AN EVALUATION OF WOLF STUDIES CONDUCTED IN GAME MANAGEMENT UNIT 13, 1957 THROUGH 1968.

by
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This evaluation of the Nelchina (Unit 13) wolf study is based upon the stated objectives of a study inaugurated by the U.S. Fish & Wildlife Service in 1957 (R.F. Scott, Memo to Regional Wildlife Administrator, 1956) and the objectives of the wolf studies conducted by the State of Alaska from 1960 to the present time. Objectives of the two programs overlap considerably but because of program changes after Statehood, notably a decreased emphasis upon formal predator control, there are some significant differences in stated objectives.

The Federal program was a statewide all encompassing program with the major emphasis on obtaining accurate statistics on predators and other forms of game from all personnel, evaluating the predator control program and gathering biological information on wolves. The Nelchina study area (Unit 13) was intended as a demonstration area.

The procedures listed under the three general objectives were very comprehensive and if carried out would have resulted in a comprehensive study of the interrelationships of wolves and their prey and the effects of various poisons on wolf population levels.

The States program of wolf study has been equally widespread but the objectives were designed to provide an understanding of the life history and dynamics of wolf populations under varying degrees of stress and to continue using the Nelchina study area as a demonstration area. Here, as elsewhere, the primary prey species, moose, caribou and sheep, were the subject of concurrent studies designed to reveal their abundance, productivity, the magnitude of the harvest by hunters and their overall wellbeing.

The basic difference between the two studies is that the Federal portion of the work revolved around evaluating a predator control program whereas the continuing studies of the State were designed to establish parameters useful in managing both the wolf and the prey species.

Long term management objectives were not available to the individuals who designed either study, but I assume the State's management program is guided by the constitutional provision of maximum sustained yield.

This summary evaluation is comprised of six sections and it is based on data that were collected by biologists and cooperators from all walks of life over the past 15 years. The six sections follow: 1) the wolf population and its foods, 2) the moose population, 3) the caribou population, 4) the sheep population, 5) public opinion, 6) discussion and recommendations.

THE WOLF POPULATION

There are no estimates of wolf numbers in the Nelchina Basin prior to 1953, when Burkholder as quoted by (Atwell 1962) estimated that there were not more than twelve wolves remaining in the area (Figure 1). Subsequent estimates, at least until 1960 were also based upon his general observations and knowledge of the area. In 1961 and 1962 population estimates based upon census efforts suggest that the 1958 estimate was too high. Even in wolf populations that are increasing, short term fluctuations caused by unusual mortality to pups in a given year, may significantly reduce their numbers in any one year. This is particularly true of an animal such as the wolf that has a tremendous capacity to increase. Thus the observed variation between the 1958 estimate and the 1961 and 1962 censuses may represent real change rather than any inaccuracy in estimates or census techniques. Whatever caused the apparent fluctuations, it is not particularly important to the long term study. The important fact is that the population did increase rather slowly and reached a peak of abundance in 1965 (Figure 1).

In 1967, duplicate surveys suggested a considerable reduction in wolf numbers (Figure 1). The cause of reduction can be related to two or three happenings, 1) changes in migration patterns of Nelchina caribou, 2) illegal aerial hunting in Game Management Unit 13, 3) apparent poor survival of pups during the summer of 1967.

1. In 1965, most of the Nelchina caribou moved into Game Management Units 11 and 12. Apparently large numbers of wolves accompanied them and many were killed by aerial hunters. The harvest of wolves in these units increased considerably concurrent to this egress of caribou (Table 1). Portions of the Nelchina caribou population continued these aberrant migration patterns in 1966 and 1967. The harvest of wolves in Unit 11 and 12 remained high though they have not equaled the 1965 harvest. This too suggests that wolves are not as readily available as demand for wolf pelts is good and bounty hunters are interested in hunting close to supply stations.

2. Illegal hunting, particularly in the northwest portion of the Unit 13 commenced on a large scale in 1965 and continued through 1966. The effort in 1965 was considerable and an estimated 64 wolves were taken.

