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Division of Wildlife Conservation

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Survey-Inventory Management Report
Survey-Inventory Activities
1 July 1992- 30 June 1994

DEER

Mary V Hicks, Editor

Grants W-24-1 & W-24-2
Study 2.0
December 1995

STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
Frank Rue, Commissioner

DIVISION OF WILDLIFE CONSERVATION
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LOCATION

Game Management Units: Subunit 1A and Unit 2 (8,900 mi^2)

Geographical Description: Subunit 1A - Unit 1 south of Lemesurier Point, including all drainages into Behm Canal and excluding all 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 are throughout Subunit 1A and Unit 2. Mainland densities have remained consistently lower than densities on the maritime-influenced off-shore islands. Deer populations have fluctuated dramatically, primarily as a result of severe winter weather. Population levels have also been influenced by wolf and bear predation. Deer numbers are at moderate levels throughout most of the area.

Weather conditions and population levels influence deer harvests. In Subunit 1A, harvests ranged from 350 to 860 deer during the past 10 seasons, while in Unit 2 harvests ranged from 1880 to 3900 deer during the same period. Hunting seasons have generally extended from August through November or December. Hunting of antlerless deer was allowed before 1978. Since 1978 (with one exception), only antlered deer have been legal to harvest, with annual bag limits varying from 3 to 4. A 3-week antlerless deer season was initiated in Unit 2 in 1987-88 but was discontinued because of public opposition.

As clearcut logging continues to reduce old-growth habitat, 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 deer hunting opportunities in Subunit 1A and Unit 2.

MANAGEMENT DIRECTION

Management Objectives

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

METHODS

We collected population information from anecdotal reports from hunters, aerial alpine surveys, and spring pellet-group surveys. We gathered harvest data from an annual hunter questionnaire which we mailed to a random sample of hunters who were issued deer harvest tickets during the hunting season.

We flew 5 aerial alpine surveys using a Bell 206 helicopter during July 1992 and 4 surveys July 1993 using a float-equipped PA-12 airplane. Helicopter surveys were flown with a pilot and 2 observers while airplane surveys included a pilot and 1 observer. We flew surveys 200-500 feet above the ground. During helicopter surveys we recorded sex and age composition data. Data recorded during fixed-wing surveys were limited to total numbers of deer.

We surveyed 8 sets of deer pellet-group transects during April and May 1993 and another 10 during 1994. Methods for conducting the surveys are described by Kirchhoff and Pitcher (1988). We did not undertake any beach mortality transects this reporting period.

We mailed harvest questionnaires to all harvest ticket holders that reside in communities where less than 150 harvest tickets were issued, while we sampled 30% of all ticket holders residing in communities where more than 150 harvest tickets were issued. Our results are expanded to cover all harvest ticket holders.

RESULTS AND DISCUSSION

Population Status and Trend

Deer densities vary within and between Value Comparison Units (VCUs) in Subunit 1A and Unit 2. The highest noted 1993 deer pellet densities in Subunit 1A were in Helm Bay and Port Stewart (Table 1). Because Port Stewart and Spacious Bay transects were new, we could not identify any trends in these areas. Helm Bay data showed about a 9% increase over the previous count in 1992. The Margaret transect, on the other hand, showed about 59% fewer pellet groups in 1993, compared to 1991.

Similar to 1992 counts, our highest Subunit 1A deer pellet density in 1994 was on Gravina Island (Table 1). Our lowest densities during 1994 were at Carroll Point and Alava Bay, although Carroll Point was up about 60% from the previous count in 1992. Four of the 5 VCUs sampled in Subunit 1A during 1994 showed increases over previous samplings.

1993 pellet-group densities in Unit 2 were highest at Port Refugio and Luck Lake (Table 2). The lowest density was observed at Snakey Lakes. We observed lower densities than previously noted in 2 of the 4 sampled VCUs. Again in 1994 Unit 2 pellet-group densities were highest at Port Refugio, increasing 27% over 1993 (Table 2). We observed increased pellet-group densities in 4 of the 5 sampled VCUs.

Unlike the high densities of up to 3.9 pellet-groups per plot observed in Unit 4 (Kirchhoff 1993), Unit 2 densities represent low to moderate population levels. The disparity between these unit densities is probably due to the presence of wolves in Unit 2 and their absence from Unit 4.

Population Composition: Although alpine helicopter surveys enable us 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. Nonetheless, alpine surveys provide comparable data which can be used with other information to evaluate the status and trends of deer populations.

During 1992 we completed 3 helicopter surveys in Subunit 1A and 2 surveys in Unit 2 (Table 3). Composition data during these surveys were extremely variable, with buck:doe ratios ranging from 47:100 to 123:100. Fawn:doe ratios showed similar variability. The small fawn and doe samples from the July 22, 1992 survey precluded our calculating and including an age ratio for that survey.

We completed 2 fixed-wing surveys in Subunit 1A and 3 in Unit 2 during 1993 (Table 3). We found high variability in the numbers of deer counted in the same area on different dates. For instance, July 13 and 24 Gravina Island surveys resulted in counts of 8 and 48 deer, respectively. The weather before the July 13 survey was hot and dry, but weather immediately before the July 24 survey consisted of rain and wind. Since weather plays a part in sighting variability, alpine surveys must be completed under nearly identical weather conditions to be comparable.

Mortality

Harvest:

Season and Bag Limit:	Resident and nonresident hunters
Subunit 1A	Aug. 1-Dec. 31 4 antlered deer
Unit 2	Aug. 1-Dec. 31 4 antlered deer

Hunter Harvest. Subunit 1A and Unit 2 deer hunter numbers increased slightly during the past 2 seasons, similar to previous levels (Table 4). Wood (1990) suggested much of the effort fluctuation between seasons can be attributed to varying snow cover; good snow cover tends to increase hunter effort. Unlike the unusually snow-free conditions experienced in southern Southeast during 1991-92, the past 2 seasons shared more typical snow levels.

Deer harvests increased in both Subunit 1A and Unit 2 during the past 2 seasons (Table 4). Hunter success remained relatively constant in both areas: 34-39% in Subunit 1A and 69-70% in Unit 2. The average number of hunter days required to bag a deer declined slightly in Unit 2 during the past 2 seasons to about half that required in Subunit 1A. Average numbers of deer taken per hunter remained constant in both areas, with the Unit 2 average as much as 3 times higher than reported for Subunit 1A.

Southern Revilla Island continued to receive the greatest hunting pressure in Subunit 1A during both 1992 and 1993 (Table 5). After declining for 3 seasons, hunter effort increased throughout most of Subunit 1A during the past 2 years. The Cleveland Peninsula and Gravina Island accounted for the highest deer harvest in the subunit during 1992; the highest harvests during 1993 came from South Revilla Island and the Cleveland Peninsula. During 1992 Annette Island, outside of state management jurisdiction, had an unprecedented reported harvest and success rate.

Central Prince of Wales Island continued to attract the most hunters and highest harvests in Unit 2 in 1992 and 1993 (Table 6). Harvests from the Outer Island Harvest Area reached a 5-season high in 1992. Deer harvests from northern Prince of Wales Island remained constant during 1991 and 1992, then declined by 25% during 1993. After steadily declining for 3 seasons, harvests from northcentral Prince of Wales Island increased during the past 2 years. Success rates varied throughout the unit. The highest success continued to be from Heceta Island.

Because of the extensive road system, many settlements, and insufficient law enforcement personnel, Unit 2 probably has a higher illegal harvest than Subunit 1A. Although the degree of illegal harvest in Units 1A and 2 is unknown, Wood (1990) thought it to be considerable (Table 7). Despite the fact that both Units 1A and 2 have antlered seasons only, several does are reported killed each season. Additionally, Flynn and Suring (1989) reported actual hunter kill may be 38% greater than total estimated harvests from hunter reports because of crippling loss.

Hunter Residency and Success. Subunit 1A residents harvested 98% of the deer from the subunit during 1992 and 1993 (Table 8). Only 6 nonresidents and 5 nonlocal state residents bagged deer in Subunit 1A in this report period. By contrast, nonlocal residents accounted for 41% of the Unit 2 deer harvest during 1992 and 1993. Nonresident hunters took only 1% of the reported Unit 2 deer harvest during the past 2 seasons (Table 8).

Harvest Chronology. Most of the Subunit 1A deer harvest occurs during August, October, and November. Similarly, most Unit 2 harvests are also in these months. However, unlike Subunit 1A, where harvest is evenly distributed among these 3 months, over 40% of the past 2 seasons' Unit 2 harvests occurred during August. Although the season officially ends on December 31, a few deer are regularly reported harvested during January, particularly from Unit 2 (Table 9).

Transport Methods. Most Subunit 1A hunters use boats to access hunting areas, while in Unit 2 most hunters use the extensive road system (Table 9). The use of airplanes increased substantially from past levels during the 1993 season.

Other Mortality:

Based on staff observations and responses to 1992-93 and 1993-94 trapper questionnaires, wolf populations are abundant in Subunit 1A (Table 10). Wolf research in Unit 2 by Person and Ingle (1995) indicates that 300-330 wolves inhabit Prince of Wales and Kosciusko islands. This corresponds with a density of about 49 wolves/1000 km^2, similar to Vancouver Island densities and higher than most other portions of North America where deer are wolves' principle prey. Wolves and

black bears kill several thousand deer each year. Trappers incidentally catch and kill a few deer in wolf snares each winter. Each year road vehicles kill a few deer.

Deer are extremely vulnerable to harsh winter weather. The extent of winter mortality depends on the severity of weather. We believe winter weather has caused few deer deaths the past several years.

Nonregulatory Management Problems and Needs

Logging is causing major changes in old-growth habitat. The most serious effects are in the higher volume stands at low elevations. These stands are critical to deer during years of heavy snowfall. U. S. Forest Service and ADF&G habitat models predict the forest's capacity to support deer in an average winter will decline by nearly half by the year 2054. This loss will be greater in deep snow years. By 2054, we expect few areas will meet projected hunter demand within roaded and logged portions of Subunit 1A and Unit 2 (U. S. Forest Service 1989).

CONCLUSIONS AND RECOMMENDATIONS

Based on pellet-group data, our objective of maintaining 45 deer/mi^2 of winter habitat was achieved in only 22% of the VCUs sampled in Subunit 1A and Unit 2 during 1993 and 1994. With reported hunter harvests relatively high throughout much of the unit and subunit, mild weather the past several years enabled deer numbers in most parts of the unit and subunit to remain stable.

Wolf abundance remained relatively high in recent years, and predation continues to influence deer populations. It is noteworthy that intensive trapping effort on northern Prince of Wales Island has substantially reduced wolf numbers. Hunters have recently reported seeing more deer in that area than during the previous 3 years. As noted in the past (Wood 1990, Larsen 1993), we are aware of illegal hunting in southern Southeast, particularly in Unit 2.

We anticipate winter habitat loss through logging will reduce carrying capacity of deer for many decades. Long-term implications of habitat loss are (1) the inability to provide for subsistence needs and (2) loss of hunting opportunities for deer hunters in Subunit 1A and Unit 2 (Wood 1990, Larsen 1993).

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Table 1. Deer pellet-group survey results, Subunit 1A; Cleveland Peninsula, Revillagigedo, and Gravina Islands, 1981-1994.

Year	VCU	Mean pellet Groups/plot[a]	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
1993	716	1.37	286	1.16-1.59
1993	719-Port Stewart	1.22	289	1.03-1.42
1993	722-Spacious Bay	0.54	300	0.43-0.64
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
1993	738	0.31	281	0.23-0.39
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

Table 1 (Cont.)

Year	VCU	Mean pellet Groups/plot[a]	Number of Plots	95% C.I.
1994	748	0.93	305	---
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
1994	758	0.70	125	---
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
1994	759	0.95	136	---
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
1994	769	0.79	326	---

Table 1 (Cont.)

Year	VCU	Mean pellet Groups/plot[a]	Number of Plots	95% C.I.
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
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
1994	999	1.58	331	---------

[a]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 deer pellet-group survey results, Prince of Wales and adjacent islands, 1984-1994.

Year	VCU[a]	Mean pellet Groups/plot[b]	Number of Plots	95% C.I.
1988	528-Calder	2.14	252	1.78-2.49
1987	532-Red Bay	0.32	177	0.18-0.47
1994	532	0.94	256	----------
1988	539-Exchange Cove	1.40	266	1.15-1.64
1992	539	1.10	125	0.83-1.38
1989	549-Sarheen	1.73	310	1.44-2.01
1988	554-Sarkar	1.28	298	1.06-1.50
1992	554	0.53	245	0.41-0.66
1994	554	0.92	292	----------
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
1994	575	0.76	293	----------
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
1993	578	0.77	356	0.61-1.32
1986	581-Luck Lake	1.74	178	1.41-2.07
1988	581	2.11	300	1.80-2.42
1993	581	1.10	175	0.87-1.32
1992	584-Little Ratz	0.94	272	0.76-1.13
1988	587-Tuxekan	1.07	300	0.84-1.28

Table 2 (Cont.)

