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DEER

Susan M. Abbott, Editor
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LOCATION

Game Management Units: 1A and 2 (8,911 mi^2)

Geographical Description: Subunit 1A - That portion of Unit 1 lying south of Lemesurier Point, including all drainages into Behm Canal and excluding all drainages into Ernest Sound.

Unit 2 - Prince of Wales and all adjacent islands bounded by a line drawn from Dixon Entrance in the center of Clarence Strait, Kashevarof Passage and Sumner Strait to and including Warren Island, in Southeastern Alaska.

BACKGROUND

Deer numbers in Southeast Alaska are subject to large fluctuations caused by variations in winter weather conditions and predation. Following severe winters in 1968-69 and 1971-72, deer numbers declined to extremely low levels which persisted until the early 1980s when noticeable increases began. With the exception of the rugged mainland areas east of Behm Canal, deer numbers are currently considered moderate to high throughout Units 1A and 2.

Deer habitat in Southeast Alaska consists of uneven aged old-growth forests of spruce, hemlock, and cedar from sea level to about 2,000 feet elevation, and alpine/subalpine habitat from 2,000 feet to 3,000 feet. Winter range is the most important limiting factor and high-volume old-growth stands are critical for deer survival during severe winters.

Harvests tend to follow population changes and therefore fluctuate dramatically. In Subunit 1A, harvests have ranged from 340 to 850 deer in the past 10 years, while in Unit 2, the low and high harvests were 615 and 3,886 in 1980 and 1987, respectively. Hunting seasons have generally extended from August through November or December. Hunting of antlerless deer was allowed prior to 1978. From 1978 to the present, seasons have been limited primarily to taking antlered deer, with annual bag limits varying from 3 to 4. However, a 3-week antlerless deer season began in Unit 2 in 1987-88, but was subsequently discontinued because of public opposition.

Habitat changes caused by 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., 3 to 20 years) are useful to deer during summer and mild winters, while closed canopy stands (i.e., 20-100 years) are not useable to deer during either summer or winter. In years of moderate to heavy snowfall, use of logged areas and low-volume habitat ceases and deer become confined to higher-volume old-growth habitat. Current population

models suggest declines in overall deer carrying capacity of 50% to 60% by the end of the logging rotation in 2054. Because of the extensive loss of critical winter habitat, declines may substantially exceed 60% after severe winters in some areas.

MANAGEMENT DIRECTION

Management Objectives

Maintain deer populations in excess of 45 deer per mi^2 of winter range in Units 1A and 2. Mean pellet group densities of 1.4 pellet groups per plot have been determined as equivalent to 45 deer per mi^2 (Kirchhoff 1990).

METHODS

Harvest assessment is based primarily on questionnaires mailed to a random sample of hunters who received deer harvest tickets during the hunting season. A 100% sample is taken from communities issuing less than 150 tickets, while 30% of all ticket holders are sampled in communities where more than 150 harvest tickets were issued. Results are expanded to cover all harvest ticket holders.

A single summer alpine survey was flown on 28 July 1990. The survey was conducted from a float-equipped PA-18 Supercub which flew at an altitude of approximately 100 feet above alpine ridges beginning at Miller Lake (above the North Arm of Moira Sound) and ending at Polk Inlet on Prince of Wales Island. A pilot with a single observer conducted the survey.

Five pellet group surveys were conducted in Units 1A and 2 during April and May 1990. Methods for conducting pellet group surveys are described by Kirchhoff and Pitcher (1988). No winter mortality transects were conducted in 1990.

RESULTS AND DISCUSSION

Population Status and Trend

Although densities vary, deer populations appear to be increasing throughout Units 1A and 2. Pellet group surveys conducted in April 1990 suggest slight increases over 1989 levels in the vicinity of Whitman Lake on Revillagigedo Island and on eastern Gravina Island (Table 1). Deer numbers in George Inlet appear relatively stable. On Prince of Wales Island, pellet-group surveys suggest density increases at 12-Mile and Port Refugio (Table 2).

An early-morning aerial alpine survey flown in July 1990 resulted in a count of 183 deer between Moira Sound and Polk Inlet on Prince of Wales Island. Although this was substantially fewer deer than the 649 seen in July 1989, weather conditions, rather than population changes, were believed to be the primary cause. Temperatures were consistently high for several days before the survey and deer were probably seeking shade under trees and shrubs. Also only about half the area surveyed in 1989 was surveyed in 1990.

Mortality

Harvest:

Season and Bag Limit

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

Hunter Harvest

The deer harvest in Subunit 1A was at a 6-year low in 1989 (Table 3). This corresponded with a 6-year low in the number of hunter days. Hunter success (measured as average deer per hunter day) was higher in Subunit 1A during 1989 than it had been during the 5 preceding seasons (Table 3).

In Unit 2, the 1989 deer harvest was very similar to the 1986 harvest, but 18% lower than in 1987 and 2% lower than in 1988 (Table 3). Numbers of hunter days in Unit 2 were higher during 1989 than during 1988; however, hunter success was lower than in 1988 (Table 3). Much of the fluctuation in hunter effort between years can be attributed to varying snow cover during the hunting season. Good snow cover tends to increase hunter effort (Wood 1990).

Southern Revilla Island received the greatest hunting pressure in Subunit 1A; and was second only to the Cleveland Peninsula for numbers of deer harvested within the subunit (Table 4). Gravina and northern Revilla Islands continued to attract several hunters, and harvests from these areas remained relatively high.

Central Prince of Wales Island attracted the highest numbers of hunters, along with the highest harvest in Unit 2 (Table 4). Northern and north central Prince of Wales Island received the second and third highest harvest, respectively. Although the outer islands adjacent to Prince of Wales accounted for only 38 of the deer harvested from Unit 2, the success rate of 80% was the highest of any area in Subunit 1A or 2 (Table 4).

Because of the extensive road system, insufficient numbers of enforcement personnel, and the many widely scattered settlements, Unit 2 is believed to account for substantially more

of the illegal harvest than Subunit 1A. Although the extent to which illegal harvest occurs in Units 1A and 2 is uncertain, it is believed to be considerable (Wood 1990) (Table 5). Additionally, Flynn and Suring (1989) report that actual hunter kill may be 38% greater than total estimated harvest because of crippling loss.

Hunter Residency and Success

Hunters taking deer in Subunit 1A are primarily local residents residing within the unit (Table 6). However, although most of the hunters hunting in Unit 2 are from the unit, a substantial number of Alaskans from elsewhere in the state hunt in Unit 2 (Table 6). This is probably due, in part, to the reputation Unit 2 has for producing trophy-sized black-tails. Numbers of nonresidents taking deer in Unit 2 was down 59% from 1988 (Table 6).

Harvest Chronology

The majority of the deer harvested from Units 1A and 2 coincided with the rut and occurred during October and November (Table 7). Several deer were also killed in August. The lowest harvest occurred in September and December.

Transport Methods

Most hunters in Subunit 1A use boats to access hunting areas, while in Unit 2, most hunters rely on highway or off-road vehicles (Table 7). Use of airplanes by hunters accessing Unit 2 nearly doubled between 1988 and 1989.

Other Mortality:

Mortality transects were not surveyed during 1989-90. Nonetheless, given the moderate winter conditions, losses were probably not substantial. Black bears and wolves are currently considered relatively abundant in Units 1A and 2, and predation is believed to account for the deaths of several thousand deer each year.

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 end of the rotation in the year 2054. This loss will be greater in 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 Units 1A and 2 where projected hunter demand for deer will be met (U.S. Forest Service 1989).

Enhancement:

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

Board of Game Actions and Emergency Orders

From 1978-1986 an August 1 - November 30 season and a 3 antlered-deer bag limit existed in southern Southeast. In response to increasing deer numbers, particularly in Unit 2, 1 antlerless deer was added to the bag limit in Unit 2 during 10-31 October 1987. Considerable opposition to this season developed. The antlerless season was subsequently dropped at the spring 1988 Board of Game meeting. However, the bag limit was increased to 4 antlered deer and the season was extended through 31 December in both Units 1A and 2.

CONCLUSION AND RECOMMENDATIONS

The objective of 45 deer/mi^2 of winter habitat is probably being met in most areas of Unit 2 and in some parts of Subunit 1A. With continued mild winters 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 support deer for hundreds of years. Efforts to inform the public of the impacts of logging on deer populations should be made so that people can understand the trade-offs between timber harvesting and wildlife populations. 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 Units 1A and 2 (Wood 1990).

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Table 1. Deer pellet-group survey results, Game Management Unit 1A; Cleveland Peninsula, Revillagigedo and Gravina Islands, 1981-1990.

Year	VCU	Mean pellet Groups/plot[a]	Number of Plots	95% C.I.
1981	715-Smugglers	0.48	147	0.30-0.66
1981	716-Helm Bay	0.16	704	0.12-0.19
1984	716	0.54	302	0.44-0.65
1985	716	0.85	181	0.65-1.05
1988	716	1.67	247	1.38-1.95
1985	738-Margaret	0.57	515	0.47-0.66
1986	738	0.84	251	0.69-1.00
1988	738	1.32	110	0.97-1.67
1989	738	0.62	129	0.44-0.84
1981	748-George Inlet	0.21	110	0.09-0.33
1984	748	0.27	344	0.19-0.35
1985	748	0.52	313	0.39-0.65
1989	748	1.41	169	1.08-1.75
1990	748	1.03	240	- - - - -
1981	752-Whitman Lake	0.18	45	0.02-0.33
1987	752	0.16	187	0.09-0.23
1990	752	0.45	193	- - - - -
1985	758-Carroll Point	0.66	118	0.46-0.86
1986	758	0.75	118	0.56-0.95
1988	758	1.15	85	0.82-1.49
1985	759-Moth Bay	0.59	140	0.42-0.74
1986	759	0.98	156	0.79-1.17
1988	759	0.72	78	0.46-0.97
1985	760-Lucky Cove	1.16	335	1.00-1.33
1986	760	1.16	258	0.95-1.32
1988	760	1.02	65	0.69-1.34
1985	769-Alava Bay	0.52	311	0.39-0.65
1986	769	0.85	326	0.68-1.01
1985	772-Wasp Cove	0.41	271	0.31-0.51
1986	772	0.50	300	0.38-0.62
1989	772	0.58	145	0.39-0.77
1981	764-Blank Inlet	1.24	108	0.89-1.59
1981	765-Dall Head	0.52	69	0.31-0.74

Table 1. Continued.

Year	VCU	Mean pellet Groups/plot[a]	Number of Plots	95% C.I.
1981	999-E. Gravina	1.06	226	0.89-1.22
1984	999 (all transects)	0.86	1,087	0.78-0.94
1985	999	1.23	1,172	1.13-1.32
1986	999	1.40	1,267	1.30-1.50
1984	999-E. Gravina	0.88	376	0.73-1.03
1985	999 (Trans. 1-3)	1.44	224	1.20-1.67
1986	999	1.62	346	1.43-1.81
1987	999	1.63	334	1.41-1.84
1988	999	2.07	278	1.79-2.35
1989	999	1.13	182	0.86-1.41
1990	999	1.40	279	- - - - -

[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

Table 2. Deer pellet-group survey results, Game Management Unit 2, Prince of Wales and adjacent islands, 1984-1990.

