# Elk

## Management Report
## 1 JULY 1999–30 JUNE 2001

Alaska Department of Fish and Game
Division of Wildlife Conservation

ADF&G

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# STATE OF ALASKA

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# 2001 ELK MANAGEMENT REPORT

From: 1 July 1999
To: 30 June 2001

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## LOCATION

**GAME MANAGEMENT UNIT:** 3 (3,000 $mi^2$)

Unit 3 - 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 six unsuccessful attempts to introduce elk into Southeast Alaska (Burris and McKnight 1973). Lack of monitoring programs precluded our determining why previous attempts to introduce elk failed in Southeast Alaska.

In 1985, the State 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, 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 an October 1–31, one-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 ADF&G's 1987 Elk Management Plan called for a limit 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 Board of Game established a bull-only elk season in Unit 3. The board authorized the department to issue up to 30 elk drawing permits for an October 1–30 season. The State 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, a total of 31 elk drawing permits were issued. One auction/raffle permits was issued in 1998. In 1999 one raffle permit was issued, and two 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 (September 15–30) for archery only. An International Bowhunters Education Program (IBEP) certification card is required to participate in the archery-only season.

*Historical harvest patterns*

Fall weather can influence elk movement patterns and hunter effort and success. In 1997 the largest percentage of the harvest occurred during the first and last weeks of October. In 1998, the highest percentage of the harvest occurred during the first and second weeks of October.

*Historical harvest locations*

In 1997 and 1998, a total of 49 hunters harvested a total of 17 elk, including 13 from Etolin Island and 4 from Zarembo Island. Of the 13 elk harvested on Etolin Island, 4 were killed in Wildlife Analysis Area (WAA) #1901 on the north half of the island and 9 were killed in WAA #1910 on the south half of the island.

## MANAGEMENT DIRECTION

We have not established management objectives for Unit 3 elk. We estimate that the Etolin Island winter carrying capacity ranges from 900 to 1300 elk (Alaska Dept. of Fish and Game, 1985, Dave Person, pers. com.). We will attempt to maintain a post-harvest ratio of 25–30 bulls per 100 cows. We are currently working on a Region I elk management plan.

## METHODS

We flew aerial surveys of Etolin Island to record tracks and visual sightings of individuals and groups of elk. We also recorded observations reported by other agency personnel and the public. We conducted winter range elk and deer pellet counts periodically to assess relative density. Jawbones were collected from harvested elk and teeth were sent to the lab for aging. Successful hunters were asked to submit a photo of their elk's antlers. We provided hunters with blood sampling kits and asked that they voluntarily collect blood serum samples from harvested elk and submit them for disease analysis.

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TREND

*Population Size*

A precise population estimate is not available for Unit 3 elk. Our June, 1999 population estimate is subjective, but based on all information available we estimate Unit 3 has 300–350 elk, with 40–50 on Zarembo and the balance on Etolin. The 2000 post-parturition modeling prediction for Etolin Island was approximately 350 elk. Based on modeling predictions we estimate that a reasonable upper limit for the elk population on Etolin and Zarembo combined was approximately 450 animals (Dave Person, pers. com.).

*Population Composition*

No data are available to make meaningful elk population composition estimates for Etolin or Zarembo islands. Almost every group of Roosevelt elk observed included large and small bulls, cows, and calves (in season). Zarembo Island apparently supports only Rocky Mountain elk, usually found in mixed sex and age groups. Some calves survive each year and are being recruited into the breeding population.

*Distribution and Movements*

Roosevelt elk have dispersed from their release site but still incorporate this area within their home range. Most Roosevelt elk have remained within 10 miles of their release site. After remaining close to the release site for 18 months, Rocky Mountain elk have dispersed widely. A breeding group is established on Zarembo Island. Elk have been reported on several islands in the area.

For both sub-species 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 3,000 feet on Etolin Island.

### MORTALITY

*Harvest*

| Season and bag limit | Resident and nonresident hunters |
|---|---|
| 1 bull by bow and arrow only | Sept. 1–Sept. 30 |
| or | |
| 1 bull | Oct. 1–Oct. 31 (General hunt only) |

Unit 3, 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 as follows: up to 120 permits will be issued.

Board of Game Action and Emergency Orders. In October 2000 the BOG increased the number of elk drawing permits from 70 to 120 and extended the archery-only season by two weeks, to a 1 September opening date. 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 August 1 through December 31, in Unit's 1, 2, and the remainder of Unit 3 outside of the drawing area.

