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JUNEAU, ALASKA

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DEER REPORT

by

Harry R. Merriam

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Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-15-R-2 and 3, Work Plan J

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WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NOS.: W-15-R-2 & 3 TITLE: Big Game Investigations

TITLE: Sitka Black-Tailed Deer

WORK PLAN: J

JOB NOS.: 1, 2, 3, 4

PERIOD COVERED: January 1, 1967 to June 30, 1967 (W-15-R-2)
July 1, 1967 to June 30, 1968 (W-15-R-3)

ABSTRACT

Deer populations are somewhat lower in Southeast Alaska and Prince William Sound than in 1966-67. Higher than average winter losses from 1964 through 1967 are apparently the most important causal factors. Losses were light throughout Alaska during the winter of 1967-68. The present deer population is in better balance with winter range.

The wolf population on Coronation Island has decreased from about twelve in 1965 to only one in January, 1968. Deer are still present on the island but the population is low. Vaccinium ovalifolium, the primary winter browse species, shows good growth from existing root systems, but establishment in voids is slow. Forbs increased rapidly from 1963 to 1965 but rate of establishment has declined since 1965. Deer became difficult for wolves to obtain in 1965 and harbor seal, birds, rodents and molluscs now are the most common food items.

Deer use of winter browse species in 1967-68 averaged 48 percent in Southeast Alaska and 37 percent in Prince William Sound, the lowest values for several years.

Study sites were selected to evaluate impact of clear-cut logging on deer range. Past cutting records were reviewed. Increment borings were taken from residual trees on each site to establish cutting dates.

Timber type maps of Southeast Alaska were compiled and existing and proposed timber cuts plotted. These aid in selecting deer habitat which should be reserved from logging. Requests were made to reserve two important deer wintering sites from logging. The U. S. Forest Service acted favorably on the requests and designated the areas as primarily important for deer.

Snow depth measurements and deer track counts indicate deer move up and down with changing snow depths. Snow depth in forest cover was about half that found in open areas.

Hunter success was lower in Southeast Alaska and Prince William Sound and higher on Kodiak Island that in 1966. Hunters took an average of 1.6 deer in Southeast, 1.1 in Prince William Sound and 0.8 on Kodiak Island. Effort per deer was 4.1, 2.2, and 5.7 days, respectively. The estimated total deer kill in Alaska for 1967 was 12,300.

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OBJECTIVES

To obtain and evaluate information on deer in Alaska necessary for management of the species including population levels, winter losses, habitat conditions and deer harvest.

To study predator-prey relationships between wolves and deer.

To determine the effects of clear-cut logging on deer habitat.

To determine winter range requirements of deer.

TECHNIQUES

Population status was evaluated by correlation of winter mortality, age classes in deer harvest, winter range use and hunter success per unit effort data. Aerial surveys were flown over Kodiak Island during winter months when snow cover was present and in Prince William Sound on alpine summer range.

Winter mortality was determined by checking 68 established transects in Southeast Alaska and 9 in Prince William Sound. Transects were one-half mile long except on Kodiak Island where 16.5 miles of transects were checked varying from 2.5 to 8.5 miles in length. Deer carcasses located were examined to determine sex, age and condition at time of death.

Wolf-deer predator-prey relationships were examined on Coronation Island. Changes in habitat were measured by ocular estimate and checking plant abundance on seven established line transects. Deer and wolf abundance was measured by track counts, range use, general observations of trail use and wolf scat and deer pellet

group abundance. Wolf food habits were evaluated by analysing scats for food content.

Deer use of browse species on winter range was measured in March and April (Deer Segment Report W-6-R-3; 1963). Nine localities were examined in Prince William Sound and 68 in Southeast Alaska. Use of current annual growth was measured on 20 plants in each area. Plant condition and height were also recorded.

A plot containing the key winter browse species Vaccinium ovalifolium was clipped to simulate 0, 20, 40, 60, 80 and 100 percent deer use. This plot was established in 1963 and is located on Mitkof Island, Southeast Alaska.

Study sites were selected to examine the impact of clear-cut logging on deer range in Alaska. Techniques were evaluated for measuring plant succession on these areas. Cutting dates were established by review of existing records and by core samples of residual trees on the sites.

Timber type maps were assembled of Southeast Alaska. Existing logged areas and proposed future cuts were plotted on these maps to show location and extent of cuts in relation to deer habitat. Recommendations were made to protect important deer wintering range.

Preferred deer food species from forest and fringe types were analyzed for protein content using the improved Kjeldahl method (Official Methods of Analysis of the Association of Official Agricultural Chemists).

The magnitude of the deer harvest was determined by post-season hunter interviews. Approximately ten percent of the licensed deer hunters in Alaska were queried re success, effort and sex, date and location of kills. Jaws were obtained from hunter-killed deer and age determined by tooth wear and replacement. A sample of deer incisors was sectioned to compare aging by cementum layers with wear technique.

ACKNOWLEDGEMENTS

Alaska Department of Fish and Game employees who assisted in field data collection included Loyal Johnson, Jack Alexander, Ben Ballenger, Dave Zimmerman and Jerold Deppa.

Dr. Alan J. Kenyon, Department of Animal Diseases, University of Connecticut, volunteered the services of his laboratory for sectioning deer incisors.

The U. S. Forest Service accomplished most of the field work on winter range and mortality surveys. They also provided maps and assistance for plotting logged areas in Southeast Alaska.

FINDINGS

Southeast Alaska

Populations

Deer populations in Southeast Alaska appear down slightly from previous years. The actual degree of the decline is difficult to measure as no census technique has given a measurement of abundance which can be compared from year to year. Winter beach counts, spring road counts, summer aerial alpine counts, pellet group counts and track counts have all been tested and discarded. The best indice of population levels remains the combination of hunter success per unit effort, winter mortality, range use and age classes of deer represented in the kill.

In 1967 hunter success was poorer than experienced since 1956, hunters taking an average of 1.6 deer each compared to a normal take of 2.0 or higher. The average effort of 4.1 days per deer taken was greater than for any year since studies were initiated in 1952. The present deer population, however, is in better balance with the habitat than for many years. In most other states a take of 1.6 deer per hunter would reflect an abundance of deer.

