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Julius A. Krug, Secretary

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CONTROL OF DEER IRRUPTIONS IN NEVADA.

By

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INTRODUCTION

During the summer of 1941, the author was contacted by the late Orange Olsen, In Charge of Game Management for the Forest Service in Region 4, Ogden, Utah, relative to inaugurating a study to determine what could be done to prevent deer irruptions on areas threatened in the Intermountain region. A choice of three such areas was presented for consideration by the Forest Service. After a cursory examination it was decided to undertake the study on the Duck Creek drainage of the Shell Creek Range, a unit of the Nevada National Forest near McGill, Nevada.

DESCRIPTION OF THE AREA

The Duck Creek study area lies in a valley immediately east of the town of McGill, Nevada. The valley extends north and south for a distance of approximately 16 miles. The valley floor averages a little over $3\frac{1}{2}$ miles in width and comprises about 39,000 acres. The winter range of the deer covers the valley floor and the immediate low foothills on either side. The mountainous area that rises abruptly from the foothills on either side is the summer range for the deer. This area is approximately 48,000 acres in extent.

VEGETATION

On the winter range the vegetation is composed largely of big sage (Artemisia tridentata), bitterbrush (Purshia tridentata), black sage (Artemisia nova), juniper (Juniperus utahensis), rabbit brush (Chrysothamnus sp), mountain-mahogany (Cercocarpus ledifolius), Mormon tea (Ephedra sp), cliff rose (Cowania stansburiana), service berry (Amelanchier sp), piñon pine (Pinus monophylla), aspen (Populus tremuloides), and a variety of grasses and forbs.

ELEVATION

The floor of the valley has an elevation of a little over 6,000 feet, and during the winter months it is usually covered with snow in varying depths, ranging from a few inches to as much as three feet. When the snow lies deep on the flat, the deer are forced to leave and move to the south slopes of the narrow ridges on the west mountain to eke out a meager living until they can again go back to the valley floor where feed is more plentiful.

CLIMATE

The average annual rainfall in the valley is slightly over 10 inches as compared to 8-1/3 inches for the State as a whole. March has the heaviest precipitation, while September has the lightest. The five months of March, April, June, August, and October all have slightly over an inch of precipitation. During the severest winter weather the temperature drops occasionally to minus 35 degrees Fahrenheit.

DRAINAGE

All of the canyons on both sides of the valley are short, and most of them on the east side have live streams that run throughout the year. All of these streams drain in a westerly direction and form tributaries to Duck Creek which runs from south to north through the valley. At the present time most of the water is utilized by the Kennecott Copper Company for their McGill smelter and the town's domestic needs.

PROGRESS OF THE STUDY

Preliminary investigations by the Forest Service personnel indicated that the deer herd was building up very rapidly and that there was a noticeable progressive deterioration of the range. It was first believed that the deterioration was most noticeable on the winter range, but later observations indicated that the summer range was being equally depleted.

The study was organized as a joint undertaking of the Forest Service and the Fish and Wildlife Service. Q. David Hansen, who had just been assigned to this ranger district, and the author, began work in the fall of 1941. Inasmuch as the area and the problem were new to both investigators, considerable exploratory work was necessary in getting acquainted with the area and in forming an overall picture of the problem with all of its ramifications. It was necessary to know something about the movements of the deer during the fall and winter months; their tendencies to group together in certain areas; approximately how many deer were using the winter range during the late fall, winter, and early spring months, and many other things pertaining to their life habits in general. The greater part of the Duck Creek drainage used by the deer at this time had been closed to hunting since 1923. Thus only about half of the drainage area had been open to legal hunting of buck deer. Sanctuary offered to the deer in the refuge area, the hunting of bucks only, predatory animal control, and reductions in livestock use over the entire area, had all contributed to the rapid buildup of the deer herd and the subsequent deterioration of the range. When the study was started in 1941 there were 163 head of cattle and 8446 sheep permitted on the Forest lands in the Duck Creek area. By 1947 cattle use had been decreased to 148 head and sheep to 7815 animals. A comparison of use between livestock and deer in this area shows cattle with 640 animal months, sheep with 39,075 months and the approximate 1,500 deer with 18,000 animal months use. Reducing these to equivalent months use, it shows that the domestic livestock use of the range was about 1/3 heavier than that of the deer.