Hunter Harvest. In 1999 we issued 70 drawing permits and 1 auction/raffle permit. Fifty-one permittees hunted and harvested 16 elk (Table 2). During the 2000 season we issued 70 drawing permits and 2 auction/raffle permits. Fifty-nine permittees hunted and harvested 8 elk.

Hunter Residency and Success. No nonresidents received elk permits in 1999 or 2000. Nonlocal residents represented the largest group of both successful and unsuccessful hunters in 1999. In 2000, nonlocal residents represented the largest group of unsuccessful hunters, but the number of successful hunters was identical for local and nonlocal residents (Table 3). The success rate for permit holders who actually hunted was 28% in 1999 and 14% in 2000. Most of the non-local hunters were from communities in Southeast Alaska, relatively close to the hunt area.

Harvest Chronology. In 1999 hunters had the best success during the first and third weeks of October when 43% and 26%, respectively, of the harvest occurred (Table 4). In 2000 the harvest was evenly distributed with 25% of the harvest occurring in each of the first, second, and third weeks of October. The first and only bull taken in during the 2000 archery-only season was taken on opening day.

Harvest in Particular Areas (WAA's). In 1999, a total of 16 elk were killed in three Unit 3 WAA's. These include WAA numbers 1901, 1905, and 1910, with 13%, 19% and 69% of the harvest, respectively. In 2000, a total of 8 elk were harvested in the same three WAA's with 1901, 1905, and 1910 representing 25%, 13% and 63% of the harvest, respectively.

Guided Hunter Harvest. No guides are currently offering guided elk hunts in the unit.

Transport Methods. In 1999, all successful hunters used boats to access their hunting areas. In 2000, 62% of successful hunters used boats, 25% used airplanes, and 13% used 3- or 4-wheelers to access their hunting area (Table 5). Etolin Island has 3 lakes that are accessible by floatplane, and some hunters flew into those lakes.

*Other Mortality*

Brown bears, black bears, and gray wolves occur on Etolin Island, and wolves and a relatively small number of black bears are found on Zarembo Island. The extent of predation on elk is not known but wolves are believed to be the major predator. 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 (USFS, unpubl. data). This will reduce the islands elk carrying capacity. The Etolin Island winter carrying capacity is estimated to be from 900–1300 elk and consists of the following: clearcut, 2.0 $mi^2$; second growth, 2.2 $mi^2$; non-forest or non-commercial forest, 72.9 $mi^2$; old growth forest, 124.4 $mi^2$ (Alaska Dept. of Fish and Game, 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. While not the primary intent, this effort does provide a benefit to elk by improving and extending habitat suitability in the short-term by reducing canopy cover which permits sunlight to reach the forest floor and increase 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 does not always detect infected animals.

Since 1999 the Department has provided elk hunters with sampling kits and asked that they voluntarily collect blood serum samples from harvested elk. A total of 17 sera samples, including 12 from 1999 and 5 from 2000, were collected during this report period and submitted for disease analysis. The sera were tested for evidence of exposure to the following disease agents: infectious bovine rhinotracheitis virus, bovine viral diarrhea virus, parainfluenza 3 virus, respiratory syncytial virus, epizootic hemorrhagic disease virus, and 5 serovars of Leptospira interrogans. Laboratory analysis revealed no evidence of exposure to any of these agents in any of the sera. We will continue attempts to obtain elk blood serum samples for disease testing.

The Department remains concerned about 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 resources, 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 is now increasing. 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.

In order to ensure that the elk population is kept below carrying capacity to minimize their likelihood of dispersal off of Etolin and Zarembo islands, there is a need to develop accurate estimates of both the carrying capacity and elk populations on these islands.

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Table 1 Unit 3 elk composition counts and estimated population size, regulatory years 1995 through 2000

| Area | Regulatory year | Bulls: 100 Cows | Calves: 100 Cows | Calves (%) | Adults | Total elk observed | Estimated population size |
|---|---|---|---|---|---|---|---|
| Etolin Island | 1995 | ( ) | ( ) | ( ) | | | |
| | 1996 | ( ) | ( ) | ( ) | | | |
| | 1997 | ( ) | ( ) | ( ) | | | |
| | 1998 | ( ) | ( ) | ( ) | | | |
| | 1999 | ( ) | ( ) | ( ) | | | |
| | 2000 | 70 | 109 | (39) | 39 | 64 | 250–350 |
| Zarembo Island | 1995 | ( ) | ( ) | ( ) | | | |
| | 1996 | ( ) | ( ) | ( ) | | | |
| | 1997 | ( ) | ( ) | ( ) | | | |
| | 1998 | ( ) | ( ) | ( ) | | | |
| | 1999 | ( ) | ( ) | ( ) | | | |
| | 2000 | ( ) | ( ) | ( ) | | | 75–100 |