Year	VCU[a]	Mean pellet Groups/plot[b]	Number of Plots	95% C.I.
1985	621-Twelvemile	0.31	196	0.19-0.43
1986	621	0.64	300	0.48-0.81
1987	621	0.65	370	0.49-0.81
1988	621	0.62	302	0.46-0.77
1989	621	0.78	235	0.59-0.98
1990	621	1.18	176	0.84-1.52
1991	621	1.84	231	1.48-2.21
1992	621	0.43	250	0.32-0.55
1993	621	0.84	258	0.63-1.05
1994	621	0.93	324	----------
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
1993	635	1.35	213	0.98-1.71
1994	635	1.85	280	----------
1988	679-Kitkun	0.32	240	0.20-1.07
1989	679	0.89	273	0.71-1.07
1988	685-Nutkwa	0.09	234	0.02-0.16

[a]Value comparison unit.

[b]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, Subunit 1A and Unit 2, 1992-1993.

Location	Date	Bucks	Does	Fawns	Unk.	Total	Bucks: 100 does	Fawns: 100 does	Flight time (hours)
Subunit 1A									
Gravina Island[a]	07/15/92	60	105	11	18	194	57	10	1.5
Cleveland Peninsula[ab]	07/16/92	8	17	0	7	32	47	--	0.2
Cleveland Peninsula[ab]	07/22/92	15	2	3	1	21	88	--	0.3
Gravina Island[c]	07/13/93	--	--	--	8	8	--	--	0.7
Gravina Island[c]	07/24/93	3	1	1	43	48	--	--	0.9
Unit 2									
P.O.W. Island[ad]	07/15/92	49	87	3	13	155	56	3	2.3
P.O.W. Island[ae]	07/22/92	64	52	6	8	130	123	11	0.9
P.O.W. Island[cf]	07/13/93	15	3	4	38	60	--	--	1.4
P.O.W. Island[cg]	07/16/93	17	2	1	66	86	--	--	1.4
P.O.W. Island[ch]	07/24/93	2	1	1	29	33	--	--	0.3

[a]Surveyed using Bell 206 Jet Ranger helicopter.
[b]Camano Point to Ship Island.
[c]Surveyed using PA-12 Supercruiser.
[d]Kasaan Peninsula, Thorne Bay, Ratz Creek, Polk Inlet to Clover Bay.
[e]Rush Peak, McGilvery Creek, Wolf Lake, Polk Inlet to McKenzie Inlet, Barren Mountain.
[f]Eudora Mountain to South Arm Cholmondeley Sound, and on to Josephine Lake.
[g]Granite Mountain, Wolf Lake, Harris Peak, Black Bear Lake.
[h]Eudora Mountain; survey aborted due to turbulence.

Table 4. Deer harvest data, Subunit 1A and Unit 2, 1984-1993.

Year	No. of hunters	No. of successful hunters	Percent Successful	Total hunter days	Average hunter days	Total deer[a]	Average deer per hunter	Average hunter days per deer
Unit 1A								
1984	1,060	440	42	5,820	5.5	620	0.6	9.3
1985	1,108	412	37	5,683	5.1	779	0.7	7.3
1986	1,107	529	48	7,100	6.4	859	0.8	8.3
1987	946	376	40	6,379	6.7	611	0.6	10.4
1988	958	413	43	4,930	5.1	686	0.7	7.2
1989	982	335	34	4,348	5.1	592	0.6	7.3
1990	1,009	443	44	5,127	5.1	723	0.7	7.1
1991	734	259	35	3,094	4.2	347	0.5	8.9
1992	751	294	39	4,519	6.0	686	0.9	6.6
1993	996	344	34	4,465	4.5	515	0.5	8.7
Unit 2								
1984	1,910	1,210	63	13,070	6.8	1,880	1.0	6.9
1985	2,025	1,373	68	14,182	7.0	3,151	1.6	4.5
1986	2,233	1,538	69	17,505	7.8	2,805	1.3	6.2
1987	2,481	1,845	74	17,709	7.1	3,886	1.6	4.5
1988	2,124	1,415	67	10,668	5.0	2,849	1.3	3.7
1989	2,132	1,397	65	12,315	5.7	2,806	1.3	4.4
1990	2,149	1,445	67	13,566	6.3	3,093	1.4	4.4

Table 4 (Cont.)

Year	No. of hunters	No. of successful hunters	Percent Successful	Total hunter days	Average hunter days	Total deer[a]	Average deer per hunter	Average hunter days per deer
1991	1,664	1,142	69	11,984	7.2	2,466	1.5	4.9
1992	2,046	1,416	69	12,337	6.0	3,097	1.5	4.0
1993	1,986	1,394	70	11,860	6.0	2,807	1.4	4.2

[a]Includes does which were reported killed.

Table 5. Deer harvests from major harvest areas within Subunit 1A, 1989-1993.

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
	1992	179	64	35	801	4.5	0.9	160
	1993	266	52	19	553	2.1	0.3	87
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
	1992	16	16	100	179	10.9	5.5	91
	1993	22	11	52	112	5.1	0.6	14
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
	1992	22	3	12	58	2.6	0.1	3
	1993	15	0	0	15	1.0	0.0	0
4-South Revilla	1989	497	121	24	1,885	3.8	0.3	157
	1990	594	180	30	2,610	4.4	0.4	259
	1991	416	124	30	1,134	2.7	0.4	147
	1992	341	61	18	1,376	4.0	0.3	102
	1993	463	135	29	1,883	4.1	0.4	188
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
	1992	275	55	20	846	3.1	0.3	80
	1993	345	80	23	1,033	3.0	0.3	97
6-Cleveland Pen.	1989	253	97	38	641	2.5	0.7	184
	1990	245	122	50	981	4.0	1.0	236

Table 5 (Cont.)

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
	1991	158	42	26	458	2.9	0.4	59
	1992	280	126	45	1,159	4.1	0.9	241
	1993	262	74	28	705	2.7	0.4	109
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
	1992	25	8	33	75	3.0	0.3	8
	1993	38	19	49	164	4.3	0.5	19
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
	1992	8	0	0	25	3.0	0.0	0
	1993	-	-	-	--	---	---	-

Table 6. Deer harvests from major harvest areas within Unit 2, 1989-93.

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
	1992	107	77	72	246	2.3	1.0	107
	1993	55	22	41	203	3.7	0.7	36
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
	1992	164	117	71	501	3.1	1.5	240
	1993	140	113	80	354	2.5	1.5	207
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
	1992	174	98	56	743	4.3	1.1	189
	1993	127	82	65	441	3.5	1.3	170
12-SE POW Island	1989	309	169	55	1,383	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
	1992	270	150	56	952	3.5	0.9	247
	1993	336	102	30	1,072	3.2	0.5	153
13-Central POW Island	1989	1,021	577	56	4,011	3.9	0.9	944
	1990	1,100	626	57	6,201	5.6	1.2	1271
	1991	849	580	68	5,093	6.0	1.3	1129
	1992	1,032	645	62	4,901	4.7	1.1	1183
	1933	1,005	657	65	5,248	5.2	1.2	1187
14-North Central POW Island	1989	753	415	55	2,869	3.8	0.9	716
	1990	664	343	52	2,964	4.5	0.9	568

Table 6 (Cont.)

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
	1991	553	275	50	3,003	5.4	0.8	448
	1992	639	375	59	2,647	4.1	1.0	662
	1993	710	418	59	3,076	4.3	1.0	690
15-North POW Island	1989	518	304	59	2,836	5.5	1.1	596
	1990	538	382	71	2,463	4.6	1.3	725
	1991	411	233	57	2,016	4.9	1.1	468
	1992	477	297	62	2,347	4.9	1.0	470
	1993	382	245	64	1,466	3.8	1.0	364

Table 7. Reported and estimated deer harvest/mortality, Subunit 1A and Unit 2, 1984-93.

Year	Reported harvest Male	Female	Total	Unreported & illegal harvest[a]	Estimated total harvest	Estimated number of road kills
Unit 1A						
1984	620	0	620	310	930	1 - 5
1985	779	0	779	390	1,169	1 - 5
1986	859	0	859	430	1,289	1 - 5
1987	611	0	611	306	917	1 - 5
1988	686	0	686	343	1,029	1 - 5
1989	587	5	592	296	888	1 - 5
1990	642	81	723	361	1,084	1 - 5
1991	331	16	347	173	520	1 - 5
1992	661	25	686	343	1,029	1 - 5
1993	515	0	515	257	772	1 - 5
Unit 2						
1984	1,880	0	1,880	1,880	3,760	unknown
1985	3,151	0	3,151	3,151	6,302	unknown
1986	2,805	0	2,805	2,805	5,610	unknown
1987	3,616	270[b]	3,886	3,886	7,772	20
1988	2,846	3	2,849	2,849	5,698	30
1989	2,806	0	2,806	2,806	5,612	25
1990	2,952	141	3,093	3,093	6,186	25
1991	2,343	123	2,466	2,466	4,932	25
1992	3,036	61	3,097	3,097	6,194	25
1993	2,746	61	2,807	2,807	5,614	25

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

Table 8. Hunter residency and success, Subunit 1A and Unit 2, 1988-1993.

Year	Successful				Unsuccessful			
	Local res.[a]	Nonlocal res.	Nonres.	Total	Local res.[a]	Nonlocal res.	Nonres.	Total
Unit 1A								
1988	392	21	0	413	508	37	0	545
1989	310	25	0	335	607	40	0	647
1990	429	14	0	443	527	38	2	567
1991	259	0	0	259	418	53	4	475
1992	292	2	0	294	440	10	8	458
1993	336	3	6	345	619	21	11	651
Unit 2								
1988	748	638	29	1,415	242	430	38	710
1989	713	675	9	1,397	272	425	38	735
1990	825	583	36	1,444	323	351	30	704
1991	632	487	23	1,142	224	276	22	522
1992	829	572	17	1,418	299	291	38	628
1993	800	582	13	1,395	260	294	37	591

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

Table 9. Deer harvest chronology, and method of transportation used by all hunters, Subunit 1A and Unit 2, 1988-1993.

	Month of Kill							Method of Transportation[a]					
Year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Unk.	Airplane	Boat	Foot	Highway Vehicle[b]	Other	Unk.
Unit 1A													
1988[c]	165	80	172	197	52	0	20	63	1,456	458	518	7	107
1989	97	68	165	221	35	5	4	93	1,394	411	465	25	0
1990	92	85	171	325	50	0	0	105	1,366	514	515	0	14
1991	121	0	65	140	21	0	0	40	972	329	367	0	15
1992	118	33	213	283	30	0	9	35	1,402	377	304	8	0
1993	126	32	88	239	30	0	0	171	1,139	553	602	32	18
Unit 2													
1988	895	447	506	888	72	7	34	173	990	547	2,875	18	55
1989	729	377	469	1061	152	12	6	203	815	1,042	3,276	52	16
1990	1013	470	559	903	135	11	2	207	776	1,023	3,522	28	0
1991	816	272	470	793	109	5	1	36	771	617	2,924	34	9
1992	1256	422	635	696	52	8	28	106	865	1,113	3,467	54	0
1993	1124	421	368	774	74	24	22	292	753	1,082	2,723	280	0

[a]Numbers of successful and unsuccessful hunter trips.
[b]Includes cars, trucks, and off-road vehicles (3 and 4-wheelers).
[c]Data for 1988 incorrectly presented in December 1991 deer management report.

Table 10. Deer pellet group and harvest data, predator abundance(I_A)[a], and weather severity indices for Subunit 1A and Unit 2, 1980-1994.

Season	Pellet Group Data[b]		Harvest Data						Wolf Abundance		Weather Index[c]
			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	1,880	0.10	0.14	42	63	--	--	4.7
1985-86	1.0	1.6	779	3,151	0.14	0.22	37	68	--	--	2.0
1986-87	1.1	1.2	859	2,805	0.12	0.16	48	69	--	--	2.7
1987-88	1.7	1.0	611	3,886	0.09	0.22	40	74	--	--	1.7
1988-89	1.1	1.3	686	2,849	0.14	0.27	43	66	--	--	4.7
1989-90	1.0	1.2	587	2,806	0.13	0.23	34	65	--	--	1.3
1990-91	1.2	1.6	723	3,093	0.14	0.23	44	67	--	--	2.3
1991-92[d]	0.8	0.7	347	2,466	0.11	0.20	35	69	86	59	0.3
1992-93	0.8	1.0	686	3,097	0.15	0.25	39	69	65	60	3.0
1993-94	1.0	1.1	515	2,807	0.11	0.24	34	70	57	25[e]	1.7

[a]Indices taken from Brand and Keith (1979). $I_A=[(\Sigma R_i-\underline{n})/2\underline{n}] \times 100$ where: R_i=the numerical value assigned to the *ith* 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). $\underline{n}$= 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 1991-94 Unit 1A and 2 trapper questionnaires.

