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Division of Wildlife Conservation

Federal Aid in Wildlife Restoration
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Elk

M. V. Hicks, Editor

Photo By
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Study 13.0
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STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
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LOCATION

Game Management: Unit 3 (3,000 mi^2)

Geographical Description: Islands of the Petersburg, Wrangell, and Kake areas

BACKGROUND

Elk (Cervus elaphus) are not endemic to Alaska but were successfully introduced to Afognak Island in the Kodiak Archipelago in 1929. There have been several unsuccessful attempts to introduce elk to Southeast Alaska. All previous introductions failed, but lack of monitoring precluded knowing cause of failure.

In 1987 50 elk from Oregon were released on Etolin Island. Most, 33, were Roosevelt elk and the remainder were the Rocky Mountain subspecies. Initial losses were high with about two-thirds of the released animals dying within the first 18 months of the release.

Apparently the lowest population was reached in mid-1988 and since that time the herd has grown and expanded its range. A breeding population is established on Zarembo Island and elk have been reported on Mitkof, Deer, Bushy, and Kupreanof islands.

MANAGEMENT DIRECTION

No Federal Aid objectives for elk exist in Unit 3. However, the Etolin Island winter carrying capacity has been estimated at 900 elk (Alaska Dep. of Fish and Game, 1985). Clearcut logging continues and 27,450 acres are scheduled to be cut between 1980 and 2080 (USFS, unpubl. data). This is expected to reduce long-term carrying capacity. Several decades may be required for the elk population to reach carrying capacity, and the division's current plan is to provide total protection for maximum population growth. An ADF&G/USFS Elk Technical Committee has recommended that a bulls-only season be initiated when the population reached approximately 250 animals. A postharvest ratio of 25-30 bulls:100 cows would be one management goal (Alaska Dep. of Fish and Game, 1985).

METHODS

We used radiotelemetry to locate individuals and groups, making visual verification when possible. We recorded observations reported to us by other agency personnel and the public. We also recorded elk pellet groups while conducting deer pellet group surveys. We made ground searches for elk and calves during the summer.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Our estimate of the population size is subjective but based on all information available. We estimate a population of at least 100 elk, with about 20 of that number on Zarembo and the rest on Etolin. The design life of the radio transmitters was 3 years. Some radios cannot be located now, and we presume these are no longer transmitting. Although some radios are no longer functioning, 4 can still be located on most flights.

Population Composition: No data are available to make a population composition estimate. Almost every group of Roosevelt elk we have seen included large and small bulls, cows, and calves in season. The elk we see on Zarembo are Rocky Mountain, but they are usually a mixed group. Some calves survive each year and are recruited into the breeding herd.

Distribution and Movements: The Roosevelt elk have dispersed from the release site but still include the release area within their range. Some of the elk have been located above 1,500 feet elevation during this reporting period. No specific seasonal movements have been noted. Most of the elk locations have been within 10 miles of the release site.

After remaining close to the release site the first 18 months, the Rocky Mountain elk have dispersed widely. A breeding group is now established on Zarembo Island. Elk have been reported on Mitkof Island, and elk fecal pellets were collected at Portage Bay on the north shore of Kupreanof Island.

For both subspecies, the area below 500 feet and adjacent to the shore is preferred habitat in spring and early summer. Some of the elk are now moving higher into the mountains in summer but prefer lowlands close to the release sites during winter.

Mortality

Harvest:

Season and Bag Limit. No open season

Other Mortality: No natural mortality was recorded for the reporting period. A cow from the original introduction was killed by a poacher on Zarembo Island in 1992. Because 2 bulls had been poached earlier, 3 of the 50 introduced animals were killed illegally. Brown bears, black bears, and wolves are on Etolin Island; wolves live on Zarembo Island, but the extent of predation on elk is unknown.

Habitat

The winter carrying capacity of Etolin Island has been estimated at 900 elk and consists of the following: clearcut-2 mi^2; second growth-2.2 mi^2; nonforest or noncommercial forest-72.9 mi^2; old growth forest-124.4 mi^2 (Alaska Dep. of Fish and Game, 1985).

