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**Survey-Inventory Activities**  
1 July 1990 - 30 June 1992

# DEER

Susan M. Abbott, Editor



Projects W-23-4 and W-23-5  
Study 2.0  
June 1993

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Walter J. Hickel, Governor

DEPARTMENT OF FISH AND GAME  
Carl L. Rosier, Commissioner

DIVISION OF WILDLIFE CONSERVATION  
David G. Kelleyhouse, Director  
Wayne L. Regelin, Deputy Director

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## LOCATION

Game Management Units: Subunit 1A and Unit 2 (8,900 mi<sup>2</sup>)

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

Unit 2 - Prince of Wales Island and adjacent islands south of Sumner Strait and west of Kashevarof Passage

## BACKGROUND

Sitka black-tailed deer occur throughout Subunit 1A and Unit 2. Mainland densities are lower than densities on the maritime-influenced off-shore islands. Historically, deer populations have fluctuated dramatically, primarily as a result of severe winter weather. Wolf and bear predation also influence population levels. Deer numbers are believed to be at moderate levels in most of Subunit 1A and Unit 2.

Weather conditions and population levels influence deer harvests. In Subunit 1A, harvests ranged from 350 to 860 deer during the past 8 seasons, while in Unit 2 harvests ranged from 1,880 to 3,900 during the same period. Hunting seasons generally extend from August through November or December. Hunting of antlerless deer was allowed before 1978. Since 1978, seasons have been limited primarily to taking antlered deer, with annual bag limits varying from 3 to 4. A 3-week antlerless deer season began in Unit 2 in 1987-88, but was discontinued because of public opposition.

As clearcut logging continues to reduce old-growth habitat throughout Subunit 1A and Unit 2, deer populations are expected to be substantially reduced. Population models suggest declines in overall deer carrying capacity of 50% to 60% by the end of the logging rotation in 2054. Long-term implications of habitat loss include the inability to provide for subsistence needs and the loss of hunting opportunities for deer hunters in Subunit 1A and Unit 2.

## MANAGEMENT DIRECTION

### Management Objectives

The management objective for area deer is to maintain deer populations in excess of 45 deer mi<sup>2</sup> of winter range in Subunit 1A and Unit 2. Mean pellet group densities of 1.4 pellet groups per plot have been determined to be equivalent to 45 deer per mi<sup>2</sup> (Kirchhoff 1990).

## METHODS

We obtained population information from anecdotal reports from hunters, aerial alpine surveys, winter mortality transects, and spring pellet group surveys. A random sample of hunters who obtained deer harvest tickets during the hunting season provide harvest data in an annual questionnaire mail survey.

One aerial alpine survey was initiated using a PA-18 Supercub during July 1990, but was prematurely aborted because of weather. We flew 5 aerial alpine surveys during July and August 1991. Staff conducted 4 surveys from a Bell 206 Jet Ranger helicopter flown at 50-100 feet above ground. A pilot and two observers conducted the surveys, recording sex and age composition data. One survey was done from a float-equipped PA-18 Supercub flown 200-500 feet above the ground. A pilot with a single observer conducted the survey. Composition data could not be obtained using the airplane and data were limited to total numbers of deer.

Twelve deer pellet-group surveys were conducted in Subunit 1A and Unit 2 during April and May 1991, and another 12 during 1992. Methods for conducting the surveys are described by Kirchhoff and Pitcher (1988).

Two winter mortality transects were conducted during April 1991, but none during 1992. Mortality transects were conducted with 2 people walking parallel to the shoreline for a distance of 1 to 2 miles, 1 person inside the forest fringe, the other person along the high tide line. All deer carcasses encountered were counted, and attempts were made to ascertain cause of death. This involved evaluating amounts of fat, if present, looking for signs of external injuries, and assessing the amount and condition of bone marrow.

Harvest questionnaires are sent to all harvest ticket holders residing in communities where less than 150 tickets were issued, 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.

## RESULTS AND DISCUSSION

### Population Status and Trend

Deer densities vary throughout Subunit 1A and Unit 2. The highest noted 1991 deer pellet densities in Subunit 1A occurred in Helm and Alava bays (Table 1). Overall, densities were higher or equal to past findings in 5 of 7 sampled Value Comparison Units (VCUs) in Subunit 1A. In 1992, the highest noted deer pellet densities in Subunit 1A occurred on Gravina Island and in Helm Bay. Although the 1992 densities were up slightly from the previous season on the Gravina Island transects and down slightly on the Helm Bay transects, the noted differences may be because of differences in sample sizes rather than

actual population changes. We noted lowest 1992 densities near Whitman Lake and Carroll Point, both were down from previous sampling in 1990 and 1988, respectively. Overall, 1992 pellet-group densities in Subunit 1A were down 33% from 1991.

In Unit 2, 1991 pellet-group densities were highest at Warm Chuck and Port Refugio (Table 2). The lowest density was observed at Point Baker. Overall, sampling efforts indicated lower densities than previously noted in 2 of 3 VCUs. In 1992, pellet-group densities were highest at Exchange Cove and on newly established transects near Thorne Lake. We noted substantial declines in pellet-group densities in all VCUs where previous data exist. Overall, 1992 densities in Unit 2 were down 56% from 1991.

Although the 1992 findings seem to indicate declines in deer numbers during the past year, we suspect that the deflated results can be attributed in part to the wet, snow-free weather conditions which persisted in southern Southeast throughout fall and winter 1991-92. This affected the persistence of pellet-groups. Accurately assessing the extent of population declines is difficult using only pellet-group data. Hunter reports, incidental observations, and aerial surveys suggest that deer populations throughout most of Subunit 1A and Unit 2 remained stable during the past year. One possible exception is northwest Prince of Wales Island where deer numbers appear substantially lower than elsewhere on the island. In the absence of severe weather conditions during the past three seasons, we consider hunting pressure and wolf predation as the most plausible causes.

Population Composition: Although alpine helicopter surveys make it possible to differentiate bucks, does, and fawns during late summer, data are considered biased because we believe higher proportions of bucks than does or fawns concentrate in alpine habitats. Albeit, alpine surveys can provide comparable data which, when used in concert with other information, can help to evaluate status and trends of deer populations.

During 1991, we conducted 3 cursory surveys in Subunit 1A (Table 3). The surveys consisted of quick passes over alpine habitats on parts of Revillagigedo and Gravina islands. The two most comparable surveys we flew over Revillagigedo Island on 19 July and over Gravina Island on 29 July.

One helicopter and 1 fixed-wing survey was flown over part of Prince of Wales Island during 1991 (Table 3). As expected, bucks made up most deer observed from the helicopter. We observed 520 deer during the fixed-wing survey where staff saw 649 deer during a 1989 survey.

### Mortality

#### Season and Bag Limit:

Subunit 1A and Unit 2

#### Resident and nonresident hunters:

1 Aug. - 31 Dec.

4 antlered deer

**Hunter Harvest:** Although relatively high numbers of hunters hunted during 1990, they spent fewer hunter-days afield in Subunit 1A and Unit 2 during 1991 than anytime during the past eight seasons (Table 4). Wood (1990) suggested that much of the fluctuation in hunter effort between seasons can be attributed to varying snow levels, and that good snowcover tends to increase hunter effort. The virtually snow-free conditions experienced in southern Southeast during 1991-92 may account for the lack of effort.

Deer harvests were at 4- and 3-season highs during 1990 in Subunit 1A and Unit 2, respectively (Table 4). With the corresponding low hunter effort, the lowest harvest in eight seasons was reported for Subunit 1A, and the lowest since 1984 in Unit 2 during 1991. The percentage of successful hunters during 1990 and 1991 was similar to that reported in the past in Subunit 1A and Unit 2; however, the average number of hunter days required to bag a deer was higher in 1991 than any of the previous three seasons.

As in the past, southern Revillagigedo Island received the greatest hunting pressure of any place in Subunit 1A during both 1990 and 1991. However, hunter effort declined throughout most of Subunit 1A during the past three seasons. Southern Revillagigedo Island also accounted for the highest number of deer harvested in the subunit during the past two seasons, although the 1991 harvest was the lowest in three seasons (Table 5). Unlike the previous two seasons, Gravina Island, north Revillagigedo Island, and the Cleveland Peninsula accounted for relatively few harvested deer during 1991. Again, Wood (1990) suggested this decline was because of mild weather conditions experienced during 1991 rather than significant declines in deer numbers.

Central Prince of Wales Island continued to attract the highest number of hunters and the highest harvest in Unit 2 during both 1991 and 1992 (Table 6). After a 2-season high in 1990, deer harvest declined on northern Prince of Wales Island during 1991. In the northcentral part of Prince of Wales Island harvests declined steadily during the past three seasons. Highest success rates during the past two seasons were noted for Hecata Island, followed closely during 1991 by the outer islands adjacent to west Prince of Wales Island. In 1991, Hecata Island also had its highest harvest in three seasons.

Because of the extensive and ever-increasing road system, insufficient numbers of law enforcement personnel, and many widely-scattered settlements, we believe Unit 2 accounts for a higher illegal harvest than Subunit 1A. Although the extent of this illegal harvest is uncertain, Wood (1990) believed it was considerable (Table 7). Despite the fact that both Subunit 1A and Unit 2 have antlered seasons only, several does are reported killed each season. Flynn and Suring (1989) reported that actual hunter kill may be 38% greater than total estimated harvest because of crippling loss.

**Hunter Residency and Success:** Hunters residing within Subunit 1A accounted for 97% of the Subunit 1A deer harvest during 1990 and all of the harvest during 1991 (Table 8). Fourteen Alaska residents visiting from outside the subunit bagged deer in Subunit 1A during 1990. By contrast, nonlocal residents accounted for 40-43% of the Unit 2 deer

harvest during 1990 and 1991. Nonresidents accounted for only 2% of the Unit 2 harvest during 1990 and 1991.

Harvest Chronology: The August deer harvest from Subunit 1A reached a 3-season high during 1991, but declined dramatically during October and November compared to the previous three seasons (Table 9). Hunters harvested more deer during November 1990 than during any other month in the past 4 seasons. For 3 of the past 4 seasons, they killed more deer in Unit 2 during August than during any other month (Table 9). The second highest harvest occurred during November. Although the season officially ends December 31, a few deer are reported taken during January.

Transport Methods: Most hunters in Subunit 1A use boats to access hunting areas, while in Unit 2, most hunters use the extensive road system to access hunting areas (Table 9). Use of airplanes dropped to 4-season lows in both units during 1991 (Table 9).

#### Other Mortality

We surveyed winter mortality transects in George and Carroll inlets in April 1991. Staff found 2 sets of deer bones along one transect. One set seemed to come from a hunter-killed deer and the second deer had not starved. Along the other transect, staff found a set of bones about 10 feet from the beach. We concluded that predation was the probable cause of death.

Based on staff observations and 22 responses to our 1991-92 trapper questionnaires, we believe that wolf populations are abundant in Subunit 1A and Unit 2 (Table 10). Wolves, along with black bears, we believe, account for the deaths of several thousand deer each year. Trappers are believed to incidentally catch and kill a few deer in wolf snares each winter. Collisions with road vehicles also account for a few deer deaths each year.

Deer are extremely vulnerable to harsh winter weather. The extent of winter mortality depends on the severity of weather. Based on general impressions along with calculated weather indices, we believe that winters accounted for relatively few deer deaths during the past 3 seasons (Table 10).

#### Nonregulatory Management Problems and Needs

Major changes in old-growth forest 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 (USFS) and Alaska Department of Fish and Game (ADF&G) habitat models predict that the capacity of the forest to support deer in an average winter will decline by nearly 50% by the end of the logging rotation in the year 2054. This loss will be greater in years of deep snow and less during years of low snow. By 2054, none of the areas within the roaded and logged



portions of Subunit 1A and Unit 2 are expected to meet the projected hunter demand for deer will be met (USFS 1989).

### CONCLUSIONS AND RECOMMENDATIONS

Based on pellet-group data, the objective of maintaining 45 deer/mi<sup>2</sup> of winter habitat was achieved in several Subunit 1A and Unit 2 VCU's during 1991. This objective was not met in these units during 1992. Despite this, because of the unusually wet and snow-free weather conditions in fall and winter 1991-92, we suspect the lower pellet counts reflect lower pellet persistence rather than significantly reduced deer numbers. One exception to this may exist on northwest Prince of Wales Island where indications are that deer populations have declined to low levels.

Mild weather has enabled deer numbers in most parts of Subunit 1A and Unit 2 to remain stable or slightly increase. Wolf abundance appears relatively high and predation may be influencing deer population levels more than during the past few years. Illegal hunting activities may be further influencing already low deer population levels on the northwestern portion of Prince of Wales Island.

The loss of winter habitat through clearcut logging will reduce the capacity of the land to support deer for many decades. Some long-term implications of habitat loss are the inability to provide for subsistence needs and the loss of hunting opportunities for deer hunters in Subunit 1A and Unit 2 (Wood 1990).

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Prepared by:

Douglas N. Larsen  
Wildlife Biologist III

Submitted by:

Bruce Dinneford  
Regional Management Coordinator

Table 1. Deer pellet-group survey results, Subunit 1A; Cleveland Peninsula, Revillagigedo, and Gravina Islands, 1981-1992.

Year	VCU	Mean pellet Groups/plot <sup>a</sup>	Number of Plots	95% C.I.
1981	715-Smugglers Cove	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
1991	716	1.63	240	1.35-1.92
1992	716	1.25	169	0.96-1.53
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
1990	738	0.56	274	0.44-0.68
1991	738	0.76	272	0.58-0.94
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	0.82-1.25
1991	748	1.49	168	1.15-1.84
1992	748	0.65	195	0.49-0.81
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	0.32-0.59
1992	752	0.20	189	0.12-0.28
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
1992	758	0.28	87	0.14-0.41

Table 1 (Cont.)

Year	VCU	Mean pellet Groups/plot <sup>a</sup>	Number of Plots	95% C.I.
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
1992	759	0.48	136	0.30-0.66
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
1991	760	1.39	271	1.07-1.70
1981	764-Blank Inlet	1.24	108	0.89-1.59
1981	765-Dall Head	0.52	69	0.31-0.74
1985	769-Alava Bay	0.52	311	0.39-0.65
1986	769	0.85	326	0.68-1.01
1991	769	1.64	143	1.22-2.05
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
1991	772	0.13	207	0.07-0.18
1991	821-Winstanley Island	0.27	49	0.11-0.42
1981	999-East 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-East 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

Table 1 (Cont.)

Year	VCU	Mean pellet Groups/plot <sup>a</sup>	Number of Plots	95% C.I.
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	1.12-1.68
1991	999	1.12	154	0.80-1.43
1992	999	1.22	302	1.05-1.38

<sup>a</sup> Density classes based on mean pellet-groups/plot:

Less than 0.5 = extremely low  
 1.51-1.0 = low  
 1.01-2.0 = moderate  
 2.01-3.0 = high

Table 2. Unit 2, Prince of Wales and adjacent islands, deer pellet-group survey results, 1984-1992.

Year	VCU	Mean pellet-Groups/plot <sup>a</sup>	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
1992	539	1.10	125	0.83-1.38
1989	549-Sarheen	1.73	310	1.44-2.01
1988	554-Sarkar	1.29	298	1.06-1.51
1992	554	0.53	245	0.41-0.66
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
1991	561	2.05	291	1.73-2.37
1991	569-Baker	0.08	256	0.04-0.12
1992	575-Thorne Lake	1.20	334	1.03-1.37
1986	578-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
1992	584-Little Ratz	0.94	272	0.76-1.13
1988	587-Tuxekan	1.07	300	0.85-1.29
1985	621-Twelvemile	0.31	196	0.19-0.43

Table 2 (Cont.)

Year	VCU	Mean pellet-Groups/plot <sup>a</sup>	Number of Plots	95% C.I.
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	0.84-1.52
1991	621	1.84	231	1.48-2.21
1992	621	0.43	250	0.32-0.55
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	1.03-1.48
1991	635	1.13	367	0.95-1.32
1992	635	0.76	255	0.57-0.95
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

<sup>a</sup> 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. Aerial alpine deer surveys conducted in Subunit 1A and Unit 2, 1991.

Location	Date	Bucks	Does	Fawns	Unk.	Total	Bucks: 100 does	Fawns: 100 does	Flight time (hours)
<u>Subunit 1A</u>									
Revilla Island <sup>ab</sup>	7/19/91	50	83	5	0	138	60	6	1.4
Deer Mountain <sup>b</sup>	7/29/91	3	8	2	0	13	37	25	0.5
Gravina Island <sup>bc</sup>	7/29/91	14	27	3	2	46	52	11	0.3
<u>Unit 2</u>									
P.O.W. Island <sup>bd</sup>	7/19/91	102	73	8	12	195	140	11	2.0
P.O.W. Island <sup>ef</sup>	8/06/91	---	--	--	--	520	---	--	2.7

<sup>a</sup> West side of Revilla Island; Mud Bight to Bluff Lake.

<sup>b</sup> Survey conducted from Bell 206 Jet Ranger helicopter.

<sup>c</sup> House Mountain to High Mountain.

<sup>d</sup> Includes the area around Clover Lake, Nipple and Rock Buttes, Barren, Green, Copper, and Hetta Mountains, and Big Creek.

<sup>e</sup> Survey conducted from PA-18 supercub.

<sup>f</sup> Survey route began near Eudora Mountain and extended north to Baird Peak.



Table 4. Deer harvest data, Subunit 1A and Unit 2, 1984-1991.

