Elk
Management Report
of survey-inventory activities
1 July 2003–30 June 2005

Patricia Harper, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

Photo by Nick Gefre

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-2 and W-33-3, Project 13.0
December 2006

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Please note that population and harvest data in this report are estimates and may be refined at a later date.

Cover Photo: Rick Swisher with the bull elk he took on Etolin Island after three days of hunting. Photo courtesy Nick Gefre.

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ELK MANAGEMENT REPORT

From: 1 July 2003
To: 30 June 2005

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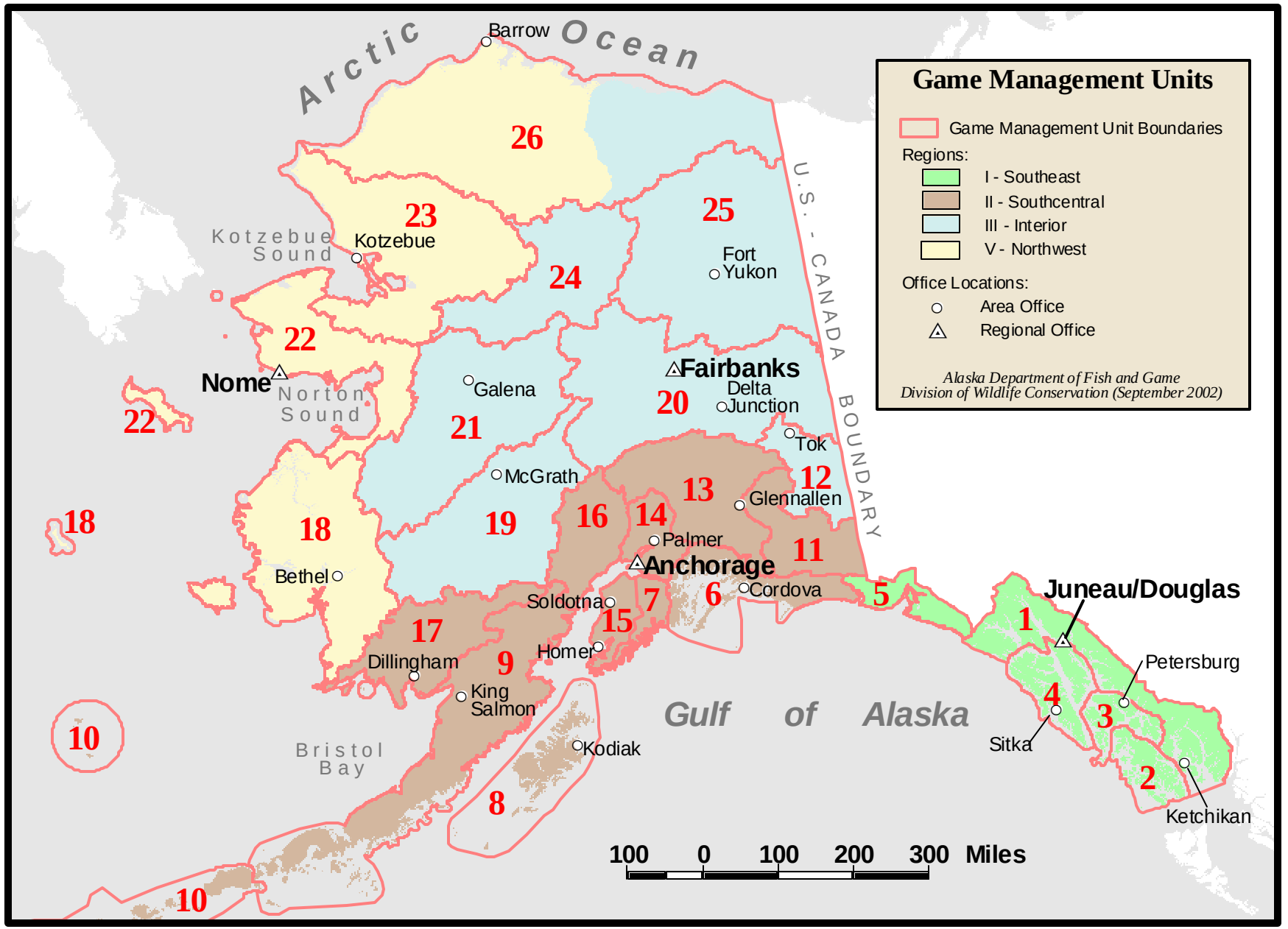
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Alaska Department of Fish and Game
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ELK MANAGEMENT REPORT

From: 1 July 2003
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNIT: 3 (3000 mi^2)

GEOGRAPHIC DESCRIPTION: Islands of the Petersburg, Kake, and Wrangell area

BACKGROUND

Elk (*Cervus elaphus*) are not endemic to Alaska but were successfully introduced onto Afognak Island in the Kodiak Archipelago in 1929. Prior to 1987, there were 6 unsuccessful attempts to introduce elk into Southeast Alaska (Burris and McKnight 1973). Lack of monitoring programs precluded our determining why those attempts failed.

In 1985 the Alaska Legislature passed a law that required the introduction of 50 elk to Etolin Island. In spring of 1987, 33 Roosevelt elk (*C. e. roosevelti*) from Jewell Meadows Wildlife Management Area and 17 Rocky Mountain elk (*C. e. nelsoni*) from the Elkhorn Wildlife Management Area in Oregon were translocated to Southeast Alaska. Roosevelt elk were released at Dewey Anchorage on the southwest side of Etolin Island, and Rocky Mountain elk were released just north of Johnson Cove on the northwest shore of Etolin Island.

Initial losses were high, and about two-thirds of the elk died from predation, starvation, and accidents within 18 months of release. Following initial losses, the population stabilized, eventually began increasing, and today seems to be permanently established and thriving. In recent years the elk population has continued to increase and extend its range. A breeding population is now established on Zarembo Island, and elk observations have been reported from Mitkof, Wrangell, Prince of Wales, Deer, Bushy and Kupreanof Islands and the Cleveland Peninsula. Elk numbers in Unit 3 on islands other than Etolin and Zarembo are believed to be low.

HUMAN USE HISTORY

Unit 3 elk have been hunted for food and trophies since 1997. In fall 1996 the Board of Game (BOG) made a negative customary and traditional determination for the introduced elk, approved a Unit 3 elk season, and authorized up to 30 drawing permits for a 1–31 October, 1-bull season.

Regulation History

In 1993, in an effort to restrict the introduced elk to Etolin Island and prevent their dispersal to other islands, the BOG authorized an open season, either-sex elk hunt in Unit 3 off of Etolin Island. During the same board meeting, this decision was reconsidered and reversed.