A review of past records reveals that deer abundance in Alaska has been extremely variable. Severe winters have many times reduced deer numbers to a low level, much lower than the present population. Since 1963 winters in Southeast Alaska have been moderately severe, but not extremely so. Losses from 1964 through 1967 were higher than average, but not excessive in any single year. They have, evidently, been sufficiently high to produce a gradual reduction in deer abundance which was difficult to observe in any single year.

Winter losses and winter range use data since 1953 show direct correlations to the proportion of yearlings in the succeeding deer harvest and hunter success per unit effort. This data is shown in Figure 1. Past highs in deer numbers coincide with single dominant yearling classes resulting from good fawn survival. These highs have occurred in 1953, 1958, 1961 and 1963 and are shown as dark bars in Figure 1. The 1963 class did not originally appear dominant, but must have been for it produced dominant classes in succeeding years. In each of the above years winter losses were very light and the fall deer harvest contained a high proportion of yearling animals. Years with large yearling classes have also provided the highest hunter success. In every case where winter mortality was

1.0 dead deer per mile of beach or higher, hunter success the following fall declined. From the above statistics, and by study of Figure 1, it appears that winter severity is the major limiting factor on deer populations in Alaska. Hunting has little impact on total deer numbers in most areas. Age classes represented in the 1967 deer kill are shown in Table 1 and compared with previous years in Figure 1. During the past three years the proportion of older-age animals has increased over previous years indicating hunting effort is not sufficiently intensive to remove them from the population. For comparison with a state where hunting is intensive, in 1967, 87 percent of the deer killed in Wisconsin were less than three-years-old compared to only 32 percent in these age classes in Alaska.

The 1967-68 winter losses were lower in Southeast Alaska than for the preceeding four years. Only one deer carcass was located on 34 miles of transects which could be attributed to malnutrition. The excellent fawn survival should be reflected by a higher proportion of yearlings in the 1968 deer harvest and by an increase in hunter success.

Natural Mortality

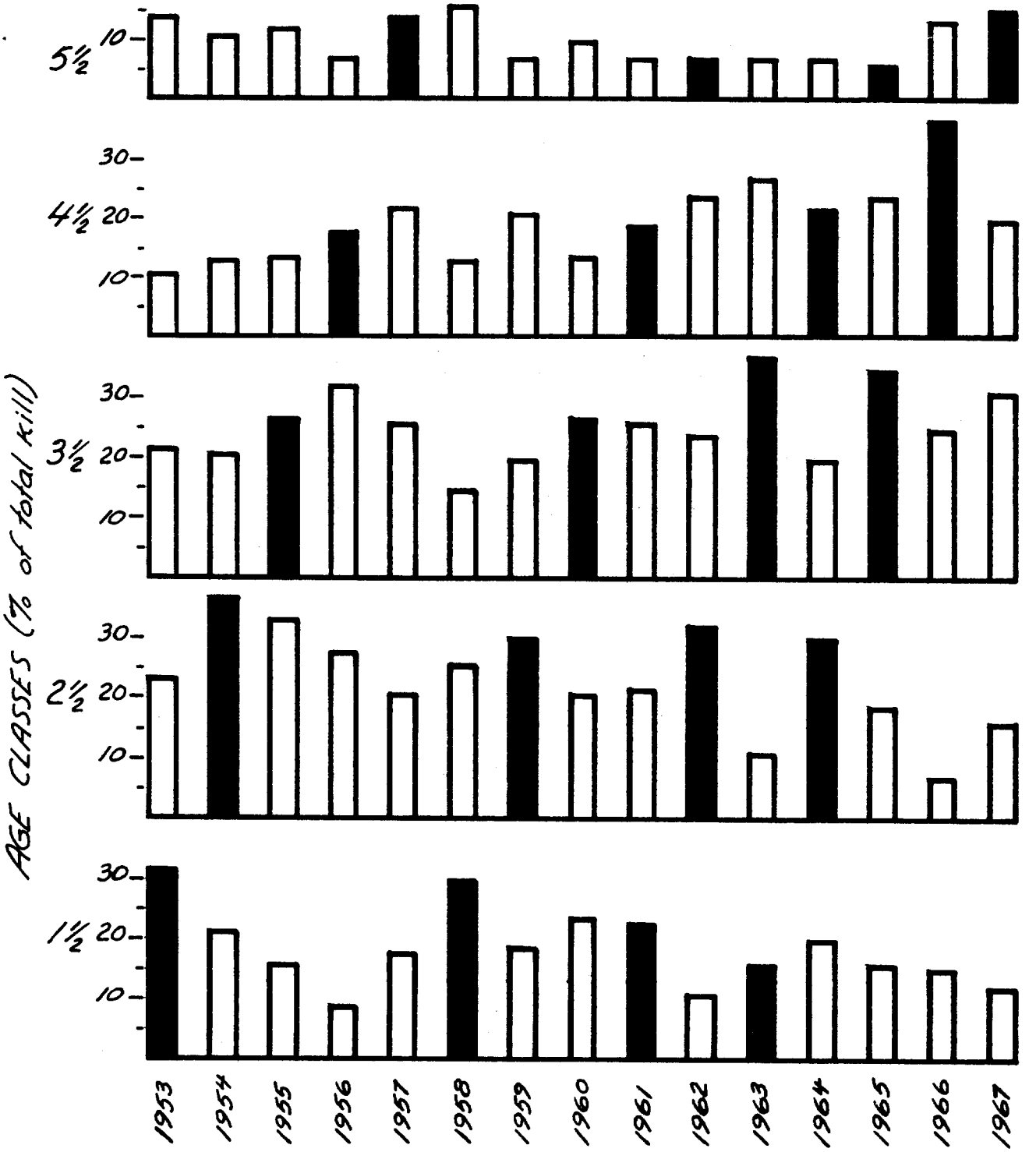
Winter Losses

The reporting date for this segment report has been changed from March 30 to June 30 to allow inclusion of mortality and utilization data for the current year. Consequently this report contains data for a two-year period (April 1, 1967 through June 30, 1968).