3. If the 1965 population estimate was accurate then the combination of illegal hunting and egress with caribou should not have been sufficient to depress the population severely, as wolves have the capability of increasing by 50 to 60% each year if conditions are optimal for pup survival. In fact, pups comprised 60% of the wolves harvested in Unit 13 and adjoining areas in 1966. As mentioned earlier, high natural mortality to young-of-the-year in heavily exploited populations can precipitate a population failure similar to what occurred to the Nelchina wolf population.

Some information is already available from the 1967-68 hunting and trapping season and from the censuses. There data strongly suggest that few pups produced during the summer of 1967, survived to the fall. Within a few weeks confirmation or repudiation of this hypothesis will be available. Earlier work (Rausch, 1967) suggests that pack size is directly related to population density. The average pack size in the Nelchina is reduced from previous years.

At this time all indices and population parameters suggest a much reduced wolf population in the Nelchina Basin. The recent aerial hunt tends to corroborate indices used to project the population level as approximately 122 aerial hunters have reported harvesting only 69 wolves through April 3, 1968. Ground hunters and trappers killed another 26. Whatever the reasons for the population decline and in all probability no single factor was paramount the most discouraging aspect was the Department's total inability to enforce the regulation against aircraft hunting during 1965 and 1966. Somehow, this deficiency must be corrected if any of our big game populations are going to be managed appropriately.

WOLF FOODS

The basis for all problems between wolves and humans is the formers dietary habits. Wolves eat big game that men covet. Because the effects of this utilization of big game has never been adequately quantified, man has assumed the effects are largely undesirable.

Slowly, ever so slowly, this broad proposition is being split into manageable questions that should eventually measure each situation in proper perspective.

At present we are still attempting to measure what wolves eat during the various seasons when they have a choice of foods as they do in Unit 13. A summary of foods found in the stomachs of 1128 wolves killed in interior and south central Alaska from 1959 through 1967 is presented in Table 2.

These data show that moose is the most important food during the winter months. The information presented may not be representative of Unit 13 because the samples are heavily weighted with specimen material from Units 19,20 and 21. Moose are more abundant than caribou in most portions of these units. The reverse is true in unit 13. A partial listing of dead animals observed in unit 13 from 1957 to 1968 reveals 71 moose, 61 caribou and 1 sheep. Most, but not all, of these animals were killed by wolves. Some undoubtedly had died of malnutrition. In 1962 examination of 45 dead animals suggested only 18 had been utilized by wolves. Of course, snow depths were tremendous in 1962 and a large number of moose perished. Carcasses of caribou and sheep disappear more rapidly than moose and therefore may be under represented in aerial observations of kills.

Moose are much larger than either caribou or sheep and therefore constitute more meals per animal. This fact may have influenced the stomach analysis data but it does not diminish the importance of moose in sustaining wolf populations.

Wolves do use a variety of foods even during the winter, including other wolves, but the overall importance of small mammals is not known. I assume that hares may be important food items during the summer months, especially during periods of abundance.

Studies conducted in Canada and on Isle Royale National Park show that beaver are used extensively in some situations. Marmots and ground squirrels, available only during summer months, may also be used.

MOOSE POPULATIONS

Records of the abundance of moose in the Nelchina Basin are not available prior to 1952 when the first aerial surveys were flown by the U.S. Fish & Wildlife Service, Bureau of River Basins.

Interviews with long time residents suggest moose have been abundant in portions of the area for at least thirty to fifty years. Sex and age composition counts from a number of separate areas within the study unit have been gathered every year since 1952. Sample sizes with the exception of 1959 have been adequate to reveal general trends in each year. More recent studies suggest that pooling of the information from all moose populations within the study unit may mask local variations that are significant to annual management decisions. But for the purposes of a general examination of the status of moose within this 20,000 to 30,000 square mile area I have assumed there is sufficient similarity in at least

