



Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Annual Report of Survey-Inventory Activities
1 July 1988-30 June 1989

DEER

HABITAT DIVISION — LIBRARY
ALASKA DEPARTMENT OF FISH & GAME
333 RASPBERRY ROAD
ANCHORAGE, ALASKA 99518 - 1599



SK
367.2
.D4
1988-89

Compiled and edited by
Sid O. Morgan, Publications Technician
Vol. XX, Part VI
Project W-23-2, Study 2.0
June 1990

STATE OF ALASKA
Steve Cowper, Governor

DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

DIVISION OF WILDLIFE CONSERVATION
W. Lewis Pamplin, Jr., Director
W. Bruce Dinneford, Acting Planning Chief

Persons intending to cite this material should obtain prior permission from the author(s) and/or the Alaska Department of Fish and Game. Because most reports deal with preliminary results of continuing studies, conclusions are tentative and should be identified as such. Due credit will be appreciated.

Additional copies of this report, or reports on other species covered in this series may be obtained from:

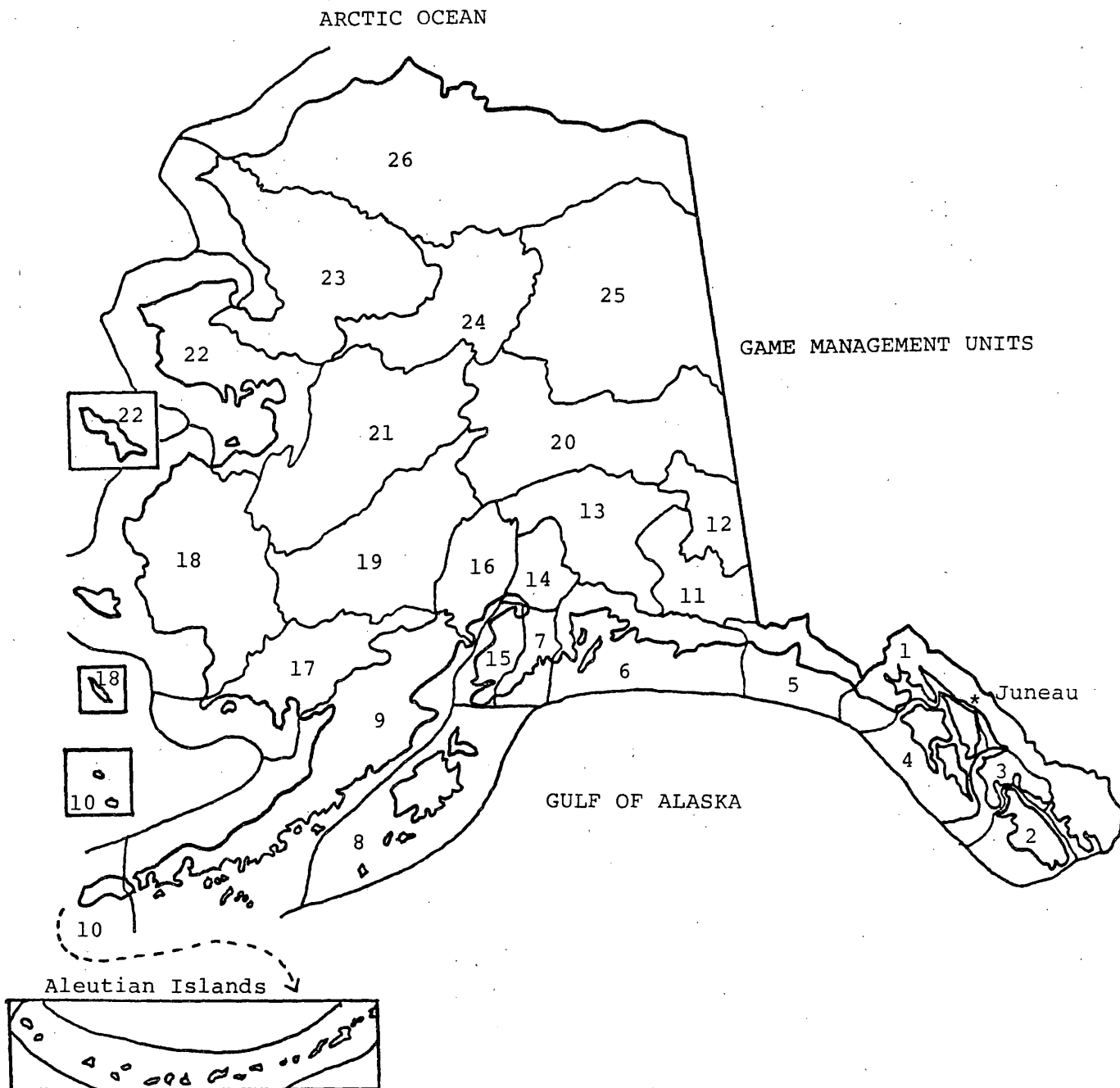
Publications Technician
ADF&G, Wildlife Conservation
P.O. Box 3-2000
Juneau, AK 99802
(907) 465-4190

The Alaska Department of Fish & Game operates all of its public programs and activities free from discrimination on the basis of race, color, national origin, age, or handicap. Because the department receives federal funding, any person who believes he or she has been discriminated against should write to: O.E.O., U.S. Department of the Interior, Washington, D.C. 20240.

ARLIS
Alaska Resources
Library & Information Service
ANCHORAGE, ALASKA

TABLE OF CONTENTS

Game Management Unit Map.	ii
Statewide Harvest and Population Status	iii
Game Management Unit/Geographical Description	
GMU 1A and 2 - Ketchikan and Prince of Wales	1
GMU 1B and 3 - Southeast mainland from Cape Fanshaw to Lemesurier Point and islands of the Petersburg, Kake, and Wrangell area	14
GMU 1C - Southeast mainland from Cape Fanshaw to Eldred Rock.	21
GMU 4 - Admiralty, Baranof, Chichagof, and adjacent islands	28
GMU 6 - Prince William Sound and north Gulf coast.	45
GMU 8 - Kodiak, Afognak, and adjacent islands.	55



STATEWIDE HARVEST AND POPULATION STATUS

Sitka black-tailed deer are found in the forests of Southeast Alaska, the Gulf Coast, and Kodiak Island. In these areas, it is the major big game species, particularly for resident hunters. In 1988-89 deer populations were variable. Populations in some units (e.g., 3, 4, 6, and 8) apparently declined over the 1987-88 reporting period because of the severe winter. Deer populations remained high in Unit 4 (Admiralty, Baranof, and Chichagof Islands) and Unit 8 (Kodiak Island).

A little over 29,000 deer were harvested statewide in 1988-89. This is a 20% reduction in the harvest over that for 1987-88. As usual, a substantial portion of the harvest (approximately 76%) occurred in Unit 4 and 8. During the reporting period, there was no evidence to suggest that hunting was inhibiting population growth; however, the recent severe winter probably negatively imparted some populations.

Unit	Population level	Population trend	Estimated harvest
1A	variable	increasing	686
1B	low	increase	101
1C	moderate to high	stable	443
2	high	increasing	2,849
3	low	stable to declining	234
4	high	stable to declining	12,000
6	moderate to high	stable to declining	2,800
8	high	stable to declining	10,000+
TOTAL			29,113+

Steven R. Peterson
Senior Staff Biologist

STUDY AREA

GAME MANAGEMENT UNITS: 1A and 2 (8400 mi²)

GEOGRAPHICAL DESCRIPTION: Ketchikan area, including mainland areas draining into Behm and Portland Canals and Prince of Wales Island and adjacent islands south of Sumner Strait and west of Kashevarof Passage.

BACKGROUND

Southeast Alaska is at the northern edge of the range for deer, and populations are subject to great fluctuations because of winter weather and predators. The most recent population low, which followed very severe winters in 1968-69 and 1971-72, carried through until the early 1980's when noticeable population increases began. Currently, deer numbers are moderate to high in much of the area, except for the rugged mainland areas generally east of Behm Canal.

Typical Southeast deer habitat is uneven-aged old-growth forest of spruce hemlock, and cedar from elevations of zero to about 2,000 feet, and alpine/subalpine habitat from 2,000 to about 3,000 feet. Winter range is the most important limiting factor, and high-volume old-growth stands are critical for survival during severe winters.

Harvests fluctuate widely because they tend to follow population changes. Harvests in Subunit 1A have ranged from 340 to 859 deer during the past 8 years, while in Unit 2, the low and high harvests during the same period were 615 and 3,886 (1988-89), respectively. Seasons have generally been long (i.e., August through November or December) and bag limits have been typically 3 or 4 bucks; either sex seasons have been authorized when populations are very high.

Habitat changes in the form of clearcut logging are rapidly reducing the old-growth forest to even-aged closed-canopy stands of limited value to deer. Early successional stages (i.e., aged 3 to 20 years) are usable habitat during mild winters, while closed-canopy stands (i.e., aged 20 to 100 years) are not considered deer habitat for either summer or winter. During years of moderate-to-heavy snowfall, use of cut over areas and low-volume timber ceases and deer are confined to the higher-volume stands of old-growth. Current population models suggest declines in overall carrying capacity of 50% to 60% by the end of the logging rotation in the year 2054. Because of extensive loss of critical winter habitat, in some areas, declines may substantially exceed even 60% following severe winters.

POPULATION OBJECTIVES

To maintain deer populations in excess of 75 deer per square mi² of winter range as measured by mean pellet density of 1.4 pellet groups per plot.

METHODS

The harvest assessment is based primarily on mail questionnaires mailed to a random sample of people who had received deer harvest tickets; in communities issuing more than 150 harvest tickets, 30% of all ticket holders were sampled. A 100% sample was used for communities issuing less than 150 tickets. Hunter check stations have been used when specific data was required. Discussions with hunters throughout the season also supplied useful data on many aspects of populations and harvests.

Summer alpine surveys are conducted on an opportunistic, rather than an annual, basis. They are dependent upon budgets, weather, and need to reinforce estimates of population levels. Spring beach mortality surveys along standardized routes are conducted following severe winters to assess losses. Excluding the spring of 1989, these surveys have not been conducted for many years because of mild winters and low natural mortality. Six transects were surveyed this year because snow accumulation during the 1988-89 winter was greater than normal. Relative deer densities and population trends are measured with standardized pellet-group transects in the early spring in areas where deer populations winter (Kirchhoff and Pitcher, 1988).

RESULTS AND DISCUSSION

Population Status and Trend

Deer populations are on the rise throughout Subunit 1A and Unit 2, but densities vary. Highest densities occur in Unit 2 and on the lower Cleveland Peninsula portion of Subunit 1A. Populations are low on the mainland and the northeastern edge of Revillagigedo Island, while the remainder of Revillagigedo Island appears to have moderate densities. The winter of 1988-89 was more severe than those of the last 10 to 15 years. It caused mortalities in areas having a heavy snow accumulation, particularly east- and north-facing winter habitats, and high deer populations (e.g., Heceta Island). It is not likely the 1988-89 winter caused enough mortality to change the upward trend of the deer population. Pellet-group data (Table 1) show population trends and pellet-group densities since surveys were initiated in 1981.

Aerial survey results vary between days. A 2.75-hour early morning survey was conducted on 25 July 1989 along the alpine-subalpine areas in Unit 2 from Moira Sound to Ratz Harbor; 649

deer were observed, indicating an abundant population. Previous surveys (early 1980's) in the same general area resulted in less than half the number counted during the July 1989 survey.

Mortality

Season and Bag Limit:

The open season for subsistence, resident, and nonresident hunters in Subunit 1A and Unit 2 is 1 August to 31 December. The bag limit is 4 antlered deer.

Human-induced Mortality:

The 1988 deer harvest was calculated from a mail survey of harvest ticket holders. Sample rates were 100% for communities with under 150 harvest ticket holders and 30% for communities with over 150 ticket holders. Returns were expanded to cover all harvest ticket holders. The expanded harvest figures for the past 5 years are shown in Table 2 for Subunit 1A and Unit 2.

The unreported or illegal harvests are significant (Table 3), and it is much higher in Unit 2 because of the extensive road system, lack of enforcement personnel, and many widely scattered subsistence-oriented settlements. In Subunit 1A the illegal harvest is estimated to be 50% of the reported harvest; however, in Unit 2 it probably equals the legal take.

Hunter effort in 1988 was less than that for 1987, and while the total harvest was also down, the success rate (i.e., the number of deer harvested per hunter day) was up. Hunter success for both Subunit 1A and Unit 2 was higher in 1988 than in any of the preceding 5 years. The number of hunters in Subunit 1A was essentially the same as in 1987, while Unit 2 experienced a 14% drop. It is possible that a portion of the Ketchikan hunters who have normally hunted in Unit 2 elected to hunt in Subunit 1A because of the increase in the deer population closer to home. There were large decreases in the average number of days hunters spent in the field in both units. Much of the fluctuation in hunter effort between years can be attributed to varying snow cover during the hunting seasons. Good snow cover tends to increase hunter effort.

Table 4 presents harvest data by major harvest areas. While the number of hunters in Subunit 1A was about the same as in 1987, the total hunter days dropped 23%. Several significant shifts in hunting locations occurred. Gravina Island and southern Revillagigedo Island attracted more hunters than in 1987, while northern Revillagigedo Island and the Cleveland Peninsula experienced large declines; reasons for the changes are unknown.

There were also declines in hunters and the number of days hunted in Unit 2. Most of the decline occurred in the northern part of Prince of Wales Island. Some of the changes have been attributed

to a shift in the locations of logging camps, but this did not account for all of it. Declines in both hunters and days hunted occurred in much of Southeast Alaska.

Hunter Residency and Success. Deer hunters are mostly local residents of Southeast Alaska. Only 5% of the hunters were from outside of Southeast (Table 5).

Harvest Chronology. There were 2 peaks in harvest: one in August to early September and the largest one in November during the rut. Moreover, any significant snowfall during the hunting season brings out many hunters. The lowest hunter participation occurs during October.

Transport Methods. Most (56%) hunters in Subunit 1A used boats to access hunting areas. Other hunters reported using highway vehicles (18%), feet (17%), or aircraft (2%). A small number of hunters reported other transportation methods, including 3- or 4-wheelers, ORV's, or "other."