An investigation at the beginning of the study on the condition of the browse showed that the big sage, because of its abundance and low palatability, was not taken extensively except in a few isolated places. The bitterbrush use ran from a low of 5 percent to as much as 80 percent. Most of the juniper showed a distinct high lining from deer use. The black sage, a much more palatable shrub than the big sage, was browsed rather heavily. Rabbit brush which has a very low palatability was seldom taken; while the mountain-mahogany, with few exceptions, was browsed as high as the deer could reach. Any reproduction of the mahogany

that started was immediately browsed to the ground level, thus preventing it from getting reestablished. Mormon tea was seldom eaten even though its occurrence was rather sparse. The cliff rose is limited to a small area on the eastern slope of the west mountain and when the deer used this mountain extensively during the deep snows it was used well beyond the proper stage. The occurrence of service berry was rather spotty and it was eaten extensively by the deer, giving it a hedged appearance. On the winter range, the aspen occurs usually in the bottoms of the canyons and was heavily utilized except in fenced recreation areas. The piñon pine is found only on the foothills or upper portions of the winter range. Deer seldom eat the needles unless forced to do so through lack of more palatable browse species. However, in years of good seed crops, they relish the nuts and feed extensively on them. Such was the picture of the most important browse species on the range when the study was initiated in 1941 (Figs. 1 & 2).

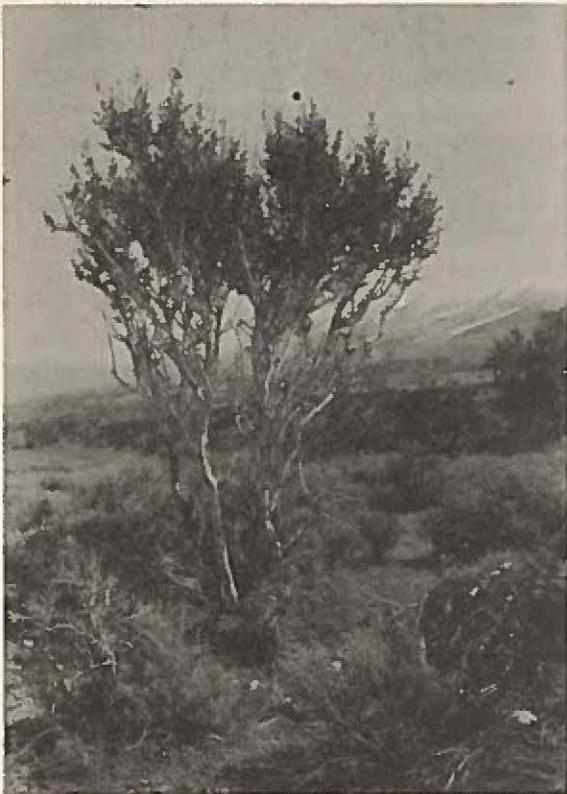


Fig. 1--Highlined mountain-mahogany.