several of the basic parameters of population condition, calf survival and annual harvest of males, to use them to characterize herd status. Supplementary data such as pregnancy rates and age composition of the herd which are too detailed to present here, support this view for specific areas. Calf production is portrayed in Figure 2 and the annual harvest is shown in Table 3. There appears to be three peaks and troughs of calf survival to about 6 months that are not of equal amplitude. The extreme high production of 1953-54 cannot be adequately explained. Most of the counts were made on central portion of Unit 13 where production of calves has been good for years. This may have biased the production figure for 1953-54. Similar population explosions of moose have been observed from time to time on a number of ranges in Alaska. Subsequent crashes in calf survival have invariably followed these highs, though the total population almost always remained high at least initially. Examples of such population explosions are the Alaska Peninsula, Koyukuk River, Middle Yukon-Tanana Valley and at present the Copper River Herd east of the Copper River, though there has been no crash as of yet in the latter example. The lowest estimates of calf survival, 1956, 1962 and 1965, all correspond with extremely severe winters, with 1962 being the most dramatic; at least we have the greatest amount of information concerning this die-off of moose. In 1966 and 1967, the calf crop was relatively good, particularly in those areas where hunters are killing a significant number of moose.

Over the entire period of study wolves may have depressed local moose populations or held them at static levels, but it is extremely doubtful that they had significant effect on the numbers of moose, particularly in view of the fact that two of the lowest periods of calf survival, 1956 and 1962, occurred before wolves were truly abundant. The annual kill by hunters, another measure of the availability of moose, shows little fluctuation in annual harvests since harvest tickets were introduced in 1963, (Table 3). Hunting pressure is not increasing rapidly (see license sales and tag issuance projections Table 4). About 4,000 hunters are using the Nelchina Basin for purposes of hunting moose and with the existing roads, lakes, rivers and airfields 1200 - 1400 male moose is about all these people will harvest.

In 1965, I estimated the total moose population within the area to be between 25,000 and 30,000. At present I see no reason to readjust this admittedly rough estimate. Approximately 6,000 moose were counted on annual sex and age composition surveys in 1965 and 1967 on selected portions of the area. In all probability, the moose population will continue to fluctuate in abundance and the best correlation with population adjustments will be with the extremes of climate rather than influences of man or wolves. This prediction could change with the advent of more liberal seasons, or with construction of additional access.

THE CARIBOU POPULATION

Caribou in the Nelchina Basin and associated areas have been subjected to comprehensive studies since the late 1940's. Ron Skoog who did much of the work starting in the 50's believes the Nelchina Basin is a core area, one possessing all the attributes of good caribou range. The caribou story has been one of constant increase at least until 1965 when most of the animals left what traditionally was thought of as "The Nelchina Wintering Areas." By 1962 the population was estimated at about 70,000 plus or minus 18,000 based upon a random stratified census (Siniff & Skoog, 1964).

Harvests have been erratic (Table 5). Estimates of harvest have never exceeded 8,000 animals even with an August 10 to March 31 season and with a bag limit which has varied from two to four to three animals per hunter. The accessibility of animals to the roadside hunters apparently determines the magnitude of the kill. It should be noted that Skoog and others predicted that seasonal movements of the herd would become erratic as herd size increased. These predictions have been born out. In the spring of 1967, a census of the calving segment, primarily cows, using the traditional calving grounds suggested a post-calving population of 61,000 animals (Hemming, 1968). This estimate, however, did not include the animals around Mankomen Lake, Mentasta Pass, Mount Sanford, nor the unknown egress that took place into the Tetlin area and Nutzotin Mountains in 1965. Clearly a substantial population remains on the traditional areas at least part of the year and the populations in the surrounding areas

have increased greatly either by egress from the Nelchina Herd or from natural increase of residual populations whose existence has been known for a number of years. The rapid increase probably resulted from both reasons.

The annual kill by humans mentioned earlier is greatly influenced by the proximity of the herd to the highway system. Increased harvests are dependent upon an increased number of hunters or better access. Competition between man and wolves for caribou has not occurred at this time. Calf crops are good and caribou abundant.

THE SHEEP POPULATION

Studies of dall sheep in this area have been limited to an accurate assessment of harvest since 1962 and periodic aerial surveys since 1949. While hunting only three-quarter curl rams may have altered the sex composition of the population, wolves seem to have had little impact on total abundance of sheep. In the southern Talkeetna Mountains, part of Unit 13 and adjoining 14, Scott, 1951, estimated a population of 626 sheep. In 1967, Nichols and Erickson counted 1295 sheep on this range, (Nichols,1968). The Watana Mountain sheep population which is near the center of the best wolf range in Unit 13 and which is isolated from other sheep range persisted throughout this study and 222 were counted in 1967. The harvest of 3/4 curl rams in unit 13,11, and 20 has been remarkably stable over the past several years. The trends in harvest and hunter participation are shown in Figure 3 and 4 and Table 6.