Year	No. of hunters	No. of successful hunters	Percent Successful	Total hunter days	Average hunter days	Total deer <sup>a</sup>	Average deer per hunter	Average hunter days per deer
<u>Subunit 1A</u>								
1984	1060	440	42	5820	5.5	620	0.6	9.3
1985	1108	412	37	5683	5.1	779	0.7	7.3
1986	1107	529	48	7100	6.4	859	0.8	8.3
1987	946	376	40	6379	6.7	611	0.6	10.4
1988	958	413	43	4930	5.1	686	0.7	7.2
1989	982	335	34	4348	5.1	592	0.6	7.3
1990	1009	443	44	5127	5.1	723	0.7	7.1
1991	734	259	35	3094	4.2	347	0.5	8.9
<u>Unit 2</u>								
1984	1910	1210	63	13070	6.8	1880	1.0	6.9
1985	2025	1373	68	14182	7.0	3151	1.6	4.5
1986	2233	1538	69	17505	7.8	2805	1.3	6.2
1987	2481	1845	74	17709	7.1	3886	1.6	4.5
1988	2124	1415	67	10668	5.0	2849	1.3	3.7
1989	2132	1397	65	12315	5.7	2806	1.3	4.4
1990	2149	1445	67	13566	6.3	3093	1.4	4.4
1991	1664	1142	69	11985	7.2	2466	1.5	4.9

<sup>a</sup> Includes does which were reported killed.

Table 5. Deer harvests from major harvest areas within Subunit 1A, 1989-1991.

Major Harvest Area	Year	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
1-Gravina Island	1989	241	61	25	597	2.5	0.4	101
	1990	221	72	33	614	2.8	0.5	101
	1991	198	46	23	624	3.2	0.2	46
2-Annette Island	1989	27	20	74	97	3.5	1.2	32
	1990	16	13	78	39	2.4	1.1	18
	1991	6	0	0	11	2.0	0.0	0
3-Duke Island	1989	23	0	0	33	1.4	0.0	0
	1990	9	2	20	18	2.0	0.2	2
	1991	33	8	26	70	2.2	0.6	20
4-South Revilla	1989	497	121	24	1885	3.8	0.3	157
	1990	594	180	30	2610	4.4	0.4	259
	1991	416	124	30	1134	2.7	0.4	147
5-North Revilla	1989	265	75	28	949	3.6	0.4	111
	1990	242	82	34	801	3.3	0.4	103
	1991	204	55	27	748	3.7	0.4	76
6-Cleveland Pen.	1989	253	97	38	641	2.5	0.7	184
	1990	245	122	50	981	4.0	1.0	236
	1991	158	42	26	458	2.9	0.4	59
7-North Mainland	1989	17	2	12	97	5.6	0.3	5
	1990	10	2	20	58	5.8	0.4	4
	1991	11	0	0	33	3.0	0.0	0
8-South Mainland	1989	14	1	7	49	3.4	0.1	2
	1990	3	0	0	7	2.5	0.0	0
	1991	9	0	0	15	1.8	0.0	0

Table 6. Deer harvests from major harvest areas within Unit 2, 1989-91.

Major Harvest Area	Year	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
9-Outer Island	1989	45	36	80	91	2.0	0.8	38
	1990	62	41	65	100	1.6	0.8	47
	1991	42	30	72	89	2.1	1.2	50
10-Hecata Island	1989	144	74	51	576	4.0	0.9	128
	1990	52	52	100	117	2.2	1.6	82
	1991	122	86	71	350	2.9	1.1	131
11-SW POW Island	1989	121	56	46	548	4.5	0.8	95
	1990	119	72	60	875	7.3	1.4	166
	1991	59	33	56	529	8.9	1.1	67
12-SE POW Island	1989	309	169	55	1383	4.5	0.9	289
	1990	264	128	48	847	3.2	0.9	234
	1991	244	121	49	904	3.7	0.7	174
13-Central POW Island	1989	1021	577	56	4011	3.9	0.9	944
	1990	1100	626	57	6201	5.6	1.2	1271
	1991	849	580	68	5093	6.0	1.3	1129
14-North Central POW Island	1989	753	415	55	2869	3.8	0.9	716
	1990	664	343	52	2964	4.5	0.9	568
	1991	553	275	50	3003	5.4	0.8	448
15-North POW Island	1989	518	304	59	2836	5.5	1.1	596
	1990	538	382	71	2463	4.6	1.3	725
	1991	411	233	57	2016	4.9	1.1	468

Table 7. Reported and estimated deer harvest/mortality, Subunit 1A and Unit 2, 1984-91.

Year	Reported harvest			Unreported & illegal harvest <sup>a</sup>	Estimated total harvest	Estimated number of road kills
	Male	Female	Total			
<u>Unit 1A</u>						
1984	620	0	620	310	930	1 - 5
1985	779	0	779	390	1169	1 - 5
1986	859	0	859	430	1289	1 - 5
1987	611	0	611	306	917	1 - 5
1988	686	0	686	343	1029	1 - 5
1989	587	5	592	296	888	1 - 5
1990	642	81	723	361	1084	1 - 5
1991	331	16	347	173	520	1 - 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 <sup>b</sup>	3886	3886	7772	20
1988	2846	3	2849	2849	5698	30
1989	2806	0	2806	2806	5612	25
1990	2952	141	3093	3093	6186	25
1991	2343	123	2466	2466	4932	25

<sup>a</sup> Unreported and illegal harvest is estimated at 50% of reported harvest in Subunit 1A and 100% of reported harvest in Unit 2.

<sup>b</sup> Antlerless season.

Table 8. Hunter residency and success, Subunit 1A and Unit 2, 1988-1991.

Year	Successful				Unsuccessful			
	Local res. <sup>a</sup>	Nonlocal res.	Nonres.	Total	Local res. <sup>a</sup>	Nonlocal res.	Nonres.	Total
<u>Subunit 1A</u>								
1988	392	21	0	413	508	37	0	545
1989	310	25	0	335	607	40	0	647
1990	429	14	0	443	527	38	2	567
1991	259	0	0	259	418	53	4	475
<u>Unit 2</u>								
1988	748	638	29	1415	242	430	38	710
1989	713	675	9	1397	272	425	38	735
1990	825	583	36	1444	323	351	30	704
1991	632	487	23	1142	224	276	22	522

<sup>a</sup> Local residents refer to those Alaskans living within the boundaries of Subunit 1A for Subunit 1A data, and Unit 2 for Unit 2 data.

Table 9. Deer harvest chronology and method of transportation used by all hunters, Subunit 1A and Unit 2, 1988-1991.

Year	Month of Kill							Method of Transportation <sup>a</sup>					
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Unk.	Airplane	Boat	Foot	Highway Vehicle <sup>b</sup>	Other	Unk.
<u>Subunit 1A</u>													
1988 <sup>c</sup>	165	80	172	197	52	0	20	63	1456	458	518	7	107
1989	97	68	165	221	35	5	4	93	1394	411	465	25	0
1990	92	85	171	325	50	0	0	105	1366	514	515	0	14
1991	121	0	65	140	21	0	0	40	972	329	367	0	15
<u>Unit 2</u>													
1988	895	447	506	888	72	7	34	173	990	547	2875	18	55
1989	729	377	469	1061	152	12	6	203	815	1042	3276	52	16
1990	1013	470	559	903	135	11	2	207	776	1023	3522	28	0
1991	816	272	470	793	109	5	1	36	771	617	2924	34	9

<sup>a</sup> Numbers of successful and unsuccessful hunter trips.

<sup>b</sup> Includes cars, trucks, and off-road vehicles (3 and 4-wheelers).

<sup>c</sup> Data for 1988 incorrectly presented in December 1991 deer management report.

Table 10. Deer pellet-group and harvest data, predator abundance( $I_A$ )<sup>a</sup>, and weather severity indices for Subunit 1A and Unit 2, 1980-1992.

Season	Pellet Group Data <sup>b</sup>		Harvest Data						Wolf Abundance		Weather Index <sup>c</sup>
			Total harvest		Deer kill/ hunter day		Hunter success (%)				
	1A	2	1A	2	1A	2	1A	2	1A	2	
1980-81	0.2	---	---	----	----	----	--	--	--	--	0.7
1981-82	---	---	---	----	----	----	--	--	--	--	6.3
1982-83	---	---	---	----	----	----	--	--	--	--	1.3
1983-84	0.6	---	---	----	----	----	--	--	--	--	1.3
1984-85	0.8	1.2	620	1880	0.10	0.14	--	--	--	--	4.7
1985-86	1.0	1.6	779	3151	0.14	0.22	--	--	--	--	2.0
1986-87	1.1	1.2	859	2805	0.12	0.16	--	--	--	--	2.7
1987-88	1.7	1.0	611	3886	0.09	0.22	--	--	--	--	1.7
1988-89	1.1	1.3	686	2849	0.14	0.27	43	66	--	--	4.7
1989-90	1.0	1.2	587	2806	0.13	0.23	34	65	--	--	1.3
1990-91	1.2	1.6	723	3093	0.14	0.23	44	67	--	--	2.3
1991-92 <sup>d</sup>	0.8	0.7	347	2466	0.11	0.20	35	69	86	59	0.3

<sup>a</sup> Indices taken from Brand and Keith (1979).  $I_A = [(\sum R_i - n) / 2n] \times 100$  where:  $R_i$  = the numerical value assigned to the  $i$ th response ( $R_i = 1$  when population level reported to be scarce, 2 when population level reported to be common, or 3 when population level reported to be abundant).  $n$  = Number of trappers that responded. Abundant when  $I_A > 50$ ; intermediate when  $20 \leq I_A \leq 50$ ; and scarce when  $I_A < 20$ . Data derived from 1991-92 Subunit 1A and Unit 2 trapper questionnaires.

<sup>b</sup> Average number of pellet groups per plot.

<sup>c</sup> Based on weather data collected at Annette Island, Alaska during November-March. Higher indices represent more severe weather conditions.

<sup>d</sup> Extremely wet but snow-free season; pellets may not have persisted as long as in past years.

## LOCATION

Game Managements Units: Subunit 1B and Unit 3 (6,000 mi<sup>2</sup>)

Geographical Description: Southeast Alaska mainland from Cape Fanshaw to Lemesurier Point and adjacent islands

## BACKGROUND

Sitka black-tailed deer are found on most islands in Unit 3 and on the Subunit 1B mainland. 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 significant population decline occurred in the late 1960s and early 1970s which led to restrictive regulations and bag limits in 1973. Subunit 1B 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 most of the area north of Sumner Strait remains closed. South of Sumner Strait a 1 antlered deer limit was reinstated in 1980. The Alaska Board of Game increased the limit to 2 antlered deer in that area in 1988. A registration permit hunt with a 16-day season and a bag limit of 1 antlered deer opened in 1991 on Mitkof, Woewodski, and Butterworth islands.

## MANAGEMENT DIRECTION

### Management Objectives

A comprehensive deer management plan for Southeast Alaska is being developed. Until the plan is adopted the following are interim objectives to: 1) maintain a deer population capable of sustaining an average hunter kill of 1 deer per 8 hunter days of effort; and 2) provide the opportunity for at least 2,500 hunter days.

## METHODS

We estimated deer harvest from hunter harvest questionnaires sent to a random sample of 1990 and 1991 harvest ticket holders. Data was compiled from the mandatory registration permit hunt report on Mitkof and adjacent islands. We measured relative winter deer densities with pellet group transects in selected areas of Unit 3. We surveyed deer mortality transects in spring 1992. During 1991 staff at a hunter check station on



Mitkof Island sampled deer taken for weight and antler development data. Incisor teeth were taken to determine age.

## RESULTS AND DISCUSSION

### Population Status and Trend

**Population Size:** Deer populations in Unit 3 appear relatively stable, with an overall slight increase on islands north of Sumner Strait (Table 1). Pellet group counts in 1992 suggested lower densities with some exceptions. Sampling intensity is too low to provide meaningful population estimates for the entire unit. Beach mortality transects conducted in 1992 found less than 1 winter-killed carcass per linear mile of beach (ADF&G files). We found some evidence of predation by wolves.

Pellet group surveys, comments from the public, and staff observations suggest that populations have recovered sufficiently on Kupreanof and Kuiu islands to support a limited hunting season. Deer in Subunit 1B are generally at low density and seem more limited by winter weather than the island populations.

### Mortality

<u>Season and Bag Limit</u>	<u>Resident and nonresident hunters</u>	
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
Unit 3, That portion of Mitkof Island south of the Petersburg city limits, Woewodski and Butterworth islands	Oct. 15-Oct. 31	1 antlered deer by registration permit only
Remainder of Unit 3	No open season	

**Board of Game Actions and Emergency Orders.** The Board of Game authorized opening of a portion of Unit 3 for a registration permit hunt in 1991. No emergency orders were issued this report period.

Hunter Harvest. Hunter participation and harvest changed little before 1991 (Tables 2-9). Unit 3 hunter survey data for 1991 which includes Mitkof Island, is primarily responsible for the large increase in both hunter numbers and kill.

All Mitkof Island deer hunters were required to report hunting activity. We surveyed these hunters by mail questionnaire, and compared the two data sets in Table 10. The mail survey reported 48% fewer hunters, 22% fewer kills, and 32% fewer hunter days than what was reported by the registration permit for the same area. Because the registration permit hunt was not designed to verify the mail survey, caution must be used in drawing conclusions. Smith (1991) concludes that his mail surveys significantly overestimated the total harvest and number of hunters while this comparison indicates the opposite.

Age data showed that 73% of the total kill were 3-, 4-, and 5-year-olds (ADF&G files). Deer averaged 112 pounds, field dressed (n = 61). Check station interviews with hunters suggest some hunters were selective and did not take the first legal deer seen.

The mail survey contained reports of does taken in Unit 3. This is an anomaly as the last legal season for does was 1972. No verification was attempted for these reports.

Hunter Residency and Success. Few nonresidents hunt deer in Subunit 1B and Unit 3 (Tables 3 & 7). Most hunters are local and few nonlocals take deer in these units. Deer populations are greater and seasons and bag limits are generally more liberal in other game management units so there is little incentive to travel to Subunit 1B and Unit 3.

Harvest Chronology. Tables 5 and 9 show the harvest percentage by month. Some hunters reported taking deer in December and January during the closed season. The increase in kill during October 1991 in Unit 3 coincides with the Mitkof Island permit hunt opening.

Transport Methods. Most hunters traveled by skiff while a few used airplanes. The increase in the use of highway vehicles in 1991 for Unit 3 reflects the opening of Mitkof Island (Tables 4 and 8).

## CONCLUSIONS AND RECOMMENDATIONS

Deer populations in Subunit 1B and Unit 3 seem stable with localized variations. Winter weather probably affects population dynamics the most, followed by clearcut logging. Nothing indicates that hunting seasons or bag limits should be restricted. All of Unit 3 can be opened for deer hunting. Season dates for Subunit 1B and Unit 3 should be the same, with the exception of the registration permit hunt area.

## LITERATURE CITED

Smith, R.E. 1991. Unit 8 deer survey-inventory progress report. Pages 57-65 in S.M. Abbott, ed. Survey-Inventory Management Report. Deer. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Rest. Proj. W-23-4, Study 2.0. Juneau. 68pp.

Prepared by:

Charles R. Land  
Wildlife Biologist III

Submitted by:

Bruce Dinneford  
Regional Management Coordinator

Table 1. Deer population trends as indicated by pellet group surveys in Unit 3, 1984-92.

VCU	Name	Pellet-Groups		Mean	95% CI
		Year	Plots		
400	Security Bay	1984	360	0.02	0.01-0.04
		1989	304	0.25	0.16-0.34
403	Pillar Bay	1988	337	0.16	0.10-0.22
408	Malmesbury	1990	206	0.11	0.05-0.18
417	Conclusion	1987	207	2.66	2.32-3.01
		1989	200	0.95	0.72-1.18
		1991	200	0.71	0.53-0.88
431	Point Barrie	1988	357	0.23	0.17-0.29
434a	Big Level	1981	399	1.54	1.45-1.63
		1983	336	1.56	
		1986	382	1.66	1.41-1.90
		1989	227	1.07	
		1991	456	2.16	1.90-2.41
434b	Little Level	1981	114	2.48	2.02-2.94
		1983	136	2.34	
		1986	122	1.39	1.07-1.70
		1989	137	1.52	
		1991	132	3.59	3.07-4.11
435	Castle River	1984	312	0.19	0.12-0.26
		1987	305	0.51	0.37-0.65
		1989	312	0.40	0.25-0.56
437	East Duncan Canal	1990	227	1.12	0.92-1.32
		1992	213	0.81	
448	Woewodski	1984	295	0.88	0.69-1.08
	(S. Mitkof )	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	417	1.35	1.24-1.73
		1990	355	1.46	1.28-1.64
		1991	316	1.80	1.52-2.07
		1992	249	0.79	
448a	Woewodski	1991	461	1.86	1.66-2.05
449	Frederick	1981	945	0.08	0.06-0.11
	(N. Mitkof )	1990	180	0.55	0.36-0.74
		1992	227	0.54	

Table 1 continued.

VCU	Name	Pellet-Groups		Mean	95% CI
		Year	Plots		
452	Blind Slough (Central Mitkof)	1990	324	1.35	1.15-1.56
		92	114	1.05	
454	Dry	1981	91	0.92	0.56-1.28
455	Vank Island Group	1981			
	a) Sokolof		900	1.73	1.61-1.85
	b) Rynda		281	0.25	0.18-0.32
	c) Greys		284	0.25	0.18-0.32
461	Woronkofski (All Transects)	1985	646	1.63	1.45-1.81
461	Woronkofski (Trans. 10, 11, 12)	1985	218	2.01	1.62-2.39
		87	201	2.23	1.85-2.61
		89	223	2.52	2.18-2.85
		91	203	1.59	1.32-1.85
473	Onslow	1984	321	0.37	0.28-0.46
		85	334	0.59	0.48-0.70
		86	347	0.72	0.59-0.84
		87	336	0.42	0.31-0.55
		88	329	0.44	0.32-0.55
		91	322	0.66	0.51-0.80
564	Coronation	1983	696	1.20	1.04-1.36
		85	228	2.34	
		88	408	1.41	1.17-1.66
		89	293	1.63	1.28-1.98

Table 2. Unit 3 deer harvest, 1987-91.

