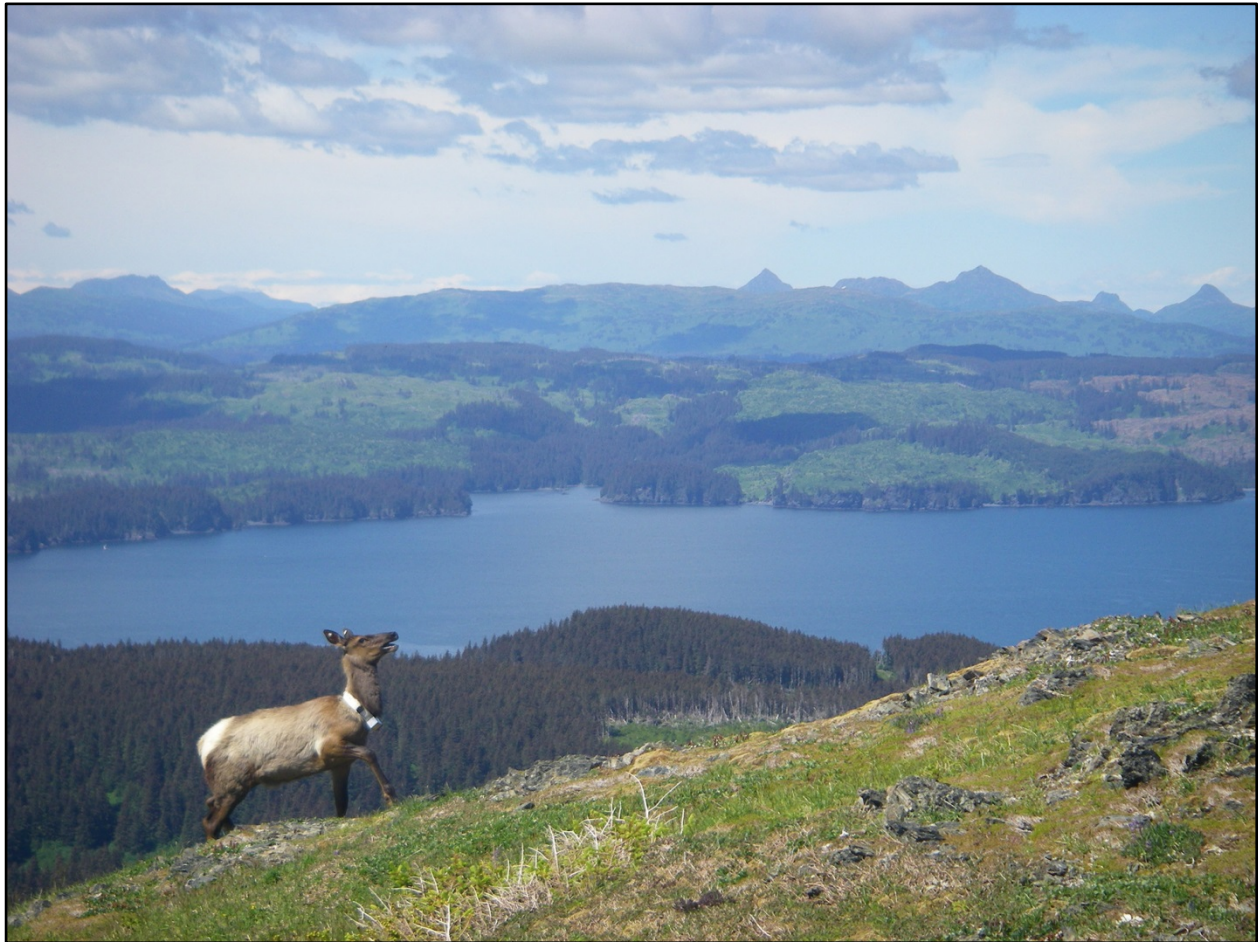


Elk Management Report of Survey-Inventory Activities, 1 July 2011–30 June 2013

Patricia Harper, editor



©2014 ADF&G, photo by Nate Svoboda.



2014

Elk Management Report of Survey-Inventory Activities, 1 July 2011–30 June 2013

©2014 Alaska Department of Fish and Game

Alaska Department of Fish and Game
Division of Wildlife Conservation
P.O. Box 115526
Juneau, Alaska 99811-5526



Many of the activities referenced in this report were funded in part by the Federal Aid in Wildlife Restoration Program, Grants W-33-10 and W-33-11, Project 13.0.

Species management reports provide information about species that are hunted or trapped and management actions, goals, and recommendations for those species. Detailed information is prepared for each species every two or three years, depending on the species, by the area management biologist for game management units in their areas. Reports are not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. The individual unit reports are compiled in this statewide report. Unit reports are reviewed and approved for publication by regional management coordinators.

Any information taken from this report should be cited with credit given to authors and the Alaska Department of Fish and Game. Authors are identified at the end of each unit section.