[b]Average number of pellet groups per plot.

[c]Based on weather data collected at Annette Island, Alaska during November - March. Higher indices represent more severe weather conditions.

[d]Extremely wet but snow-free season; pellets may not have persisted as long as in past years.

[e]Sample consisted of only 2 trappers.

LOCATION

Game Management Unit: Subunit 1B and Unit 3 (6,000 mi^2)

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

BACKGROUND

Sitka black-tailed deer are found on most of the 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 was in the late 1960s and early 1970s which led to restrictive regulations and bag limits in 1973. Subunit 1B remained open, with a 1antlered deer limit from 1973 to 1980 and a 2 antlered deer limit from 1981 to the present.

Unit 3 was closed to deer hunting from 1975 through 1979. The area south of Sumner Strait had a 1 antlered deer limit from 1980 to 1987. The Alaska Board of Game increased this limit to 2 antlered deer in 1988 with an August 1-November 30 season. In 1991 a registration permit hunt with an October 15-31 season and a 1 antlered deer bag limit was opened on parts of Mitkof, Kupreanof, Woewodski, and Butterworth islands. Beginning in the 1993 hunt, the only part of Unit 3 closed to deer hunting was the area within the Petersburg and Kupreanof city limits.

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:

Maintain a deer population capable of sustaining an average hunter kill of 1 deer per 8 hunter days of effort.

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 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. Deer mortality transects were surveyed in the spring of 1992. A hunter check station in 1991 on Mitkof Island sampled deer taken for weight and antler development data. Incisor teeth were taken for age determination.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Deer populations in Unit 3 seem stable (Table 1). Pellet-group counts in 1993 and 1994 suggest similar densities, with some minor exceptions, to recent years. Onslow Island pellet counts indicated an increase in deer density. Conversely, Woronkofski counts showed ten-fold decrease in the number of deer. This decrease correlates with ancecdotal information from deer hunters seeing few deer and more wolves on the island.

Mortality

Season and Bag Limit:	Resident and nonresident hunters
Unit 1B	Aug. 1-Dec. 31 - 2 antlered deer
Unit 3, that portion of Mitkof Island south of the Petersburg city limits, that portion of Kupreanof Island on the Lindenberg Peninsula east of Portage Bay-Duncan Canal portage outside the Kupreanof city limits, and Woewodski and Butterworth islands	Oct. 15-Oct. 31 - 1 antlered deer by registration permit only
Unit 3, that portion of Mitkof Island within the Petersburg city limits and that portion of Kupreanof Island within the Kupreanof City limits	No open season

Remainder of Unit 3 Aug. 1-Nov. 30 - 2 antlered deer

Board of Game Actions and Emergency Orders. Previous years pellet surveys, comments from the public, and staff observations indicated populations had recovered sufficiently on Kupreanof and Kuiu islands to support a limited hunting season. In 1991 a 2-week, 1 antlered deer season was implemented on Kupreanof and Mitrkof islands (except within Petersburg and Kupreanof city limits which remain closed) and Woewodski and Butterworth islands. In 1994 Kuiu Island was included with the balance of Unit 3 in a 4-month, 2 antlered deer season.

Hunter Harvest. Hunter effort and harvest changed little before 1991 (Tables 2-9). Unit 3 hunter survey data for 1991-1993 includes Mitkof Island, primarily responsible for the large increase in both hunter numbers and kill.

All Mitkof Island deer hunters were required to report hunting activity. As in 1991, we surveyed hunters by mail questionnaire, comparing the data sets (Table 10). In 1991 the mail survey reported fewer hunters, kills, and hunter days than reported in registration permit reports. In 1992 and 1993 the mail survey reported 73-80 % fewer hunters, 20-74 % more deer, and 92 % (both years) of hunter days, compared to registration reports.

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 indicate some of the hunters were selective and did not take the first legal deer seen.

The mail survey contained reports of does taken in Unit 3 and 1B. This is reported as illegal kill in this report because there is no doe season in these units.

Hunter Residency and Success. Few nonresidents hunt deer in Units 1B and 3 (Tables 3 and 7). Most hunters are local. Deer populations are greater and seasons and bag limits more liberal in other nearby units, incentives for nonlocals to hunt deer in these units instead of Units 1B and 3.

Harvest Chronology. Tables 5 and 9 show the harvest percentage by month. Some Unit 3 hunters reported taking deer in December and January during the closed season. The increase in Unit 3 kill during October 1991-1993 coincides with the Mitkof Island permit hunt.

Transport Methods. Most hunters traveled by skiff while a few used airplanes. The increase in the use of highway vehicles and decrease in boat use in 1991-1993 in Unit 3 reflects the opening of Mitkof Island (Tables 4 and 8).

CONCLUSIONS AND RECOMMENDATIONS

Deer populations in Units 1B and 3 seem stable with localized variations. Winter weather and clearcut logging have the greatest effects on deer population dynamics. There are no indications that hunting seasons or bag limits should be restricted. All of Unit 3 can remain open for deer hunting, except for the closures in the communities of Petersburg and Kupreanof.

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Table 1. Deer population trends as indicated by pellet group surveys in Unit 3, 1984-94.

VCU	Name	Pellet-Groups Year	Plots	Mean	95% CI
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
427	Big John Bay	1994	300	0.38	
431	Point Barrie	1988	357	0.23	0.17-0.29
		1993	375	0.77	0.64-0.90
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
		1994	310	0.33	
437	East Duncan Canal	1990	227	1.12	0.92-1.32
		1992	213	0.78	0.63-0.94
442	Portage Bay	1993	282	0.43	0.31-0.56
448	Woewodski	1984	295	0.88	0.69-1.08
	(S. Mitkof)	1985	209	1.00	0.82-1.19

Table 1 Continued

		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	248	0.79	0.62-0.97
		1993	230	1.06	0.85-1.27
		1994	152	1.13	
448a	Woewodski Island	1991	461	1.86	1.66-2.05
		1994	510	1.30	
449	Frederick	1981	945	0.08	0.06-0.11
	(N. Mitkof)	1990	180	0.55	0.36-0.74
		1992	227	0.54	0.42-0.65
452	Blind Slough				
	(Central Mitkof)	1992	114	1.04	0.77-1.30
		1993	265	1.28	1.04-1.51
454	Dry	1981	91	0.92	0.56-1.28
		1993	210	1.44	1.17-1.72
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
458	Snow	1994	345	0.57	
461	Woronkofski	1985	646	1.63	1.45-1.81
	(All Transects)				
461	Woronkofski	1985	218	2.01	1.62-2.39
	(Trans. 10, 11, 12)	1987	201	2.23	1.85-2.61
		1989	223	2.52	2.18-2.85
		1991	203	1.59	1.32-1.85
		1993	225	0.22	0.13-0.31
		1994	224	0.26	
467	Mosman	1993	304	0.07	0.03-0.11
473	Onslow	1984	321	0.37	0.28-0.46
		1985	334	0.59	0.48-0.70

Table 1 Continued

		1986	347	0.72	0.59-0.84
		1987	336	0.42	0.31-0.55
		1988	329	0.44	0.32-0.55
		1991	322	0.66	0.51-0.80
		1993	341	0.68	0.55-0.82
		1994	340	0.88	
480	Fools	1994	193	0.54	
564	Coronation	1983	696	1.20	1.04-1.36
		1985	228	2.34	
		1988	408	1.41	1.17-1.66
		1989	293	1.63	1.28-1.98

Table 2. Unit 3 deer harvest, 1987-93.

Regulatory year	Estimated legal harvest M (%)	F (%)	Unk.	Total	Estimated illegal harvest	Total[a]
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
1992/93	581 (100)		0	581	57	638
1993/94	619 (100)		0	619	51	670

[a] Data from mail questionnaire survey.

Table 3. Unit 3 deer hunter residency and success, 1987-93.

	Successful					Unsuccessful					
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Total[b] hunters
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
1992/93	428	45	0	473	(48)	468	46	0	514	(52)	987
1993/94	422	51	2	475	(45)	492	72	5	569	(55)	1,044

[a] Residents of Units 1B, 3, Meyers Chuck, Point Baker and Port Protection
b Data from registration permit report and hunter survey included.

Table 4. Unit 3 deer hunter effort percent by transport method, 1987-93.[a]

Regulatory year	Percent of effort							Number of trips
	Airplane	Boat	3- or 4-wheeler	Foot	ORV	Highway vehicle	Other	
1987/88[b]								
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	0.7	666
1990/91	3.8	60.7		14.1		20.6	0.7	708
1991/92	0.6	40.8	1.4	11.5	2.6	43.0	11.5	1,227
1992/93	0.8	31.8	4.2	11.6	1.1	50.3	0.4	1,861
1993/94	2.2	43.5	2.4	10.3	3.6	36.5	1.6	1,835

[a] The hunter mail survey reports transport as total number of hunting trips by method.
[b] Not available

Table 5. Unit 3 deer harvest chronology percent by month, 1987-93.

Regulatory year	Harvest periods						Total[a] deer
	August	September	October	November	December	January	
1988/89	17	13	40	28	1	1	238
1989/90	14	19	16	51	0	0	216
1990/91	36	10	24	25	4	0	250
1991/92	15	11	53	21	0	0	410
1992/93	9	11	63	16	0	0	639
1993/94	21	6	45	24	1	2	671

[a] May not equal harvest table due to rounding or incomplete reporting.

Table 6. Unit 1B deer harvest, 1987-93.

Regulatory year	Estimated legal harvest M (%)	F (%)	Unk.	Total	Estimated illegal harvest M (%)	F (%)	Unk.	Total[a]
1987/88	65 (100)		1	66				66
1988/89	101 (100)			101				101
1989/90	73 (100)			73				73
1990/91	148 (100)			148				148
1991/92	50 (100)			50				50
1992/1993	142 (100)			142	6 (100)		6	148
1993/1994	164 (100)			164	21 (100)		21	185

[a] Data from mail questionnaire survey.

Table 7. Unit 1B deer hunter residency and success, 1987-93.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Local[a] 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
1992/93	123	10	0	133	(54)	94	18	0	112	(46)	245
1993/94	80	14	0	107	(56)	53	26	6	85	(44)	192

[a] Residents of Units 1B, 3, Meyers Chuck, Point Baker and Port Protection

Table 8. Unit 1B deer hunter effort percent by transport method, 1987-93.[a]

Reg year	Percent of effort							Number of trips
	Airplane	Boat	3- or 4-wheeler	Foot	ORV	Highway vehicle	Other	
1988/89		95		3				209
1989/90	6	90		1		1		324
1990/91		85	15	1				307
1991/92		86	14					148
1992/93		87	3	6	2	3		422
1993/94	10	74		8		8		244

[a] The hunter mail survey reports transport as total number of hunting trips by method.

Table 9. Unit 1B deer harvest chronology percent by time period, 1987-93

Regulatory year	Harvest periods					Total[a] deer
	August	September	October	November	December	
1988/89	32	11	35	16	6	100
1989/90	7	0	32	49	12	73
1990/91	18	10	15	53	3	148
1991/92	10	0	47	22	22	51
1992/93	39	0	5	27	30	148
1993/94	14	17	22	47	0	186

[a] May not equal harvest table due to rounding or incomplete reporting.

Table 10. Unit 3, Mitkof and Woewodski islands only, a comparison of hunter effort and success estimates from registration permit reports and hunter surveys, 1992 and 1993.

	1992	
	Source	
	Hunter mail survey	Registration permit report
Total hunters	488	664
Deer killed	326	187
Average deer/hunter	0.7	0.3
Total hunter days	1894	2062
Average days/hunter	3.9	3.1

	1993	
	Source	
	Hunter mail survey	Registration permit report
Total hunters	451	562
Deer killed	186	155
Average deer/hunter	0.4	0.3
Total hunter days	1756	1916
Average days/hunter	3.9	3.4

LOCATION

Game Management Unit: 1C (7,600 mi^2)

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

BACKGROUND

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

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	1090
Shelter-Lincoln Islands	354
Douglas Island	1326
Mainland-Taku Inlet to Cape Fanshaw	1256
Total	**4612**

The following has been identified as a management objective for Unit 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 11,748 deer harvest tickets for the 1992 hunting season in Southeast Alaska and 12,228 for 1993. We mailed hunter surveys to 43 % of 1992 harvest ticket holders; 43% of those responded to the survey. In 1993 we mailed surveys to 42% of harvest ticket holders; the response rate was 39%. Survey results for hunter effort, success, and kill location were extended to estimate results for all harvest ticket holders. We conducted pellet-group surveys on Shelter Island, north Douglas Island, and at Pt. Couverden in 1993. In 1994 we suveyed the north Douglas Island transects and established a new transect near the Kensington mine at Point Sherman.