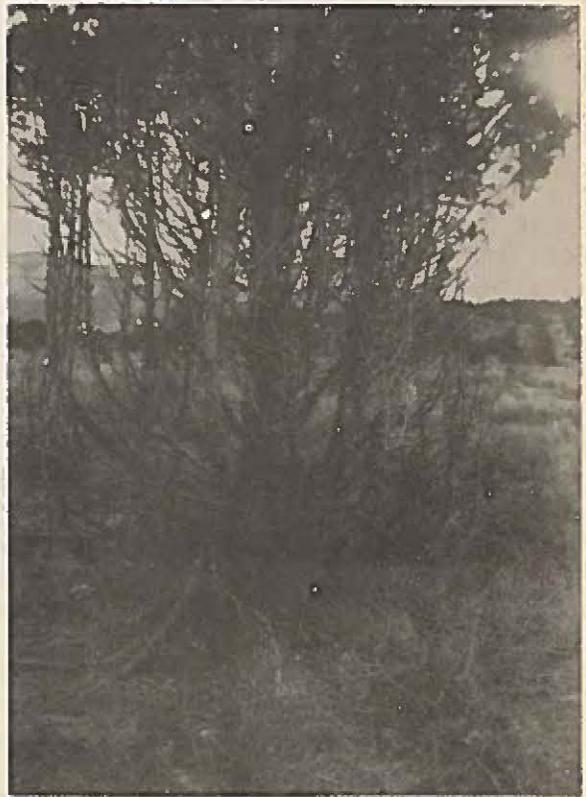


Fig.2--Highlined juniper.

1942 STUDIES

During the early winter months of 1941 and the spring months of 1942, random counts were made of deer over the entire winter range in the Duck Creek area where 850 head were observed (Table 2). This did not include a portion of the south end of the valley which was later included in the counting area. In the fall of 1941 there were 8 widely distributed browse utilization plots established on bitterbrush (Table 1). Measurements were made late in the fall, before the deer were on the winter range, to determine the extent of the current growth on marked twigs. These same twigs were again measured late in the spring after the deer had moved from the winter range into the intermediate and summer portions of the range. The difference in the twig length gave the amount removed by the deer during the time they remained on the winter range. Computed on a percentage basis, the first year showed a low use figure of 24 percent and a high of 43 percent for the entire eight plots (Table 1). This amount of utilization was not considered excessive for this species. After the browse utilization studies were completed and the spring deer count was made in 1942, the situation was discussed thoroughly with Forest Supervisor A. E. Briggs and it was decided that the time was ripe to start reducing the herd or at least to hold down further increases as far as it would be possible to do so. A recommendation was prepared and submitted to the White Pine County Sportsman's group and to the County Commissioners asking that the present refuge be declared open for hunting and a limited number of antlerless deer be removed during the fall hunt. The sportsmen, after a hearing on the matter, voted against the recommendation and petitioned the County Commissioners not to accede to the recommendations made by those responsible for the study. The County Commissioners, acting on the wishes of the sportsmen, decided to keep the refuge closed and not to permit the taking of any antlerless deer. It was the contention of the sportsmen that insufficient time had been spent on the study to justify such action. They also contended that the refuge had been responsible for the present increase of the deer herd and that if it were thrown open to hunting now, the deer population would be reduced to a very low level in a relatively short time. Hunting for bucks only, outside of the refuge in 1942 resulted in removing 213 of these animals in the Duck Creek drainage (Table 3). This removal was about 25 percent of the deer numbers counted in the spring of 1942, but did not reduce the breeding potential of the herd (Fig. 4). The reduction approximately equaled the fawn crop of 1942.

1943 STUDIES

In 1943 the spring herd count jumped to 1314, but this increase can be partially explained on the basis of a more thorough count and a greater proportion of does in the herd as a result of the buck kill.

The bitterbrush had made an average growth of 1.9 inches and was utilized an average of 50 percent. This usage was considered about optimum.

At about this time, through an act of the State Legislature, each County where deer problems existed was authorized to set up an investigative body. The purpose of these investigative committees was to make studies of trouble areas and then to make recommendations to the respective county commissioners and to the State Game Commission for the best method of handling these trouble spots. In White Pine County the committee was made up of one representative from each of the following organizations and interested groups; namely, U. S. Forest Service, U. S. Grazing Service (now the Bureau of Land Management), U. S. Fish and Wildlife Service, livestock interests and the sportsmen.

The investigative committee, after looking over the Duck Creek area and familiarizing itself with the browse condition, went on record in favor of opening the refuge and of removing 200 antlerless deer during the fall hunt. The sportsmen's organization and the County Commissioners went on record favoring the above recommendation. During the hunt 509 deer were removed of which 159 were does. The kill amounted to about 38.8 percent of the 1943 spring count. It was agreed that this was a satisfactory removal and that progress was being made in reducing the herd as the taking of 159 antlerless deer had lowered the breeding potential. Dressed weights of the deer at the checking station showed the bucks to average 123 pounds, and the average weight of the does was 77.7 pounds. These average weights were found to be well below those for most of the Utah deer killed the same season (Fig. 3). The Nevada deer were in poor flesh, which undoubtedly was the result of inadequate forage on the summer range.