Year	VCU	Mean pellet Groups/plot[a]	Number of Plots	95% C.I.
1988	528-Calder	2.14	252	1.79-2.50
1987	532-Red Bay	0.32	177	0.18-0.47
1988	539-Exchange Cove	1.40	266	1.15-1.65
1989	549-Sarheen	1.73	310	1.44-2.01
1988	554-Sarkar	1.29	298	1.06-1.51
1984	561-Warm Chuck	1.02	326	1.02-1.38
1985	561	1.60	295	1.36-1.84
1989	561	2.21	302	1.91-2.50
1986	78-Snakey Lakes	0.62	279	0.51-0.73
1988	578	1.05	300	0.85-1.26
1989	578	1.56	200	1.26-1.86
1986	581-Luck Lake	1.74	178	1.41-2.07
1988	581	2.11	300	1.80-2.42
1988	587-Tuxekan	1.07	300	0.85-1.29
1985	621-12 Mile	0.31	196	0.19-0.43
1986	621	0.64	300	0.48-0.81
1987	621	0.65	370	0.49-0.81
1988	621	0.62	302	0.46-0.78
1989	621	0.78	235	0.59-0.98
1990	621	1.17	176	- - - - -
1985	635-Port Refugio	2.69	317	2.27-3.12
1986	635	2.52	324	2.09-2.96
1987	635	1.76	369	1.46-2.07
1988	635	1.15	270	0.90-1.40
1989	635	0.80	507	0.68-0.93
1990	635	1.25	232	- - - - -
1988	679-Kitkun	0.32	240	0.21-1.07
1989	679	0.89	273	0.71-1.07
1988	685-Nutkwa	0.10	234	0.02-0.17

[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

Table 3. Deer harvest data, Game Management Units 1A and 2, 1984-1989.

Year	No. of hunters	No. of successful hunters	Percent successful	Total hunter days	Avg. hunter days	Total deer	Avg. deer per hunter	Average deer per hunter day
Unit 1A								
1984	1,060	440	42	5,820	5.5	620	0.6	0.19
1985	1,108	412	37	5,683	5.1	779	0.7	0.20
1986	1,107	529	48	7,100	6.4	859	0.8	0.16
1987	946	376	40	6,379	6.7	611	0.6	0.18
1988	958	413	43	4,930	5.1	686	0.7	0.22
1989	982	335	34	4,348	5.1	587[a]	0.6	0.23
Unit 2								
1984	1,910	1,210	63	13,070	6.8	1,880	1.0	0.27
1985	2,025	1,373	68	14,182	7.0	3,151	1.6	0.37
1986	2,233	1,538	69	17,505	7.8	2,805	1.3	0.20
1987	2,481	1,845	74	17,709	7.1	3,886	1.6	0.35
1988	2,124	1,415	67	10,668	5.0	2,849	1.3	0.43
1989	2,132	1,397	65	12,315	5.7	2,806	1.3	0.33

[a] Does not include 5 does which were killed.

Table 4. Deer harvests from major harvest areas within Game Management Units 1A and 2, 1989.

Major harvest area	Number of hunters, expanded	Number of successful hunters, expanded	Percent successful	Total hunter days, expanded	Average days per hunter	Average deer per hunter	Total deer killed
Unit 1A							
1-Gravina Island	241	61	25	597	2.5	0.4	101
2-Annette Island	27	20	74	97	3.5	1.2	32
3-Duke Island	23	0	0	33	1.4	0.0	0
4-South Revilla	497	121	24	1,885	3.8	0.3	157
5-North Revilla	265	75	28	949	3.6	0.4	111
6-Cleveland Pen.	253	97	38	641	2.5	0.7	184
7-North Mainland	17	2	12	97	5.6	0.3	5
8-South Mainland	14	1	7	49	3.4	0.1	2
Unit 2							
9-Outer Islands	45	36	80	91	2.0	0.8	38
10-Hecata Island	144	74	51	576	4.0	0.9	128
11-SW P.O.W. Is.	121	56	46	548	4.5	0.8	95
12-SE P.O.W. Is.	309	169	55	1,383	4.5	0.9	289
13-Central P.O.W. Is.	1,021	577	56	4,011	3.9	0.9	944
14-N. Cent. P.O.W. Is.	753	415	55	2,869	3.8	0.9	716
15-N. P.O.W. Is.	518	304	59	2,836	5.5	1.1	596

Table 5. Reported and estimated deer harvest/mortality, Game Management Units 1A and 2, 1984-89.

Year	Reported harvest Male	Female	Total	Unreported & illegal harvest[a]	Estimated total harvest	Estimated number of road kills
Unit 1A						
1984	620	0	620	310	930	1 to 5
1985	779	0	779	390	1,169	1 to 5
1986	859	0	859	430	1,289	1 to 5
1987	611	0	611	306	917	1 to 5
1988	686	0	686	343	1,029	1 to 5
1989	587	5	592	296	888	1 to 5
Unit 2						
1984	1,880	0	1,880	1,880	3,760	unknown
1985	3,151	0	3,151	3,151	6,302	unknown
1986	2,805	0	2,805	2,805	5,610	unknown
1987	3,616	270[b]	3,886	3,886	7,772	20
1988	2,846	3	2,849	2,849	5,698	30
1989	2,806	0	2,806	2,806	5,612	25

[a] Unreported and illegal harvest is estimated at 50% of reported harvest in Unit 1A and 100% of reported harvest in Unit 2.

[b] Antlerless season.

Table 6. Hunter residency and success, Game Management Units 1A and 2, 1988-1989.

Year	Successful				Unsuccessful			
	Local res.[a]	Nonlocal res.	Nonres.	Total	Local res.[a]	Nonlocal res.	Nonres.	Total
Unit 1A								
1988	392	21	0	413	508	37	0	545
1989	310	25	0	335	607	40	0	647
Unit 2								
1988	748	638	29	1,415	242	430	38	710
1989	713	675	9	1,397	272	425	38	735

[a] Local residents refer to those Alaskans living within the boundaries of GMU 1A for Unit 1A data, and GMU 2 for Unit 2 data.

Table 7. Deer harvest chronology and method of transportation used by successful hunters, Game Management Units 1A and 2, 1988-1989.

	Month of Kill							Method of Transportation					
Year	Aug	Sept	Oct	Nov	Dec	Jan	Unk	Airplane	Boat	Foot	Highway Vehicle[a]	Other	Unk
Unit 1A													
1988	1	5	80	172	197	52	0	20	13	406	85	85	08
1989	97	68	165	221	35	5	4	22	304	96	66	10	0
Unit 2													
1988	895	447	506	888	72	7	34	54	388	309	1,509	18	21
1989	729	377	469	1,061	152	12	6	100	386	413	1,339	22	5

[a] Includes cars, trucks, and off-road vehicles (3 and 4-wheelers).

LOCATION

Game Management Unit: 1B and 3 (5,946 mi^2)

Geographical Description: Subunit 1B - Southeast Mainland from Cape Fanshaw to Lemesurier Point

Unit 3 - 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. Historically deer populations in these areas have been very unstable with both high and low population extremes. Declines can be attributed to many factors; the most prominent being severe winter weather. Wolf and bear predation, excessive or illegal hunting, and reduced carrying capacity caused by clearcut logging all contribute to reducing deer populations.

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

MANAGEMENT DIRECTION

Management Goals

Management goals have not been determined for deer in GMUs 1B and 3:

Management Objectives

- Increase populations on deer winter range (< 1500' elevation) to moderate levels (50 deer/mi^2) as reflected by a mean pellet density of 1 pellet-group per 20m^2 plot.

METHODS

Deer harvest was estimated from returned hunter harvest questionnaires sent to a random sample of 1989 harvest ticket holders. Relative deer densities were measured with pellet-group transects in selected areas of Unit 3. These transects show relative abundance of wintering deer in the area by tabulating the numbers of deer pellet groups (fecal deposits) per unit area, in this case $20m^2$. Additional new pellet group transects were established on Kupreanof, Mitkof, and Kuiu Islands.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: After several years of apparent increase and then a leveling off the populations in Unit 3 seem to be increasing again (Table 1). Mitkof Island still appears to have a substantially higher population than Kuiu or Kupreanof overall. The data from the new pellet group survey area on the East side of Duncan Canal suggests a good population in that area.

The data in Table 1, comments from the public, and staff observations provide the basis for the following discussion of relative sizes of the deer populations on various islands of Unit 3. The 1990 pellet group surveys indicated no major changes in populations except for Kupreanof Island. More pellet groups/plot were found on the new transect lines on the east side of Duncan Canal than were found in previous years at other sites. Mitkof Island again had the highest count for any area surveyed in Unit 3. After declining slightly in 1988, the mean pellet groups/plot on the southern part of Mitkof Island rose in 1989 and again in 1990.

Mortality

Harvest:

Season and Bag Limit.

Unit 1B	Aug. 1 - Dec. 31	2 antlered deer
Unit 3, that portion south of Sumner Strait and Decision Passage, including the Vank Island group.	Aug. 1 - Nov. 30	2 antlered deer

Board of Game Actions and Emergency Orders. There were no Board of Game actions and no Emergency Orders issued this report period.

Hunter Harvest. The numbers of deer killed and the percentage of successful hunters in both Unit 1B and 3 changed very little in 1989 from the previous year (Tables 2-5). A few more people hunted in each area but the percentage of hunter success dropped slightly.

Hunter Residency and Success. Non-residents were not successful hunters in the Unit 1B and 3 deer hunting seasons (Tables 4 and 5). Non-local residents accounted for 27% of the successful hunters in Subunit 1B in 1989, a slight increase from the previous year. Successful non-local resident deer hunters comprised 5% of the total in Unit 3, the same as last year(Table 4, 5). Primarily local residents harvested deer in Units 1B and 3. Deer are more numerous and seasons and bag limits more liberal in other GMUs of southeast Alaska. There is relatively little incentive for residents of those areas to hunt in 1B and 3.

CONCLUSIONS AND RECOMMENDATIONS

The population objective, as stated, may not provide sufficient flexibility for the deer management program in Units 1B and 3. The present objective could imply that if pellet group counts fall below 1.00/plot, hunting should be stopped or restricted to facilitate population recovery. This is not easily reconciled with the Etolin Island situation where the mean pellet-group density has been well below 1.00/20m^2 for 5 years, yet Etolin Island has had the same season and bag limit as areas with a much higher pellet group density. I suggest the following objectives be adopted:

- In areas presently closed to deer hunting with an increasing deer population, open the area with season and bag limits matching adjacent areas of comparative population density. Monitor the harvest closely to detect any population trends attributable to hunting pressure.

- In areas presently open to hunting and where mean pellet-group counts are below 1.00/20m^2 plot; maintain present seasons as long as future pellet group counts and other information do not decline and as long as public support remains favorable.

- In areas presently open to hunting and where mean pellet group counts are above and remain above 1.00/plot; maintain present seasons and bag limits, or promote more liberal seasons and bag limits if pellet group data and other information indicate an increasing number of deer.

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Table 1. Deer population trends as indicated by pellet group surveys in Unit 3, 1985-90.