RESULTS AND DISCUSSION

Population Status and Trend

No population estimates are available for deer in Unit 1C, and pellet-group survey information is scant. In 1993 pellet densities on the north Douglas Island transects averaged only .80 pellets per plot, increasing to .91 in 1994. The 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 and the crew inexperienced. We have not gathered data at both Douglas Island sites in the same year and have not established any relationship between the 2 locations. Data indicates the North Douglas Island location provides less deer use, perhaps due to the northerly aspect and quick rise to higher elevation. Based on the north Douglas Island transects, deer populations improved slightly during the 2-year period.

In 1993 the Shelter Island transects equaled the management objective, although once again a suboptimum number of plots were read. The relatively mild weather in lower Lynn Canal has allowed high deer densities to persist.

We established 2 new sample sites. The Pt. Couverden site yielded very low pellet densities, and we found no deer sign at Pt. Sherman. Annual heavy snow accumulations probably prevent deer from acheiving high densities north of Juneau.

Mortality

Harvest:

Season and Bag Limits:	Resident and nonresident hunters	
Unit 1(C), That portion including Douglas, Lincoln, Shelter, and Sullivan islands	Aug. 1-Dec. 31	4 deer; antlerless deer may be taken only from Sept. 15-Dec. 31
Unit 1(C), remainder	Aug. 1-Dec. 31	2 antlered deer

Board of Game Actions and Emergency Orders. State regulations remained unchanged. However, the implementation of federal subsistence regulations in Unit 4 and confusion over federal and state seasons may have redirected some hunting effort to Unit 1C.

Hunter Harvest. Based on data gathered from the annual deer hunter survey, 511 deer were killed in Unit 1C in 1992 and 579 in 1993 (Table 2). This represents a 16% increase over the average of the previous 5 years. Does composed 30% of the 1992 harvest and 48% of the 1993 kill. The latter figure is the highest in the 1989-1993 5-year period.

Hunter Residency and Success. In both years, most successful (94% and 98%) and unsuccessful (89% and 91%) hunters were residents of Subunit 1C (Table 3). Nonlocal residents made up most of the remainder of hunters, with 4% and 3% of successful hunters and 10% and 8% of unsuccessful hunters during 1992 and 1993, respectively. In 1992, 11 nonresidents (6 successful) were 2% of successful and 1% of unsuccessful hunters. In 1993, 2 nonresidents hunted without success.

In 1992 there was an average of 0.5 deer taken per hunter, 0.2 deer taken per hunter-day, 2.8 hunter-days expended per deer, and 3.3 days spent in the field per hunter (Table 4). The 1992 hunter success rate (# deer/hunter) was less than one third that of 1989, but about the same as 1990 and 1991. The success rate has declined to less than half of what was common in the late 1980s. Effort (# hunter days/deer) during the reporting period was markedly lower than the two preceding years and similar to figures for 1987-1989. The number of deer per hunter day remained at low levels, and the number of days afield per hunter has remained similar since 1986.

In 1993 the pattern remained much the same, although there was a slight increase in the number of deer per hunter. Unit 1C deer hunters continued to make trips the same length as in the mid to late 1980s, but each successful hunter brought home only about one third the number of deer.

Transport Methods. Boats have usually been the predominant form of transportation for deer hunters in Subunit 1C, but in 1992 this mode (34%) was equaled by highway vehicles (34%) and almost matched by foot access (31%). In 1993 we saw a more normal pattern when 37% of deer hunters reported using boats, 35% highway vehicles, and 22% hunted only on foot. The reason for this variability in transport modes is unknown.

CONCLUSIONS AND RECOMMENDATIONS

Subunit 1C pellet counts are inconclusive because few transects were sampled. Pellet group densities on Douglas Island in spring 1993 and 1994 remained stable or slightly improved, although below management objectives. Pellet group sampling before the reporting period indicated an overall reduction in deer number on Douglas, Shelter, and Lincoln islands. With so few pellet group data for the reporting period, it is not possible to determine whether our current population objective is being met. Transect counts on Douglas Island sites and on Shelter Island should be conducted annually.

Hunter survey data indicate the number of hunters in Unit 1C has remained stable since 1986, but with a substantial change in success. The proportion of sucessuful hunters has increased to one third of all hunters while the number of deer taken per hunter has declined. The total harvest has increased but is spread between more sucessful hunters. The percent of females in the harvest has increaseed dramatically, similar to 1989.

Despite the trends noted above, little or no anecdotal information or hunter complaints have been received regarding deer hunting in Subunit 1C. Possibly this is because many, if not most, of the hunters using this area still regard it as a secondary deer hunting area to be used when weather or time do not allow them to access Unit 4.

Further reductions in both season and bag limit should be considered if downward trends in pellet-group densities occur and success per unit effort for all hunters continues to remain low.

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Table 1. Unit 1C. Deer pellet group surveys, 1986-94.

Site	Year	Mean pellet groups/plot	Number of plots	95 % CI
Kensington (VCU 20)	1994	0.0	180	NA
Portland Island	1987	.99	381	0.87-1.12 (VCU 27)
North Douglas (VCU) 35	1991	.80	300	0.65-0.96
	1993	.74	324	0.62-0.87
	1994	.91	315	----
Inner Point (VCU) 36	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	1.75-2.36
Harbor Island (VCU 65)	1987	1.28	200	1.00-1.56
Couverden (VCU 117)	1993	.35	350	.27-.44
Shelter Island (VCU 124)	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	1.23-1.62
	1990	1.60	300	1.37-1.82
	1993	2.00	250	1.73-2.26
Sullivan Island (VCU 94)	1990	1.40	250	1.17-1.62

Table 2. Unit 1C. Annual deer harvest, 1986-93.

Year	M	F	Estimated Total[a]
1986	296	138	434
1987	347	149	496
1988	325	118	443
1989	271	218	489
1990	330	169	499
1991	245	172	417
1992	358	153	511
1993	302	277	579

[a]Data from results of hunter surveys.

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

	Successful				Unsuccessful			
Year	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
1992	321	15	6	343	550	63	5	618
1993	295	8	0	302	549	50	2	601

Table 4. Unit 1C. Statistics for successful deer hunters, 1986-1993.

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
1992	0.5	0.2	2.8	3.3
1993	0.6	0.2	3.1	3.3

LOCATION

Game Management Unit: Unit 4 (5,800 mi^2)

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

BACKGROUND

Unit 4 provides most of the deer hunting opportunity in Southeast Alaska, accounting for 44% of the region's hunter effort and 59% of the deer harvest in the 1992-93 season. In 1993-94 the Unit again provided 44% of the effort and 63% of the deer taken in Southeast Alaska.

Significant changes in density of deer populations are normal in Unit 4. Periodic declines are 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 seems to be on a 10-year cycle, with intervening mild winters. Most winters in Unit 4 were mild from the mid-1970s through 1987-88, with excellent survival of fawns and adult deer. During the winters of 1988-89, 1989-90, and 1990-91, however, persistent snow caused significant deer mortality. Since then, winters have been mild and winter survival for all age classes has been good.

Deer in other units (Units 1, 2, and 3) in Southeast are prey to wolves (*Canis lupus*), which contributes to deer losses (Merriam 1966, Smith et al. 1986), but wolves are absent or very rare in Unit 4. Although brown bears (*Ursus arctos*) are numerous in the unit and kill deer, bear predation has minor impact on deer numbers.

During this report period both state and federal subsistence hunting regulations were in effect. State regulations were adopted by the Alaska Board of Game and applied on all land in Unit 4. The Federal Subsistence Board promulgated regulations that applied only to federal lands and gave federally qualified subsistence hunters more liberal seasons and bag limits.

MANAGEMENT DIRECTION

Management Objectives

Management objectives for Unit 4 deer are to maintain the following: 1) a population density capable of sustaining an average hunter kill of at least 1.5 deer, 2) a population capable of providing a minimum success rate of 1 deer killed per 4 days hunting, and 3) at least 60% males in the harvest.

METHODS

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

Because of mild winter conditions in both years, no winter mortality surveys were conducted.

A harvest questionnaire to survey hunter effort and success for both seasons was mailed to a sample of persons obtaining deer harvest tickets. Hunters were asked to indicate hunting effort, number of kills, months hunted, and kill locations by wildlife analysis area.

During the 2-year report period, 622 deer jaws were collected for age analysis. Jaws were from hunter-killed deer and were collected in Hoonah, Juneau, Sitka, and Tenakee. Teeth were sent to Matson's Laboratory for aging.

RESULTS AND DISCUSSION

Population Status and Trend

During this report period deer populations increased. Pellet-group surveys indicated higher populations in most sampled areas. The population has recovered from winter losses in 1989-91. By the end of this report period, deer numbers were at or near carrying capacity in many areas of the unit.

Habitat quality and winter severity vary significantly throughout the unit because of local climactic factors, topography, and changes brought by logging. Some areas logged before 1970 are now entering a stage of regrowth that will have little value for deer. Because of the extensive logged acreage, deer carrying capacities will be lower than prelogging levels. In the future, many popular hunting areas will not be able to sustain current harvest levels.

Pellet-group surveys (Table 1) generally reflect an increasing population, with data from most of the unit indicating a high number of deer. This trend was supported by public and department staff observations. We should continue to evaluate population status on a variety of indicators, including pellet and mortality transects, hunter contacts, staff field observations, and harvest questionnaires.

Population Size: Deer pellet-group surveys on Admiralty, Baranof, Chichagof, and Kruzof islands indicate an increase in numbers following 1992 (Table 1). This technique alone may not accurately reflect deer populations in late winter. Deer which deposited pellets on the range in December and January could have died in February and March. Snowfall that concentrates deer in restricted habitats may result in localized high pellet counts. In years with little snow accumulation, even high numbers of deer may be scattered over a wide area with fewer apparent pellet groups in sample transects.

Population Composition: The sex composition of the legal kill (Table 2) was estimated from deer harvest questionnaires (Alaska Department of Fish and Game, 1993). Hunter reports indicated a 1992-93 take of 5176 bucks, 71% of the kill. Hunters took 5989 bucks (70%) in 1993-94. Yearlings and 2 year olds of both sexes composed the largest segment of the kill in 1992 and 1993. There remains a tendency for hunters to select for males although the either-sex season has been in effect for many years. Few fawns were taken by hunters in either year.

Mortality

Season and Bag Limit	Resident and nonresident hunters	
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	Aug. 1-Jan.31	3 deer; antlerless deer may be taken only from Sept. 15-Dec. 31
Remainder of Unit 4	Aug. 1-Dec. 31	4 deer; antlerless deer may be taken only from Sept. 15-Dec.-31

Game Board Actions and Emergency Orders. None.

Hunter Harvest. A questionnaire was mailed to a sample of deer harvest ticket holders for harvest information during both seasons. Extrapolation of hunter responses indicated 4018 hunters went afield during the 1992-93 season and 4029 hunters in 1993-94 (Table 3).

In 1992-93 hunters reported killing 7200 deer (rounded to nearest hundred). In 1993-94 the reported kill increased to 8500 deer. The crippling loss, unreported kills, and illegal kills are estimated to be 10% of the reported harvest (Table 2). Based on these estimates, the total hunter-related mortality was approximately 6000 deer in 1992-93 and 9400 deer in 1993-94.

Hunter Residency and Success. In 1992-93 1884 hunters reported they resided in Unit 4, while 2106 resident hunters lived outside the unit (Table 3). In 1993-94, 1939 hunters reported they resided in Unit 4, while 2040 resident hunters lived outside the unit. There were 27 nonresidents in 1992-93 and 50 in 1993-94 who hunted in Unit 4. Seventy five percent of unit residents were successful in 1992-93, and 82% were successful in 1993-94. Nonlocal residents had a 62% success rate in 1992-93 and a 72% success rate in 1993-94. Nonresidents had a 48% success rate in 1992-93 and a 34% rate in 1993-94. The success rate for all hunters was 68% in 1992-93 and 77% in 1993-94.

Harvest Chronology. In both 1992-93 and 1993-94, the greatest hunting effort was expended in November (Table 4). November 1992 provided 39% of the total hunter days hunted and 35% of

the harvest. In 1993 hunting in November accounted for 35% of the total hunter days and 36% of the harvest. In the 1992-93 and 1993-94 seasons, the month of January accounted for 6% (623) and 7% (443) of the estimated harvest, respectively.