Table 2 Unit 3 elk harvest data by permit hunt, regulatory years 1997 through 2000

| Regulatory year | Permits issued | Percent did not hunt | Percent unsuccessful hunters | Percent successful hunters | Harvest | | | Illegal | Total harvest |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Bulls (%) | Cows (%) | Unk (%) | | |
| 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 |

Table 3 Unit 3 elk hunter residency and success, regulatory years 1997 through 2000

| 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 |

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

Table 4 Unit 3 elk harvest chronology percent by harvest period, regulatory years 1997 through 2000

| Regulatory year | Harvest period | | | | | | *n* |
|---|---|---|---|---|---|---|---|
| | 9/15–21 | 9/22–9/30 | 10/1–10/7 | 10/8–10/14 | 10/15–10/21 | 10/22–10/31 | |
| 1997 | (0) | (0) | (38) | (0) | (24) | (38) | 8 |
| 1998 | (0) | (0) | (56) | (33) | (1) | (0) | 9 |
| 1999 | (0) | (0) | (43) | (12) | (26) | (19) | 16 |
| 2000 | (12) | (0) | (25) | (25) | (25) | (13) | 8 |

Table 5 Unit 3 elk harvest percent by transport method, regulatory years 1997 through 2000

| Regulatory year | Harvest percent by transport method | | | | | | | | *n* |
|---|---|---|---|---|---|---|---|---|---|
| | Airplane | Boat | 3- or 4-wheeler | Snowmachine | ORV | Highway vehicle | Walk | Unk | |
| 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 ELK MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

**GAME MANAGEMENT UNIT:** 8 (5,097 $MI^2$)

Unit 8 - 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 peaked at 1,200–1,500 by 1965, with 9 separate 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). 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 suffered declines. As a result of the winter mortality, overall populations declined under the management objective of 1,000 elk.

Relative accessibility of each elk herd to hunters strongly influenced management strategies. In the 1960's 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 resulting from logging road access and loss of security cover. By the mid-1980's 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 part of Afognak Island was 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.

In 1999, the Department initiated a cooperative research project with the Rocky Mountain Elk Foundation, Washington Division of Wildlife, and Olympic National Park. This project was designed to investigate the degree of genetic diversity between the Unit 8 elk and the parent herd in western Washington. Investigation of herd fidelity on Afognak and Raspberry Islands was another aspect of the project. The Department is currently working with the Rocky Mountain Elk Foundation and the Afognak Native Corporation to identify critical wintering habitat and initiate habitat enhancement projects.

## MANAGEMENT DIRECTION

### MANAGEMENT OBJECTIVES

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

## METHODS

Each year we attempt to use one observer in a Piper PA-18 (Super Cub) aircraft to conduct 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 6 female elk on 16–17 May 2000 and we equipped them with VHF radio collars. We recovered the 3 GPS radio collars that were placed on elk in the spring of 1999, and a hunter recovered an additional GPS collar when he harvested the instrumented cow in the fall of 1999.

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

## RESULTS AND DISCUSSION

### POPULATION STATUS AND TRENDS

*Population Size*

Aerial composition surveys indicated a notable decrease in the elk population in 2000 (Table 1). The minimum population on Raspberry and Afognak Islands was estimated at 865 elk, well below the 1,206 elk minimum estimate in the previous 5 years. Among the 8 herds identified on Afognak Island, the Marka Lake and Duck Mountain herds were stable, while all others declined. Much of the decline was attributable to severe winter conditions and delayed spring green-up in 1998–99. During that same period, an estimated 50% of the Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) in the Unit succumbed to winter mortality.

Elk in the Raspberry Island and Malina Lake herds had the greatest declines, losing about 77% and 60% of the elk observed in 1996–97, respectively. We postulated that part of the decline could have been due to movement of some members of the herds to the adjacent Afognak Lake and Marka Lake herds, but we have not seen commensurate increases in those herds.