Areas (VCU)	Island	Regulatory year	Mean pellet Groups/plot	Number of plots
400	Kuiu	1983-84	0.02	360
	"	1988-89	0.25	304
403	"	1987-88	0.16	337
408	"	1989-90	0.11	206
417	Conclusion	1986-87	2.66	207
	"	1988-89	0.95	200
428	Kuiu	1988-89	0.40	298
431	"	1987-88	0.23	357
434a	Big Level	1980-81	1.54	399
	"	1982-83	1.56	336
	"	1985-86	1.66	382
	"	1988-89	1.07	227
434b	Little Level	1980-81	2.48	114
	"	1982-83	2.34	136
	"	1985-86	1.39	122
	"	1988-89	1.52	137
435	Kupreanof	1983-84	0.19	312
	"	1986-87	0.51	305
	"	1988-89	0.40	312
437	"	1989-90	1.11	227
448	Mitkof	1984-85	1.00	209
	"	1986-87	1.65	195
	"	1987-88	1.33	433
	"	1988-89	1.35	417
	"	1989-90	1.46	355
449	"	1980-81	0.08	945
	"	1989-90	0.55	180
452	"	1989-90	1.36	324
454	"	1980-81	0.92	91

Table 1. Continued

Areas (VCU)	Island	Regulatory year	Mean pellet Groups/plot	Number of plots
455a	Sokolof	1980-81	1.73	900
455b	Rynda	1980-81	0.25	281
455c	Greys	1980-81	0.25	284
461	Woronkofski	1984-85	2.01	218
	"	1986-87	2.23	201
	"	1988-89	2.52	223
473	Onslow	1983-84	0.37	321
	"	1984-85	0.59	334
	"	1985-86	0.72	347
	"	1986-87	0.42	336
	"	1987-88	0.44	329
564	Coronation	1982-83	1.20	696
	"	1984-85	2.34	228
	"	1987-88	1.41	408
	"	1988-89	1.63	293

Table 2. Deer harvest in Subunit 1B, 1985-89.

Regulatory year	Estimated legal harvest M	(%)	F	(%)	Unk.	Total	Estimated illegal harvest	Total
1985	39	100	0	0	0	39	0	39
1986	69	100	0	0	0	69	0	69
1987	59	100	0	0	0	59	0	59
1988	101	100	0	0	0	101	0	101
1989	73	100	0	0	0	73	0	73

Table 3. Deer harvest in Unit 3, 1985-89.

Regulatory year	Estimated legal harvest M	(%)	F	(%)	Unk.	Total	Estimated illegal harvest	Total
1985	166	100	0	0	0	166	0	166
1986	201	100	0	0	0	201	0	201
1987	128	100	0	0	0	128	0	128
1988	234	100	0	0	0	234	0	234
1989	237	100	0	0	0	237	0	237

Table 4. Deer hunter residency and success in Subunit 1B, 1985-89.

Year	Successful					Unsuccessful					Total hunters
	Local[a] Res.	Nonlocal resident	Non Res	Total	(%)	Local Res	Nonlocal resident	Non Res	Total	(%)	
1985	40	7	0	47	50	43	0	4	47	50	94
1986	69	0	0	69	58	50	0	0	50	42	119
1987	34	26	0	60	39	78	10	5	93	61	153
1988	65	13	0	78	44	86	13	0	99	56	177
1989	40	15	0	55	29	95	37	5	137	71	192

Table 5. Deer hunter residency and success in Unit 3, 1985-89.

Year	Successful					Unsuccessful					Total hunters
	Local[a] Res.	Nonlocal resident	Non Res	Total	(%)	Local Res	Nonlocal resident	Non Res	Total	(%)	
1985	152	22	0	174	48	162	25	5	192	52	366
1986	197	5	0	202	53	164	17	0	181	47	383
1987	128	0	0	128	32	251	20	0	270	68	397
1988	175	12	0	187	55	148	7	0	155	45	342
1989	154	9	0	163	46	162	25	5	192	54	355

[a] Residents of Subunit 1B, Unit 3, Myers Chuck and Point Baker

LOCATION

Game Management Unit: 1C (7,563 mi^2)

Geographical Description: The southeast Alaska mainland and the islands of Lynn Canal and Stephens Passage between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay.

BACKGROUND

Deer have resided in northern southeast Alaska since their emigration from southern habitats following the Pleistocene epoch (Klein, 1965). Deep winter snow on the mainland portion of Subunit 1C has kept the number of deer lower than 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 in southeast Alaska at that time (Merriam, 1965). The harvest in the 1962 season was 10,500 deer. Hunter surveys began in 1970 and have continued through the present. Pellet group counts began in Subunit 1C in 1984, and have been conducted on Douglas, Harbor, Lincoln, and Shelter islands (Kirchhoff and Pitcher, 1988).

MANAGEMENT DIRECTION

Management Objectives

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. This objective was identified by staff. Long range objectives are being developed and will be offered for Board of Game concurrence.

Kirchhoff and Pitcher found that pellet group densities generally correlated well with hunters' and biologists' subjective impressions of deer densities in the areas. They concluded that deer densities could be estimated in certain conditions; Douglas, Lincoln, and Shelter Islands met these conditions. The following subjective scale was developed (number of mean pellet groups per 20 m^2): <0.5= extremely low; 0.5-.99= low; 1.0-1.99= moderate; 2.0-2.99= high; >3.0= extremely high.

METHODS

A total of 12,403 deer harvest tickets were issued for the 1989 hunting season in southeast Alaska. Approximately 35% (1,125) of the harvest ticket holders residing in

Subunit 1C were mailed hunter surveys, 56% (634) responded to the survey. Hunter effort, success, and kill location were expanded to all harvest ticket holders. Pellet group surveys were conducted on Sullivan and Shelter islands in spring 1990.

RESULTS AND DISCUSSION

Population Status and Trend

No estimates of the total number of deer, or population size, are available for deer in Subunit 1C. A survey technique has not been determined to count deer accurately in southeast Alaska's dense rain forest. Pellet group counts for Shelter Island (Table 1), revealed relatively high deer densities (the number of deer per unit area). The management goal of 2.0 pellet groups per plot was exceeded from 1985 through 1988 on Shelter Island, but was not met in 1989 and 1990 (Table 1).

Pellet group counts on Douglas Island averaged 1.51 groups per plot in the most recent 5-year period (Table 1). The 1989 count average of 1.31 was slightly above the 1988 figure of 1.21 but still well below the 5-year mean. No count was conducted in 1990 because of inclement weather which prohibited access to study transects.

Pellet counts for Shelter Island in 1990 increased 13% over 1989, but still were considerably lower than the 1985-1988 high values (mean= 2.96). Reasons for the smaller count on Shelter Island in 1989 and 1990 remain unknown. Pellet group counts on the islands of Subunit 1C do not relate to mainland deer densities.

Season and Bag Limits.

Subunit 1C	1 Aug - 31 Dec	4 deer; antlerless deer may be taken only from Sept. 15-Dec. 31.

Harvest

Mortality

Hunter/Trapper Harvest. Based on data gathered from the annual deer hunter survey, 489 deer were killed in Subunit 1C in 1989 (Table 2). This level of take is 2% above the 5-year average of 478 deer. Forty-five percent of the 1989 harvest were does, highest of the 5-year period, and 11% above the average doe take for that period.

Hunter Residency and Success. Most successful (90%) and unsuccessful (94%) hunters were residents of Subunit 1C (Table 3). No nonresidents were represented in the hunter survey as hunting in this unit. In 1989 there was an average of 1.8 deer taken per hunter,

0.5 deer taken per hunter-day, 3.2 hunter-days expended per deer, and 3.4 days spent in the field per hunter (Table 4). The hunter success rate (# deer/hunter) was identical to 1988, although the effort (# hunter days/deer) increased 23%. The number of deer per hunter and deer per hunter day equalled the current 5-year averages, and the number days afield per hunter was close to the 5-year mean of 3.3.

Transport Methods. Boats are the predominant transportation mode in Subunit 1C. Hunters reported using boats for 54% of their hunts. Highway vehicles were used second most (24%) and 21% of the hunts were made via foot only. This possibly reflects the substantial number of hunters in this subunit whose residences are adjacent to hunting areas.

CONCLUSIONS AND RECOMMENDATIONS

Pellet counts on Douglas Island in 1989 increased slightly from 1988 and counts conducted on Shelter Island in 1990 suggest a moderate increase in deer numbers. However, as reported in 1988, there are indications of an overall reduction in deer on Douglas, Shelter and Lincoln islands.

Hunter survey data indicate slightly declining success. The percent of females in the harvest increased dramatically in 1989. A majority of these does (72%) came from Douglas Island, suggesting that low pellet-group counts on Shelter Island were not caused by a high doe harvest there. Estimates of deer densities on Douglas Island lead us to believe that the kill of does on that island in 1989 was not excessive.

Our current population objective of a mean pellet group density of 2.0 pellet groups per plot is not being met. Reductions in both season and bag limit should be considered if downward trends in pellet group densities and success per unit effort for all hunters continue. Transect counts on Douglas Island should be conducted in 1991.

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Table 1. Subunit 1C. Deer population trends as indicated by pellet group surveys, 1984-90.

Year	Mean pellet groups/plot	Number of plots	95 percent Confidence Interval
		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	
1990	1.60	300	
Sullivan Island VCU 94			
1990	1.40	250	

Table 2. Subunit 1C. Annual harvest, 1985-89.

Year	M	F	Estimated Total
1985	329	197	526
1986	296	138	434
1987	347	149	496
1988	325	118	443
1989	271	218	489

Data from expanded results of hunter surveys.

Table 3. Subunit 1C. Hunter residency and success, 1985-1989.

	Successful				Unsuccessful			
Year	Local Res.	Nonlocal Res.	Nonres.	Total	Local Res.	Nonlocal Res.	Nonres.	Total
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
1989	247	26	0	273	624	43	0	667

Table 4. Subunit 1C. Average statistics for successful hunters, 1985-1989.

Year	No. deer/ hunter	No. deer/ hunter day	No. hunter days/deer	No. days/ hunter
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
1989	1.8	0.5	3.2	3.4

LOCATION

Game Management Unit: 4 (5,820 mi^2).

Geographical Description: Admiralty, Baranof, Chichagof, and adjacent islands.

BACKGROUND

Deer population peaks and declines have been attributed to winter weather. Persisting deep snow conditions cause deer mortality (Merriam 1970, Olson 1979). Most winters in GMU 4 were mild from the mid–1970's through 1987, allowing excellent overwinter survival of deer. During the winters of 1988 and 1989, persistent snow caused significant deer mortality.

In other game management units (GMUs 1, 2, and 3) in Southeast wolf (*Canis lupus*) predation has contributed to population depression (Merriam 1966, Smith et al. 1986), but wolves were unreported in GMU 4 until recently (D. Johnson pers. comm.). Although brown bears (*Ursus arctos*) are numerous, deer predation by bears is probably not significant.

MANAGEMENT DIRECTION

Management Objectives

- Maintain a population density capable of sustaining an average hunter kill of at least 1.5 deer.
- Maintain a population capable of providing a minimum success rate of 1 deer killed per 4 days hunting.
- 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 spring 1990. Methodology is described 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 and Clark 1990). Hunters were asked to indicate hunting locations by harvest area (Figures 1–3).

Mortality transects 1 mile in length were examined by 2–person crews to determine the extent of deer mortality. One observer searched for signs of dead deer at the high tide line, while the other surveyed the area just inside the timber fringe. Observers recorded sex, age, and bone marrow condition of winter–killed deer when possible.

RESULTS AND DISCUSSION

Population Status and Trend

A population trend for the 5-year period is not evident. Pellet group surveys indicated an increased population in areas sampled, but do not reflect winter losses in 1989-90. Winter conditions vary significantly throughout the Unit, and some local populations are increasing while others are declining.

Population Size:

Deer pellet–group (pg) surveys were conducted on Admiralty, Baranof, Chichagof, and Kruzof Islands in spring 1990 (Table 1). The single Chichagof Island transect was on Finger Mountain, which showed 3.36 pg/plot.

Admiralty Island transect averages ranged from 1.40 to 2.19 pg/plot.