If this report is referenced in its entirety, please reference as follows:

Harper, P., editor. 2014. Elk management report of survey-inventory activities 1 July 2011–30 June 2013. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2014-1, Juneau.

These reports are available from the Alaska Department of Fish and Game's Division of Wildlife Conservation, P.O. Box 115526, Juneau, Alaska 99811-5526; phone (907) 465-4190; email: dfg.dwc.publications@alaska.gov; website: www.adfg.alaska.gov. The report may also be accessed through most libraries, via interlibrary loan from the Alaska State Library or the Alaska Resources Library and Information Service (www.arlis.org).

Product names used in this publication are included for completeness but do not constitute product endorsement.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

- ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK, 99811-5526
- U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA, 22203
- Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street, NW MS 5230, Washington D.C., 20240

The department's ADA Coordinator can be reached via telephone at the following numbers:

- (VOICE) 907-465-6077
- (Statewide Telecommunication Device for the Deaf) 1-800-478-3648
- (Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

Patti Harper, Publications Specialist, ADF&G Division of Wildlife Conservation, PO Box 115526, Juneau, Alaska.
Email: patricia.harper@alaska.gov. Phone: (907) 465-4176

Cover Photo: A recently radiocollared female elk on the highlands of Afognak Island. ADF&G staff placed radio collars on a small number of the elk in this population to examine their seasonal movements and determine what habitats they use at different times of the year. ©2014 ADF&G, photo by Nate Svoboda.