While wolves undoubtedly use sheep, food habit studies based on observation of 1128 stomachs, Table 2 suggest winter use of this

food is proportionately low. Unusual winter conditions may change patterns of food usage (Murie, 1944). The extent that wolves eat sheep during the summer has not been determined. This is one of the objectives of current studies of wolves denning in the alpine areas utilize lambs during the summer months, but the significance of their use to the welfare of a trophy species is conjectural, at best.

PUBLIC OPINION

Public opinion which has had, and continues to have, a considerable influence upon the management of wolf populations has changed during the past 15 years. I believe the Unit 13 demonstration area has been a most effective instrument in helping bring about this change.

Exact measurements of intangibles like public opinion are impossible. Perhaps the spoken and written ideas of those individuals who are willing to be heard is our best gauge. If so, the change in attitude from the middle fifties to the late sixties is dramatic indeed.

I assess the present intense public interest in the management of wolves to mean a large number of people are interested in retaining wolf populations at levels of abundance that will not jeopardize their continued existence and will allow for sport hunting and trapping. Public opinion seems to be turning against wolf control involving non-selective means i.e. poisons of all types, summer trapping, bounties and unrestricted aerial hunting. The Department, however, must have some management tools at their disposal to affect management (control) of carnivore populations when their use of ungulates competes signifi-

cantly with other human utilization or when such use jeopardizes the survival of a species. In interior and arctic Alaska, public hunting from aircraft is the most efficient management tool. Some people enjoy it and the harvest results in direct economic benefits.

SUMMARY & RECOMMENDATIONS

In Unit 13, during the period of 1953 to 1967 utilization of the wildlife resource undoubtedly increased. In fact, the area is probably the most important recreation area in Alaska. The only possible challenge would come from the Kenai Peninsula. Access to the area through road construction and improvement plus technical advances in design and construction of airplanes, tracked vehicles and other off-the-road vehicles have contributed to this increased exploitation. More recently, the sales of hunting licenses and the distribution of moose harvest and sheep harvest tickets strongly suggest that interest in hunting by residents is decreasing. At least proportionately fewer people are participating in hunting.

Management of this complex of carnivores and ungulates must recognize changes in human attitudes as well as changes in the numbers of animals and their habitat. The Nelchina wolf population probably will be most beneficial to all interests if it is managed at a level where some sport hunting can be allowed each year. I suggest that to attain this goal there should be from 200 to 300 wolves in the fall population. Downward population adjustments of wolves might be advisable following exceptionally severe winters or other major catastrophies to ungulates such as disease. For example, brucellosis is prevalent

in the Nelchina herd but at a low level. Under optimal conditions of stress or other unknown factors it could become a major decimating factor resulting in a much reduced survival of calves. Then serious thought might be given to reducing utilization by wolves and humans; however, there would be no assurance that intense exploitation might not be the "best cure".

Methods for utilizing the surplus wolves should include sport hunting and trapping. If surpluses exist by midwinter, I recommend recreational aerial hunting even though it is controversial. General aerial hunting without check in and check out procedures can only lead to severe management problems resulting from over utilization of the wolf resource. This may have occurred this year. The Nelchina Basin has so many lakes, ridges, rivers and other features where aircraft can land to retrieve wolf carcasses that such a reduction is inevitable and as mentioned before, it may have already occurred.

While exact relationships between wolves and their prey were not obtained from the study, that is, the physical condition of prey utilized has not been adequately characterized. A great deal of worthwhile information concerning the rate wolf populations may increase and their effect upon lightly hunted moose, caribou and sheep was obtained. I conclude that at the level of exploitation experienced, there was no significant conflict during the study between humans and wolves for utilization of the ungulate resource. Public attitudes toward wolves

have changed during the past 15 years and the Nelchina study may have been extremely important in this education effort. The public clearly wants a rational management of all game including carnivores. Furthermore, direct control of carnivores by the Department will probably be limited to aerial shooting or chemo-sterilants. The use of poisons, strychnine, 1080, or cyanide in interior and arctic Alaska, none of which are truly selective, cannot be justified, nor will the public accept such antiquated management tools.