Transport. Transport used by deer hunters were almost identical in both years (Table 5). In 1992-93 boats were used in 67% of the hunting trips, airplanes in 8%, 12% of hunters walked from a community, 11% used highway vehicles, and 1% used off-road vehicles (including 3- or 4-wheelers and snow machines). In 1993-94 boats were used in 66% of the hunting trips, airplanes in 7%, 11% of the hunters walked from a community, 12% used highway vehicles, and 1% used off-road vehicles. Transport use has changed little since the 1988-89 season, when data were first collected. However, off-road vehicle use by deer hunters is increasing in many locations with logging roads.

Other Mortality

No data were collected.

CONCLUSIONS AND RECOMMENDATIONS

All management objectives were met during both years. The average kill in 1992-93 was 1.8 deer per hunter with a hunting effort of 2.8 days per deer. Males composed 71% of the harvest. The average kill in 1993-94 was 2.1 deer per hunter with a hunting effort of 2.6 days per deer. Males made up 70% of the harvest.

Harvest questionnaires indicated an estimated deer harvest of 7246 during the 1992-93 season and 8523 during the 1993-94 season.

In 1992-93, 68% of all deer hunters were successful. In 1993-94 the hunter success increased to 77%. The increase in both deer harvest and hunter success in 1993-94 probably reflects the increased density of deer within the unit.

Different regulations promulgated by the Federal Subsistence Board and the State Board of Game are major management concerns. Conflicting regulations on adjacent lands make law enforcement difficult, confuse hunters, and lessen the credibility of management agencies. In addition to creating public confusion, conflicting regulations may make deer management more difficult in the future. Wherever possible the Division should assist the 2 regulatory boards in standardizing regulations.

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

Area	Regulatory year	Mean pellet groups/plot	Number of plots
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
162 - **Thayer Lake**	1986/87	2.81	313
	1988/89	2.04	283
	1993/94	2.27	282
171 - **Hood Bay**	1986/87	2.31	358
	1988/89	1.77	366
	1989/90	1.85	375
	1991/92	1.91	360
	1993/94	1.66	371
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
	1992/93	1.77	305
	1993/94	1.22	345
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
	1992/93	0.56	305
	1993/94	0.71	294

Table 1 Continued

Area	Regulatory year	Mean pellet groups/plot	Number of plots
209 - **Suntaheen Creek**	1987/88	1.22	272
	1991/92	1.13	271
	1992/93	0.73	265
	1993/94	1.04	272
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
	1992/93	0.47	249
	1993/94	0.61	319
231 - **Saltery Bay**	1987/88	2.02	256
	1991/92	0.97	256
	1993/94	0.97	193
235 - **Kadashan**	1987/88	2.67	221
	1991/92	1.62	282
	1992/93	1.12	385
	1993/94	1.39	294
236 - **Corner Bay**	1991/92	2.27	206
	1992/93	1.72	50
	1993/94	1.69	198
247 - **Finger Mountain**	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
	1992/93	3.03	179
	1993/94	2.29	275

Table 1 Continued

Area	Regulatory year	Mean pellet groups/plot	Number of plots
254 - **Soapstone**	1987/88	1.92	274
	1990/91	2.05	270
	1992/93	1.88	243
	1993/94	1.34	310
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
	1993/94	1.46	230
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
	1993/94	1.29	221
308 - **South Kruzof**	1992/93	1.62	345
	1993/94	1.72	370

Table 2. Unit 4 deer harvest, 1987/88-1993/94.

Regulatory year	Estimated legal harvest[a]				Estimated illegal harvest[b]	Total[c]
	M (%)	F (%)	Unk.	Total		
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
1992/93	5,200 (71)	2,100 (29)	-	7,300	730	8,000
1993/94	6,000 (70)	2,500 (30)	-	8,500	850	9,400

[a] From mail questionnaire survey.

[b] Includes crippling loss estimate.

[c] Rounded to nearest 100.

Table 3. Unit 4 deer hunter residency and success, 1987/88-1993/94.

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total	Local[a] 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
1992/93	1,416	1,310	13	2,738	468	796	14	1,278	4,018
1993/94	1,590	1,476	17	3,083	349	564	33	946	4,029

[a] Residents of GMU 4.

Table 4. Unit 4 deer harvest chronology by month, 1987/88-1993/94.

Regulatory year	Harvest periods						n
	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
1992/93	557 (8)	663 (9)	1,204 (17)	2,544 (35)	1,819 (25)	443 (6)	7,230
1993/94	684 (8)	672 (8)	1,561 (18)	3,110 (36)	1,744 (20)	623 (7)	8,394

Table 5. Unit 4 deer hunting trips by transport method, 1989/90-1993/94.[a]

Regulatory year	Percent of harvest						n[b]
	Airplane	Foot	Boat	ORV[a]	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
1992/93	8	12	67	1	11	1	9,781
1993/94	7	11	66	1	12	3	10,134

[a] Includes all off-road vehicles (including snowmachine, 3-wheelers, and 4-wheelers).

[b] Includes successful and unsuccessful hunters.

Location

Game Management Unit: 5 (6,200 mi^2)

Geographical Description: Cape Fairweather to Icy Bay, Eastern Gulf 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 animals established a small herd that is found on islands and the mainland along the east side of Yakutat Bay. Deer densities have been limited by habitat and predators, and the population has supported only small hunts over the years. Many of the deer were taken during the course of hunts for other species. The potential for this deer herd is very limited.

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

MANAGEMENT DIRECTION

Management objectives

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

METHODS

We issued 11,748 deer harvest tickets for the 1992 regulatory year in Southeast Alaska and 12,228 for 1993. Forty three percent of the 1992 harvest ticket holders were mailed hunter surveys and 43% of those responded to the survey. In 1993, 42% of the people with harvest tickets were mailed surveys and the response rate was about 39%. In Yakutat 53 sets of harvest tickets were issued in 1992, and the response rate to the survey was 26%, much lower than the regionwide average. In 1993, 91 Yakutat hunters obtained harvest tickets and 36% responded to the harvest survey. Survey results for hunter effort, success, and kill location were extended to estimate results for all harvest ticket holders, but the difference in response levels probably affected survey resoults (see Table 2). Pellet-group surveys have been conducted intermittently on several islands and the mainland near Yakutat since 1986. US Forest Service crews gathered pellet-group data in spring 1993 and 1994.

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, although some islands in Yakutat Bay will continue to offer some hunting opportunities. At the end of the report period, wolf predation was reported to be increasing on islands in Yakutat Bay.

Mortality

Season and Bag Limits:		Resident and nonresident hunters:
Unit 5A	Nov. 1-Nov. 30	One antlered deer
Unit 5B	No Open Season	

Harvest

Hunter Harvest. Deer hunter survey results indicate no deer were taken in 1992, but this may be primarily due to low survey response rate. In 1993 the survey indicated 3 male deer were taken. The estimated hunter effort was 61 days in 1992 and 174 days in 1993. The low apparent effort in 1992 may also be a result of the low response rate. The management objective of 125 hunter days of effort was exceeded in 1993.

Hunter Residency and Success. All hunters within Subunit 5A were local residents. Since the limited deer habitat in the Yakutat area supports relatively low densities of deer, it is unlikely nonlocal hunters would choose to pursue deer in this subunit.

Transport Methods. All 26 hunting trips reported in 1992 were by boat. In 1993, 67% of the trips were by boat, 22% by foot, and 6% each by snowmobiles and ORVs.

Regulatory Changes. No regulatory changes were instituted in the period.

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. Deer pellet transect data should continue to be collected to monitor deer densities.

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Table 1. Unit 5A. Deer population trends as indicated by pellet-group surveys, 1987-94.

Site	Year	Mean pellet-groups/plot	Number of plots	95 % CI
Knight Island	1991	0.81	100	0.61-1.01
(VCU 361)	1992	0.95	100	0.74-1.16
Humpback				
(VCU 363)	1991	0.01	118	0.00-0.03
Yakutat Islands	1991	0.32	415	0.24-0.39
(VCU 368)	1992	0.48	243	0.37-0.58
	1993	1.07	106	0.81-1.32
	1994	0.66	251	------
Ankau	1991	0.03	116	0.00-0.05
(VCU 369)				

Table 2. Unit 5A annual harvest, 1991-1993.

			Estimated Survey Response	
Year	M	F	Total	Rate
1991	2	0	2	47%
1992	0	0	0	26%
1993	3	0	3	36%

Data from extended results of hunter surveys.

Table 3. Unit 5A. Deer hunter residency and success, 1991-1993.

Year	Successful				Unsuccessful			
	Local res.	Nonlocal res.	Nonres.	Total	Local res.	Nonlocal res.	Nonres.	Total
1991	2	0	0	2	34	0	0	34
1992	0	0	0	2	15	0	0	15
1993	3	0	0	3	19	0	0	22

Table 4. Unit 5A. Statistics for successful deer hunters, 1991-1993.

Year	No. deer/ hunter	No. deer/ hunter day	No. hunter days/deer	No. days/ hunter
1991	0.06	0.06	1.00	3.41
1992	NA			
1993	0.13	0.04	3.0	6.75

LOCATION

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

Geographic Description: Prince William Sound and North Gulf 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. The population reached a peak in 1945. Resulting habitat damage may have reduced carrying capacity (Robards 1952). Major winter die-offs occurred in the late 1940s and mid 1950s and again in the late 1960s and early 1970s (Reynolds 1979). Today deer exist in all subunits of Unit 6. The highest densities are on Hawkins, Hinchinbrook and Montague Islands in PWS. Lower densities occur on mainland areas surrounding PWS, and 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 due to a strong maritime influence. Stands of old-growth forest provide food and shelter during winter (Shishido 1986, Reynolds 1979), and predation is minimal because of the absence of wolf or coyote populations. A change in these conditions could significantly influence the deer population.

The most important factors limiting deer populations are snow depth and duration (Reynolds 1979). Numbers increase during mild winters and decline during severe winters when some deer starve. Four mild winters from 1985-86 through 1988-89 allowed overwintering populations to increase to approximately 8000-12,000 deer (Griese 1989). Subsequent, more severe winters have reduced populations. Hunting is also an important limiting factor when deep snow concentrates deer on beaches during open season. Harvest may become a more significant factor in the future if numbers of hunters increase.

Deer harvesting began in 1935. It was monitored from 1960 through 1979 by harvest reports and hunter contacts. Beginning in 1980 ADF&G collected most information through questionnaires mailed to deer harvest ticket holders. Annual harvests before 1978 probably ranged between 500 and 1500 (Reynolds 1979). Harvests began to increase after 1978 and peaked at 3000 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 forest on private land in PWS is clearly 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, Schoen et al 1985, Schoen 1978, Yoe and Peek 1992, Kirchhoff and Schoen 1987 and 1983). 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 capable of sustaining an annual harvest of 1500 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 population trend in PWS using pellet-group surveys conducted during late May and early June (Kirchhoff and Pitcher 1988). Three transects consisting of continuous 3.3- X 65.6- foot plots were run uphill from the beach fringe to the alpine at each sampling location. Number of plots varied, depending on the distance from the beach to the alpine and the persistence of snow at the time of the survey. Mean numbers of pellet groups per plot (MPGP) were calculated for each location. Within each location, means were examined for significant differences between years ($P<0.1$) using the Mann-Whitney U test (Marascuilo and McSweeney 1977). Locations were grouped by geographic areas that included: Hawkins Island, Hinchinbrook Island, Montague Island, western PWS, and northern and eastern PWS (Figure 1).

I summarized snow depth and duration as number of days when snow at Port San Juan in southwestern PWS and at the Cordova State 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 within 50 feet of sea level.

I estimated deer harvest from responses to questionnaires mailed to deer hunters issued harvest tickets in southcentral Alaska. Staff mailed approximately 3000 questionnaires each year (30% of harvest ticket holders). The questionnaire response rate was 64.3% during 1992-93 and 63.9% during 1993-94. 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 1992-93 and in 6 locations during 1993-94. An accurate estimate of deer population size was not possible using this data. However, when I assumed a MPGP of <0.5 was very low density, 0.5-0.99 was low density, and 1.0-1.99 was moderate density (Kirchhoff and Pitcher 1988), all locations had extremely low, low, or moderate deer numbers (Table 1). The number of locations in each density range was: 1 very low, 6 low, and 4 moderate. Among harvest areas, the highest MPGP was on Hinchinbrook Island (1.26-1.48), followed by Hawkins Island (1.16), Montague Island (0.29-0.97), and western PWS (0.35).

Population Trend: Pellet-group data indicated deer numbers during this reporting period were stable on Hawkins Island and stable or decreasing elsewhere in PWS (Table 1). All comparisons of MPGP between this reporting period and previous years on Hawkins Island were nonsignificant ($P<0.01$). Comparisons on Hinchinbrook Island revealed no change at Hook Point and significant declines at Shelter Bay-Deer Cove and Port Etches. Results were more variable on Montague Island. No change was detected at Rocky Bay. Declines occurred at Jeanie Cove, MacLeod Harbor, and Patton Bay. However, at Port Chalmers the 1993-94 MPGP was higher than in 1991-92 but lower than in 1987-88. At San Juan Bay the 1992-93 MPGP was unchanged from that of 1991-92 but lower than in 1987-88. In western PWS, MPGP declined at Naked Island.