The Alaska Department of Fish and Game's (ADF&G) 1987 Elk Management Plan called for a limited elk hunt when the population reached 250 elk and could sustain a harvest of 20 bulls. It was determined that the introduced elk had reached such a population level by 1996. In October of 1996 the BOG established a bull-only elk season in Unit 3. The board authorized the department to issue up to 30 elk drawing permits for a 1–30 October season. The Alaska Legislature passed House Bill 59, stating: "The department may donate 4 elk harvest permits each year for elk from the Etolin Island herd for competitive auctions or raffles. The donations may be made only to nonprofit corporations based in the state that are established to promote fish and game management of hunted species, transplantation of species, and use of fish and game populations for hunting and fishing, subject to the terms of a memorandum of understanding developed by the department."

In 1997, the first year of elk hunting in Southeast Alaska, ADF&G issued a total of 29 elk permits, including 27 drawing permits and 2 public raffle permits. In 1998, we issued 31 elk drawing permits. One auction/raffle permit was issued in 1998. In 1999 one raffle permit was issued, and 2 were issued in 2000.

In fall 1998 the BOG authorized increasing the number of drawing permits from 30 to 70 and added a 2-week period (15–30 September) for archery only. An International Bowhunters Education Program (IBEP) certification card is required to participate in the archery-only season.

In fall 2000 the BOG increased the number of drawing permits from 70 to 120 and extended the archery only season by 2 weeks (1–30 September). To forestall the dispersal of elk and the establishment of elk herds off of Etolin and Zarembo Islands, the BOG established boundaries for the Unit 3 permit hunt area and authorized an either-sex elk hunt from 1 August through 31 December, in Units 1, 2, and the remainder of Unit 3 outside of the drawing area.

In fall of 2002 the BOG split the DE-320 elk drawing permit hunt into separate archery (DE-318) and rifle (DE-322) permit hunts and authorized the department to issue a combined total of up to 300 permits.

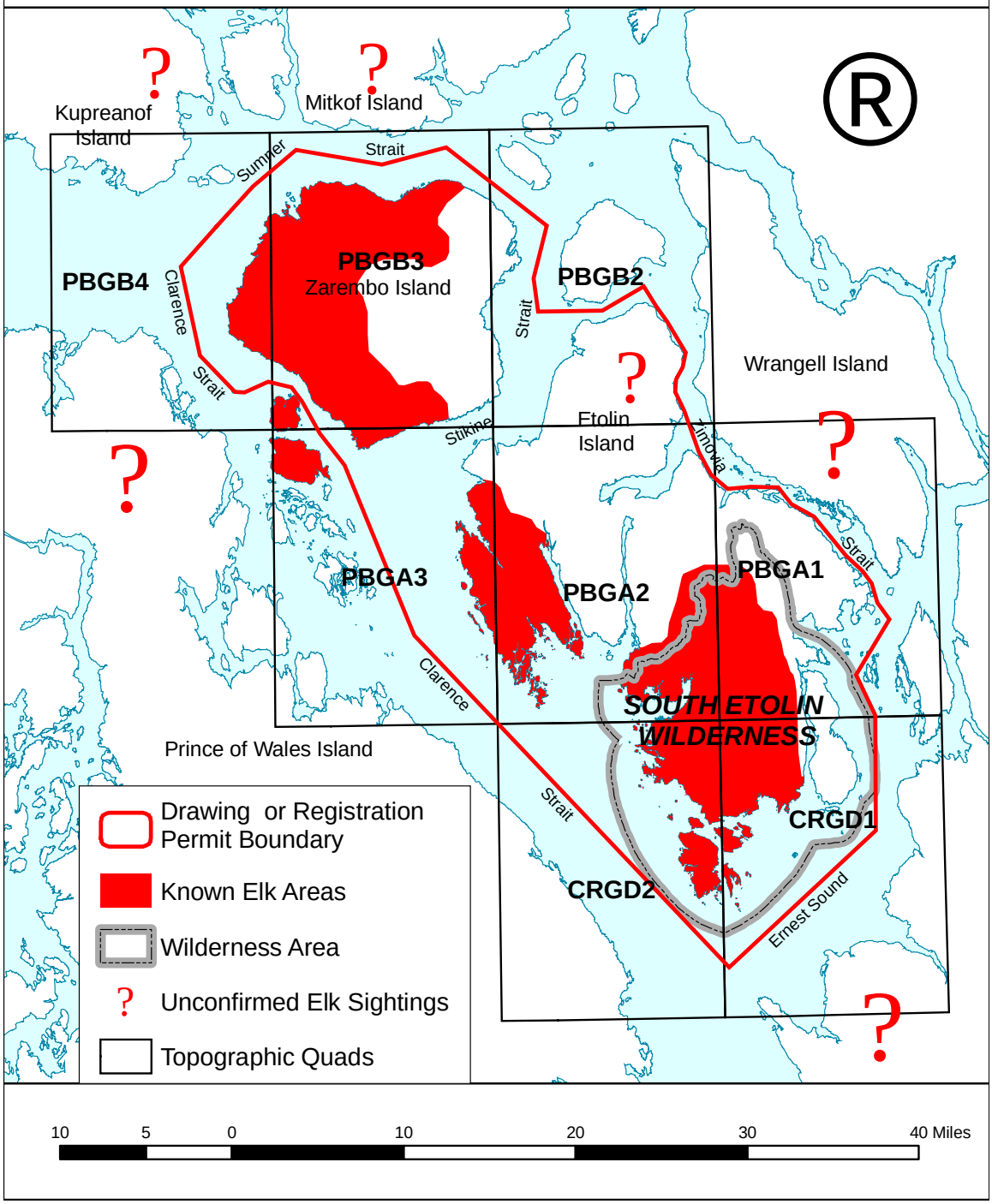
Historical harvest patterns

Fall weather can influence elk movement patterns and hunter effort and success. Although harvest chronology varies somewhat from year to year, between 1997 and 2002 the largest percentage of the overall harvest occurred during the first and third weeks of the October rifle season. Following the initial season opening, elk typically retreat to the more inaccessible portions of Etolin and Zarembo. Hunters are aided somewhat later in the season when the elk typically return to low elevation winter range along the coast.

Historical harvest locations

Between 1997 and 2002, a total of 319 hunters harvested 73 elk, including 55 from Etolin Island and 18 from Zarembo Island. Of the 55 elk harvested on Etolin Island, 11 were killed in Wildlife Analysis Area (WAA) 1901 on the north half of the island and 44 were killed in WAA 1910 on the south half of the island.