Baranof Island transects ranged from 1.87 pg/plot in the Kelp Bay Basin to 3.03 pg/plot in nearby Portage Arm. This indicates a wintering population of 80 to 130 deer/section on the sampled area.

Kruzof Island transects showed an average of 2.03 pg/plot in the Sea Lion Cove area for a winter estimate of 87 deer per section.

Population Composition:

The sex composition of the legal kill was estimated from deer harvest questionnaires (Thomas and Clark 1990). Male deer accounted for 69% of the harvest, the lowest percentage of males in the harvest since 1985 (Table 2).

Mortality

Harvest:

Season and Bag Limit.

Unit 4, that portion of Chichagof Island east of Port Frederick and north of	1 August - 1 January

Tenakee Inlet including all drainages
into Tenakee Inlet and Port Frederick

Subsistence Hunters (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 deer hunters for Unit 4 (Alaska Game Regulations Number 28): 6 deer, however antlerless deer may be taken only from 15 September – 31 January.

Resident and Non–Resident Hunters: 3 deer; however antlerless deer may be taken only from 15 September-31 January.

Remainder of Unit 4:

Six deer, however antlerless deer may be, taken only from 15 September–31 January. 1 August – 31 January

Board of Game 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) 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 GMU 4 remained at 6 deer. The regulations were continued in 1989-90. The unitwide season closure of 31 January included both subsistence and regular hunters in 1988–89 and 1989-90.

Hunter Harvest: A questionnaire was mailed to a sample of deer harvest ticket holders to obtain harvest information (Thomas and Clark 1990). The hunter harvest survey indicated that hunter numbers declined by 13%, while deer harvest declined 18% (Table 2). A harvest total of 9,800 deer was estimated compared to 12,000 in 1989.

Hunter reports indicated a take of 6,800 bucks (69%) as compared to 8,900 bucks (75%) in 1989. I calculated crippling loss, unreported kills, and illegal kills at 10% of the reported harvest (Table 2). I estimate the total hunter-related mortality at 10,800 deer in 1989–90 compared to the 1988–89 mortality of 13,100 deer.

The harvest in Unit 4 increased steadily until 1987–88 and has declined since then.

Hunter Residency and Success: A total of 1,925 hunters resided in Unit 4, while 2,660 resident hunters lived outside the unit. There were 79 nonresidents who hunted in Unit 4. The overall success rate was 64%. Eighty-three percent of the unit residents were successful, and 53% of the nonlocal residents succeeded in killing at least 1 deer. Nonresidents had a 47% success rate.

Harvest Chronology: For the third consecutive year, the Unit 4 season extended into January. The most effort was expended in November, when 47% of the harvest occurred. Fourteen percent of the harvest took place in January, and many deer were killed on the beach.

Transport: Boats were used in 69% of the hunting trips by successful hunters, 9% used airplanes, 11% walked from a community, 8% used highway vehicles, and 3% used off–road vehicles (including 3– or 4–wheelers and snow machines). The 1989 percentages are compared in Table 5.

The use of motorized land vehicles along the road system on the Hoonah Peninsula undoubtedly helped increase the deer harvest in that area (Young 1988). The convenient Alaska Marine Highway schedule and the extensive logging road system attract many hunters from the Juneau area.

Off-road vehicles are being used by deer hunters in many locations in the unit where logging roads exist. Areas which receive significant use include Wildlife Analysis Areas 3001, 3002, 3104, and 3308 (Figure 1).

Other Mortality:

The winter of 1989-90, like the preceding winter, was colder than normal, and significant 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.

Deer mortality transects were surveyed in spring 1990 at Port Krestof, Nakwasina Passage, Peril Strait, and Sitkoh Bay. Beach mortality surveys provide useful information about the relative severity of winter mortality. Not all beach carcasses can be 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.

Seven 1-mile mortality transects were examined to determine extent of deer mortality. Mortality was lower on all but one transect. In Nakwasina Sound on eastern Baranof Island, mortality on 2 transects was 3.0 dead deer/mile as compared to 6.5 dead deer/mile in 1989. In Fish Bay and Peril Strait transects (near Bear Bay) on Baranof Island, the 1990 count was 4.0 deer/mile compared to 6.7 deer/mile in 1989. The Port Krestof transect on Kruzof Island dropped from 3.0 dead deer/mile to 0 in 1990, but at Sitkoh Bay on Chichagof Island a 1-mile transect increased from 11.0 dead deer in 1989 to 18.0 deer/mile in 1990.

The average mortality for the 7 miles surveyed in 1990 was 5.1 dead deer/mile of examined coastline. The same transects showed a figure of 6.7 dead deer/mile in 1989. Beach surveys indicate a portion of the deer loss. A study of telemetered deer at Hawk Inlet found that only 17% of deer winter deaths occurred within 100 m of the beach or

below 20 m elevation (Schoen and Kirchhoff 1983, Schoen et al. 1981). Many deer in that study were captured in the alpine and may have had behavior characteristics different from deer found at lower elevations.

CONCLUSIONS AND RECOMMENDATIONS

Objectives for Unit 4 are to: 1) maintain a population density capable of sustaining an average hunter kill of at least 1.5 deer per hunter, a hunting success of no more than 4 days per deer, and 2) maintain the male deer component of the harvest at a minimum of 60%. These objectives were achieved during the 1989–90 season. The average kill was 2.0 deer per hunter with a hunting effort of 2.3 days per deer. Males made up 69% of the harvest. The number of deer killed decreased by 18% (Table 2), while the number of hunters decreased 13% from 1988-89.

Extrapolation of reports from Unit 4 deer hunters indicated an estimated harvest of 9,800 deer in the 1989–90 season (Thomas and Clark 1990). Sixty-five percent of the hunters were successful. The winter was moderately cold, but the 6–month season allowed hunters to select for optimum weather conditions.

Thousands of deer died in GMU 4 during winter 1989-90, and hunting pressure was high near major communities. Shrubs were apparently browsed extensively during the winter in the Sitka area, indicating that the range may be deteriorating from continued heavy use.

I expect deer populations to decline if the current trend toward moderate winters continues. Fawn recruitment into the herd is declining. Fifty-three percent of dead deer on 1990 transects were fawns. The cohorts of 1988 and 1989 will not contribute as much to herd numbers when their maximum breeding potential is reached. This should eventually cause a decline in the herd.

Hunters complained before snow fall that deer were scarce. When populations are low, deer use more desirable habitat until it snows. Since much of the hunting takes place along the beach, lower populations mean hunters will see fewer deer. When populations are high, deer use the lower elevations to a greater extent, being pushed into the heavily hunted habitat by population pressure. Hamlin and Mackie (1989) observed this along roads and ridgetops in a Montana mule deer population.

Experience has shown that the Department loses credibility with the public when deer populations drop sharply and hunter success declines. As wildlife managers, we are expected to manipulate seasons and bag limits to prevent declines.

Managing conservatively demonstrates ADF&G's concern for avoiding harvest-related declines. The failure to reduce bag limits and shorten seasons in the early 1970s caused the public to blame overharvest for a deer decline that was clearly a result of natural

factors. The success of wildlife management depends in part on not repeating past failures (Giles 1971). I recommend that the bag limit and season be reduced slightly as a signal to the public that the ADF&G recognizes the influence of colder winters on deer populations and wants to reduce the harvest.

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Table 1. Unit 4 deer population trends as indicated by pellet group surveys.

Area	Regulatory year	Mean pellet groups/plot	Number of plots
125 — Barlow Cove	1981-82	1.07	2,567
	1983-84	1.69	347
	1984-85	1.55	347
	1989-90	1.40	270
247 — Finger Mountain	1985-86	3.23	279
Chichagof Island	1986-87	2.88	277
	1987-88	3.11	236
	1988-89	2.99	305
	1989-90	3.36	225
128 — Hawk Inlet	1984-85	1.69	270
	1985-86	1.92	286
	1986-87	2.54	278
	1988-89	1.82	334
	1989-90	2.19	250
298 — Kelp Bay, Middle Arm[a]	1989-90	2.68	306
315 — Kelp Bay, The Basin[a]	1989-90	1.87	151
300 — Nakwasina	1984-85	3.65	218
	1985-86	3.38	205
	1986-87	2.31	195
	1988-89	2.32	244
	1989-90	2.99	255
296 - Portage Arm[a]	1989-90	3.03	214
182 — Pybus Bay	1984-85	1.86	269
	1985-86	2.00	235
	1986-87	2.03	242
	1988-89	2.00	156
	1989-90	1.72	221
305 Sea Lion Cove	1984-85	2.57	292
	1985-86	2.87	235
	1986-87	3.31	226
	1988-89	1.75	303
	1989-90	2.03	227

[a] New transect.

Table 2. Unit 4 deer harvest, 1985–89.

Regulatory year	Estimated legal harvest[a]				Estimated illegal harvest[b]	Total[c]
	M (%)	F (%)	Unk.	Total		
1985-86	7,000 (67)	3,400 (33)	-	10,400	1,140	11,600
1986-87	7,600 (74)	2,700 (26)	-	10,300	1,130	11,000
1987-88	10,300 (72)	4,100 (28)	-	14,400	1,440	16,000
1988-89	8,900 (74)	3,100 (26)	-	12,000	1,200	13,200
1989-90	6,800 (69)	3,000 (31)	-	9,800	980	10,800

[a] From mail questionnaire survey.
[b] Includes crippling loss estimate.
[c] Rounded to nearest 100.

Table 3. Unit 4 deer hunter residency and success, 1985–1989.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	nonresident	Total	Local[a] resident	Nonlocal resident	Nonresident	Total	
1985-86	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1986-87	1,773	2,332	4	4,099	703	971	5	1,679	5,778
1987-88	1,934	2,369	23	4,326	551	982	77	1,610	5,936
1988-89	1,851	1,780	24	3,865	394	1,161	28	1,583	5,448
1989-90	1,584	1,449	37	3,070	341	1,211	42	1,694	4,764

[a] Residents of GMU 4.

Table 4. Unit 4 deer harvest chronology by time period, 1987-1989[a].

Regulatory year	Harvest periods						
	August (%)	September (%)	October (%)	November (%)	December (%)	January (%)	n
1987-88	1,290 (9)	1,089 (8)	2,522 (18)	5,374 (38)	2,966 (21)	1,089 (8)	14,330
1988-89	954 (8)	1,193 (10)	2,028 (17)	4,533 (38)	2,028 (17)	1,193 (10)	11,929
1989-90	529 (5)	571 (6)	1,171 (12)	4,573 (47)	1,523 (16)	1,402 (14)	9,769

[a] Data not available for prior years.

Table 5. Unit 4 deer hunting trips percent by transport method, 1988—1989.[a]

Regulatory year	Percent of harvest								
	Airplane	Foot	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1988-89	9	9	71	--	--	3[b]	8	--	--
1989-90	8.6[c]	11.2	69.0	1.6	0.2	0.8	7.7	0.9	5,831

[a] Data not available for prior years.
[b] Includes ORV, 3— or 4—wheelers, and snowmachine.
[c] Percentages to the nearest tenth are included to display subtle differences in motorized vehicle use.

LOCATION

Game Management Unit: 6 (10,140 mi^2)

Geographical Description: Prince William Sound and North Gulf Coast

BACKGROUND

Sitka black-tailed deer are distributed in all subunits of GMU 6. Their highest densities occur primarily on the islands of Prince William Sound (PWS) in Subunit 6D. Prominent mainland peninsulas in PWS hold lower densities, presumably because of greater winter snow accumulation and canid predator abundance. Deer density on the mainland diminishes rapidly as distance from the PWS waters increases. Deer are rarely found east of the Bering River in Subunit 6A (Griese 1989).