The Paramanof Peninsula herd, which declined precipitously after 1989 (Smith 1996), showed no sign of recovery, and we now assume that is has been incorporated into the Marka Lake herd.

The Tonki Cape herd has shown little growth despite complete protection since 1993–94.

Each year we receive reports of elk on Kodiak Island, including small bands along Narrow Strait, Kizhuyak Bay, and Kupreanof Peninsula. Although we have never been able to verify the

reports, the consistency with which they are received suggest that small numbers of elk persist on Kodiak. There have been no recent reports of elk on Shuyak 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 2000–2001, down from a 5-year average (1996/97–1999/2000) of 22% (Table 1). The Raspberry Island herd continued to have healthy percentages of bulls and calves in spite of the dramatic population declines. In contrast, the Malina Lake herd had only 1 branch-antlered bull and no calves when we surveyed it in the fall of 2001.

*Distribution and Movement*

Elk herd distribution has been monitored by composition counts, hunter and logger reports, and by relocating radio collared elk. There are at least 8 separate herds on Afognak Island and 1 herd on Raspberry Island. In July 2000, we had 19 active radio collars in the population, distributed among all of the herds except Tonki Cape.

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/early spring weather. Data recovered in 2000 from 4 GPS collars has helped in determining the extent of herd range, critical over-wintering areas and rutting areas. With the help of Afognak Native Corporation we are overlaying relocation data with current habitat maps to better understand the relationships of elk movements to virgin, recently altered and regenerating habitats.

**MORTALITY**

*Harvest*

Seasons and Bag Limits: There was 1 open season for resident and nonresident hunters for Raspberry Island. During the 1–22 October season, the bag limit was 1 bull elk by drawing permit only with up to 10 permits issued.

The open season for resident and nonresident hunters in 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 was 25 September–22 October; the bag limit was 1 elk by drawing permit, with up to 500 permits issued.

The open season for resident and nonresident hunters for the remainder of Unit 8 was 25 September–30 November; the bag limit was 1 elk by registration permit.

That portion of Afognak Island east of Tonki Bay and east of a line from the head of Tonki Bay to Pillar Cape was closed to elk hunting.

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

In 1999, we issued 1 Emergency Order. It took effect on 28 October 1999 and closed a portion of registration hunt RE754 between Paramanof and Malina Bays, which was occupied by the Marka Herd. The estimated population of the Marka herd included 125 elk, and the target harvest rate of 15%–18% was accomplished a few days prior to the Emergency Order closure.

In 2000, we issued 1 Emergency Order which closed portions of registration hunts RE753 on 27 October and RE754 on 31 October 2000. The effected areas included the portion of RE753 which lies north and west of a line from the head of Muskomee Bay to the head of Malina Bay, which was occupied by the Malina herd, and the portion of RE754 which lies north and west of a line from Paramanof and Malina Bays, which was occupied by the Marka Lake herd. These areas received greater pressure than usual due to increased hunter effort on lands not subject to newly imposed access fees on some Native-owned lands.

In 1998, the Federal Subsistence Board opened a subsistence elk hunt from 1–25 September on Kodiak National Wildlife Refuge lands on northwestern Afognak, within the traditional range of the Waterfall elk herd. In 1999, the season was liberalized to extend through 30 November. Hunters were limited to Unit 8 residents and access was limited to marine waters only. In 2000, the marine access only restriction was lifted. In 2001, the season was reduced to 15 September–30 November.

Hunter Harvest: The annual elk harvest decreased in each of the past 3 years from a high of 181 elk in 1998–99 to 66 elk in 2000–2001 (Table 2). Recent annual harvests remained well below the peak of 206 elk killed in 1989–90. The percentage of bulls in the harvest declined to 42% in 2000–2001 from a 50% average for the previous 5 years (Table 2). Smith (1996) noted that 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 1 year to the next; reflecting the vagaries in weather, access options and elk distribution.

Permit Hunts: In 2000, we dropped the number of drawing permits available for the Raspberry Island from 146 to 10 bull only permits, in response to the population decline on the island. The south and east Afognak Island elk hunts remained constant during this reporting period at 500 each year, however an administrative error resulted in an extra permit being issued in 2000–01 (Table 2). The number of registration permits, which were valid for both north Afognak and the late season in south and east Afognak, decreased to 431 in 2000–01 from an average of 505 in the previous 5 years.