The U. S. Forest Service again cooperated by checking transects in the field. Surveys included 66 locations in Southeast Alaska in 1967 and 68 locations in 1968. Tables 2 and 3 show mortality data for 1967 and 1968 and Figure 1 summarizes data from 1956 through 1968.

Winter losses in Southeast Alaska in 1967 averaged 1.1 dead deer per mile of beach. In addition, 0.2 deaths per mile were attributed to causes other than malnutrition. Losses were confined almost entirely to the northern portion of Southeast Alaska. The Juneau and Sitka areas both had 2.9 dead deer per mile while mortality in all other districts was low. Winter losses of the magnitude of 1.0 deer per mile are not considered excessive for any one year; however, as stated previously, this is the fourth consecutive year that mortality has approached or exceeded this figure. The cumulative effect has been a gradual reduction in deer numbers. This is a favorable situation as range studies indicate excessive use in many areas, particularly where mortality has been greatest.

The early portion of the 1967-68 winter was extremely cold,



Deer/Hunter			1.4	1.6	2.4	1.8	2.3	2.2	2.0	2.0	2.0	1.7	2.0	1.6	
Days/Deer			4.0	3.6	2.6	3.6	2.9	3.1	3.2	3.0	2.4	2.8	2.6	4.1	
Mortality	0.0	0.6	1.0	2.3	0.1	0.0	0.2	0.1	0.1	1.0	0.1	0.7	1.4	1.0	1.1	0.0
Range Use				86	44	43	74	66	57	75	48	52	66	58	55	48

Figure 1. Age classes in deer harvest showing dominant year classes and relations to success, effort, mortality and range use.

Table 1. Age composition of deer harvest for Southeast Alaska, 1959 - 1967.

Year	Age Class (% of total sample)						% 3 Years and older	Sample Size
	Fawns	1-1/2	2-1/2	3-1/2	4-1/2	5-1/2		
1959	3	19	30	20	21	7	48	281
1960	4	24	21	27	14	10	51	412
1961	3	23	22	26	19	7	52	703
1962	2	11	32	24	24	7	55	183
1963	2	16	11	37	27	7	71	106
1964	1	20	30	20	22	7	49	87
1965	0	16	19	35	24	6	65	148
1966	3	15	7	25	37	13	77	262
1967	4	12	16	31	20	15	66	121

Table 2. Winter mortality in Southeast Alaska, 1967 and 1968.

	1967		1968	
District	Deaths Per Mile	No. Transects	Deaths Per Mile	No. Transects
Ketchikan	0.2	10	0.0	10
Kasaan	0.0	9	0.0	9
Craig	0.0	7	0.0	7
Juneau	2.9	8	0.0	8
Sitka	2.9	9	0.0	11
Petersburg	0.0	10	0.2	10
Wrangell	0.0	13	0.0	13
All Southeast	1.1	66	0.0	68

Table 3. Sex and age composition of winter deer losses in Southeast Alaska, 1967.

Sex	Number	Percent
Male	15	34
Female	18	41
Unknown	11	25
Total	44	100

Age	Number	Percent
Fawn	17	39
Adult	14	31
Unknown	13	30
Total	44	100

temperatures dropping to minus 20 degrees F. in some localities. Temperatures moderated in February and the remainder of the winter was very favorable for deer survival. Surveys made in March and April, 1968, indicate lower winter losses than for the previous four years. Only one deer carcass evidencing malnutrition was found on all transects checked in Southeast Alaska. It will be extremely interesting to observe the reflection of the low mortality on deer abundance during the fall of 1968.

Deer-Wolf Relationships

Two trips were made to Coronation Island during the report period to monitor the deer-wolf project. This study was initiated in 1960 when two male and two female wolves were placed on a 30-square mile island which had no previous history of predator occupancy. The habitat evidenced extreme use by deer which were about 20 percent smaller than those on some of the better ranges in Southeast Alaska. From 1960 to 1965 the wolf population increased to approximately 12 animals. During this period evidence of deer decreased rapidly until 1965 when it was difficult to locate even a track. In early 1966 a decline in the wolf population was apparent and by August of that year only two or three wolves were present on the island and no denning activity was noted. In May, 1967, two or three wolves were still present but again there was no evidence of denning and in January, 1968, only one wolf was located.

Food items occurring in wolf scats collected since 1960 is given in Table 4. From 1960 through 1965 deer was the major food item. It is especially interesting to note that wolves were able to obtain sufficient deer in 1965 when the deer population had dropped to a point where it was difficult to locate a track. In February, 1966, deer occurrence in scats dropped to 53 percent and in 1967 and 1968 no deer remains were noted in 51 scats. Only 44 scats were located in May, 1967, and none were found in January, 1968, even though the same routes were followed as in previous years. In spite of the absence of deer remains in scats, more evidence of deer was observed on the island in May, 1967, than for several previous years. A proportion of the scats normally contained a small amount of wolf hair, but in February, 1966, six scats contained only wolf material. This was the first indication of intra-specific strife. Actual cause of death could not be determined, but a considerable amount of blood was noted along a wolf trail in the snow. In August, 1966, only seven scats were located and again one of these contained entirely wolf material, but in May, 1967, none of the 44 scats collected contained wolf remains. During the first years of the study vegetation changes on the island were dramatic. Plant occurrence on seven 50-foot line transects increased from 1076 hits in 1963 to 1773 in 1965. Forbs constituted the major portion of the increase. Since 1965

Table 4. Frequency of food items in wolf scats from Coronation Island, 1961 - 1967.