CONCLUSIONS AND RECOMMENDATIONS

The elk population in Unit 3 is increasing after initial losses. Elk are dispersing and have established a breeding herd on Zarembo Island. We do not know if a breeding group has been established on Mitkof Island. We should continue to monitor elk to determine dispersal patterns and study effects they may have on native Sitka black-tailed deer.

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LOCATION

Game Management Unit: 8 (5,097 mi^2)
Geographical Description: Kodiak and Adjacent Islands

BACKGROUND

The Roosevelt elk population in Unit 8 originated from a release of 8 animals near Litnik Bay on Afognak Island in 1929 (Batchelor 1965). The population was estimated at more than 200 elk in 1948, and the first hunt occurred in 1950. Hunts have been held annually since 1955. By 1965, the population reached an estimated peak of 1,200-1,500 elk, with 9 herds on Afognak Island and 1 herd on nearby Raspberry Island. A series of severe winters caused extensive mortality, reducing the population to an estimated 450 elk by 1972 (Burris and McKnight 1973). Improved winter conditions and conservative harvests resulted in a recovery of over 1,000 elk by the early 1980s. Increasingly severe winters since 1988 correlated with a recent declining trend in the elk population.

Accessibility of elk herds to hunters was the most important consideration in managing harvest this past decade. The Raspberry Island herd and the southwestern Afognak Island herd, which were most accessible, were regulated with drawing and registration permit hunts. Season closures by emergency order were used frequently to enforce annual harvest quotas.

Access to other Afognak Island herds was relatively limited until 1975 when commercial logging activities began. Increased elk harvest near logging roads in central and eastern Afognak Island correlated with a decline in those herds by the mid-1980s. In 1986, the Board of Game imposed a shorter hunting season for eastern Afognak Island where extensive logging road access was available.

Hunting pressure declined to 398 hunters in 1992, compared with an average of 636 hunters during the period 1986-90. The harvest declined to 67 elk in 1992, less than half the average take of 163 elk in 1986-90.

MANAGEMENT DIRECTION

Management Objective

The management objective is to maintain a population of at least 1,000 elk for use by all user groups.

METHODS

One observer in a Piper PA-18 aircraft completed aerial composition counts annually in July-September. Supplemental counts of herds > 50 animals were made from color photographs taken during surveys.

Using helicopter darting techniques, we captured 14 elk from 6 herds in 1992 and equipped them with radiocollars. Each year we made 6-8 flights with fixed-wing aircraft to relocate collared animals.

We collected data on harvest and hunting effort from mandatory hunting reports, from field check stations, and periodic monitoring of hunting activity by boat and aircraft.

RESULTS AND DISCUSSION

Population Status and Trend

Population Size: Aerial composition surveys indicated overall decline in the elk population (Table 1). The minimum population in 1992 was 760 elk, an 81% decline from the 1,375 elk estimated in 1988. The decline was widespread, except for the eastern Afognak elk herds where the population was stable. Above average harvests in 1989 and 1990 and increased winter mortality correlated with the decline.

Elk density on Afognak Island was estimated at 0.9-1.0 elk/mi^2 in 1992. Raspberry Island supported an estimated density of 1.4-1.5 elk/mi^2. Smith (1992) estimated a range in elk density for Afognak and Raspberry Islands of 0.6-1.9 elk/mi^2 from the early 1960s to 1990.

Since 1989 a major decline occurred in the Paramanof Peninsula herd. Numbers declined from 233 elk in 1989 to 99 elk in 1990, but it was assumed that part of the herd was missed. In 1991 the count dropped to < 25 elk, and elk were not located in 1992. The reported harvest from this herd was 25 and 32 elk in 1989 and 1990, respectively. I suspect low survival during the 1989/90 and 1990/91 winters was responsible for the decline, but the harvest in 1990 might have aggravated the decline. It was also possible that part of the Paramanof Peninsula herd joined the closely adjacent Malina Lakes herd.