Deer were introduced to Unit 6 by the Cordova Chamber of Commerce in 1916. The deer quickly exploited virgin habitat, dispersing to most islands in PWS as well as the adjacent mainland. Reynolds (1979) reported major winter die-offs in the late 1940s, mid-1950s, late 1960s and the early 1970s. He identified snow depth and duration as the primary factors limiting deer abundance and distribution. During the last decade, deer numbers peaked in 1986 and 1987, then began to decline because of inclement winter and spring weather.

The deer harvest in Unit 6 reached historically high levels in the last 5 years. Reynolds (1979) reported that before 1978, annual deer harvests in Unit 6 ranged from 500 to 1,500 animals. Griese and Miller (1986) identified a 14% average annual increase in deer harvest between 1980 and 1984 with the harvest reaching 2,200 animals by 1984. The estimated legal harvest peaked in excess of 3,000 deer in 1986 (Griese 1988) and declined to 2,800 in both 1987 and 1988 (Griese 1989, Griese 1990).

The susceptibility of deer to deep snow conditions has been clearly identified as reason to concentrate management effort on preserving or improving winter habitat. The greatest future impact to deer abundance in Unit 6 would be the loss of winter habitat to clear-cut timber harvesting methods on Montague Island (Griese 1989).

MANAGEMENT DIRECTION

Management Goals

While management goals established in 1976 called for providing greatest opportunity to participate in hunting deer, future federal or state determinations on how significantly deer contribute to meeting subsistence demands, may limit opportunity for some hunters.

Management Objectives

Maintain a deer population to sustain an annual harvest of 1,500 deer, with a harvest of 60% males and a minimum hunter success rate of 50%.

METHODS

Deer hunter questionnaires[1] were mailed to most deer hunters issued 1989 harvest tickets by southcentral Alaska vendors. Questionnaires were mailed to 9,903 potential deer hunters. Two reminder letters with questionnaires were sent to non-responding individuals. Results of the 1987 and 1989 surveys did not compare precisely because of differences in the number of reminder letters and in the calculation methods used to estimate total harvest.

In addition to the mail survey, a 10% random sample of Cordova residents holding deer harvest tickets was interviewed by telephone or in person to assess participation, success, chronology and location of harvest. These data were collected to increase reliability of estimates made in years of no mail survey.

An aerial composition count of deer on 3 major island shorelines was conducted during March in a Piper Super Cub to assess overwinter survival of fawns. Deer were classified as adults, fawns (short yearlings) or unknown age.

Deer pellet-group surveys described by Kirchhoff and Pitcher (1988) were established to better monitor population trend and assist in land management decisions. Four new uniform coding units (UCU) and 2 previously sampled UCUs were each sampled with 130-266 $20m^2$ plots. Data were expressed as mean number of pellet-groups counted per plot (pgp).

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[1] Alaska Deer Hunter Survey 1989-90. On file with Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage Regional Office. 6pp.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size:

The Unit 6 pre-parturition deer population apparently declined between 1988 and 1990. This decline followed a peak density between 1986 and 1987. The extent of the decline was difficult to estimate. The estimated number of deer killed by Cordova deer hunters, collected in most years since 1965, indicated a decline in deer availability after 1987 (Figure 1). The decline may have resulted from poor fawn survival because of inclement spring and summer weather (Griese 1989), 2 consecutive deep snow winters, and moderate hunting pressure.

Deer pellet-group surveys were conducted between 1988 and 1990 (Table 1). Overall, pgp densities suggested moderate (Kirchhoff and Pitcher 1988) deer densities on winter range in winter. UCU 1903 (Port Etches on Hinchinbrook Island) was the exception; it produced a relatively high pgp density.

March composition counts provided additional evidence that deer numbers have declined (Table 2). Aerial surveys in 1989 and 1990 were conducted under similar weather conditions and snow depth. The number of deer observed per linear mile of shoreline in 1989 was higher than the density observed in 1990. Deer populations may have declined approximately 10-20%.

I estimated the 1990 pre-parturition population at 6,500-11,000 based on previous population estimates and an apparent declining trend. In 1988 the overwintering deer population was estimated at 8,000-12,000 deer (Griese 1989). The 1989 pre-parturition estimate was also 6,500-11,000 (Griese 1990). The deep snow winter of 1989-90 presumably resulted in only a slight deer population reduction in Unit 6.

Population Composition:

The March shoreline deer composition survey did not indicate fawn survival for winter 1989-90 (Table 2). The observer was unable to identify age classes and grouped all deer as adults or unidentified age.

Mortality

Harvest:

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.

Board of Game Actions and Emergency Orders. No actions were taken by the Board of Game concerning deer in Unit 6. The last Board action on deer hunting seasons and bag limits was in 1982. The bag limit was increased from 4 to 5 to allow hunters to take more of an increasing deer surplus.

Hunter Harvest. The number of deer killed by hunters in Unit 6 apparently increased through 1987 and declined thereafter. Results of mail questionnaires (Table 3) and Cordova telephone deer hunter surveys (Figure 1) suggested a peak harvest in 1987.

Response to the questionnaire was low again in 1989 (Appendix A). The 1989 deer harvest, estimated from mail questionnaire surveys, was 1,952 animals (Table 3). Deer harvest peaked in 1987 with approximately 3,000 deer harvested. As noted previously, these surveys were not precisely comparable because of differences in sampling and calculations. A projection of the Cordova harvest generated an estimated harvest of 1,390 to 1,780 deer in 1989. In past mail questionnaires, Cordova residents harvested 32-41% of the Unit 6 harvest. The telephone survey of Cordova deer harvest ticket holders produced an estimated harvest of 570 deer by all residents of Cordova (Figure 1).

Hunters harvested 61% males (Table 3). Male composition of the harvest was low over the past 9 years. Harvest composition may represent a decline in the availability of males because of previous hard winters. It may also have been influenced by redistribution of hunters because of real or perceived impacts of the *Exxon Valdez* oil spill, which may have caused crowding in remaining accessible hunt areas. Finally, the termination of the annual "big buck" contest in Cordova probably reduced selectivity of a few Cordova hunters.

Naked and Knight Islands and southwestern PWS accounted for approximately 17% of the deer harvested in Unit 6 between 1980 and 1987. These areas were severely affected by the *Exxon Valdez* oil spill in March 1989, and there was a significant decline ($T = -9.75$, $P<0.01$) in the proportion (8%) of the deer harvest taken from these areas in 1989.

Preliminary analysis suggested that the shift in harvest was attributable to hunters avoiding oil spill affected areas rather than lack of deer. A comparison of deer killed/day between 1987 (0.21) and 1989 (0.24) suggested a similar rate of kill. I concluded that a shift in hunter effort away from the oil spill affected areas caused the decline in the proportion of harvest.

Hunter Residency and Success. An estimated 1,447 individuals hunted for deer in Unit 6 in fall 1989. This represented a 28% decline in participation from 1987 (Table 5). The real or perceived impacts of the *Exxon Valdez* oil spill combined with word of reduced densities from winter starvation were probably responsible for hunters deciding not to hunt deer in Unit 6.

Deer hunters in Unit 6 reported an overall hunting success rate of 54% (Table 5). Success rate, as determined from mail questionnaires, changed little from 1987, but declined noticeably from 1983 and 1984. Hunting success by local residents declined substantially, falling from 73% in 1987 to 58% in 1989.

Harvest Chronology. Deer hunters killed 48% of their deer in November, capitalizing on rutting behavior, favorable transportation weather and available snow for tracking. The proportion of deer killed during November 1989 was higher than in previous years (Table 6).

Fifty-four percent of the deer harvested in October and December were males. This was the lowest for all months (Table 6). This pattern was consistent for questionnaire results between 1980 and 1989.

Transport Methods. Unit 6 deer hunters relied on boats (56%) and aircraft (40%) to reach their hunt areas in 1989, which represents a substantial increase from 29% of hunters using aircraft in 1987 (Griese 1989). Deer hunters who were transported by aircraft killed 54% of the total harvest (Table 7). Again, the fear of potential oil contamination apparently influenced hunters' decisions as to where they hunted. Hunters who may have normally taken boats out of Whittier, Valdez or Seward to hunt on the western side of PWS, either decided not to hunt, or decided to fly to the larger islands out of the oil spill's influence. Many deer hunters might have chosen to fly to Montague Island because of special rates offered by air taxi operators.

Other Mortality:

Observations during pellet group surveys and reports from hunters suggested that winter mortality affected a moderate proportion of short yearlings. Older deer did not appear to be affected. Distribution and numbers of winter-killed deer were not available. However, hunter reports of deer carcasses on the southeast side of Montague Island suggested that mortality occurred in areas of high to moderate wintering densities.

Snow accumulations exceeding 15 inches at sea level began in December and lasted 41 days in the eastern side of PWS (Cordova airport). On the west (Main Bay) and north (Valdez) sides of PWS, snow accumulation reached 15 inches in late October and exceeded that depth through April. Snow accumulations exceeding 30 inches, as recorded at Cordova airport, lasted for 5 days. Valdez and Main Bay experienced 2 and 28 days, respectively, of snow accumulation exceeding 100 inches (NOAA Climatological Data, Vol. 75 & 76).

Canids apparently were at moderate densities on the mainland range of deer and appeared to lessen deer abundance. Wolves seemed to be increasing on the northern, eastern and southwestern mainland shores of PWS. Coyotes appeared to be locally abundant. Deep snow accumulations exacerbated the impact of canid predation on mainland deer.

Habitat

Assessment:

Observations during deer pellet group surveys indicated that *Vaccinium* was moderately to heavily browsed in winter range. Concentrations of deer in winter range during the previous 2 winters have stressed the range. Continued heavy use of winter range may result in short term damage to the range and subsequent lower winter capacities.

CONCLUSIONS AND RECOMMENDATIONS

Population objectives as indicated by measurements of hunter success were apparently met. Deer hunters killed between 1,800 and 2,050 deer in Unit 6. While the male portion of the harvest reached objectives, comparability to previous years became unreliable because the oil spill redistributed normal hunter effort and termination of the Cordova big buck contest may have reduced selectivity by some hunters.

Population objectives measure the relationship between the deer population and the hunter in terms of hunter success and ability to select desirable animals. I assumed that changes in the deer population can be identified through changes in the relationship but only if the same populations are involved. Because the oil spill apparently affected the number and distribution of hunters, the hunter population was changed artificially. The extent of this change therefore reduced indicator reliability.

The deer population in Unit 6 apparently declined for the report period. The deep snow winter of 1989-90 may have caused the population to fall below management objectives. Moderately-deep snow conditions in December 1990 forced deer on to beaches, increasing hunter access.

More consistent harvest estimation methods are essential as is an annual deer questionnaire. Telephone surveys of Cordova deer hunters provide an early indication of hunter success and can be useful to evaluate the need for spring regulation changes and should be continued for the next few years.

Deer pellet-group surveys and identification of winter range should be the highest management priority. The deer pellet-group survey project should be evaluated in 1993. Spring beach composition surveys should be evaluated for accuracy. Identifying and reserving essential winter range in timbered lowlands on major deer producing islands should be the goal of habitat management efforts.

The population objective should be reworded as follows: To maintain a deer population that will sustain a 3-year-average annual minimum harvest of 1,500 deer, with a minimum

composition of 60% males and a minimum hunter success rate of 50%. The current objective does not allow for a harvest in excess of population indicators.