Immediately after the hunt an opposition element started rumors to the effect that all the deer in the unit had been killed and that the hillsides were littered with dead, unclaimed deer. To check on the validity of this rumor, Rangers Hansen and Olsen rode over a large section of the range and found only the normal number of dead deer that can be found on any area at the close of a hunting period. They found live deer in all the areas they rode. Shortly after the close of the hunt a sex ratio count was made of 304 deer. It was found that the ratio of bucks to does was 1 to 1.56 and the doe fawn ratio was 1 to 1.02. Inasmuch as some of the sportsmen were of the opinion that the previous spring count had been exaggerated, it was decided to ask the sportsmen's organization to appoint one or more of its group to assist and check on the count during the spring of 1944.

1944 STUDIES

As was expected, the spring count in 1944 dropped below the 1943 count of 1314 deer. A tally at the conclusion of the count showed the total to be 1143 or a decrease of 171 head from the previous year. The heavy kill in 1943 had been responsible for the herd decrease. The bitterbrush during 1943 had made a growth average of 2.6 inches and during the winter had been utilized an average of 32 percent. This was considered moderate usage for this species. As in all previous years, the mountain-mahogany was completely eaten off as high as the deer could reach. After making a range appraisal, the county investigative committee again recommended that the refuge be declared open to hunting and that only 100 antlerless deer be authorized for removal. Because the number of does to be removed was less than the number recommended for the previous year, the sportsmen, as well as the State Game Commission, again agreed to go

along with the recommendations made by the investigative committee. During the fall hunt only 279 deer were removed, and of this number 55 were antlerless. Bad weather during the first days of the hunt was largely responsible for the small kill. This was especially true during the first day when the largest number of hunters were in the field. Alternate snow flurries and rolling fog belts obscured the vision of the hunters, and this weather lasted well into the second day.

The cliff rose browse utilization plots were established late in the fall before the deer began to use them. The winter of 1944-'45 was the most severe one in many years. Deep snows practically buried the bitterbrush and remained on the ground well into late spring. The deer came through that winter in very poor shape, in fact some of them were so weak that any undue excitement caused them to tire easily and as a result, they could not keep up with the stronger animals when being chased. While making the count, two yearling deer were found dead; apparently the cause was malnutrition. Had the winter with its deep snow lasted another two weeks there is no question but that many more of the animals would have perished.

1945 STUDIES

The spring count in 1945 over the same area gave a total of 1220 deer, an increase of 77 over the previous years' count. This was due primarily to the light kill during the 1944 hunt. The bitterbrush had made an average growth of 2.6 inches and was utilized an average of 31.4 percent. This was not considered excessive although one or two of the plots were rather heavily utilized. During the sex ratio count at the beginning of the year, 294 animals were classified, showing a ratio of 1 buck to 2.6 does and a ratio of 1 doe to 1.1 fawns. A 1945 appraisal of the range by the investigative committee resulted in again recommending that the refuge be opened to hunting and for the removal of 200 antlerless deer. Because of the poor kill in 1944 the sportsmen, believing this was due to a shortage of deer, as well as an overestimation of the number of deer in the spring count, refused to accept the recommendations of the investigative committee and petitioned the State Game Commission to turn it down. Acting on the wishes of the sportsmen alone, the State Game Commission voted that no antlerless deer should be removed during the 1945 hunt. This was the first real setback to the progress of the study. Because the State did not provide for any checking stations to be operated during the hunt, no official record was made of the number of deer that were removed during the 1945 hunt.