Population Composition: A declining trend in bull:cow ratios noted by Smith (1992) continued with a low of 3 bulls:100 cows in the 1992 composition surveys (Table 1). The declining trend in bull:cow ratios was verified by a decline in the percent of bulls in the harvest (Table 2). High hunter selectivity for bulls and increased winter mortality were suspected in the decline. Anecdotal reports from hunters confirmed mature bulls were scarce in 1992.

The calf:cow ratio was stable to increasing, but the number of calves in the annual composition surveys declined since 1988 (Table 1).

Distribution and Movement: Distribution of the elk herds has been monitored by relocating radio-collared elk since 1986. Smith (1992) denoted home ranges of 6 elk herds, and only minor changes in distribution of those herds have been found since. Additional radiocollars were deployed in 1992, and 7 of the 8 herds on Afognak Island now contain 1 or more radiocollared cows. The disappearance of the Paramanof Peninsula herd from its former range between 1989 and 1992 was the most noteworthy change in elk distribution.

Mortality

Harvest:

Season and Bag Limits. The open season for resident and nonresident hunters for Raspberry Island was 1 October to 15 November; the bag limit was 1 elk by drawing permit only. Up to 40 permits were to be issued in 1991/92 and up to 300 permits were to be issued in 1992/93.

The open season for resident and nonresident hunters in that portion of Afognak Island south and west of a line from the head of Malina Bay to the head of Back Bay was 1 September to 10 October; the bag limit was 1 elk by drawing permit only, with up to 400 permits issued in 1990/91 and up to 150 permits issued in 1992/93. A second season was open by registration permit during 15 to 16 October in 1991.

The open season for resident and nonresident hunters for that portion of Afognak Island east of a line from Delphin Point to the head of Saposa Bay was 1 September to 15 November in 1991/92, and the bag limit was 1 elk by registration permit only.

The open season for resident and nonresident hunters for that portion of Afognak Island south and west of a line from Delphin Point in Perenosa Bay to the head of Saposa Bay and east of a line from the head of the northwest arm of Kazakof Bay to Delphin Point was 1 September to 23 October in 1991/92, and the bag limit was 1 elk by registration permit only.

The open season for resident and nonresident hunters for that portion of Afognak Island east of a line from the head of the northwest arm of Kazakof Bay to Delphin Point in Perenosa Bay and south and west of a line from Delphin Point to the head of Saposa Bay was 1 September to 5 October in 1992/93, and the bag limit was 1 elk by registration permit only.

The open season for resident and nonresident hunters for the remainder of Unit 8 was 1 September to 15 December in 1991/92 and 1992/93, and the bag limit was 1 elk by registration permit only.

Board of Game Actions and Emergency Orders. The Board of Game passed a regulation shortening the 1 September to 15 December season to 10 October to 25 November effective for the 1993/94 season. The new regulation provided for a 10-31 October drawing permit hunt followed by a 5-25 November registration permit hunt for that portion of Afognak Island west of Tonki Bay and west of a line from the head of Tonki Bay to Pillar Cape and south and east of a line from the head of Discoverer Bay to the head of Malina Bay and south of Malina Bay. Those

changes were recommended by department staff to incorporate the most accessible elk herds into a single management area with a shorter season. The change from a 1 September opening to a 10 October opening was done to reduce hunting pressure on bulls during the rut and to assure maximum participation in breeding by mature bulls. The Board closed hunting in that portion of Afognak Island east of Tonki Bay and east of a line from the head of Tonki Bay to Pillar Cape to facilitate recovery of the Tonki Cape elk herd which numbered < 25 animals.

Two emergency orders were issued in 1991/92 closing registration permit hunts. The season dates for the southwestern Afognak Island hunt (No. 751) were changed from 15 October to 15 December to 15-16 October after aerial surveys indicated the herd had declined. Part of the eastern Afognak hunt (No. 750) was closed after only 9 days of a scheduled 32-day season when higher than expected harvests occurred, partly because of several new logging roads and clearcuts which improved hunters' access.

In 1992/93 an emergency order was issued to cancel the southwestern Afognak registration permit hunt (No. 751) when we projected the allowable harvest would be taken during the drawing permit hunt. A second emergency order closed part of the registration permit hunt including the ranges of the Duck Mountain, Marka Lake and Portage Lake herds on 5 October, well before the scheduled 1 November closure. A higher than expected harvest rate near the logging roads and the declining population trend prompted that closure.