In Unit 2, most (52%) hunters reported using highway vehicles. Boats were reported by 23% of the hunters; 13% walked, 4% used 3- or 4-wheelers, 3% used aircraft, and 2% used ORV's. Other hunters (3%) used other modes or did not report.

Natural Mortality:

The winter of 1988-89 was moderately severe, and for the 1st time in many years, some winter losses occurred. Six winter mortality transects (i.e., Nos. 4, 23, 27, 32, 33, and 46) were walked this spring; however, no carcasses were found that could be attributed to the winter. Overall, losses were probably not significant, except in small areas that received the heaviest snowfall. Large numbers of black bears and wolves occur throughout both units, and predation slowed the growth of the deer population, particularly on Suemez and Gravina Islands.

Habitat

Assessment:

Major changes in old-growth deer habitat are occurring, as a result of logging. The most serious impacts occur in the higher-volume stands at low elevations. These stands are critical during years of heavy snowfall; U.S. Forest Service and ADF&G habitat models predict that the capacity of the forest to support deer in an average winter will decline by nearly half by the year 2054. This loss will be greater during years of deep snow and somewhat less during years of low snow. By 2054, there will be no areas within the roaded and logged portions of Subunit 1A and Unit 2 where projected hunter demand for deer will be met (U.S. Forest Service 1989).

Enhancement:

Various treatments, like precommercial thinning, are applied by the USFS for both silvicultural purposes and to improve cut-over areas as winter deer habitat. However, at this time, none of these efforts have been shown to have any significant value to deer.

Game Board Actions and Emergency Orders

The same season and bag limit (i.e., 3 antlered deer, 1 Aug-30 Nov) persisted from 1978 through 1986. In 1987, in response to increasing deer numbers, particularly in Unit 2, 1 antlerless deer was added to the bag limit in Unit 2 for 10-31 October. Out of a total Unit 2 harvest of 3,886 deer, 270 were antlerless. Considerable opposition to this season developed. The season was dropped at the spring 1988 Board meeting, but the bag limit was raised to 4 antlered deer and the season was extended through December for both Subunits 1A and Unit 2.

CONCLUSIONS AND RECOMMENDATIONS

The objective of 75 deer/mi² of winter habitat is probably being met in most areas of Unit 2 and in some parts of Subunit 1A. With continued mild winters the deer populations in all suitable habitat should surpass the objective within a few years.

The loss of winter habitat through logging will reduce the capacity of the land to produce deer for hundreds of years. Efforts to inform the public of the impacts of logging on deer population should be made, so that people can be made aware of the trade offs between timber harvest and wildlife. The long-range implications of this habitat loss are the inability to provide for subsistence needs and the loss of hunting opportunity for deer hunters in Subunit 1A and Unit 2.

LITERATURE CITED

- Kirchhoff, M. D., and K. W. Pitcher. 1988. Deer pellet group surveys in Southeast Alaska 1981-87. Alaska Department of Fish and Game, Fed. Aid in Wildlife Rest., Res. Final Rep. Proj. W-22-6, W-23-1. Job 2.9. Douglas. 113 pp.
- U. S. Forest Service, 1989. 1989-94 operating period for the Ketchikan Pulp Company. Long-Term Sale Area, final Environmental Impact Statement. USDA Forest Service. R-10-MB-66h. Approx. 2,000 pp.

PREPARED BY:

Robert E. Wood
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Deer population trends as indicated by pellet-group surveys in Subunit 1A and Unit 2, 1981-1989.

Year	Mean Pellet ^a Groups/plot	Number of Plots	95% C.I.
<u>Prince of Wales and adjacent islands</u>			
	VCU 528 Calder		
1988	2.14	252	1.79-2.50
	VCU 532 Red Bay		
1987	0.32	177	0.18-0.47
	VCU 539 Exchange Cove		
1988	1.40	266	1.15-1.65
	VCU 549 Sarheen		
1989	1.73	310	1.44-2.01
	VCU 554 Sarkar		
1988	1.29	298	1.06-1.51
	VCU 561 Warm Chuck		
1984	1.02	326	1.02-1.38
1985	1.60	295	1.36-1.84
1989	2.21	302	1.91-2.50
	VCU 578 Snakey Lakes		
1986	0.62	279	0.51-0.73
1988	1.05	300	0.85-1.26
1989	1.56	200	1.26-1.86
	VCU 581 Luck Lake		
1986	1.74	178	1.41-2.07
1988	2.11	300	1.80-2.42
	VCU 587 Tuxekan		
1988	1.07	300	0.85-1.29
	VCU 621 12 Mile		
1985	0.31	196	0.19-0.43
1986	0.64	300	0.48-0.81
1987	0.65	370	0.49-0.81
1988	0.62	302	0.46-0.78
1989	0.78	235	0.59-0.98

Table 1. Continued

VCU 635 Port Refugio			
1985	2.69	317	2.27-3.12
1986	2.52	324	2.09-2.96
1987	1.76	369	1.46-2.07
1988	1.15	270	0.90-1.40
1989	0.80	507	0.68-0.93
VCU 679 Kitkun			
1988	0.32	240	0.21-0.43
1989	0.89	273	0.71-1.07
VCU 685 Nutkwa			
1988	0.10	234	0.02-0.17
<u>Cleveland Peninsula</u>			
VCU 715 Smugglers			
1981	0.48	147	0.30-0.66
VCU 716 Helm Bay			
1981	0.16	704	0.12-0.19
1984	0.54	302	0.44-0.65
1985	0.85	181	0.65-1.05
1988	1.67	247	1.38-1.95
<u>Revillagigedo Island</u>			
VCU 738 Margaret			
1985	0.57	515	0.47-0.66
1986	0.84	251	0.69-1.00
1988	1.32	110	0.97-1.67
1989	0.62	129	0.44-0.84
VCU 748 George Inlet			
1981	0.21	110	0.09-0.33
1984	0.27	344	0.19-0.35
1985	0.52	313	0.39-0.65
1989	1.41	169	1.08-1.75
VCU 752 Whitman Lake			
1981	0.18	45	0.02-0.33
1987	0.16	187	0.09-0.23
VCU 758 Carroll Point			
1985	0.66	118	0.46-0.86
1986	0.75	118	0.56-0.95
1988	1.15	85	0.82-1.49

Table 1. Continued

VCU 759 Moth Bay			
1985	0.59	140	0.42-0.74
1986	0.98	156	0.79-1.17
1988	0.72	78	0.46-0.97
VCU 760 Lucky Cove			
1985	1.16	335	1.00-1.33
1986	1.16	258	0.95-1.32
1988	1.02	65	0.69-1.34
VCU 769 Alava Bay			
1985	0.52	311	0.39-0.65
1986	0.85	326	0.68-1.01
VCU 772 Wasp Cove			
1985	0.41	271	0.31-0.51
1986	0.50	300	0.38-0.62
1989	0.58	145	0.39-0.77
<u>Gravina Island</u>			
VCU 764 Blank Inlet			
1981	1.24	108	0.89-1.59
VCU 765 Dall Head			
1981	0.52	69	0.31-0.74
VCU 999 E. Gravina - all transects			
1981	1.06	226	0.89-1.22
1984	0.86	1,087	0.78-0.94
1985	1.23	1,172	1.13-1.32
1986	1.40	1,267	1.30-1.50
VCU E. Gravina - Trans 1,2,3			
1984	0.88	376	0.73-1.03
1985	1.44	224	1.20-1.67
1986	1.62	346	1.43-1.81
1987	1.63	334	1.41-1.84
1988	2.07	278	1.79-2.35
1989	1.13	182	0.86-1.41

^a Density classes based on Mean Pellet Groups/Plot:

Less than 0.5 = extremely low
 0.51-1.0 = low
 1.01-2.0 = moderate
 2.01-3.0 = high
 Over 3.0 = extremely high

Table 2. GMU 1A and 2. Summary harvest statistics for deer in Subuint 1A and Unit 2, 1984-88.

Year	GMU	No. of hunters	No. of success	Percent success	Total Hunter days	Avg. Hunter days	Total deer	Deer per hunter	Deer per ^a hunter Day
1984	1A	1060	440	42	5820	5.5	620	0.6	0.19
1985	1A	1108	412	37	5683	5.1	779	0.7	0.20
1986	1A	1107	529	48	7100	6.4	859	0.8	0.16
1987	1A	946	376	40	6379	6.7	611	0.6	0.18
1988	1A	958	413	43	4930	5.1	686	0.7	0.22
1984	2	1910	1210	63	13070	6.8	1880	1.0	0.27
1985	2	2025	1373	68	14182	7.0	3151	1.6	0.37
1986	2	2233	1538	69	17505	7.8	2805	1.3	0.20
1987	2	2481	1845	74	17709	7.1	3886	1.6	0.35
1988	2	2124	1415	67	10668	5.0	2849	1.3	0.43

^a Calculated by mean of ratios

Table 3. Annual harvest and accident death, 1984-1988.

Year	Reported legal		Total	Estimated ^a unreported & illegal	Total	Accidental ^b death
	M	F				
<u>Unit 1A</u>						
1984	620	0	620	310	930	1 to 5
1985	779	0	779	390	1169	1 to 5
1986	859	0	859	430	1289	1 to 5
1987	611	0	611	306	917	1 to 5
1988	686	0	686	343	1029	1 to 5
<u>Unit 2</u>						
1984	1880	0	1880	1880	3760	unknown
1985	3151	0	3151	3151	6302	unknown
1986	2805	0	2805	2805	5610	unknown
1987	3616	270 ^c	3886	3886	7772	20
1988	2846	3	2849	2849	5698	30

^a Unreported and illegal kill are estimated at 50% of reported harvest in Unit 1A and 100% of reported harvest in Unit 2.

^b Estimated number of road kills.

^c From antlerless season in 1987 only.

Table 4. Summary deer harvest statistics by major harvest for 1988.

Game mgmt. unit	Major harvest area	Number of hunters	Number succes.	Percent succes.	Total hunte days
1A	1-Gravina Island	280	87	31	1051
1A	2-Annette Island	11	5	45	35
1A	3-Duke Island	19	11	58	63
1A	4-South Revilla	580	215	37	2511
1A	5-North Revilla	201	46	23	538
1A	6-Cleveland Peninsula	212	101	48	657
1A	7-North Mainland	13	0	0	46
1A	8-South Mainland	14	0	0	30
2	9-Outer Islands	80	51	64	252
2	10-Hecata Island	124	95	77	282
2	11-SW Prince of Wales	109	59	54	343
2	12-SE Prince of Wales	189	94	50	769
2	13-Central P.O.W	922	564	61	3553
2	14-North Central POW	779	475	61	3100
2	15-N. Prince of Wales	557	370	66	2369

^a Includes reported legal kill only.

^b Calculated by mean of ratios.

Table 5. Hunter residency and success in Subunit 1A and Unit 2, 1984-1988.

Year	Successful				Unsuccessful			
	Local ^a res.	Nonlocal res.	Nonres.	Total	Local res.	Nonlocal res.	Nonres.	Total
<u>Subunit 1A</u>								
1984	Data unavailable							
1985	"	"						
1986	"	"						
1987	377	0	0	377	571	0	0	571
1988	393	21	0	414	521	7	16	544
<u>Unit 2</u>								
1984	Data unavailable							
1985	"	"						
1986	"	"						
1987	1800	13	32	1845	636	3	4	643
1988	1368	17	29	1414	639	32	38	709

^a Local resident-anyone living within GMU 1 through 5.

STUDY AREA

Game Management Unit: 1B and 3 (6,900 miles²)

Geographical Description: Southeast mainland from Cape Fanshaw to Lemesurier Point and Islands of the Petersburg, Kake, and Wrangell area

BACKGROUND

Sitka black-tailed deer are found on most of the islands in Unit 3 and on the mainland area of Subunit 1B. Deer populations in these areas have historically been very unstable with both high and low population extremes. The declines can be attributed to many factors; the most prominent one is severe winter weather. Wolf and bear predation, excessive or illegal hunting, and reduced carrying capacity caused by clearcut logging also contribute to reductions in deer populations.

The most recent population decline, which occurred in the late 1960's and early 1970's, led to restrictive regulations and bag limits in 1973. Subunit 1B has remained open since; a 1-deer bag limit was in effect from 1973 to 1980, and a 2-deer limit has been in effect from 1981 to the present. Unit 3, however, was closed in 1975, and the area north of Sumner Strait is still closed. A bag limit of 1 antlered deer was reinstated in 1980 south of Sumner Strait. The Alaska Board of Game also recently increased the bag limit there to 2 antlered deer for the 1988 season.

POPULATION OBJECTIVES

To increase populations on the winter range (<1,500-ft elevation) to moderate levels (50 deer/mi²), as reflected by a mean pellet density of 1 pellet group per 20-m² plot.

METHODS

The deer harvest was based on responses from hunter harvest questionnaires sent to a random sample of 1988 harvest ticket holders. Relative deer densities were measured with pellet-group transects in selected areas of Unit 3. Relative deer densities were also measured with spotlight counts along logging roads on Mitkof Island in Unit 3. To locate winter-killed deer, 16 one-mile-long beach mortality transects were surveyed in Unit 3 immediately after the snow receded.

RESULTS AND DISCUSSION

Population Status and Trend

After several years of apparent increases, the populations in Unit 3 seem to have stabilized and in some instances have decreased (Table 1). Mitkof Island still appears to have a substantially higher population than Kuiu or Kupreanof Islands, but the moderately severe winter of 1988-89 caused some winter mortality. During beach mortality transects on Woronkofski, south Mitkof, east Mitkof, Castle River on Kupreanof one. None were found on the other 12 lines where deer populations are known to be low.

Population Size:

The 1989 pellet-group surveys suggested no major changes in populations, except for Conclusion Island. The 1987 survey resulted in an average of 2.66 groups per plot; severe over-browsing was evident. An average of only 0.95 groups per plot were found during the survey in 1989. Some areas in the remainder of Unit 3 had slightly higher or lower counts. Data from Mitkof and Woronkofski islands continued to suggest higher populations than the rest of Unit 3.