Year	No. Scats	Frequency (% occurrence in total scats) Deer	Harbor Seal	Wolf	Misc.
1961	146	78	43		2
1962	18	89	48		11
1963	45	89	53		27
1964	77	95	32		14
1965	213	97	8	7	17
1966					
Feb.	110	53	18	10	66
March	7	0	14	29	57
1967	44	0	57	0	73

rate of plant establishment has not increased but those present evidence good growth. The primary winter browse species on the island are Vaccinium ovalifolium and V. parvifolium. In 1960 it was difficult to find a plant of these species available for deer use. Some old plants were present which had grown to a height beyond deer reach and some plants were present in inaccessible locations. New shoot growth from these old plants has been very rapid, some plants having up to 12 inches of annual lineal increment. Establishment of additional Vaccinium spp. has been much slower than anticipated. Young plants are filling in the voids, but lineal growth on these small plants is very small.

Wolves increased on the island as long as deer were present in sufficient numbers to provide the major portion of their food. The annual wolf increment was far below their potential, even during initial years when food was plentiful. In five years the wolf population increased from four to about twelve animals. If the maximum potential had been reached, assuming an average litter of five pups and a 50:50 sex ratio, over one hundred and fifty wolves could have been on the island in 1965. Even under optimum conditions wolves apparently do not approach their potential productivity.

In 1965 deer became difficult for wolves to obtain. Their diet was supplemented by many miscellaneous items and the wolves became scavengers. At this time the first evidence of intra-specific strife was noted by occurrence of wolf remains in wolf scats. In a period of a few months (August, 1965 to February, 1966) the wolf population declined from approximately twelve to three animals and by 1968 only one wolf remained. Since 1966 there has been little evidence of wolves preying on deer. It appears that when the prey species is reduced to a low level the predator turns to more available food sources, even though they may not be preferred. Forb species on over-used deer range in Southeast Alaska show a rapid recovery when the deer population is reduced, but browse species, though showing good growth from established root systems, are slow filling in the available niches.

Habitat

Winter Range Use

As noted previously this segment includes mortality and utilization data for both 1967 and 1968. Deer winter range use studies are also included in the cooperative deer study program between the Alaska Department of Fish and Game and the U. S. Forest Service. Surveys included 67 localities of Southeast Alaska in 1967 and 68 in 1968. Table 5 gives utilization values by locality and Table 6 summarized this data. Figure 1 shows utilization figures since 1956 for all of Southeast Alaska.

Winter browse use of Vaccinium ovalifolium and V. parvifolium by deer was 55 percent in 1967 and 48 percent in 1968. From 1965 through 1967 there was a gradual decline in winter browse use as shown in Figure 1. This decline was in spite of relatively severe winters and is apparently resultant of a declining deer population. In 1968 browse use dropped to 48 percent, the lowest figure since 1963. The low figure in 1968 can be attributed to one of the mildest winters in recent years and a lower deer population. The decline in deer numbers has been confined primarily to the nothern segment of Southeast Alaska including the Wrangell, Petersburg, Sitka and Juneau districts. South of these areas winter losses have been light and deer populations remained at about the same level or have increased in some localities. In 1968 winter browse use decreased in the northern districts where mortality has been greatest in past years and increased in the Ketchikan and Kasaan districts where winter losses have been light for many years.

The degree of browse use in 1967 and 1968 is in better balance with the carrying capacity of Southeast Alaskan deer range than in previous years. In 1963 a plot was established near Petersburg on which Vaccinium ovalifolium was clipped to simulate varying degrees of deer use. Each spring since 1963 the plot has been clipped, removing only current annual growth. In 1968 no loss of vigor was noted below 40 percent use; however 60 percent use has resulted in about 10 percent dead twigs, 80 percent use in about 50 percent dead twigs and 100 percent use in about 80 percent dead twigs. Sustained use in excess of 60 percent appears to be detrimental to deer winter range in Southeast Alaska. Since 1956 the lowest winter browse use has been 43 percent and during five of these years it has ranged from 66 to 86 percent.

Protein Analyses

In 1965 and 1966 collections were made of the deer food species Vaccinium ovalifolium, Cornus canadensis and Fauria crista-galli. Samples were taken at monthly intervals from forest and fringe types. As time permitted during the report period these samples were analysed for nitrogen content using the "Improved Kjeldahl Method" (Official Methods of Analysis of the Association of Official Agricultural Chemistry) which was converted to protein by multiplying by the constant 6.25. Much time was involved setting up apparatus, standardizing chemicals and making trial tests. Two tests were made for each sample and if results varied more than 0.1 percent a third sample was tested. The results of analyses completed are given in Table 7. Determinations will be continued during the next report period.

Effects of Logging on Deer Habitat

During the past 15 years the lumbering industry has expanded rapidly in Alaska. In the future it will probably have more impact

Table 5. Deer winter range use, condition index and plant height for Southeast Alaska, 1967 and 1968.

Transect Number and Location	Average Percent Utilization		Average Condition Index		Average Plant Height	
Ketchikan District	1967	1968	1967	1968	1967	1968
1 Helm Bay	62	69	2.1	1.7	27	24
2 Carroll Inlet	82	54	2.2	1.8	37	30
3 Carroll Inlet	72	71	2.3	1.7	25	21
4 Coon Cove	63	59	1.8	1.7	25	28
5 Tongass Narrows	52	60	2.0	2.0	32	31
6 Marguerita Bay	26	62	2.0	1.5	41	24
7 Neets Bay	51	53	1.8	1.8	24	25
8 Square Island	34	56	2.2	1.9	39	35
9 Bostwick Inlet	36	67	2.0	1.6	31	26
10 Thorn Arm	50	63	2.0	1.9	29	27
District Average	52	61	2.0	1.8	35	27
Kasaan District						
21 Polk Inlet	22	25	2.2	2.0	41	44
23 Thorne Bay	43	58	1.9	1.8	37	32
25 Moira Sound	32	40	2.4	2.3	33	34
26 Chomly Sound	33	72	2.2	2.0	28	28
27 Karta Bay	18	32	2.2	1.8	38	37
30 Cat Island	17	53	2.0	1.9	28	31
32 Whale Pass	34	35	2.0	1.9	32	32
33 Salmon Bay	33	43	2.1	2.2	26	26
35 Union Bay	65	34	2.3	2.4	28	23
District Average	33	44	2.2	2.0	32	32