Incidental observations by hunters and ADF&G personnel were generally consistent with pellet-group data. Observers reported fewer deer after the severe winter of 1990-91 and little change since then. The most noticable declines were reported from Montague Island.

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. The Board of Game took no actions, and no emergency orders were issued during this reporting period.

Hunter Harvest. Total estimated deer harvest in Unit 6 during 1992-93 and 1993-94 was 2314 and 1378, respectively (Table 2). The 1993-94 total was the lowest harvest in 5 years. Number of hunters was very low that year. Reports of low deer numbers may have discouraged hunter participation. As during past years, most harvest came from Montague and Hinchinbrook Islands. Northern and eastern PWS had the lowest harvests, and other areas were intermediate.

The harvest consisted of 64% males during 1992-93 and 66% males during 1993-94. These proportions were similar to past years, with the exception of 1991-92 when 71% males were

taken. The higher proportion in 1991-92 was probably due to implementing the current season, which delayed the opening date for the antlerless hunt from 15 September to 1 November.

Hunter Residency and Success. Approximately 1435 and 1005 individuals hunted deer in Unit 6 during 1992-93 and 1993-94, respectively (Table 3). Their success during each year was 61% and 57%. Total numbers of hunters were less than previous years, and success rates were slightly higher. Reports of low deer numbers may have discouraged hunter participation. However, hunters who went afield still enjoyed good success.

Most successful hunters during this reporting period were local residents of Unit 6 (41% in 1992-93 and 47% in 1993-94) or nonlocal residents (51% in 1992-93 and 57% in 1993-94). These proportions were similar to previous years.

Harvest Chronology. Hunters took the most deer during December in 1992-93 (44%) and during November in 1993-94 (50%). Deer are easiest to hunt during these 2 months because of rutting activity and because of snow accumulation that often forces animals to concentrate near beaches. This was the same pattern as in previous years.

Transport Methods. Boats were the most important transportation method used (64% in 1992-93 and 69% in 1993-94) (Table 5). Airplanes were second; 3-4 wheelers, highway vehicles and walking 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 likely 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 in old-growth was modified from results of snow interception studies in southeast 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 volume and potential for snow interception was lower than in southeast Alaska. My assumption about energetic cost of movement came from Parker et al. (1984). He found that snow depth greater than 10 inches resulted in a significant increase in the net cost of travel for mule deer.

Substantial overwinter mortality likely occurred during winter 1990-91 when snow depth near sea level exceeded 25 inches on 139 days at Port San Juan and on 15 days at Cordova airport (Figure 2). This was the highest number of biologically significant snow days recorded at Port San Juan between 1984-85 and 1992-93. It was the second highest recorded at Cordova

Airport since 1984-85. Pellet-group surveys indicated deer numbers were lower after the severe winter of 1990-91 on Hinchinbrook and Montague Islands and in Western PWS.

Overwinter mortality was probably lower after 1990-91 because of milder winters. Snow depth exceeded 25 inches at Port San Juan on only 45 days during 1991-92 and 28 days during 1992-93. No data are available from 1993-94, but that year was similar to the very mild winter of 1986-87. At Cordova Airport the only significant snow accumulation was in 1992-93, when depth exceeded 25 inches on 10 days.

Habitat

Logging by private land owners began in Patton Bay on Montague Island during 1993. Clearcutting was completed on 2119 acres. A haul road was constructed around the south end of the island to move logs from Patton Bay to a log transfer site in MacLeod Harbor. Habitat alteration from these activities will negatively affect deer. Logging is removing 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 was constructed almost entirely along the beach fringe where deer concentrate during deep snow years. However, the road was constructed under a USFS permit that contains provisions for restricting hauling under deep snow conditions. Those provisions could mitigate some adverse effects of winter operations.

CONCLUSIONS AND RECOMMENDATIONS

The objective to maintain a deer population capable of sustaining an annual harvest of 1500 deer, with a minimum harvest of 60% males and a minimum hunter success rate of 50% was achieved. The management strategy applied during this reporting period was successful, and I recommend no changes in regulations. Regulatory changes made in 1991/92 that reduced the bag limit from 5 to 4 and delayed opening the antlerless season from 15 September to 1 November were appropriate. These changes prevented overharvest and decreased the proportion of females in the take as expected. Conservative harvest was needed after the population decline of 1990-91, and it should be continued until pellet-group surveys indicate a recovery.

We should continue and refine pellet-group surveys. MPGP is probably a good index to population trend. Significant changes in MPGP were related to snow conditions and to general observations of deer population status. However, we need to improve our ability to detect those changes by completing at least 200 plots at each location (Nowlin 1993), and by sampling the same plots yearly, rather than every 2-3 years.

We should monitor the deer population and harvest on South Montague Island where logging is in progress. We should repeat pellet-group surveys in spring 1995 at San Juan Bay, and harvest data should be summarized for the south end of the island and related to population trend to assess if regulations are appropriate.

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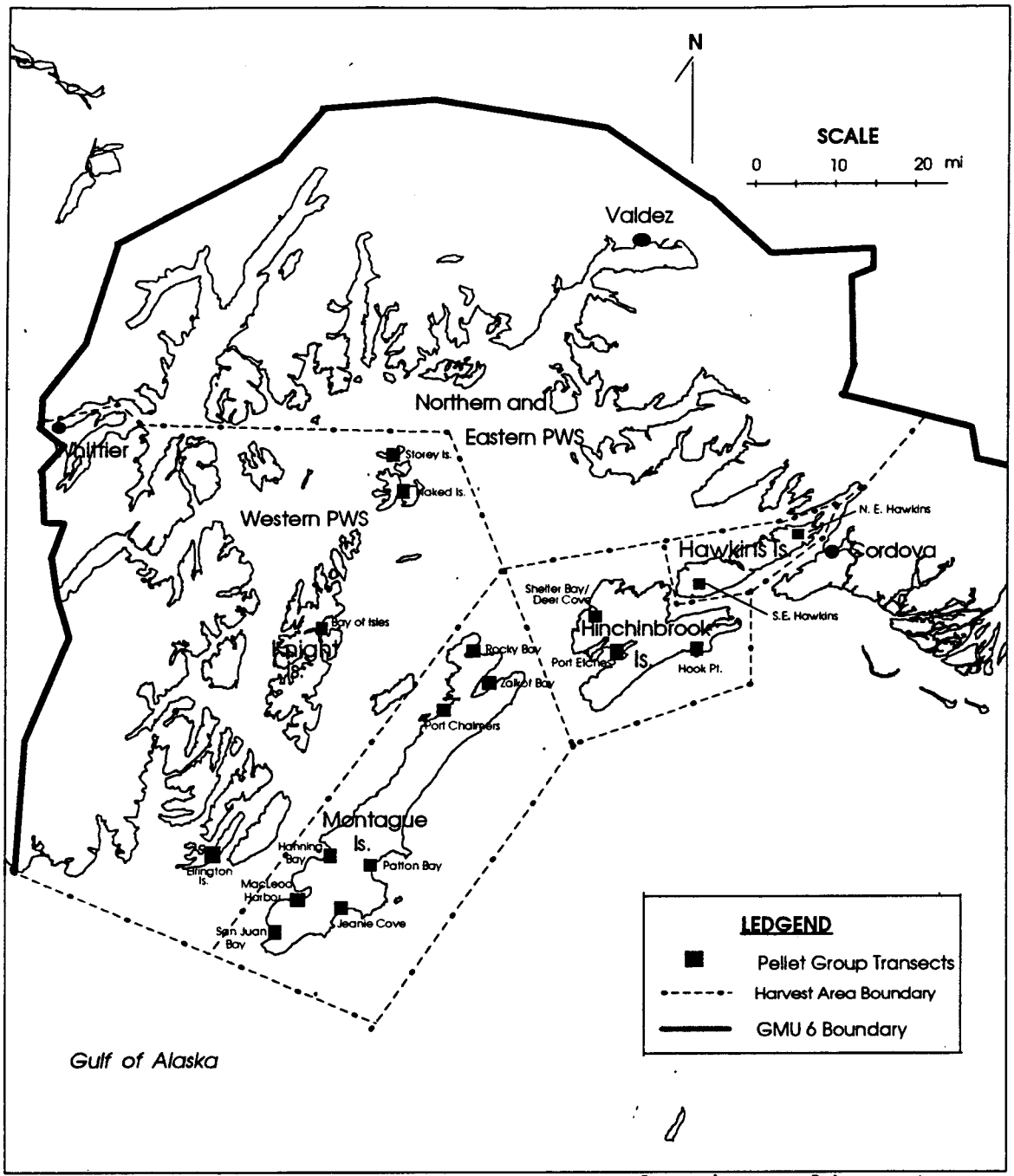

Figure 1. Unit 6 deer pellet-group transect locations and harvest area boundaries.

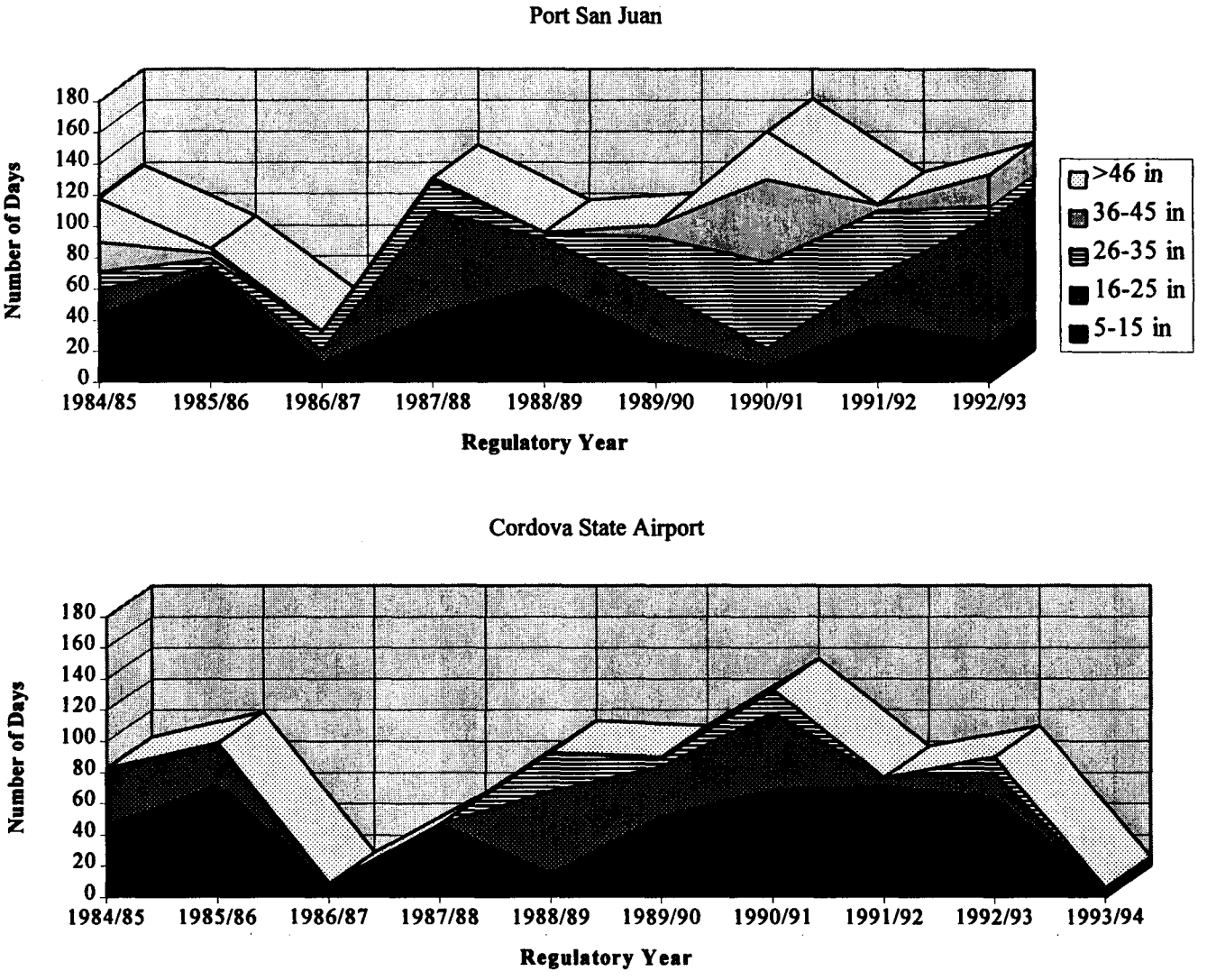

Figure 2. Snow depth and duration at Port San Juan in western PWS, 1984-92, and Cordova state airport, 1984-93.