Hunter Harvest. The annual harvest ranged from a high of 206 elk in 1989/90 to a low of 67 elk in 1992-93 (Table 2). A declining trend in the harvest occurred in all but the eastern Afognak Island hunt where the harvest was stable to slightly increasing. Early emergency order closures of hunts in 1991/92 and 1992/93 and issuing fewer permits in drawing permit hunts reduced hunting effort and harvest. A declining trend in the percent of bulls in the harvest also occurred (Table 2).

Permit Hunts. Lowering the number of drawing permits for the Raspberry Island hunt reduced the harvest from 30 elk in 1988/89 to 4 elk in 1992/93 (Table 2). Hunter success was only 16% in 1992/93, compared to a high of 50% in 1990/91.

The registration permit hunt for southwestern Afognak was canceled in 1992/93 and limited to only 3 days in 1991/92 because adequate harvests were taken during the earlier drawing permit hunt.

Hunter Residency and Success. Hunter success declined to 18% and 17% in1991/92 and 1992/93, respectively (Table 3). Mean annual harvest by local residents was highest (53%), followed by other Alaska residents (43%) and nonresidents (4%). The number of hunters afield declined from 662 in 1989/50 to 398 in 1992/93.

Harvest Chronology. Annual harvest chronology is shown in Table 4. Harvest chronology varies widely with weather patterns. Severe weather limits transportation to the field as well as hunting success. In eastern Afognak where road access is good, the harvest occurred in the latter part of the season. In northwestern Afognak Island where access is normally by boat and floatplane, proportionally more harvest occurred in September.

Transport Methods. Aircraft were the most common type of transport, then boats and highway vehicles (Table 5). An increasing trend toward use of highway vehicles reflects the continuing spread of logging roads in central and eastern Afognak Island.

Other Mortality: An accidental drowning incident was discovered in January 1992 during a radiotracking flight. Radio signals from 2 radiocollared elk were found in a small lake north of Izhut Bay, and a minimum of 6 mostly submerged carcasses were seen frozen in the ice.

Smith (1992) commented on the difficulty finding elk winter mortalities, but he verified the deaths of 4 radiocollared elk during the 1990/91 winter. Reports of 5 dead elk were also received during the 1990/91 winter. I suspect moderate winter mortality occurred each winter from 1989/90 through 1991/92. Conditions were improved in 1992/93, and a small increase in the composition count sample in 1993 corroborated that conclusion.

Habitat Assessment: Clearcutting of Sitka spruce (*Picea sitchensis*) on Afognak Island began in 1975 and logging has occurred in the ranges of 6 of the 8 elk herds. Grass (*Calamagrostis* sp.), forbs and shrubs, principally salmonberry (*Rubus spectabilis*), alder (*Alnus sinuata*) and blueberry (*Vaccinium ovalifolium*) predominate in the clearcuts. Although spruce regrowth in the older clearcuts is becoming more dominant, the stands are not yet dense enough to provide cover for elk. Harris (1972) observed that Sitka spruce regrowth in clearcuts logged in the 1940s was retarded by excessive competition with grass and shrubs. Forage quantity increased in clearcuts, but loss of forest cover may offset benefits of increased forage production. If current timber harvest rates continue, most commercial timber will be clearcut within 25 years. A serious decline in elk carrying capacity may occur with the onset of closed canopy second-growth stands.

The department reviews timber harvest plans which private landowners must submit to the Department of Natural Resources. However, current laws regulating logging on private lands do not contain provisions for protecting terrestrial wildlife, so reviews are only advisory. The department has furnished logging companies with suggested guidelines for protecting elk habitat. State law prohibits timber cutting within 66 feet of important riparian areas to protect fish habitat, and those buffers may provide limited cover and travel routes for elk.