Regulatory year	Estimated legal harvest					Estimated illegal harvest	Total <sup>a</sup>
	M	(%)	F (%)	Unk.	Total		
1987/88	130	(100)		0	130	5	135
1988/89	234	(100)		0	234	6	240
1989/90	236	(100)		0	236	0	236
1990/91	228	(100)		0	228	22	250
1991/92	381	(100)		0	381	30	411

<sup>a</sup> Data from mail questionnaire survey.

Table 3. Unit 3 deer hunter residency and success, 1987-91.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	(%)	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	(%)	
1987/88	124	0	0	124	(31)	257	17	0	274	(69)	398
1988/89	175	12	0	187	(55)	148	7	0	155	(45)	342
1989/90	154	9	0	163	(46)	162	25	5	192	(54)	355
1990/91	131	43	0	174	(51)	145	18	2	165	(49)	339
1991/92	278	22	0	299	(49)	282	19	5	306	(51)	605

<sup>a</sup> Residents of Subunit 1B and Unit 3, Meyers Chuck, Point Baker and Port Protection

Note: Individual datum may not add to total due to rounding error. This table includes data that is also reported by registration permit.

Table 4. Unit 3 deer hunter effort percent by transport method, 1987-91.<sup>a</sup>

Regulatory year	Percent of effort						Number of trips
	Airplane	Boat	3- or 4-wheeler	Foot	ORV	Highway vehicle	Other
1987/88 <sup>b</sup>							
1988/89	4.2	68.6		3.4	4.2	19.5	677
1989/90	2.8	72.5		7.8	0.7	14.1	666
1990/91	3.8	60.7		14.1		20.6	708
1991/92	0.6	40.8	1.4	11.5	2.6	43.0	1,227

<sup>a</sup> The hunter mail survey reports transport as total number of hunting trips by method.

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Table 5. Unit 3 deer harvest chronology percent by month, 1987-91.

Regulatory year	Harvest periods						Total <sup>a</sup> deer
	August	September	October	November	December	January	
1987/88 <sup>b</sup>							
1988/89	16.8	13.0	40.3	28.2	0.80	0.80	238
1989/90	14.4	19.0	16.2	50.5	0.00	0.00	216
1990/91	36.4	10.4	24.0	24.8	4.40	0.00	250
1991/92	14.9	10.5	53.4	21.2	0.00	0.00	410

<sup>a</sup> May not equal harvest table due to rounding or incomplete reporting.

<sup>b</sup> Not available.

Table 6. Subunit 1B deer harvest, 1987-91.

Regulatory year	Estimated legal harvest		Unk.	Total
	M (%)	F (%)		
1987/88	65 (100)		0	65
1988/89	101 (100)		0	101
1989/90	73 (100)		0	73
1990/91	148 (100)		0	148
1991/92	50 (100)		0	50

\* Data from mail questionnaire survey.



Table 7. Subunit 1B deer hunter residency and success, 1987-91.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	(%)	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	(%)	
1987/88	31	18	0	49	(33)	81	18	5	104	(67)	153
1988/89	65	13	0	78	(44)	86	13	0	99	(56)	177
1989/90	40	15	0	55	(29)	97	35	5	137	(71)	192
1990/91	89	14	0	103	(52)	80	14	3	97	(48)	200
1991/92	37	8	0	45	(43)	40	17	2	59	(57)	104

<sup>a</sup> Residents of Subunit 1B, Unit 3, Meyers Chuck, Point Baker and Port Protection

Note: Individual data may not add to total due to rounding error.

Table 8. Subunit 1B deer hunter effort percent by transport method, 1987-91.<sup>a</sup>

Regulatory year	Percent of effort						Number of trips
	Airplane	Boat	3- or 4-wheeler	Foot	ORV	Highway vehicle	
1987/88 <sup>b</sup>							
1988/89		95.0		2.5			209
1989/90	5.5	90.4		1.4		1.4	324
1990/91		84.9	14.5	0.6			307
1991/92		85.6	14.4				148

<sup>a</sup> The hunter mail survey reports transport as total number of hunting trips by method.

Table 9. Subunit 1B deer harvest chronology by time period, 1987-91

Regulatory year	Harvest periods					Total <sup>a</sup> deer
	August	September	October	November	December	
1987/88 <sup>b</sup>						
1988/89	32.0	11.0	35.0	16.0	6.0	100
1989/90	6.8	0.0	31.5	49.3	12.3	73
1990/91	18.2	10.1	14.9	53.4	3.4	148
1991/92	9.8	0.0	47.1	21.6	21.6	51

<sup>a</sup> May not equal harvest table due to rounding or incomplete reporting.

<sup>b</sup> Not available.

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Table 10. Unit 3, Mitkof and Woewodski islands only, a comparison of hunter effort and success estimates from different sources, 1991.

	Source	
	Hunter mail survey	Registration permit report
Total hunters	312	603
Deer killed	167	214
Average deer/hunter	0.53	0.35
Total hunter days	1,116	1,636
Average days/hunter	3.58	2.71

## LOCATION

<u>Game Management Subunit:</u>	1C (7,600 mi <sup>2</sup> )
<u>Geographical Description:</u>	Southeast Alaska mainland and islands of Lynn Canal and Stephens Passage between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and drainages of Berners Bay

## BACKGROUND

Deer have resided in northern Southeast Alaska since their emigration from southern refugia after 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 were in Southeast Alaska at that time (Merriam, 1965). The 1962 harvest was 10,500 deer. Hunter surveys began in 1970 and have continued through the present. Pellet group counts (Kirchhoff and Pitcher, 1988) began in Subunit 1C in 1984, and have been conducted on Douglas, Harbor, Lincoln, and Shelter islands as well as the mainland.

## MANAGEMENT DIRECTION

### Management Objectives

Population objectives were established in the Strategic Plan for Management of Deer in Southeast Alaska 1991-1995 (ADF&G, 1991). Population objectives are listed by area within Subunit 1C:

Chilkat Range	586
Juneau Mainland	1,090
Shelter-Lincoln Islands	354
Douglas Island	1,326
Mainland-Taku Inlet to Cape Fanshaw	1,256
Total	4,612

In order to have a measurable target, staff identified the following as a management objective for Subunit 1C: 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

We issued 12,356 deer harvest tickets for the 1990 hunting season in Southeast Alaska and 12,271 for 1991. In 1990, we mailed hunter surveys to approximately 41% (5,073) of the 1990 harvest ticket holders; 49% (2,474) responded to the survey. In 1991, approximately 38% (4,629) were mailed surveys; 2,240, or 48%, returned the survey. We expanded survey results for hunter effort, success, and kill location to estimate results for all harvest ticket holders. We conducted pellet group surveys on north Douglas Island in spring 1991 and near Inner Point on Douglas Island in 1992.

## RESULTS AND DISCUSSION

### Population Status and Trend

No population estimates are available for deer in Subunit 1C. Pellet group survey information for 1991 and 1992 is scanty, when only Douglas Island was sampled. In the first year of the report period, pellet group densities on the new North Douglas Island transects averaged only 0.80/plot. The Douglas Island management goal of 2.0 pellet groups per plot was exceeded (2.05) in spring 1992 at Inner Point, although the number of plots sampled was less than optimum. Pellet group counts on Douglas Island have averaged 1.3 groups per plot since 1986 (Table 1), although that number includes the newly-established north Douglas Island transects and one year (1990) when no sampling took place. The spring 1991 count average of 0.80 was well below the long term average but represented the first year staff established those transects and cannot be easily compared to the Inner Point history. They are not yet useful for analyzing trends. The spring 1992 count produced results above the long term average. Although this data may be compared to past efforts at Inner Point, staff sampled a minimal number of plots. Higher elevations, where we would expect pellet densities to be lower, were under-represented in the results.

### Mortality

#### Season and Bag Limits:

1990:

Unit 1(C)            1 Aug.-31 Dec.

1991:

Unit 1(C), that    1 Aug.-31 Dec.  
portion including  
Douglas, Lincoln,  
Shelter, and Sullivan  
islands

#### Resident and nonresident hunters:

Four deer; antlerless deer may be taken only  
from 15 Sept.-31 Dec.

Four deer; antlerless deer may be taken only  
from 15 Sept.-31 Dec.

Unit 1(C),            1 Aug.-31 Dec.            Two antlered deer.  
remainder

Hunter Harvest: Data gathered from the annual deer hunter survey indicate that 499 deer were killed in Subunit 1C in 1990 and 417 in 1991 (Table 2). These harvest levels bracket the five-year average of 469 deer. Does comprised 34% of the 1990 harvest. In 1991 does were 41% of the kill. The latter figure is less than the highest of the 5-year period (1989 - 45%), but greater than the average doe take for that period (35%).

Hunter Residency and Success: In both years, most successful (90% and 91%) and unsuccessful (91% and 92%) hunters were residents of Subunit 1C (Table 3). Nonlocal residents made up most of the remaining hunters, at 10% and 9% of successful hunters and 9% and 7% of unsuccessful hunters during 1990 and 1991, respectively. In 1990, 5 nonresidents (2 successful) made up less than 1% of successful and unsuccessful hunters. In 1991, four nonresidents hunted without success.

During 1990 hunters took an average of 0.5 deer each, took 0.2 deer per hunter-day, expended 6.5 hunter-days per deer, and spent 3.4 days afield (Table 4). The 1990 hunter success rate (deer/hunter) was less than one-third that of 1989, and effort (hunter days/deer) doubled. The number of deer per hunter was well below the current 5-year average of 1.2. The number of deer per hunter day was lower than any year since 1985, and the number of days afield per hunter was slightly above the 5-year mean of 3.3.

During 1991 hunters took an average of 0.5 deer each. Hunters took an average of 0.1 deer per hunter-day, expended 7.2 hunter-days per deer, and spent 3.6 days afield. The 1991 success rate (deer/hunter) was identical to the previous year's, and effort climbed to 7.2 days/deer. The number of deer per hunter was well below the current 5-year average of 1.2. The number of deer per hunter day was even lower than in 1990, and the number of days afield per hunter remained above the 5-year mean of 3.3.

Transport Methods: Boats are usually the preferred form of transportation for deer hunters in Subunit 1C, but in 1990 this mode (29.3%) was superseded by both highway vehicles (36%) and foot access (32%). In 1991 hunters returned to their preference for boats with 41.3% of deer hunters using boats, 39.3% using highway vehicles, and 19.1% hunting only on foot. This variability in transport methods may reflect the effect bad weather has on hunting patterns in this subunit.

Board of Game Actions and Emergency Orders: The Board of Game reduced the bag limit for deer to 2 antlered animals for mainland portions of Subunit 1C after the 1990 season. This change was because of the low densities of deer on the mainland and was consistent with management actions taken in other areas with apparent low deer numbers. The total number of 1991 Subunit 1C deer hunters was 14% below the previous five-year average. This decline was probably because the success rate for Subunit 1C hunters declined and hunters traveled to other areas with more liberal bag limits.

## CONCLUSIONS AND RECOMMENDATIONS

Subunit 1C pellet count data for 1990 and 1991 are inconclusive because we sampled few transects and during 1991 we sampled only along new transects. Relatively high pellet group densities on Douglas Island in spring 1992 possibly reflected undersampling at high elevations. Pellet group sampling before the report period indicated reduced deer numbers overall on Douglas, Shelter, and Lincoln islands. With so few pellet group data for the report period, it is not possible to determine whether our current population objective of a mean pellet group density of 2.0 pellet groups per plot is being met. We should conduct annual transect counts on Douglas and Shelter islands.

Hunter survey data indicated a substantial decline in success as the report period began, and no recovery during the two years covered. The percent of females harvested increased dramatically in 1989, but returned to more normal numbers during the report period.

Despite trends noted above, we received little anecdotal information about deer hunting in Subunit 1C. This may be because many hunters using this area regard it as a secondary deer hunting area to be used when weather or time do not allow them to access Unit 4. We should consider further reductions in season and bag limit if we see downward trends in pellet group densities and if success per unit effort for all hunters remains low.

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Prepared by:

Matthew H. Robus  
Wildlife Biologist III

Submitted by:

Bruce Dinneford  
Regional Management Coordinator

Table 1. Unit 1C. Deer pellet group surveys, 1987-92.

Year	Mean pellet groups/plot	Number of plots	95 % CI
<b>Portland Island/VCU 27</b>			
1987	0.99	381	0.87-1.12
<b>Douglas Island/North Douglas/VCU 35</b>			
1991	0.8	300	0.65-0.96
<b>Inner Point/VCU 36</b>			
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	1.08-1.53
1992	2.05	204	
<b>Tracy Arm/Harbor Island/VCU 65</b>			
1987	1.28	200	1.00-1.56
<b>Shelter Island/VCU 124</b>			
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	
<b>Sullivan Island/VCU 94</b>			
1990	1.40	250	

Table 2. Subunit 1C. Annual deer harvest, 1986-91.

Year	M	F	Estimated Total
1986	296	138	434
1987	347	149	496
1988	325	118	443
1989	271	218	489
1990	330	169	499
1991	245	172	417

Data from expanded results of hunter surveys.

Table 3. Subunit 1C. Deer hunter residency and success, 1986-1991.

Year	Successful				Unsuccessful			
	Local Res.	Nonlocal Res.	Nonres.	Total	Local Res.	Nonlocal Res.	Nonres.	Total
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
1990	291	32	2	324	564	56	3	623
1991	209	21	0	230	551	42	4	597



Table 4. Subunit 1C. Statistics for successful deer hunters, 1986-1991.

Year	No. deer/ hunter	No. deer/ hunter day	No. hunter days/deer	No. days/ hunter
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
1990	0.5	0.2	6.5	3.4
1991	0.5	0.1	7.2	3.6

## LOCATION

Game Management Unit: Unit 4 (5,800 mi<sup>2</sup>)

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

## BACKGROUND

Unit 4 provides the bulk of deer hunting opportunity in southeast Alaska, accounting for an estimated 52% of the region's hunter effort and 73% of the deer harvest in the 1990-91 season. In 1991-92 the unit provided 47% of the effort and 60% of the deer killed in southeast Alaska.

Deer population peaks and declines are normal in Unit 4. Periodic declines have been attributed to severe winter weather and associated deep snow conditions (Olson 1979). Populations were low in the late 1940s, following years of heavy winter losses. By 1956 deer increased to exceed carrying capacity (Klein and Olson 1960). Winter severity appears to be on a 10-year cycle, with intervening winters mild. Most winters in Unit 4 were mild from the mid-1970s through 1987-88, with excellent winter survival of fawns and adult deer. During the winters of 1988-89, 1989-90, and 1990-91, however, persistent snow caused significant deer mortality. Winter 1990-91 broke records for snow persistence (M. Kirchhoff pers comm). Winter 1991-92 was very mild with little snow and no evidence of winter deer mortality.

Other game management units (Units 1, 2, and 3) in Southeast experience wolf (*Canis lupus*) predation as a contributing factor to deer losses (Merriam 1966, Smith et al. 1986), but wolves are absent or very rare in Unit 4. Brown bears (*Ursus arctos*) are numerous, but bear predation apparently has little impact.

Regulations during this report period are state regulations approved by the Alaska Board of Game and applied on all land in Unit 4. During the next report segment, regulations will reflect the assumption of wildlife management on federal lands by the federal government. The Federal Subsistence Board (FSB) has promulgated different deer regulations for 1992-93 on federal lands than those approved by the state Board of Game for adjacent nonfederal land.

## MANAGEMENT DIRECTION

### Management Objectives

Management objectives for Unit 4 deer are to: 1) maintain a population density capable of sustaining an average hunter kill of at least 1.5 deer; 2) maintain a population capable

of providing a minimum success rate of 1 deer killed per 4 hunter days; and 3) maintain the male component of the deer harvest at a minimum of 60%.

## METHODS

Population data were gathered through surveys of fecal pellet-groups on Admiralty, Baranof, Chichagof, and Kruzof islands in spring 1991-1992. The technique has been used to collect trend data for many years (Figures 1-3). Methodology is described in detail in Kirchhoff and Pitcher (1988).

Staff flew deer surveys during winter in fixed-wing aircraft. Observers measured snow depths and evaluated populations and winter range conditions.

We mailed a harvest questionnaire to a sample of deer harvest ticket holders to survey hunter effort and success for the 1990-91 and 1991-92 seasons (Clark 1992, 1991). The questionnaire asked hunters to indicate hunting effort, number of kills, months hunted, and kill locations by wildlife analysis area (Figures 4-6).

Each year, 2-person crews examined 7 mortality transects 1 mile in length to determine the extent of deer winter mortality. Transects were run on Kruzof, Baranof, and Chichagof islands. One observer searched for signs of dead deer within about 50 feet of the high tide line, while the other surveyed the area parallel inside the timber fringe. Observers recorded sex, age, and cause of death based on bone marrow condition.

## RESULTS AND DISCUSSION

### Population Status and Trend

The deer population has recently trended downward. Pellet-group surveys indicated decreased populations in most areas sampled. This probably reflects winter losses in 1988-89, 1989-90, and 1990-91. Beach mortality transects in those years showed significant losses of deer.

In January 1992, staff aerially surveyed 750 miles of coastline on Admiralty, Baranof, and Chichagof islands. Observers counted deer on the beaches and noted the percent snow cover. Observers counted 4 deer during the survey (M.D. Kirchhoff pers. comm.), an unusually low number.