1946 STUDIES

The agencies responsible for the deer studies, had, for the past two years, asked the sportsmen to have a duly appointed representative work with them on the annual counts. These requests had been ignored in every case, so prior to the 1946 counts a more urgent appeal was made to the sportsmen's organization for their participation. This time they acted by naming one of their members to assist and check on the 1946 count. At the finish of the census it was found that the group had counted an all time high of 1640 deer. This was an increase

of 420 over the 1945 count, and was undoubtedly the result of having no female deer removed in 1945. Even though one of their members had corroborated the final count, a few of the sportsmen still insisted that there were not that many deer on the area. The sex ratio of 326 deer showed 1 buck for each 2.5 does and 1 doe for each 0.9 fawns. This was the first year the number of fawns was less than the number of mature does.

The bitterbrush during the 1945 growing season made an average growth of 3 inches and was utilized an average of 41.3 percent. The cliff rose had made an average growth of 2.6 inches and was utilized an average of 67 percent. This was considered nearing the danger point of over use.

After the investigative committee had made its inspection of the range and had taken into consideration other facts from the study, it recommended that the refuge be opened to hunting and that 300 antlerless deer be removed under special permits. Both the sportsmen's organization and the State Game Commission agreed to accept these recommendations. At this time, Forest Supervisor Briggs was transferred to another forest and John Herbert succeeded him on the Nevada National Forest. During the 1946 hunt, 448 deer were removed of which 208 were does. The total removal was 27.31 percent of the spring count. Again a great howl went up to the effect that all of the deer in this area had been killed and that many dead deer had been left in the hills unclaimed. This rumor got a great deal of publicity through the papers of the State, and for a time the general public was greatly alarmed. Some articles appeared in several of the papers countering this claim and the thing was soon forgotten.

1947 STUDIES

When the January sex count was completed, it showed that out of 479 deer classified, there was a buck for every 2.5 does and a doe for each 0.9 fawns. The sportsmen, believing that their representative, who participated in the 1946 count, had been misled in the number of deer actually seen, proceeded to designate a different man from their organization to participate in the 1947 counts. This man appeared on the scene with the avowed purpose of proving that it was impossible to count deer and arrive at reliable figures. After his first day out with the crew, he made several apologies for his previous beliefs and statements and agreed fully with all of the counts at the end of each day in the field. On the Duck Creek area the total count amounted to 1618 deer, a figure slightly under the 1946 count of 1640 head. During the growing season of 1946 the bitterbrush made an average growth of 2.02 inches and was utilized during the winter months 49 percent. The cliff rose had made an average growth of 2.25 inches and was utilized 54 percent.

For the 1947 hunt the investigative committee recommended the removal of 300 does by special doe permits and, in addition, that the regular hunting season be opened for the taking of one deer of either sex. It was believed that through this arrangement sufficient deer could be removed to bring the population more nearly to the desired level. These recommendations were accepted and the refuge was again opened to hunting. Only one checking station was provided for this

area and at the close of the hunting season only 437 deer had been checked through. Some additional deer were taken out of the valley by way of Success Summit and were not checked. Although a final check of hunters tags has not been completed, it is believed that at least 500 deer were actually removed from the area. Of the 437 that passed through the checking station, 215 were antlerless deer of all ages. This was the heaviest yearly removal of female deer ever to be taken out of the area, and the result of this heavy removal will undoubtedly cause a lowering of the breeding potential during the next two years. With the above authorized kill, it was hoped that at least 700 deer would be taken out, but such was not the case.

At the time of this writing, only the spring count of the deer on the Duck Creek area had been made as part of the 1948 studies. The total count on the area amounted to 1166 deer of all ages and a decrease of 452 below the 1947 count. This is a gratifying decrease and definitely shows some real progress is being made in adjusting the number of deer to the carrying capacities of both the winter and summer range. Probably from this point on, the taking of one deer of either sex will tend to keep the situation in balance.