After declining slightly in 1988, the pellet-group count on the southern part of Mitkof Island rose in 1989 to near the 1987 level. This area is one of the 2 areas on Mitkof Island where some winter kill was noted.

Mortality

The open season for subsistence, resident, and nonresident hunters in Subunit 1B and that portion of Unit 3 south of Sumner Strait and Decision Passage, including the Vank Island group and Level and Conclusion Islands, are 1 August to 31 December and 1 August to 30 November, respectively. The bag limit for Subunit 1B and Unit 3 is 2 antlered deer. There is no open season for the remainder of Unit 3.

Human-induced Mortality:

The harvest and proportion of successful hunters in Subunits 1B and Unit 3 increased in 1988 from that of the previous year; both were lower in 1987 than in previous years, but the increase for 1988 brought them in line with the trend from 1984 through 1986. Hunters required more days afield for each deer taken than they did in 1987 (Table 2).

Hunter Residency and Success. The harvest records indicate that nonresidents were unsuccessful during the hunting seasons in Subunit 1B and Unit 3 (Table 3). Nonlocal residents accounted for 15% of the harvest in Subunit 1B in 1988, a much smaller percentage than that for the previous year. Nonlocal resident

deer harvest in Unit 3 increased from zero percent in 1987 to 6% in 1988. Most deer harvested in Subunits 1B and Unit 3 were taken by local residents. Because deer were more numerous and seasons and bag limits more liberal elsewhere in Southeast Alaska, there was little incentive for residents of those areas to hunt here.

Game Board Actions and Emergency Orders

The Board of Game increased the bag limit from 1 to 2 antlered deer in that part of Unit 3 open to hunting. At the same time, the Board removed Level and Conclusion Islands from the area open to hunting, in response to requests from local residents. Acting on a proposal from the Petersburg Advisory Committee, the Board also lengthened the season in Subunit 1B from November 30 to December 31. No Emergency Orders were issued.

CONCLUSIONS AND RECOMMENDATIONS

The population objective may not provide sufficient flexibility for the management program in Subunits 1B and Unit 3. For instance, it could imply that if pellet group counts fall below 1.00/plot, hunting should be stopped or restricted in order to facilitate a population recovery. This is not easily reconciled with the Etolin Island situation, in which pellet-group data have been well below 1.00/plot for the past 5 years and yet has had the same season and bag limit as areas with much higher pellet-group densities. I suggest the following objectives be adopted: (1) to maintain closures in areas presently closed to hunting to promote deer population growth and pellet-group counts of 1.00/plot or higher; (2) to maintain present seasons in areas presently open to hunting and in which pellet-group counts are below 1.00/plot as long as future pellet-group counts and other information do not indicate a downward trend and public support remains favorable; and (3) to maintain present seasons and bag limits or promote more liberal seasons and bag limits in areas presently open to hunting and in which pellet group counts are above and remain above 1.00/plot if pellet group data and other information indicate an increasing deer population.

Limits on the practical utility of population objectives that are not developed in a thorough public review-consent process are obvious in the case of Mitkof Island. Although biological data and other information indicate a deer population that could withstand some hunting pressure, public sentiment is to delay a hunting season to allow more growth.

PREPARED BY:

Charles R. Land
Wildlife Biologist I

David James
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Deer pellet group survey data for Unit 3, 1981-89.

Year	Number of plots	Number of groups/plot	95% C.I.
<u>Kuiu Island</u>			
Security (VCU 400)			
1984	360	0.02	0.01-0.04
1989	304	0.25	0.16-0.34
Bay of Pillars (VCU 403)			
1988	337	0.16	0.10-0.22
Conclusion Island (VCU 417)			
1987	207	2.66	2.32-3.01
1989	200	0.95	0.72-1.18
<u>Kupreanof Island</u>			
Rocky Pass (VCU 428)			
1989	298	0.40	0.27-0.53
Point Barrie (VCU 431)			
1988	357	0.23	0.17-0.29
Big Level Island (VCU 434a)			
1981	399	1.54	1.45-1.63
1983	336	1.56	-----
1986	382	1.66	1.41-1.90
1989	227	1.07	-----
Little Level Island (VCU 434b)			
1981	114	2.48	2.02-2.94
1983	136	2.34	-----
1986	122	1.39	1.07-1.70
1989	127	1.53	-----
Castle (VCU 435)			
1984	312	0.19	0.12-0.26
1987	305	0.51	0.37-0.65
1989	312	0.40	0.25-0.56
<u>Mitkof Island</u>			
Woewodski Island (VCU 448) (includes south end of Mitkof Island)			
1984	295	0.88	0.69-1.08
1985	209	1.00	0.82-1.19
1987	195	1.65	1.85-2.61
1988	433	1.33	1.16-1.51
1989	320	1.48	1.24-1.73

Table 1, continued.

Year	Number of plots	Number of groups/plot	95% C.I.
<u>Frederick (VCU 449)</u>			
1981	945	0.08	0.06-0.11
<u>S. Mitkof (VCU 452)</u>			
1984	127	0.98	-----
1989	97	0.92	0.63-1.20
<u>Dry Island (VCU 454)</u>			
1981	91	0.92	0.56-1.28
<u>Vank Island (VCU 455)</u>			
<u>Sokolof (VCU 455a)</u>			
1981	900	1.73	1.61-1.85
<u>Rynda (VCU 455b)</u>			
1981	281	0.25	0.18-0.32
<u>Greys (VCU 455c)</u>			
1981	284	0.25	0.18-0.32
<u>Woronkofski Island (VCU 461)</u>			
<u>All transects</u>			
1985	646	1.63	1.45-1.81
<u>Transects 10, 11, and 12 only</u>			
1985	218	2.01	1.62-2.39
1987	201	2.23	1.85-2.61
1989	223	2.52	2.18-2.85
<u>Etolin Island (VCU 473)</u>			
1984	321	0.37	0.28-0.46
1985	334	0.59	0.48-0.70
1986	347	0.72	0.59-0.84
1987	366	0.42	0.31-0.55
1988	329	0.44	0.32-0.55
<u>Coronation Island (VCU 564)</u>			
1983	696	1.20	1.04-1.36
1985	228	2.34	-----
1988	408	1.41	1.17-1.66
1989	293	1.63	1.28-1.98

Table 2. Estimated deer harvest, hunter success rate, and hunter effort in Subunits 1B and Unit 3, 1984-88.

Year	Harvest	Successful hunters(%)	Hunter days per deer
Subunit 1B			
1984	5	7	3.2
1985	39	42	6.7
1986	69	58	5.8
1987	59	31	4.4
1988	101	40	5.8
Unit 3			
1984	130	33	2.2
1985	166	39	5.3
1986	201	48	3.4
1987	128	31	3.7
1988	234	43	6.0

Table 3. Residency of successful deer hunters in Subunits 1B and Unit 3, 1983-87.

	Local resident ^a	Nonlocal resident	Nonresident	Total
Subunit 1B				
1984	NA	NA	NA	5
1985	40	7	0	47
1986	69	0	0	69
1987	34	26	0	60
1988	151	26	0	177
Unit 3				
1984	NA	NA	NA	130
1985	152	22	0	174
1986	197	5	0	202
1987	128	0	0	128
1988	323	19	0	342

^a Residents of Units 1B and 3, and also Myers Chuck and Point Baker.

STUDY AREA

GAME MANAGEMENT UNIT: 1C (6,500 mi²)

GEOGRAPHICAL DESCRIPTION: Southeast mainland from Cape Fanshaw to Eldred Rock

BACKGROUND

Deer have resided in northern Southeast Alaska since their emigration from southern refugia following the Pleistocene epoch (Klein 1965). Deep winter snow on the mainland portion of Subunit 1C has kept the number of deer lower than that on adjacent islands. Severe winters in 1969 and 1971 increased winter mortality and reduced deer numbers (Olson 1979). A 1963 population estimate suggested 200,000 deer were in Southeast Alaska at that time (Merriam 1965). The harvest for the 1962 season was 10,500 deer. Hunter surveys were begun in 1970, continuing to the present. Pellet-group counts, which were begun in Subunit 1C in 1984, have been conducted on Douglas, Harbor, Lincoln, and Shelter Islands (Kirchhoff and Pitcher 1988).

POPULATION OBJECTIVES

To maintain population densities on Douglas, Lincoln, and Shelter islands at high levels, as reflected by a mean pellet density of 2.0 pellet groups per plot.

METHODS

A total of 12,949 deer harvest tickets were issued for the 1988 hunting season in Southeast Alaska. Approximately 1/3 of the harvest ticket holders residing in Subunit 1C were mailed hunter surveys; 52% (1,069) responded to the survey. Hunter effort, success, and harvest location were expanded to all harvest ticket holders. Pellet-group surveys were conducted on Douglas and Shelter Islands in the spring of 1989.

RESULTS AND DISCUSSION

Population Status and Trend

No population estimates are available for deer in Subunit 1C. Based on pellet-group counts for Shelter Island (Table 1), deer densities are relatively high. The management goal of 2.0 pellet groups per plot was exceeded from 1985 through 1988 on Shelter Island, but it was not met in 1989 (Table 1).

Pellet group counts on Douglas Island averaged 1.51 groups per plot in the most recent 5-year period (Table 1). Although the 1989 count average of 1.31/plot was slightly above the 1988 figure of 1.21/plot, it was still well below the 5-year mean.

The reasons for the smaller count on Shelter Island in 1989 are unknown. The 1988 count was relatively high, perhaps because of the small number of plots surveyed; however, approximately 300 plots were evaluated in 1984 through 1987, and all had more pellets than in 1989. Shelter Island was the last area to be evaluated in the 1989 field season. Leaf-out was relatively far advanced, and pellet-group visibility was probably reduced. Finally, persistent late winter snow in 1989 may have altered deer distributions from that of previous recent years.

Mortality

Season and Bag Limits:

The open season for subsistence, resident, and nonresident hunters in Subunit 1C is 1 August to 31 December. The bag limit is 4 deer; however, antlerless deer may be taken only from 15 September to 31 December.

Harvest

Human-induced Mortality:

Based on data gathered from the annual deer hunter survey, 443 deer were killed in subunit 1C in 1988 (Table 2). This level of take is four percent below the five-year average of 459 deer. Seventy-three percent of the harvest was bucks, the highest in the five year period, and five percent above the average take for that period.

Hunter Residency and Success. Most successful (92%) and unsuccessful (93%) hunters were residents of Subunit 1C (Table 3). The 6 nonresidents sampled in the survey reported taking no deer. In 1988 there was an average of 1.8 deer harvested per hunter, 0.6 deer per hunter-day, 2.6 hunter-days per deer, and 2.5 days afield per hunter (Table 4). The success rate for hunters has increased during recent years. The number of deer per hunter was close to the 5-year average of 1.6; however, the number of deer per hunter day increased by 33%, and the number days afield per hunter was down by 26%.

Transport Methods. Boats were the predominant transportation mode in Subunit 1C; 42% of the hunters reported using them. Highway vehicles were used by 31% of the hunters, and an unspecified number of hunters walked, possibly reflecting the substantial number whose residences are adjacent to hunting areas. Other transportation types reported, including off-road vehicles and 3- or 4-wheelers, were used in 1% or fewer of the hunts.

CONCLUSIONS AND RECOMMENDATIONS

All indicators suggest that deer numbers may be down on Douglas, Shelter, and Lincoln Islands. Pellet-group counts conducted on Douglas Island for the past 4 years suggest a moderate decline. The impact of the moderately severe winter of 1988-89 should be accurately determined during the spring 1990 pellet-group surveys. Hunter survey data indicated declining success by hunters.

Our current population objective (i.e., mean density of 2.0 pellet groups per plot) was not met. Reductions in seasons and bag limits should be considered, if downward trends in pellet-group densities and harvests continue.

In contrast to those on Douglas and Shelter Islands, deer numbers on the mainland and on Sullivan Island may have increased. Reports of deer and track sightings have been increasing. Hunting effort has been light, but success improved on Sullivan Island and was stable on the mainland. Sullivan Island and the mainland near Point Bishop will be included in the 1990 pellet counts, if conditions permit.

LITERATURE CITED

- Kirchhoff, Matthew D., and K. W. Pitcher. 1988. Deer pellet-group surveys in southeast Alaska, 1981-1987. Alaska Department of Fish and Game, Division of Game, Federal Aid in Wildlife Restoration, Research Final Report. Project W-22-6, Job 2.9, Objective 1. July 1988.
- Klein, D. R.. 1965. Postglacial distribution patterns of mammals in the southern coastal regions of Alaska. Journal of Arctic Institute of North America, 18:7-20.
- Merriam, H. R. 1970. Deer fluctuations in southeast Alaska. Paper presented to Annu. Mtg. Northwest Sec., The Wildl. Soc., Spokane, WA, March 13, 1970. 13 pp.
- Olson, Sigurd. 1979. Life and times of Sitka black tailed deer. Pages 160-168 in O. C. Wallmo and J. W. Schoen, eds., Sitka black tailed deer: proceedings of a conference in Juneau, AK. USDA Forest Service, Juneau, AK. R-10-48. 231 pp.

PREPARED BY:

Bruce Dinneford
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

Table 1. Deer population trends as indicated by pellet group surveys in Subunit 1C, 1984-88.

Year	Mean pellet groups/plot	Number of plots	95% CI
Portland Island VCU 27			
1987	0.99	381	0.87-1.12
Douglas Island Inner Point VCU 36			
1985	1.30	239	1.10-1.51
1986	1.97	235	1.68-2.25
1987	1.76	262	1.53-2.00
1988	1.21	200	1.02-1.39
1989	1.30	258	
Tracy Arm Harbor Island VCU 65			
1987	1.28	200	1.00-1.56
Shelter Island VCU 124			
1984	1.52	300	1.34-1.70
1985	2.52	296	2.24-2.81
1986	3.24	292	2.91-3.57
1987	2.91	288	2.57-3.24
1988	3.16	130	2.62-3.70
1989	1.42	300	

Table 2. Annual harvests in Subunit 1C, 1984-88^a.

Year	M	F	Estimated total
1984	265	130	395
1985	329	197	526
1986	296	138	434
1987	347	149	496
1988	325	118	443

^a Data are from expanded results of hunter surveys.