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Table 1. Harvest of wolves Units 11, 12, 13, 14

	Year					
Unit	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68
11	21	24	30	117	70	
12	26	17	24	47	38	
13				64*	31*	95**
14	3	8	11	19	30	

*Minimum estimates of illegal take based on interviews and bounty records of suspected violators.

**Known legal harvest reported through April 3, 1968; at least 20-25 wolves were taken illegally prior to the legal aerial hunt.

Table 2. Wolf foods based on examination of stomach contents, November - April, 1959-1967, Alaska.*

(Units 11,12,13,16,19,20,21,25)

Method of Take	Total No. Stom.	Empty #	%	Total No. Food Occ.	Moose #	%	Caribou #	%	Sheep #	%	Hare #	%	Grouse #	%	Unkn. #	%	Debris #	%	Wolf #	%
Aerial Shooting	696	289	(41.5)	409	284	(69.4)	75	(18.3)	1	(.2)	14	(3.4)			13	(3.2)	2	(.5)	5	(1.2)
Ground Shooting	95	33	(34.7)	65	34	(52.3)	5	(7.7)	2	(3.1)	10	(15.4)			2	(3.1)	1	(1.5)	3	(4.6)
Trapping	238	113	(47.4)	132	45	(34.1)	34	(25.7)			17	(12.9)	9	(1.8)	5	(3.8)	21	(15.9)	9	(1.8)
Snaring	72	36	(50.0)	38	10	(26.3)	8	(21.1)			7	(18.4)			2	(5.3)	4	(10.5)		
Unknown	27	12	(44.4)	15	2	(13.3)	5	(33.3)	1	(6.7)	6	(40.0)								
All Methods	1128	483	(42.8)	659	375	(56.9)	127	(19.3)	4	(.6)	54	(8.2)	1	(.2)	22	(3.3)	28	(4.2)	9	(1.4)

* Trace Items

#	%	
4	(.6)	Beaver
10	(1.5)	Vegetation
1	(.2)	Spruce
4	(.6)	Cervid
3	(.4)	Paper
7	(1.0)	Unident. Bird
5	(.7)	Unident. Fish(Salmon)
1	(.2)	Sm. Mammal
1	(.2)	Lynx
1	(.2)	Porcupine
1	(.2)	Salmon
1	(.2)	Unident. Hair

Table 3. Harvest of moose in Unit 13, 1963-1967

Year	Male	Female
1963	1,385	343
1964	1,213	394
1965	1,213	No season
1966	1,336	181
1967*	1,217	314

*Late season shortened by 10 days.

Table 4. Hunting license sales by calendar year, 1959-1967**

Year	Resident Hunting	Nonresident Hunting	Subsistence (25¢)
1959	27,517		
1960	30,376		
1961	34,519		3,005
1962	34,609		2,925
1963	36,453	4,842	4,728
1964*	37,183	4,946	5,882
1965	37,667	6,288	5,048
1966	36,086	6,795	4,664
1967	35,182	7,717	4,354

*Fiscal year. Calendar year not available.
**Prepared by Oliver Burris, 1968

Moose harvest ticket issuance & hunter participation, 1963-1967, Alaska

Year	Harvest ticket Issuance	Percent who Hunted
1963	32,412	82
1964	29,904	77
1965	32,824	
1966	31,549	77
1967	31,941	73