Table 5. (Continued)

Transect Number and Location	Average Percent Utilization		Average Condition Index		Average Plant Height	
Craig District	1967	1968	1967	1968	1967	1968
41 Warm Chuck Inlet	49	41	1.6	2.0	39	40
43 Picnic Bay	50	40	2.0	1.9	44	40
44 Halibut Harbor	43	20	2.1	2.0	27	28
45 Marble Creek	18	0	1.8	1.9	42	37
46 Naukati Bay	21	10	1.6	2.0	48	45
47 Cruz Pass	23	15	1.9	2.1	42	35
48 Trocadero Bay	41	24	1.7	2.0	52	47
District Average	38	21	1.8	2.0	42	39
Wrangell District						
61 South Woronkofski	12	25	2.2	2.1	31	28
62 Thoms Place	32	26	2.4	2.1	30	31
63 Dewey Anchorage	53	52	2.0	2.2	28	29
64 St. Johns Harbor	59	50	2.5	2.3	30	31
65 North Woronkofski	2	1	2.1	2.2	29	28
66 Anita Bay	48	49	1.8	2.0	30	33
67 Meter Bight	48	18	2.0	2.0	28	27
68 Eastern Passage	71	43	1.9	1.8	35	35
District Average	38	33	2.1	2.1	30	30

Table 5. (Continued)

Transect Number and Location	Average Percent Utilization		Average Condition Index		Average Plant Height	
Petersburg District	1967	1968	1967	1968	1967	1968
81 Wrangell Narrows	70	30	2.3	2.3	31	31
82 Big John Bay	44	53	2.3	2.2	29	31
83 Duncan Canal	51	36	2.1	1.8	30	33
84 Five Mile	38	26	2.1	2.0	29	32
84 Twelve Mile		31		1.5		23
85 Totem Bay	37	39	2.3	2.0	20	22
86 Portage Bay	42	37	2.2	1.8	30	31
87 Ideal Cove (North)	53	27	2.3	2.4	30	31
88 West Duncan Canal	73	72	2.2	2.3	28	29
89 Three Mile Arm	34	28	2.2	1.6	30	28
87a Ideal Cove		59		2.2		23
District Average	48	40	2.2	2.0	28	28
Sitka District						
101 Ushk Bay	76	91	2.2	2.1	27	28
102 Nakwasina Passage	88	87	2.6	2.2	24	25
104 Fish Bay	83	81	2.3	2.1	28	29
105 Port Krestof	76	72	2.1	2.2	25	26
106 Hannus Bay	83	80	2.3	2.0	28	28
107 Hoonah Sound	71	87	2.3	2.3	23	22
111 Long Bay	75	76	2.2	2.2	30	30
112 Adams Channel	75	85	2.2	2.3	23	23

Table 5. (Continued)

Transect Number and Location	Average Percent Utilization		Average Condition Index		Average Plant Height	
Sitka District (cont)	1967	1968	1967	1968	1967	1968
130 Whitestone Harbor	77	61	2.2	2.2	27	27
131 Neka Bay	69	29	2.2	2.2	20	20
District Average	78	75	2.2	2.2	26	26
Juneau District (Chatham)						
103 Hood Bay	94	39	2.0	1.9	29	28
108 Chiak Bay	45	35	1.6	1.9	31	29
109 Mitchell Bay	76	56	1.9	2.1	23	22
121 Pybus Bay	98	58	2.4	2.1	21	21
122 Mole Harbor	84	72	2.0	2.2	26	26
123 Point Hilda	82	22	2.0	2.0	24	25
124 Eliza Harbor	75	45	2.2	2.2	26	26
125 Gambier Bay	75	46	1.9	2.2	30	28
126 King Salmon Bay	94	61	2.1	2.2	25	22
127 Young Bay	82	53	2.1	2.2	26	26
128 Eliza Harbor	83	49	1.2	1.8	34	28
129 Bug Island	82	66	1.9	2.2	26	28
132 Barlow Cove	69	44	1.7	2.0	23	25
District Average	80	50	1.9	2.1	26	26

on deer habitat than any other human-controlled factor. This study is designed to provide information on the long-term influence of logging on deer habitat. The 1967 field season was devoted primarily to selection of study areas. Many areas were inspected which were logged between 1900 and 1966. It was necessary to locate sites which were clear-cut for comparison purposes as this is the technique practiced today. When a site appeared suitable it was essential to date the original cutting. Records were not always available or were sometimes in error. We therefore took increment samples to determine age of reproduction. Each site had some residual trees which were left when the areas were cut. Increment cores from these trees clearly showed the date of release and cuttine dates could be established with a reasonable degree of accuracy. In addition to selecting study areas considerable time was spend measuring sample plots to test sampling techniques and determine size of sample required for each area. Actual sampling will be initiated during the coming field season.

A complete set of timber type maps (1:31,680) was assembled of Southeast Alaska. Completed logging cuts and projected five-year cutting plans were plotted on these maps to provide a picture of location and size of cuts in relation to winter deer habitat. In Southeast Alaska cover is essential on winter range. During the first 10 to 15 years after cutting, logged areas produce a great deal of vegetation suitable for deer food. These open areas, however, are blanketed by snow much faster than adjoining areas where timber cover is still present. If cuts are extensive deer populations will probably increase during mild years when food is abundant, but during severe winters the higher population is compressed into a smaller area and the problems of winter survival compounded. For this reason it is essential that adequate cover be left adjacent to large cuts. The timber type maps have already been a valuable aid in selecting sites which should be reserved from cutting to protect deer habitat. During the past year requests were made to reserve two extensive areas on Kupreanof Island for deer winter habitat. The U. S. Forest Service agreed to suspend timber sales in these areas and list them in their Multiple Use Atlas as primarily important for deer winter range. This has been a major step forward in cooperative deer management in Alaska.

Snow Depths

In conjunction with the logging study we are attempting to describe optimum deer winter range and determine where deer are in relation to snow depths. In Southeast Alaska deer do not have a specific winter range but continually migrate up and down the mountains as snow depths and conditions change. During mild winters deer may concentrate above the 1,000 foot level or if the winter is severe most deer may be below 200 feet. A transect was established

Table 6. Summary of deer winter range use for Southeast Alaska, 1967 and 1968.

