AN AGE SPECIFIC WINTER DIE-OFF IN DALL SHEEP IN ALASKA

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ABSTRACT

Dall sheep (Ovis dalli dalli) population estimates made in summer 1982 indicated a loss of 21% among collared ewes in the eastern Alaska Range. Reports of similar overwinter losses came from adjacent mountain ranges. Severe winter weather was presumed to be the cause of this heavy mortality. Analysis of age data for ewes missing from the marked sample population showed that 77% of the missing (presumed dead) ewes were 9 years of age or older. Mortality in age classes younger than 9 years was 6%. The high percentage population loss was probably due to unusually high survival of 12-year-old ewes during the previous winter (1980-81) which was quite mild. This cohort, then aged 13 years, died along with other old-age ewes in 1981-82. Age distribution and mortality data of collared ewes are presented. Caution should be exercised in generating mortality curves for ewes.

INTRODUCTION

It is the purpose of this paper to report on ewe mortality data which has been collected as part of a long-term study of Dall sheep ecology in the eastern Alaska Range (Heimer and Watson 1982). It is prompted by a die-off of marked ewes after winter 1981-82.

In June 1982 observations at the Sheep Creek mineral lick revealed a large proportion (21%) of the marked ewes (which constitute about 10% of the ewe population) did not return to the mineral lick. As ewes are virtually certain to appear at the lick, if they are alive (Heimer 1973), missing ewes were presumed dead. A loss of this magnitude is highly unusual in the eastern Alaska Range, and was cause for concern. When reports of similar losses were received from local residents in the northern Wrangell Mountains, the Tanana/Yukon Uplands, and Sheep Mountain, Kluane Park, Yukon, corrective management actions were taken. In the study area near Tok, Alaska, the ewe hunt was closed by emergency order. This closure may, in retrospect, appear more cosmetic or philosophical then necessary.

METHODS

Ewes were marked with visual collars at the Sheep Creek mineral lick in the eastern Alaska Range during June 1977-1979. Trapping and marking techniques used were described by Heimer et al. (1980). In subsequent years, the mineral lick was monitored for collared ewes during June, the month in which lick use is most likely to occur (Heimer 1973). In 1977, 1978, and 1979, the lick was observed incidental to trapping operations from 0400 hrs to 2000 hrs daily from the second week in June through the first week in July. In 1980 the mineral lick was observed from 12-14 June and 19-28 June. Observations were made from 0400 through 2000 hrs on those dates. In 1981, 1982, and 1983, the lick was observed continuously from 28 May through 30 June. Observations were conducted from 0300 to 2000 hrs.

Collared ewes not returning to the lick were presumed dead in the year they first failed to return (Heimer 1973). Each year's "deaths" were checked by noting if the missing individual was seen in the following year. They were then either "confirmed as dead" or re-entered as still living in the population. Some deaths were confirmed through hunter kills and the discovery of dead ewes.

The list of "confirmed" dead collared ewes for each year was divided into 2 age groups: those less than 9 years of age at death and those with ages greater than or equal to 9 years at death. Hunter killed ewes were deleted from both groups. Annual percent natural mortality in each age group was derived by dividing the number dead by the total number living at the end of mineral lick observations.

RESULTS

In June 1982, 14 of a possible 62 marked ewes failed to retun to the mineral lick. One of these ewes was seen in 1983 so the confirmed overall mortality was 13/62 (21%) of the marked population. Of the 62 total collars in the population, 13 were 9 years of age or older. Ten of these 13 ewes died. These 10 ewes were 77% of the total year's mortality of 13 ewes. This compares with an annual 5% mortality averaged over the previous 3 years for ewes 9 years old or older. Mortality during the difficult winter was 15.4 times that of earlier years for ewes of this age group.

Among ewes less than 9 years of age, mortality documented for winter 1981-82 was 3/49 or 6% (Table 1). This is identical to the average for the preceeding 3 years. Sample sizes among each cohort of marked ewes and the mortality percentages by age class are given in Table 2.

Table 1. Collared ewe mortality due to natural causes and hunter kill by age group.