Habitat quality and winter severity vary significantly throughout the unit because of local climactic factors such as solarization, influence of salt water masses, and overstory vegetation. Some local populations may still be at or near capacity, while most have fallen well below carrying capacity.

Pellet-group surveys are slow to reflect downward population trends. Deer winter mortality surveys and hunter contacts indicated that populations declined because of severe winters in the late 1980s, but pellet-group data in most of the unit continued to indicate high numbers until 1992. Pellet-group surveys indicated record deer numbers for winter 1990-91, while hunter contacts and routine field observations indicated low deer numbers. Management direction should be based on a variety of indicators, including pellet transects, hunter contacts, harvest questionnaires, and mortality transects.

Population Size: Figures 1-3 display pellet-group information for 6 transects which have the longest survey history. Deer pellet-group surveys conducted on Admiralty, Baranof, Chichagof, and Kruzof islands in spring 1991 and 1992 indicated a decline in numbers by 1992 (Table 1). The technique does not accurately reflect deer populations in late winter. Many deer that deposited pellets on the range in December and January could have died in February and March. Losses at that time are not evident until the following year's surveys.

The delay in detecting deer population declines can also be attributed to placement of transects in prime wintering habitat. When winter weather is severe, deer numbers decline at a slower rate in areas of prime habitat than deer in adjacent areas of marginal habitat. With pellet transects located in optimal ranges, it creates the illusion that populations are high throughout the area.

Population Composition: The sex composition of the legal kill was estimated from deer harvest questionnaires (Clark 1991, 1992). Hunters reported a 1991-92 take of 3,500 bucks, 62% of the total kill. Hunters took 7,900 bucks (63%) in 1990-91 (Table 2). We believe that the downward trend in buck harvest from previous years reflects a lower deer population. Many hunters may have killed a doe even though they may have wanted to kill a buck; hunters still tend to select for bucks although the either-sex season has been in effect for many years. Only bucks were legal in Unit 4 until 1955, when the first limited antlerless deer season was permitted in response to burgeoning populations (Klein and Olson 1960). -

### Mortality

#### Season and Bag Limit:

Unit 4, that portion of Chichagof Island east of Port Frederick and north of Tenakee Inlet including all drainages into Tenakee Inlet and Port Frederick

#### Resident and nonresident hunters:

Aug. 1--Jan. 31<sup>1</sup>

3 deer, however antlerless deer may be taken only from 15 Sept.-31 January

Remainder of Unit 4

Aug. 1—Jan. 31<sup>1</sup>

6 deer, however antlerless deer may be taken only from 15 Sept.-31 Jan.

<sup>1</sup> Closed January 12 in 1992 by Emergency Order.

Board of Game Actions and Emergency Orders. The Alaska Board of Game took no action on Unit 4 deer regulations during 1990 or 1991. The Unit 4 non-subsistence deer season was closed by Emergency Order No. 01-05-91 on January 12, 1992.

The emergency order read in part, "Deer populations in most of GMU 4 experienced excessive winter mortality during the late winter of 1990-91. Snowpack was 126% greater than the long-term average and 220% greater than the 1989-90 level in certain areas of northern Southeast Alaska. This snowpack persisted into the spring and summer, exacerbating the problem...Closure is needed to eliminate harvest pressure on deer that may concentrate along the shoreline during periods of deep snow. Any further mortality at this time would be additive and reduce the herd's ability to rebound to levels that will continue to provide desired hunter opportunity."

The Federal Subsistence Board took no action on Unit 4 deer regulations in 1990 or in 1991. The Federal Subsistence Board closed the Unit 4 subsistence season on federal lands on January 20, 1992.

Under the terms of the Alaska National Interest Lands Claim Act (ANILCA), the federal government assumed management responsibility for wildlife species on federal lands in the state. This could have resulted in different regulations for federally eligible and non-eligible deer hunters in Unit 4, but regulations were identical during the report period. The 1992-93 regulations will differ greatly.

Hunter Harvest: We mailed a questionnaire to a sample of deer harvest ticket holders to obtain harvest information during both seasons (Clark 1991, 1992). Analysis of hunter responses indicated that there were 4,850 hunters during the 1990-91 season; and 3,240 hunters in 1991-92, a decline of 33%.

In 1990-91 hunters reported killing 12,500 deer (rounded to nearest 100). In 1991-92 the reported kill dropped to 5,600 deer, a decline of 55%. The estimated crippling loss, unreported kills, and illegal kills was 10% of the reported harvest (Table 2). Based on these estimates, the total hunter-related mortality was approximately 13,750 deer in 1990-91. The estimated 1991-92 mortality was 6,160 deer.

Hunter Residency and Success: In 1990-91, a total of 2,046 hunters reported they resided in Unit 4, while 2,759 resident hunters lived outside the unit (Table 3). In 1991-92, a total of 1,293 hunters reported they resided in Unit 4, while 1,925 resident hunters lived outside the unit. There were 47 nonresidents in 1990-91 and 23 in 1991-92 who hunted in Unit 4. Eighty-two percent of the Unit residents were successful in 1990-91, and 64%

were successful in 1991-92. Nonlocal residents had a 77% success rate in 1990-91 and 65% success in 1991-92. Nonresidents had a 64% success rate in 1990-91 and a 61% rate in 1991-92. The success rate for all hunters was 79% in 1990-91 and 65% in 1991-92.

Harvest Chronology: During both 1990-91 and 1991-92, most hunting effort expended was during November. In November 1990 and 1991, 43% and 41% of the harvest occurred, respectively. During 1990-91, 10% (1,250) of the harvest occurred in January and 6% (336) of the 1991-92 harvest took place in January.

Transport: In 1990-91, hunters used boats for 70% of the hunting trips, 8% used airplanes, 10% walked from a community, 11% used highway vehicles, and 1% used off-road vehicles (including 3- or 4-wheelers and snow machines).

In 1991-92, transport use was almost identical. Hunters used boats in 70% of the successful hunting trips, 8% used airplanes, 9% walked from a community, 12% used highway vehicles, and 1% hunted from off-road vehicles. Transport use has changed little since the 1988-89 season, when such data were first collected.

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

Deer hunters use off-road vehicles in many locations where logging roads exist. Roaded areas which receive significant use include Wildlife Analysis Areas 3001, 3002, 3104, and 3308 (Figures 4-6).

Other Mortality: Snows of winter 1990-91 persisted later than normal, while winter 1991-92 was exceptionally mild (U.S. Dept. of Agric. 1991).

We examined seven 1-mile mortality transects in spring 1991 and 1992 at Port Krestof, Nakwasina Passage, Peril Strait, and Sitkoh Bay to determine extent of deer mortality. It is likely that not all carcasses were found due to terrain, vegetation density, observer experience, scavenging of carcasses by animals, and tidal action. Nevertheless, beach mortality surveys provide useful information about the relative effects of winters on deer (Klein and Olson 1960).

While the surveys provided trend data on deer mortality, the actual loss of deer in a given winter cannot be determined from the data. 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). However, many deer in that study were captured in the alpine and may have had a tendency to stay higher and farther from the beach than deer found at lower elevations.

The average for Kruzof Island, the Nakwasina area, and Fish Bay was 5 dead deer per linear mile of beach for winter 1990-91. Staff noted no deer mortalities for winter 1991-92, a very mild winter. Significant mortality occurred in 1988-89 and 1989-90 (Young 1990).

## CONCLUSIONS AND RECOMMENDATIONS

All management objectives were met during both hunting seasons. The average kill in 1990-91 was 2.6 deer per hunter with a hunting effort of 2.3 days per deer. Males made up 63% of the harvest. During 1991-92 hunters killed an average of 1.7 deer each with a hunting effort of 3.4 days per deer. Males made up 62% of the harvest.

Harvest questionnaire data provided an estimated deer harvest of 12,500 during the 1990-91 season (Clark 1991) and 5,600 during the 1991-92 season (Clark 1992). The number of deer killed decreased by 55%, while the number of hunters decreased 33% from 1990-91 to 1991-92.

During 1990-91, 79% of all hunters were successful. Although fewer deer were apparent in 1990-91 than in 1989-90, snows during the hunting season presumably forced deer to the beach in 1990-91 making them more vulnerable to hunting.

In winter 1991-92, 65% of the hunters were successful. Not only were populations lower, but winter conditions were mild with little snow. Deer were not forced to the beach, and many remained at high elevations during the season.

A major management concern is the differing regulations promulgated by the federal and state boards. Having different regulations on adjacent lands makes law enforcement difficult, confuses hunters, and lessens the credibility of management agencies. I recommend that ADF&G pursue the possibility of coordination meetings between the two boards to standardize regulations where possible.

Acknowledgments: Many people helped collect data under a variety of weather conditions. I am grateful for the help of all who assisted: Jere Christner, Ted Schenck, Captain Howard Ulrich, Mark Kirchhoff, Vic Staroska, Mike Weber, Bill Lorenz, Kris Rutledge, Artwin Schmidt, Dave Gordon, Phil Mooney, Todd Braun, Elizabeth Braun, Linda Bergdoll-Schmidt, Matthew Kirchhoff, Matt Robus, Kim Titus, LaVern Beier, Elliott Swarthout, and Bruce Dinneford.

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Prepared by:

Submitted by:

E. L. Young  
Wildlife Biologist III

Bruce Dinneford  
Regional Management Coordinator

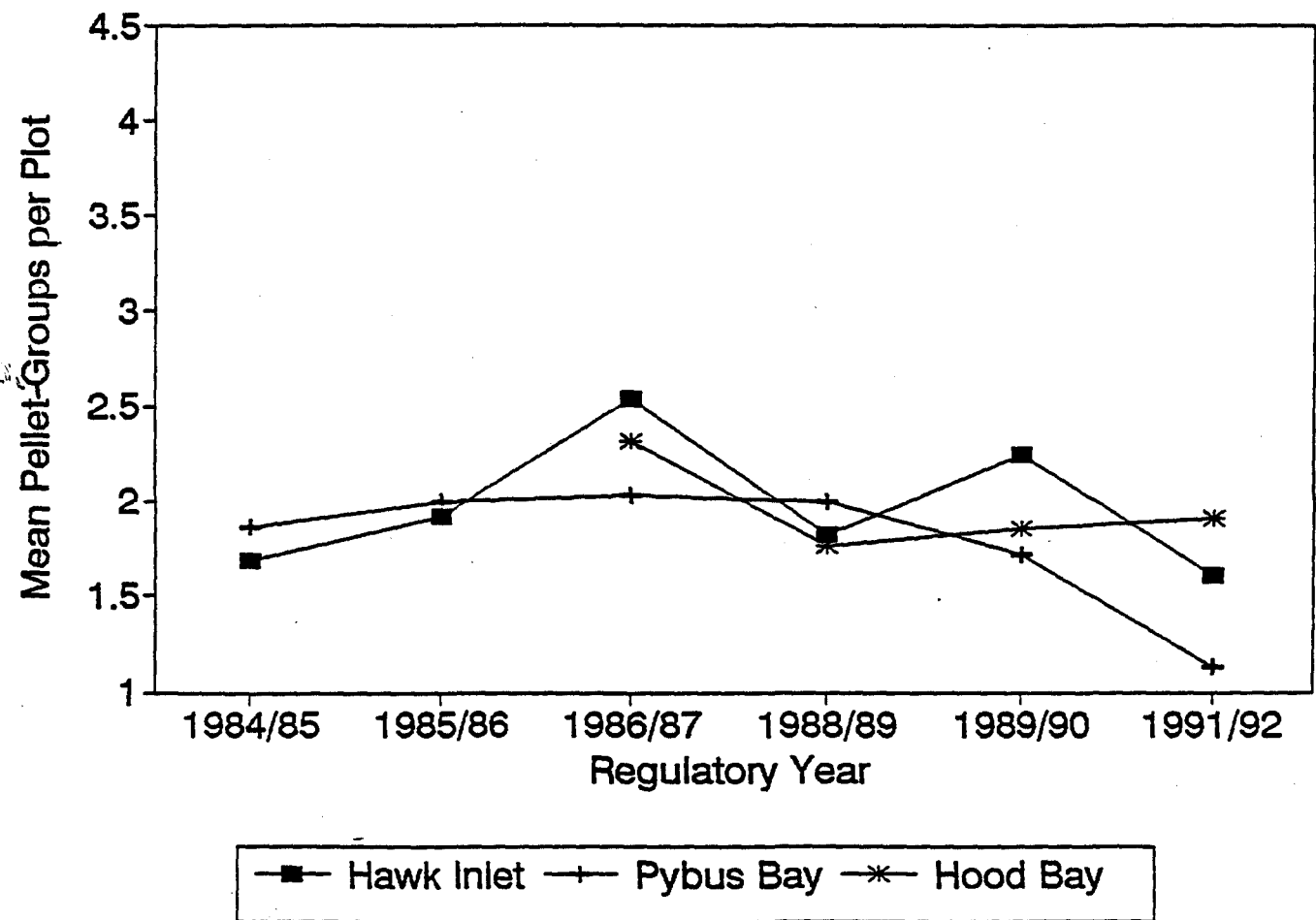


Figure 1. Deer pellet group survey results, Admiralty Island.

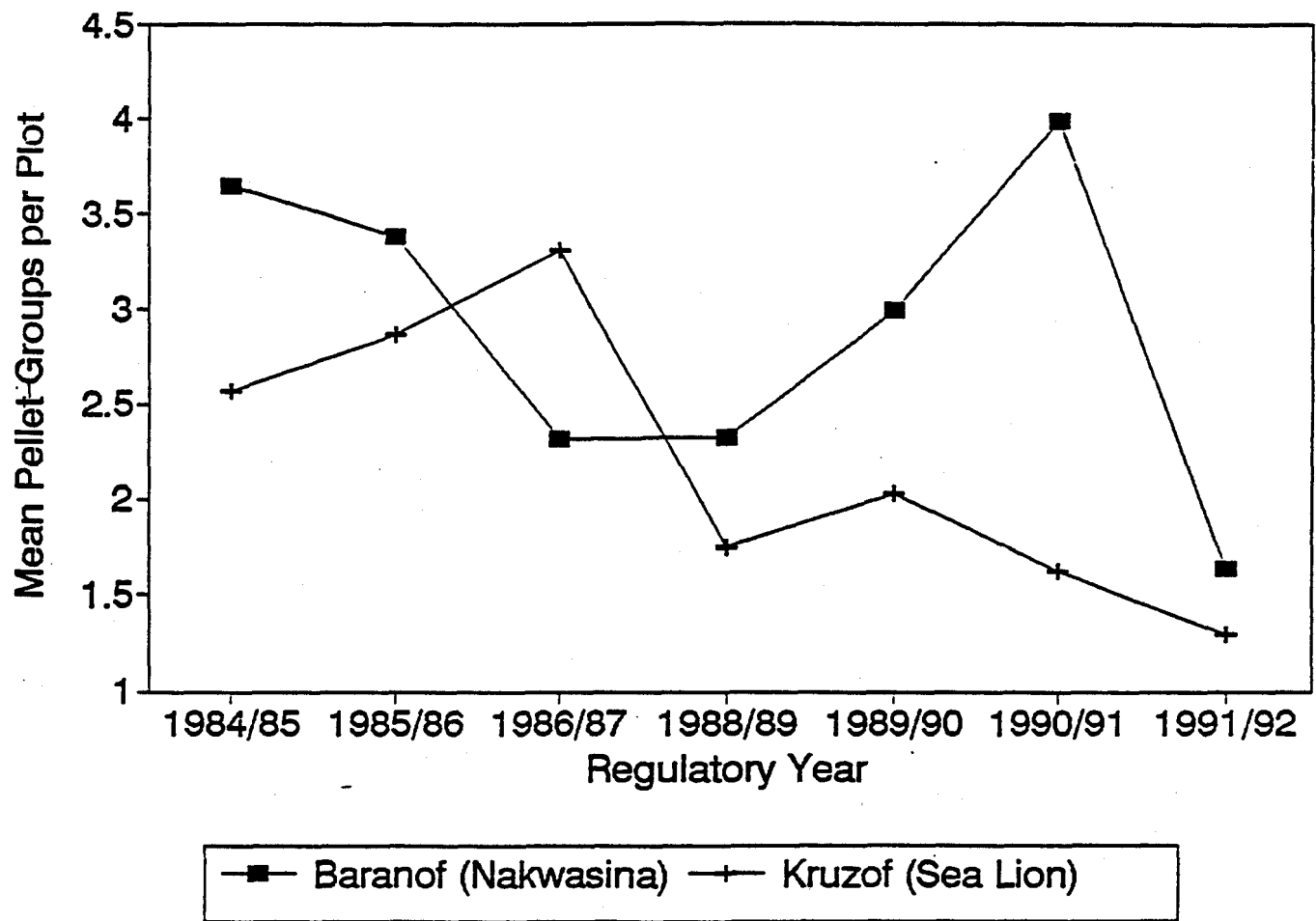


Figure 2. Deer pellet group survey results, Baranof and Kruzof islands, 1984-1992.