DE-318, DE-321, DE-323, and RE-325
Elk Permit Boundary



MANAGEMENT DIRECTION

A Region I elk management plan has been finalized and establishes management objectives for Unit 3 elk. The Etolin Island winter carrying capacity is estimated to be from 900 to 1300 elk (Person 2000). We will attempt to maintain a postharvest ratio of 25–30 bulls per 100 cows.

METHODS

We periodically fly aerial surveys of Etolin Island to record tracks and visual sightings of individuals and groups of elk. Observations reported by other agency personnel and the public are also recorded. Winter-range elk and deer pellet counts are periodically conducted to assess relative density. Incisors are collected from harvested elk and sent to a lab for aging. Successful hunters are asked to submit a photo of their elk's antlers.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

A precise population estimate is not available for Unit 3 elk. Annual differences in survey coverage and uncertainties about the sightability of elk during aerial surveys make it difficult to accurately estimate abundance. Variables that influence survey results are numerous, and for the most part, unquantifiable. Our June 2003 population estimate is subjective, but based on all information available, we estimate Unit 3 has 350–450 elk, with 75–100 on Zarembo and the balance on Etolin. The 2000 postparturition modeling prediction for Etolin Island was approximately 350 elk; however, at the time, our actual population was probably much lower because the estimate does not include factors such as predation, dispersal, competition with deer, etc. Based on these modeling predictions, we estimate that a reasonable upper limit for the elk population on Etolin and Zarembo combined was approximately 450 animals (Person 2000).

Population Composition

No data are available to make meaningful elk population composition estimates for Etolin or Zarembo Islands. Elk are usually found in groups of mixed sex and age. Almost every large group of Roosevelt elk observed during a hunting season included large and small bulls, cows, and calves. Zarembo Island was originally thought to support only Rocky Mountain elk; however, hunters have taken elk with antler characteristics indicative of both subspecies from the island.

Distribution and Movements

Roosevelt elk have dispersed, but many remained within 10 miles of their release site. After remaining close to the release site for 18 months, Rocky Mountain elk dispersed widely. It is likely that Rocky Mountain elk have intermixed with Roosevelt elk, at least on Etolin. A breeding group is established on Zarembo Island, and elk have been reported on several islands in the area.

For both subspecies the area below 500 feet adjacent to the coast is preferred winter and spring habitat. Roosevelt elk move higher into the mountains in summer and have been observed above 3000 feet on Etolin Island.

MORTALITY

Harvest

The following regulations apply in Unit 3 in that portion bounded by a line beginning at the intersection of Sumner Strait and Clarence Strait, running southeast following the midline of Clarence Strait, down the midline of Snow Passage, then east of the Kashevarof Islands back to the midline of Clarence Strait down to its intersection with Ernest Sound, then northeast following the midline of Ernest Sound, excluding Niblack Islands, to its intersection with Zimovia Strait, then northwest following the western shoreline of Zimovia Strait to its intersection with Chichagof Passage, then west along the midline of Chichagof Passage to its intersection with Stikine Strait, then northerly along the midline of Stikine Strait, west of Vank Island, to its intersection with Sumner Strait, then northwest along the midline of Sumner Strait back to the point of beginning: One bull by drawing permit only; up to 120 permits will be issued.

Season and bag limit	Resident and Nonresident hunters
1 bull by drawing permit only, by bow and arrow only	1 Sep–30 Sep (General hunt only)
or	
1 bull by drawing permit only	1 Oct–31 Oct (General hunt only)

Remainder of Unit 3

Season and bag limit	Resident and Nonresident hunters
1 elk	1 Aug–31 Dec

Board of Game Action and Emergency Orders. In November 2002, the BOG adopted a proposal to separate the DE-320 archery hunt and rifle hunt for elk in Unit 3 into separate drawing permit hunts, and authorized the department to issue up to 300 permits for the 2 hunts combined. As a result of these regulatory changes, the DE-318 archery-only elk and the DE-322 rifle season elk hunts were implemented during the report period. Fifteen drawing permits were issued for the DE-318 archery-only elk hunt in September, and 140 drawing permits were issued for the month-long DE-322 elk rifle season in October.

In fall 2004 the BOG adopted several changes to the structure of the Unit 3 elk hunt. The DE-322 rifle hunt, which had encompassed the entire month of October, was split into 2 separate drawing permit hunts, each 2 weeks long. The DE-321 rifle season will run the first 2 weeks of October, while the DE-323 rifle season will run the second 2 weeks of October. The BOG also authorized a late-season registration elk hunt in Unit 3, which will allow permit holders to harvest elk within the boundaries of the drawing hunt area during the last 2 weeks of November. The fall 2004 changes to the Unit 3 elk hunting season will be implemented and reported on during the next report period.

No emergency orders were issued for elk hunting in Unit 3 during the report period.

Hunter Harvest. In 2003 we issued 15 archery-only and 136 rifle season drawing permits and 3 auction/raffle permits for elk hunting in Unit 3. Ninety-eight permittees hunted and harvested 8 elk (Table 1). No elk were taken during the 2003 archery-only hunt in September. During the 2004 season we issued 15 archery-only and 140 rifle season drawing permits and 1 auction/raffle permit. Ninety-four permittees hunted and harvested 12 elk, including 2 taken during the September archery-only season.

In fall 2000, the board authorized an either-sex elk hunt from 1 August through 31 December in Units 1, 2, and the remainder of Unit 3. In 2004, we received the first ever hunter report of an elk having been harvested outside the boundaries of the Unit 3 drawing permit area. This report involved the harvest of a cow elk on Shrubby Island; however, the kill location was never verified.

Hunter Residency and Success. Two nonresidents received elk permits in 2003 and one nonresident received a permit in 2004, although in neither year did nonresidents actually hunt. In 2003 nonlocal residents represented the largest group of unsuccessful hunters, while local and nonlocal residents represented the largest group of successful hunters, each with an equal proportion of the annual harvest. Nonlocal residents represented the largest group of both successful and unsuccessful hunters in 2004 (Table 2). The success rate for permit holders who actually hunted was 8% in 2003 and 13% in 2004. Most nonlocal resident hunters were from communities in Southeast Alaska, relatively close to the hunt area.

Harvest Chronology. In 2003 hunters had the best success during the last, first, and third weeks of October when 50%, 38% and 12%, respectively, of the harvest occurred (Table 3). No harvest occurred during the archery-only hunt in September, nor was any harvest reported during the second week of the October rifle season. In 2004, harvest chronology was distributed more evenly. The first and second weeks of October, each with 34%, provided the highest percentage of the annual harvest, followed by the second and third weeks of October, with each providing 8% of the harvest. In 2004, 2 bulls were taken during September, including 1 each during the first and second weeks of the archery-only season.

