

**CRATERS OF THE MOON NATIONAL MONUMENT
MULE DEER SURVEY
2001**

2001 Mule Deer 1



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Mule deer surveys were performed during the spring and fall of 2001. These included unstructured spring surveys as well as the systematic fall surveys in the north end of the monument. Systematic road surveys were continued on the loop road in addition to the usual informal count during May and June.

The number of does while down from the last three years was above the 15 year average. Yearlings were also down with numbers less than half of 2000 and near half of the 15 year average. Over winter survival of fawns at 50% was also below the average value for the 16 years of monitoring.

The fall survey recorded numbers for all age classes, except yearling males, that were up from 2000 but well below the 15 year average. The fawn to adult ratio continued a major decline that started in 2000. This indicates either a change in previously stable birth rates or a decline in early fawn survival. The total population estimate also showed a slight increase over but was significantly below the 15 year average. This is likely a result of drought conditions for the previous 25 months.

When the data was averaged into three year intervals the deer population shows a general pattern of decline since the mid 1980s and reaching its lowest point in the current period. The numbers of all age/sex classes showed at least small increases in 1996-1998 over the previous three year period then showed a significant decline in the current period.

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Introduction

Monitoring of the mule deer population began in 1980 when Griffith (Griffith, B. 1983. Ecological characteristics of mule deer: Craters of the Moon National Monument, Idaho. Report B-83 2. Coop. Park Studies Unit. Univ. of Idaho, Moscow 109 pp.) initiated a study on the population dynamics and habitat use of the monument's deer herd. As a result of this study Griffith developed site specific Standard Operating Procedures (SOP) for the continued monitoring of the deer population using an annual spring and late summer deer survey. These surveys were first performed in 1984 and have been conducted every year since.

Methods

In accordance with the monument's Standard Operating Procedures (SOP) informal spring surveys were conducted from late April until 30 June. During this period monument staff were requested to record any mule deer sighted. Most of these observations were made while in the field conducting other duties such as ranger patrols or other wildlife monitoring. Deer sighted were classified as adult males, adult females, yearlings and unknown. Starting in the spring of 1998 systematic road surveys were conducted in addition to the usual informal survey. The spring road surveys were conducted on the loop road starting at the Visitor Center and ending at the end of the one way section of the loop road. The route used included the spur road to the tree molds parking area but did not include the road to Devil's Orchard trailhead. Six surveys were run on this route from 15 May to 29 June 2000.

From 17 August to 13 September, there were eight early morning surveys conducted from a vehicle along the 3.9 mile section of secondary road that runs from the North End gate off Highway 26 to the old Martin Mine site in the north end of the monument (appendix 2). Observations began 10 minutes after sunrise and were made in one direction only. Survey days were evenly distributed over the four week period, avoiding mornings with rain or winds greater than 10 mph. As with the spring surveys, all sightings were classified according to sex and age (adult, yearling, fawn). Surrounding hillsides, lava flows, and valleys along the route were carefully observed with the use of binoculars and a spotting scope. All surveys took approximately two hours to complete.

Over-winter survival rates were determined using the spring and previous year's late summer survey data. In order to get more normally distributed data for analysis the highest and lowest counts were dropped leaving the 6 middle surveys for statistical analysis. Population means, ratios and percent change estimates

were calculated for all age/sex classes. Population estimates and 95% confidence intervals were established using data from the six late summer surveys. Standard error estimates for each age and sex class in the late summer survey were calculated and 95% confidence intervals established using the student t-test.

Results

SPRING SURVEY

The number of adult does observed in the spring surveys was 74 (table 1). The number of yearlings was 22. Overwinter fawn survival was 50%. This was significantly below the 15 year average of 62.5%. The yearling to doe ratio was 30 compared to the 15 year average of 60. The percentage of does that were adults was 87 compared to the 15 year average of 73.

FALL SURVEY

The mean number of deer in most sex/age classes showed small increases over 2000 counts (Table 1). The only exception was yearling males which had a mean count of 0.5 in 2000 which was identical to last year and adult males which were essentially the same as in 2000 (0.8 compare to 1). Adult females at a mean of 17.7 increased from 13.8 in 1999. Fawns showed an increase from 8 in 2000 to 9.8 in 2001. The total number of deer observed also showed an incline (to 29 from 23.5 in 2000). All of these observed changes were rather small and none were statistically significant at $p < 0.05$. The fawn to doe ratio at 56 was essentially the same as last years 60. Fawn to adult doe ratios showed an even greater rate of decline falling from 132 in 1999 to 74 in 2000 and 64 in 2001.