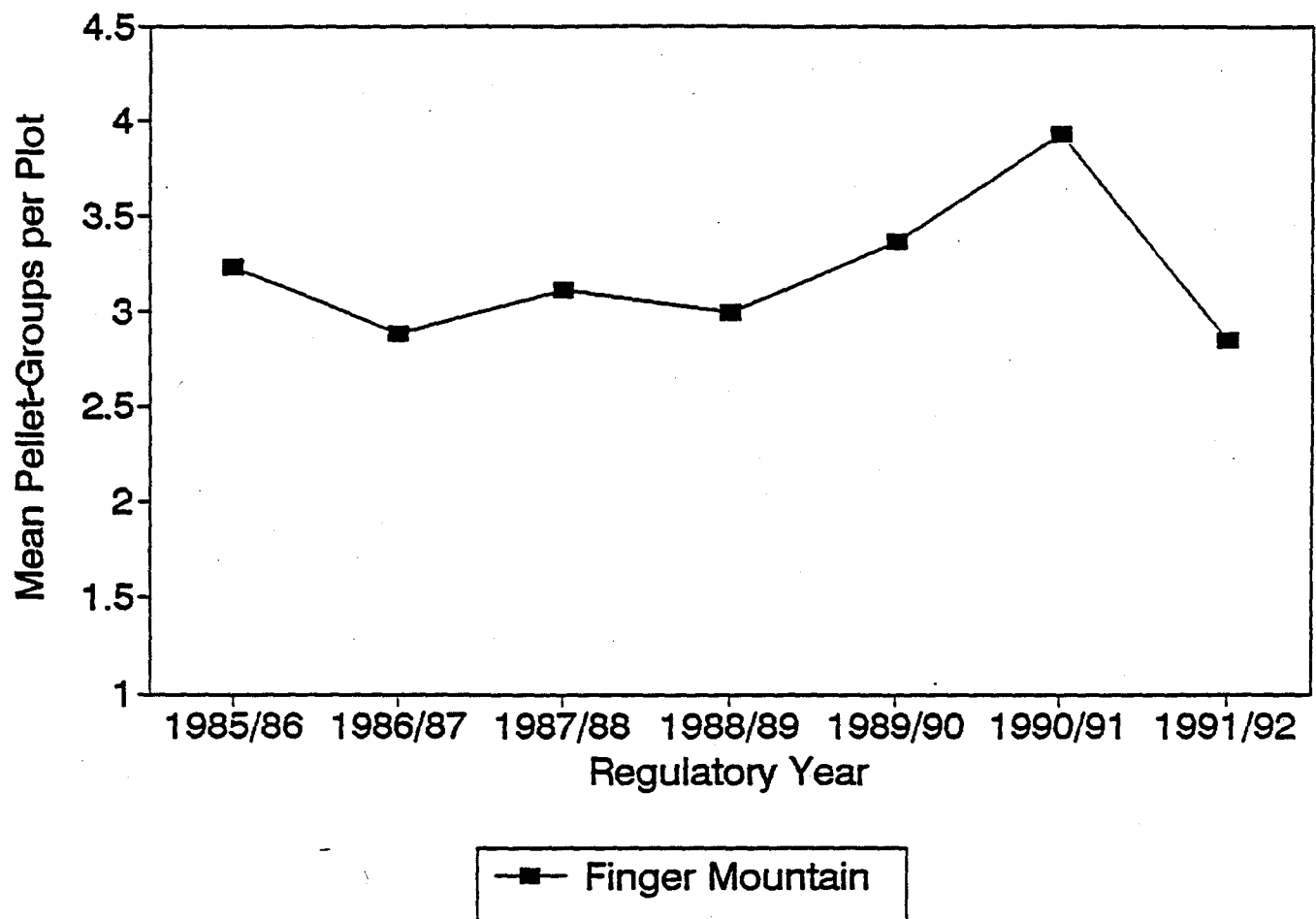


Figure 3. Deer pellet group survey results, Chichagof Island, 1985-1992.

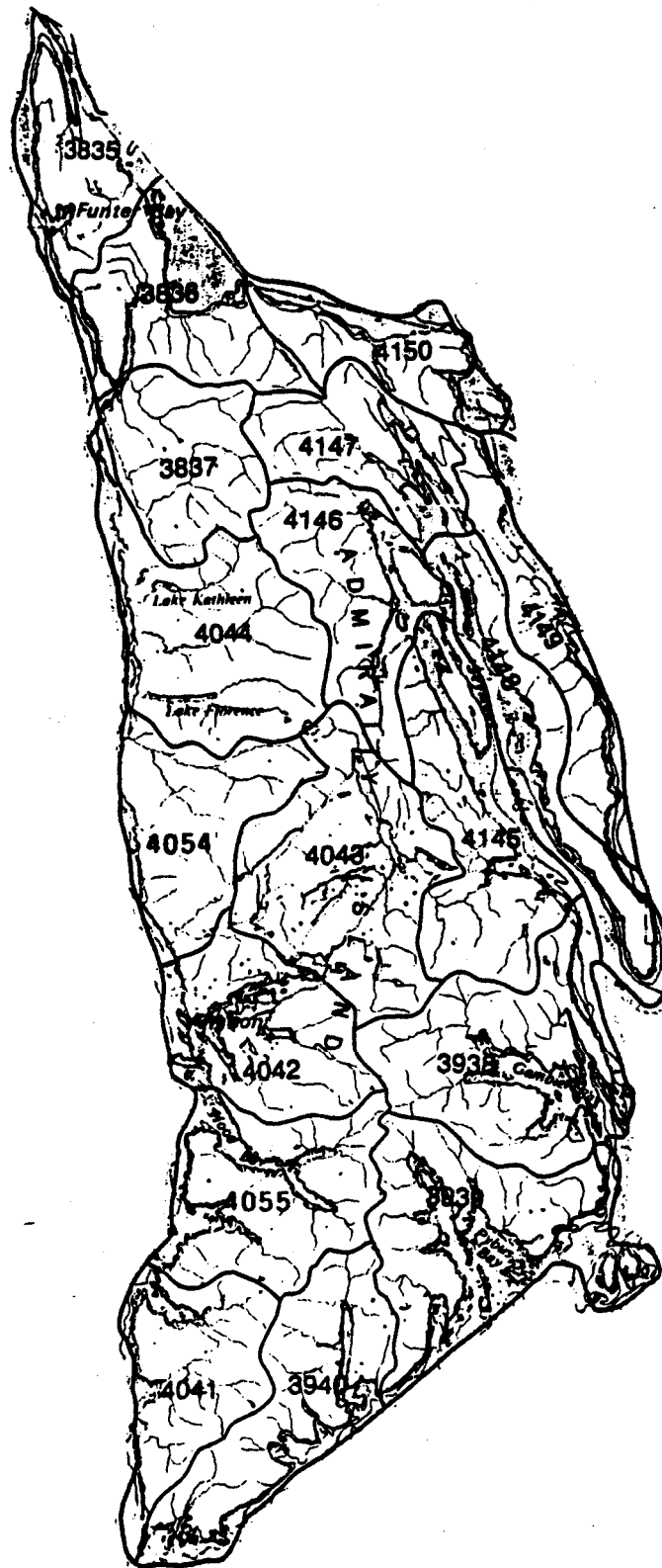


Figure 4. Admiralty Island Wildlife Analysis Areas.

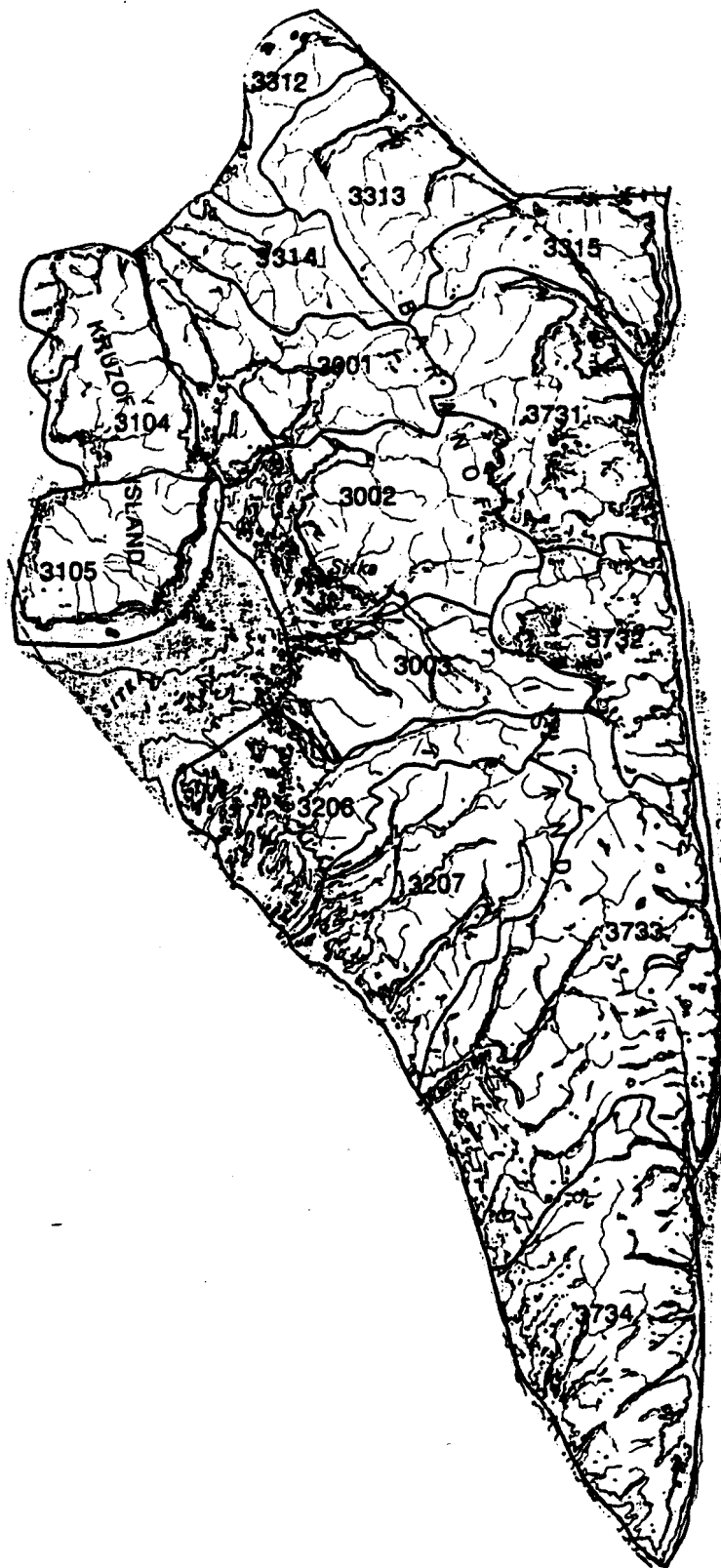


Figure 5. Baranof and Kruzof Islands Wildlife Analysis Areas.



Figure 6. Chichagof and Yakobi Islands Wildlife Analysis Areas.

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

Area	Regulatory year	Mean pellet groups/plot	Number of plots
128 - Hawk Inlet	1985/86	1.92	286
	1986/87	2.54	278
	1988/89	1.82	334
	1989/90	2.19	250
	1991/92	1.61	319
171 - Hood Bay	1986/87	2.31	358
	1988/89	1.77	366
	1989/90	1.85	375
	1991/92	1.91	360
182 - Pybus Bay	1985/86	2.00	235
	1986/87	2.03	242
	1988/89	2.00	156
	1989/90	1.72	221
	1991/92	1.13	236
185 - Pleasant Island	1990/91	1.38	311
	1991/92	1.34	210
189 - Port Althorp	1987/88	1.80	195
	1990/91	1.92	223
	1991/92	1.36	261
190 - Idaho Inlet	1987/88	1.34	258
	1991/92	0.94	219
209 - Suntaheen Creek	1987/88	1.22	272
	1991/92	1.13	271
218 - Pavlov River	1987/88	1.78	325
	1991/92	1.56	341
223 - Upper Tenakee	1987/88	1.47	253
	1991/92	0.59	265
231 - Saltery Bay	1987/88	2.02	256
	1991/92	0.97	256

(continued)



Table 1. Continued.

Area	Regulatory year	Mean pellet groups/plot	Number of plots
247 - Finger Mountain Chichagof Island	1987/88	3.11	236
	1988/89	2.99	305
	1989/90	3.36	225
	1990/91	3.93	150
	1991/92	2.85	207
300 - Nakwasina	1986/87	2.31	195
	1988/89	2.32	244
	1989/90	2.99	255
	1990/91	3.98	175
	1991/92	1.64	223
305 - Sea Lion Cove	1986/87	3.31	226
	1988/89	1.75	303
	1989/90	2.03	227
	1990/91	1.63	219
	1991/92	1.30	239

Table 2. Unit 4 deer harvest, 1987-1992.

Regulatory year	Estimated legal harvest <sup>a</sup>					Total <sup>c</sup>
	M (%)	F (%)	Unk.	Total	Estimated illegal harvest <sup>b</sup>	
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
1990/91	7,900 (63)	4,600 (37)	-	12,500	1,250	13,800
1991/92	3,500 (62)	2,100 (38)	-	5,600	560	6,200

<sup>a</sup> From mail questionnaire survey.

<sup>b</sup> Includes crippling loss estimate.

<sup>c</sup> Rounded to nearest 100.

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Table 3. Unit 4 deer hunter residency and success, 1987/88-1991/92.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total	
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
1990/91	1,677	2,135	30	3,842	369	624	17	1,010	4,852
1991/92	831	1,253	14	2,098	462	672	9	1,144	3,242

<sup>a</sup> Residents of Unit 4.

Table 4. Unit 4 deer harvest chronology by month, 1987-1992.

Regulatory year	Harvest periods						<u>n</u>
	August (%)	September (%)	October (%)	November (%)	December (%)	January (%)	
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
1990/91	554 (4)	669 ( 5)	1,360 (11)	5,347 (43)	3,378 (27)	1,201 (10)	12,511
1991/92	236 (4)	299 ( 5)	827 (15)	2,301 (41)	1,643 (29)	332 ( 6)	5,635

Table 5. Unit 4 deer hunting trips by transport method, 1988-1992<sup>a</sup>.

Regulatory year	Percent of harvest						<u>n<sup>b</sup></u>
	Airplane	Foot	Boat	ORV <sup>a</sup>	Highway vehicle	Unknown	
1988/89	9	9	71	3	8	--	--
1989/90	9	11	69	3	8	1	8,990
1990/91	8	9	70	1	12	--	11,976
1991/92	8	9	70	1	12	--	8,266

<sup>a</sup> Includes all off-road vehicles (including snowmachine, 3-wheelers, and 4-wheelers).

<sup>b</sup> Includes successful and unsuccessful hunters.

## LOCATION

Game Management Unit: 5 (6,200 mi<sup>2</sup>)

Geographical Description: Cape Fairweather to Icy Bay, eastern Gulf of Alaska Coast

## BACKGROUND

Deer were introduced to the Yakutat area in 1934, with the release of 7 does and 5 bucks (Burris and McKnight, 1973). These deer established a small herd on islands and the mainland along the east side of Yakutat Bay. Deer densities have been limited by habitat, deep snow, and predators. The population has supported small hunts. Many deer were taken during hunts for other species. The potential for this deer herd is very limited.

Because of deer declines in the 1970s and a virtual cessation of harvest, the deer season in Unit 5 was closed beginning July 1980. By the late 1980s, deer had recovered to some degree, and the public requested an open season. To provide an opportunity for legal deer hunting, the Board of Game instituted a limited deer hunt in Subunit 5A for 1991.

## MANAGEMENT DIRECTION

### Management Objectives

No formal management objectives were established for this deer population. Preliminary objectives are to sustain an effort level of 125 hunter days annually.

## METHODS

We issued 12,356 deer harvest tickets for the 1990 regulatory year in Southeast Alaska and 12,271 for 1991. In 1990, we mailed hunter surveys to approximately 41% (5,073) of the 1990 harvest ticket holders; 49% (2,474) responded to the survey. In 1991, approximately 38% (4,629) were mailed surveys; 2,240, or 48%, returned the survey. We expanded survey results for hunter effort, success, and kill location to estimate results for all harvest ticket holders. ADF&G staff have conducted intermittent pellet-group surveys on several islands and on the mainland near Yakutat since 1986. USFS crews gathered pellet-group data for the report period in spring 1991.

## RESULTS AND DISCUSSION

### Population Status and Trend

Deer populations remain low in the Yakutat area. Habitat condition and heavy snow accumulations on the mainland will probably prevent numbers from climbing significantly, though some islands in Yakutat Bay will continue to offer hunting opportunities.

### Mortality

#### Season and Bag Limits:      Resident and nonresident hunters:

1990:		
Unit 5	No Open Season	
1991:		
Subunit 5(A)	Nov. 1-Nov. 30	One antlered deer
Subunit 5(B)	No Open Season	

### Harvest

Hunter Harvest: Expanded deer hunter survey results indicate that two hunters were successful in taking one deer each in 1991. The harvest effort of 123 hunter days led to the establishment of the preliminary management objective for future seasons.

Hunter Residency and Success: All 36 hunters within Subunit 5A were local residents. Since the habitat in the Yakutat area supports low densities of deer and is not extensive, nonlocal hunters probably would not travel to this subunit to hunt deer.

Transport Methods: Virtually all (96.9%) of the 68 estimated deer hunting trips were made by boat. The remainder of the trips were made by highway vehicle.

Board of Game Actions and Emergency Orders: After 1990 the Board of Game instituted a season for deer in Subunit 5A, with a bag limit of one antlered deer during a November 1-November 30 season.

## CONCLUSIONS AND RECOMMENDATIONS

The deer hunt within Subunit 5A will remain an opportunity for Yakutat residents to legally harvest a small number of deer. Habitat conditions, predation, and snow depths will prevent the deer population from growing significantly. We should continue to collect pellet transect data to monitor deer population trends.

Prepared by:

Matthew H. Robus  
Wildlife Biologist III

Submitted by:

Bruce Dinneford  
Regional Management Coordinator

Table 1. Subunit 5A, deer population trends as indicated by pellet-group surveys, 1987-92.

Year	Mean pellet-groups/plot	Number of plots	95 % CI
Knight Island			
VCU 361			
1991	0.81	100	0.61-1.01
Humpback			
VCU 363			
1991	0.01	118	0.00-0.03
Yakutat Islands			
VCU 368			
1991	0.32	415	0.24-0.39
Ankau			
VCU 369			
1991	0.03	116	0.00-0.05

Table 2. Subunit 5A annual harvest, 1991.