Table 5. Caribou harvests, Nelchina herd*

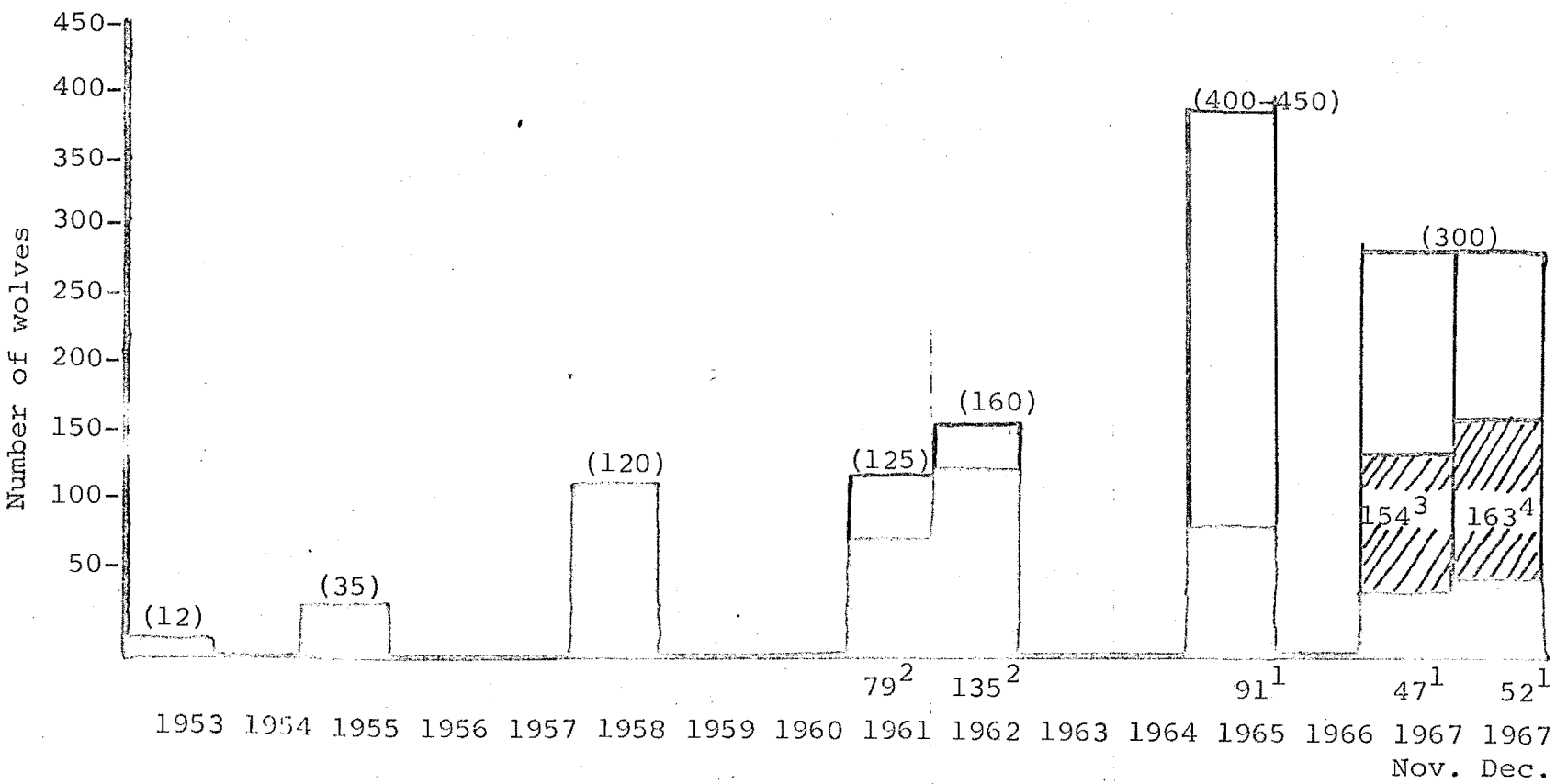
1955	3,800
1956	
1957	3,500
1958	2,500
1959	4,000
1960	5,500
1961	8,000
1962	3,500
1963	6,300
1964	8,000
1965	7,100
1966	4,800
1967	4,000

*Harvest estimates based on check stations, guide interviews, and a general knowledge of hunting effort.