Harvest in Particular Areas (WAAs). In 2003 a total of 8 elk were killed in 2 Unit 3 WAAs; WAA 1905 and 1910 each provided half of the annual harvest. Including the 1 cow elk reportedly harvested outside the drawing permit area during the general season hunt, 13 elk were harvested from 3 WAAs in 2004; WAAs, 1910, 1905, and 1906 provided 62%, 31%, and 8% of the harvest, respectively.

Guided Hunter Harvest. No guides are currently offering guided elk hunts in the unit. The Unit 3 elk hunt is logistically challenging and is considered an extremely difficult hunt. These factors, combined with the relatively low success rate and limitations on the number of Guide Use Areas each guide may use, have prevented guides from offering guided elk hunts.

Transport Methods. In 2003, 88% of successful hunters reported using boats and 12% used 3- or 4-wheelers to access their hunting areas. In 2004, 59% of successful hunters reported using boats, 33% used airplanes, and 8% used 3- or 4-wheelers to reach their hunting area (Table 4). Etolin Island has several lakes that are accessible by floatplane, and several hunters reported using aircraft to access hunting areas in the vicinity of these lakes.

Other Mortality

Brown bears, black bears, and gray wolves occur on Etolin Island. Wolves and a relatively small number of black bears are found on Zarembo Island. The extent of predation on elk is not known, but fieldwork conducted by ADF&G staff indicates that wolves are a major predator. Early and late season aerial surveys suggest calf survival is much higher on Zarembo Island than on Etolin Island, where wolves are thought to be more abundant. Some poaching of the introduced elk has been documented in the past.

HABITAT

Assessment

Clearcut logging continues on Etolin and about 30,000 acres are scheduled to be cut by 2080 (U.S. Forest Service, unpublished data). This will reduce the island's elk carrying capacity. The Etolin Island winter carrying capacity is estimated to be 856 elk and consists of the following: clearcut, 2.0 mi^2; second growth, 2.2 mi^2; nonforest or noncommercial forest, 72.9 mi^2; old-growth forest, 124.4 mi^2 (ADF&G, 1985).

Enhancement

No habitat enhancement projects specifically intended to benefit elk have been attempted in the unit. Although primarily intended as a silvicultural practice, precommercial thinning and pruning has been performed in some young second-growth stands on Etolin and Zarembo Islands. This improves elk habitat in the short term by reducing canopy cover, which permits sunlight to reach the forest floor and increases the production of understory forage plants. These benefits are relatively short-lived, approximately 20–25 years, after which time canopy closure again results in loss of understory vegetation. The long-term effects of clearcut logging will be detrimental to elk populations.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The potential for disease and parasite transmission from exotics to endemic wildlife has long been a concern of wildlife biologists. Prior to transport to Alaska, transplanted elk were tested for disease and treated for parasites. However, required quarantine periods and disease testing do not always detect infected animals.

ADF&G remains concerned about the potential negative effect that an increasing elk population may have on native Sitka black-tailed deer. Elk may affect deer populations directly through physical displacement or indirectly by competition for food or by altered predator–prey dynamics. Research has shown the diets of deer and elk overlap to a high degree, suggesting potential for interspecific competition (Kirchhoff and Larsen 1998). Introduced elk have dispersed from Etolin to other islands and established a breeding population on at least one other island. Should elk become widely distributed throughout Southeast Alaska, a reduction in deer numbers is to be anticipated. Also, native moose populations have been increasing in Unit 3 over the past decade, with recent sightings on Zarembo Island. Our concerns regarding deer–elk conflicts may have a counterpart with this expansion in moose distribution.

CONCLUSIONS AND RECOMMENDATIONS

Despite initial losses following introduction, the Unit 3 elk population continues to increase. Elk are dispersing and have established a breeding population on Zarembo Island. As elk disperse and the population increases, it will be important to continue monitoring their numbers and distribution. Research is needed to evaluate the extent of interspecific competition between introduced elk and native Sitka black-tailed deer and to develop reliable methods of inventorying Southeast Alaska elk populations.

In order to ensure that the elk population is kept below carrying capacity to minimize the likelihood of dispersal off of Etolin and Zarembo Islands, accurate estimates must be developed of both the carrying capacity and elk populations on these islands.

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Table 1 Unit 3 elk harvest data by permit hunt, regulatory years 1997 through 2004

Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Harvest							Total harvest
					Bulls	(%)	Cows	(%)	Unk	(%)	Illegal	
1997	29	14	68	32	8	(100)	0	(0)	0	(0)	0	8
1998	31	32	55	45	9	(100)	0	(0)	0	(0)	0	9
1999	71	17	72	28	16	(100)	0	(0)	0	(0)	0	16
2000	72	18	86	14	8	(100)	0	(0)	0	(0)	0	8
2001	123	43	72	28	19	(100)	0	(0)	0	(0)	0	19
2002	121	27	85	15	13	(100)	0	(0)	0	(0)	0	13
2003	154	36	92	8	8	(100)	0	(0)	0	(0)	0	8
2004	156	40	87	13	12	(100)	0	(0)	0	(0)	0	12

Table 2 Unit 3 elk hunter residency and success, regulatory years 1997 through 2004

Regulatory year	Unsuccessful					Successful					Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	
1997	7	10	0	17	(68)	3	5	0	8	(32)	25
1998	1	9	1	11	(55)	2	7	0	9	(45)	20
1999	8	34	0	42	(72)	7	9	0	16	(28)	58
2000	13	38	0	51	(86)	4	4	0	8	(14)	59
2001	18	31	1	50	(72)	4	15		19	(28)	69
2002	25	49	1	75	(85)	8	5	0	13	(15)	88
2003	36	54	0	90	(92)	4	4	0	8	(8)	98
2004	27	55	0	82	(87)	2	10	0	12	(13)	94

[a] Residents of Petersburg, Wrangell, and Kake.