District	Average Percent Use		Average Condition Index		Average Plant Height*	
	67	68	67	68	67	68
Ketchikan	52	61	2.0	1.8	31	27
Kasaan	33	44	2.2	2.0	32	32
Craig	38	21	1.8	2.0	42	39
Wrangell	38	33	2.1	2.1	30	30
Petersburg	48	40	2.2	2.0	28	28
Sitka	78	75	2.2	2.2	26	26
Juneau	80	50	1.9	2.1	26	26
Average for Southeast Alaska	55	48	2.1	2.0	30	29

* = inches

Table 7. Protein content of ground dogwood (Cornus canadensis).

Date Collected	Habitat Type	Protein (%)
7- 2-64	Forest	13.16
8-21-64	Fringe	11.75
9-30-64	Fringe	9.84
10-21-64	Forest	13.13
10-21-64	Fringe	11.53

in known deer winter range on Mitkof Island, beginning at sea level and extending to 1500 feet. Snow depths were measured periodically at each 100-foot elevation interval, both under timber cover and in open areas. Deer tracks were counted between each elevation interval. Measurements are tabulated in Table 8. Some variation occurred in the pattern of deer movements but generally they did not use areas where snow depths exceeded 12 to 15 inches. There was a general trend downward from the occurrence of first snow falls in November through February. Mild weather in early March reduced snow depths and deer were found up to the 1800 foot level. Snow deposition in open areas was usually about double that found beneath timber canopy at the same elevation.

Hunter Harvest

Statistics for the 1967 deer harvest are given in Table 9 and are compared with previous years in Table 10. Table 11 shows the kill by town and Game Management Unit.

Deer hunting was poorer in most areas of Southeast Alaska than experienced since 1956 and 1957. The average hunter took only 1.6 deer compared to 2.0 or higher in better years and as high as 2.4 in 1958. The effort of 4.1 days per deer was higher than for any year since 1956. The total deer kill in 1967 was approximately 10,150. This is only slightly lower than in recent years because of an increase in the number of licensed hunters. The poor success in 1967 can be attributed to fewer deer than in previous years and to poor hunting conditions. Most hunters in Southeast Alaska wait for heavy snowfalls to bring deer to low elevations. Snowfall was light during the hunting season and consequently deer remained high. In late December deer in many areas were still above the 1000 foot level and unavailable to most hunters. A heavy snowfall did occur in the northern portion of Southeast Alaska in mid-December, providing good hunting for a short period. Figure 2 shows the chronological distribution of the 1967 deer kill. The major portion of the kill usually occurs in November. This remained true in 1967 but the kill during November was proportionally smaller and that in December greater than in previous years.

The take of 1.6 deer per hunter, though considered low by Alaskan hunters, would be considered excellent in most other states. If hunting pressure was sufficiently intensive to maintain the deer population at its present level, hunting would still be good and deer would be in better balance with their environment.

The low success in 1967 is viewed with alarm by many hunters. Some wish to attribute it to predation and excessive hunting. The high proportion of older age animals in the deer harvest (Table 1) invalidates excessive hunting and there is no evidence that

Table 8. Snow depth measurements and deer track counts, Mitkof Island, 1967-1968.

Elevation	11-28-67 Depth			12-19-67 Depth			1-22-68 Depth			1-31-68 Depth			2-7-68 Depth			2-21-68 Depth			3-11-68 Depth		
	0	Ti	Tr	0	Ti	Tr	0	Ti	Tr	0	Ti	Tr	0	Ti	Tr	0	Ti	Tr	0	Ti	Tr
0	0	0	0	0	0	0	22	0	0	17	0	0	17	0	1	19	0	0	0	0	0
100	3	2	0	T	0	1	12	0	0	10	5	4	12	7	8	6	0	0	0	0	4
200	2	1	0	T	0	2	19	13	0	8	0	0	12	9		6	1	2	0	0	4
300	4	2	0	6	0	2	26	12	1	0	0				3	22	12	0	T	0	1
400	2	1	2	6	0	3	37	14	0			10	24	13	1	22	12	0	T	0	1
500	4	2	0	5	0	2	21	12	5	12	8		24	14	0	11	6		T	0	1
600	3	1	0	7	T	1	33	17	0	0	0	8	24	18	0				T	0	0
700	2	1	1	2	0	0	26	15	0	11	8	0	25	13	0				0	0	0
800	2	1	0	10	3	4	28	19		26	14		26	13					T	0	0
900	3	2	3	10	4	6													T	0	2
1000	3	2	1	10	2	0													T	0	4
1100	6	4	1	13	6	0													T	0	3
1200	3	2		18	8	0													T	0	2
1300				13	7	0													T	0	0
1400				21	9	1													T	0	0
1500				24	12														T	0	2
1600																			T	0	0
1700																			24	8	1
1800																			12	8	0
1900																			35	0	

Elevation in feet; depth in inches. 0 - Open, Ti - Timber, Tr - Tracks, T - Trace

Table 9. Deer Harvest Statistics for Southeast Alaska, 1967.

	Juneau	Ketchikan	Petersburg	Sitka	Wrangell	Other*	ALL SE
% Hunter Success	70	53	64	74	59	80	64
Deer/Hunter	1.8	1.2	1.3	1.8	1.4	2.0	1.6
Days/Deer	3.0	4.9	4.9	2.8	5.0	--	4.1
% Kill Female	39	35	38	40	39	--	38
License Sales	2900	2400	900	1200	550	550	8500
% Who Hunted	70	76	88	81	76	85	77
Actual Hunters	2030	1825	790	970	420	470	6500
Total Kill	3650	2190	1030	1750	590	940	10,150
Sample Size	100	100	150	100	87	--	537

*Statistics for villages (other) is estimate based on past years.

Table 10. Summary of deer harvest statistics for Southeast Alaska, 1959 - 1967.