Table 6. Harvest of Dall sheep, Units 11, 13, 20, 1963-1967

Year	Unit 11	Unit 13	Unit 20
1963	131	132	157
1964	151	156	182
1965	131	143	165
1966	125	154	148
1967	149	152	132

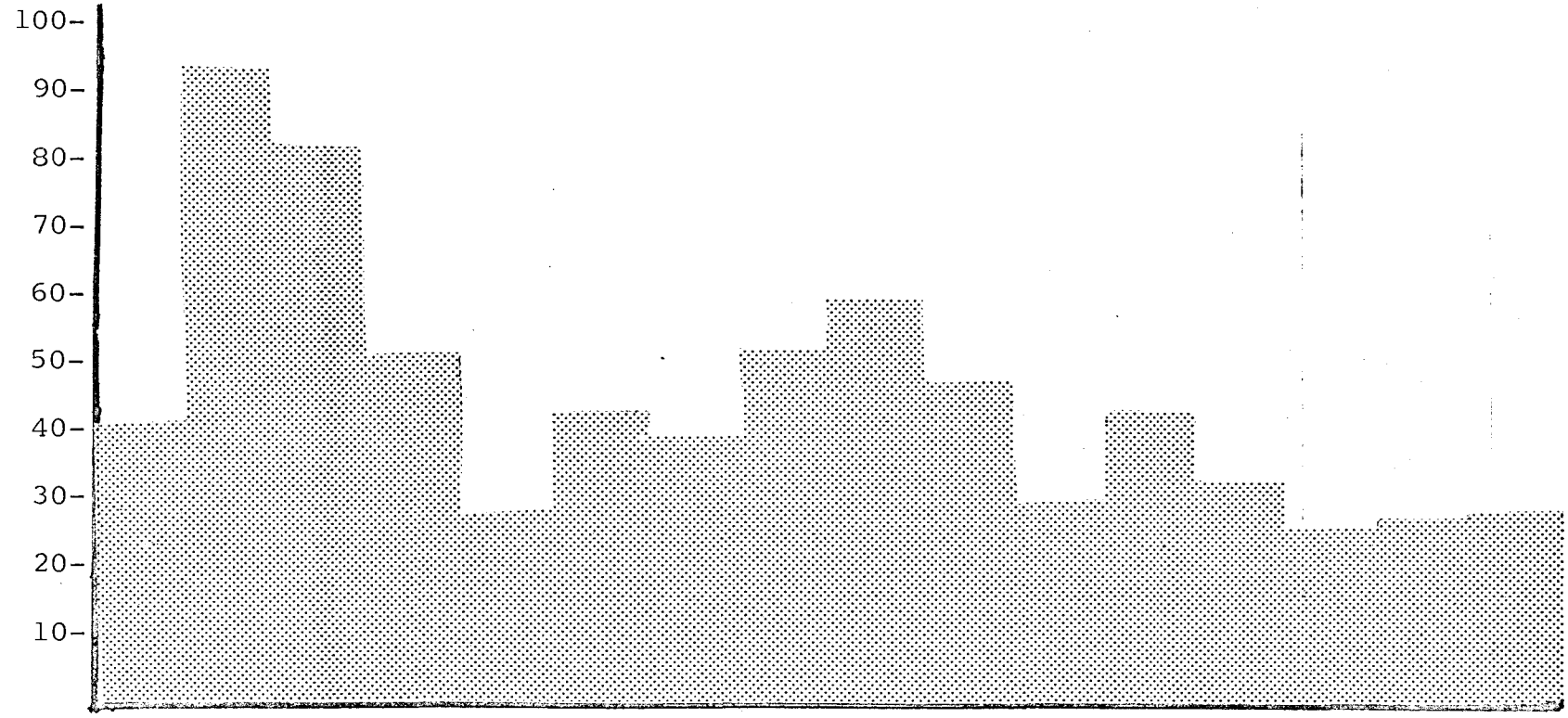
Fig. 1. Wolf population estimates, 1953-1967, Unit 13, Alaska.



1. Individual wolves seen during census.
2. Wolves accounted for throughout the year.
3. 105 separate tracks, 9 instances where tracks could not be counted computed at 5 animals per pack, the average pack size in 1967.
4. Individual tracks seen.

( ) Maximum estimate.

Fig. 2. Moose Calf Survival to Mid-Winter, Nelchina Basin, 1952-1967.



	40	90	79	52	27	42	37	51	55	46	28	40	32	26	27	28
Year	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Sample Size	683	1100	1700	2500	1154	2386	3371	251	1467	2977	1177	2061	1500	6200	4534	5794

Fig. 3. Number of hunters, kill of sheep, and percent of hunters successful, 1962 through 1967, Alaska, (from Nichols, 1968).