SUMMARY

From the foregoing chronological account of the progress of the study, it can be seen that to date this herd has been kept from irrupting, although the progress made was not as decisive as had been hoped. Deterioration of the browse and other vegetation on the area has continued. If the time comes when the deer numbers are reduced to the carrying capacity of the winter range, it will probably require several years to notice any improvement in the condition of the browse or other vegetation, with the exception of perhaps some species of the grass family. Range recovery always lags behind any deer herd reduction on overused ranges. The number of deer will need to be kept down for a period of years in order to allow for satisfactory range recovery. Responsibility for the slow progress of this study must be placed largely on the shoulders of the hunters who have refused to accept the fact that it is necessary to remove antlerless deer in order to reduce a herd on problem areas such as Duck Creek. Each year that a special hunt was authorized for the removal of antlerless deer there were a good number of hunters who purchased doe permits with the avowed intention of not using them in an endeavor to defeat the move to reduce the herd. This attitude most certainly has had a decided effect in slowing down the expected progress of the study. Likewise, many local sportsmen have done everything in their power to discourage out-of-state hunters from coming into this area, which many of the local hunters feel is their own private hunting ground. Having a duly appointed sportsman to assist and check on the annual spring count has gone a long way in breaking down the criticism heaped on the persons responsible for the study, especially in the matter of accepting the accuracy of each count. Then too, if the sportsmen are charged with some responsibility in the constructive formulation of the program, they are more apt to work with the program than against it.

RECOMMENDATIONS

A movement of this kind can progress no faster than public opinion will permit. To educate the public and make progress it is always necessary to obtain facts and sustaining data in advance of making recommendations for managing a deer herd.

In order to be able to prevent deer irruptions, the first requisite is to be able to recognize the early stages of browse deterioration on the species used by the deer. Failure to recognize the early stages of browse deterioration in the past has invariably resulted in the loss of deer through starvation as well as the loss of favorite deer browse on the range. As soon as range degradation is noticed, the second stage of action is to immediately start a move for reducing the deer and possibly some livestock from the range in question. In the case of deer this can only be done by an orderly removal of a predetermined number of female deer. Thirdly, it is necessary to make a good range appraisal to determine to what extent the deer and livestock compete for the forage and to what extent either or both should be reduced. Reduction of either one alone will seldom remedy the situation. The fourth step is to educate the public through the presentation of data based on facts obtained from an intelligent study of all angles of the situation. If a deteriorating area can be recognized in time it should seldom become necessary to recommend heavy removals to correct the situation. To start off a program by recommending heavy removals is usually looked upon by the general public with a great deal of skepticism.

ACKNOWLEDGEMENTS

The author is indebted to the Forest Service officials of the Nevada National Forest for their whole-hearted cooperation in these studies through their active participation in the actual field work and in making facilities available for conducting the field and office studies. Without participation on the part of the Forest Service officials, this study would not have progressed so smoothly and so far. Credit is also due the County Game Wardens who gave their time in making the yearly deer counts, to W. Leslie Robinette of the Fish and Wildlife Service who materially assisted with many phases of the study during the past two years, and to many of the local sportsmen who volunteered their services in assisting with the annual inventories.

TABLE 1.