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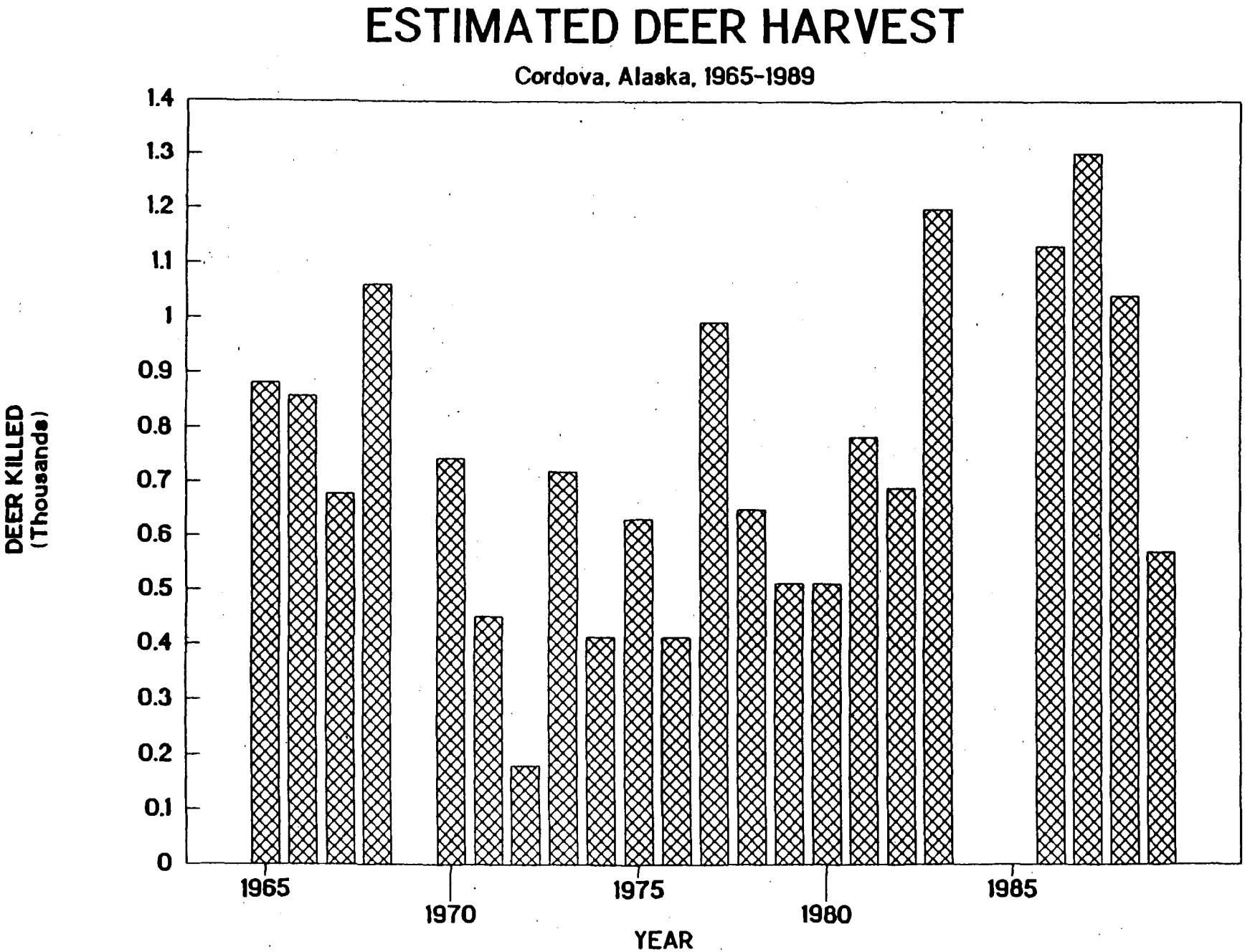

Figure 1. Estimated Deer Harvest, Cordova, Alaska, 1965-1989.

Table 1. Unit 6 deer population trends as indicated by pellet group surveys, 1988-90.[a]

Area	Regulatory year	UCUs	Mean pellet groups/plot	Number of plots
Montague Island	1987-88	1802,1804,1807,1810	1.0[b]	782
	1988-89	1811	0.9	219
	1989-90	1803,1804,1808,1812	1.2[b]	930
Hinchinbrook Island	1987-88	1902,1905	1.7	412
	1988-89	-	-	-
	1989-90	1903	2.7	137
Hawkins Island	1987-88	2001,2003	1.1[c]	299
	1988-89	-	-	-
	1989-90	2001	1.2[c]	130
Western PWS Is.[d]	1987-88	-	-	-
	1988-89	1402,1503,1701,1703	1.3	602
	1989-90	-	-	-

[a] Data were not collected prior to May 1988.
[b] Comparable data in UCU 1804: 1987/88 = 1.3pgp; 1989/90 = 1.2pgp.
[c] Comparable data in UCU 2001: 1987/88 = 1.3pgp; 1989/90 = 1.2pgp.
[d] Includes Elrington, Knight, Naked and Storey Islands.

Table 2. Unit 6 deer spring composition trends as indicated by aerial beach surveys 1988-90[a]

Area	Regulatory year	Total deer observed	Short yearlings (%)[b]	Deer/mile
Montague Island	1987-88	178	33 (23)	1.0
	1988-89	1013	106 (23)	5.6
	1989-90	884	--[c]	4.8
Hinchinbrook Island	1987-88	19	3 (19)	0.3
	1988-89	341	66 (22)	4.7
	1989-90	177	--[c]	2.7
Hawkins Island	1987-88	20	6 (60)	0.4
	1988-89	19	2 (13)	0.4
	1989-90	4	--[c]	0.1
Total	1987-88	217	42 (25)	0.7
	1988-89	1373	174 (22)	4.5
	1989-90	1065	--[c]	3.6

[a] Data were not collected before March 1988.
[b] % of deer identified to age only.
[c] Observer unable to identify short yearlings.

Table 3. Unit 6 deer harvest, 1980-89.

Regulatory year	Estimated Legal Harvest M (%)	F (%)	Unk.	Total	(90% CI)	Estimated illegal harvest	Estimated total
1980-81	833 (64)	477 (36)	0	1310	(--[b])	200[c]	1410-1610
1983-84	1215 (62)	744 (38)	0	1959	(±122)	120[d]	1960-2200
1984-85	1407 (66)	714 (34)	79	2198	(±161)	150[d]	2190-2510
1987-88	1792 (67)	889 (33)	147	2828	(±286)	150[d]	2690-3260
1989-90	1113 (61)	701 (39)	138	1952	(±117)	120[d]	1956-2189

[a] From mail questionnaire survey.
[b] Data files not available - estimate 90% CI to be ±100.
[c] Estimated illegal take, primarily by local residents exceeding 4 deer bag limit or take during closed season.
[d] Estimated illegal take, primarily by local residents exceeding 5 deer bag limit or take during closed season.

Table 4. Unit 6 deer harvest distribution and estimated harvest, 1980-1989.[a]

Area	Estimated deer kill (%)[a]				
	1980	1983	1984	1987	1989
Montague Island	590(45)	942(48)	1,085(49)	1,039(37)	971(50)
Hinchinbrook Island	170(13)	243(12)	365(17)	577(20)	375(19)
Hawkins Island	249(19)	262(13)	248(11)	475(17)	286(15)
Knight Island	79(06)	125(06)	88(04)	130(05)	25(01)
Naked Island	52(04)	122(06)	152(07)	148(05)	68(03)
Southwestern PWS	52(04)	157(08)	97(04)	207(07)	67(03)
Eastern PWS	26(02)	44(02)	62(03)	69(03)	38(02)
Green Island	52(04)	48(02)	64(03)	35(01)	59(03)
Northern PWS	1(<1)	16(01)	13(01)	77(03)	19(01)
Unknown	39(03)	--[b]	13(01)	71(03)	44(02)
Total	1,310(100)	1,959(100)	2,198(100)	2,828(100)	1,952(100)

[a] % derived from locations of reported kills from mail questionnaires; estimates represent proportional allocation of total harvest estimate.
[b] 1983 unknown location kills were proportionally distributed among known locations.

Table 5. Unit 6 deer hunter residency and success, 1980-1989.[a]

	Reported successful				Reported unsuccessful				
Regulatory year	Local[b] resident	Nonlocal resident	Non-resident	Total(%)	Local[b] resident	Nonlocal resident	Non-resident	Total(%)	Estimated total hunters
1980-81	136	240	4	387 (43)	169	332	7	513 (57)	1,250
1983-84	--[c]	--[c]	--[d]	260 (80)	--[c]	--[c]	--[d]	63 (20)	1,020
1984-85	118	199	--[d]	318 (58)	59	167	--[d]	227 (42)	1,600
1987-88	127	187	3	317 (55)	47	202	7	256 (45)	2,020
1989-90	127	266	16	409 (54)	91	238	22	351 (46)	1,447

[a] As determined from mail questionnaire; except for 1980 and 1987, excludes Southeastern Alaska.
[b] Local = Unit 6 resident.
[c] Data collected but no longer available.
[d] Nonresidents not sampled.

Table 6. Unit 6 deer harvest chronology percent and males percent by month, 1980-89.[a]

Regulatory	August		September		October		November		December		Total		
year	%	%M[a]	%	%M[a]	%	%M[a]	%	%M[a]	%	%M[a]	%	%M[a]	n
1980-81	5	78	8	48	21	63	32	67	34	63	100	62	910
1983-84	4	96	9	61	25	53	40	64	22	59	100	61	587
1984-85	4	--	10	--	32	--	37	--	17	--	100	66	697
1987-88	8	94	7	64	22	60	36	71	27	61	100	67	666
1989-90	5	95	9	64	22	54	48	65	15	54	99	61	830
Mean	5	91	9	59	24	58	39	67	23	59	100	63	738

[a] % males of known sex deer.

Table 7. Unit 6 deer harvest percent by transport method, 1980-89.[a]

Regulatory	Percent of Harvest				
year	Airplane	Boat	Highway veh.	ORV	Other
1980-81	--	--	--	--	--
1983-84	--	--	--	--	--
1984-85	30	68	<1	1	1
1987-88	31	66	<1	0	2
1989-90	54	45	<1	<1	0
Mean	38	60	<1	1	1

[a] As determined from mail questionnaires.

Appendix A. Unit 6 deer hunter mail questionnaire survey results, 1980-89.

	1980	1983	1984	1987	1989
No. harvest ticket holders sampled	16,756	10,169	[a] 11,726	[a] 10,803	[a] 9,989 [a]
No. questionnaires distributed	16,756	6,000	6,000	6,579	9,903
% deliverable questionnaires returned	72	63	77	53	54
No. mailings	3	1	1	2	3
No. respondents hunting Unit 6	899	323	545	583	762
% successful hunters	43	80	58	55	54
No. reported days hunted	4,455	1,692	2,542	2,864	3,753
No. reported deer killed	942	620	746	811	1,035
% male deer of known sex deer	62	61	66	67	61
% deer killed by Cordova residents	37	--	34	41	32
Mean:					
Hunting days/hunter	5.0	5.2	4.8	4.9	3.8
Hunting days/deer	4.7	2.7	3.4	3.5	3.6
Deer killed/hunter	1.0	1.9	1.4	1.4	1.4
Deer killed/successful hunter	2.2	2.4	2.4	2.6	2.5
% successful hunters taking:					
1 deer	48.5	34.6	38.4	33.2	30.2
2 deer	26.2	26.2	21.7	24.8	25.4
3 deer	13.5	17.7	18.2	14.4	19.3
4 deer	11.3	10.8	10.4	9.7	12.0
5 or more deer[b]	0.6	10.8	11.3	17.9	13.2

[a] Sample included "railbelt" harvest ticket holders only.
[b] Legal bag limit increased from 4 to 5 deer in 1982.