Year	License Sales	Actual Hunters	Hunter[1] Success	Deer/ Hunter	Days/ Deer	% Kill Female	Total[2] Kill
1959	6160	?	74	1.8	3.6	24	11,000
1960	6460	5800	83	2.3	2.9	21	12,400
1961	6620	5800	77	2.2	3.1	26	11,200
1962	6900	5800	74	2.0	3.2	34	11,000
1963	7100	5400	79	2.0	3.0	33	11,100
1964	7100	3500	80	2.0	2.4	31	10,000
1965	7430	5900	73	1.7	2.8	38	10,000
1966	7970	6100	73	2.0	2.6	40	12,300
1967	8500	6500	64	1.6	4.1	38	10,500

[1]Percent of hunters taking at least one deer.
[2]Weighted by number of hunters in each town sampled.

Table 11. Deer kill by town and unit for Southeast Alaska, 1967.

Town	Unit 1	2	3	4	Total
Juneau	266		504	2880	3650
Sitka		12	37	1701	1750
Ketchikan	1625	425	140		2190
Petersburg	154		855	21	1030
Wrangell	12		579		590
Villages		414	140	385	940
All Southeast	2057	851	2255	4987	10,150

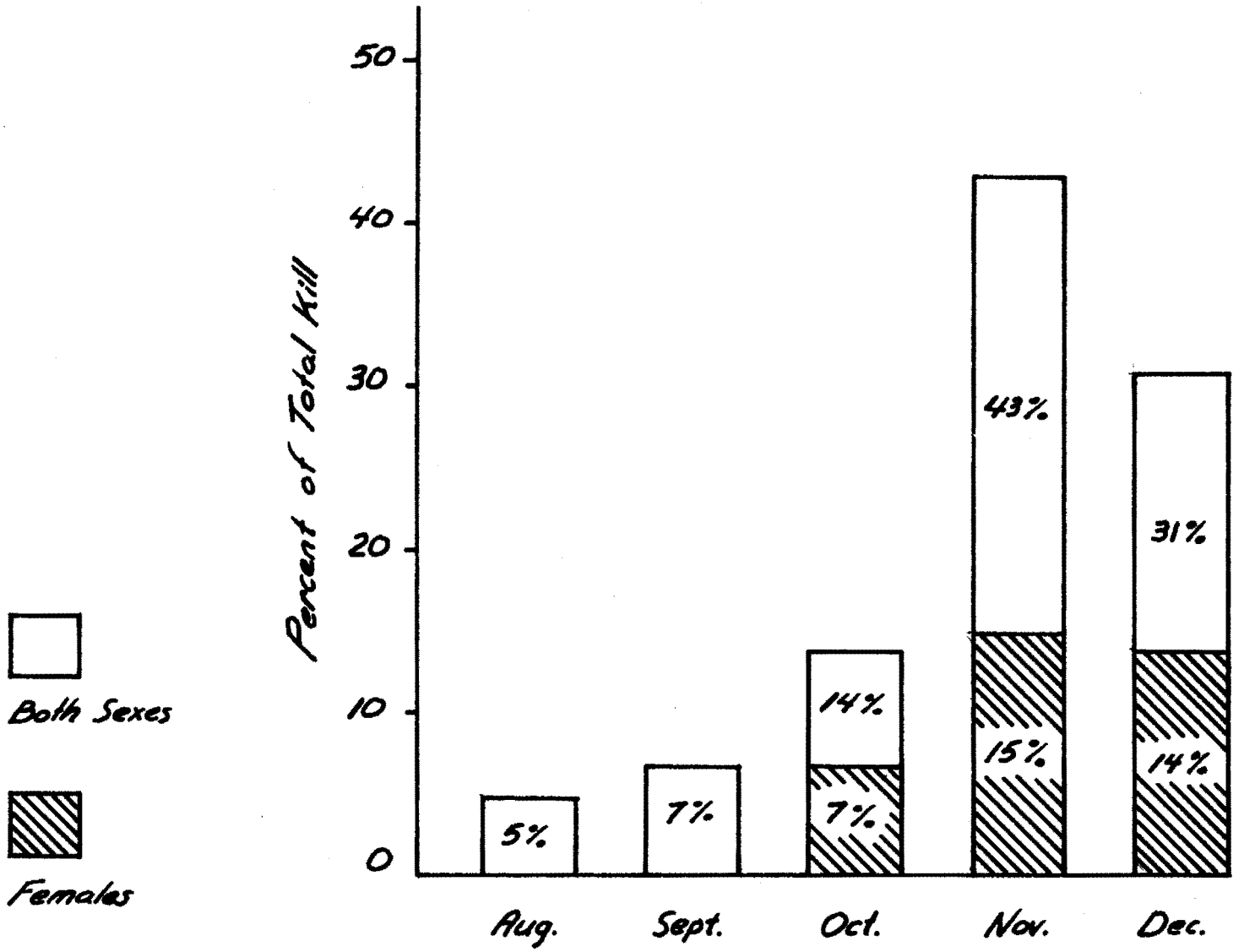


Figure 2. Chronological distribution of the 1967 deer harvest in Southeast Alaska.

predators (wolves), which have always been present, have ever materially influenced total deer numbers. Deer populations in areas with and without predators seem to fluctuate at about the same rate. In actuality the present level of abundance stems from too many deer in past years.

Prince William Sound

Deer populations in the Prince William Sound area have followed the same general pattern as in Southeast; however fluctuations have been more pronounced and populations appear lower than for several years. This is substantiated by the low fall counts, poor hunter success and very low range use during the winter of 1967-68. Poor flying conditions precluded aerial censusing on Montague Island in 1967; however counts on Hinchenbrook and Hawkins Islands were both lower than for the previous two years (Table 12).

A deer tagging program was scheduled for Prince William Sound in 1967-68. Deer did not concentrate at low levels due to mild weather conditions and only one deer was tagged. Tagging will be attempted during the next report period if favorable conditions exist.