Conclusions

The 2001 fall deer counts showed insignificant increases in all age classes except adult and yearling males. Yearling males, which usually have low counts, remained the same as 2000 and 2001 with a mean count of only 0.5. Increases in the fall counts were not statistically significant ($P < 0.05$) for any of the age groups (Table 2). The fawn to doe ratio was the lowest since surveys were started in 1984 and was less than half of the average for the 17 year period (Table 1).

This pattern may be related to weather conditions that predominated in the past two years. With the good snowpack and spring rains, 1999 experienced decent growing and forage

conditions at least into midsummer. By contrast the dry conditions of fall continued through the winter of 1999-2000 and into spring and summer. The spring and summer season (May-August) of 2000 had only 1.49 inches of rain compared to an average of 4.63 (National Weather Service, Western Region Climate Center 2000). The drought conditions continued into 2001 with only 2.45 inches of rain falling during May to August. Additionally, the peak growing season of May to June had a cumulative rainfall of 0.28 compared to 3.06 average. Incidental observations indicate poor growth and early drying of vegetation. The only surface water in the area is Little Cottonwood and Leech Creeks which dried up much earlier than normal and much higher up the stream channels than has been recorded in several years. This lack of water and forage has likely had a negative influence on fawn survival. Dry conditions will also cause deer to spread out over much larger areas in search suitable browse and open water, then concentrating animals at locations that still have water. The drought conditions caused the park to turn off irrigation water to lawns in the developed area by July. This loss of water contributed to deer concentrating in the riparian area and reducing the number of roadkills found on the highway. The number of roadkills at 5 was the lowest number (Table 1) since monitoring began in 1984.

Over-winter fawn survival was 50% compared to 55% in 2000 and 43% in 1999 (figure 3). This was a midrange value although somewhat lower than the 15 year average of 63%. The number of yearlings per 100 does was quite low at 30. This ratio was only half of the 15 year average of 60 and was lowest since 1989. The fawn ratio was low in the fall of 2000 the low yearling ratio this spring was influenced as much by low reproduction in 2000 as by overwinter losses.

Table 3 shows survey and population statistics in 3 year intervals since surveys began in 1984. Several trends are observable in this data. One is declining numbers of does and fawns in the fall survey since the mid 1980s. These data show that recent counts of these two age classes are about half of what they were in the mid 1980s. The most recent period (1999 to 2001) showed the lowest average count of fawns and the 2nd lowest for adult females. These declines are likely a result of climate and other factors already discussed. The last two year's data accounts for most of the drop with 1999 counts being near the 1996-98 levels.

Another trend in the three year data is the declining overwinter survival of fawns. Fawn survival has declined 30 percentage points since the early 1990s. This trend is noticeable for all periods since 1992. Fawn survival was down in 1999. But, even with a modest rebound in 2000 the most recent period is the lowest of any period to date.

Unlike females and fawns, male deer (both adults and yearlings) have always had comparatively low counts and they have not showed any consistent trends in their year to year numbers. This lack of trends is true both for spring (figure 2) and fall counts (figure 1). This accounts for large percentage fluctuations not having much significance. A decrease of 47% from 1998 to 1999 was less than a whole animal per survey.

One population statistic, which had previously remained relatively constant, has been the birth rate as measured by the ratio of fawns to adult does in the fall survey. This number has generally remained between 100 and 130 since 1988, except for unusually high years in 1990 and 91. Thus, population fluctuations during the last ten years are likely the result of survival rates rather than birth rates. The exception to this came in 2000. This year the fawn to adult doe ratio fell to an all time low of 74 this drop continued in 2001 with another new low of 64. This is 52% drop from 1999 (132) and the 15 year average (131) (table 1).