Table 1. Unit 6 deer population trends as indicated by pellet-group surveys 1987-1993.

Area	Specific location	Regulatory year	Mean pellet groups/plot	Number of plots
Hawkins Island	N.E. Hawkins	1987/88	1.32[a]	132
		1989/90	1.15[a]	130
		1991/92	1.49[a]	132
		1993/94	1.16[a]	225
	S.W. Hawkins	1987/88	0.85[a]	168
		1990/91	1.07[a]	169
Hinchinbrook Island	Hook Point	1987/88	1.18[a]	226
		1992/93	1.30[a]	237
	Shelter Bay-Deer Cove	1987/88	2.40[a]	186
		1990/91	2.43[a]	197
		1993/94	1.48[b]	215
	Port Etches	1989/90	2.77[a]	137
		1991/92	1.68[b]	189
		1993/94	1.26[c]	225
Montague Island	Zaikof Bay	1987/88	1.18[a]	203
		1989/90	1.23[a]	206
		1990/91	0.86[b]	206
	Rocky Bay	1989/90	1.25[a]	250
		1993/94	0.97[a]	194

Table 1. Continued.

Area	Specific location	Regulatory year	Mean pellet groups/plot	Number of plots
Montague Island	Port Chalmers	1987/88	0.46[a]	173
		1991/92	0.23[b]	182
		1993/94	0.29[c]	221
	MacLeod Harbor	1988/89	0.89[a]	222
		1992/93	0.59[b]	219
	San Juan Bay	1987/88	1.01[a]	206
		1991/92	0.64[b,c]	214
		1992/93	0.77[c]	228
	Jeanie Cove	1989/90	1.60[a]	266
		1992/93	0.75[b]	277
	Patton Bay	1987/88	1.23[a]	220
		1990/91	1.75[b]	221
		1992/93	0.89[c]	248
Western PWS	Elrington Island	1988/89	1.43[a]	139
		1990/91	1.23[a]	137

Table 1. Continued.

Area	Specific location	Regulatory year	Mean pellet groups/plot	Number of plots
Western PWS	Knight Island (Bay of Isles)	1988/89	1.30[a]	158
		1991/92	1.16[a]	123
	Naked Island	1988/89	0.65[a]	240
		1991/92	0.56[a]	196
		1993/94	0.35[b]	210
	Story Island	1988/89	1.27[a]	164
		1991/92	1.15[b]	205

[a-c] Means with different letters within specific locations are significantly different ($p<0.1$).

Table 2. Unit 6 deer harvest 1989-93

Area	Regulatory year	Estimated legal harvest M	(%)	F	(%)	Unk.	Total	Estimated illegal harvest	Total
Hawkins Island	1989/90	187	(64)	107	(36)	19	313	20	333
	1990/91	157	(52)	146	(48)	0	303	30	333
	1991/92	281	(83)	58	(17)	0	339	40	379
	1992/93	178	(62)	111	(38)	0	289	30	319
	1993/94	185	(61)	120	(39)	0	305	20	325
Hinchinbrook Island	1989/90	213	(58)	155	(42)	19	387	10	397
	1990/91	325	(60)	221	(40)	0	546	20	566
	1991/92	155	(64)	88	(36)	0	243	30	273
	1992/93	322	(65)	174	(35)	0	496	30	526
	1993/94	242	(65)	129	(35)	0	371	20	391
Montague Island	1989/90	543	(61)	349	(39)	38	930	40	970
	1990/91	574	(58)	409	(42)	0	983	50	1033
	1991/92	460	(69)	210	(31)	0	670	60	730
	1992/93	421	(60)	284	(40)	0	705	40	745
	1993/94	236	(65)	125	(35)	0	361	30	391
Western PWS	1989/90	125	(65)	66	(35)	29	220	25	245
	1990/91	172	(51)	162	(49)	0	334	25	359
	1991/92	277	(78)	78	(22)	0	355	30	385
	1992/93	333	(72)	132	(28)	0	465	30	495
	1993/94	149	(81)	36	(19)	0	185	20	205

(Cont.)

Table 2. Continued

Area	Regulatory year	Estimated legal harvest M	(%)	F	(%)	Unk.	Total	Estimated illegal harvest	Total
Northern and	1989/90	41	(75)	14	(25)	6	61	25	86
Eastern PWS	1990/91	82	(54)	70	(46)	0	152	25	177
	1991/92	40	(75)	13	(25)	0	53	30	83
	1992/93	51	(48)	56	(52)	0	107	20	127
	1993/94	26	(63)	15	(37)	0	41	20	61
Unit 6 - Unknown	1989/90	4	(29)	10	(71)	27	41	0	41
	1990/91	61	(54)	51	(46)	0	112	0	112
	1991/92	37	(77)	11	(23)	0	48	0	48
	1992/93	81	(79)	21	(21)	0	102	0	102
	1993/94	5	(100)	0	(0)	0	5	0	5
Unit 6 - Total	1989/90	1113	(61)	701	(39)	138	1952	120	2072
	1990/91	1371	(56)	1059	(44)	0	2430	150	2580
	1991/92	1250	(73)	458	(27)	0	1708	190	1898
	1992/93	1386	(64)	778	(36)	0	2164	150	2314
	1993/94	843	(66)	425	(34)	0	1268	110	1378

Table 3. Unit 6 deer hunter residency and success, 1989-93.

Regulatory year	Successful					Unsuccessful					Total hunters
	Local resident[a]	Nonlocal resident	Non-resident	Total	(%)	Local resident	Nonlocal resident	Non-resident	Total	(%)	
1989/90	243	508	30	781	(54)	173	451	42	666	(46)	1447
1990/91	331	533	29	893	(54)	227	493	29	749	(46)	1642
1991/92	387	377	8	772	(46)	220	682	17	919	(54)	1691
1992/93	418	451	9	878	(61)	141	392	24	557	(39)	1435
1993/94	233	325	14	572	(57)	177	256	0	433	(43)	1005

[a] Resident of Unit 6

Table 4. Unit 6 deer harvest chronology percent by time period, 1989-93.

Regulatory year	Harvest periods					n
	August	September	October	November	December	
1989/90	5	9	22	48	15	830
1990/91	5	6	31	36	22	449
1991/92	11	6	15	43	25	375
1992/93	5	4	8	39	44	510
1993/94	6	5	15	50	23	363

Table 5. Unit 6 deer harvest percent by transport method, 1989-93.

Regulatory year	Percent of harvest						n
	Airplane	Boat	3/4 Wheeler	Highway vehicle	Foot	Unknown	
1989/90	54	45	0	0	0	1	--
1990/91	38	56	0	3	0	3	302
1991/92	33	62	0	3	0	2	370
1992/93	29	64	0	3	3	0	348
1993/94	26	69	1	2	3	0	314

LOCATION

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

Geographical Description: Kodiak and Adjacent Islands

BACKGROUND

The Sitka black-tailed deer population originated from 4 transplants, totaling 30 deer, made to Long Island and Kodiak Island between 1924 and 1934 (Burris and McKnight 1973). By the early 1940s deer occupied northeastern Kodiak Island, and the first hunt was in 1953. The deer population continued to extend 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 animals (Smith 1989). Increased winter severity beginning in 1987-88 caused a declining population trend through 1992. Improved overwinter survival in 1992-93 and 1993-94 moderately increased the deer population.

Hunter harvest surveys were used to assess trends in the deer population in the past 10 years. Deer hunters were surveyed with 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 periodically supplemented the mail surveys. Winter mortality was assessed by searching for and examining deer carcasses in selected coastal wintering areas. We used 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.

There were liberal seasons and bag limits 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 was 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 and a limit of 1 antlerless deer was imposed from October 1-November 30 in part of northeastern Kodiak Island and the Afognak Island group for the 1991-92 season. The bag limit remained at 5 deer for Unit 8 residents hunting the Kodiak National Wildlife Refuge under federal subsistence regulations.

MANAGEMENT DIRECTION

Management Objective

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

METHODS

Beginning with the 1989-90 season, we mailed questionnaires to hunters annually to assess trends in hunting effort and harvest. The questionnaires were sent to a random sample of deer harvest ticket holders, and harvest estimates were derived from returned questionnaires. In 1992-93, 3000 questionnaires were sent, and 1929 were returned (64%). In 1993-94, 3000 questionnaires were sent, and 1917 were returned (64%). Field interviews and posthunt interviews provided preliminary harvest data. The US Fish and Wildlife Service interviewed hunters annually in the Kodiak National Wildlife Refuge during October-December enforcement patrols by boat. A few outfitters and transporters submitted voluntary summaries of hunting activities.

Natural mortality was assessed by searching for deer carcasses in selected coastal winter ranges each year. Occasional flights were made to observe snow conditions and condition of deer during winter months. Reports from the public also provided information on winter conditions and deer mortality.

The USFWS conducted winter aerial and ground surveys in several locations on the Kodiak National Wildlife Refuge to assess techniques for monitoring population trends.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: The deer population began declining in the 1987-88 winter, the first in a series of severe winters that resulted in moderate-high natural mortality. Smith (1993) estimated that by 1992 the population in the northern part of Kodiak Island had declined to about 50% of the abundance in the mid-1980s. Survival was much improved during the 1992-93 and 1993-94 winters, and the population trend is increasing. The deer population was estimated at 100,000 in the mid-1980s, but no methodology for objectively estimating deer numbers in Unit 8 had been developed.

Population Composition: Anecdotal reports from hunters and comments on hunter questionnaires indicated that spike (yearling) males were abundant during the 1993-94 season. The increase from 73% males harvested in 1992-93 to 82% males in 1993-94 tends to confirm the hunters' observations (Table 1). Hunters reported that older, trophy-sized males were scarce during the 1992-93 and 1993-94 hunts.

Distribution and Movements: Deer are throughout Unit 8 except in the more remote Semedi, Barren, and Chirikof island groups. Sitkinak Island, a 90 mi.^{2} island 12 mi. south of Kodiak Island was colonized by deer within the past 10-15 years. Hunters first reported killing deer there in the 1991-92 season.

Mortality

Harvest:

Season and Bag Limits. The 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 the mouth of Elbow Creek, and adjacent small islands in Chiniak Bay is *1 August to 31 October*. The bag limit is 1 deer; however, antlerless deer may be taken only from 25-31 October.

The 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 four deer; however, antlerless deer may be taken only from 1 October to 31 December. The 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 residents of Unit 8 have a bag limit of 5 deer if hunting on the Kodiak National Wildlife Refuge.

Board of Game Actions and Emergency Orders. The most recent change occurred in 1991 when the Board of Game reduced the bag limit from 5 to 4 deer, changed the antlerless season opening to 15 September-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. 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. Only residents of Unit 8 are qualified as subsistence hunters under federal regulations.

A new law was implemented in 1993-94 allowing disabled and elderly Alaskan residents to harvest deer, caribou and moose by proxy. Any resident who is 70% disabled or at least 65 years old can designate another hunter to harvest up to the bag limit by permit.

Hunter Harvest. The estimated annual harvest continued to decline from the recorded high of nearly 14,000 deer in 1987-88 (Table 1). Although the deer population increased in 1993 and 1994, the harvest declined from 8948 in 1991-92 to a low of 6254 deer in 1993-94. The number of hunters afield also declined, from 4421 in 1991-92 to 2946 in 1993-94 (Table 2). Between the

1991-92 and 1993-94 seasons, the number of hunters afield declined by 59%, 42% and 56% for Unit 8 residents, other Alaskan residents, and nonresidents, respectively.

A slight increase in harvest occurred in the 1991 season which followed a winter with good survival. The harvest again declined in 1992 following the more severe 1991-92 winter. Low hunting success in 1992 may have had a residual effect by discouraging hunters during the 1993 season when hunting improved.

Distribution of the harvest shifted toward southern Kodiak Island in 1992-93 and 1993-94. In 1989-90 only 24% of the harvest occurred in southern Kodiak Island (hunt areas #18-26), compared to 42% in 1992-93 and 40% in 1993-94. The population decline was more precipitous in the northern part of Unit 8, prompting hunters to concentrate more effort in the southern Kodiak Island area. The Olga Bay and Alitak Bay areas became especially popular destinations, with several charter boats operating there.

Harvest of males increased to 82% in 1993-94, the highest take of males since 1987-88 (Table 1). That increase correlated with much improved survival during the 1992-93 winter. The mean no. deer/hunters afield increased from 1.7 in 1992-93 to 2.1 in 1993-94 (Table 3).

