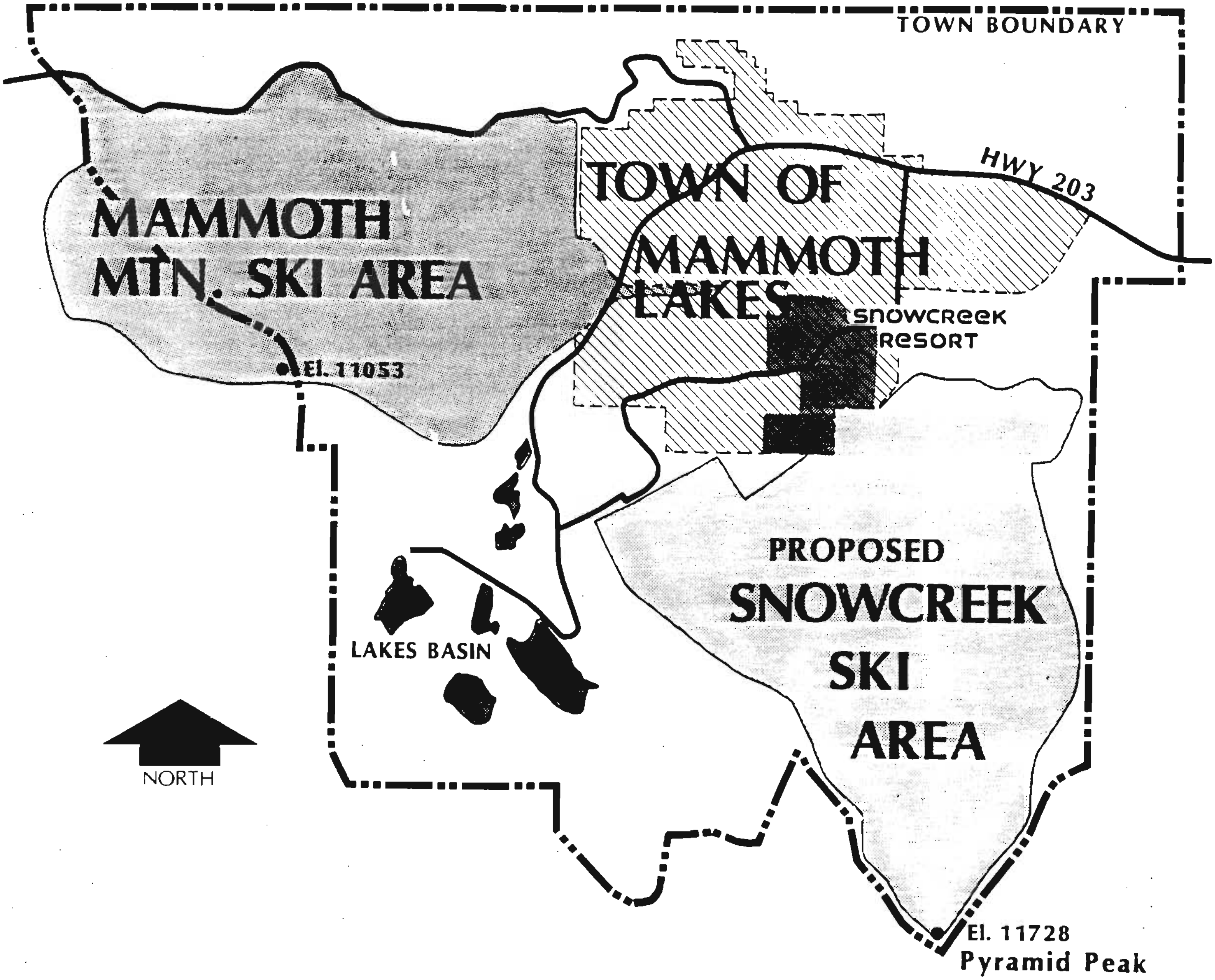


Figure: 1 LOCATION OF THE SNOWCREEK SKI AREA NEAR THE TOWN OF MAMMOTH LAKES, CA plant communities including: barren or fellfield, whitebark pine, mixed conifer, mixed brush, quaking aspen, riparian, wetland, possible wetland, and late-seral mixed conifer (old growth). A complete description of these plant communities and their locations within the project area was provided in the FEIS (page III 17-20).

METHODS

Field surveys of deer migration were conducted from 15 September and 30 November 1993.

Migration Studies

Infrared Sensor Equipment

The Trailmaster 1500 (Trailmaster, 10614 Widmer, Lenexa, KS 66215) was used during the 1993 fall migration to determine the amount, timing, and specific locations of deer migration through Solitude Canyon. The Trailmaster 1500 operates with an invisible infrared light beam that automatically records an event each time the infrared beam is broken. Each event is stored by date and by time (to-the-minute) and can instantly be recalled. By positioning the Trailmaster beam at a certain height and setting the length of time that the beam of light is broken, the Trailmaster can be used to monitor the activities of deer, as opposed to most other wildlife species.

Eight Trailmaster units were used during the fall surveys. Each unit was fastened to a tree or post and the infrared beam aligned to cross a narrow deer trail at about 24 inches above ground. Seven

Trailmaster units (stations 1-7) were established on major deer trails located at Solitude Pass (Figure 1-2). These stations were situated on the north side of the pass within small groves of whitebark pine (*Pinus albicaulis*). Station 8 was situated in Solitude Canyon on the first bench immediately south of Solitude Flat. Because of human activity in the vicinity of the Mammoth Rock migration corridor, sampling with Trailmaster units was not conducted in this area.

The accuracy of the Trailmaster as a deer counting device was determined in two ways. The first employed use of a 35 mm camera used in conjunction with the Trailmaster at Station 8 to photographically record the number of deer that broke the beam. A second way involved positioning two Trailmaster units within 30 feet of one another along the same trail so that they provided replicate samples of the same day's events.

Trailmaster units 1-5 and 8 were deployed continuously between 16 September and 15 November; units 6-7 were deployed continuously between 21 October and 15 November. Information on the number of deer passing through each station was recorded at 3-5 day intervals.

Radio-telemetry

During January 1993, 39 deer were captured and fitted with radio collars in Round Valley in conjunction with larger ecological study of the Round Valley population (Vern Bleich, California Dept. of Fish and Game, pers. comm.).

From 15 September-30 November 1993, radio-collared deer were monitored 3 days per week using radio-telemetry. Initial locations were made from a vehicle equipped with a Telonics TR-2 receiver with an attached program-scanner (TS-1) and a base loaded whip antenna. Triangulation bearings (1 observer) were obtained using a hand-held, 2-element antenna (RA-2A; Telonics Inc., Mesa, Ariz.) and ear phones. A bearing was defined as the bisection of the arc of audible reception (Garrott et al. 1987). Radio locations taken within ≥10 minutes of each other were "triangulated" on a map at the intersection of the directional vectors. If the angle of bearing intersection is <60 or >120 degrees, additional bearings were obtained from different recording locations. Due to safety considerations and limited manpower, night monitoring of radio-collared deer was not attempted.

Because of the error in signal location induced by steep, rocky terrain, attempts were made to verify triangulation locations by approaching deer on foot and, whenever possible, observing deer from a distance. Variables recorded once deer were observed include aspect (N, S, E, W), slope (%), elevation, group size, and sex and age classification.

Deer Composition Counts

During October and November, ground classification of deer was conducted to determine the sex (males/100 females) and age (fawns/100 females) ratios of deer migrating through the project area and surrounding vicinity.