Hunter Residency and Success: Average hunter success was 16% in 2000–01 and 27% in 1999–2000 (Table 3). Residents of Unit 8 accounted for an average of 51% of the hunters afield from 1996–97 to 2000–01, and they consistently harvested more elk than other Alaskan residents and nonresidents combined. The number of hunters in the field decreased to 417 in 2000–01 from an average of 533 in the previous 5 years.

Harvest Chronology: Lengthening the elk season to include the last week of September and first 10 days of October dramatically altered the harvest chronology patterns. Prior to 1997–98 harvest was highest in the last 2 weeks of October for all 3 areas in most years (Table 4). After the change, most of the elk were harvested in the first 20 days of the season.

Transportation Methods: Aircraft and boats are the predominate methods of transportation for elk hunters in Unit 8. (Table 5). Use of highway vehicles is dependant on the level of logging activity and the vehicle use policies of the logging companies and the land owners. An increase in 4-wheeler activity on Raspberry Island prompted local residents to propose a ban on their use on that island. The Board of Game failed to adopt the proposal during their March 1999 meeting, but requested that the Kodiak Advisory Committee develop a task force to investigate the concerns and possible solutions.

*Other Mortality*

Four radiocollared female elk died. Hunters killed two of the elk, while the causes of death for the others were unknown. Separately, the radiocollars on 4 other female elk ceased functioning during this reporting period. The decreasing trend in elk counts indicated that overwinter mortality was heavy in 1998–99, but moderated in 1999–2000 and 2000–01.

**HABITAT ASSESSMENT**

Commercial logging of Sitka spruce (*Picea sitchensis*) on Afognak Island slowed during this reporting period. Roads in much of eastern Afognak were closed and culverts were removed. There was some expanded timber harvesting in the Marka Creek drainage. The Department continued to review timber harvest plans which private timber owners are required to submit to the 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 land managers have expressed a desire to work with the Department 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 have also 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 non-government organizations have expressed a desire to purchase these lands and eventually turn them over to the State for management under the State Parks system. Negotiations are ongoing, but the proposal has potentially favorable impacts for elk and elk hunters.

### NONREGULATORY MANAGEMENT PROBLEMS / NEEDS

Continued vulnerability of elk to hunting, as the result of logging and road construction, is still a management concern, although cooperation with landowners and logging operators has improved tremendously.

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 seem 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. This suggests that inbreeding many not be a serious concern, and that 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.

## CONCLUSIONS AND RECOMMENDATIONS

Throughout most of the 1990s, the elk population in Unit 8 continued to increase to a minimum of 1,400 elk. Winter mortality during 1997–98 and 1998–99 curtailed that increasing trend. Since then, the population has been relatively stable, but below the 1,000 elk objective level. The Malina Lake and the Raspberry Island herds had the most dramatic declines, probably due to winter mortality. We have responded to the population decline by reducing harvest from 181 elk in 1998–99 to 66 elk in 2000–2001. To accomplish this, emergency closures have been common.

For the first time in over 25 years, road access on Afognak declined significantly during this reporting period. There was also a reduction in the number of people living and working on Afognak, as one of the logging companies (Silver Bay Logging) curtailed operations. 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 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 there has yet to be an elk killed under a federal subsistence permit.

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. We should work with the Kodiak Advisory Committee to develop a proposal for the March 2003 Board of Game meeting;

- work closely with Native and Federal land managers to coordinate elk management objectives and harvest strategies;
- foster and improve relationships and cooperative research agreements between the state and Kodiak National Wildlife Refuge and Native land owners;
- 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 on each major elk herd (>100 animals) and 2 on each minor herd (<100 animals); and,
- use radio telemetry 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, 1996/97–2001/02.**