BROWSE UTILIZATION STUDIES
Nevada National Forest 1941-1947
Duck Creek Unit

Purshia tridentata

Plot No.:	Year	Total Number Twigs Measured	Average Current Growth, Inches	Total Current Growth, Inches	Amount Eaten, Inches	Utilized Percent
1	1941-2	519	3.4	1764	639	36
	1942-3	221	1.5	320	134	42
	1943-4	382	1.7	650	246	38
	1944-5	304	2.3	688	224	33
	1945-6	433	2.9	1256	280	22
2	1941-2	652	3.5	2284	684	30
	1942-3	555	2.0	1108	549	49
	1943-4	470	2.7	1262	545	43
	1944-5	444	2.8	1243	413	33
	1945-6	358	3.8	1358	763	56
	1946-7	367	2.0	719	406	56
5	1941-2	592	3.5	2071	637	31
	1942-3	315	2.1	661	396	60
	1943-4	477	3.1	1480	441	30
	1944-5	374	2.3	862	184	21
	1945-6	280	3.0	848	356	42
	1946-7	230	1.9	438	204	47
6	1941-2	768	3.2	2459	581	24
	1942-3	381	1.6	609	475	78
	1943-4	794	2.5	1995	627	31
	1944-5	516	2.6	1342	240	18
	1945-6	277	3.0	831	373	45
	1946-7	385	2.5	962	480	50
7	1941-2	630	3.5	2204	953	43
	1942-3	414	2.3	953	680	71
	1943-4	870	2.8	2435	976	40
	1944-5	694	2.7	1873	1132	60
	1945-6	328	2.5	819	88	11
	1946-7	207	1.6	331	154	47
12	1942-3	947	2.6	2461	1368	51
	1943-4	556	2.8	1556	1034	66
	1944-5	603	3.0	1808	412	23
	1945-6	239	2.8	669	510	76
	1946-7	216	1.8	389	219	56
Established 1945 in Bird Creek Campground - Deer only use this area.						
15	1945-6	235	3.2	752	260	35
	1946-7	206	2.5	514	204	40

Cowania stansburiana

13	1942-3	867	2.5	2167	1156	53
	1943-4	375	2.6	975	601	62
	1944-5	633	2.2	1393	1275	92
	1945-6	556	3.0	1667	1329	80
	1946-7	607	2.0	1214	544	45
14	1942-3	992	2.0	1985	423	21
	1943-4	298	2.0	596	573	96
	1944-5	619	2.0	1237	1122	91
	1945-6	619	2.3	1423	836	59
	1946-7	501	2.5	1242	798	64

TABLE 2.

ANNUAL DEER COUNTS DUCK CREEK AREA

Units counted	: 1940	: 1941	: 1942	: 1943	: 1944	: 1945	: 1946	: 1947:
West Side	: 130	: 7	: 167	: 193	: 117	: 56	: 366	: 222:
Berry Creek & South	: 124	: 173	: 102	: 128	: 117	: 62	: 134	: 159:
Berry to Snake	: 472	: 760	: 353	: 664	: 531	: 715	: 697	: 782:
Snake to East	: 2	: ---	: 83	: 90	: 99	: 163	: 124	: 152:
East and North Creek	: 20	: ---	: 145	: 239	: 279	: 224	: 319	: 303:
Totals	: 748	: 940	: 850	: 1314	: 1143	: 1220	: 1640	: 1618:

TABLE 3.—A Summary of Developments -- Duck Creek Drainage, Nevada
Winter Deer Study 1941-47.

Years	Kill, Pre-hunting Season				Percentage of Count	Sex and Age Classification				Sex Ratio	Doe-fawn ratios	Browse Growth and Utilization				Rainfall-Inches Oct. 1-Sept. 30
	Spring Counts	Number Removed Bucks	Does	Fawns		Number Classified	Bucks	Does	Fawns			Bucks to Does	Does to Fawns	Bitbergbrush Growth	Per cent Utilized	
1941	947	130	—	—	13.8						3.5	29.7*	—		12.22	
1942	850	213	—	—	25.0						1.9	50.0	2.2	37.0	8.02	
1943	1,314	350	159	—	38.8	304	73	114	117	1:1.6	1:1.0	2.6	32.0	2.7	78.8	7.65
1944	1,143	224	55	—	24.7	294	46	120	128	1:2.6	1:1.1	2.6	31.4	2.0	91.1	8.02
1945	1,220	No check of kill			—	326	57	130	139	1:2.3	1:1.1	3.0	41.3	2.6	67.2	14.20
1946	1,640	240	208	—	27.31	518	89	226	203	1:2.5	1:0.9	2.0	49.2	2.2	54.5	10.94
1947	1,618	188	191	30 m. 24 f.	30.8	479	81	206	192	1:2.5	1:0.9					

* Utilization was made Winter of 1941-42.

Figure 3.