Weather Data

Daily weather data (maximum and minimum temperatures and precipitation) was provided by the U.S. Forest Service, Mammoth Lakes Ranger District.

This chapter describes the results of the fall 1993 studies.

MIGRATION STUDIES

Timing and Intensity of Migration

Infrared Sensor Equipment

The Trailmaster units at Solitude Pass recorded 337 events that could be used to determine the timing and intensity of fall deer migration through the project area (Figure 2-1, Appendix Table 1). Deer migration through the project area lasted for approximately six weeks, from 2 October to 15 November. There were two noticeable peaks in deer movement during this period, both of which occurred in conjunction with weak fall storms (Figure 2-2).

The first pulse of movement occurred between 11 and 20 October. During this period, a total of 90 events ($\bar{x}$ = 9.0 events per day) were recorded by the Trailmaster units at Solitude Pass. This movement coincided with a series of weak storms that occurred between 11 and 16 October. Total precipitation accumulations from these storms registered 0.66 millimeters (0.26 inches) in the form of rain at 2,438 meters (7,800 feet) elevation in the town of Mammoth Lakes and about 10 centimeters (4 inches) of snow at Solitude Pass (3,220 meters [10,300 feet] elevation).

There was no precipitation recorded in the Mammoth Lakes area between 20 October and 11 November. Consequently, the daily number of

Figure 2-1. Number of Deer Recorded by

the Trailmasters at Solitude Pass

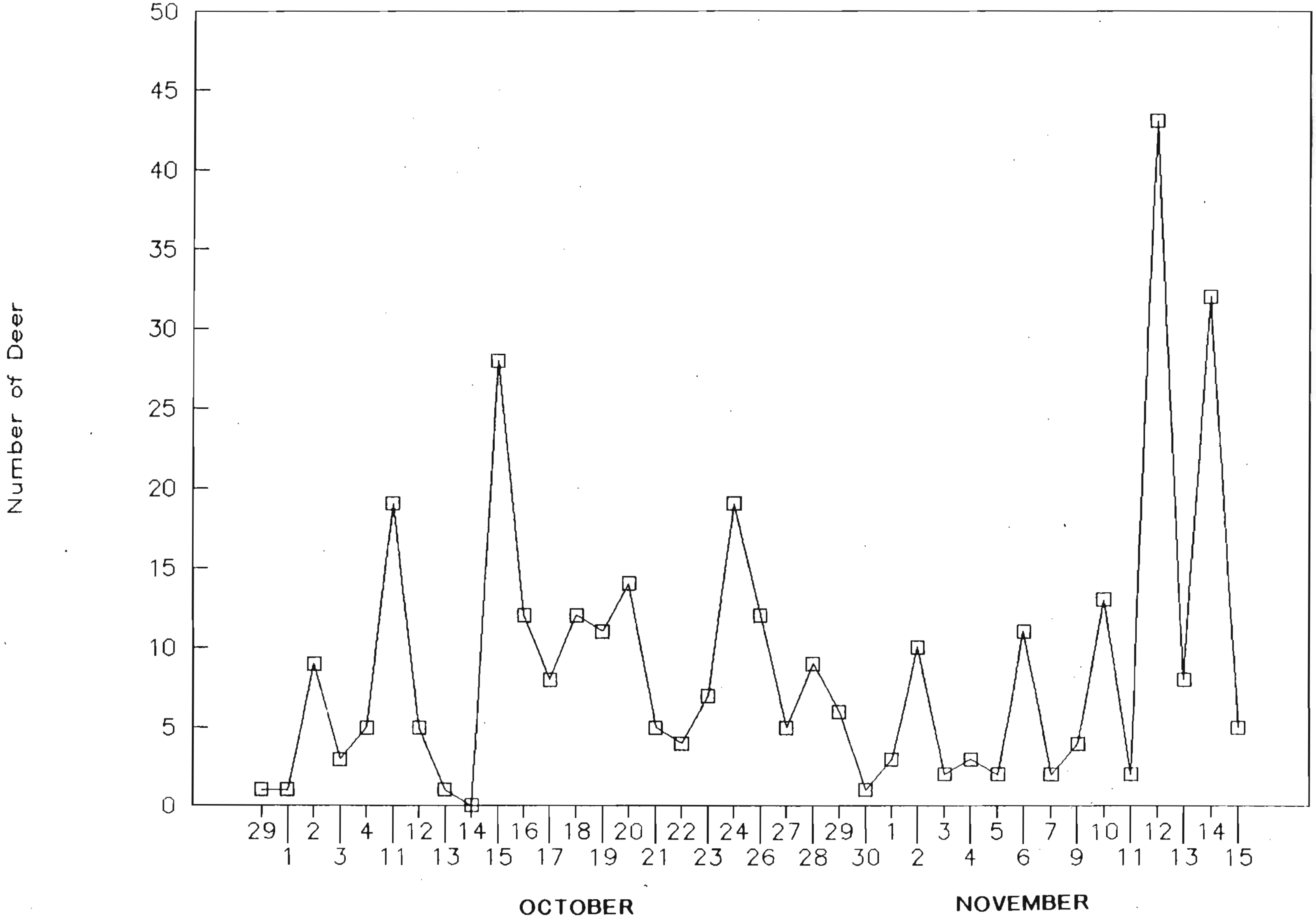
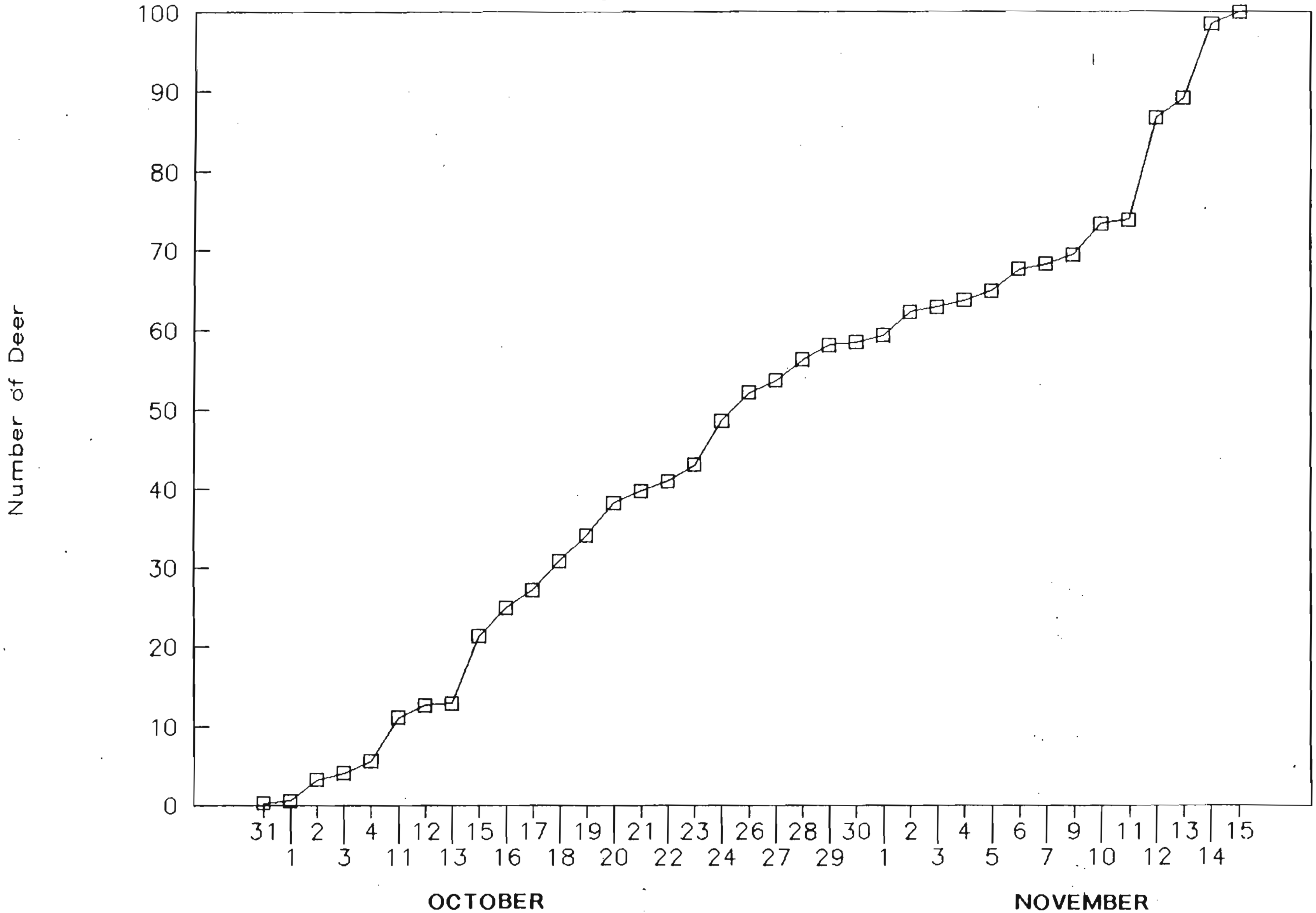