LOCATION

Game Management Unit: 8 (5,097 mi^2)

Geographical Description: Kodiak and Adjacent Islands

BACKGROUND

The Sitka black-tailed deer population originated from 4 transplants, totaling 30 deer, made to Long Island and Kodiak Island between 1924 and 1934 (Burris and McKnight 1973). By the early 1940s deer occupied northeastern Kodiak Island, and the first hunt was held in 1953. The deer population continued to expand into unoccupied habitat, and by the late 1960s deer were distributed throughout Kodiak, Afognak and adjacent islands (Smith 1979). The population suffered high mortality during the 1968-69 and 1970-71 winters, which resulted in declines in harvest and hunter success (Alexander 1970, 1973). An increasing population trend occurred from 1972 to the mid-1980s, when the population probably reached peak numbers, exceeding 100,000 animals (Smith 1989). A declining trend began during the 1987-88 winter, the first of 3 consecutive winters with high mortality in fawns and older bucks.

Hunter harvest surveys were used to assess deer population trends in the past decade. Deer hunters were surveyed by mail questionnaires for the 1980-81, 1983-84, 1984-85, 1987-88 and 1989-90 hunting seasons. Field interviews and locally distributed questionnaires have supplemented the periodic mail surveys. Winter mortality was assessed by searching for, and examining, deer carcasses in selected coastal wintering areas. Aerial surveys assessed winter conditions and physical appearance of wintering deer.

Liberal seasons and bag limits were in effect the past 15 years. Season length ranged from 153 to 184 days, and the maximum annual bag limits ranged from 4 to 7 deer of either sex. The bag limit was increased from 3 to 4 deer in 1970-71, with an 1 August - 31 December season. The season was extended to 15 January in 1978-79, followed by an extension to 31 January in 1981-82. Bag limits of 5 and 7 deer were in effect in 1982-83. The most recent change in hunting regulations occurred in 1983 when the bag limit was reduced from 7 to 5 deer, and the season length was reduced from 184 to 160 days. That season has been in effect through this report period. A 1-deer bag limit has been in effect since 1961 for part of northeastern Kodiak Island accessible by road.

MANAGEMENT DIRECTION

Management Objectives

- Maintain a deer population that will sustain an annual harvest of 8,000 deer.

METHODS

Hunter interviews and mail questionnaires were used to assess trends in hunting effort and deer harvest, as well as to provide an index to deer population trends. Mail questionnaires were used to survey hunters for the 1987-88 and 1989-90 seasons. For the 1987 survey, questionnaires were mailed to 6,579 deer harvest ticket holders, and harvest data were extrapolated from 3,270 returned questionnaires (Smith 1989). In 1989, questionnaires were sent to 9,903 harvest ticket holders. Total harvest was extrapolated from the 4,986 returned questionnaires (R. Walker 1990 unpubl. memo). Results of 1987 and 1989 surveys did not compare precisely because of differences in the number of reminder letters sent and in the calculations used to estimate total harvest from the sample. Both mail surveys probably significantly overestimated the total harvest and the total number of hunters (R. Walker 1990 unpubl. memo).

Field interviews of hunters were conducted annually except in 1985-86. Most field interviews were done at the Kodiak National Wildlife Refuge by the U.S. Fish and Wildlife Service (USFWS) with participation by State personnel. Outfitters voluntarily submitted a few reports of deer hunting activity. Natural mortality was assessed by searching for deer carcasses in selected coastal deer winter ranges in spring 1988, 1989 and 1990. Occasional aerial reconnaissance flights and reports from the public provided additional observations on winter severity and deer mortality. A 1.7-hour aerial composition survey was flown in alpine habitat in the Terror Bay and Uganik Island area on 30 July 1990.

Several deer carcasses were collected and necropsied in 1989 and 1990 in a study to determine the effects of the *Exxon Valdez* oil spill on deer. Tissue samples were collected for hydrocarbon tests and histological studies; however, little data from these analyses has been released because of legal proceedings regarding liability for the *Exxon Valdez* oil spill.

In 1989 Jeff Selinger, a University of Alaska graduate student, began research on deer movements and habitat relationships, in cooperation with the Kodiak National Wildlife Refuge. The study is scheduled for completion in 1992.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size:

The deer population has been declining since 1988, the result of 3 successive moderately severe winters with significant deer mortality. When the deer population was at its peak in 1986-87, it was estimated at > 100,000 animals. Generally, colder winters with persistent snow have prevailed since winter 1987-88. No objective estimate of the magnitude of the current decline is possible, but hunters reported seeing fewer deer each year since the decline began.

Population Composition:

We counted 129 deer in alpine habitat on northwestern Kodiak and Uganik Islands during a 1.7-hour aerial survey in 1989. Composition of the 106 animals classified was: 20 (19%) antlered males; 34 (32%) single females; 21 (20%) females w/fawns; and 31 (29%) fawns. Ten (48%) females had twins and 11 (52%) females had single fawns. A ratio of 36 antlered males:100 adult females was recorded. Kirchhoff (1990) alluded to the difficulty of obtaining unbiased samples from deer composition surveys; however, summer aerial surveys in alpine habitat are the best means of observing large numbers of deer when they can be classified by age and sex. These surveys could be useful in interpreting harvest questionnaire data and winter mortality data.

Population composition has changed with the decline in abundance. Hunters consistently reported observing relatively low numbers of older, trophy-sized males, beginning with the 1988-89 season. The frequency of yearling deer observed was also relatively low. Mortality surveys support those observations, with a high incidence of fawns and older males among winter-killed deer. Adult does apparently survived relatively well, as hunters reported seeing numerous does and fawns.

Distribution and Movements:

A graduate study (J. Selinger) of seasonal movements and habitat use by deer in the Spiridon Bay area has been in progress since 1989. Twenty-five deer were captured and radio-collared, and aerial and ground telemetry are being used to monitor movements. Results of the study will be published as a master's thesis by the University of Alaska in 1992.

Mortality

Harvest:

Season and Bag Limits. 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 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 1 to 31 October. 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 15 September to 7 January.

Board of Game Actions and Emergency Orders. No regulatory changes were made during this report period.

Hunter Harvest. Results of 2 mail questionnaire surveys for this report period are summarized in Tables 1 and 2. Trends in hunting pressure and harvest are apparent from comparing results of the 5 mail questionnaire surveys done in the past decade (Table 3). Deer harvest and hunting effort peaked in the 1987-88 season, with nearly 6,000 hunters harvesting approximately. Those estimates are probably somewhat inflated, but the estimating methods were comparable. The deer harvest more than doubled and the number of hunters increased by nearly 40% between the 1980-81 season and the 1987-88 season.

A decline in harvest and in the number of hunters afield occurred in this 5-year report period. The winter of 1986-87 was the only recent winter with relatively light mortality. Abundant yearling deer were observed by hunters during the 1987-88 hunting season, confirming that survival was high the preceding winter (Smith 1989).

The *Exxon Valdez* oil spill may have factored into reducing the 1989 hunting effort. Some residents expressed concern about palatability and safety of eating deer exposed to crude oil which began washing onto Kodiak area beaches in early April, 1989. Field studies indicated some deer fed on visibly contaminated kelp but most deer had already dispersed to higher elevations when the oil arrived. Subsequent tasting of deer meat from several deer collected near contaminated beaches in late August and September 1989

indicated that palatability of deer meat was not affected. No reports were received by the area biologist of killed deer unfit for consumption.

Males composed 80% of the harvest in 1987-88, compared to a range of 72-74% of the annual harvests recorded in the 4 other hunter surveys since 1980, including the 1989-90 season (Table 3). The percent of bucks harvested declined between 1987-88 and 1989-90 in 19 of 25 harvest areas, further indicating that adult bucks experienced high mortality.

Hunter Residency and Success. Hunter success apparently declined slightly from 76% in 1987-88 to 74% in 1989-90 (Table 2). The mean number of deer per hunter also declined from 2.3 to 2.1. Local and non-local residents experienced declines in hunting success, but non-resident success increased. The proportion of hunters taking a bag limit (15%) is the lowest reported (Table 3).

Harvest Chronology. A trend toward increased November harvest has occurred since 1980. Slightly more than half the annual 1989 harvest took place in November (Table 4). Factors which may influence hunters in shifting to November include the higher vulnerability of bucks during rut, better visibility because of less dense vegetation, deer movements toward coastal wintering areas, and the increased possibility of snowfall.

Transport Methods. Air taxis and private boats were the principal means of access used by deer hunters (Table 5). Nonlocal hunters favored the use of aircraft for transportation, whereas local hunters were more likely to have boats available.

Other Mortality:

Winter losses have been an important mortality factor for 3 years. Beach mortality surveys indicate that the highest mortality occurred among fawns (Table 6). Mortality was much higher for adult males than for adult females in 1988 and 1989, but more adult females than adult males were found in 1990. Winter losses were higher on Afognak Island and northern Kodiak Island, according to hunters' reports of relatively low numbers of deer seen in the 1989 hunting season. Although the validity of using beach transects to assess winter mortality has been questioned (Kirchhoff and Pitcher 1988; Schoen and Kirchhoff 1983), I believe insight into the sex and age composition of the mortality in local areas can be gained from mortality surveys. Two observers searched a 400 m-wide band along the coast with continuous parallel transects and found that more than half of the 161 carcasses were more than 100 m from the coast (Smith 1990). Thorough searches of uplands in wintering areas require considerable staff time, but a relatively large mortality sample can be collected. This sample is probably more representative than samples obtained from the traditional transects that do not account for landward mortalities.

An unusual mortality incident was reported on 21 July 1988, when an estimated 30 deer were reported dead on a beach near Tanner Head on southwestern Kodiak Island. During

a subsequent investigation, 22 deer, including 10 males, 8 females and 4 deer of unknown sex, were found scattered along a 1.5 mile beach. The animals were all > 1 year old. Field necropsies performed on 2 yearling males indicated no abnormalities, other than symptoms of drowning. Fishermen commonly see deer swimming between islands, and it is suspected these deer drowned in rough seas.

Another common, although poorly documented source of mortality, is deer killed by dogs near communities. Numerous reports of dogs chasing and killing deer have been received in recent winters. Collisions with automobiles resulted in an estimated 15-20 deer mortalities annually. Although predation by brown bears occurs, it is not a serious limiting factor.

Habitat

Assessment:

Heavy browsing on elderberry, willow, and highbush cranberry on western Kodiak Island was previously reported after the 1987-88 and 1988-89 winters (Smith 1989, Smith 1990). Heavy browsing on willow was noted near Chief Cove in Spiridon Bay in early April 1990. The bark of larger willows had been stripped, and tops of the taller plants were browsed. The recent decline in deer population reduced pressure on deer winter ranges, but an objective assessment of overall browse conditions was not attempted.