Nonregulatory Management Problems/Needs

Logging roads are rapidly improving hunters' access to elk in previously remote drainages. The potential for excessive harvest of individual herds is enhanced by hunters' increased mobility. Accuracy of the annual aerial composition counts varies, but in heavily forested areas counts are not possible. Deploying radio collars on elk improved our ability to locate major herds, but sometimes population size must be estimated from incomplete counts. Accurately distinguishing cows from yearling bulls is extremely difficult from aerial surveys. With the increased harvest efficiency provided by roads, more precise annual composition counts are needed, and the range of each elk herd must be determined. Maintaining radiocollared elk in each herd and increasing the intensity of aerial surveys should fill those needs to a large extent. Labor-intensive composition

counts from the ground may be necessary to gain accuracy in identifying herds most susceptible to excessive harvest.

Management of the elk herds on Raspberry Island and southwestern Afognak Island has continued to be controversial, particularly with Unit 8 residents. Relatively few local residents harvest elk when those hunts are managed by drawing permit, whereas locals have a decided advantage over nonlocals with a registration permit hunt. This has led to Board proposals to allocate the harvestable surplus from 2 herds to local residents under provisions of the State's subsistence preference law. A segment of the public, mostly nonlocals, would like management oriented toward producing more trophy bulls.

CONCLUSIONS AND RECOMMENDATIONS

The elk population was near historic peak levels in the late 1980s. By 1990, lower summer counts and low bull:cow ratios indicated a declining trend in most elk herds. High natural mortality among radiocollared cows during the 1990-91 winter suggested that declining overwinter survival was a factor in the population decline.

The prehunt population was estimated at 760-850 elk in 1992, a density of approximately 1 elk/mi^2. Densities exceeding 3 elk/mi^2 occurred within the ranges of individual herds at peak populations in the late 1960s and mid-1980s. Densities exceeding 3 elk/mi^2 were probably above long-term carrying capacity. I recommend that overall mean prehunt elk density be maintained at 1-2 elk/mi^2. Population objectives for individual herds should be developed based on historical population trends and estimates of relative habitat quality within the range of each herd.

We should continue to focus on managing individual herds by monitoring seasonal distribution and population trends and by setting and enforcing harvest quotas by herd. Continuing expansion of logging roads provides improved access, increasing vulnerability of elk to hunting and also the difficulty of monitoring harvest. Although land managers have closed some roads to motorized access by the general public, many hunters associated with the landowners and with logging companies continue to utilize the road system for hunting.

Summer aerial surveys remain the most useful technique for assessing population composition and trends, but occasional changes in herd distribution and failure to observe herds where they can be accurately classified continue to be problems. Maintaining radiocollared animals in each herd greatly assists in locating herds and facilitates monitoring seasonal movements. A technique for assessing winter mortality would aid in interpreting composition counts. Ground composition counts should be attempted in spring to estimate overwinter calf survival.

We should try to evaluate effects of a later season opening date on bull harvest and bull:cow ratios. Alternative harvest regimes such as specified sex permits may be necessary to improve bull:cow ratios.

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Table 1. Unit 8 summer aerial elk composition counts and estimated population size, 1988-92.

Area	Regulatory year	Bulls: 100 Cows	Calves: 100 Cows	Calves (%)	Adults	Total elk observed	Estimated population size
Raspberry Island	1988/89	6	20	26 (16)	138	164	200-230
(Hunt No. 702-707)	1989/90	12	40	27 (26)	76	103	150-160
	1990/91	3	56	54 (35)	100	154	155-175
	1991/92	11	37	34.(25)	102	136	135-145
	1992/93	7	35	26 (25)	80	106	115-125
Southwestern Afognak	1988/89	11	30	96 (21)	356	452	450-550
Island (Hunt No.	1989/90	10	28	88 (20)	346	434	475-550
708-710, 751)	1990/91	6	16	14 (8)	94	108[a]	400-425
	1991/92	3	41	57 (29)	143	200	200-250
	1992/93	0	35	69 (33)	137	206	225-250
Eastern Afognak	1988/89	7	34	35 (24)	111	146	250-300
(Hunt No. 750)	1989/90	6	22	4 (17)	19	23	200-300
	1990/91	--	--	-- --	--	--[b]	300-425
	1991/92	0	48	13 (33)	27	40	220-295
	1992/93	3	27	40 (21)	153	193	260-280
Northwestern Afognak	1988/89	8	17	71 (17)	350	421	450-550
(Hunt No. 752)	1989/90	12	21	66 (16)	347	413	450-500
	1990/91	13	48	69 (30)	162	231	350-475
	1991/92	3	37	44 (26)	123	167	165-285
	1992/93	7	36	32 (25)	96	128	160-195
Total all areas	1988/89	17	26	228 (19)	955	1183	1375-1580
	1989/90	11	26	185 (19)	788	973	1275-1510
	1990/91	8	42	137 (28)	256	493	1205-1500
	1991/92	5	39	148 (27)	395	543	700-1000
	1992/93	3	37	167 (26)	466	633	760-850