Figure 2-2. Cumulative Percent of Deer

Crossing Solitude Pass by Date



events recorded by the Trailmasters at Solitude Pass decreased to an average of 5.2 events per day (range = 1-19 events per day) over this 23 day period.

A second pulse of movement through the project area occurred between 12 and 14 November. The Trailmasters units at Solitude Pass recorded 83 events ($\overline{x}$ = 27.6 events per day) during this period. This peak in movement was triggered by a larger storm on 12 November that deposited 0.64 centimeters (2.5 inches) of snow in the town of Mammoth Lakes and approximately 15 centimeters (6.0 inches) of snow at Solitude Pass.

Radio-telemetry

Another approach to determining the temporal pattern of deer migration is from radio-telemetry. A total of 39 deer were fitted with radio collars on the Round Valley winter range in January 1993 and 20 of these migrated north from the winter range (Vern Bleich, DFG, pers. comm.). Of these 20 deer, 16 were located in the Mammoth Lakes area by DCC personnel during the 1993 spring migration (Taylor 1993).

During a telemetry flight conducted on 24 August, personnel from DFG obtained approximate summer range locations for 18 of the 20 deer that migrated north from winter range. Of these 18 deer, 8 were located east of the Sierra crest, from the Convict Knolls west to the Mammoth Lakes Basin. The remaining 10 were located west of the Sierra crest, from the North Fork of the San Joaquin River south to Florence Lake (Vern Bleich, DFG, pers comm). Of the 8 deer that summered on the east side, 2 summered in the vicinity of the Convict Creek drainage, located several miles east of the project area, and 6 summered in the general vicinity of Mammoth Lakes.

Fall monitoring of radio collared deer was conducted from 15 September-30 November 1993. Seven of the 10 deer that summered on the west side of the Sierra Nevada were located in the Mammoth Lakes area during the fall migration. Of these 7 deer, four passed through the area during the second week of October, and 1 each during the third and forth weeks of October and the second week of November.

Of the 8 deer that summered on the east slope of the Sierra Nevada, 6 were located during the fall migration. Of these 6 deer, 3 migrated during the fourth week of October, 2 during the first week of November, and 1 during the fourth week of November.

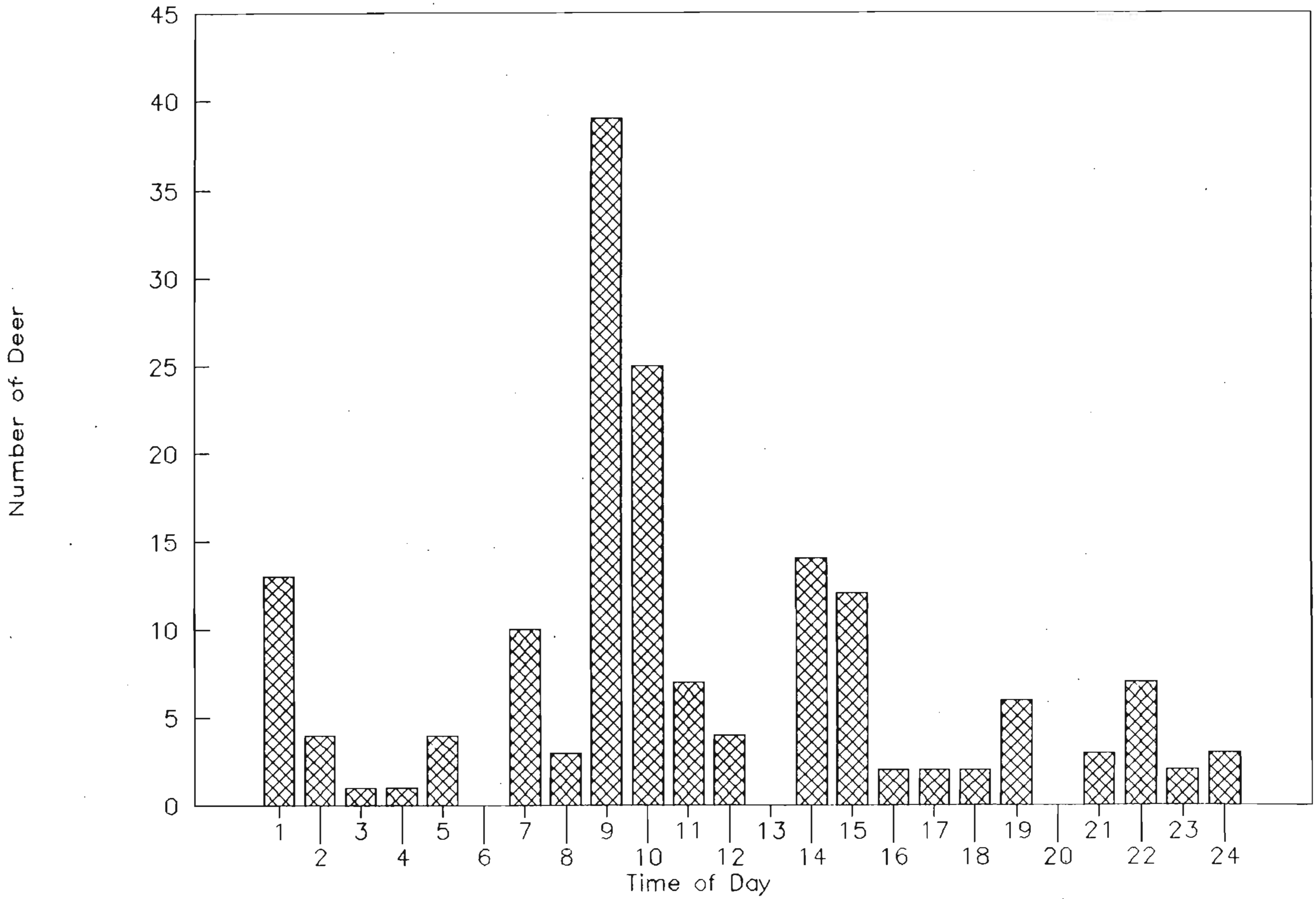
Daily Timing of Deer Movements

Event data recorded by the Trailmaster units at Solitude Pass (stations 1-7) was used to determine the daily timing of deer movements through the project area (Figure 2-3). Approximately 58% of all deer moved through Solitude Pass in the daytime hours between 0701 and 1800 hours. Twenty-seven percent of deer migrated over the pass between 0001 and 0700 hours and 15% between 1801 and 2400 hours. This is similar to the 1993 spring migration, when 67% of deer migrated through the project area between 0700 and 1800 hours, 20% between 0001 and 0700 hours and 13% between 1801 and 2400 hours.