| Estimated Herd Population | Regulatory Year | Bulls | Cows | Calves | (%) | Bulls: 100 Cows | Calves: 100 Cows | Total Elk Observed | |
|---|---|---|---|---|---|---|---|---|---|
| Raspberry Island | 1996–97 | 42 | 138 | 27 | (13) | 30 | 20 | 207 | 210–220 |
| | 1997–98 | 22 | 96 | 44 | (27) | 23 | 46 | 162 | 210–220 |
| | 1998–99 | 17 | 87 | -- | -- | 20 | -- | 104 | 210–220 |
| | 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 |
| Seal Bay | 1996–97 | -- | -- | -- | -- | -- | -- | -- | 170–180 |
| | 1997–98 | -- | -- | -- | -- | -- | -- | -- | 170–180 |
| | 1998–99 | -- | -- | -- | -- | -- | -- | -- | 170–180 |
| | 1999–2000 | -- | 34[a] | 3 | ( 8) | -- | -- | 37 | 90–110 |
| | 2000–01 | -- | -- | -- | -- | -- | -- | -- | 60–80 |
| | 2001–02 | -- | 38[a] | -- | -- | -- | -- | 38 | 60–80 |
| Duck Mt. | 1996–97 | -- | -- | 8 | (24) | -- | -- | 33 | 130–140 |
| | 1997–98 | 2 | -- | -- | -- | -- | -- | 2 | 130–140 |
| | 1998–99 | -- | -- | -- | -- | -- | -- | -- | 130–140 |
| | 1999–2000 | -- | -- | -- | -- | -- | -- | 42 | 90–110 |
| | 2000–01 | -- | 48[a] | -- | -- | -- | -- | 48 | 90–110 |
| | 2001–02 | -- | 97[a] | -- | -- | -- | -- | 97 | 90–110 |
| Portage Lake | 1996–97 | 3 | 55 | 17 | (23) | 5 | 31 | 75 | 75-85 |
| | 1997–98 | -- | -- | -- | -- | -- | -- | -- | 75-85 |
| | 1998–99 | -- | -- | -- | -- | -- | -- | -- | 75-85 |
| | 1999–2000 | -- | 30[a] | 9 | (23) | -- | -- | 39 | 60–80 |
| | 2000–01 | -- | 79[a] | 15 | (19) | -- | -- | 94 | 90–110 |
| | 2001–02 | -- | -- | -- | -- | -- | -- | -- | 90–110 |
| Marka Lake | 1996–97 | -- | -- | 17 | (22) | -- | -- | 78 | 120–130 |
| | 1997–98 | -- | -- | -- | -- | -- | -- | -- | 120–130 |
| | 1998–99 | -- | -- | -- | -- | -- | -- | -- | 120–130 |
| | 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 |

**Table 1. Unit 8 aerial elk composition counts and estimated population by herd, 1996/97–2001/02 (continued).**

| Herd | Year | Regulatory Bulls | Cows | Calves | (%) | Bulls: 100 Cows | | Calves: 100 Cows | | Total Elk Observed | Estimated Population |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Malina Lake | 1996–97 | 4 | 259 | 64 | (20) | 2 | 25 | 327 | 335-345 | | |
| | 1997–98 | 12 | 221 | 65 | (22) | 5 | 29 | 298 | 335-345 | | |
| | 1998–99 | -- | -- | -- | (--) | -- | -- | -- | 335-345 | | |
| | 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 | | |
| Afognak Lake | 1996–97 | -- | -- | -- | (--) | -- | -- | -- | 125-135 | | |
| | 1997–98 | 4 | -- | -- | (--) | -- | -- | 4 | 125-135 | | |
| | 1998–99 | -- | -- | -- | (--) | -- | -- | -- | 125-135 | | |
| | 1999–2000 | -- | 71[a] | 30 | (30) | -- | -- | 101 | 130–150 | | |
| | 2000–01 | -- | 6[a] | -- | -- | -- | -- | 6 | 20–50 | | |
| | 2001–02 | -- | -- | -- | -- | -- | -- | -- | 20–50 | | |
| Waterfall Lake | 1996–97 | 7 | 79 | 31 | (26) | 9 | 39 | 117 | 175-185 | | |
| | 1997–98 | 2 | 110 | 35 | (22) | 2 | 32 | 147 | 175-185 | | |
| | 1998–99 | -- | -- | -- | (--) | -- | -- | -- | 175-185 | | |
| | 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 | | |
| Tonki Cape | 1996–97 | 1 | 23 | 4 | (14) | 4 | 17 | 28 | 30–40 | | |
| | 1997–98 | 2 | 21 | 6 | (21) | 10 | 29 | 29 | 30–40 | | |
| | 1998–99 | -- | -- | -- | -- | -- | -- | -- | 30–40 | | |
| | 1999–2000 | -- | -- | -- | -- | -- | -- | -- | 20–30 | | |
| | 2000–01 | -- | -- | -- | -- | -- | -- | -- | 20–30 | | |
| | 2001–02 | -- | -- | -- | -- | -- | -- | -- | 20–30 | | |
| Total all herds | 1996–97 | 57 | 554 | 168 | (22) | 10 | 30 | 779 | 1300–1400 | | |
| | 1997–98 | 53 | 498 | 174 | (24) | 11 | 35 | 725 | 1300–1400 | | |
| | 1998–99 | 17 | 87 | -- | (--) | 20 | -- | 104 | 1300–1400 | | |
| | 1999–2000 | -- | 485 | 110 | (19) | -- | -- | 595 | 880–1060 | | |
| | 2000–01 | 15 | 314 | 52 | (14) | 5 | 17 | 381 | 800–900 | | |
| | 2001–02 | 8 | 418 | 41 | (9) | 2 | 10 | 467 | 740–860 | | |