Table 3 Unit 3 elk harvest chronology percent by harvest period, regulatory years 1997 through 2004

Regulatory year	Harvest period								
	9/1–9/7	9/8–9/14	9/15–9/21	9/22–9/30	10/1–10/7	10/8–10/14	10/15–10/21	10/22–10/31	n
1997	N/A	N/A	N/A	N/A	38	0	24	38	8
1998	N/A	N/A	N/A	N/A	56	33	1	0	9
1999	N/A	N/A	0	0	43	12	26	19	16
2000	N/A	N/A	12	0	25	25	25	13	8
2001	0	0	5	0	42	16	37	0	19
2002	0	0	8	0	31	23	15	23	13
2003	0	0	0	0	38	0	12	50	8
2004	8	8	0	0	34	8	8	34	12

Table 4 Unit 3 elk harvest percent by transport method, regulatory years 1997 through 2004

Regulatory year	Harvest percent by transport method								
	Airplane	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	n
1997	13	67	0	0	0	0	0	0	8
1998	22	78	0	0	0	0	0	0	9
1999	0	100	0	0	0	0	0	0	16
2000	25	62	13	0	0	0	0	0	8
2001	32	68	0	0	0	0	0	0	19
2002	23	77	0	0	0	0	0	0	13
2003	0	88	12	0	0	0	0	0	8
2004	33	59	8	0	0	0	0	0	12

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ELK MANAGEMENT REPORT

From: 1 July 2003
To: 30 June 2005

LOCATION

GAME MANAGEMENT UNIT: 8 (5097 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 by 1948, and the first hunt occurred in 1950. Hunting has been allowed annually since 1955. The population had peaked at 1200–1500 by 1965, with 9 separate herds on Afognak Island and one 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). The herd recovered to near the previous high by the 1980s and remained relatively stable through the 1990s with minor fluctuations correlated with winter severity. Harsh winters in 1998–99 severely impacted ungulate populations on the archipelago, and elk herds on western Afognak and Raspberry Islands declined. As a result of the winter mortality, overall populations fell below the management objective of 1000.

Relative accessibility of each elk herd to hunters strongly influenced management strategies. In the 1960s many herds were only lightly harvested, despite a 153-day season and a 2-elk bag limit. However, excessive harvest of the highly accessible Raspberry Island herd prompted managers to recommend closing that herd to hunting in 1968 (Alexander et al. 1968). Drawing permit hunts and registration permit hunts with harvest quotas regulated by emergency order closures characterized management strategies for the most accessible herds of southwestern Afognak Island and Raspberry Island from the mid 1970s to the late 1980s. Initiation of commercial logging in 1977 marked a new management era, with increased vulnerability of elk to hunting through logging road access and loss of security cover. By the mid 1980s, shorter seasons had to be imposed in east-central Afognak Island, where logging was concentrated. Beginning with the 1993–94 season, the road-accessible eastern and central parts of Afognak Island were incorporated with the southwestern Afognak areas into a single management area regulated by staggered drawing permit hunts, followed by a registration hunt. North Afognak was included in a registration hunt, while the elk on Raspberry Island were subject to staggered drawing hunts.

During this report period Afognak Island was divided into 3 drawing hunt areas. These areas were designed to address concerns associated with newly imposed access fees on private lands, decreased bull and calf percentages in the Malina/Afognak Lakes, and unclear boundaries from

logging roads. Each area was opened for drawing hunts 25 September–22 October, and if harvest targets were not met for individual herds, Afognak Island was reopened as a registration hunt.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

The management objective is to maintain a population of at least 1000 elk for use by all user groups.

METHODS

Each year we attempt an aerial composition count of each herd between July and September. We also opportunistically conduct winter surveys to identify wintering areas and to refine population estimates of herds.

We used helicopter darting techniques to capture 13 female elk in June 2002. Conventional VHF radio collars were deployed on 11 elk, and 2 received GPS/VHF collars.

We collected data on harvest and hunting effort from mandatory hunting reports and periodic monitoring of hunting activity by aircraft.

The regulatory year (RY) begins 1 July and ends 30 June (e.g., RY01 = 1 July 2001 through 30 June 2002).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Aerial composition surveys indicated a stable to increasing elk population in 2004 (Table 1). The elk population on Raspberry and Afognak Islands was estimated to include 890–950 animals. During the previous 5 years population estimates ranged from 740 to 1060 elk. Among the 8 herds identified on Afognak Island, most increased during this reporting period. In 2003, a portion of the Duck Mountain herd moved west and was included into the Marka Lake herd. The same animals moved back to Duck Mountain in 2004. The elk herd on Raspberry Island is slowly increasing and is now estimated at 100 animals with a healthy bull:cow ratio. The Waterfall Lake herd has shown the greatest growth during this report period, due to the Marka Lake animals moving north.

The Paramanof Peninsula herd, which declined precipitously after 1989 (Smith 1994), showed no sign of recovery, and we now assume that it has been incorporated into the Marka Lake herd. The Tonki Cape herd is stable, and the area was open to hunting in the fall of 2003.

During the fall of 2004, residents of the city of Port Lions on the Kupreanof Peninsula reported seeing 2 bull elk by the city airport. Months later, 2 bull elk were legally harvested on Kodiak Island in the Hidden Basin area. There have been no recent reports of elk on Shuyak or Whale Island.

Population Composition

Obtaining bull:cow ratios continued to be problematic during this reporting period. Aerial composition data are often suspect due to the difficulty distinguishing spike bulls in velvet from cows. Overall calf percentages in the population were 14% in 2004–2005, down from the previous 5-year average (1999–2000 through 2003–04) of 16.5% (Table 1). The Marka Lake herd continued to have healthy percentages of bulls and calves.

Distribution and Movement

Elk herd distribution has been monitored by composition counts, hunter and logger reports, and radiotelemetry relocations. There are at least 7 separate herds on Afognak Island and 1 on Raspberry Island. In June 2004, we had 18 active radio collars in the population, distributed among all of the herds.

Prior to 1998, the annual home ranges of most of the elk herds were relatively stable with little interchange between herds. Recent data suggest considerable mixing of herds and changes in traditional use areas during the winter and early spring. We suspect much of this change is due to significant alteration of winter ranges by commercial logging operations and/or increased severity of winter and early spring weather. Data recovered in 2000 from 4 Global Positioning System (GPS) collars has helped in determining the extent of herd range, critical overwintering areas, and rutting areas. With the help of Afognak Native Corporation we are overlaying radiotelemetry relocation data with current habitat maps to better understand the relationships of elk movements to virgin, recently altered, and regenerating habitats.

MORTALITY

Harvest

Season and Bag Limits	Resident and Nonresident Open Seasons
Unit 8, Raspberry Island:	
1 bull by drawing permit; up to 100 permits will be issued	1 October–22 October
1 anterless elk; up to 200 permits will be issued	23 October–30 November
Unit 8, Southwest Afognak, that portion of Afognak Island and adjacent islands south and west of a line from the head of Back Bay to Hatchery Peak, to the head of Malina Bay:	
1 bull elk by drawing permit only; up to 500 permits will be issued	25 September–9 October
1 anterless elk by drawing permit; up to 500 permits will be issued	8 October–22 October
1 elk by registration permit only	23 October–30 November

Season and Bag Limits	Resident and Nonresident Open Seasons
Unit 8, Eastern Afognak, that portion of Afognak Island east of the main logging road (1100 road) from the Danger Bay logging camp north to its terminus at Discoverer Bay	
1 elk by drawing permit only; up to 500 permits may be issued	25 September–22 October
1 elk by registration permit only	23 October–30 November
Remainder of Unit 8:	
1 elk by drawing permit only; up to 500 permits may be issued	25 September–22 October
1 elk by registration permit only	23 October–30 November

A federal subsistence elk hunt occurred from 15 September to 30 November on Kodiak National Wildlife Refuge lands on northwestern Afognak.