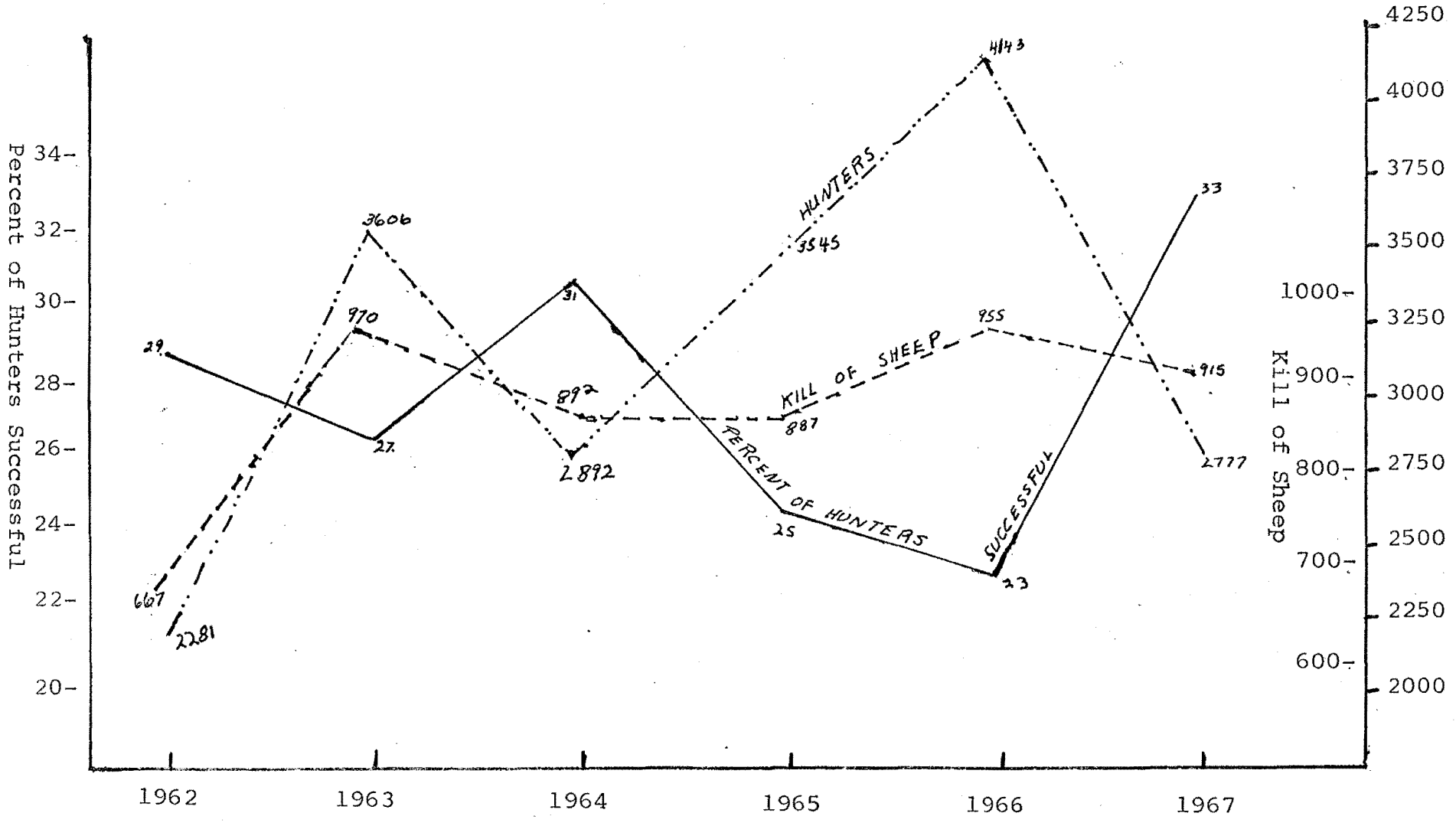


Fig. 4. Issue of sheep harvest tickets, 1962-1967, Alaska, (from Nichols, 1968).