[a] An additional herd of 179 unclassified adults and 71 calves was observed.
[b] A herd of 167 unclassified adults and 49 calves was observed.

Table 2. Unit 8 elk harvest data by permit hunt, 1988-92.

Hunt Area/No.	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls (%)	Cows (%)	Unk.	Illegal/[a] unreported	Total harvest
Raspberry Is.	1988-89	230	51	72	28	17 (57)	13 (43)	0	0	30
(Drawing Hunt	1989-90	200	66	66	34	8 (36)	14 (64)	0	0	22
No. 702-707)	1990-91	60	62	50	50	4 (36)	7 (64)	0	0	11
	1991-92	90	56	56	44	5 (29)	12 (71)	0	0	17
	1992-93	50	50	84	16	2 (50)	2 (50)	0	0	4
Southwestern	1988-89	[illegible]	[illegible]	66	34	30 (91)	3 (9)	1	3	37
Afognak Is.	1989-[illegible]	[illegible]	[illegible]	[illegible]1	49	31 (76)	10 (24)	1	0	42
(Drawing Hunt	1990-[illegible]	[illegible]	[illegible]	[illegible]4	66	25 (56)	20 (44)	0	0	45
No. 708-710)	1991-[illegible]	[illegible]	[illegible]	[illegible]3	17	3 (27)	8 (73)	0	0	11
	1992-93	[illegible]	[illegible]	62	38	5 (26)	14 (74)	0	0	19
Southwestern	1989-90[c]	1045	--[b]	66	34	36 (54)	31 (46)	1	0	68
Afognak Island	1990-91[c]	1065	--[b]	64	36	11 (28)	29 (72)	0	0	40
(Registration Hunt	1991-92[c]	860	--[b]	94	6	0 (0)	2 (100)	0	0	2
No. 751)	1992-93	No Registration Hunt								
Northwestern	1988-89	737	--[b]	77	23	23 (62)	14 (38)	4	0	41
Afognak Island	1989-90	1045	--[b]	70	30	28 (68)	13 (31)	6	0	47
(Registration	1990-91	1065	--[b]	73	27	28 (38)	45 (62)	1	0	74
Hunt No. 752)	1991-92	860	--[b]	84	16	15 (42)	21 (58)	0	0	36
	1992-93	648	--[b]	90	10	10 (63)	6 (37)	0	0	16
Eastern	1988-89	737	--[b]	82	18	15 (79)	4 (21)	0	2	21
Afognak Island	1989-90	1045	--[b]	83	17	13 (68)	6 (32)	7	0	26
(Registration	1990-91	1065	--[b]	83	17	15 (54)	13 (46)	1	0	29
Hunt No. 750)	1991-92	860	--[b]	81	19	13 (37)	22 (63)	0	0	35
	1992-93	648	--[b]	83	17	12 (43)	15 (54)	1	0	28

Table 2. (Con't.)

Hunt Area/No.	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls (%)	Cows (%)	Unk.	Illegal/ unreported	Total harvest
Total all areas	1988-89	1267	56	74	26	85 (71)	34 (29)	5	5	129
	1989-90	1545	56	69	31	116 (61)	74 (39)	16	0	206
	1990-91	1335	52	67	33	84 (42)	115 (58)[d]	2	0	201
	1991-92	1135	51	81	19	36 (36)	65 (64)	0	0	101
	1992-93	848	53	83	17	29 (44)	37 (56)	1	0	67

[a] No illegal kill documented after 1988.
[b] Registration permit valid for multiple hunts, so % of permittees not hunting in a specific area is not a valid statistic.
[c] Both drawing permits and registration permits valid in this area in 1989, 1990 and 1991.
[d] Includes 1 cow taken by registration permit but area unreported.