Logging has occurred on east-central Afognak Island since 1975. Much of the coastal Sitka spruce forest was logged by clearcutting in Kazakof, Perenosa and Izhut Bays. The vegetation was rapidly converted to a shrub/grass successional stage. Studies in southeastern Alaska indicated that old-growth forest was essential to maintaining carrying capacity for deer (Wallmo and Schoen 1980). It is suspected that logging coastal winter ranges on Afognak initially reduces deer carrying capacity. As shrub/grass vegetation develops after logging, forage abundance increases, but availability of the forage clearly depends on snow depths in winter. Deer occur in high densities on nearby Kodiak Island and other islands where spruce is scarce or absent. This indicates that spruce forest is not absolutely required for deer.

Non-regulatory Management Problems/Needs

A recent declining trend in the deer population, coupled with an increased hunting effort in the last decade, requires that more intensive management practices be considered. Deer hunter mail surveys, beach mortality surveys, field monitoring of deer hunting, and irregular ground and aerial reconnaissance of seasonal deer concentrations have been used to monitor population trends in recent years. Competition between local and nonlocal hunters, as well as conflicts among a growing number of commercial operations that provide lodging, guiding and transportation services to hunters are issues which will require better harvest and population trend data. Deer hunter surveys can provide

economical and reliable data on sex composition, distribution of the harvest and hunter success. These surveys should be done annually. Efforts should be continued to improve survey reliability and accurately estimate harvest parameters.

More precise methods to assess trends in deer population numbers are desirable, but developing and implementing new techniques requires assigning a much higher priority to deer management. Pellet-group transects, which are being used to index deer population trends in densely forested habitat elsewhere in Alaska, may not be readily applicable to Kodiak. Direct counts of deer are variable because of seasonal movements by deer responding to annual variations in snowfall and vegetation development. Research specific to deer on Kodiak and adjacent islands will be required to develop useful management techniques.

Although hunting pressure increased dramatically within the past decade, deer density continues to regulate hunter density to some extent. This was indicated by the concomitant declines in deer numbers and hunters between the 1987-88 and 1989-90 seasons. Dense vegetation, severe weather, and relatively poor access are important factors limiting hunting success. Having experienced extremely high densities of deer, public demand for unnecessarily conservative hunting regulations may be great when deer numbers decline. Public support for more conservative hunting seasons and bag limits is increasing, as is demand for special regulations for trophy management, special weapons hunts, and for preferential seasons and bag limits for local residents. Accurate, timely data on harvests and hunting activities are required to meet these demands.

Public access for deer hunting is rapidly becoming an issue, as native corporations are beginning to restrict access or require land use fees. Hunting pressure on remaining public lands will probably intensify as a result. State and federal land managers must be encouraged to mark public easements in the field and to provide accurate land status maps for distribution to the public. Public information programs should inform hunters about these recent changes in land status as well as encourage hunters to respect the landowner's right to control access.

Conflicts between deer hunters and brown bears is an increasing concern. Deer hunters are the leading source of bear killings in defense of life or property in GMU 8 (Smith et al. 1989). Preliminary results of a study by the USFWS on interrelationships of deer hunters and brown bears in a popular deer hunting area on western Kodiak Island, indicates that many bears occupy inland areas remote from deer hunters, though some individual bears are frequently found in proximity to deer hunting activity (Barnes 1990). Imposing more restrictive deer limits and seasonal deer hunting closures to protect bears until denning occurs, are among the potential solutions which have been considered. Increasing efforts in informational programs to teach hunters how to avoid bear problems and more rigorous enforcement of defense of life and property regulations should be pursued.

CONCLUSIONS AND RECOMMENDATIONS

If the present deer population decline continues through winter 1990-91, a more conservative harvest regime should be implemented for northern Kodiak and Afognak Islands where the population decline is most pronounced and hunting effort is highest. Preliminary information from hunter interviews for the 1990-91 season indicated that does comprised almost 50% of the harvest from that area. Recruitment has been relatively poor for 3 years. Although adult females apparently survived and produced fawns, the female segment of the population is aging rapidly, and overall productivity is apparently declining.

The population decline was less pronounced on southern Kodiak Island. Although there is less biological justification for harvest restrictions for southern Kodiak Island, some adjustments in season length or bag limits may be necessary to offset the potential for a major shift in hunting effort which could occur if hunting opportunity is restricted in the northern part of the unit. One serious concern is that brown bear killings in defense of life or property could increase dramatically if deer hunting effort shifts to stream/lake systems such as Karluk Lake, where bears concentrate in large numbers to feed on salmon in late summer and fall.

The deer population could rebound rapidly because a strong adult doe component remains. A relatively minor decline in hunter success was evident in the 1989-90 survey. Caution must be exercised not to implement unnecessarily restrictive seasons and bag limits if winter mortality is light in 1990-91.

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Table 1. Unit 8 deer harvest, 1985-89.

Regulatory year	Estimated legal harvest[a] M (%)	F (%)	Unk.	Total	Estimated illegal harvest	Total
1985-86[b]						
1986-87[b]						
1987-88	10,844 (80)	2,702 (20)	245	13,791	No estimate	13,791
1988-89[b]						
1989-90	6,923 (73)	2,625 (27)	490	10,038	No estimate	10,038

[a] From mail questionnaire survey
[b] No survey

Table 2. Unit 8 deer hunter residency and success, 1985-89.

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1985-86[b]									
1986-87[b]									
1987-88	1,851	2,410	290	4,551 (76)	645	665	161	1,471 (24)	6,022
1988-89[b]									
1989-90	1,341	1,851	368	3.560 (74)	487	585	183	1,255 (26)	4,815

[a] Includes all residents of Unit 8 with Alaska addresses on 1989-90.
[b] No survey

Table 3. Unit 8 comparison of deer hunter questionnaire results for 1980-81, 1983-84, 1984-85, 1987-88, and 1989-90 seasons.

	% Hunter success	% Successful hunters taking bag limit*	% Male	% Female	Estimated total harvest	Estimated no. hunters	Mean no. deer/hunter	Mean no. days hunted/deer
1980-81	73	37	74	26	5,347	3,440	1.6	3.8
1983-84	81	24	74	26	9,897	4,113	2.4	2.3
1984-85	81	23	74	26	8,905	3,948	2.3	2.6
1987-88	76	27	80	20	13,791	6,022	2.3	2.3
1989-90	74	15	73	27	10,038	4,815	2.1	2.5

* Bag limit 4 deer in 1980; 5 deer other years.

Table 4. Unit 8 deer harvest chronology percent by time period, 1980-89.

Regulatory year	Harvest periods August	September	October	November	December	January	n
1980-81	6.4	9.1	23.5	33.4	21.6	5.9	5,347
1983-84	4.9	7.3	25.4	37.4	17.9	7.0	9,897
1984-85	4.5	9.1	27.8	40.7	15.1	2.7	8,905
1987-88	4.7	8.2	26.1	40.7	17.5	2.7	13,791
1989-90	2.9	6.0	19.7	50.5	18.0	2.9	10,038

Table 5. Unit 8 deer harvest percent by transport method, 1985-89.

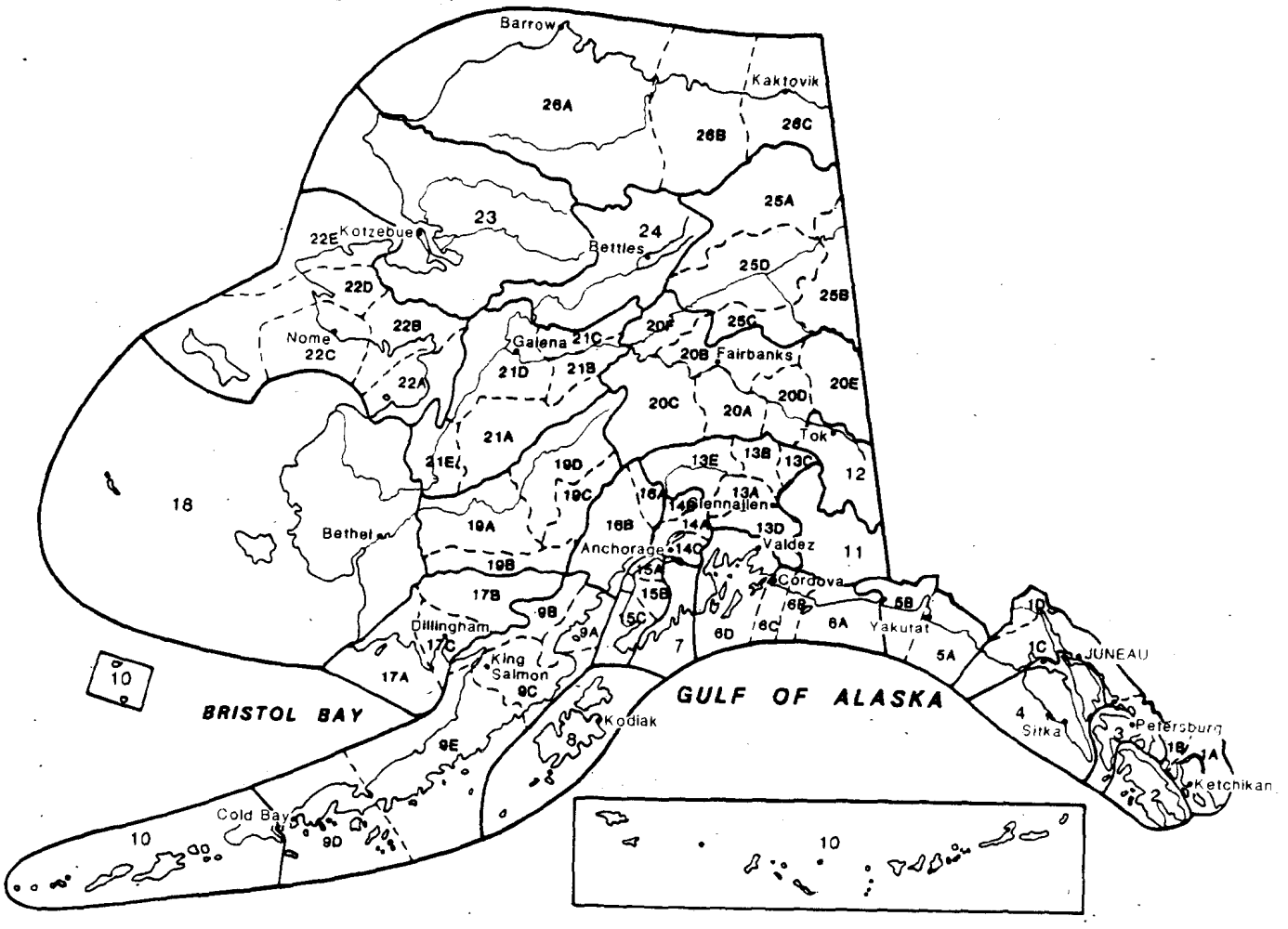
Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1985-86[a]									
1986-87[a]									
1987-88	37		40			5	16	2	13,791
1988-89[a]									
1989-90	42		35			5	15	3	10,038

[a] No survey

Table 6. Unit 8. Sex and age composition of deer winter-kill from beach mortality transects, 1988-90.

Year	Adult				Fawn				Unk. age	Unknown age			
	M (%)	F (%)	Unk.	Total	M (%)	F (%)	Unk.	Total	Unk. sex	M (%)	F (%)	Unk.	Total
1987-88	8 (89)	1 (11)	3	12	6 (50)	6 (50)	18	30	10	14 (67)	7 (33)	31	52
1988-89	22 (85)	4 (15)	0	26	43 (57)	32 (43)	69	144	16	65 (64)	36 (36)	85	186
1989-90	9 (41)	13 (59)	16	38	9 (50)	9 (50)	73	91	2	18 (45)	22 (55)	91	131

Alaska Game Management Units



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