Table 3. Hunter residency and success in Subunit 1C, 1984-1988.

Year	Successful				Unsuccessful			
	Local res.	Nonlocal res.	Nonres.	Total	Local res.	Nonlocal res.	Nonres.	Total
1984	--	--	--	390	--	--	--	560
1985	--	--	--	268	--	--	--	723
1986	256	8	0	264	655	67	4	726
1987	316	14	0	330	611	42	2	655
1988	232	20	0	252	639	45	6	690

Table 4. Average statistics for successful hunters in Subunit 1C, 1984-1988.

Year	No. deer/ hunter	No. deer/ hunter day	No. hunter days/deer	No. days hunter
1984	0.4	0.2	3.4	3.8
1985	1.7	0.2	1.7	3.6
1986	2.4	0.5	6.7	3.3
1987	1.5	0.5	3.4	3.6
1988	1.8	0.6	2.6	2.5

STUDY AREA

GAME MANAGEMENT UNIT: 4 (5,700 mi²)

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof, Chichagof, and adjacent islands

BACKGROUND

Unit 4 provides the bulk of deer hunting opportunity in Southeast Alaska, accounting for 58% of the region's hunter effort and 73% of the deer harvest for the 1988-89 season.

During the winter of 1988, persistent snow caused significant mortality in deer. Deer population peaks and declines are the norm in Southeast Alaska, and observers attribute declines to severe winter weather and associated deep-snow conditions (Merriam 1970, Olson 1979). From the mid-1970's through 1987 most winters in Unit 4 were mild, allowing excellent overwinter survival of deer.

While other units in Southeast have experienced wolf (Canis lupus) predation as a contributing factor to population depression (Merriam 1966, Smith et al. 1986), there are no wolves in Unit 4. Brown bears (Ursus arctos) are numerous, and although it is not considered a significant factor, deer predation by brown bears is occasionally noted.

POPULATION OBJECTIVES

To maintain a population density capable of sustaining an average harvest of at least 1.5 deer/hunter.

To maintain a population capable of providing a minimum success rate of 1 deer killed/4 days hunting.

To maintain the male deer component of the harvest at a minimum of 60%.

METHODS

Population data were gathered by fecal pellet-group surveys conducted on Admiralty, Baranof, Chichagof, and Kruzof Islands in the spring of 1989. Methodology is described in detail in Kirchhoff and Pitcher (1988).

A survey questionnaire was mailed to a sample of deer harvest ticket holders to obtain deer hunter effort and success (Thomas 1989). Hunters were asked to indicate hunting locations by harvest area (Figs. 1-3).

Observations of physical condition of wintering deer were made in February and March 1989. Deer were counted from boats and classified accordingly to physical condition when possible. The following physical and behavioral guidelines were developed for rating deer condition: (1) excellent condition--deer appears fat, very alert, runs or bounds away when approached by boat, ears erect; (2) good condition--deer alert, walks quickly away when approached, ears erect; (3) fair condition--ribs may be visible but flanks not sunken, deer moves away slowly when approached by boat, ears not erect; (4) poor condition--hipbones prominent, flanks sunken, ribs visible under skin, ears flattened, deer not alert, not alarmed when approached; (5) very poor condition--deer staggers or reluctantly stands when approached, does not move away when approached, ears flattened, bones prominent, may show hair loss, appears sick.

Aerial surveys of deer on beaches were conducted during the winter by project personnel. A Supercub or Cessna 185 aircraft was used to survey the beaches during periods when snow had accumulated on the beach (M. Kirchhoff, pers. commun.). An aerial survey of alpine ridges was made in July, utilizing a Supercub.

To determine the extent of deer mortality, 35 transects (i.e., each 1 mile long) were examined by 2 persons working together (Figs 1-3). One observer searched for signs of dead deer at the high tideland, while the other surveyed the area just inside the timber fringe. When discernible, observers recorded sex, age, and bone marrow condition of winter-killed deer. Measurements of the pelvic girdle were used to determine sex of fawns, while presence of antler pedicels identified adult males.

RESULTS AND DISCUSSION

Population Status and Trend

Deer numbers are high throughout most of Unit 4; however, based on limited habitat reconnaissance, populations in many areas appear to exceed the long-range carrying capacity of their habitat. I believe that the deer population in Unit 4 has declined for this reason; it was also affected by the moderately severe winter of 1988/89.

Condition Surveys:

During winter surveys conducted by boat, deer were observed on the beaches, and their physical condition was rated when possible. On 25 February, I observed 16 deer on southeast Baranof Island from Port Conclusion to Hoggatt Bay; only six were classified. Five were in good condition, and one was in poor condition.

On 26 February, I saw 69 deer on southwest Admiralty Island in Wilson Cove, Whitewater Bay, and Chaik Bay. Fourteen were in good or fair condition and two were in poor condition.

On 10 March, 56 were observed in Neva and Olga Straits on Baranof Island. Of the 32 classified, two were rated poor and 30 were in fair or good condition.

On 11 March, 113 deer were observed on Baranof and Chichagof Islands. Of these, 32 were in fair or good condition and two were in very poor condition.

On 14 March, I observed 297 deer on Chichagof Island beaches between Deep Bay and Douglas Bay. Of these, the condition of 144 were classified as fair or good and four as excellent.

On 14 March, all 20 and 8 deer observed on Chichagof Island between the Finger River and Broad Island were classified in good and excellent condition, respectively.

On 14 March, 92 deer were sighted on Baranof Island between Deadman Reach and Neva Point. Of these, 27 were classified as fair or good; the remainder was unclassified.

On 21 March, 155 deer were observed from Sitkoh Bay to Lindenberg Cove and from Rodgers Point to Rose Channel on Chichagof Island. Of these, 93 were classified: 3 dead, 1 poor, and 84 in fair or good condition. Dead deer were noticeable because ravens and eagles were feeding on carcasses. I suspect that most overwinter mortality occurred between 11 March and 21 March.

Pellet-Group Transects:

Spring pellet-group surveys were conducted on Admiralty, Baranof, Chichagof, and Kruzof Islands in the spring of 1989 (Table 1). The single Chichagof Island VCU sampled was Finger Mountain, which showed 2.98 pellet groups per plot (pg/plot), down from 3.11 in 1987. Admiralty Island transect averages ranged from 1.71 pg/plot at Hood Bay to 2.07 at Thayer Lake. On Baranof Island, transects showed 2.17 pg/plot for Redoubt Bay, 2.22 for Nakwasina Sound, and 1.35 in West Crawfish Inlet. Kruzof Island showed an average of 1.74 pg/plot in the Sea Lion Cove VCU (M. Kirchhoff, pers. commun.).

Kirchhoff and Pitcher (1988) reported 1981-1987 data, and I have added pellet-group survey results from 1988 to their data (Table 1). These data indicate that the Unit 4 population was probably declining prior to the winter of 1988-89. I expect that winter mortality in 1988-89 will be reflected in the spring surveys in 1990. Spring pellet-group surveys do not indicate mortality in the winter immediately past, because pellet groups deposited before deer die persist for 6-9 months.

During an aerial (Supercub) alpine survey of summer ranges on western Baranof, southwestern Chichagof, and northern Kruzof Islands on 19 July 1989, I counted 104 deer, averaging 73 deer per hour. A 2-hour aerial (Supercub) survey of wintering deer on 6 February totaled 107 deer on beaches of north Admiralty and portions of Chichagof Island, averaging 54 deer per hour. A 17 February survey with a Cessna 185 of the majority of Admiralty Island's beaches resulted in a total count of 426 deer during 2.5 hours, averaging 170 deer per hour (M. Kirchhoff, pers. commun.). These surveys may be useful indicators of change as they are duplicated in the future.

Population Composition:

The sex composition of the legal harvest was estimated from deer harvest questionnaires (Thomas 1989). Male deer accounted for 74% of the 1988 harvest, compared with 72% in 1987. Sex and age composition could not be reliably determined from counts of wintering deer on the beach.

Mortality

Season and Bag Limit:

The open season for subsistence and resident or nonresident hunters in that portion of Chichagof Island east of Port Frederick and north of Tenakee Inlet, including all drainages into Tenakee Inlet and Port Frederick is 1 August to 1 January. The bag limits for subsistence and resident or nonresident hunters are 6 and 3 deer, respectively; however, antlerless deer may be taken only from 15 September to 31 January.

The open season for all hunters for the remainder of Unit 4 is 1 August to 31 January. The bag limit is 6 deer; however, antlerless deer may be taken only from 15 September to 31 January. Rural residents of Unit 4 and rural residents of Kake, Gustavus, Haines, Petersburg, Point Baker, Klukwan, Port Protection, and Wrangell are designated by the Board of Game as subsistence hunters for Unit 4 (AK Game Regs. No. 28).

Natural Mortality:

The winter of 1988-89 was colder than most winters of the 1980's, and a significant deer mortality occurred. By mid-February, at least 18 inches (45.7 cm) of snow was found in forest openings and muskegs at sea level in Unit 4.

Thirty-five deer mortality transects were surveyed in the spring of 1989. Some of the transects surveyed had been established in the 1960's, while others were surveyed for the first time in 1989. Beach mortality surveys provide useful information about the relative severity of winter mortality, but not all beach carcasses are found because of differences in observer experience, difficulty of terrain, effect of vegetation on

visibility, observer fatigue, scavenging of carcasses by animals, and tidal action.

On Admiralty Island, 21 dead deer were found on nine 1-mile mortality transects (2.3 deer per linear mile). On established transects on northern Baranof Island, 9 transects were completed and 47 carcasses were found (5.2 dead deer per linear mile). On three newly established transects on western Baranof, 4 carcasses were found (1.3 dead deer per mile). On southwest Chichagof Island, 4 transects were completed and 21 carcasses were found (5.3 deer per linear mile), while on southeast Chichagof there were 31 dead deer on 8 transects (3.9 deer per mile). A Kruzof Island survey indicated a loss of 3 deer per mile. Yakobi Island showed a loss of 6 deer on 2 transects (3.0 deer per mile).

A total of 129 deer on 35 transects were found, resulting in an average mortality in Unit 4 of 3.7 deer per linear mile. The actual mortality is not known; but assuming that every mile of beach experienced the average loss of deer recorded on transects, at least 8,000 deer succumbed in Unit 4. Sixteen of the transects had been surveyed periodically since 1962 and were plotted for comparison (Figure 4).

Beach mortality surveys indicate that Admiralty, Baranof, Chichagof, Yakobi, and Kruzof Islands experienced winter losses of around 1,300, 2,500, 3,100, 200, and 500 deer, respectively. Beach surveys reveal only a portion of the deer mortality; Schoen and Kirchhoff (1983) used telemetered deer to determine that only 17% of deer mortality occurred within 100 m (328 feet) of the beach or below an elevation of 20 m (66 feet).

Human-induced Mortality:

A questionnaire was mailed to a sample of deer harvest ticket holders to obtain harvest information (Thomas 1989). Extrapolation of responses from the hunter harvest survey indicated the number of hunters declined by 10%, while deer harvest declined 13% (Table 2). Estimates from hunter reports indicated a harvest of 8,869 bucks (75%), compared with 10,265 bucks (72%) in 1987. Hunters reported a harvest of 3,060 does in Unit 4, compared with 4,100 in 1987. I calculated crippling losses, unreported harvests, and illegal kills at 10% of the reported harvest (Table 2). I estimate the total hunter-related mortality at 13,100 deer in 1988-89, compared with a mortality of 15,700 deer in 1987-88.

Eleven percent of successful hunters in Unit 4 harvested 6 deer; 8%, 5 deer; 12%, 4 deer; 11%, 3 deer; 17%, 2 deer; 20%, 1 deer; and 21%, unsuccessful. The harvest in Unit 4 increased steadily until 1988-89. The northeast portion of Chichagof Island (i.e., from Port Frederick to Tenakee Inlet) was roaded during the 1980's providing over a third of the deer taken on Chichagof Island in 1987-88. Nonlocal hunters on northeastern

Chichagof were restricted to 3 deer in 1988-89, whereas the 1987 limit was 6 deer. The 1988 harvest on the Hoonah peninsula was 1,650 deer, representing 15% of the harvest in Unit 4.

Hunter Residency and Success. The estimated 2,941 hunters (56%) residing outside the unit in 1988 (Table 3), compared with 3,351 nonlocal hunters in 1987, may account for the smaller harvest in the unit. Less than 1% (52) of Unit 4 hunters were nonresidents.

On the Hoonah peninsula (Harvest Area Nos. 3523, 3524, 3525, and 3626) residents of Unit 4 took 44% of the deer, while nonlocal residents took 54%. Juneau, local logging camp, and Hoonah residents accounted for 42%, 6%, 40% respectively.

Eighty-two percent of the hunters who resided in Unit 4 (local residents) killed at least 1 deer, while 60% of the residents living outside the unit (nonlocal residents) and 46% of the nonresidents were successful (Table 3). The average harvest for local residents was 3.3 deer with an expenditure of 2.3 days per deer harvested.

Harvest Chronology. During the winter of 1988 the Sitka area was colder than usual with persistent snow. For the 2nd consecutive year, the season extended into January. The most successful month for hunters was November, accounting for 38% of the harvest. Even though the season was closed by Emergency Order on 19 January 1989, 10% of the harvest occurred in January.

Transport. In Unit 4, 71% of the successful hunters used boats, 10% used airplanes, 9% walked from a community, 7% used highway vehicles, and 2% used off-road vehicles (i.e., 3- or 4-wheelers). The use of motorized land vehicles along the road system on the Hoonah peninsula undoubtedly helped to increase the deer harvest in that area during the 1987-88 season (Young 1988). The 6-deer bag limit, a convenient Alaska Marine Highway schedule, and the extensive logging-road system attracted many hunters from the Juneau area. Much concern about potential overharvesting of deer was expressed by residents of Hoonah and Tenakee Springs, causing the Board of Game to modify the bag limit for the area. This modification was necessary largely because of the increased access to vehicles along with decreased habitat capability because of logging. The Division is working with the USFS to develop a road management plan to better manage this population.