Year	M	F	Estimated total
1991	2	0	2

Data from expanded results of hunter surveys.

Table 3. Subunit 5A, deer hunter residency and success, 1991.

Year	Successful				Unsuccessful			
	Local res.	Nonlocal res.	Nonres.	Total	Local res.	Nonlocal res.	Nonres.	Total
1991	2	0	0	2	34	0	0	34

Table 4. Subunit 5A, statistics for successful deer hunters, 1991.

Year	No. deer/ hunter	No. deer/ hunter day	No. hunter days/deer	No. days/ hunter
1991	0.06	0.06	1.00	3.41



## LOCATION

Game Management Unit: 6 (10,140 mi<sup>2</sup>)

Geographic Description: Prince William Sound and North Gulf of Alaska Coast

## BACKGROUND

Between 1916 and 1923 the Cordova Chamber of Commerce introduced Sitka black-tailed deer to Unit 6 by releasing 24 deer on Hawkins and Hinchinbrook islands in Prince William Sound (PWS) (Burris and McKnight 1973). This was the first big game transplant in the state and was one of the most successful. Deer quickly occupied vacant habitat on most islands in PWS and on some areas of the adjacent mainland. Deer population numbers reached a peak around 1945. Resulting habitat damage may have reduced carrying capacity (Robards 1952). Major winter die-offs occurred in the late 1940s, mid-1950s, late 1960s and early 1970s (Reynolds 1979). Today, deer exist in all subunits of Unit 6. The highest densities in PWS are on Hawkins, Hinchinbrook and Montague islands. Lower deer densities occur on mainland areas surrounding PWS, and deer densities decrease rapidly as distance from PWS increases.

Deer in Unit 6 are at the extreme northern limit of their range (Cowan 1969). The population thrives because of favorable environmental conditions on islands in PWS. Weather data from Hinchinbrook Island indicate the climate (Shishido 1986) is milder than on the surrounding mainland. Stands of old-growth forest provide food and shelter during winter (Shishido 1986, Reynolds 1979), and predation is minimal because there are no wolf or coyote populations. A change in these conditions will probably significantly influence the deer population.

The most important factors limiting deer populations are snow depth and duration (Reynolds 1979). Deer populations increase during mild winters and decline during severe winters when some deer starve. Four mild winters from 1985-86 through 1988-89 allowed the over-wintering population to increase to approximately 8,000-12,000 deer (Griese 1989). Subsequent, more severe, winters may have reduced the deer population. Hunting is also an important limiting factor when deep snow concentrates deer on beaches during open season. Harvest may become a more significant limiting factor in the future because of increasing numbers of hunters.

Deer harvesting began in 1935. It was monitored, from 1960 through 1979, by harvest reports and hunter contacts. Beginning in 1980, ADF&G obtained most information through questionnaires mailed to deer harvest ticket holders. The annual harvests before 1978 probably ranged between 500 and 1,500 (Reynolds 1979). Harvests began to increase after 1978 and peaked at around 3,000 in 1987. Harvests probably increased at an average annual rate of 14% between 1980 and 1984 (Griese and Miller 1986).

Clearcut logging of old-growth stands on private land in PWS is the most important deer management concern in Unit 6. Extensive logging is underway or planned on the mainland in eastern PWS and in Patton Bay on Montague Island. Research demonstrates the importance of these timber stands for overwinter survival of deer in coastal ecosystems in PWS (Shishido 1986) and in southeastern Alaska (Kirchhoff 1992, Yoe and Peek 1992, Schoen et al. 1985, Kirchhoff and Schoen 1987 and 1983, Schoen 1978). As old-growth is removed, the deer population in Unit 6 will decline.

## MANAGEMENT DIRECTION

### Management Objectives

The management objective for Unit 6 deer is to maintain a deer population to sustain an annual harvest of 1,500 deer, with a minimum harvest of 60% males and a minimum hunter success rate of 50%.

## METHODS

The USFS and ADF&G cooperated to monitor the population trend using pellet-group surveys conducted during late May and early June (Kirchhoff and Pitcher 1988). Mean number of pellet-groups per plot (PGP) and 90% confidence intervals were calculated for each location (Steel and Torrie 1960). Within each location, confidence intervals were compared among years to determine overlap. I assumed that means with non-overlapping confidence intervals had differences of management significance. Locations were grouped by geographic areas that included: Hawkins Island, Hinchinbrook Island, Montague Island, western PWS, and northern and eastern PWS (Figure 1).

Staff estimated overwinter survival of fawns from aerial survey composition counts done along the shorelines of Hawkins, Hinchinbrook and Montague islands during late March 1992. We flew our surveys in a Piper Super Cub flying 300-500 feet above ground over beaches at 60-80 mph. We classified deer as adults, fawns or unknown age.

I summarized snow depth and duration as number of days when snow cover at Port San Juan in southwestern PWS and at the Cordova Airport was within intervals of: 5-15 inches, 16-25 inches, 26-35 inches, 36-45 inches, and >45 inches (NOAA, Climatological Data Annual Summary Alaska). Depths were measured in openings at recording stations.

I estimated deer harvest from responses to questionnaires mailed to deer hunters who were issued harvest tickets in southcentral Alaska. I also included illegal harvest data in the estimate. Staff mailed approximately 3,000 questionnaires each year (30% of harvest ticket holders). I summarized total harvest, hunter residency and success, harvest

chronology, and transportation methods for Unit 6. I grouped total harvest data into the same geographic areas used for pellet-group surveys (Figure 1).

## RESULTS AND DISCUSSION

### Population Status and Trend

#### Population Size:

Staff completed deer pellet-group surveys in 5 locations during 1990-91, and 7 locations during 1991-92 (figure 1). An accurate estimate of deer population size was not possible using the data collected. However, pellet-group data indicated moderate densities in most areas, as compared to southeastern Alaska. In southeastern Alaska relative densities of PGP's were: extremely low, <0.5; low, 0.5-0.99; moderate, 1.0-1.99; high, 2.0-2.99; and extremely high >3.0 (Kirchhoff and Pitcher 1988). In PWS during this report period, the number of locations in each density range was: 1 very low, 3 low, 7 moderate, and 1 high (Table 1). The highest density was in the Shelter Bay-Deer Cove area on Hinchinbrook Island and the lowest density was in Port Chalmers on Montague Island.

Pellet-group data indicated deer numbers were probably stable on Hawkins Island, decreasing on Hinchinbrook and Montague islands, and stable in western PWS (Table 1). Comparisons of PGP's among years for each location where data were available indicated 4 increases and 8 decreases. Two of the increased PGP's were on Hawkins Island and 1 each on Hinchinbrook and Montague islands. The only increase of management significance, indicated by non-overlapping confidence intervals, was on Montague Island at Patton Bay. Overwinter mortality at this location may have been less than elsewhere on the island because of the high quality winter habitat provided by old-growth stands with exceptionally high timber volume. Among the decreased PGP's, 1 was on Hinchinbrook Island, 3 were on Montague Island, and 4 were in western PWS. The decrease on Hinchinbrook Island was significant, as were 2 of the 3 decreases on Montague Island.

Griese (1989) estimated 3,000-12,000 overwintering deer in PWS during 1988-89. Pellet-group surveys indicated an overall decline in the population during this report period. Mortality during the severe winter of 1990-91 was an important factor.

#### Population Composition:

We obtained composition data from Montague Island only. Staff surveyed Hawkins and Hinchinbrook islands, however, sample sizes were insufficient to calculate reliable estimates. Survival on Montague Island was low compared to previous years. Of 318 deer

observed, 49 (15%) were fawns, 269 were adults, and 1 was unidentified. Similar surveys in 1987-88 and 1988-89 found 23% fawns each year.

### Mortality

### Harvest:

Season and Bag Limit. The open season for subsistence, resident, and nonresident hunters was 1 August to 31 December. The bag limit was 4 deer; however, antlerless deer could be taken only from 1 November to 31 December.

Board of Game Actions and Emergency Orders. In regulatory year 1991-92, the Board of Game reduced the bag limit from 5 to 4 deer and delayed opening the antlerless deer season from 15 September to 1 November. The change was consistent with the department's recommendation. We felt the deer population had decreased because of higher mortality during severe winters in 1989-90 and 1990-91 and could not sustain harvests under the existing season and bag limit.

Hunter Harvest. The total deer harvest in Unit 6 during 1990-91 and 1991-92 was 2,580 and 1,898, respectively (Table 2). The 1990-91 estimated total was the second highest since 1984, and the 1991-92 total was the lowest since 1984. Large differences between the 2 years were because of a combination of lower deer densities and regulatory changes that reduced the bag limit and delayed the open season for antlerless deer.

As during past years, most deer harvested (40% in 1990-91 and 38% in 1991-92) came from Montague Island. Northern and eastern PWS had the lowest harvests, and other areas were intermediate. Harvests in specific areas between 1990-91 and 1991-92 appear to be related to deer abundance indicated by pellet-group surveys. On Hawkins Island and western PWS harvests were stable or slightly larger, and deer numbers were stable. The number of deer killed on Hinchinbrook and Montague islands decreased substantially, and deer abundance declined.

The harvest consisted of 57% males during 1990-91 and 73% males during 1991-92. The proportion of males in 1990-91 was similar to past years; however, the percentage of male deer harvested in 1991-92 was much higher than in the past because of the regulatory change restricting antlerless hunting opportunity early in the season.

Hunter Residency and Success. Approximately 1,642 and 1,691 individuals hunted deer in Unit 6 during 1990-91 and 1991-92, respectively (Table 3). Hunter success in 1990-91 was 54% and 45% the following season. Total number of hunters each year and the success rate for 1990-91 were similar to previous years. However, the success rate for 1991-92 was well below historic rates because of lower deer density and more restrictive regulations.

Among hunters in the 3 residency categories, the entire decline in success was from nonlocal Alaska residents and nonresidents. This occurred because the regulation changes had minimal impact on locals in Unit 6. Many local hunters know where the deer are located and they concentrated their efforts where chances of success were greatest. Many local hunters have large boats they can use to access PWS in poor weather during November and December which was when the antlerless deer season was open and snow depth forced deer to concentrate near beaches.

Harvest Chronology. Hunters took the most deer during November (36% in 1990-91 and 43% in 1991-92), taking advantage of rutting behavior and snow for tracking (Table 4). Other important months were October and December. This was the same pattern as in previous years.

Transport Methods. Boats were the most important transportation method used (Table 5). Airplanes were second, and ORV and highway vehicles were of minor importance. This was also the case in previous years with the exception of 1989-90, when airplanes were most important. During that year, contamination from the *Exxon Valdez* oil spill may have discouraged hunters who normally used boats.

#### Other Mortality:

I interpreted snow depth in excess of 25 inches in open areas as biologically significant to deer populations. When depth in the open exceeded 25 inches, accumulation in old-growth forest wintering areas probably exceeded 9 inches (35% of depth in open areas). This depth limited food availability and increased the energetic cost of movement. The relationship between depth in open areas and old-growth was modified from results of snow interception studies in southeastern Alaska that showed depth in high-volume stands averaged 29% of that in adjacent openings (Kirchhoff and Schoen 1987). The percentage was increased for PWS to 35% because stand volumes and potential for snow interception was probably lower than in southeastern Alaska. I based the assumption about energetic cost of movement upon Parker et al. (1984). Parker found that snow depths greater than 10 inches significantly increased the net cost of travel for mule deer.

Substantial overwinter mortality occurred during winter 1990-91 in western PWS and on Montague and Hinchinbrook islands. Snow measurements indicated a severe winter (Figures 2 and 3), and pellet-group surveys during 1991-92 suggested lower deer numbers on Montague and Hinchinbrook islands.

During 1990-91, snow depth near sea level exceeded 25 inches on 139 days at Port San Juan and on 15 days at the Cordova airport. Over the past 8 winters, this was the highest number of days recorded at Port San Juan and the second highest recorded at Cordova. The highest at Cordova was 25 days during 1988-89.

Winter 1991-92 was milder than 1990-91 and mortality was probably lower. Snow depth exceeded 25 inches at Port San Juan on 45 days and never exceeded that depth at Cordova airport. Observations during the aerial composition and pellet-group surveys indicated deer were in good condition and overwinter survival was high.

#### Habitat

#### Assessment:

Logging is scheduled to begin in Patton Bay on Montague Island during summer 1993. Construction of a haul road around the south end of the island from Patton Bay to a log transfer site in MacLeod Harbor will begin in fall 1992. Habitat alteration from these activities will negatively affect deer. Logging will remove high-volume, old-growth stands that provide critical winter forage and snow shelter on one of the highest density wintering areas in PWS. The haul road will be constructed almost entirely along beach fringe where deer concentrate during deep snow years. However, the road will be constructed under a USFS permit that restricts hauling under deep snow conditions. Those provisions could mitigate adverse effects of winter operations.

### CONCLUSIONS AND RECOMMENDATIONS

Objectives to sustain an annual harvest of 1,500 deer and to maintain a minimum of 60% males in the take were achieved. However, the objective of 50% success rate was not met during 1991-92. This was because of a combination of lower deer density and regulatory changes. I expect success will improve as the deer population recovers from the severe winter of 1990-91.

The management strategy applied during this report period was appropriate and I recommend no changes in regulations. The regulatory changes made in 1991-92 reduced the total harvest and decreased the proportion of females in the take as expected. This conservative harvest was needed after the population declined, and it should be continued until surveys indicate a recovery.

We should continue and refine pellet-group surveys and aerial composition surveys. Pellet-group surveys are good indicators of population trend; however, 90% confidence intervals around PGPs were too wide (up to +42%) at locations with less than 200 plots. We should increase sample size to at least 200 by adding a second transect adjacent to those already established. Composition surveys seem to be a useful indicator of fawn survival; however, we should evaluate them by comparing results to ground surveys in the same areas.

We should closely monitor the deer population and harvest on Montague Island where logging and road building are scheduled. We should repeat pellet-group surveys in spring

1993 at MacLeod Harbor, San Juan Bay, Jeanie Cove, and Patton Bay to get additional pre-logging information. We should summarize harvest data for the south end of the island and relate it to population trend to assess if regulations are appropriate or not.

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Prepared by

Roy Nowlin  
Wildlife Biologist -

Submitted by:

Jeff Hughes  
Wildlife Biologist



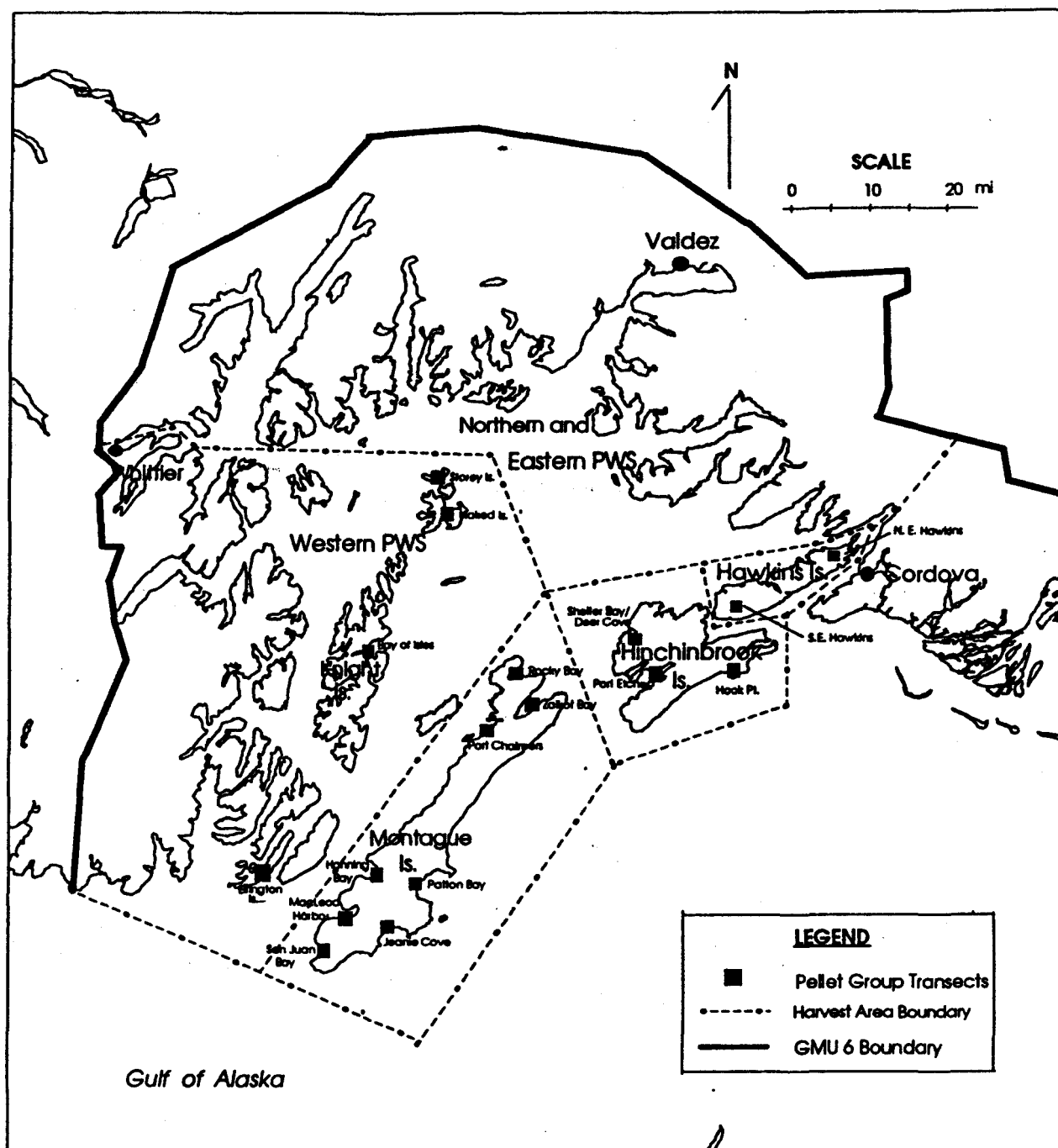


Figure 1. Unit 6 deep pellet group transect locations and harvest area boundaries.