The total population estimates follow similar trends as the doe counts. That is declining numbers throughout the 1980s and mid 1990s with stabilizing numbers in the late 1990s and drop in 2000 and 2001. This trend was likely influenced by the occurrence of frequent drought years from the mid 1980s through the early 1990s. Throughout shrub lands of southern Idaho many stand replacing fires occurred during this time period. This included the 1992 Little Prairie Fire in the monument. These environmental conditions produced poor forage conditions compared with the first few years of deer monitoring in the monument. In the years since the drought, vegetation has begun to recover. Which may explain the stabilizing numbers in the last 4 years. Late summer 1999 through September of 2001 had similar drought like conditions and the resulting poor forage. Time will tell whether the drought and resulting population declines will follow.

Recommendations

Migration especially in the spring tends to be spread out over a several weeks. To further quantify spring use of the monument by mule deer it may be useful to expand the survey area to include walking surveys on the wilderness trail or other areas of deer use.

Annual weather patterns are also a factor in the movement of deer in the region. In years like 1998, which produce excellent forage conditions, deer may be more spread out rather than actually experiencing an apparent decline. In other years like 1999, which are unusually dry in spring and summer, deer may be more concentrated in areas of better forage or available water. In even more dry years like 2000 and 2001 when water sources dry up

the deer likely suffer higher mortality, lower reproduction, and spread out even more in search of water then concentrate when water is located. These factors will be difficult to determine without much more widespread surveys and great caution when looking at single year data. Data under these conditions is best looked at over periods of several years and for analysis of long term trends rather than year to year fluctuations.

The monument was significantly expanded in late 2000. This has brought both new lands and new deer and elk herds. The Idaho Fish and Game commission has expressed concern with potential depredation and other issues with deer and elk and it may become necessary to initiate further monitoring of deer or elk in other areas of the monument.

Table 1. Summaries for 1996-2001 Craters of the Moon National Monument Mule Deer Survey.

	1997	1998	1999	2000	2001	15 year Average
SPRING						
Adult Doe	42	120	95	87	74	64
Yearlings	21	68	38	45	22	39
Yearling:100 Doe	47	57	40	51	30	60
Over-winter Survival	47%	70%	43%	55%	50%	63%
Total Does	52	154	114	110	85	99
Adult Doe Ratio	0.81	.78	83	80	87	73
FALL						
Mean # Adult Males	3.5	3.7	3.8	1.0	0.8	3.6
Percent change	-16.7%	5.7%	2.7%	-73%		
Mean # Yearling Male	1.5	1.2	0.5	0.5	0.5	3.4
Percent change	-59.1%	-20%	-46.7%	0.0		
Mean # Adult Females	17.0	13.5	15	13.8	17.6	21.8
Percent change	-7.1%	-20.6%	18.8%	-7.8%		
Mean # Fawns	14.0	10.8	14	8.2	9.8	21.0
Percent change	-24.3%	-22.9%	22.9%	-41.7		
MEAN TOTAL	37.7	27.5	33.3	23.5	28.7	48.9
Fawns:100 Does	82.1	92	92.4	59	56	97.8
Fawns:100 Adult Does	101	117	132	74	64	131
FALL POP'N ESTIMATES	294	232	266	191	231	366
95% CI	170-417	55-409	208-324	164-217	177-285	
VEHICLE KILLS						
Adult males	0	0	2	0	0	1.4
Yearling males	0	1	0	3	0	1.2
Adult females	7	4	1	10	4	5.4
Fawns	6	7	4	7	1	5.3
Unknown	1	0	1	0		0.7
Total	14	12	7	20	5	13.6