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

**Table 2. Unit 8 elk harvest data by permit hunt, 1996/97 - 2000/01.**

| Hunt Area/No. | 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 No. 702-709) | 1996–97 | 195 | 56 | 63 | 37 | 12 | (39) | 19 | (61) | 0 | 0 | 31 |
| | 1997–98 | 146 | 47 | 62 | 38 | 8 | (28) | 21 | (72) | 0 | 0 | 29 |
| | 1998–99 | 146 | 45 | 60 | 40 | 10 | (39) | 22 | (61) | 0 | 0 | 32 |
| | 1999–2000 | 146 | 73 | 80 | 20 | 5 | (63) | 3 | (37) | 0 | 0 | 8 |
| | 2000–01 | 10 | 50 | 60 | 40 | 2 | (100) | 0 | -- | 0 | 0 | 2 |
| South and East Afognak Is. (Drawing Hunt 712,714,716,718) | 1996–97 | 450 | 52 | 67 | 33 | 44 | (63) | 26 | (37) | 0 | 0 | 70 |
| | 1997–98 | 500 | 49 | 61 | 39 | 59 | (60) | 39 | (40) | 0 | 0 | 98 |
| | 1998–99 | 500 | 54 | 69 | 31 | 28 | (42) | 39 | (58) | 0 | 0 | 67 |
| | 1999–2000 | 500 | 68 | 77 | 23 | 22 | (59) | 15 | (41) | 0 | 0 | 37 |
| | 2000–01 | 501 | 65 | 85 | 15 | 9 | (35) | 17 | (65) | 0 | 0 | 26 |
| South and East Afognak Is. (Registration Hunt No. 753)[a] | 1996–97 | 513 | -- | 88 | 12 | 12 | (52) | 11 | (48) | 0 | 0 | 23 |
| | 1997–98 | 549 | -- | 93 | 7 | 4 | (67) | 2 | (33) | 0 | 0 | 6 |
| | 1998–99 | 593 | -- | 83 | 17 | 21 | (58) | 15 | (42) | 0 | 0 | 36 |
| | 1999–2000 | 466 | 57 | 69 | 31 | 18 | (45) | 21 | (53) | 1 | 0 | 40 |
| | 2000–01 | 431 | 40 | 83 | 17 | 6 | (45) | 10 | (55) | 0 | 0 | 16 |
| North Afognak Is. (Registration Hunt No. 754)[a] | 1996–97 | 513 | -- | 91 | 9 | 9 | (82) | 2 | (18) | 0 | 0 | 11 |
| | 1997–98 | 549 | -- | 73 | 27 | 31 | (72) | 12 | (28) | 0 | 0 | 43 |
| | 1998–99 | 593 | -- | 62 | 38 | 36 | (78) | 10 | (22) | 0 | 0 | 46 |
| | 1999–2000 | 466 | 57 | 71 | 29 | 28 | (74) | 10 | (26) | 0 | 0 | 38 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000–01 | 431 | 40 | 86 | 14 | 10 | (50) | 10 | (50) | 0 | 2 | 22 |
| Total all hunts | 1996–97 | 1158 | 47 | 77 | 23 | 77 | (57) | 58 | (43) | 0 | 0 | 135 |
| | 1997–98 | 1209 | 51 | 69 | 31 | 101 | (58) | 73 | (42) | 0 | 0 | 174 |
| | 1998–99 | 1239 | 47 | 77 | 23 | 95 | (52) | 86 | (48) | 0 | 0 | 181 |
| | 1999–2000 | 1112 | 54 | 73 | 27 | 73 | (59) | 49 | (40) | 1 | 0 | 123 |
| | 2000–01 | 942 | 54 | 84 | 16 | 27 | (42) | 37 | (58) | 0 | 2 | 66 |

[a] Permits were valid for both RE753 and RE 754.