Game Board Actions and Emergency Orders

At its spring 1988 meeting, the Board of Game adopted a regulation for that portion of Chichagof Island east of Port Frederick and north of Tenakee Inlet (Hoonah peninsula) and all Tenakee Inlet drainages to restrict the sport and nonresident bag limit to 3 deer for the 1988-89 season. The bag limit for hunters eligible for subsistence deer hunting in Unit 4 remained

at 6 deer. The Board standardized the 1988-89 season closure to 31 January to include both subsistence and regular hunters.

For the remainder of Unit 4, the Board adopted a 6-deer bag limit for subsistence and regular hunters and extended the season to 31 January for the 1988-89 season. The action was proposed by Division of Wildlife Conservation to increase the harvest of deer during a period of high populations.

Because of colder temperatures and persistent snow, the season in Unit 4 was closed by Emergency Order on 19 January 1989. The action was taken for a number of reasons: deer were concentrated on beaches where they were extremely vulnerable to hunters; deer were beginning to lose weight rapidly, which made them less desirable as food animals; there were reports of venison being wasted; public opinion was generally in favor of a season closure; and the Board of Game asked the Division to monitor the season and close it early if necessary to prevent overharvesting during a severe winter.

CONCLUSIONS AND RECOMMENDATIONS

The population objectives for Unit 4 are to maintain a population density capable of sustaining an average harvest of at least 1.5 deer per hunter, a hunting success rate of no more than 4 days per deer, and a minimum male deer component of the harvest of 60%. All 3 objectives were achieved during the 1988-89 season. The average harvest was 2.3 deer per hunter with a hunting effort of 2.4 days per deer. The male deer component of the harvest was 74%. The number of hunters decreased by 10%, while the number of deer harvested decreased 17% from that for 1987-88.

Extrapolation of reports from Unit 4 deer hunters indicated an estimated harvest of 11,929 deer during the 1988-89 season (Thomas 1989). Seventy percent of the hunters were successful. The winter was relatively severe, but the 172-day season allowed hunters to select for optimal weather conditions.

Since thousands of deer died during the winter of 1988-89, it is appropriate to institute more restrictive regulations for the 1990-91 season. I recommend shortening the season by eliminating January hunting for regular season hunters and reducing the deer bag for regular season hunters from 6 to 4. I recommend closing the subsistence hunting season on 15 January. In the event of deep snow conditions during the winter of 1989-90, deer mortality transects should be surveyed and even more restrictive measures implemented if significant die-off occurs.

The detrimental effects of severe winters is intensified by the removal of old-growth forest habitat through clearcutting and is a major concern. Clearcutting of old-growth forests in Southeast has been documented as being detrimental to deer welfare

(Kirchhoff and Schoen 1987, Sigman 1985, Smith et al. 1983, Schoen et al. 1981). It is essential that information be provided to the USFS to try to influence the placement of sale areas and cutting units to avoid cutting in prime deer habitat. Road access associated with timber harvest creates serious deer hunter management problems in areas where communities are linked to the Alaska Marine Highway system. I recommend that we continue to work with the Forest Service to jointly develop a road closure and hunter access management plan for problem areas such as the Hoonah peninsula.

ACKNOWLEDGMENTS

Phil Mooney, Chatham Area Wildlife Biologist for the USFS, assisted with deer pellet group counts, deer mortality surveys, and winter deer counts and arranged for volunteers to help with mortality surveys. Fred Samson, Region 10 Wildlife Biologist for the USFS, made arrangements for funding mortality surveys. Linda Bergdoll-Schmidt prepared the tables and proofread the report. Matt Kirchhoff provided information gathered for the deer research project and did the final editing of the manuscript.

LITERATURE CITED

- Kirchhoff, M. D. and J. W. Schoen. 1987. Forest cover and snow: Implications for deer habitat in southeast Alaska. *J. Wildl. Manage.* 51(1):28-33.
- Kirchhoff, M. D. and K. W. Pitcher. 1988. Deer pellet-group surveys in southeast Alaska 1981-1987. Research Final Report. Proj. W-22-6. Job 2.9. Alaska Dep. Fish and Game. July 1988. Juneau. 113pp.
- Merriam, H. R. 1966. Relationships between deer and wolves on Coronation Island, southeast Alaska. Presentation at Northwest Section of The Wildlife Society. La Grande, OR.
- Merriam, H. R. 1970. Deer fluctuations in Alaska. Presentation at Northwest Section of The Wildlife Society. Spokane, WA. Mimeo. 5pp.
- Olson, S. T. 1979. The life and times of the black-tailed deer in southeast Alaska. Pages 160-168 in O. C. Wallmo and J. W. Schoen, eds. Sitka black-tailed deer. USDA For. Serv, Alaska Region. Ser. No. R10-48. Juneau.
- Schoen, J. W., M. D. Kirchhoff, and O. C. Wallmo. 1981. Seasonal distribution and habitat use by Sitka black-tailed deer in southeastern Alaska. Progress Rep. Fed. Aid in Wildl. Rest. Vol. II. Alaska Dep. Fish and Game, Juneau. 59pp.

- Schoen, J. W. and M. D. Kirchhoff. 1983. Seasonal distribution and habitat use by Sitka black-tailed deer in southeastern Alaska. Progress Rep. Fed. Aid in Wildl. Rest. Proj. W-221. Job 2.6 R. Alaska Dep. Fish and Game, Juneau. 50pp.
- Sigman, M. J. (ed.) 1985. Impacts of clearcut logging on the fish and wildlife resources of southeast Alaska. Alaska Dep. Fish and Game, Habitat Division, Juneau. 95pp.
- Smith, C. A., E. L. Young, C. R. Land, and K. P. Bovee. 1986. Effects of predation on black-tailed deer population growth. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-4. Job 14.13. Juneau.
- Smith, C., K. Kohrt, B. Baker, J. Sturgeon, M. Barton, R. Harris. 1983. Deer and timber management in southeast Alaska - issues and recommendations. Tech. Comm. Rep. by: The Wildl. Soc., Soc. Am. Foresters, State of Alaska, USDA For. Serv., Sealaska Corp. 44pp.
- Thomas, M. 1989. 1988 Deer Harvest Information. Alaska Dep. Fish and Game. Region I. Game Division. Juneau. 117pp.
- Young, E. L. 1988. Unit 4 deer survey-inventory progress report. Pages 23-39 in S. O Morgan, ed. Annual Rep. of Survey-Inventory Activities. Part VI. Deer. Fed. Aid in Wildl. Rest. Vol. XVII. Alaska Dep. Fish and Game, Juneau. 112pp.

PREPARED BY:

E. L. Young
Wildlife Biologist III

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

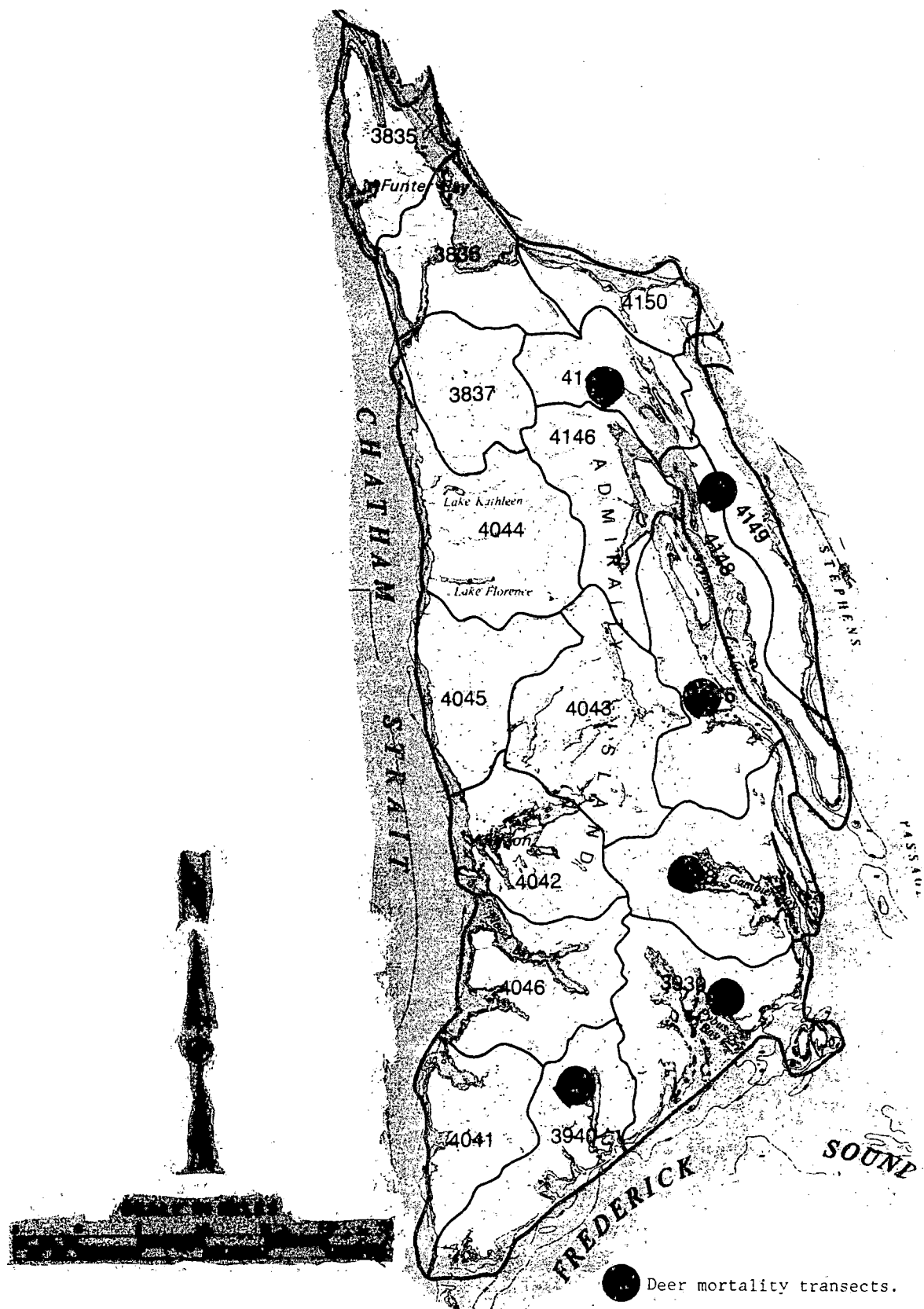


Fig. 1. Admiralty Island deer harvest areas.

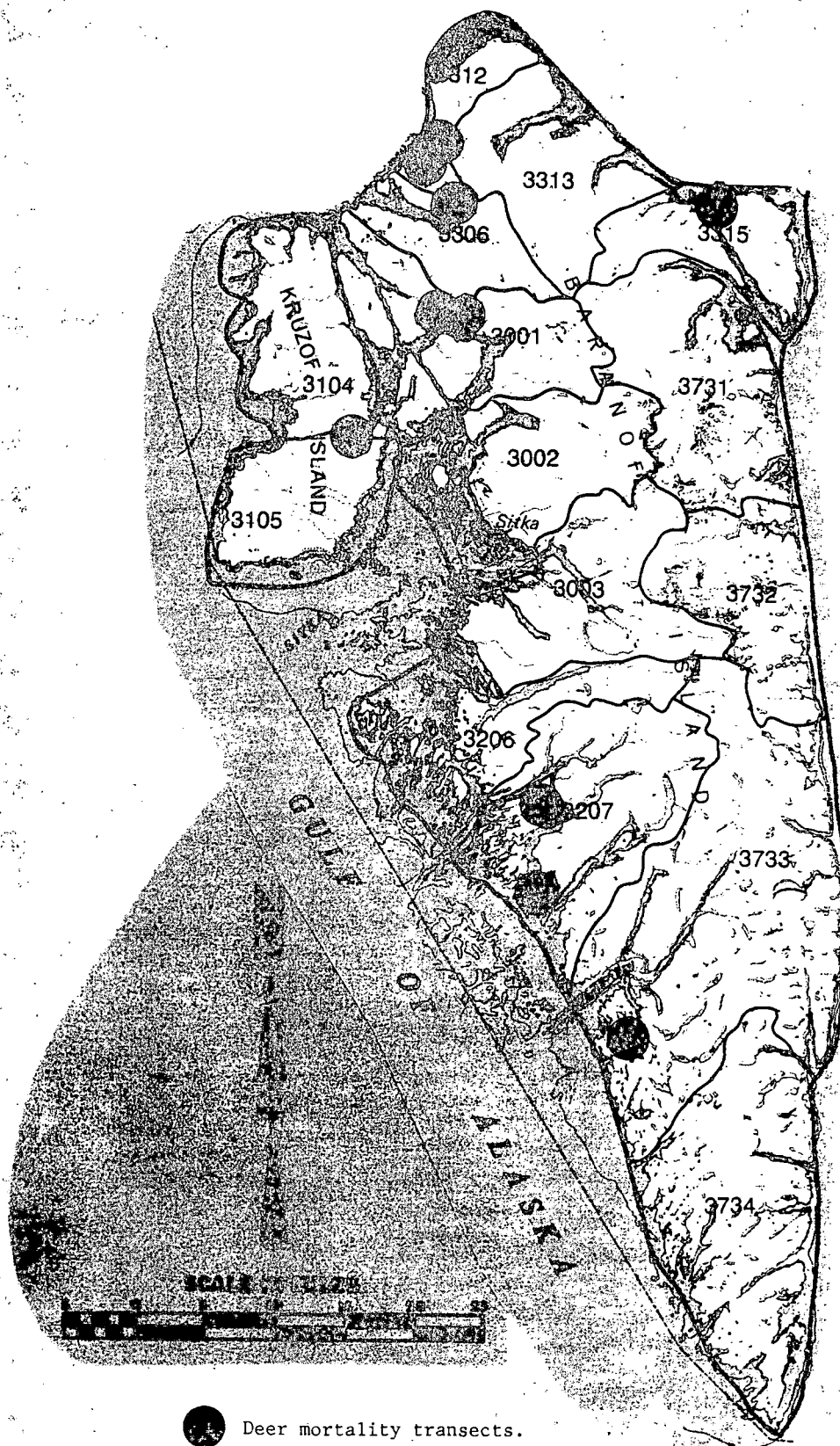


Fig. 2. Baranof and Kruzof Islands deer harvest areas.