Table 3. Unit 8 elk hunter residency and success, 1988-92.

Regulatory year	Successful				Unsuccessful				Total[b] hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	
1988/89	62	54	8	124 (25)	149	202	18	369 (75)	493[c]
1989/90	113	87	6	206 (31)	162	275	18	456 (69)	662
1990/91	106	91	4	201 (32)	196	214	22	432 (68)	633[d]
1991/92	57	40	4	101 (18)	218	210	26	454 (82)	555
1992/93	35	29	3	67 (17)	147	166	18	331 (83)	398

[a] Local means resident of Unit 8.
[b] Hunters participating in more than one permit hunt were tallied for each hunt.
[c] Does not include 6 unsuccessful hunters whose residency is unknown.
[d] Does not include 1 unsuccessful hunter with residence unknown.

Table 4. Unit 8 elk harvest chronology percent by 15-day period, 1988-92.

Area	Regulatory year	Harvest periods 9/1-15	9/16-30	10/1-15	10/16-31	11/1-15	11/16-30	12/1-15	n
Raspberry Is.	1988/89	--	--	--	--	--	--	--	30
	1989/90	--	--	--	--	--	--	--	22
	1990/91	--	--	9 (82)	2 (18)	0	--	--	11
	1991/92	--	--	7 (41)	8 (47)	2 (12)	--	--	17
	1992/93	--	--	1 (25)	3 (75)	0	--	--	4
Southwestern	1988/89	--	--	10 (29)	20 (59)	4 (12)	--	--	34
Afognak Is.	1989/90	11 (10)	24 (22)	8 (7)	26 (23)	6 (5)	19 (17)	17 (15)	111
	1990/91	12 (14)	26 (30)	13 (15)	35 (41)	--	--	--	86
	1991/92	6 (46)	5 (38)	2 (16)	--	--	--	--	13
	1992/93	6 (32)	9 (47)	4 (21)	--	--	--	--	19
Northwestern	1988/89	3 (7)	7 (17)	5 (12)	8 (20)	2 (5)	13 (32)	3 (7)	41
Afognak Is.	1989/90	3 (6)	17 (36)	5 (11)	4 (9)	1 (2)	5 (11)	12 (26)	47
	1990/91	2 (3)	22 (30)	6 (8)	4 (5)	4 (5)	7 (9)	29 (39)	74
	1991/92	3 (8)	10 (28)	9 (25)	5 (14)	3 (8)	2 (6)	4 (11)	36
	1992/93	2 (13)	8 (50)	1 (9)	3 (19)	1 (9)	0	0	16
Eastern	1988/89	--	1 (5)	7 (37)	11 (58)	--	--	--	19
Afognak Is.	1989/90	1 (4)	0	4 (15)	7 (27)	13 (50)	--	--	26
	1990/91	2 (7)	1 (3)	6 (21)	9 (31)	9 (31)	--	--	29
	1991/92	4 (12)	2 (6)	10 (29)	10 (29)	7 (21)	--	1 (3)	34[a]
	1992/93	0	5 (18)	7 (25)	3 (11)	13 (46)	--	--	28