Board of Game Actions and Emergency Orders: Prior to each hunting season, we analyzed survey results and estimated herd sizes to derive harvest limits for each herd. These limits were usually based on a 15% harvest rate, with modifications to accommodate population trends. We issued emergency orders closing the ranges of the herds to hunting when the individual harvest limits were reached.

In 2003, we issued 2 emergency orders to close portions of registration hunts (RE755). The first closure occurred 22 October for RE755 (south and west of a line from the head of Back Bay to the head of Malina Bay and the area of the Tonki Peninsula). The next closed the eastern portion of RE755 (eastern Afognak, east of the main north-south logging road on Afognak) on 20 November.

In 2004, we issued 2 emergency orders to close portions of RE755. The first closure occurred on 29 October for RE755, (Tonki Peninsula). The next closed the eastern portion of registration hunt RE755 (eastern Afognak, east of a line from the head of Kazakof Bay to the head of Delphin Bay) on 19 November.

In March of 2003, the Board of Game adopted a proposal from the Kodiak Advisory Committee to divide Afognak into 3 separate drawing hunt areas. Some of the problems addressed were overcrowding of hunters due to access fees on private lands and unclear boundary lines that were not discernible from logging roads. These areas are open as drawing hunts from 25 September to 22 October, and if harvest targets are not met, portions of Afognak Island may be open to a registration hunt. Due to concern about low bull and calf observations in the Malina and Afognak Lake herds, the either-sex hunt for this hunt area was changed to a bull-only drawing hunt 25 September–9 October, followed by a cow-only hunt 8–22 October.

Hunter Harvest: The annual elk harvest increased in the past 5 years with a high of 95in 2004–05 and a low of 62 elk in 2002–03 (Table 3). Recent annual harvests remained well below the peak of 206 elk killed in 1989–90. The percentage of bulls in the harvest increased to 68% in RY 2004–05 from 63% for the 2003–04 season (Table 2). Smith (1996) noted the proportion of bulls in the harvest was in a declining trend prior to 1992–93, and Smith and Van Daele (1998) noted an increase in the bull proportion from 1992–93 to 1994–95. The distribution of the elk harvest among the individual hunts varied considerably from one year to the next, reflecting differences in weather, access options and elk distribution.

One cow elk was harvested during the federal subsistence hunt during this report period.

Permit Hunts: During this report period, we increased the number of bull and cow permits and lengthened the hunting season on Raspberry Island in response to herd growth. In the newly created Southwest Afognak hunt area 15 bull permits and 100 cow drawing permits were issued each regulatory year. We issued up to 150 either-sex drawing permits for both the Remainder of Unit 8 and the East Afognak hunt areas (Table 2). Registration permit hunts went into effect after the drawing hunts for all hunt areas except Raspberry Island. The number of registration permits increased to 378 in 2004–05 from an average of 359 in the previous 5 years.

Hunter Residency and Success: Overall elk hunter success was 28% in 2003–04 and 23% in 2004–05 (Table 3), a slight increase over the average of the previous 5 years (22.2%). Residents of Unit 8 accounted for 48% of the elk hunters in 2003–04 and 52% in 2004–05, comparable to the average of the previous 5 years (52.6%). The number of hunters afield was 287 in 2003–04, and 393 in 2004–05, a notable decrease from the average of the previous 5 years (429.4).

Harvest Chronology: After the 2003 change, most of the elk were harvested in the first 20 days of October (Table 4). Prior to this report period, a registration permit harvest that opened 25 September contributed a large proportion of the harvest.

Transportation Methods: Aircraft and boats are the predominant methods of transportation for elk hunters in Unit 8 (Table 5). Use of highway vehicles depends on the level of logging activity and the vehicle use policies of the logging companies and the landowners. It is difficult to track the harvest by highway vehicle because hunters typically record on their permit the transportation they used to arrive on Afognak rather than the transportation used to hunt..

Other Mortality

Four radiocollared cow elk died, and 2 radios ceased functioning during this reporting period. A hunter killed 1 radiocollared elk, while the causes of death for the others were unknown. The decreasing trend in elk counts indicated that winter mortality was heavy in 1998–99, but moderated considerably from RY 1999 to RY 2004.

Documenting mortality from sources other than hunting is seldom possible because of the remote setting of Afognak and Raspberry Islands. Predation by brown bears undoubtedly occurs, but it is probably rare. It has been estimated that wounding loss and illegal harvest contribute additional mortality equivalent to 15% of the reported harvest.

HABITAT ASSESSMENT

Commercial logging of Sitka spruce (*Picea sitchensis*) on Afognak Island increased during this reporting period. Timber harvesting expanded somewhat in the Marka Creek drainage, Duck Mountain, Duck Bay, and east of Paramanof Bay. The Alaska Department of Fish and Game (ADF&G) continued to review timber harvest plans that private timber owners are required to submit to the Alaska Department of Natural Resources. Current laws do not contain provisions for protecting terrestrial wildlife, so the reviews are strictly advisory.

Representatives from logging companies and Native corporation land managers have expressed a desire to work with ADF&G to investigate the long-term effects of logging on elk habitat quality on Afognak Island and develop cost-effective methods to improve elk habitat. Village Wildlife Conservation Cooperative, in association with Alaska Village Initiatives, has chosen Afognak Island as the site for an inaugural project that will emphasize cooperative wildlife management between the department and Native landowners. We have been working closely with Afognak Native Corporation to identify areas that are suitable for habitat enhancement to benefit wildlife. We also have embarked on a cooperative research project with Rocky Mountain Elk Foundation, Kodiak Brown Bear Trust, Afognak Native Corporation, and the Kodiak National Wildlife Refuge to deploy additional VHF and GPS radio collars on elk and brown bears (*Ursus arctos middendorffi*) and to refine our knowledge of critical habitats for these species on Afognak.

Kodiak Brown Bear Trust has been acting as a facilitator to acquire Native-owned lands on northern Afognak. Several nongovernmental organizations have expressed a desire to purchase these lands and eventually turn them over to the state for management under the Alaska State Parks system. Negotiations are ongoing, but the proposal has potential benefits for elk and elk hunters.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

We remain concerned about vulnerability of elk to hunting as the result of logging and road construction, although cooperation with landowners and logging operators has improved tremendously.