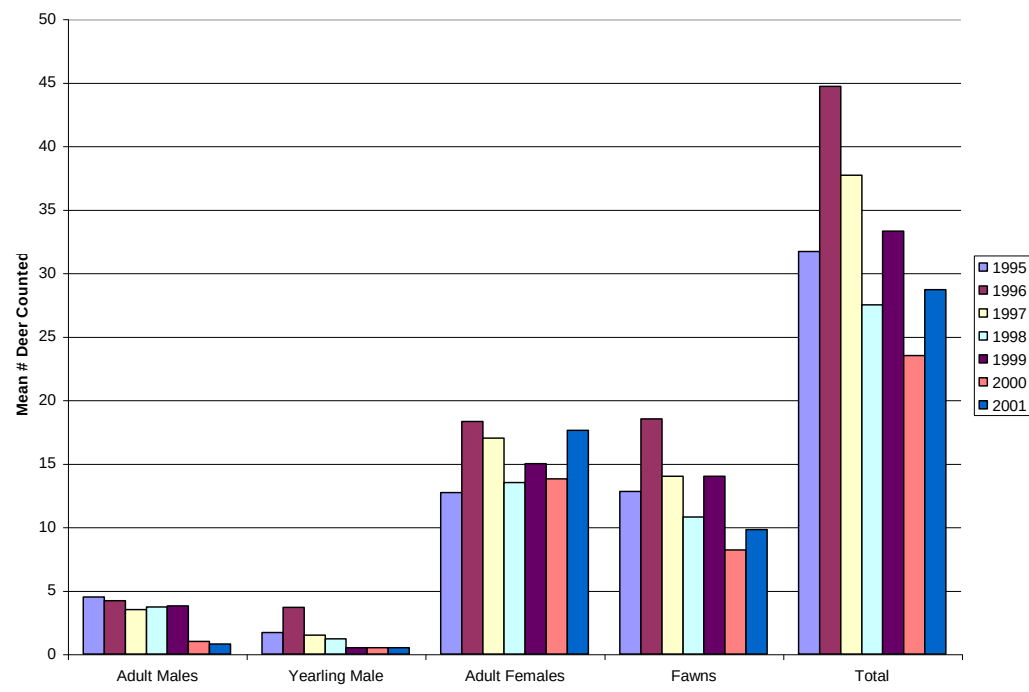


Figure 1. Mean number of mule deer counted in fall surveys 1995-2001.

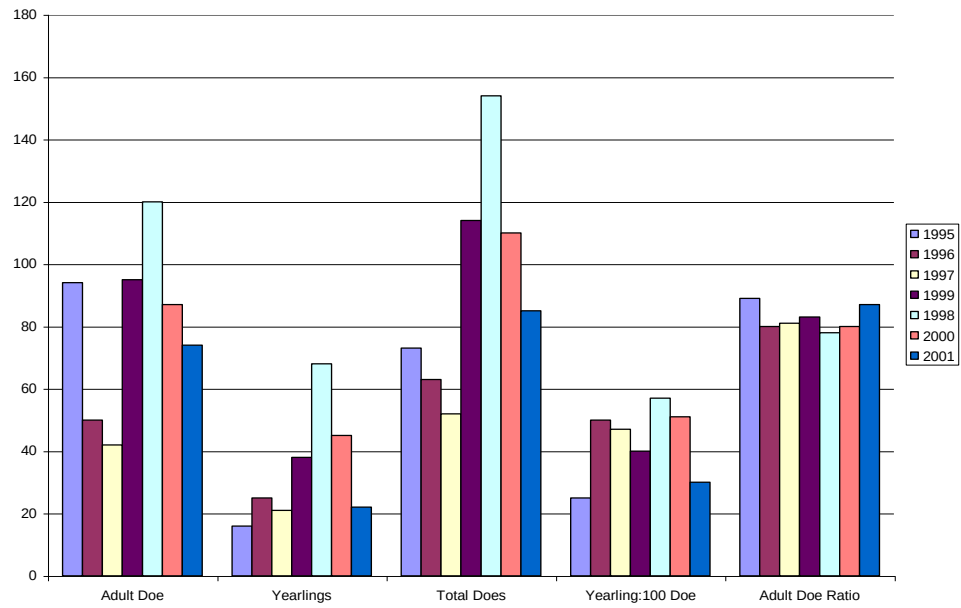


Figure 2. Number of deer counted in spring surveys 1995-2001.