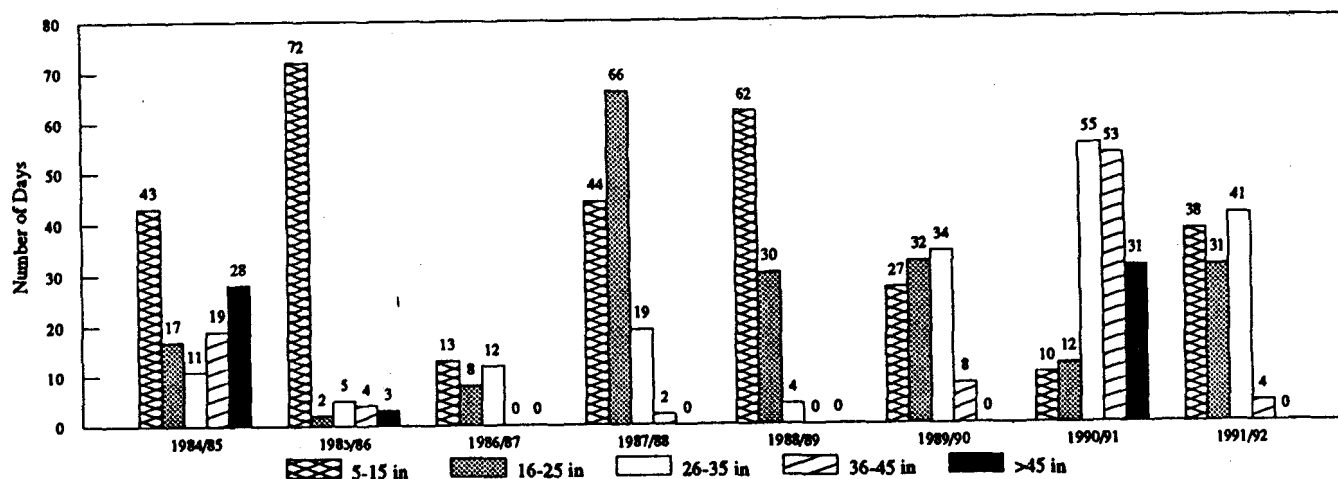


Figure 2. Snow depth and duration at Port San Juan in western PWS, 1984-91.

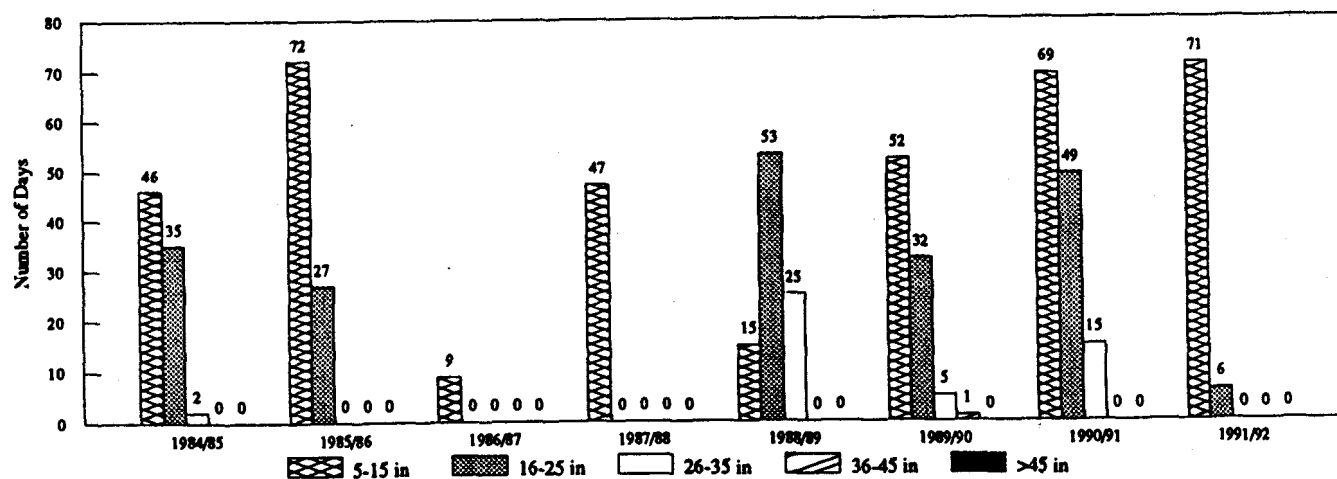


Figure 3. Snow depth and duration at Cordova, 1984-91

Table 1. Unit 6 deer population trends as indicated by pellet group surveys, 1987-1990.

Area	Specific location	Regulatory year	Mean pellet groups/plot	90% C.I.	Number of plots
Hawkins Island	N. E. Hawkins	1987/88	1.33 <sup>a</sup>	1.06-1.59	132
		1989/90	1.15 <sup>a</sup>	0.94-1.37	130
		1991/92	1.49 <sup>a</sup>	1.21-1.78	132
	S. E. Hawkins	1987/88	0.85 <sup>a</sup>	0.66-1.04	168
		1990/91	1.07 <sup>a</sup>	0.78-1.36	169
Hinchinbrook Island	Hook Point	1987/88	1.18	0.95-1.40	226
	Shelter Bay/Deer Cove	1987/88	2.40 <sup>a</sup>	2.04-2.76	186
		1990/91	2.43 <sup>a</sup>	2.07-2.79	197
	Port Etches	1989/90	2.76 <sup>a</sup>	2.38-3.15	136
		1991/92	1.68 <sup>b</sup>	1.44-1.92	189
Montague Island	Zaikof Bay	1987/88	1.18 <sup>a</sup>	0.98-1.39	203
		1989/90	1.23 <sup>a</sup>	1.00-1.46	206
		1990/91	0.92 <sup>a</sup>	0.73-1.12	206
	Rocky Bay	1989/90	1.25	1.06-1.44	250
	Port Chalmers	1987/88	0.46 <sup>a</sup>	0.34-0.57	173
		1991/92	0.23 <sup>b</sup>	0.13-0.33	182
	Hanning Bay	1989/90	0.41	0.30-0.51	208
	MacLeod Harbor	1988/89	0.89	0.75-1.03	222
(Cont.)					

Table 1. Continued.

Area	Specific location	Regulatory year	Mean pellet groups/plot	90% C.I.	Number of plots
Montague Island	San Juan Bay	1987/88	1.01 <sup>a</sup>	0.82-1.20	206
		1991/92	0.64 <sup>b</sup>	0.49-0.79	214
	Jeanie Cove	1989/90	1.60	1.38-1.83	266
	Patton Bay	1987/88	1.22 <sup>a</sup>	1.00-1.45	220
		1990/91	1.76 <sup>b</sup>	1.49-2.02	221
Western PWS	Elrington Island	1988/89	1.44 <sup>a</sup>	1.10-1.79	138
		1990/91	1.22 <sup>a</sup>	0.92-1.53	138
	Knight Island (Bay of Isles)	1988/89	1.30 <sup>a</sup>	0.88-1.71	158
		1991/92	1.16 <sup>a</sup>	0.67-1.66	123
	Naked Island	1988/89	0.65 <sup>a</sup>	0.51-0.78	240
		1991/92	0.56 <sup>a</sup>	0.41-0.71	196
	Storey Island	1988/89	1.28 <sup>a</sup>	1.05-1.51	166
		1991/92	1.15 <sup>a</sup>	0.93-1.37	205

<sup>a-b</sup> Means (x) with different letters (<sup>a</sup> or <sup>b</sup>) have confidence intervals that do not overlap.

Table 2. Unit 6 deer harvest, 1984-91.

Area	Regulatory year	Estimated legal harvest					Total	Estimated illegal harvest	Total
		M	(%)	F	(%)	Unk.			
Hawkins Island	1984/85	--	--	--	--	--	248	30	278
	1987/88	277	(60)	184	(39)	11	472	30	502
	1989/90	187	(63)	107	(36)	19	313	20	333
	1990/91	157	(51)	146	(48)	0	303	30	333
	1991/92	281	(82)	58	(17)	0	339	40	379
Hinchinbrook Island	1984/85	--	--	--	--	--	365	20	385
	1987/88	339	(63)	195	(36)	34	568	20	588
	1989/90	213	(57)	155	(42)	19	387	10	397
	1990/91	325	(59)	221	(40)	0	546	20	566
	1991/92	155	(63)	88	(36)	0	243	30	273
Montague Island	1984/85	--	--	--	--	--	1085	50	1,135
	1987/88	702	(70)	292	(29)	25	1019	50	1,069
	1989/90	543	(60)	349	(39)	38	930	40	970
	1990/91	574	(58)	409	(41)	0	983	50	1,033
	1991/92	460	(68)	210	(31)	0	670	60	730
Western PWS	1984/85	--	--	--	--	--	401	25	426
	1987/88	333	(69)	147	(30)	40	520	25	545
	1989/90	125	(65)	66	(34)	29	220	25	245
	1990/91	172	(51)	162	(48)	0	334	25	359
	1991/92	277	(78)	78	(21)	0	355	30	385

Table 2. Continued.

Area	Regulatory year	Estimated legal harvest <sup>a</sup>					Total	Estimated illegal harvest	Total
		M	(%)	F	(%)	Unk.			
Northern and Eastern PWS	1984/85	--	--	--	--	--	75	25	100
	1987/88	85	(62)	51	(37)	37	173	25	198
	1989/90	41	(74)	14	(25)	6	61	25	86
	1990/91	82	(53)	70	(46)	0	152	25	177
	1991/92	40	(75)	13	(24)	0	53	30	83
Unit 6 - Unknown Location	1984/85	--	--	--	--	--	26	0	26
	1987/88	56	(73)	20	(26)	0	76	0	76
	1989/90	4	(28)	10	(71)	27	41	0	41
	1990/91	61	(54)	51	(45)	0	112	0	112
	1991/92	37	(77)	11	(22)	0	48	0	48
Unit 6 - Total	1984/85	1407	(66)	714	(33)	79	2200	150	2350
	1987/88	1792	(66)	889	(33)	147	2828	150	2978
	1989/90	1113	(61)	701	(38)	138	1952	120	2072
	1990/91	1371	(56)	1059	(43)	0	2430	150	2580
	1991/92	1250	(73)	458	(26)	0	1708	190	1898

<sup>a</sup> From mail questionnaire survey.

Table 3. Unit 6 deer hunter residency and success, 1984-91.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Non-resident	Total	(%)	Local resident	Nonlocal resident	Non-resident	Total	(%)	
1984/85	346	582	--	928	(58)	176	496	--	672	(42)	1600
1987/88	445	655	11	1111	(55)	167	717	25	909	(45)	2020
1989/90	243	508	30	781	(53)	173	451	42	666	(46)	1447
1990/91	331	533	29	893	(54)	227	493	29	749	(45)	1642
1991/92	387	377	8	772	(45)	220	682	17	919	(54)	1691

<sup>a</sup> Resident of Unit 6.

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Table 4. Unit 6 deer harvest chronology percent by time period, 1984-91.

Regulatory year	Harvest periods					<u>n</u>
	August	September	October	November	December	
1984/85	4	10	32	37	17	697
1987/88	8	7	22	36	27	666
1989/90	5	9	22	48	15	830
1990/91	5	6	31	36	22	449
1991/92	11	6	15	43	25	375

Table 5. Unit 6 deer harvest percent by transport method, 1984-91.

Regulatory year	Percent of harvest					<u>n</u>
	Airplane	Boat	ORV	Highway Vehicle	Unknown	
1984/85	30	68	1	0	2	--
1987/88	31	66	0	0	3	--
1989/90	54	45	0	0	1	--
1990/91	38	56	0	3	3	302
1991/92	33	62	0	3	2	370



## LOCATION

Game Management Unit: 8 (5,097 mi<sup>2</sup>)

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 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 harvests and hunter success (Alexander 1970, 1973). An increase in the population occurred from 1972 to the mid-1980s, when the population reached peak numbers, exceeding 100,000 deer (Smith 1989). The population has declined since the 1987-88 winter because of overwinter mortality.

Hunter harvest surveys were used to assess trends in the deer population in the past 10 years. Department staff surveyed deer hunters by mail questionnaires for the 1980-81, 1983-84, 1984-85, and 1987-88 hunting seasons, and annual surveys began with the 1989-90 season. Field interviews and questionnaires distributed locally supplemented the mail surveys. We assessed winter mortality by searching for and examining deer carcasses in selected coastal wintering areas. We flew aerial surveys to assess winter conditions and physical appearance of deer. In 1990, the U.S. Fish and Wildlife Service (USFWS) began using various aerial and ground surveys to monitor deer population trends on the Kodiak National Wildlife Refuge.

Seasons and bag limits were liberal during the past 15 years. Seasons ranged from 153 to 184 days, and bag limits ranged from 4 to 7 deer of either sex. The bag limit increased from 3 to 4 deer in 1970-71, with a 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 deer and 7 deer were in effect in 1982-83. For the 1983-84 season the bag limit was reduced from 7 to 5 deer, and the season length was reduced from 184 to 160 days. That regulation was in effect through the 1990-91 regulatory year. The bag limit was reduced to 4 deer in 1991-92. A 1-deer bag limit has been in effect since 1961 for part of northeastern Kodiak Island which is accessible by road.

## MANAGEMENT DIRECTION

### Management Objective

The management objective for Unit 8 deer is to maintain a deer population that will sustain an annual harvest of 8,000 deer.

## METHODS

We mailed questionnaires to hunters 4 of the last 5 years, to assess trends in hunting effort and deer harvest. A hunter survey was not done for the 1988-89 season. We sent questionnaires to a random sample of deer harvest ticket holders, and derived harvest estimates from questionnaires returned. Of the 2,990 questionnaires sent in 1990-91, 1,757 were returned. Of the 3,000 questionnaires sent in 1991-92, 2,034 were returned.

Field interviews of deer hunters provided preliminary harvest data. Most field interviews were done by the USFWS on the Kodiak National Wildlife Refuge. Outfitters and transporters voluntarily submitted a few summaries of annual deer hunting activities.

We assessed natural mortality by searching for deer carcasses in selected coastal winter ranges each year. Aerial surveys and reports from the public provided additional information on winter severity and deer mortality.

We flew replicate aerial deer surveys over alpine habitat on northwestern Kodiak Island during August 1991 under a contract with USFWS to evaluate the technique as a population trend indicator.

In an attempt to develop techniques to monitor population trends, the USFWS did ground and aerial deer counts during January and February 1992 in several locations in the Kodiak National Wildlife Refuge. The USFWS also conducted deer winter mortality surveys in several deer wintering areas on the Kodiak National Wildlife Refuge during April and May 1992.

## RESULTS AND DISCUSSION

### Population Status and Trend

#### Population Size:

The deer population has been declining since the 1987-88 winter, the first in a series of severe winters with high natural mortality. At its peak in the mid-1980s, the deer population was estimated at more than 100,000. A trend toward colder winters, with more persistent snow, has prevailed since the 1987-88 winter. The winter of 1990-91 was an

exception when light overwinter mortality resulted in population increases. The increase was short-lived because mortality was again high during the 1991-92 winter. An objective estimate of the deer population can not be made, but on northern Kodiak Island where the decline was most pronounced, deer were less than half as abundant than during the mid-1980s. The population remained relatively high on the extreme southern end of Kodiak Island.

#### Population Composition:

Population composition changed with the decline in deer abundance. During the 1988-89 season, hunters reported fewer older, trophy-sized bucks. Hunters also reported fewer spike (yearling) bucks each year except 1991-92. Mortality surveys supported hunters' observations; incidence of fawns and adult bucks among winter-killed deer was high.

Deer counts varied widely during 3 replicate aerial surveys conducted in alpine habitat in August 1991. Totals ranged from 156-298 deer, with a range of 88-181 deer/hr. Only large antlered bucks and does with fawns were easily classified by sex. Bucks composed 4-6% of the deer seen in individual surveys, and fawns constituted 33% of each survey. Considering the large variation in sample size among surveys and the difficulty in classifying deer, we may have to appreciably increase sampling intensity to make this technique reliable for assessing population trends.

#### Distribution and Movements:

Deer occur throughout Unit 8 except on a few smaller offshore islands. A graduate study of seasonal movements and habitat use by deer of western Kodiak Island is expected to be published as an M.S. thesis by the University of Alaska in 1993.

#### Mortality

#### Harvest:

Season and Bag Limits. Open season for subsistence, resident and nonresident hunters in that portion of Kodiak Island north of a line from the head of Settlers Cove to Crescent Lake (57° 52'N., 152° 8'W), 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 east of a line from the mouth of Saltery Creek to Crag Point, and adjacent small islands in Chiniak Bay is 1 August to 31 October. The bag limit is 1 deer; antlerless deer may be taken only from 25-31 October.

Open season for subsistence, resident, and nonresident hunters in that portion of Kodiak Island and adjacent islands south and west of a line from the head of Terror Bay to the head of the southwesternmost arm of Ugak Bay is 1 August to 31 December. The bag limit is 4 deer; antlerless deer may be taken only from 1 October to 31 December.

Open season for the remainder of Unit 8 is 1 August to 31 December. The bag limit is 4 deer; however, antlerless deer may be taken only from 1 October to 31 December and no more than 1 antlerless deer may be taken from 1 October to 30 November.