Fixed-winged aircraft seem to have little direct impact on the elk, but helicopters typically prompt flight responses from both individuals and groups. In April of 2002, a memorandum of agreement among the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Coast Guard regarding flight operations over the Kodiak Archipelago was finalized. This agreement has spurred further cooperation between the Coast Guard and the department to minimize elk and other wildlife species disturbances from helicopter flight operations.

Genetic diversity has been a lingering concern for both hunters and managers of Unit 8 elk. Notably small, and often broken, antlers were cited as possible byproducts of inbreeding. Preliminary analysis of antler measurements seems to confirm that Unit 8 elk do have significantly smaller antlers than elk in the parent herd in western Washington. Preliminary analysis of genetic data, however, indicates that the Unit 8 elk are at least as genetically diverse as those sampled from the parent herd. In years following mild winters we have observed increased antler development and fewer cases of antler narrowing and breakage. This suggests inbreeding may not be a serious concern, and antler abnormalities may be caused by some other

agent. We will continue to analyze these data and publish the results as soon as possible. We will also consider investigating the role of nutrient and mineral availability in antler development on Raspberry and Afognak islands.

In 2003 the department began investigating the incidence of chronic wasting disease (CWD) in elk and deer on the Kodiak archipelago. Deer and elk hunters were asked to voluntarily submit the heads of harvested animals for analysis. All deer and elk heads that were tested during this report period have come back negative. We are also working closely with the one commercial elk rancher on Kodiak to assure that his animals do not have contact with wild animals.

CONCLUSIONS AND RECOMMENDATIONS

Throughout most of the 1990s, the elk population in Unit 8 continued to increase to a minimum of 1400 elk. Winter mortality during 1997–98 and 1998–99 curtailed that increasing trend. Since then, the population has been increasing, but remains below the objective of 1000 elk. The Malina Lake and the Raspberry Island herds had the most dramatic declines, probably due to winter mortality. In 2003 Afognak was managed by drawing hunts, which are followed by a single registration hunt if target harvests are not met through the drawing hunt. In addition, Afognak was divided into 3 hunt areas easily discernible from current logging roads. These changes distributed the harvest throughout the hunting season, reducing wounding loss and increasing the quality of the hunting experience for hunters.

In 2002 an additional logging company (White Stone Logging) started operations and increased the number of people living and working on Afognak Island. Much of the current logging is occurring around Duck Mountain, the Marka River, and east of the Kodiak National Wildlife Refuge boundary. The result of these changes, coupled with the imposition of land use fees on Native corporation-owned lands on southern and eastern Afognak, has shifted much of the hunting pressure away from the Duck Mountain and Portage Lake herds in recent years.

Management has been further complicated by the Federal Subsistence Board's action establishing elk as a customary and traditional resource for all residents of the Kodiak Archipelago. Federal seasons have changed several times since their inception, but only one elk has been killed under a federal subsistence permit. There will be more effort associated with this hunt now that all of Afognak Island is managed as a drawing hunt and the Waterfall elk herd has tripled in size.

To address these concerns and better manage the elk resource, we recommend the following:

- Manage the Raspberry Island elk herd to encourage growth of the herd to a maximum of 150 elk with a higher proportion of large bulls. In the past 40 years population data have shown 3 distinct peaks (1965, 1987, and 1997) in which the herd reached a maximum of 220 animals before suffering catastrophic declines. This suggests the island can support no more than 200 elk at a time.
- Manage Afognak Island elk hunting entirely by time-specific drawing permits, followed by registration permits if surplus elk are available.
- Work closely with Native and federal land managers to coordinate elk management objectives and harvest strategies.

- Foster and improve relationships and cooperative research agreements among the state, the Kodiak National Wildlife Refuge and Native landowners.
- Work closely with Native land managers to devise methods of improving elk habitat while recognizing economic goals of the corporations.
- Maintain at least 3 active radio collars in each major elk herd (≥100 animals) and 2 in each minor herd (<100 animals).
- Use radiotelemetry data from both GPS and VHF radio collars to refine our knowledge of elk habitat use patterns.

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Table 1 Unit 8 aerial elk composition counts and estimated population by herd, 1999–2000 through 2004–05

Herd	Regulatory year	Bulls	Cows	Calves	% Calves	Bulls: 100 cows	Calves: 100 cows	Total elk observed	Estimated population
Raspberry Island	1999–2000	20	37	21	(27)	54	57	78	80–100
	2000–01	9	25	6	(15)	36	24	40	40–50
	2001–02	7	27	8	(19)	26	30	42	40–60
	2002–03	--	58	13	(18)	--	22	71	80
	2003–04	--	58	18	(24)	--	31	76	90
	2004–05	9	50	15	(20)	18	30	74	100
Seal Bay	1999–2000	--	34[a]	3	(8)	--	--	37	90–110
	2000–01	--	--	--	--	--	--	--	60–80
	2001–02	--	38[a]	--	--	--	--	38	60–80
	2002–03	--	--	--	--	--	--	--	70–80
	2003–04	--	--	--	--	--	--	--	80
	2004–05	--	--	--	--	--	--	--	80
Duck Mt.	1999–2000	--	--	--	--	--	--	42	90–110
	2000–01	--	48[a]	--	--	--	--	48	90–110
	2001–02	--	97[a]	--	--	--	--	97	90–110
	2002–03	--	35	12	(26)	--	34	47	110–140
	2003–04	--	--	--	--	--	--	--	70
	2004–05	--	48	12	(20)	--	25	60	120
Portage Lake	1999–2000	--	30[a]	9	(23)	--	--	39	60–80
	2000–01	--	79[a]	15	(19)	--	--	94	90–110
	2001–02	--	--	--	--	--	--	--	90–110
	2002–03	--	35[a]	18	(35)	--	51	52	60
	2003–04	1	11	2	(14)	9	18	14	60
	2004–05	--	--	--	--	--	--	--	60
Marka Lake	1999–2000	--	93[a]	6	(6)	--	--	99	120–130
	2000–01	5	68	19	(21)	7	28	92	150–200
	2001–02	--	95	24	(20)	--	25	119	130–150
	2002–03	--	102[a]	54	(35)	--	--	156	180–220
	2003–04	--	212	--	--	--	--	212	255
	2004–05	25	87	29	(21)	29	33	141	180