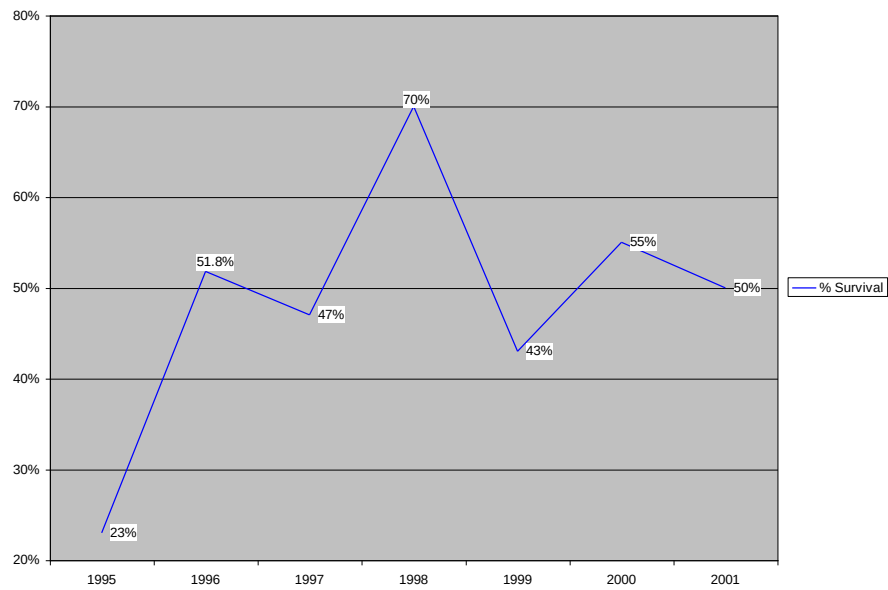


Figure 3. Percent over winter survival of fawns 1995-2001

Table 2. Daily survey totals, mean totals, and standard error figures for each class (age/sex) of deer in the 2001 Craters of the Moon National Monument Mule Deer Fall Survey.

		1st	2nd	3rd	4th	5th	6th	total	mean	SE	Significant Change
Ault males	#	1.0	0.0	0.0	1.0	3.0	0.0	5.0	0.8	0.5	0.883
	ratio	0.0	0.0	0.0	0.1	0.3	0.0		0.1		
Yrlg males	#	1.0	0.0	0.0	1.0	1.0	0.0	3.0	0.5	0.2	1.000
	ratio	0.0	0.0	0.0	0.1	0.1	0.0		0.0		
Females	#	31.0	18.0	16.0	15.0	11.0	15.0	106.0	17.7	2.8	0.246
	ratio	100.0	100.0	100.0	100.0	100.0	100.0		100.0		
Fawns	#	13.0	10.0	9.0	4.0	7.0	16.0	59.0	9.8	1.7	0.391
	ratio	41.9	55.6	56.3	26.7	63.6	106.7		58.5		
Unknown		0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.2		
Total		46.0	29.0	25.0	21.0	22.0	31.0	174.0	29.0	3.8	0.218