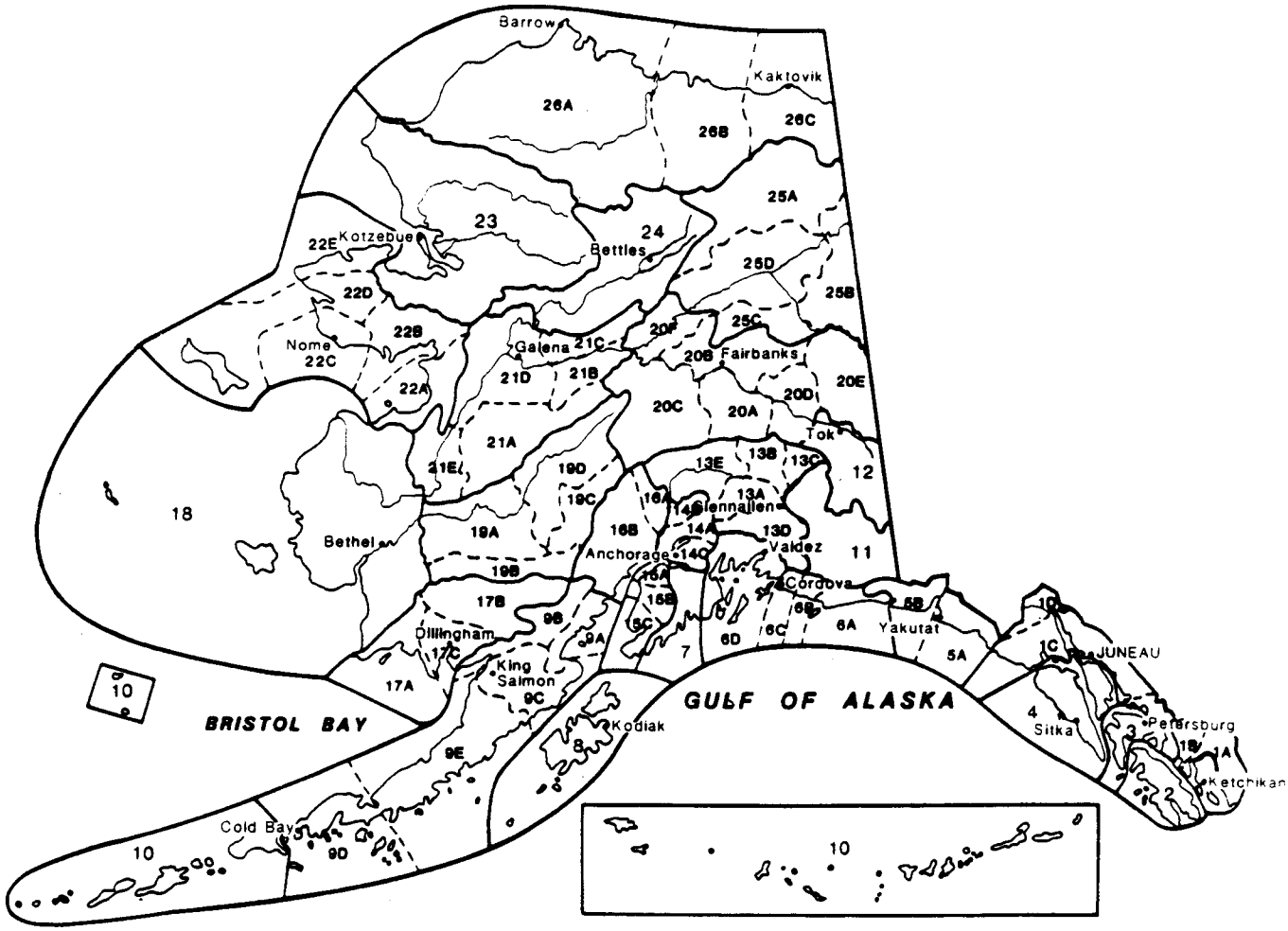
[a] Date of kill not reported for one elk; no season open in December.

Table 5. Unit 8 elk harvest percent by transport method, 1988-92.

Regulatory year	Percent of harvest						n
	Airplane	Horse	Boat	ORV	Highway vehicle	Unknown	
1988/89	65 (52)	0	46 (37)	1 (1)	2 (2)	10 (8)	124
1989/90	94 (46)	0	77 (37)	0 (0)	12 (6)	23 (11)	206
1990/91	86 (43)	0	69 (34)	1 (T)	15 (7)	30 (15)	201
1991/92	45 (45)	0	34 (33)	0 (0)	18 (18)	4 (4)	101
1992/93	29 (43)	0	23 (34)	0 (0)	12 (18)	3 (5)	67

NOTES

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.