During the fall migration, 44% of daytime movements occurred

Figure 2-3. Daily Timing of Deer

Movements Over Solitude Pass



between 1000 and 1400 hours and 40% between 1500 and 1800 hours. In comparison, 58% of daytime movements during the spring migration occurred between 0800-1000 hours and 24% between 1300-1500 hours (Taylor 1993).

Verification of Deer Counting Accuracy

The accuracy of the Trialmaster as a deer counting device was determined from Trailmaster units placed in selected replicated locations and from a 35 mm camera used in conjunction with the Trailmaster.

At Solitude Pass, replicate samples of the same days's events were obtained from the Trailmaster units at stations 1 and 2 and stations 3 and 4. Between 11 October and 15 November, a total of 247 events were recorded at stations 1 and 2, and of these, 48 (19%) were duplicated. Thus, a minimum of 48 deer migrated through stations 1 and 2 during the survey period. Because the accuracy of the remaining 151 (247-96) events could not be verified, there is no way to determine how many of these events were actually deer related. There were many fresh deer tracks in the snow that passed through stations 1 and 2 during the survey period. This indicates that most events were likely caused by deer and not by other factors.

Discrepancies in the number of events counted at the different stations can be attributed to the effects of weather on the individual Trailmaster units and deer migrating through one station and not the other. There were several occasions during the course of the survey period when at least one of the Trailmaster units was disabled because either the transmitter, the receiver, or both were covered by drifted snow. When the units at both stations were functioning simultaneously, 27% of events were the same. There were numerous instances when fresh deer tracks where observed in the snow passing through station 1, but around station 2. Nevertheless, the number of deer that actually passed through stations 1 and 2 is probably somewhere between 48 and 199.

A total of 74 events were recorded at station 3 and 4. Of these, only 5 (7%) were replicate samples. Therefore, a minimum of 5 deer passed through these stations during the survey period. However, the actual number is somewhere between 5 and 64 because the effects of weather often prevented both Trailmaster units from functioning simultaneously and many deer tracks were observed passing through one station and not the other. When the Trailmaster units at both stations were functioning simultaneously, 15% of events were replicated.

Between 29 October and 15 November, a 35 mm camera was used in conjunction with the Trailmaster unit at station 8. This station provided only limited information regarding the efficacy of the Trailmaster as a deer counting device because black bears (Ursus americanus) periodically pulled the unit out of alignment. A total of 8 photographs were taken of 8 individual deer as they crossed through the infrared beam. In each case, the number of deer recorded by the Trailmaster was the same as the number of deer in the photograph. In spring 1993, the camera accurately counted 23 deer that passed through the infrared beam (Taylor 1993). In addition, the Trailmaster accurately counted 8 deer that were observed passing through station 6 on 15 June 1993. Thus, of the 39 deer known to have crossed through the infrared beam, all were accurately counted by the Trailmaster.

Locations of Deer Movements

Only 1 radio-collared deer was located within the project area boundaries during the fall migration. Between 15-26 October, resident female #340 was consistently located in the vicinity of Mammoth Rock; her presence at this location was confirmed visually on 18 October (Appendix Table 2).

Between 11 and 26 October, 2 summer resident females (#350 and #210) were consistently located near the eastern perimeter of the project area in the vicinity of Sherwin Creek. Resident male #610 was consistently located to the west of the project area in the TML, however, it is not known if he moved through the project area during the fall migration.

Of those deer that summered west of the Sierra crest, none were located in the project area. Females #300 and #226 were located in the vicinity of the Summers Canyon on 15 October and 21 October respectively, indicating that they may have migrated over Solitude Pass and through the Sherwin Lakes area. Female #300 was subsequently located in the Convict Lake drainage between 24 and 26 October, and near Hilton Creek on 29 October.

On 9 November, radioed female #510 was located approximately 0.5

km north of Route 203, indicating that she may have migrated to the north of Mammoth Lakes.

Deer Composition Counts

During 116 man-hours of field work, a total of 29 deer (22 females, 6 males, and 1 fawn) were classified, yielding a buck/doe/fawn ratio of 27/100/5 (Table 2-1). Of these 29 deer, 26 were observed in the project area and 3 were observed in the holding area near Sherwin Creek.

Post-season (January) composition counts conducted on the Round Valley winter range by DFG yielded a buck/doe/fawn ratio of 21/100/35 (DFG Files).

Table 2-1. Number of deer classified in the Snowcreek Ski Area and surrounding vicinity according to sex and age during the 1993 fall migration.

Date	Males No. Antler Points 1x1	2x2	3x3	4x4	Females	Fawns	Total	Observed Location
101193	0	0	0	0	5	0	5	Solitude Pass
101493	0	0	0	0	2	0	2	Moto-cross
101593	1	0	0	1	3	0	5	Solitude Flat
101893	1	0	0	0	3	0	4	Solitude Flat
102793	0	0	1	0	2	0	3	Snowcreek
110193	0	1	0	1	2	1	5	Sherwin Creek
110193	2	0	0	0	0	0	2	Mammoth Rock
110203	0	0	0	0	3	0	3	Moto-cross
	4	1	1	2	20	1	29	

CHAPTER 3. DISCUSSION

Information regarding the timing and pattern of migration is important to deer managers because disturbance impacts of development projects within movement corridors can often be mitigated by avoiding disruptive activities during migration periods. A specific requirement of the Deer Herd Monitoring Plan is to determine the timing of deer movements through the project area during the spring and fall migrations so that annual allowable construction periods and the timing of road closures can be established (FEIS, page IV-47-48).

The timing of deer migration through the project area during fall 1993 was similar in duration to other migrations that occurred in the absence of major fall snowstorms. There were no major fall storms in 1986-1988. Therefore, deer migrations occurred gradually, lacked any episodes of mass movement, and were extended into mid-November (13 October-19 November in 1986, 11 October-13 November in 1987, and 17 October-14 November in 1988) (Taylor 1988). In both 1987 and 1988, however, migration from the summer range was triggered by weak storms that occurred on 11 October and 17 October, respectively (Taylor 1988).

In 1984 and 1985, deer migrated from the summer range in October in response to major fall snowstorms (Kucera 1992). Because of the severity of these storms, deer hastily vacated the summer range and migrated in mass through the project area. In both years, migration to the winter range was completed by early November. Several other studies have associated deer departure from the summer range with fall snow storms and increasing snow depths at higher elevations (Russell 1932, Leopold et al. 1951, Loveless 1967, Gilbert et al. 1970).