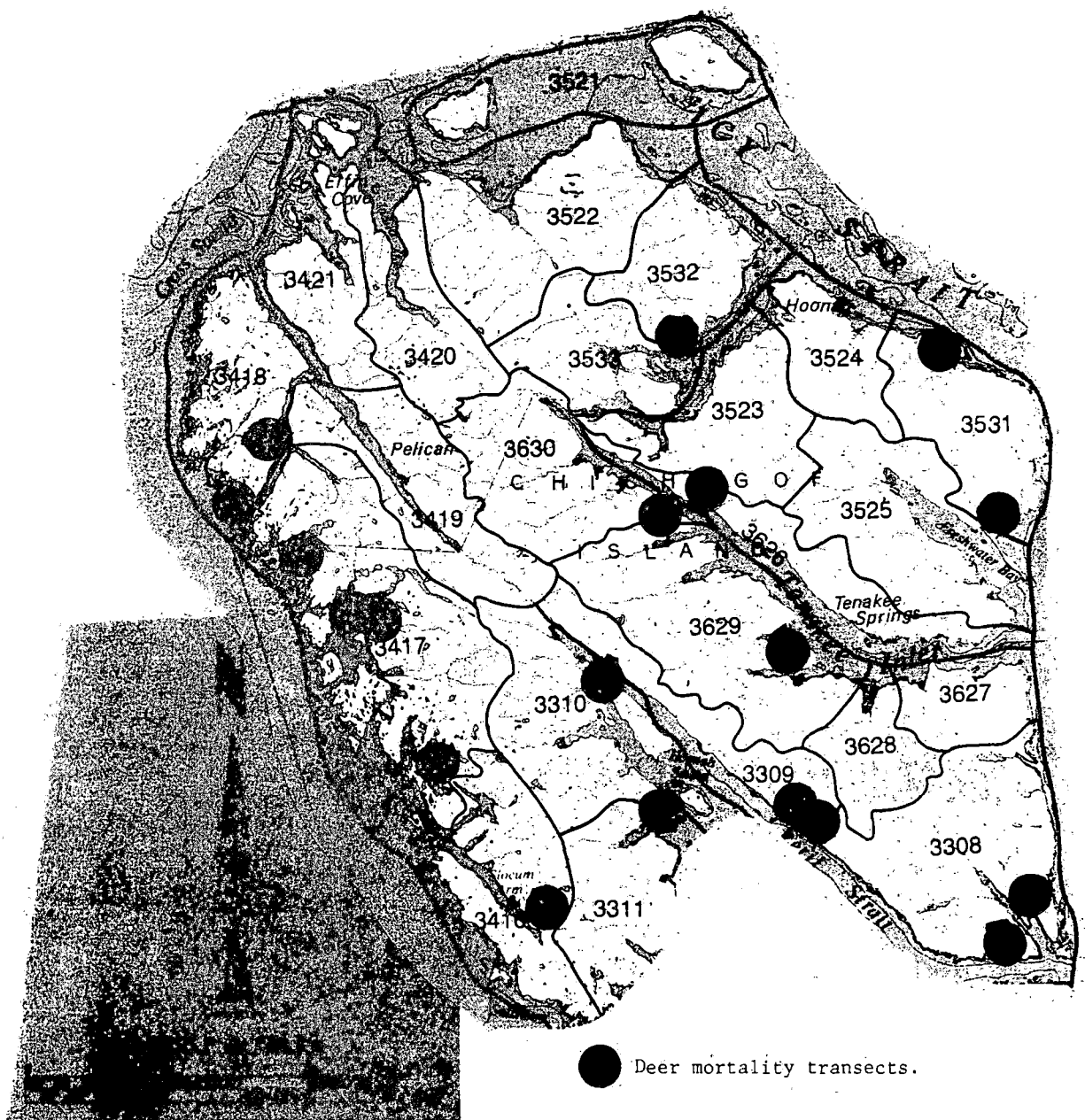


Fig. 3. Chichagof and Yakobi Islands deer harvest areas.

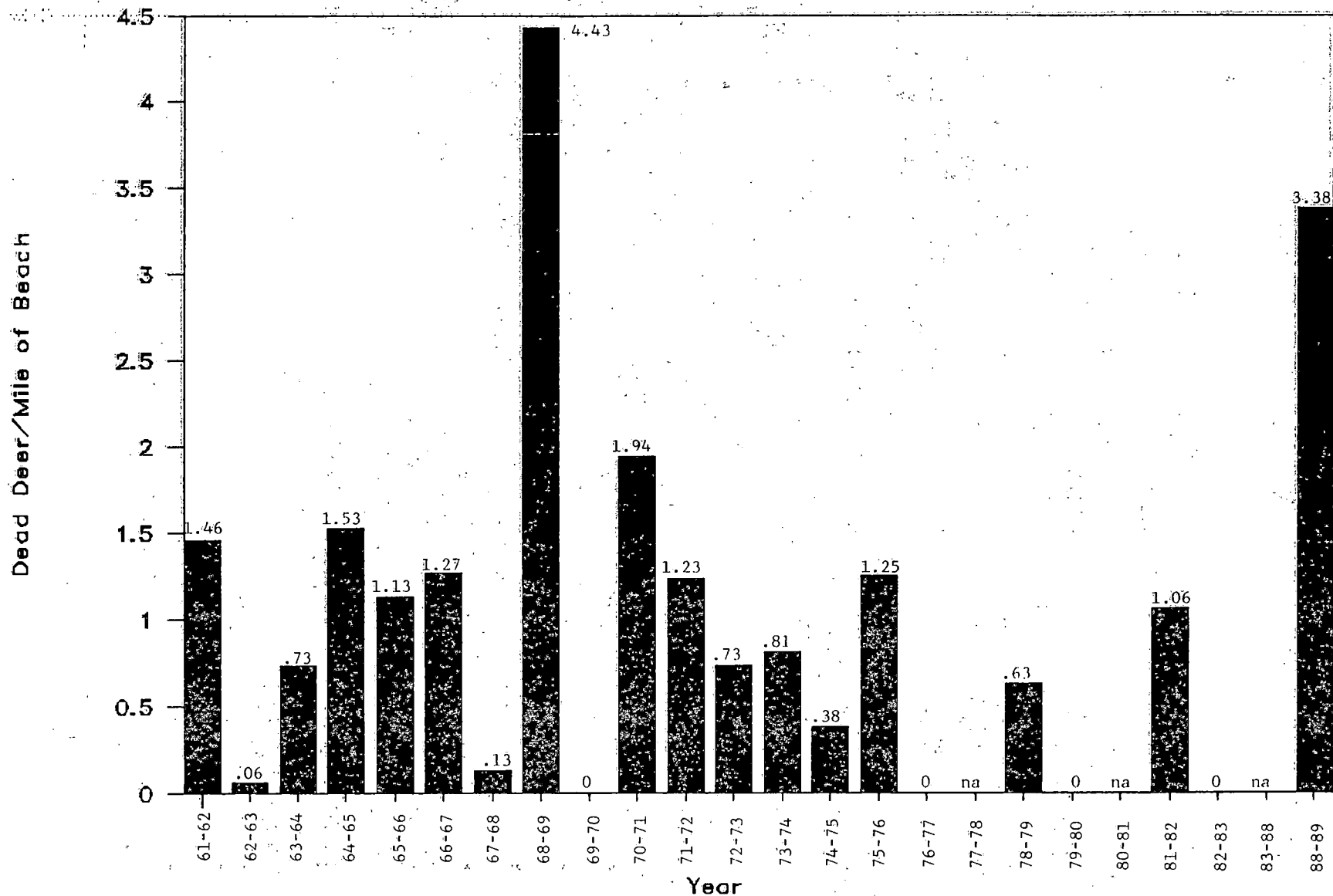


Fig 4. Data from 16 deer mortality transects, GMU 4, 1961-62 through 1988-89.

Table 1. Deer population trends by VCU^a as indicated by pellet group surveys Unit 4, 1981-1989.

VCU ^a	Name	Year	Mean pellet groups/plot	Number of plots	95% C.I.
<u>Admiralty Island</u>					
125	Barlow Cove	1982	1.07	2,567	1.01-1.12
		1984	1.69	347	1.46-1.92
		1985	1.55	347	1.35-1.76
127	W Admiralty	1982	1.65	1,054	1.53-1.77
128	Hawk Inlet	1982	1.21	1,605	0.99-1.42
		1984	1.42	339	1.22-1.63
		1985	1.69	270	1.43-1.95
		1986	1.92	286	1.64-2.19
		1987	2.54	278	2.19-2.89
		1989	1.82	334	1.57-2.08
140	Dorn Island	1984	1.27	230	1.02-1.53
148	Lake Kathleen	1987	2.13	207	1.76-2.49
150	Lake Florence	1988	1.49	294	1.28-1.70
162	Thayer Lake	1987	2.81	313	2.49-3.12
		1989	2.04	244	1.75-2.32
171	Hood Bay	1987	2.31	358	1.99-2.63
		1989	1.77	366	1.54-2.00
182	Pybus Bay	1981	1.34	390	1.16-1.52
		1984	1.02	300	0.86-1.18
		1985	1.86	269	1.60-2.12
		1986	2.00	235	1.70-2.29
		1987	2.03	242	1.69-2.37
		1989	2.00	156	1.63-2.36
<u>Chichagof Island</u>					
189	Port Althorp	1988	1.80	195	1.48-2.14
190	Idaho Inlet	1988	1.35	250	1.09-1.60
202	Port Frederick	1988	1.88	242	1.62-2.14
209	Whitestone Harbor	1988	1.23	272	1.01-1.45
211	Point Augusta	1983	1.78	757	1.62-2.01
218	Pavlof Harbor	1988	1.78	324	1.51-2.06
221	NE Tenakee Inlet	1981	0.86	193	0.64-1.08
222	N Tenakee Inlet	1981	0.60	253	0.48-0.73
223	NW Tenakee Inlet	1988	1.47	253	1.24-1.71
231	Saltery Bay	1988	2.03	256	1.70-2.36
234	E Crab Bay	1981	0.49	35	0.08-0.89
235	Kadashan River	1981	0.54	96	0.32-0.76
		1988	2.67	221	2.19-3.16
236	Corner Bay	1981	0.35	60	0.17-0.53
246	Broad Island	1981	1.41	209	1.18-1.63

Table 1. Continued.

VCU ^a	Name	Year	Mean pellet groups/plot	Number of plots	95% C.I.
247	Finger Mountain	1983	1.17	2,145	1.11-1.24
		1984	1.83	302	1.57-2.09
		1985	3.23	279	2.79-3.67
		1986	2.88	277	2.57-3.19
		1987	3.11	236	2.71-3.52
		1989	2.99	305	2.57-3.40
249	Lisianski Inlet	1988	0.97	255	0.80-1.15
254	Yakobi Island	1988	1.93	275	1.68-2.18
275	Cobol/Slocum	1984	1.15	224	0.92-1.37
279	Rapids Point				
	(W Peril Strait)	1983	0.77	2,734	0.73-0.81
281	Ushk Bay	1981	0.63	94	0.41-0.85
<u>Baranof Island</u>					
288	Range Creek	1983	0.51	1,788	0.46-0.55
		1984	0.71	303	0.61-0.92
		1985	1.32	22	1.02-1.62
295	Lake Eva	1987	1.81	172	1.46-2.15
296	Portage Arm	1981	0.53	213	0.39-0.68
300	Nakwasina				
	(all transects)	1984	2.51	196	2.14-2.88
		1985	3.92	1,046	3.67-4.17
		1986	3.50	715	3.26-3.76
		1989	2.32	244	2.00-2.65
300	Nakwasina				
	(transects 2,3,8)	1984	2.51	138	2.10-2.93
		1985	3.65	218	3.13-4.17
		1986	3.38	205	2.91-3.84
		1987	2.31	195	1.90-2.72
305	Sea Lion Cove	1984	1.36	320	1.15-1.58
		1985	2.57	292	2.23-2.91
		1986	2.87	235	2.44-3.29
		1987	3.31	226	2.82-3.80
		1989	1.75	303	1.50-2.00
321	Redoubt	1989	2.17	304	1.88-2.47
339	Port Alexander	1988	1.75	174	1.44-2.06
348	Crawfish	1989	1.35	360	1.14-1.57

^a Value comparison units.

Table 2. Deer harvest data in Unit 4, 1984 through 1988-89.

Year	M ^a	F ^a	Total ^b estimated	U ^c	Estimated ^a total harvest
1984	6,500	2,400	8,900	890	9,800
1985	7,000	3,400	10,400	1,040	11,400
1986-87	7,600	2,700	10,300	1,030	11,300
1987-88	10,300	4,100	14,400	1,440	15,700
1988-89	8,900	3,100	12,000	1,200	13,200

^a Rounded to nearest hundred.

^b Estimate based on reported kill from Hunter Harvest Questionnaires (Thomas 1989).

^c Estimated 10% of reported harvest as crippling loss, unreported, and illegal take of deer of unknown sex.

Table 3. Hunter residency and success in Unit 4, 1986-87 through 1988-89 seasons.

Year	Successful				Unsuccessful			
	Local Res.	Nonlocal Res.	Nonres.	Total	Local Res.	Nonlocal Res.	Nonres.	Total
1986-87	1,773	2,322	4	4,099	703	971	5	1,679
1987-88	1,934	2,369	23	4,326	551	982	77	1,610
1988-89	1,851	1,780	24	3,655	394	1,161	28	1,583

Table 4. Harvest chronology in Unit 4 , 1987-88 and 1988-89.^a

Year	Aug	Sep	Oct	Nov	Dec	Jan
1987-88	1,290 (9%)	1,089 (8%)	2,522 (18%)	5,374 (38%)	2,966 (21%)	1,089 (8%)
1988-89	954 (8%)	1,193 (10%)	2,028 (17%)	4,533 (38%)	2,028 (17%)	1,193 (10%)

^a Reported chronology percentages expanded to include unknown dates of kill.