Year of observation	Total collars possible			Mortality by hunters			Mortality Overall natural mortality			Mortality % Overall mortality		
	Combined	<9yrs	≥9yrs	Combined	<9yrs	≥9yrs	Combined	<9yrs	≥9yrs	Combined	<9yrs	≥9yrs
1979	24	22	2	0	0	0	2	2	0	8	9	0
1980	72	65	7	1	1	0	?*	?*	?*	5*	4.5	8*
1981	71	64	11	1	1	0	9	8	1	5*	4.5*	8*
1982	62	49	13	0	0	0	13	3	10	21	6	77
1983	49	35	9	0	0	0	11**	8	3	22**	23	34

* Mortality averaged over 1979-80 and 1980-81; mineral lick observations not continuous in 1980.

** Mortality for each year is affirmed the following year. These mortalities to be reaffirmed in 1984.

Table 2. Cohort sample sizes and percent mortality by age class among collared ewes by year.

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1977	0	0	6	0	0	0	0	0	0	0	0	0	0	0
1978	0	6	3	9	1	0	3	0	0	2	0	0	0	0
1979	7	13	8	9	15	7	4	4	1	3	2	0	1	0
1980	0	7	13	8	9	15	7	4	4	1	3	2	0	1
1981	0	0	7	13	8	9	15	7	4	4	1	3	2	0
1982	0	0	0	7	13	8	9	15	7	4	4	1	3	2
1983	0	0	0	0	7	13	8	9	15	7	4	4	1	3
Total	7	26	37	46	58	52	46	39	31	21	14	10	7	6
Total mortality	1	3	1	1	3	2	3	5	5	1	2	1	3	-
Percent mortality	14	8	3	2	5	4	7	13	16	5	14	10	43	-
Percent survival	86	92	97	98	95	96	93	87	84	95	86	90	57	-

DISCUSSION

The notable result of comparisons in mortality between the 2 age groups is the magnitude of percent mortality among ewes 9 years old or older during the 1981-82 winter. We realize that sample sizes are small, but we suspect the 15.4-fold increase in mortality recorded among older ewes that winter was caused by decreased ability to survive unusually severe weather.

Weather data from stations on either side of the study area (Northway 100 km east and Delta Junction about 100 km west) show winter 1981-82 was one with greater than average snowfall, and lower than average temperatures during February and March (National Oceanic and Atmospheric Administration 1982). These data indicate those months were more severe than normal.

The low average mortality for ewes in the age classes above 9 years before 1981-82 is probably indicative of unusually mild conditions during the years from 1979 to the difficult winter of 1981-82. During these years, mortality among all age classes of ewes was low, and the population increased. This increase was due to good production and recruitment (Heimer and Watson 1982), a function of mild winters as well as very limited mortality in older ewe cohorts. Hence, the difficult winter of 1981-82 resulted in a percentage loss that was most impressive among the marked ewes, but which had minimal actual impact on the population. Ewes which were lost were, for the most part, near the end of natural life expectancy.

We support the conservative management actions taken in this case, and always recommend conservatism when there are questions about correct procedures. Still, our experience shows the possible consequences of applying population mortality figures across ages classes when they are, in fact, specific to a given identifiable cohort or group of cohorts.

The age-specific mortality rates in Table 2 appear to indicate an increase in ewe mortality at about age 8. This survivorship pattern (Fig. 1) is similar to that reported for bighorn ewes by Bradley and Baker (1957), and similar to that found in Dall rams in the Alaska Range by Murie (1944). It is more difficult to rationalize a sudden increase in ewe mortality than in ram mortality since ewe behavior shows no documented changes at this age. Of course, ram behavior changes markedly with attainment of Class IV status at 8 years of age (Geist 1971). Still, the apparent increase in ewe mortality represents only a doubling of the mortality rate compared with ewes of the young age group. Further data will be required to clarify the overall picture.