In fall 1993, some deer migrated through the project area prior to the first storm on 11 October. Garrott et al. (1987) postulated that departure from summer ranges in northwest Colorado was not induced by snow, but instead by differences in forage quality between summer and winter ranges. When deer migrated prior to fall snow storms it was to take advantage of high quality forage on irrigated and fertilized hay meadows near the winter range. If deer waited until snow forced them to migrate, they would arrive on the winter range after meadows were senescent and snow covered. Kucera (1992) suggested that females may be constrained in their timing of fall migrations because of smaller body size, the inability of fawns to negotiate deep snow, and the energetic demands of lactation. Bertram and Remple (1977) found that deer migration on the west slope of the Sierra Nevada preceded significant fall storms by more than one week.

The Trailmaster accurately counted deer when animals passed single file through the infrared beam. However, despite the apparent accuracy of the Trailmaster under these circumstances, there are a number of inherent problems associated with use of the Trailmaster as a technique for estimating population size. First, and most obvious, is that the Trailmaster underestimates total numbers of deer moving through the project area because not all deer pass through the infrared beam. This is mainly a function of the snow conditions at higher elevations, which often dictate, in both spring and fall, the precise locations at where deer cross the pass. When snow is hard and crusted, it allows deer to roam freely and enables them to cross the pass at numerous locations, as opposed to one or two specific trails. This deficiency, in itself, may be serious for obtaining total population estimates.

Severe weather appears also to bias results because high winds and drifted snow can force the Trailmaster out of alignment. These conditions are the norm at Solitude pass, where powerful southerly winds deposit snow in major snowdrift areas on the north side of the pass. Other factors, such as fluctuating snow levels in the spring, which influences the height of the infrared beam above ground, and human scent left in the vicinity of the counting station can also negatively bias results. Conversely, events caused by other wildlife, human activity (e.g., hikers), and weather can result in estimates that are too high.

A number of radioed deer were not detected until after they had arrived on the holding area. Consequently, the specific migration routes used by these deer when they passed through the Mammoth area were not identified. A sampling design representative of the entire 24-hour cycle may be the only way to accurately determine the migration patterns and specific migratory routes used by individual radio-collared deer as they move through the project area and surrounding vicinity.

Because the project area has poor line-of-sight capabilities resulting from undulating terrain, it was often difficult to obtain more than one monitoring location for triangulation. When this occurred, an attempt was made to approach the deer on foot until it was visually located or, if the deer could not be visually located, to triangulate its location from a higher vantage point. Obtaining visual locations in lieu of triangulation worked well when animals occurred in proximity [≤ 0.8 km, 0.5 mile)] to roads. However, this approach proved to be rather inefficient at distances beyond 0.8 km (0.5 mile) because of the time required to walk from the vehicle to the animal and back again. Errors in location estimates may have occurred when attempts were made to triangulate a deer's position while on foot. This is primarily because of difficulty in determining the exact locations of monitoring sites in the field and the time required to move between sites.

Attempts were made to determine the sex and age composition of deer as they migrated through the project area. However, only 29 deer were classified during 116 man-hours of field work. Because this number was so small, estimates of the number bucks to does and fawns to does are too inaccurate to be useful.

Trailmaster data indicated that an average of 7.2 (range = 0-43) deer per day crossed Solitude pass during the fall migration, and of these, 42% moved at night. Thus, during daylight hours when deer were visible to observers, an average of 4 deer per day (0.38 deer per hour) migrated through the project area. During field work in the project area, deer were observed at an average rate of 0.27 deer per man-hour. This appears to explain why so few deer were observed in the project area during the fall migration.

CHAPTER 4. RECOMMENDATIONS

Trailmasters

Use of Trailmasters at selected replicated locations at Solitude pass has revealed some major problems inherent in this technique which could result in large errors. However, it is hopeful that through additional sampling modifications the Trailmaster can be used to gather accurate results. Because conditions for good results are extremely rigorous, it is recommended that the counting stations at Solitude pass be checked at least every 2-3 days during peak migration so that adjustments and modifications can be made in accordance with changing environmental conditions, e.g., fluctuating snow levels.

Because some deer have a greater chance of being counted than others, a major focus of spring work should be to arrive at some estimate of the bias that could be used to calibrate Trailmaster data collected at the various recording stations. The sampling error of the Trailmaster should also be determined so that confidence limits can be set for the stations at Solitude pass. An additional goal of spring work should be to find ways to reduce the confidence limits, e.g., by increasing the number of stations at Solitude pass. Both direct observations of deer at Solitude pass and the telemetry results can be used to accomplish these goals. In addition, direct observations of deer as they cross Solitude pass may be the only way to obtain an adequate sample size for determination of sex and age composition of this deer herd segment.

Radio-telemetry

Throughout the next several years, telemetered animals will be used to determine the locations of migration routes and deer home range areas and to provide information on habitat use patterns, spatial relationships, behavior, and energetics. Telemetry precision and accuracy will be determined prior to the start of the 1994 spring migration. Beginning in early April 1994, triangulation accuracy will be determined using radio collars taped to wooden posts at surveyed points scattered throughout the project area and adjacent lands. Estimation location of each collar will be compared to the true location and the size, shape, and sampling error of error polygons will be determined.

Because deer pass quickly through the Mammoth area on their way to the winter range, a sampling design representative of the entire 24-hour cycle should be used to accurately determine the migratory routes and movement patterns of individual radio-collared deer. In addition, the frequency of sampling needed to detect the migration routes of individual deer should be increased during peak movement periods.

It is often very difficult and time consuming to determine the exact locations of receiving stations and visual observations of deer in the field. Therefore, the use of a hand-held Global Positioning System (GPS) is highly recommended. The GPS, which is available through most boating supply dealers, uses satellites to quickly provide the precise locations (UTM X/Y coordinates) of reference points.

CHAPTER 5. ACKNOWLEDGMENTS

This investigation was conducted under a contract with Dempsey Construction Corporation, Mammoth Lakes, California, with the cooperation of a Special Use Permit from the U.S. Forest Service, Mammoth Ranger District, Inyo National Forest. The design of field work was based on consultations with Dr. Ken Raedeke and Dennis Oakeshot conducted much of the field work.