**Table 3. Unit 8 elk hunter residency and success, 1996/97–2000/01.**

| | Successful | | | | | Unsuccessful | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Regulatory Year | Local[a] resident hunters[b] | Nonlocal resident | Nonresident | Total | (%) | Local[a] resident | Nonlocal resident | Nonresident | Total | (%) | Total |
| 1996–97 | 73 | 55 | 7 | 135 | (23) | 241 | 198 | 25 | 465 | (78) | 600 |
| 1997–98 | 107 | 63 | 6 | 176 | (31) | 168 | 203 | 20 | 391 | (69) | 567 |
| 1998–99 | 97 | 78 | 6 | 181 | (29) | 204 | 218 | 19 | 441 | (71) | 622 |
| 1999–2000 | 61 | 57 | 5 | 123 | (27) | 178 | 149 | 11 | 338 | (73) | 461 |
| 2000–01 | 34 | 29 | 1 | 64 | (15) | 189 | 149 | 15 | 353 | (85) | 417 |

[a] Local means resident of GMU 8.
[b] 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), 1996/97–2000/01.**

| Area | Regulatory Year | Harvest periods (percent) | | | | | | | n |
|---|---|---|---|---|---|---|---|---|---|
| | | 21–30 Sep | 1–10 Oct | 11–20 Oct | 21–31 Oct | 1–10 Nov | 11–20 Nov | 21–30 Nov | |
| Raspberry Island | 1996–97 | -- | -- | 5 (16) | 5 (16) | 12 (39) | 8 (26) | 1 (3) | 31 |
| | 1997–98 | -- | 7 (24) | -- | 3 (10) | 7 (24) | 11 (38) | 1 (3) | 29 |
| | 1998–99 | -- | 8 (25) | 2 (6) | 3 (9) | 7 (22) | 7 (22) | 5 (16) | 32 |
| | 1999–2000 | -- | 3 (38) | 2 (25) | 1 (13) | -- | 2 (25) | -- | 8 |
| | 2000–01 | -- | 1 (50) | 1 (50) | -- | -- | -- | -- | 2 |
| South & East | 1996–97 | -- | -- | 59 (63) | 29 (31) | 5 (5) | -- | -- | 93 |
| | 1997–98 | 26 (25) | 52 (50) | 19 (18) | 7 (7) | -- | -- | -- | 104 |
| | 1998–99 | 14 (14) | 35 (34) | 16 (16) | 13 (13) | 14 (14) | 3 (3) | 8 (8) | 103 |
| | 1999–2000 | 18 (24) | 13 (17) | 3 (39) | 14 (18) | 8 (11) | 12 (16) | 8 (11) | 76 |
| | 2000–01 | 8 (19) | 3 (7) | 14 (33) | 8 (19) | 6 (14) | 1 (2) | 2 (5) | 42 |
| North Afognak Island | 1996–97 | -- | 3 (27) | 1 (1) | 4 (36) | 3 (27) | -- | -- | 11 |
| | 1997–98 | 7 (16) | 12 (28) | 6 (14) | 9 (21) | 4 (9) | 5 (12) | -- | 43 |
| | 1998–99 | 18 (39) | 17 (37) | 7 (15) | 2 (4) | -- | 2 (4) | -- | 46 |
| | 1999–2000 | 14 (37) | 7 (18) | 4 (11) | 8 (21) | 2 (5) | -- | 3 (8) | 38 |
| | 2000–01 | 6 (30) | 10 (50) | 3 (15) | 1 (5) | -- | -- | -- | 20 |

**Table 5. Unit 8 elk harvest by transport method (percent in parentheses), 1996/97–2000/01.**

| Regulatory Year | Airplane | Horse | Boat | ORV | Highway vehicle | Unknown | |
|---|---|---|---|---|---|---|---|
| 1996–97 | 44 (33) | 0 | 56 (42) | 2 (2) | 33 (24) | 0 (--) | 135 |
| 1997–98 | 68 (39) | 0 | 70 (40) | 2 (1) | 36 (20) | 0 (--) | 176 |
| 1998–99 | 82 (45) | 0 | 65 (36) | 1 (1) | 31 (17) | 1 (1) | 181 |
| 1999–2000 | 42 (34) | 0 | 49 (40) | 3 (2) | 23 (19) | 6 (5) | 123 |
| 2000–01 | 30 (45) | 0 | 14 (21) | 2 (3) | 16 (24) | 4 (6) | 66 |

# 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.

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