Age classes represented in the 1967 deer harvest are given in Table 13. Age distribution is quite different from previous years as shown by the high proportion of fawns and conversely low proportion of yearling and two-year-old animals in the deer kill.

Results from winter range and mortality surveys in 1967 and 1968 are shown in Table 14. In 1964 and 1965 no measurable winter losses occurred; however in 1966 and 1967 losses were 2.2 and 2.3 dead deer per mile of beach. The losses in 1966 and 1967 were much higher than for average years. Fawns are most susceptible to severe winter conditions. The abnormally low proportion of yearlings and two-year-old deer in the 1967 harvest reflects fawn losses during 1966 and 1967. Winter conditions in the Sound area were mild in 1967-68 and no deer mortality was observed.

Winter range use for 1967 and 1968 is shown in Table 14. Average use of 37 percent in 1968 is lower than for any year since 1964 when surveys were initiated. Deer winter range in Prince William Sound has evidenced high use for the past several years resulting in poor browse condition. The low use in 1968, apparently resultant of a mild winter and lower deer population, is desirable. The islands of Prince William Sound provide a much smaller proportion of suitable winter deer range than most areas of Southeast and high deer populations, consequently, have more impact on winter range.

Table 12. Aerial deer counts for Prince William Sound, 1965 - 1967.

Date of Count	Hawkins Island	Hinchenbrook Island	Montague Island
7-25-65	73	257	51
8-26-65	20	175	134
7-17-66		100	
7-19-66			74
8-1-66	65		
8-9-66		241	
8-13-66			166
8-28-67	15	110	
9-11-67	21	73	

Table 13. Age class distribution in the 1967 deer harvest, Prince William Sound.

Age Class	% of Kill	Sample Size
Fawns	41	43
1 1/2	8	8
2 1/2	6	6
3 1/2	18	19
4 1/2	13	14
5 1/2	14	15
	Total Sample	105

Hunters took an average of 1.1 deer each in 1967 compared to 1.7 in 1966 (Table 15). The effort of 2.7 days per deer was also slightly greater than for 1966; however is much less than for Southeast in 1967. The total kill was 680 deer in 1967, compared to 880 in 1966 and 1170 in 1965. Lack of hunting effort must be partially responsible for the low kill for the effort of 2.7 days per deer is considered good hunting. Table 16 shows the kill by area. Most deer continue to come from Hawkins and Hinchenbrook Islands.

Kodiak Island

The deer population on Kodiak Island appears to be increasing slightly. Mortality during the winters of 1966-67 and 1967-68 has been light. The deer harvest in 1967 was higher than for any previous year. Mortality data is shown in Table 17 and harvest statistics in Tables 18 and 19. Hunter success was slightly better than in 1966, 0.8 deer per hunter compared to 0.6. The number of actual hunters increased from 1180 in 1966 to 1790 in 1967 and the deer kill from 720 in 1966 to 1500 in 1967.

Deer on Kodiak Island utilize many food species not generally found on other deer ranges of Alaska. Stomach samples collected in November and December contained substantial amounts of alder (Alnus fruticosa), spruce (Picea sitchensis), willow (Salix spp.), bearberry (Arcloslaphylos spp.), crowberry (Empetrum spp.), fireweed (Epilobium angustifolium) and various grasses.

Table 14. Winter range use and mortality for Prince William Sound, 1967 and 1968.

Transect Location	Utilization %		Condition Index		Plant Height		Winter Mortality (Deaths/Mile)	
	67	68	67	68	67	68	67	68
Windy Bay	53	49	2.6	2.5	30	28	0.0	0.0
Port Etches	56	16	2.4	2.6	24	27	0.0	0.0
Rocky Bay	83	31	2.4	2.4	30	32	12.0	0.0
Port Chalmers	57	40	2.2	2.4	27	27	0.0	0.0
Green Island	61	45	2.2	2.2	25	27	0.0	0.0
Canoe Pass	60	30	2.3	2.2	25	25	0.0	0.0
Ziakoff Bay	65	38	2.2	2.3	27	29	8.0	0.0
MacLeod Hbr.	64		2.5		30		0.0	
Hawkins Cutoff	80	36	2.6	2.2	22	23	2.0	0.0
Knight Island		34		2.1		32		0.0
Elrington Island	79	53	2.2	2.6	28	29	2.0	0.0
ALL PWS	65	37	2.4	2.4	27	28	2.4	0.0

Table 15. Deer harvest statistics for Prince William Sound, 1966 and 1967.

	1966	1967
% Hunter Success	69	69
Deer/Hunter	1.7	1.1
Days/Deer	2.3	2.7
% Kill Female	38	41
License Sales	630	600
Actual Hunters	520	460
Total Kill	880	680
Sample Size	100	100

Table 16. Distribution of 1967 deer harvest, Prince William Sound.

Area	% of Total Kill
Mainland	10
Hawkins Island	35
Hinchenbrook Island	39
Montague Island	13
Other	3

Table 17. Winter mortality data for Kodiak Island, 1967 and 1968.

Transect Location	Transect Length (Miles)	No. Dead Deer	
		1967	1968
Chiniak	8.5	1	0
Womens Bay	2.5	1	0
Monaska Bay	2.5	0	0
Portage Bay	3.0	1	0
Totals	16.5	3	0

Deaths/Mile = 0.2

Table 18. Deer harvest statistics for Kodiak Island, 1966 and 1967.

	1966	1967
% Hunter Success	42	48
Deer/Hunter	0.6	0.8
Days/Deer	9.3	5.7
% Kill Female	40	31
License Sales	1480	2011
Actual Hunters	1180	1790
Total Kill	720	1500
Sample Size	175	201

Table 19. Distribution of 1967 deer harvest, Kodiak Island.

Area	% of Total Kill
Monashka	13
Kalsin Bay	3
Chiniak	31
Saltery Cove	11
Uganik - Kupreanof	42

PREPARED BY:

Harry R. Merriam
Study Leader

APPROVED BY:

Don H. Strode
Federal Aid Coordinator

SUBMITTED BY:

Franklin F. Jones
Acting Director, Division of Game

Robert A. Rausch
Project Leader