CHAPTER 6. LITERATURE CITED

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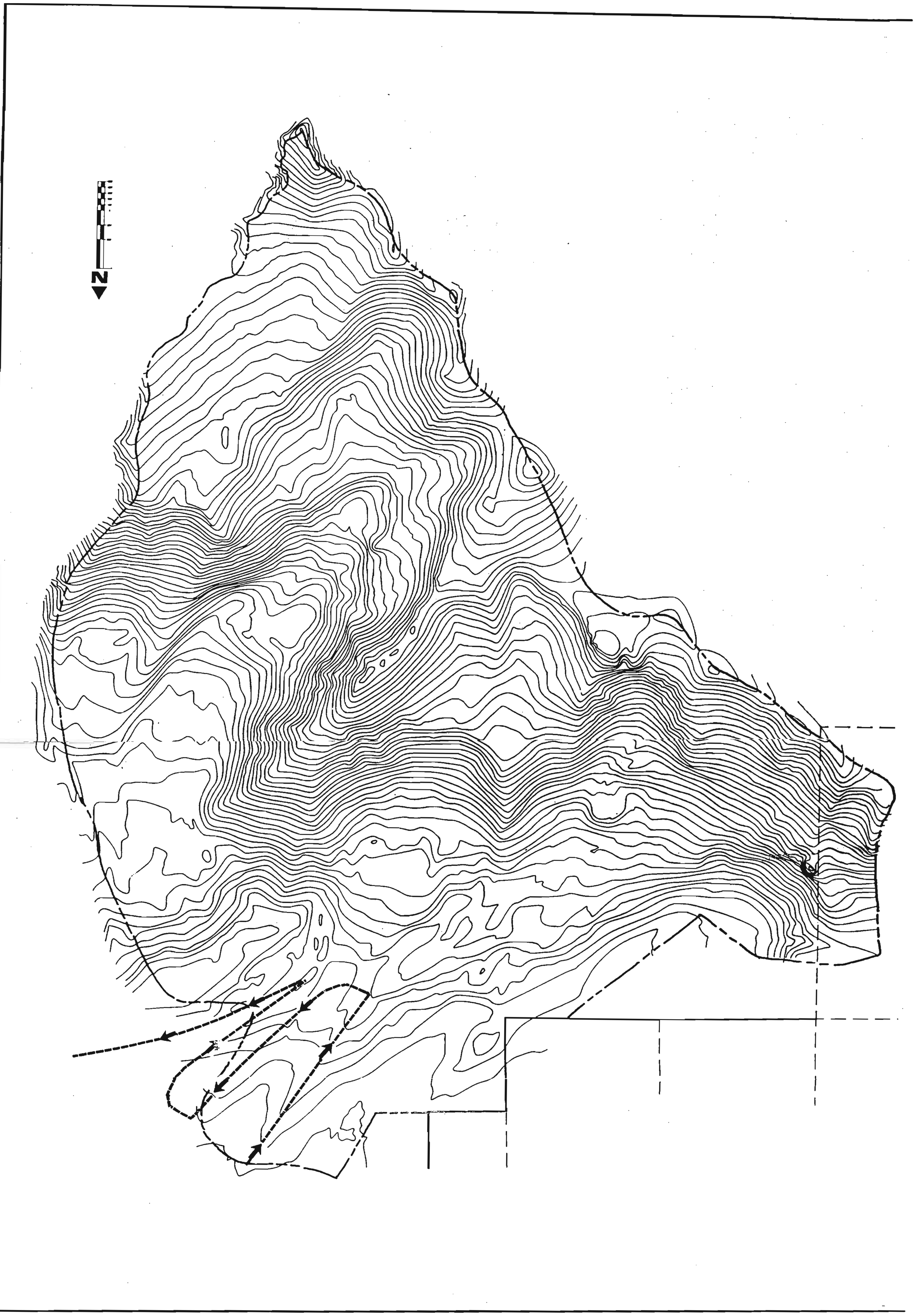
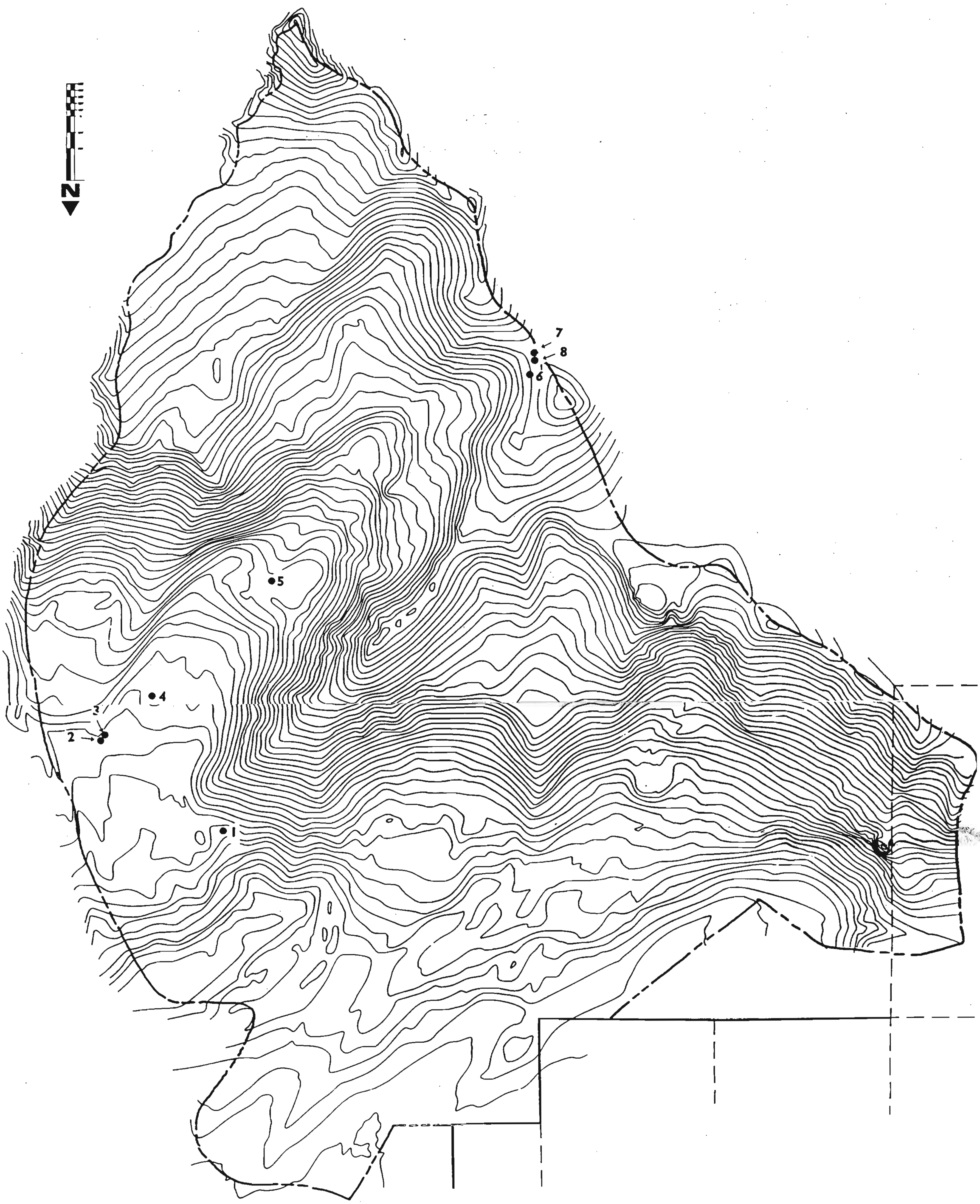