Table 1 continued

Herd	Regulatory year	Bulls	Cows	Calves	% Calves	Bulls: 100 cows	Calves: 100 cows	Total elk observed	Estimated population
Malina Lake	1999–2000	--	136[a]	19	(12)	--	--	155	160–180
	2000–01	1	49	12	(19)	2	24	62	120–150
	2001–02	1	122	0	(0)	--	0	123	120–150
	2002–03	10	86	7	(7)	12	8	103	120–150
Malina/	2003–04	--	95	37	(28)	--	39	132	160
Afognak Lake	2004–05	14	90	11	(10)	16	12	115	170
Afognak Lake	1999–2000	--	71[a]	30	(30)	--	--	101	130–150
	2000–01	--	6[a]	--	--	--	--	6	20–50
	2001–02	--	--	--	--	--	--	--	20–50
	2002–03	--	58	13	(18)	--	22	71	50–70
Waterfall Lake	1999–2000	--	64[a]	22	(34)	--	--	86	130–170
	2000–01	--	39[a]	--	--	--	--	39	40–60
	2001–02	--	39	9	(19)	--	23	48	40–60
	2002–03	6	30	4	(10)	20	13	40	40–60
	2003–04	--	82	36	(31)	--	44	118	120
	2004–05	--	93[a]	--	--	--	--	93	150
Tonki Cape	1999–2000	--	--	--	--	--	--	--	20–30
	2000–01	--	--	--	--	--	--	--	20–30
	2001–02	--	--	--	--	--	--	--	20–30
	2002–03	10	3	--	--	--	--	13	20–30
	2003–04	--	--	--	--	--	--	--	30
	2004–05	3	--	--	--	--	--	3	30
Total all herds	1999–2000	--	465	110	(19)	--	--	575	880–1060
	2000–01	15	314	52	(14)	5	17	381	800–900
	2001–02	8	418	41	(9)	2	10	467	740–860
	2002–03	26	407	121	(22)	6	30	554	740–860
	2003–04	1	458	93	(17)	--	20	552	850–900
	2004–05	51	368	67	(14)	14	18	486	890–950

[a] Includes all adults, not differentiated by sex.

Table 2 Unit 8 elk harvest data by permit hunt, 2003–04 through 2004–05 [a]

Hunt Area/Nr	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls	(%)	Cows	(%)	Unk.	Illegal/ unreported	Total harvest
Raspberry Is. (Drawing Hunt Nr 702–706)	2003–04	60	61	73	27	5	(71)	2	(29)	0	0	7
	2004–05	80	58	69	31	8	(80)	2	(20)	0	0	10
SW Afognak Is. (Drawing Hunt Nr 711 & 713)	2003–04	115	56	71	29	2	(15)	11	(85)	0	0	13
	2004–05	115	55	88	12	1	(17)	5	(83)	0	1	7
Remainder of Unit 8 (Drawing Hunt Nr 715 & 717)	2003–04	150	55	68	32	14	(78)	4	(22)	0	0	18
	2004–05	122	50	64	36	17	(81)	4	(19)	1	0	22
East Afognak (Drawing Hunt Nr 721 & 723)	2003–04	150	58	73	27	7	(50)	7	(50)	0	0	14
	2004–05	150	66	71	29	8	(57)	6	(43)	0	1	15
Remainder of Unit 8 (Registration Hunt Nr 755)	2003–04	222	50	75	25	22	(81)	5	(19)	0	0	27
	2004–05	378	45	80	20	29	(71)	12	(29)	0	0	41
Federal Subsistence	2003–04	14	70	67	33	0	0	1	(100)	0	0	1
	2004–05	14	67	100	0	0	0	0	0	0	0	0
Total all hunts	2003–04 [b]	711	55	72	28	50	(63)	30	(37)	0	0	80
	2004–05	859	52	78	22	63	(68)	29	(32)	1	2	95

[a] Hunt number and hunt boundary change occurring in 2003

Table 3 Unit 8 elk hunter residency and success, 2000–01 through 2004–05

Regulatory Year	Successful					Unsuccessful					Total hunters[c]
	Local[a] resident	Nonlocal resident	Nonresident	Total[b]	(%)	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	
2000–01	34	29	1	64	(15)	189	149	15	353	(85)	417
2001–02	53	35	2	90	(20)	131	101	9	241	(73)	331
2002–03	34	24	4	62	(20)	135	106	13	254	(80)	316
2003–04	47	29	4	80	(28)	92	102	13	207	(72)	287
2004–05	52	34	6	92	(23)	154	138	9	301	(77)	393

[a] Local means resident of GMU 8.

[b] Totals do not include illegal/unreported and unknown harvest data

[c] Hunters participating in more than one permit hunt were tallied for each hunt.

Table 4 Unit 8 elk harvest chronology by 10-day period (percent in parentheses), 2000–01 through 2004–05

Area	Regulatory Year	Harvest periods (percent) 21–30 Sep	1–10 Oct	11–20 Oct	21–31 Oct	1–10 Nov	11–20 Nov	21–30 Nov	*n*
Raspberry Island	2000–01	--	1 (50)	1 (50)	--	--	--	--	2
	2001–02	--	--	1 (100)	--	--	--	--	1
	2002–03	--	1 (50)	1 (50)	--	--	--	--	2
	2003–04	--	2 (28.5)	3 (43)	--	2 (28.5)	--	--	7
	2004–05	--	3 (30)	5 (50)	--	--	1 (10)	1 (10)	10
Afognak Island	2000–01	14 (23)	13 (21)	17 (27)	9 (14)	6 (10)	1 (2)	2 (3)	62
	2001–02	31 (35)	16 (18)	24 (27)	8 (9)	10 (11)	0 (0)	0 (0)	89
	2002–03	11 (17)	14 (22)	20 (32)	6 (10)	9 (14)	3 (5)	0 (0)	63
	2003–04	12 (16.5)	12 (16.5)	21 (29)	10 (14)	9 (12)	9 (12)	0 (0)	73
	2004–05	12 (15)	15 (18)	14 (17)	15 (18)	12 (15)	9 (11)	5 (6)	82

Table 5 Unit 8 elk harvest by transport method (percent in parentheses), 2000–01 through 2004–05

Regulatory Year	Airplane	Horse	Boat	ORV	Highway vehicle	Unknown	n
2000–01	30 (47)	0	14 (22)	2 (3)	16 (25)	2 (3)	64
2001–02	38 (42)	0	26 (29)	0 (--)	19 (21)	7 (8)	90
2002–03	20 (32)	0	11 (18)	0 (--)	12 (19)	19 (31)	62
2003–04	25 (31)	0	25 (31)	2 (3)	24 (30)	4 (5)	80
2004–05	30 (33)	2 (2)	36 (39)	1 (1)	21 (23)	2 (2)	92

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.

Photo by Nick Gefre