STUDY AREA

GAME MANAGEMENT UNIT: 6 (10,140 mi²)

GEOGRAPHICAL DESCRIPTION: Prince William Sound and North Gulf Coast

BACKGROUND

Sitka black-tailed deer were introduced to Unit 6 by the Cordova Chamber of Commerce beginning in 1916. The deer quickly exploited available habitat, dispersing to most islands in Prince William Sound (PWS) as well as the adjacent mainland. An initial population peak in about 1945 caused sufficient habitat damage to reduce subsequent carrying capacity (Robards 1952). Reynolds (1979) reported major winter die-offs in the late 1940's, mid-1950's, late 1960's and the early 1970's. He identified snow depth and duration as the primary factors limiting deer abundance and distribution.

Deer hunter harvest in Unit 6 has been monitored by varying methods since the first legal deer season in 1935. To assess hunter effort and success, a sample of Cordova residents have been interviewed annually since 1965 (Reynolds 1979, Griese 1988). In 1980, 1983, 1984, and 1987, deer hunter questionnaires were distributed to a large percentage of Alaskan deer harvest ticket holders (Griese and Miller 1987, Griese and Becker 1989).

Reynolds (1979) reported that prior to 1978, annual harvest in Unit 6 ranged between 500 and 1,500 deer. Griese and Miller (1987) identified an average annual increase of 14% in the harvest between 1980 and 1984, reaching 2,200 deer. The deer harvest was estimated to be over 3,000 in 1986 and 2,828 (± 174) in 1987 (Griese 1989).

Relationships between deer range and habitat characteristics of PWS have been investigated by Eck (1983), who found an inverse relationship between biomass of deer winter browse species and percentage of spruce as well as the net volume of timber stands. Shishido (1986) found that during the mild winters of 1981-83, deer wintered in forested habitat with less than 60% crown closure, in mixed species stands that consisted of greater than 50% hemlock and 12% spruce, and on south-facing slopes below elevations of 91 meters.

The greatest future impact to deer abundance in Unit 6 will be the loss of critical winter habitat and an increasing predator population. The timber practice of clear-cutting the major lowland timber stands on private and public lands on Montague Island will produce a long-lasting reduction in winter habitat. Deer winter habitat in Unit 6 is much more limited than that in Southeast Alaska, and snow depths vary more dramatically. An expanding wolf population on the mainland will probably establish

on Hinchinbrook and Montague Islands within the next 10 to 20 years. Successful long-term deer management must therefore emphasize winter habitat preservation for deer.

POPULATION OBJECTIVES

To maintain a deer population that will sustain an annual harvest of 1,500 deer, with 60% males and a minimum hunter success rate of 50%.

METHODS

To assess local hunting effort and success, a 10% sample of Cordova residents holding deer harvest tickets was interviewed by phone or in person. An estimate of the total harvest in Unit 6 was then developed, based on proportions of the deer harvest attributable to Cordovan hunters (34-41%), compared with the total harvest reported in recent statewide deer hunter questionnaires conducted in 1980, 1983, 1984, and 1987. No statewide harvest questionnaire was administered for this reporting period.

Late-winter beach counts on the 3 major islands assessed overwinter survival of fawns; a Piper PA-18 Supercub was used. Deer were classified as adults, fawns (short yearlings), or unknown age.

Deer pellet-group transects were established, as described by Kirchoff and Pitcher (1988). Five new uniform coding units (UCU) were sampled in PWS with 138 to 240, 20-m² plots in each UCU. Data were expressed as the mean number of pellet groups counted per plot. This was the second consecutive year pellet-group data were collected.

RESULTS AND DISCUSSION

Population Status and Trend

I believe the deer population in Unit 6 peaked between 1986 and 1987. Estimated number of deer killed by Cordova residents indicates a recent peak in either deer availability or abundance (Figure 1). Decreased harvest by these local hunters in 1988 may have reflected a lower deer density. The lower density may have resulted from poor fawn survival because of the unusually wet spring and summer (Griese 1989).

Deer pellet-group transects conducted during 1988 and 1989 produced overall "low-to-moderate" pellet-group densities (Table 1). Kirchoff and Pitcher (1988) suggested that mean pellet-group densities ranging from 1.0 to 2.0 groups per plot in Southeast Alaska were moderate, reflecting moderate deer

densities. Deer pellet-group densities measured within individual UCU's every third year should provide adequate population trend information. Repeat surveys are scheduled to begin in the Spring of 1991.

March aerial composition counts provided insight into the relative distribution of deer winter densities (Table 2). The number of deer observed per linear mile of shoreline was highest in Jeanie Cove (UCU 1808), Northeast Montague (UCU 1805) and northwest Hinchinbrook (UCU 1902), in descending magnitude. Persistent greater-than-average snow depth favored high deer concentrations on beaches during the survey.

Population Size:

Postnatal fawn mortality in 1988 and winter mortality in 1988-89 reduced deer numbers in Unit 6. The overwintering deer population was estimated at 8,000-12,000 deer in 1988 (Griese 1989). Postnatal fawn mortality may have been unusually high, because of lengthy periods of rain between May and July 1988. Winter (1988-89) mortality caused by above-average persisting snow depths, exacerbated by human and aircraft disturbance and following the Exxon Valdez oil spill, was believed to effect a 10-20% reduction from the previous population estimate. The 1989 preparturition population estimate for Unit 6 is 6,500-11,000 deer.

Population Composition:

The March shoreline deer composition survey suggested that a minimum 13-23% of each island population were short yearlings (Table 2). Twenty-two percent of 779 deer identified to age were short yearlings. Ground verification of this method of collecting data is needed to increase validity.

Mortality

Season and Bag Limit:

The open season for subsistence, resident, and nonresident hunters is 1 August to 31 December. The bag limit is 5 deer; however, antlerless deer may be taken only from 15 September to 31 December.

Human-induced Mortality:

Cordova deer hunters killed an estimated 1,042 deer, based on interviews with 10% of the harvest ticket holders (Table 3). Sixty-four percent of the reported deer were males. Harvest by these local hunters was concentrated on Montague and Hinchinbrook Islands.

Total harvest in Unit 6 was probably within the range of 2,500-3,000 deer. Based on deer harvest by a sample of Cordova

hunters, the projected total harvest was 2,800. In recent years Cordova hunters have averaged 37% of the estimated total harvest, as determined by statewide mail questionnaires (Griese 1989).

Hunter Residency and Success. The Cordova deer hunter sample reported 52% hunter success (Table 3). Unit 6 residents, especially hunters from Cordova, reported higher success rates than other Alaskan residents (Griese 1989).

Harvest Chronology. Cordova deer hunters killed nearly half the reported harvest in November (Table 3). The 1988 harvest chronology is typical for resident deer hunters.

Transport Methods. Hunters from Unit 6 relied on boats (66%) and aircraft (29%) to reach their hunt areas in 1987 (Griese 1989). No data on transport methods were collected for 1988.

Natural Mortality:

Snow accumulations exceeding 15 inches at sea level began in late December, followed by record cold temperatures and additional snow accumulation. Snow depth exceeding 30 inches recorded at the Cordova airport lasted for 10 days. Snow persisted at low-to-moderate depths through March.

A moderate proportion of short yearlings and older males probably succumbed to winter mortality. While no mortality surveys were conducted, individuals responding to the Exxon Valdez oil spill recovered numerous deer carcasses from PWS beaches. Most of the deer dying from winter starvation were short yearlings and older males, age classes susceptible to winter stress. Distribution and numbers of winter-killed deer were not available.

Game Board Actions and Emergency Orders

Deer hunting seasons and bag limits were last changed by the Board of Game in 1982. The bag limit was increased from 4 to 5 deer at that time, in response to an increasing surplus. The Board has made no subsistence determination concerning Unit 6 resident deer hunters. Current seasons and bag limits appear to be meeting public needs and management objectives.

CONCLUSIONS AND RECOMMENDATIONS

Population objectives were attained or exceeded for the 1988 period. This information is based on a limited sample of Cordova hunters. Total hunter success for Unit 6 may have dropped below 50%. Unitwide harvest information will be available for the 1989-90 season.

Total deer harvest appeared to have fluctuated between 2700 and 3000 for the last 3 years. However, the preparturition

population declined in 1989 and will likely produce a decline in harvest in the fall 1989.

At the current deer population density, the existing season and bag limit are not expected to cause further population decline; however, if snow conditions promote deer concentrations on the beach during the hunting season, current bag limits could cause significant local reductions. Existing limits could be reduced with an intent to promote a higher success rate for hunters; this would meet 1 management objective. Bag limit changes would also be much preferred by the rural residents over season length reductions. A bag limit reduction will be considered for the spring 1991 meeting of the Alaska Board of Game. Reduction in bag limits are recommended when hunting success falls below 50%.

The accumulation of trends in pellet-group densities should provide population information for evaluating future regulatory changes. Pellet-group analyses is suitable for tracking population trends and in assisting with land management decisions. The continuation of this program is important. The pellet-group technique is relatively new in Unit 6, and it should be evaluated in 1993.

Spring beach composition surveys should be continued. They would be of a greater value if ground checked for accuracy and if fall composition surveys were available for comparison of fawn components. Continuity of a statewide harvest database is also essential. An annual hunter questionnaire to 10-25% of "railbelt" harvest ticket holders, similar to survey methods currently conducted in Southeast Alaska, is needed. Identifying and reserving essential winter range in the timbered lowlands on the major deer producing islands should be the ultimate goal of habitat management efforts in Unit 6.

On 24 March 1989 the Exxon Valdez grounded on Bligh Reef and spilled about 11 million gallons of crude oil into the waters of PWS. The oil from that spill washed ashore on most islands of central and southwestern PWS. It is possible that the ingestion of crude oil by deer will occur, affecting them physiologically. The extent of that impact and the impact of substantially increased human presence and activity in PWS should be assessed.

LITERATURE CITED

- Eck, K. C. 1983. Forest characteristics and associated deer forage production on Prince William Sound Islands. M. S. Thesis. Univ. Alaska, Fairbanks. 60 pp.

Griese, H. J. 1988. Unit 6 deer survey-inventory progress report. Pages 22-26 in S. O. Morgan, ed. Annual report of survey-inventory activities. Part VI. Deer. Vol. XVIII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-6. Job 2.0. Juneau. 28 pp.

_____. 1989. Unit 6 deer survey-inventory progress report. Pages 40-77 in S. O. Morgan, ed. Annual report of survey-inventory activities. Part VI. Deer. Vol. XIX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-1, Study 2.0. Juneau. 112 pp.

_____, and E. Becker. 1989. Results of the 1987-88 deer hunter questionnaire: Game Management Unit 6. Appendix to Griese (1989). Unit 6 deer survey-inventory progress report. Pages 40-77. in S. O. Morgan, ed. Annual report of survey-inventory activities. Part VI. Deer. Vol. XIX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-23-1, Study 2.0. Juneau. 112 pp.

_____, and S. Miller. 1987. Summary of Alaska Game Management Unit 6 deer hunter surveys, 1980, 1983 and 1984. Appendix to: H. J. Griese. 1987. Unit 6 deer survey-inventory progress report. Pages 17-26 in B. Townsend, ed. Annual report of survey-inventory activities. Part VI. Deer. Vol. XVII. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Proj. W-22-5. Job 2.0. Juneau. 30 pp.

Kirchoff, M. D., and K. W. Pitcher. 1988. Deer pellet-group surveys in Southeast Alaska, 1981-1987. Alaska Dep. Fish and Game. Fed. Aid in Wild. Rest. Res. Final Rep. Proj. W-22-6. Job 2.9. Juneau. 113 pp.

Reynolds, J. R. 1979. History and current status of Sitka black-tailed deer in Prince William Sound. Pages 177-183 in O. C. Wallmo and J. W. Schoen, eds. Sitka black-tailed deer: Proceedings of a conference in Juneau, Alaska. U.S. Dep. Agric. For. Serv., Alaska Reg., Juneau. Series No. R10-48.

Robards, F. C. 1952. Annual report game, fur and game fish. U.S. Fish and Wildl. Serv. Cordova. (Memorandum)

Shishido, N. 1986. Seasonal distribution and winter habitat use by Sitka black-tailed deer in the Prince William Sound region, Alaska. M. S. Thesis. Univ. of Alaska, Fairbanks. 105 pp.

PREPARED BY:

SUBMITTED BY:

Herman Griese
Wildlife Biologist III

John Trent
Management Coordinator

ESTIMATED DEER HARVEST

Cordova, Alaska, 1965-1988

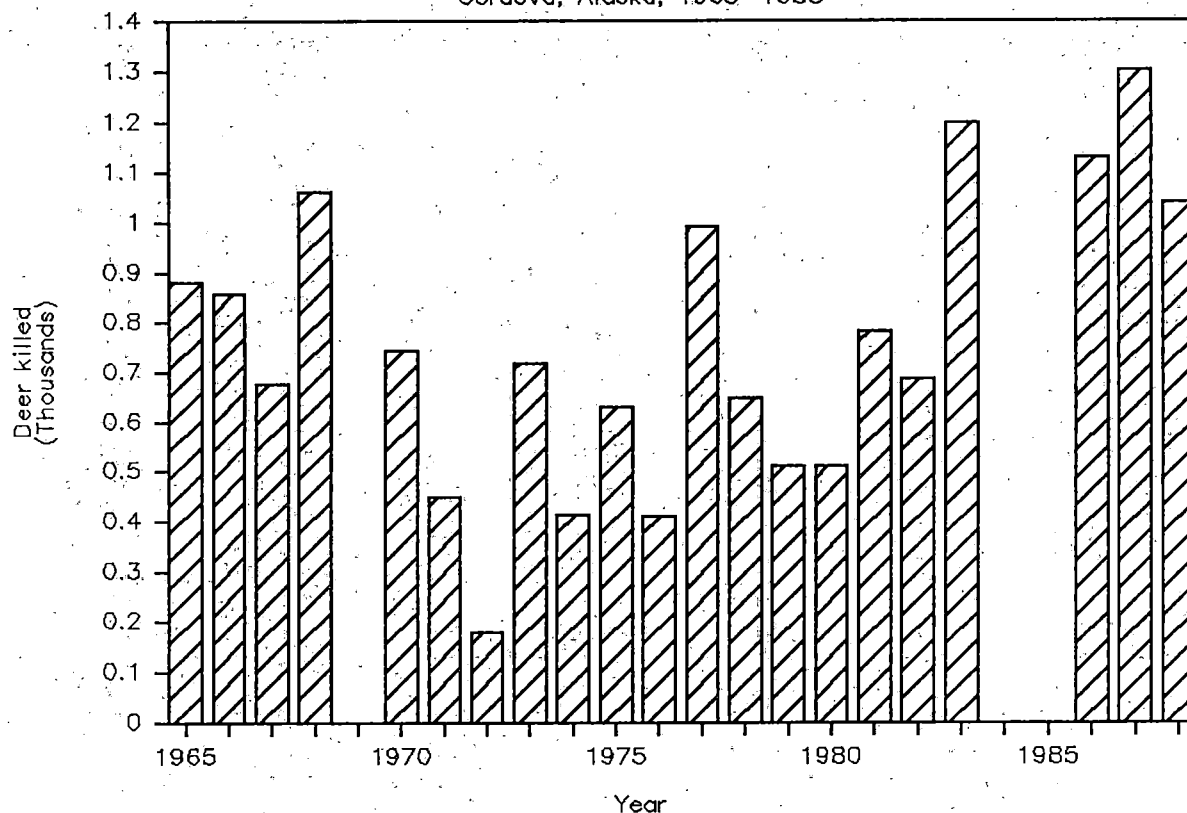


Figure 1. Estimated deer harvest by Cordova deer hunters derived from deer hunter surveys, Cordova, Alaska, 1965-88.