SNOWCREEK SKI AREA
SNOWCREEK RESORT
at Mammoth Lakes, California

LOCATION OF THE GROUND SURVEY ROUTE
IN THE SHERWIN HOLDING AREA

Timothy Taylor
Consulting
Wildlife Biologist

FIGURE: 3

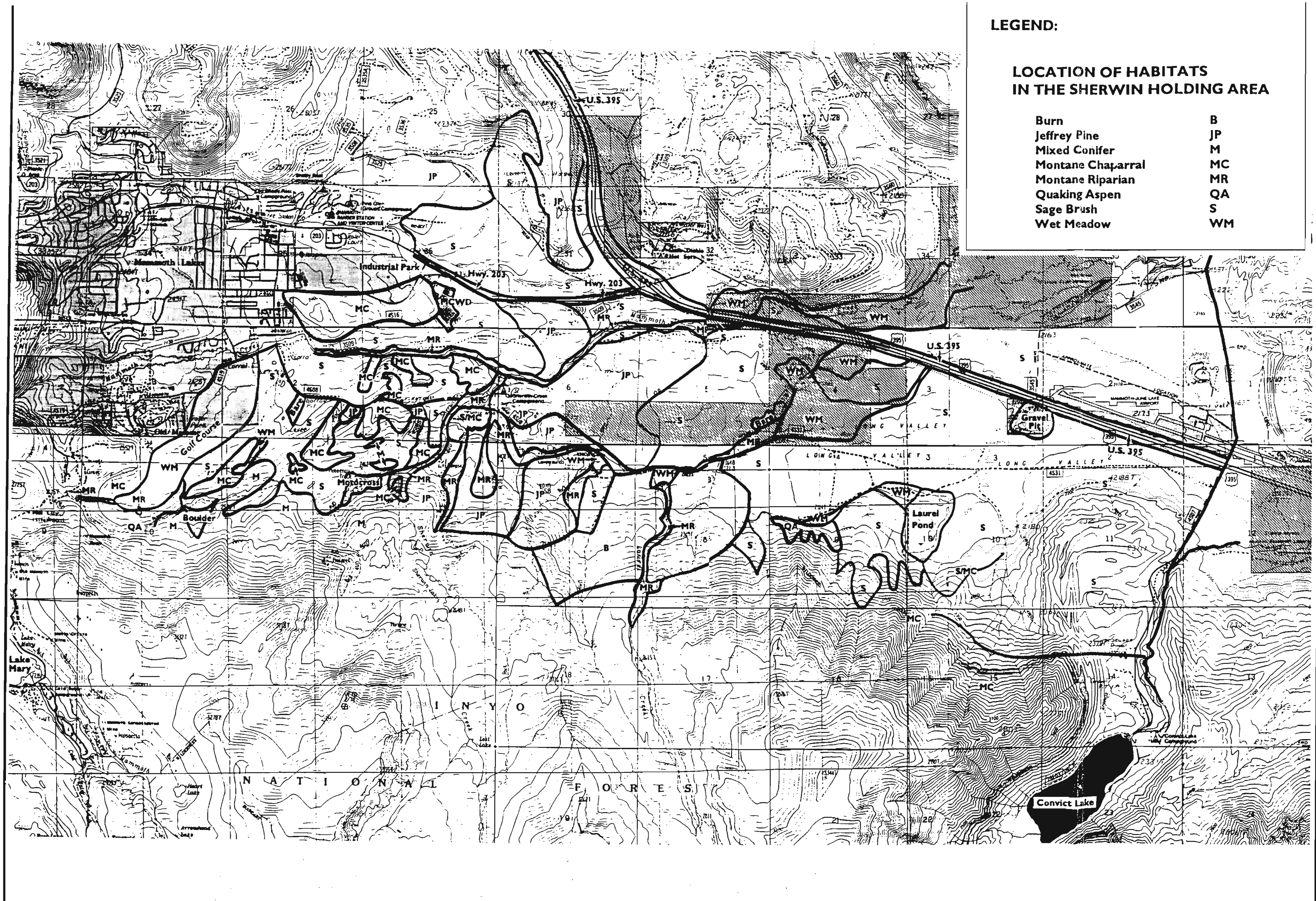


SNOWCREEK SKI AREA
SNOWCREEK RESORT
at Mammoth Lakes, California

LOCATIONS OF TRAIL MASTER DEER COUNTING STATIONS IN THE SNOWCREEK SKI AREA

Timothy Tayl
Consulting
Wildlife Biolo

FIGURE: 4



LEGEND:

LOCATION OF HABITATS IN THE SHERWIN HOLDING AREA

Burn	B
Jeffrey Pine	JP
Mixed Conifer	M
Montane Chaparral	MC
Montane Riparian	MR
Quaking Aspen	QA
Sage Brush	S
Wet Meadow	WM

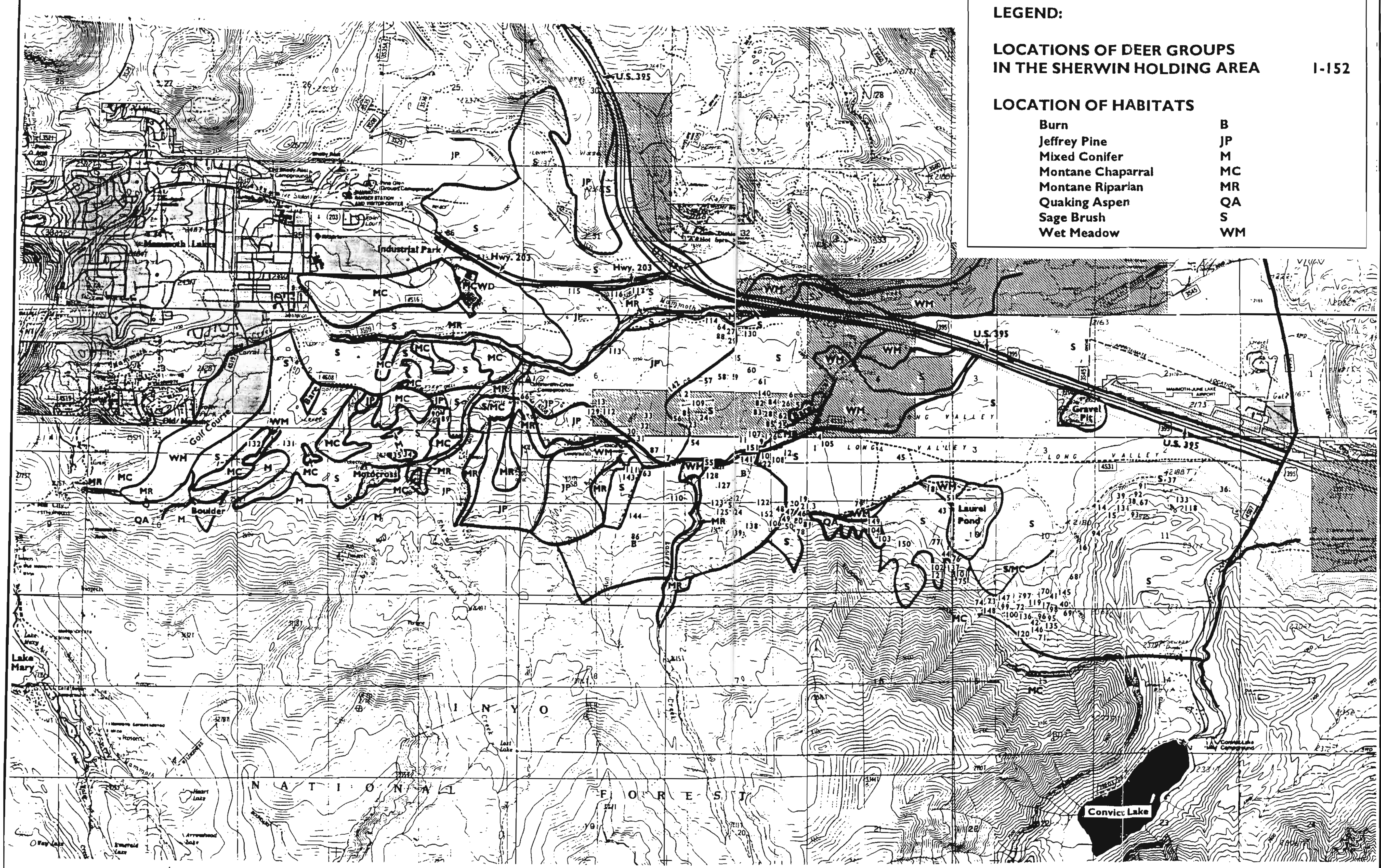
Timothy Taylor Consulting Wildlife Biologist