Federal subsistence hunting regulations conform to the State regulations except that Unit 8 residents have a bag limit of 5 deer when hunting on the Kodiak National Wildlife Refuge.

Board of Game Board Actions and Emergency Orders. In 1991, the Board of Game passed regulations which reduced the season bag limit from 5 to 4 deer, changed the antlerless season opening from 15 September to 1 October, and implemented a bag limit of 1 antlerless deer from 1 October to 30 November for part of northern Kodiak, Afognak, Raspberry and Shuyak islands. The board's action responded to proposals from the public and the staff to reduce the bag limit because of a continuing decline in the deer population. Staff proposed the seasonal bag limit on antlerless deer as an alternative to smaller bag limits proposed by the public for northern Kodiak Island.

Under their authority to regulate subsistence harvest on federal lands, the Federal Subsistence Board retained the 5-deer bag limit for subsistence hunters on the Kodiak National Wildlife Refuge for the 1991 season. Only Unit 8 residents qualified as subsistence hunters under federal regulations.

Hunter Harvest. Harvests have declined since the 1987-88 season, when approximately 6,000 hunters were afield, and the estimated harvest was more than 13,000 deer (Table 1). The estimated harvest declined from 10,038 deer in 1989-90 to 8,106 deer in 1990-91 (Table 1). We estimated a small increase to 8,948 deer for the 1991-92 season. Hunting pressure showed a similar pattern, declining from 4,815 hunters in 1989-90, to 4,176 hunters in 1990-91, and increasing to 4,421 hunters in 1991-92 (Table 2). The harvests reflected the decline in deer population since winter 1987-88. The small increase in the 1991-92 harvest correlated with improved survival during the 1990-91 winter.

Males comprised 67% of the overall harvest in 1990-91, the lowest frequency of males in the harvest in the past 5 years. The low male harvest was most evident in part of Kodiak Island north of a line from Viekada Bay to Kiliuda Bay, where < 60% males were harvested in 7 of 8 harvest reporting areas. Improved overwinter survival was reflected in the 1991-92 harvest with an increase to 73% males overall and > 60% harvest of males in 7 of 8 harvest areas in northern Kodiak Island.

Hunter Residency and Success. Minimal annual variation occurred in the proportions of non-residents, Unit 8 residents and nonlocal Alaska hunters afield (Table 2). From 1987 to 1991, 38-41% of the hunters afield were Unit 8 residents. Participation by nonlocal Alaskans ranged from 49-51%, and 7-11% of the hunters were nonresidents.

The percentage of hunters that took at least 1 deer ranged from 74-76% (Table 2). Nonlocal residents had slightly higher hunter success (range = 76-78%) than Unit 8 residents (range = 70-75%). Nonresident hunter success ranged from a low of 63% in 1990-91 to a high of 76% in 1991-92. The mean number of deer per hunter declined from a high of 2.3 in 1987-88 to a low of 1.9 in 1990-91, but increased to 2.1 deer per hunter in 1991-92 (Table 3). Only 5% of hunters harvested the 5 deer bag limit provided under federal subsistence regulations, well below the frequency recorded during previous seasons (Table 3).

Harvest Chronology. The number of deer taken in November and December has increased since 1989-90 (Table 4). This correlated with the decline in the deer population that began in the 1987-88 winter. Nearly 70% of the harvest occurred in November and December 1991, compared to approximately 55% of the harvest in 1980, 1983 and 1984. Hunters apparently adapted to the smaller deer population by shifting to late-season hunts after deer moved to lower-elevation winter range and were more vulnerable to hunting.

Transport Methods. Aircraft and boats accounted for approximately 80% of the transportation used by deer hunters (Table 5). Aircraft were slightly favored over boats for access.

#### Other Mortality:

Winter-kill was an important mortality factor in 4 of the past 5 years. Sampling intensity varied somewhat among years, but mortality surveys were done each year since 1989 in the same coastal strip in Spiridon Bay drainage near Chief Cove. The mortality surveys indicated good overwinter survival in 1990-91, and high fawn losses in other years (Table 6). The USFWS conducted additional mortality surveys in Uganik Bay and at several locations in eastern Kodiak Island (Zwiefelhofer and Stovall 1992). Those surveys indicated relatively light winter mortality in eastern Kodiak Island compared to western Kodiak Island. Smith (1991) found coastal mortality transects useful for determining sex and age composition of deer winter losses, but applying this method to assess population trends was questionable (Kirchhoff and Pitcher 1988; Schoen and Kirchhoff 1983).

A local hunter observed an estimated 100-200 deer carcasses floating in Geese Channel on 9 December 1990. The deer probably drowned while swimming between Aiaktalik or Geese islands and the southeastern tip of Kodiak Island. Smith (1991) documented a mass drowning of deer in 1988 at Tanner Head in Alitak Bay.

Predation by free roaming dogs near communities is a common, but poorly documented source of mortality. Motor vehicle collisions kill an estimated 15-20 deer annually. Predation by brown bears occurs, but it is not a limiting factor.

Deer harvest outside the legal hunting season occurs commonly in remote areas. We estimate the illegal harvest at 10-15% of the legal harvest. Rigorous enforcement of

hunting regulations occurs only along the approximately 100-mile road system near the town of Kodiak.

### Habitat

#### Assessment:

The recent decline in the deer population has reduced pressure on winter ranges, but an objective assessment of browse conditions has not been attempted. The USFWS recently completed a research project on deer habitat use on Kodiak Island. The thesis on that research is expected to be completed in 1993.

Since 1975, much of the Sitka spruce forest in central and eastern Afognak Island has been logged by clearcutting. Mature spruce stands have rapidly converted to shrub/grass communities. Studies in southeastern Alaska indicated that old-growth forest was critical in maintaining deer populations (Wallmo and Schoen 1980).

I suspect that logging of winter range on Afognak Island will initially reduce deer carrying capacity. Forage abundance may increase as the shrub/grass stage develops, but forage availability in winter depends on snow depth and snow density. Although deer occur on Kodiak and other islands where mature spruce stands are scarce or absent, deer populations incur severe winter mortality when deep snow persists at low elevation.

#### Nonregulatory Management Problems/Needs

Initiating a hunter survey by mail questionnaire on an annual basis in 1989-90 was an important step toward more intensive management advocated by Smith (1991). A standardized technique has been developed to economically monitor trends in harvest sex ratios, hunter success and hunting effort. Every effort to improve accuracy of the mail questionnaire survey should be continued.

Better precision in assessing the size and composition of the deer population is desirable. Developing techniques to accomplish this will be expensive and deer management will need to be a priority. Direct and indirect counts vary highly because seasonal deer movements, related to snow conditions and phenology of vegetation, vary among years. The USFWS initiated aerial and ground deer counts in several deer wintering areas in the Kodiak National Wildlife Refuge during 1992 in an effort to develop a "subsistence deer population availability index" (Zwiefelhofer and Stovall 1992). They concluded that censusing deer with aerial surveys required intensive effort to develop corrections for variations in sightability.

The potential for deer management conflicts between state and federal land managers increased greatly with the recent federal takeover of subsistence management. Approximately 50% of the deer habitat in Unit 8 is in the Kodiak National Wildlife

Refuge. Under federal regulations only Unit 8 residents qualify as subsistence hunters. The Alaska National Interest Lands Conservation Act gives precedence to rural subsistence hunting on Federal lands. The USFWS has stated, if the deer population declines such that harvest must be reduced, all nonsubsistence hunting (hunting by nonresidents and Alaska residents not domiciled in Unit 8) would have to be eliminated before any restrictions in subsistence hunting would be justified. For that reason, the Federal Subsistence Board retained the 5-deer bag limit on federal lands in 1991 when the Board of Game reduced the bag limit to 4 deer. Close cooperation between the state and the USFWS will be increasingly important in deer management issues.

## CONCLUSIONS AND RECOMMENDATIONS

After reaching peak levels in the mid-1980s the deer population declined because of high mortality in fawns and increased mortality of adults, particularly bucks, during 4 of the past 5 winters. A 3-year decline was reversed during winter 1990-91. A subsequent decline occurred in 1991-92 when heavy snow and unusually cold conditions prevailed in March and April; this contributed to relatively high deer mortality on northern Kodiak Island. Deer population numbers remained high on the southern one-third of Kodiak Island where winter losses were less severe.

Hunter success and the average harvest per hunter varied little during this report period. Hunting pressure shifted to more productive areas and hunting increased in November and December when deer were more vulnerable. These changes contributed to maintaining hunter success. The annual harvest and the number of hunters declined from 1987 to 1990, though these numbers increased slightly in 1991.

Effectiveness of the more restrictive hunting regulations imposed for the 1991-92 season was difficult to evaluate. With improved survival in the 1990-91 winter, the deer population increased. The harvest and the number of hunters also increased slightly. The board reduced the bag limit from 5 to 4 deer. A 5-deer limit which was in effect on federally-managed lands may have minimized the effect of the state regulation. The 1 antlerless deer bag limit imposed in 1991-92 shifted the harvest somewhat toward bucks. The frequency of antlerless deer in the harvest declined in 6 of the 7 harvest reporting areas affected. The estimated harvest of antlerless deer increased in 4 of the 7 areas. A decline from 33% females in 1990 to 27% females in the 1991 harvest occurred for all of Unit 8. Hunter reports and field observations indicated the buck:doe ratio has declined in northern Kodiak and Afognak islands since 1987. Recruitment was low during 4 of the past 5 years, and older bucks have suffered proportionally higher overwinter mortality rates than does. On southwestern Kodiak Island where winter mortality was less severe, adult bucks were comparatively abundant. During 1991, 86% of the harvest was male in that part of Kodiak Island west of Larsen Bay and southwest of Old Harbor, compared to 76% males overall in Unit 8.

Reduced season and bag limits in 1991-92 seemed to limit the antlerless deer harvest in northern Kodiak and Afognak islands. I recommended no changes in season and bag limits.

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Prepared by

Roger B. Smith  
Wildlife Biologist

Submitted by

Jeff Hughes  
Wildlife Biologist

Table 1. Unit 8 deer harvest, 1987-91.

Regulatory year	Estimated legal harvest <sup>a</sup>				Estimated illegal harvest	Total
	M (%)	F (%)	Unk.	Total		
1987/88	10,844 (80)	2,702 (20)	245	13,791	No estimate	13,791
1988/89 <sup>b</sup>						
1989/90	6,923 (73)	2,625 (27)	490	10,038	No estimate	10,038
1990/91	5,367 (67)	2,739 (33)		8,106		
1991/92	6,569 (73)	2,379 (27)		8,948		

<sup>a</sup> From mail questionnaire survey.

<sup>b</sup> No survey.

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Table 2. Unit 8 deer hunter residency and success, 1987-91.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total (%)	Local <sup>a</sup> resident	Nonlocal resident	Nonresident	Total (%)	
1987/88	1,851	2,410	290	4,551 (76)	645	665	161	1,471 (24)	6,022
1988/89 <sup>b</sup>									
1989/90	1,341	1,851	368	3,560 (74)	487	585	183	1,255 (26)	4,815
1990/91	1,260	1,627	185	3,071 (74)	550	448	107	1,105 (26)	4,176
1991/92	1,414	1,702	262	3,378 (76)	479	479	85	1,043 (24)	4,421

<sup>a</sup> Includes all residents of Unit 8 with Alaskan addresses in 1989/90.

<sup>b</sup> No survey.

Table 3. Unit 8 comparison of deer hunter questionnaire results for 1980-81, 1983-84, 1984-85, 1987-88, 1989-90, 1990-91, and 1991-92 seasons.

Regulatory year	% 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
1990-91	74	19	67	33	8,106	4,176	1.9	2.9
1991-92	76	5	73	27	8,948	4,421	2.0	2.7

\* Bag limit 4 deer in 1980; 5 deer in 1983-1990; 5 deer on Kodiak National Wildlife Refuge and 4 deer on non-federal lands in 1991.

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Table 4. Unit 8 deer harvest chronology percent by time period, 1980-91.

Regulatory year	Harvest periods						<u>n</u>
	August	September	October	November	December	January	
1980/81	6	9	24	33	22	6	5,347
1983/84	5	7	25	37	18	7	9,897
1984/85	5	9	28	41	15	3	8,905
1987/88	5	8	26	41	18	3	13,791
1989/90	3	6	20	51	18	3	10,038
1990/91	5	4	24	43	23	2	8,106
1991/92	5	5	20	40	30	0	8,948

Table 5. Unit 8 deer harvest percent by transport method, 1987-91.

Regulatory year	Percent of harvest									n
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Other	Unknown	
1987/88	34	--	40	--	--	5	16	2	3	2,638
1988/89 <sup>a</sup>										
1989/90	38	--	31	--	--	4	14	4	9	3,156
1990/91	43	<1	35	4	<1	1	9	9	0	724
1991/92	43	<1	39	5	<1	1	11	14	0	862

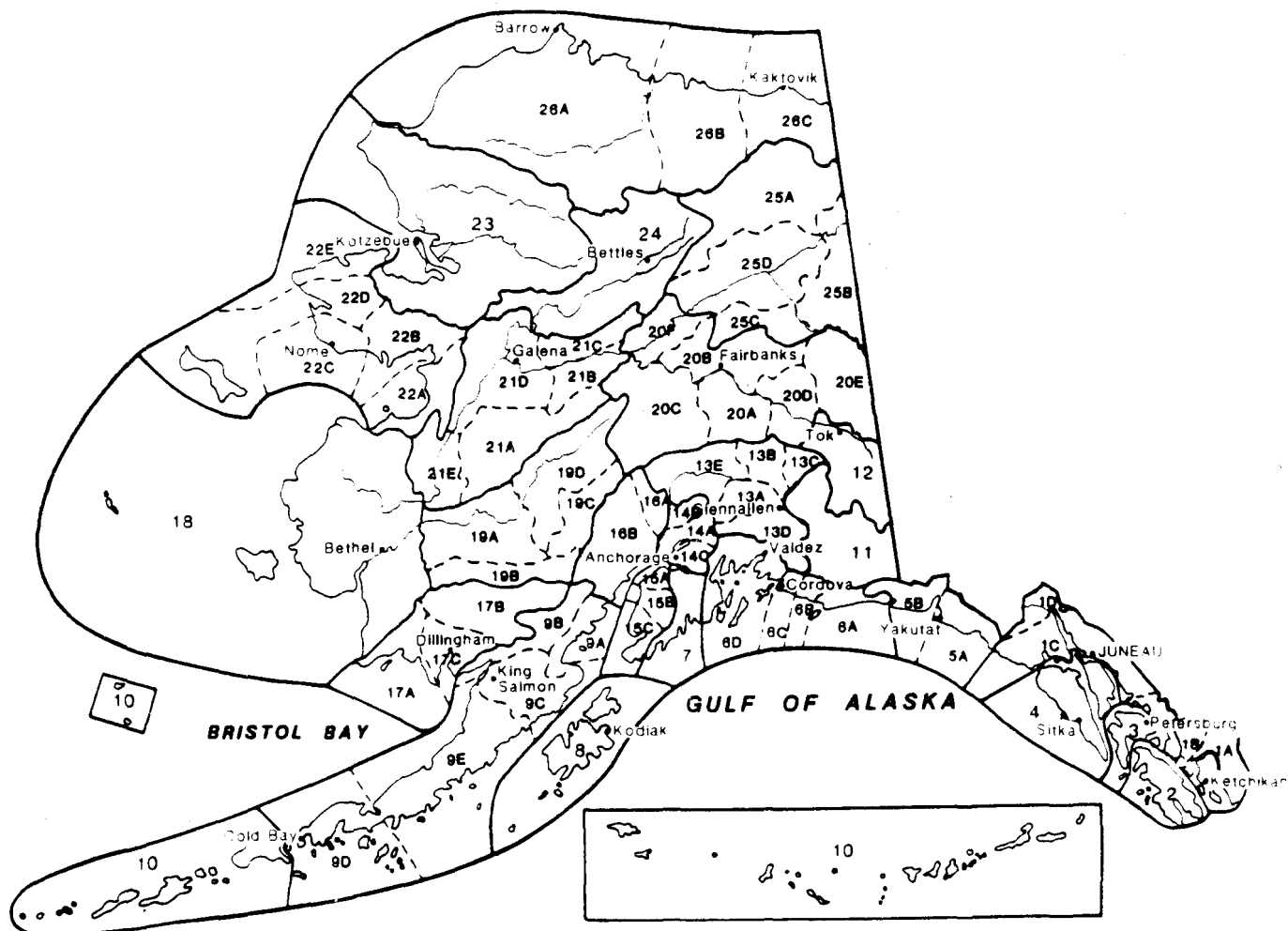
<sup>a</sup> No survey.

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Table 6. Unit 8 sex and age composition of deer winter-kill from beach mortality transects, 1988-1992.

Regulatory Year	Adult				Fawn				Sex	Unk. age/		All	
	M (%)	F (%)	Unk.	Total	M (%)	F (%)	Unk.	Total		M (%)	F (%)	Unk.	Total
1987-88	8 (89)	1 (11)	3	12	6 (50)	6 (50)	18	30	10	14	7	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
1990-91	--	--	--	--	--	--	--	--	--	3 (75)	1 (25)	4	8
1991-92	25 (76)	8 (24)	4	17	31 (57)	23 (43)	22	76	17	57 (64)	32 (36)	43	132

# Alaska's Game Management Units



## Federal Aid in Wildlife Restoration

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a for-

each state's area and of paid censehold- s t a t e . ceives 5% enues col- year, the lowed. The



ment of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be reponsible hunters. Seventy-five percent of the funds for this project are from Federal Aid.

mula based on geographic the number hunting li- ers in the Alaska re- of the rev- lected each maximum al- Alaska Depart-

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