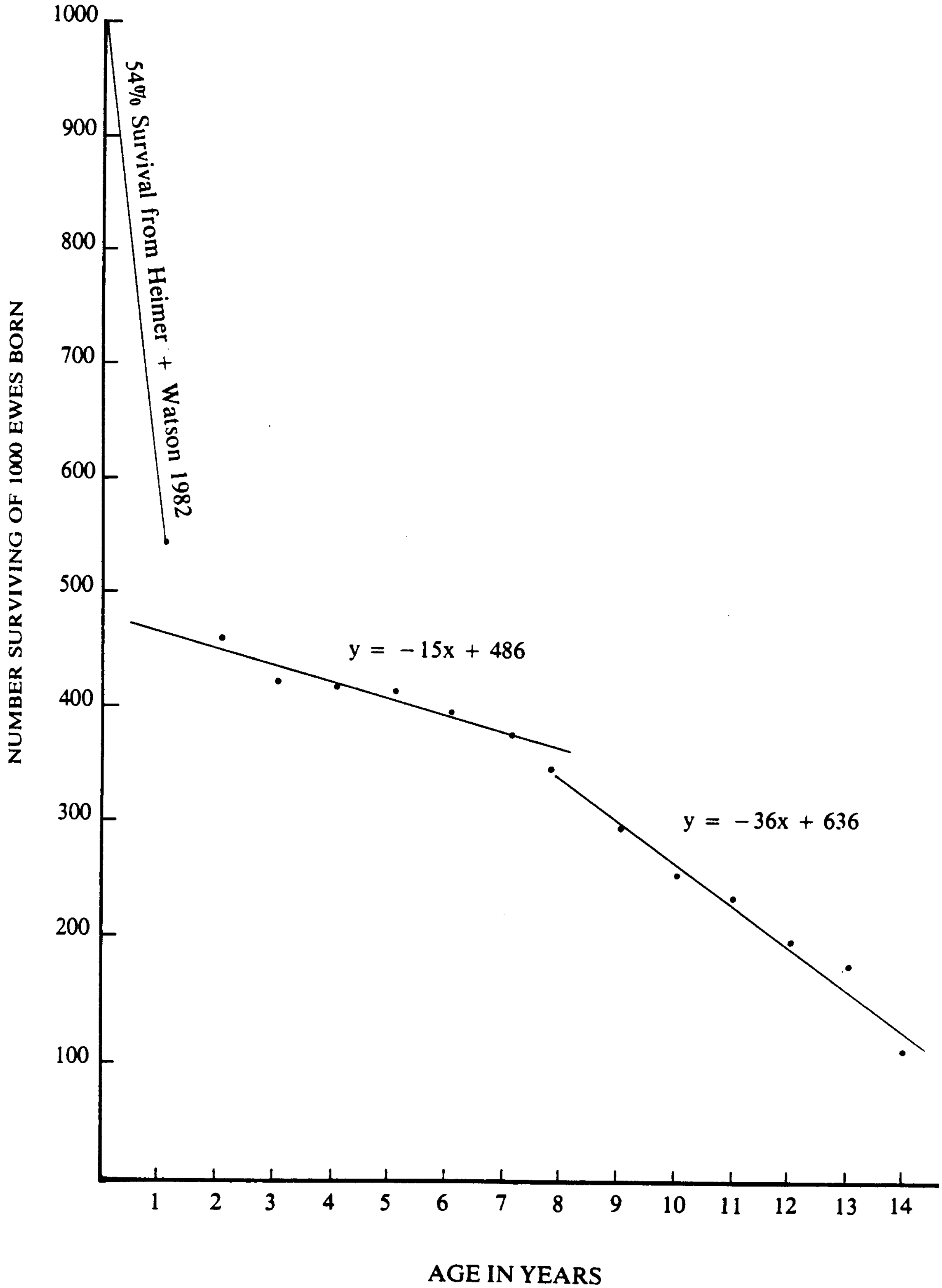

Fig. 1. Observed survival of marked Dall ewes from Sheep Creek, eastern Alaska Range expressed per 1,000 ewes born.

The high mortality between ages 1 and 2 is also worthy of note. It is clearly different than the other measured mortalities for ewes less than 7 years old, and we attribute it to the very small sample size for that cohort (n = 7).

We also note the observed mortality pattern would be greatly different if winter 1981-82 were not included in the data set. Had we omitted this difficult winter from the data set, calculations would have indicated very little effect of advancing age on ewe survival until incredibly old ages were reached. Simmons et al. (1984) reported a mortality pattern different from the one which appears to be developing here, and those cited above. The methods applied in Simmons et al. (1984) were quite different than those used in this study. We believe our work highlights the dynamic nature of Dall ewe mortality. When attempting to characterize a general phenomenon rather than reporting on a time-specific event, it is desirable to work over the longest practical time span.

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