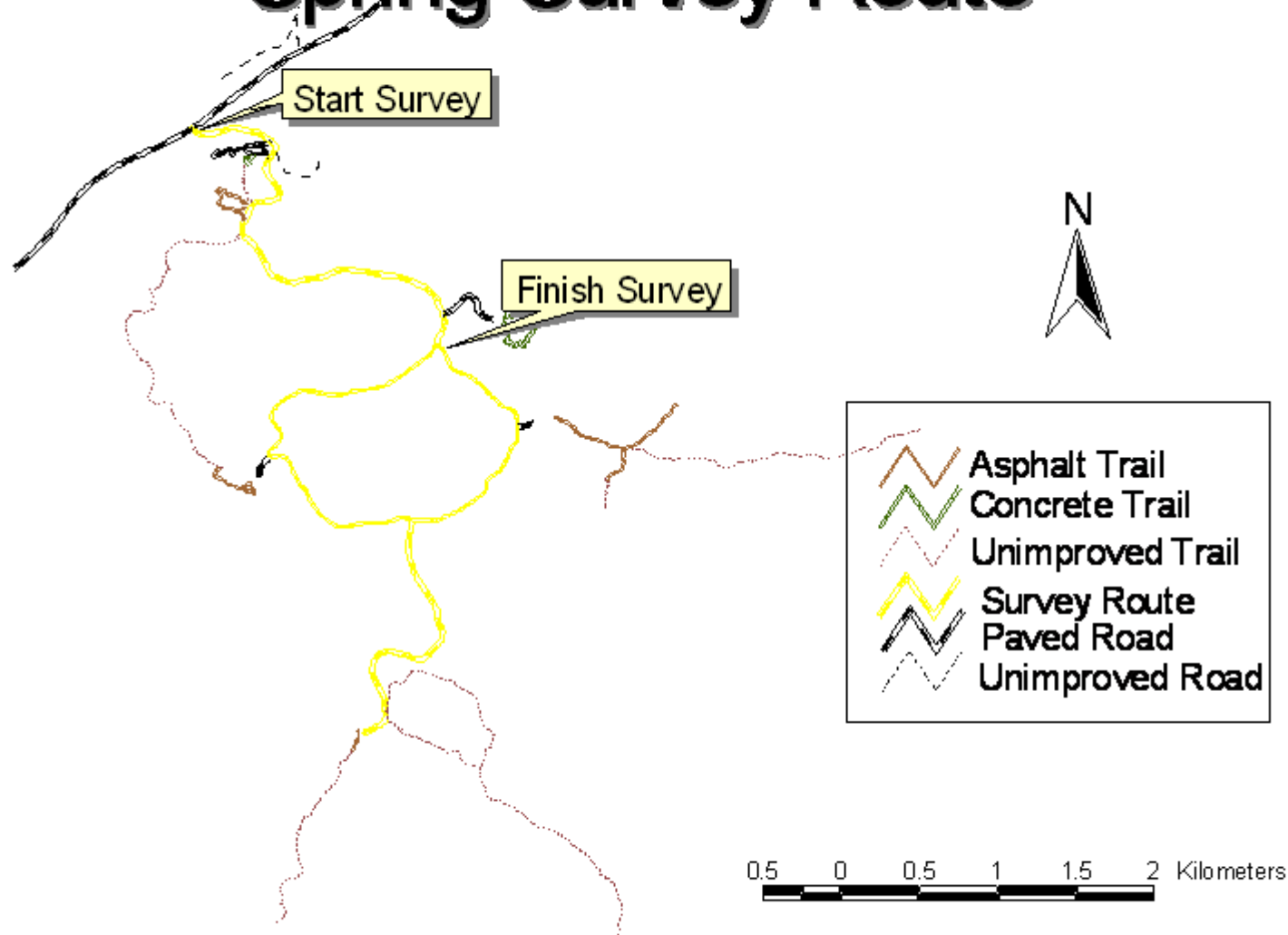
Significant change is the P value from a student t-test between means for 2000 and 1999 counts

ratio = the age/sex class to adult doe ratio for a survey

Table 3. Craters of the Moon National Monument Mule Deer Survey Summaries in 3 year intervals for the period 1984-2001.

	1984-86	1987-89	1990-92	1993-95	1996-98	1999-2001
SPRING						
Adult Doe	71	59	47	48	71	85
Yearling	62	40	41	16	38	35
Yearling:100 Doe	71	65	85	44	51	40
Over-winter Survival	68%	66%	79%	55%	56%	49%
Total Does	120	80	67	56	90	103
Adult Doe Ratio	0.74	0.76	0.71	0.82	0.80	0.83
FALL						
Mean # Adult Males	2.4	3.2	5.6	3.4	3.8	1.9
Percent Change		33%	75%	-39%	12%	-50%
Mean # Yearling Males	4.8	4.0	2.4	1.2	2.2	0.5
Percent Change		-17%	-40%	-50%	83%	-77%
Mean # Adult Females	29	27	27	12	16	12.1
Percent Change		-7%	0%	-55%	27%	-25%
Mean # Fawns	30	22	29	12	14	10.6
Percent Change		-26%	32%	-60%	17%	-24%
MEAN TOTAL	66	55	64	28	37	28.5
Fawns:100 Does	106	93	105	96	92	69
Fawns:100 Adult Does	144	123	170	116	115	90
VEHICLE KILLS						
Adult Males	1.3	1.7	1.3	1.3	0.3	1
Yearling Males	3.0	2.0	0.0	0.7	0.3	1.5
Adult Females	7.0	3.3	5.6	3.7	8.7	7.7
Fawns	9.0	5.0	1.0	2.3	7.3	5.5
Unknown	1.0	0.3	1.0	0.3	0.7	0.5
TOTALS	21.3	12.3	8.9	8.3	17.3	13.5
FALL POPULATION ESTIMATES	502	417	486	228	290	179

Spring Survey Route



Fall Survey Route