FIGURE: 5

LOCATION OF HABITATS IN THE SHERWIN HOLDING AREA

SNOWCREEK SKI AREA

SNOWCREEK RESORT at Mammoth Lakes, California



LOCATION OF DEER GROUPS IN THE SHERWIN HOLDING AREA

FIGURE: 8

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SNOWCREEK SKI AREA
SNOWCREEK RESORT
at Mammoth Lakes, California

APPENDIX

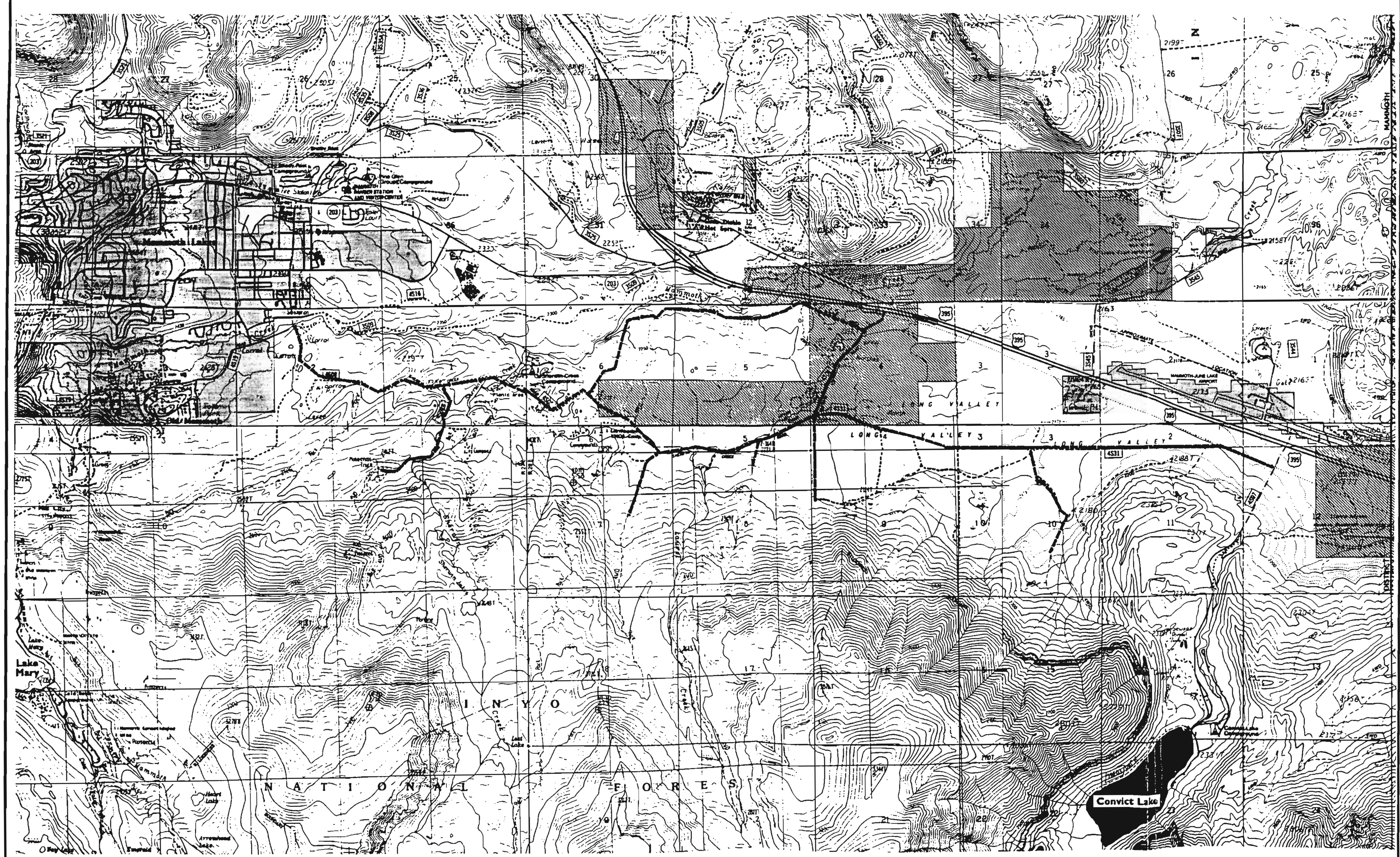
Appendix Table 1. Total number of events counted per day by the Trailmasters units located at Solitude pass, fall migration 1993.

Date	Total Number of Events per day	Percent of Total	Cumulative Number of Events per day	Cumulative Percent of Events per day
093193	1	0.3	1	0.3
101093	1	0.3	2	0.6
100293	9	2.7	11	3.3
100393	3	0.9	14	4.2
100493	5	1.5	19	5.6
101103	19	5.6	38	11.2
101293	5	1.5	43	12.7
101393	1	0.3	44	13.0
101593	28	8.3	72	21.3
101693	12	3.6	84	24.9
101793	8	2.4	92	27.2
101893	12	3.6	104	30.8
101993	11	3.3	115	34.1
102093	14	4.2	129	38.2
102193	5	1.5	134	39.7
102293	4	1.2	138	40.9
102393	7	2.0	145	43.0
102493	19	5.6	164	48.6
102693	12	3.6	176	52.2
102793	5	1.5	181	53.7
102893	9	2.7	190	56.3
102993	6	1.7	196	58.1
103093	1	0.3	197	58.4
110193	3	0.9	200	59.3
110293	10	3.0	210	62.3
110393	2	0.6	212	62.9
110493	3	0.9	215	63.7
110593	2	0.6	217	64.9
110693	11	3.3	228	67.6
110793	2	0.6	230	68.2
110993	4	1.2	234	69.4
111093	13	3.9	247	73.3
111193	2	0.6	249	73.8
111293	43	12.8	292	86.6
111393	8	2.8	300	89.0
111493	32	9.5	332	98.5
111593	5	1.5	337	100.0

Appendix Table 2. Locations of radio-collared deer located visually or by triangulation in the project area and surrounding vicinity during the 1993 fall migration.

Deer Number	Date Located	Deer Location X Coord.	Deer Location Y Coord.	Aspect (Degrees)	Plant Community Type
.210	102493	328810	4165605	N	MC
.225	101893	332105	4165420	N	B
.226	101593	330610	4164510	NE	MC
	102193	330210	4165610	NW	MC
.260	102393	332305	4165420	NE	B
.300	101593	330720	4164700	N	MC-JP
	102193	331980	4164080	N	MC
	102493	336030	4463320	E	SS
	102993	336205	4463230	E	SS
.340	101593	325080	4165075	NW	MCF
	101893	325140	4165190	N	MCF
	102193	325160	4165070	N	MCF
.350	101193	328100	4166130	E	MC
	101593	328740	4165930	N	MC
	101893	328300	4165230	NW	MC
	102693	327800	4165820	NW	MC
.510	110993	329105	4168205	E	SS
.610	102193	325300	4167020	N	LP
	110293	325210	4167050	N	LP

MC = Montane Chaparral, LP = Lodgepole Pine, SS = Sagebrush Scrub, MCF = Mixed Conifer Forest, JP = Jeffrey Pine, B = Burn



DEER COUNT SURVEY ROUTE

FIGURE: 2

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Consulting
Wildlife Biologist

SNOWCREEK SKI AREA
SNOWCREEK RESORT
at Mammoth Lakes, California