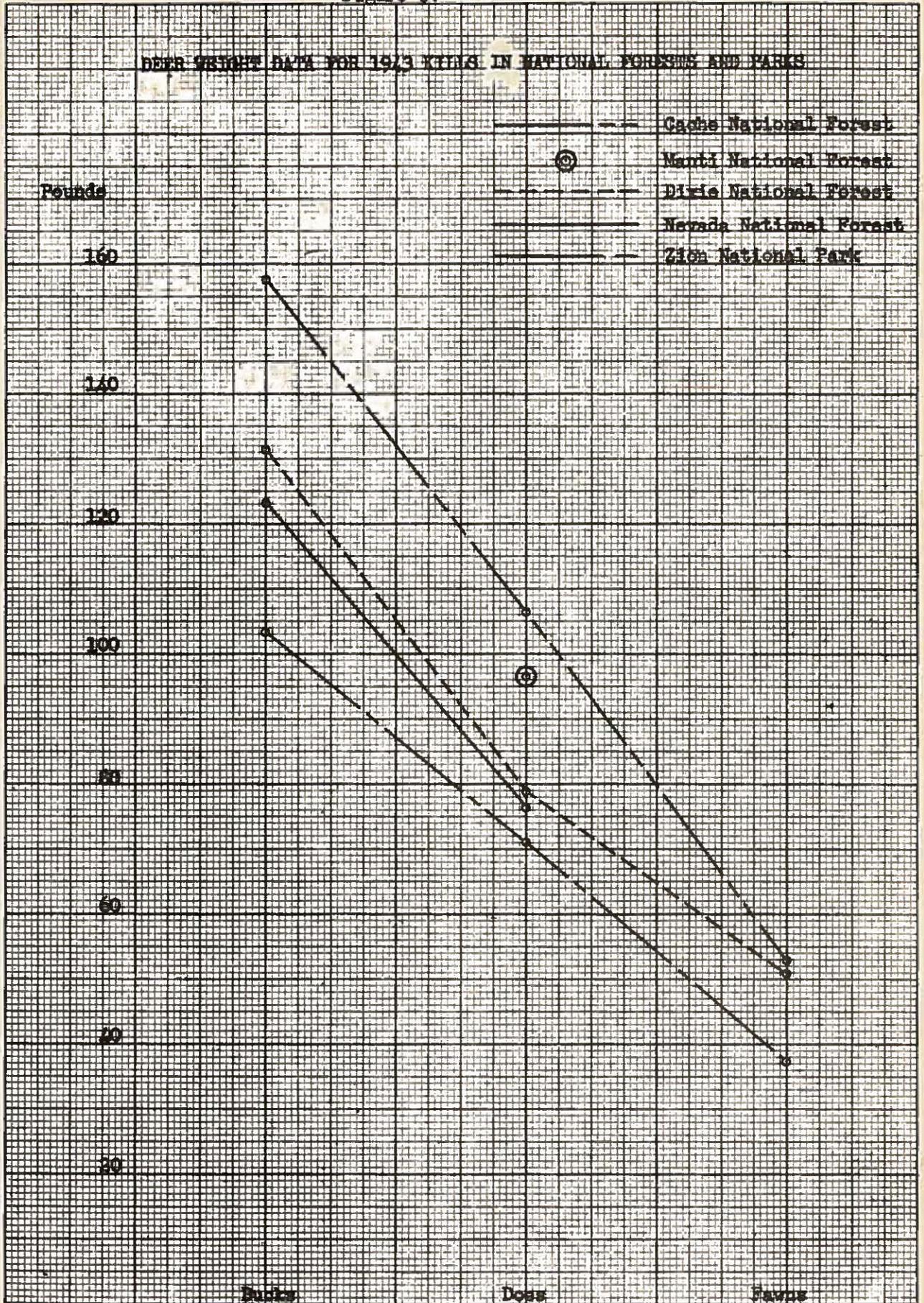


Figure 4.

ACTUAL SPRING DEER COUNTS MADE IN THE
DUCK CREEK AREA.
Nevada National Forest.

2,000

1,800

1,600

1,400

1,200

1,000

800

600

400

200

0

Population Count

Kill

1960

1961

1962

1963

1964

1965

1966

1967

1968