Table 1. Deer pellet-group count results by UCU for June, 1989, in Unit 6.

Location	Uniform coding unit (UCU)	Name	No. plots	Mean groups/plot
Montague Island	1811	McLeod Harbor	219	0.87
Southwest PWS	1402	Elrington Island	138	1.44
Knight Island	1503	Bay of Isles	159	1.29
Naked Island	1701	Naked Island	240	0.65
	1703	Storey Island	165	1.28
Subtotal (Naked Island)			405	0.91
Total			921	1.04

Table 2. Shoreline deer composition count by UCU in Unit 6, March 1989.

Location	Uniform coding unit (UCU)	Linear miles searched	Number Deer Observed					Deer/mile
			Adults	Short yearlings	%	Unidentified	Total	
Montague Island								
	1801	23.0	27	12	30	16	55	2.4
	1802	32.5	31	9	23	72	112	3.4
	1803	17.0	0	0	--	130	130	7.6
	1804	17.0	30	9	23	56	95	5.6
	1805	23.0	116	26	18	93	235	10.2
	1806	6.5	8	2	20	19	29	4.5
	1807	16.5	43	14	25	27	84	5.1
	1808	9.0	28	9	24	81	118	13.1
	1809	10.5	12	4	25	14	30	2.9
	1810	4.5	5	3	37	14	22	4.9
	1811	13.0	24	10	29	15	49	3.8
	1812	10.0	34	8	19	12	54	5.4
Subtotal		182.5	358	106	23	549	1013	5.6
Hinchinbrook Island								
	1901	27.0	63	16	20	6	85	3.1
	1902	14.0	81	23	22	18	122	8.7
	1903	28.0	77	22	22	18	117	4.2
	1906	3.0	12	5	29	0	17	5.7
Subtotal		72.0	233	66	22	42	341	4.7
Hawkins Island								
	2001	31.0	1	0	0	1	2	0.1
	2002	13.0	4	1	20	2	7	0.5
	2003	8.0	9	1	10	0	10	1.3
Subtotal		52.0	14	2	13	3	19	0.4
Total		306.5	605	174	22	594	1373	4.5

Table 3. Cordova deer hunter survey results: 1983, 1986-88.

	1983	%	1986	%	1987	%	1988	%
Harvest ticket holders	750 ^a		712		656		705	
Survey sample	100		100		66		71	
No. hunters	93		83		47		52	
Successful hunters	55	59	55	66	38	81	27	52
Days hunted	584		407		351		219	
Reported Kill:								
Male	98	61	93	58	78	59	67	64
Female	62	39	66	42	48	37	38	36
Total	160	100	159	100	131	100	105	100
Chronology of Kill:								
August	5	3	-- ^b	12	11	1	1	
September	16	10	--		15	14	7	7
October	55	34	--		25	23	23	22
November	57	36	--		28	25	48	46
December	27	17	--		30	27	26	25
Distribution:								
Hawkins Is.	43	27	-- ^b	50	42	15	15	
Hinchinbrook Is.	55	34	--		43	34	38	37
Montague Is.	44	27	--		20	15	41	40
Other	17	10	--		6	9	8	8
Means:								
Days/hunter	6.3		4.9		7.5		4.2	
Days/successful hunter	7.7		5.9		8.5		5.8	
Days/deer	3.7		2.6		2.7		2.1	
Deer/active hunter	1.7		1.9		2.8		2.0	
Deer/successful hunter	2.9		2.9		3.5			3.9
Estimated total harvest	1200		1132		1302		1042	

^a Estimated number of harvest ticket holders.

^b Data not collected.

STUDY AREA

GAME MANAGEMENT UNIT: 8 (8,750 mi²)

GEOGRAPHICAL DESCRIPTION: Kodiak, Afognak, and adjacent islands

BACKGROUND

Sitka black-tailed deer were introduced into the Kodiak area in 1924. Numbers steadily increased, until deep and persistent snow in 1969-70 and 1970-71 precipitated a population decline. Milder weather since 1971 has allowed deer to expand into all available habitat. Deer occur in high densities in habitat types ranging from mature Sitka spruce timber on Afognak-Shuyak and northern Kodiak Islands to heath-sedge tundra vegetation on southwestern Kodiak Island. Some natural mortality occurred during the 1987-88 winter (Smith 1989).

Both harvests and hunting pressures have increased steadily since the late 1970's. From an estimated annual harvest of 587 deer in 1972, it has increased to more than 10,000 in 1987. More remote parts of western Kodiak Island receive little hunting pressure, while relatively high hunter densities occur in easily accessible areas of northern Kodiak and Afognak Island. Demand for deer hunting is still high. The Kodiak Island's deer population remains generally underharvested, even with a relatively long hunting season and liberal bag limits. Only in northeastern Kodiak Island, with its good road access and where most of the human population occurs, does hunting have potential to impact the deer population.

POPULATION OBJECTIVES

To maintain a deer population that will sustain a minimum annual harvest of 8,000 deer.

METHODS

Harvest data were collected by interviewing 186 hunters in 47 parties in the field on western Kodiak Island from 24 October to 3 December 1988. No mail questionnaire estimating total harvest was used for this reporting period.

Natural mortality was assessed by searching for deer carcasses in coastal wintering areas of Kodiak, Afognak, Whale, and Raspberry Islands. A more intensive search for carcasses was conducted in a deer wintering area near Chief Cove in Spiridon Bay on western Kodiak Island by University of Alaska graduate student, Jeff Selinger, who used 2 observers to search a 400-m-wide band along 9.5 miles of coastline with continuous parallel transects.

Interviewing rural residents and monitoring winter weather and snowfall patterns provided additional information on natural mortality.

Documenting the impacts of the Exxon Valdez oil spill included a study on the effects of the oil spill on deer in Prince William Sound and on Kodiak and adjacent islands. Field work included searching for deer mortalities near oiled beaches and conducting gross necropsies. Several deer were later collected by shooting, and tissue samples were preserved for histological studies and analysis of hydrocarbon content.

RESULTS AND DISCUSSION

Population Status and Trend

A moderate decline in the deer population occurred in most of Unit 8 during this reporting period. Some natural mortality occurred during the 1987-88 winter (Smith 1989), but hunters experienced little decline in success during the 1988 season (Table 1). However, relatively high mortality in fawns and older bucks occurred during the 1988-89 winter, and a moderate decline in the population apparently occurred during the latter part of this reporting period.

Population Size and Composition:

Census methods for deer have not been developed for Unit 8. The population has been estimated in excess of 100,000 animals, but natural fluctuations (i.e., dependent on winter severity) occur commonly.

Hunters reported seeing below-average numbers of yearling deer during the 1988 season. Does with fawns were reported to be about average in abundance.

Distribution and Movements:

Deer were pushed to relatively low elevations by heavy snow in December 1988 and January 1989. By late February southerly aspects became snow free and deer began moving upslope. Although only minor snowfall was received after February, deer remained at low elevations into early April in the northern part of Unit 8 where snow was more persistent near the coast.

Mortality

Season and Bag Limit:

The open season for subsistence, resident, and nonresident hunters in that portion of Kodiak Island north of the access road from Port Lions to Crescent Lake and east of a line from the outlet of Crescent Lake to Mount Ellison Peak and from Mount

Ellison Peak to Pokati Point at Whale Passage and that portion of Kodiak Island north of a line from Sequel Point to Pasagshak Pass and north of the area draining into Ugak Bay east of a line from the mouth of Saltery Creek to Crag Point is 1 August to 31 October. The bag limit is 1 deer; however, antlerless deer may be taken only from 1 to 31 October.

The open season for subsistence, resident, and nonresident hunters in that portion of Kodiak Island east of a line taken only from the mouth of Saltery Creek to Crag Point draining into Ugak Bay and south of a line from Sequel Point to Pasagshak Pass is 1 August to 15 December. The bag limit is 1 deer; however, antlerless deer may be taken only from Oct. 1-Oct 31. The open season for the remainder of Unit 8 is from 1 August to 7 January. The bag limit is 5 deer; however, antlerless deer may be taken only from Sept. 15-January 7.

Human-induced Mortality:

Results of field interviews with 186 hunters on the Kodiak National Wildlife Refuge in 1988 indicated that hunting success was comparable to that of the previous 2 years (Table 1). Hunters reported seeing more deer while hunting in 1988 than in the previous 2 years. Males composed 78% of the 226 harvested deer of known sex, closely comparable to the 80% males recorded in 1987.

Based on mail questionnaire surveys, Smith (1989) reported previous estimates of annual harvests ranging from 8,905 deer (1984-85) to 10,000+ deer (1987-88). Although a comparable survey was not done for the 1988-89 season, it appeared that hunting effort was stable in 1988 and the harvest probably exceeded 10,000 deer.

Natural Mortality:

Extensive mortality among fawns and older bucks occurred during the 1988-89 winter. Heavy snow during December and January coincided with unusually cold temperatures in January and resulted in a relatively severe winter. Hunters reported finding dead fawns and bucks as early as December. Most of the mortality occurred during late December to early March, but some deer died as late as April. Although deer were lost throughout Unit 8, the population on northern Kodiak Island apparently sustained higher mortality than did the deer population in southwestern Kodiak Island.

Examination of 186 carcasses from several locations revealed that fawns and older bucks were hardest hit. Distribution of the mortalities by age was as follows: 144 fawns, 6 yearlings, 20 adults, and 16 undetermined sex and age. All the adults were males, and the fawns included 43 males, 32 females, and 69 unknowns.

An intensive search for carcasses within a 400-m band along the coast in the Chief Cove area of Spiridon Bay indicated that significant numbers of deer died well away from the coast. A total of 161 winter-killed deer carcasses was found distributed at the following distances from the coast: 0-100 m, 63 deer (39%); 101-200 m, 40 deer (25%); 201-300 m, 18 deer (11%); 301-400 m, 40 deer (25%). More than half of the deer carcasses were found at distances exceeding 100 m from the coast, although the zero- to 100-m zone contained more carcasses than any single 100-m zone.

In early April deer on Shuyak Island were observed feeding on kelp that had been exposed to crude oil from the Exxon Valdez oil spill that occurred in Prince William Sound on 27 March 1989. Gross necropsies of several deer carcasses found in oiled areas indicated that the animals died from malnutrition in late winter. Results of histological analysis and testing of tissues for hydrocarbons from deer shot in oiled areas are not yet available. However, none of the deer collected exhibited any symptoms indicating that they were suffering toxic effects of exposure to crude oil. Lungworms were found in several deer found and collected on Shuyak Island.

Habitat

Heavy browsing by deer on elderberry was noted on western Kodiak Island in the Spiridon Bay area in March. Bark had been stripped so uniformly from this species that the individual plants had a conspicuous whitish appearance visible from several hundred meters. Willow was also hedged severely, especially near deer trails. Severe browsing on elderberry was also noted in wintering areas on northeastern Kodiak Island. Deer were confined by relatively deep snow to a narrow elevational band near sea level in many areas, resulting in the heavy browsing.

Game Board Action and Emergency Orders

The seasons and bag limits have remained the same for the past 5 years. The most recent previous change occurred when the Board of Game reduced the bag limit from 7 deer to 5 deer and changed the season closing date from 31 January to 7 January for the 1983-84 season. That change was supported by the Kodiak Fish and Game Advisory Committee, based largely on concerns that wanton waste of game was encouraged by high bag limits and deer experienced high vulnerability to hunting in late winter if pushed by snow to beaches.

CONCLUSIONS AND RECOMMENDATIONS

I recommend that the present season and bag limit be retained. Although a decline in the population was apparent because of relatively high mortality among fawns in both the 1987-88 and 1988-89 winters, productivity of females has not been seriously

affected. Evidence of extremely heavy use of preferred browse plants in winter range further supports the need to continue a management strategy that encourages adequate harvest.

LITERATURE CITED

Smith, R. B. 1989. Unit 8 deer survey-inventory progress report. Pages 78-112 in S. O. Morgan, ed. Annual report of survey-inventory activities. Part VI. Deer. Vo. XIX. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Prog. Rep. Project W-23-1. Study 2.0. 112pp.

PREPARED BY:

Roger B. Smith
Wildlife Biologist III

SUBMITTED BY

John N. Trent
Survey-Inventory Coordinator

Table 1. Deer harvest data from hunter interviews on the Kodiak National Wildlife Refuge, 1986-88.

Year	No. hunter interviews	No. deer/ hunter	% males	% females	% fawns	Mean No. deer seen/hunter	Mean no. days afield
1986	68	2.1	64	29	6	40	5.3
1987	88	1.9	72	26	2	34	5.9
1988	110	2.2	74	20	6	50	6.2



Federal Aid Project
funded by your purchase of
hunting equipment