A regulatory change that imposed a bag limit of 1 antlerless deer in part of northern Kodiak, Afognak, Raspberry and Shuyak Islands (hunt areas #10-14, 30, 35) beginning in 1991-92 resulted in a decline in the harvest frequency of females. For the 3 seasons the 1 antlerless bag limit was in effect, female harvest ranged from 20-31%, compared with 34-36% for the 2 preceding seasons. The total harvest declined from 3950 deer in 1989-90 to only 1761 deer in 1993-94 in this area.

Hunter Residency and Success. The number of hunters afield declined in each category, but the proportions of Unit 8 residents, other Alaskan residents and nonresidents were stable (Table 2). Residents of Unit 8 composed 38-43% of the hunters afield from 1989-1993. Other Alaskan residents composed 48-52% of the hunters afield, and nonresident participation ranged from 7-11% during that period.

The effect of the Federal Subsistence Board's decision to retain a 5-deer bag limit on lands within the Kodiak National Wildlife Refuge was relatively minor (Table 4). A maximum of 5% of the hunters harvested the 5 deer bag limit in 1992-93. The harvest under federal subsistence regulations represented an additional take equivalent to 10%, 11% and 7% of the harvest under State regulations in 1991-92, 1992-93 and 1993-94, respectively.

Hunter success increased from 67% in 1992-93 to 80% in 1993-94, reflecting improved overwinter survival.

Harvest Chronology. November was the peak month of harvest in 1992-93 and 1993-94 with 39% of the season's take (Table 5). A slight increase in the October harvest occurred in 1993-94 along with a corresponding decline in the December harvest.

Transport Methods. Aircraft was slightly favored over boats in transport methods used by hunters (Table 6). A shift toward aircraft use since the late 1980s corresponded with recent increases in harvest in more remote southern Kodiak Island.

Other Mortality

Winter kill was light in 3 of the past 5 years based on mortality surveys in coastal winter range (Table 7). No adult female carcasses were found in the 1992-93 or 1993-94 surveys which indicates reproductive potential of the deer population remains high.

Illegal deer harvest by hunters outside the hunting season occurs commonly. The illegal harvest is estimated at 10-15% of the legal take. Predation by free-roaming dogs occurs commonly near communities and isolated residences. An estimated 20-25 deer are killed annually in motor vehicle collisions. Brown bear predation occurs but is not a serious limiting factor.

Habitat

Assessment: High deer densities in the late 1970s through the mid 1980s resulted in heavily browsed winter range. The recent decline in the population reduced pressure on winter range, but no assessment of browse conditions has been done. Results of a graduate research project on deer habitat use is expected to be published as a M.S. thesis by the University of Alaska in 1995.

Much of the Sitka spruce forest of central and eastern Afognak Island has been clear-cut logged since 1975. Mature spruce has been converted to seral shrub-grass communities. Logging began in 1993 on private land in the Chiniak Peninsula of northeastern Kodiak Island. Studies in southeastern Alaska indicated old-growth forest was critical in maintaining deer populations (Wallmo and Schoen 1980). Logging deer winter range on Afognak Island initially reduces carrying capacity; subsequent increased production of herbaceous and shrubby vegetation may benefit deer depending on snow conditions (Smith 1993).

Nonregulatory Management Problems/Needs

Conflicting results from harvest surveys used by the Division of Wildlife Conservation and Division of Subsistence cloud the validity of current methodology. An annual hunter survey by mail questionnaire is used by the Division of Wildlife Conservation to monitor deer harvest and hunter effort. Deer harvest parameters are estimated by extrapolating results of questionnaires received from approximately a 20% sample of harvest ticket holders. The Division of Subsistence harvest estimates were derived from a survey of 200 residents of Kodiak city and adjoining road-connected residents in 1991-92 using personal interviews to assess use of fish, game, and wild plants. The mail questionnaire survey underestimated the harvest by 31% in road-connected areas and 41% when including villages, according to an analysis by the Division of Subsistence (Jim Fall, unpublished report). I recommend research be directed toward improving deer hunter survey methods and resolving discrepancies between the 2 survey methods.

Improving precision in assessing deer population trends is desirable, but it is difficult and expensive. Hunter surveys are the most economical, although an indirect method of monitoring deer population trends. The US Fish and Wildlife Service initiated aerial and ground deer counts in wintering areas in the Kodiak National Wildlife Refuge in 1992, concluding that aerial surveys required intensive effort to develop corrections for variations in sightability (Zwiefelhofer and Stovall 1992). Pellet-group counts are used in forested habitat of southeastern Alaska to monitor deer population trends (Kirchoff 1988). The US Fish and Wildlife Service established some pellet-group transects in the Olga Bay area in 1994 to use the technique for monitoring population trends on Kodiak Island (Stovall 1994).

CONCLUSIONS AND RECOMMENDATIONS

The deer population recovered somewhat from a decline which began in the 1987-88 winter. Improved winter conditions in 1992-93 and 1993-94 resulted in increased survival, and hunter success improved in the 1993-94 season. Hunting effort increased in the southern part of Kodiak Island, where the population declined less. The estimated 1993-94 harvest of 6254 deer was the lowest take in the past 7 years, and the number of hunters afield declined comparably.

More restrictive regulations in effect beginning with the 1991-92 season contributed to the decline in the deer harvest. Imposing a bag limit of 1 antlerless deer in October and November correlated with a decline in the frequency of females in the harvest from northern Kodiak and Afognak, Raspberry and Shuyak Islands since the regulation went into effect in 1991-92. Hunters reported that deer were more abundant in those areas in 1993. Although the more restrictive regulations protecting females should assist the population in recovering, winter severity will remain the most important factor in recovery of the population. I did not recommend any changes in seasons and bag limits.

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Table 1. Unit 8 deer harvest, 1987-93.

Regulatory year	Estimated legal harvest [a] M (%)	F (%)	Unk.	Total	Estimated illegal harvest	Total
1987/88	10,844 (80)	2,702 (20)	245	13,791	No estimate	13,791
1988/89[b]						
1989/90	6,923 (73)	2,625 (27)	490	10,038	No estimate	10,038
1990/91	5,367 (67)	2;739 (33)		8,106	No estimate	8,106
1991/92	6,569 (73)	2,379 (27)		8,948	No estimate	8,948
1992/93	5,144 (73)	1,899 (27)		7,043	No estimate	7,043
1993/94	5,124 (82)	1,130 (18)		6,254	No estimate	6,254

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

Table 2. Unit 8 deer hunter residency and success, 1987-93.

Regulatory year	Successful Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Unsuccessful Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1987/88	1,851	2,410	290	4,551 (76)	645	665	161	1,471 (24)	6,022
1988/89[b]									
1989/90	1,341	1,851	368	3,560 (74)	487	585	183	1,255 (26)	4,815
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
1992/93	1,221	1,345	207	2,774 (67)	541	645	160	1,345 (33)	4,119
1993/94	935	1,247	159	2,341 (80)	256	286	63	605 (20)	2,946

[a]Includes residents of GMU 8.
[b]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, 1991-92, 1992-93 and 1993-94 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
1992-93	67	5	73	27	7,043	4,119	1.7	3.7
1993-94	80	4	82	18	6,254	2,946	2.1	2.4

*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 1991-1993.

Table 4. Number and percent of hunters who took 1, 2, 3, 4, 5 deer, 1989-93 - Unit 8.

	1993-94[a]		1992-93[a]		1991-92[a]		1990-92		1989-90	
	Hunters	%	Hunters	%	Hunters	%	Hunters	%	Hunters	%
1 deer	638	27.2	804	29.0	915	27.1	980	31.9	965	27.1
2 deer	462	19.7	630	22.7	692	20.5	682	22.2	716	20.1
3 deer	491	21.0	529	19.1	637	18.9	466	15.2	622	17.5
4 deer	645	27.5	665	24.0	963	28.5	359	11.7	514	14.4
5 deer	83	3.5	139	5.0	157	4.6	577	18.8	738	20.8

[a] Bag limit 5 deer in Federal lands within the Kodiak National Wildlife Refuge, and only residents of Unit 8 eligible.

Table 5. Unit 8 deer harvest chronology percent by time period, 1980-93.

Regulatory year	Harvest periods						*n*
	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
1992/93	4	5	26	39	26	0	7,043
1993/94	5	7	31	39	19	0	6,254

Table 6. Unit 8 deer harvest percent by transport method, 1987-93.

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[a]										
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
1992/93	46	<1	39	4	0	2	9	9	0	831
1993/94	45	<1	42	5	0	1	9	12	0	889

[a]No survey.

Table 7. Unit 8 sex and age composition of deer winter-kill from beach mortality transects, 1988-1994.

Regulatory Year	Adult				Fawn					Unk. age/ sex		All Unk.	Total
	M (%)	F (%)	Unk.	Total	M (%)	F (%)	Unk.	Total		M (%)	F (%)		
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
1992-93	0	0	0	0	0	0	1	1	0	0	0	1	1
1993-94	15	0	2	17	2	2	8	12	0	17	2	10	29

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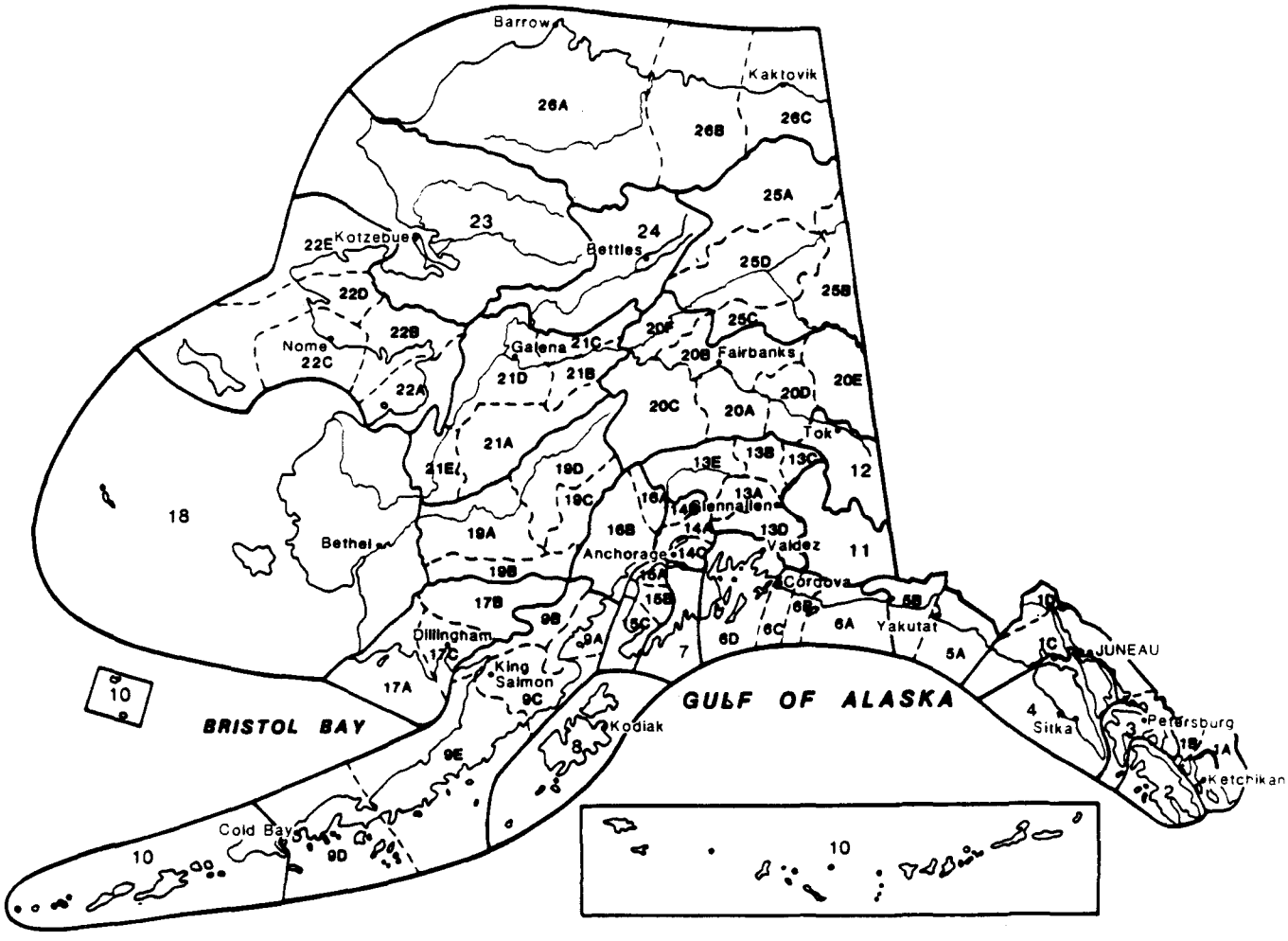
Alaska's Game Management Units



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 allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve, and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes for responsible hunting. Seventy-five percent of the funds for this report are from Federal Aid.

PAT COSTELLO