ELK MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

TABLE OF CONTENTS

Map of Alaska’s Game Management Units ii

Unit 3 Islands of the Petersburg, Kake, and Wrangell area1

Unit 8 Kodiak and adjacent islands17

Alaska Game Management Regions, Units, and Subunits

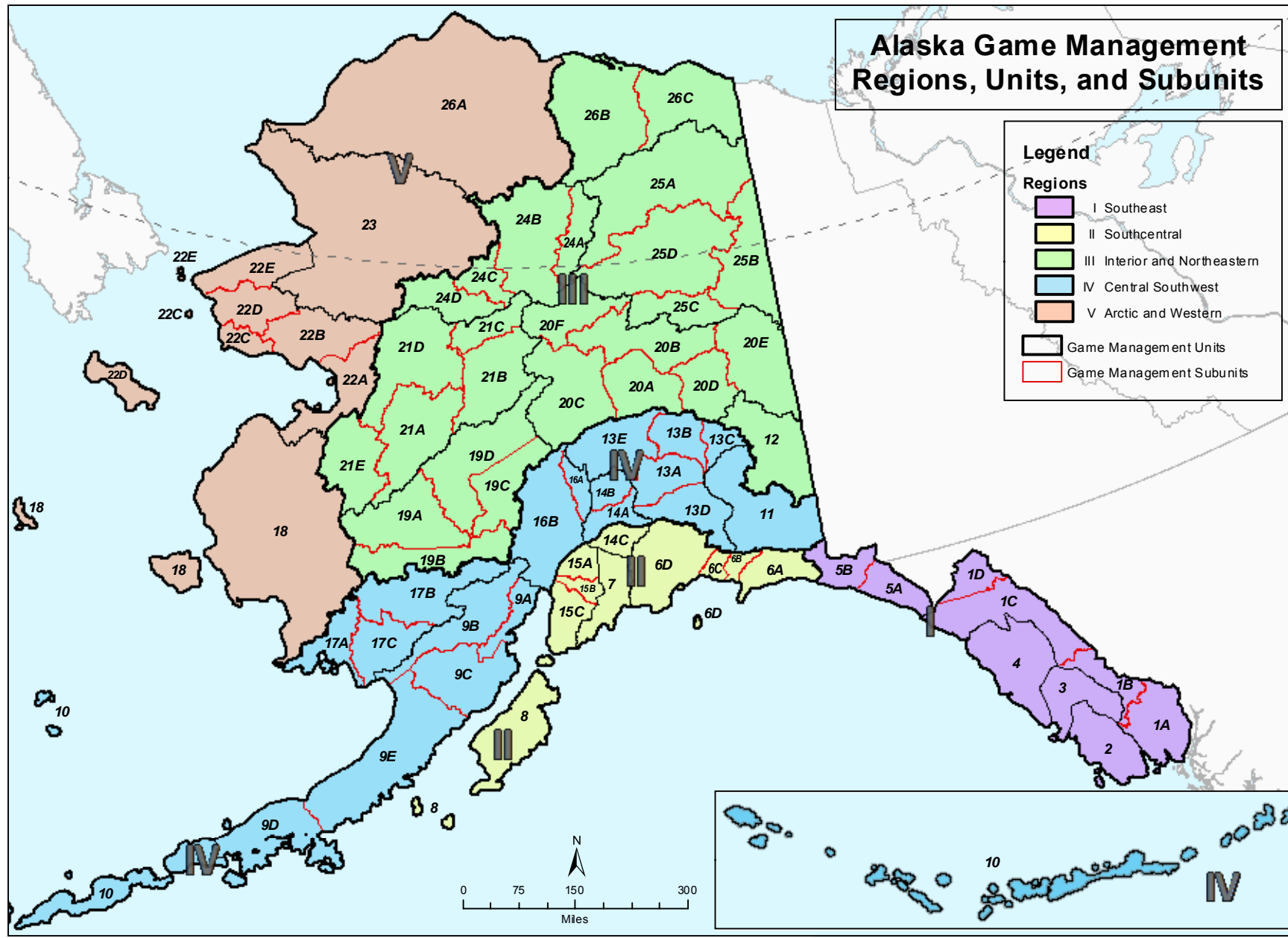
Legend

Regions

- I Southeast
- II Southcentral
- III Interior and Northeastern
- IV Central Southwest
- V Arctic and Western

Game Management Units

Game Management Subunits



SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 115526
JUNEAU, AK 99811-5526

ELK MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 3 (3,000 mi²)

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, Paul 2009). 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 transplanted 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 members of the public have reported observing elk on Mitkof, Wrangell, Prince of Wales, Deer, Bushy, Shrubby, and Kupreanof islands and on portions of the Unit 1A and 1B mainland. We believe elk numbers are low on islands other than Etolin and Zarembo in Unit 3.

The Alaska Department of Fish and Game initially planned, in 1987, to manage the elk population with the goal of allowing a limited elk hunt when the population reached 250 elk and could sustain a harvest of 20 bulls. In 1996, it was determined that the introduced elk had reached the population level for hunting and the BOG established a bull-only elk season in Unit 3.

HUMAN USE HISTORY

Unit 3 elk have been hunted for food and trophies since 1997.

Regulation History

In 1996, the Board of Game established a bull only elk season in Unit 3, when it was determined that the introduced population had reached a level that could sustain a harvest. Thirty draw permits for bull elk were issued in 1997, the first year of the hunt. Over the next few board cycles, changes were made to the elk permit hunt, including an increase in permit numbers from 30 (1996), to 70 (1998), and finally to 120 (2000). The board also established a separate archery-only hunt in 1998.

In 2005, prior to the start of the late-November RE325 elk registration hunt, we issued an emergency order closing the Zarembo Island portion of the hunt area. Six bulls were harvested on Zarembo during the September and October drawing permit hunts and managers believed there were an insufficient number of bulls remaining in the quota to allow for an open registration permit hunt. In the aftermath of the 2005 emergency closure of the elk season on Zarembo Island and prior to the start of the 2006 season we decided not to reopen the elk season on Zarembo Island until the population and bull:cow ratio increased. Zarembo Island has not had an elk hunt since 2005 and remained closed to elk hunting during this report period.

Historical harvest patterns

Fall weather can influence elk movement patterns and hunter effort and success. Although harvest chronology varies somewhat from year to year, the first and third weeks of October seem to contain the majority of the harvest in most years. This makes sense as the September season is archery only, and only in October can hunters begin to use rifles to hunt elk in this area. Following the initial season opening, elk typically retreat to the more inaccessible portions of Etolin and Zarembo Islands. Hunters are aided somewhat later in the season when the elk typically return to low elevation winter range along the coast.

Historical harvest locations

From 1997 to 2012, a total of 2,406 drawing and registration permits were issued, 1,168 hunters harvested 148 elk, including 116 from Etolin Island and 32 from Zarembo Island. Of the 116 elk harvested on Etolin Island, 18 were killed in Wildlife Analysis Area (WAA) 1901 on the north half of the island and 98 were killed in WAA 1910 on the south half of the island.

In 2004 we received the first-ever hunter report of an elk harvested during the general season elk hunt outside the boundaries of the Unit 3 drawing permit area—a cow elk on Shrubby Island in WAA 1906. In 2005 we received hunter reports of an additional 4 cow elk harvested on Shrubby Island. During this report period a hunter reported 1 cow elk harvested on Bushy Island in 2011. We have concerns that at least some of the elk reportedly taken during the general season hunt have been killed illegally within the drawing permit area and falsely reported as having been killed elsewhere. To date, we have not verified any of the locations for elk reportedly harvested outside the boundaries of the Unit 3 drawing permit area during the general season hunt.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES:

The Draft Southeast Alaska Elk Management Plan (ADF&G 1999) established management recommendations for Unit 3 elk. These include:

- Manage Unit 3 elk for hunting opportunity.
- Maintain elk populations on Etolin and Zarembo islands below estimated carrying capacity.
- Limit dispersal of Etolin and Zarembo elk to adjoining islands and the mainland.
- Attempt to maintain a postharvest ratio of 25–30 bulls per 100 cows.

METHODS

We periodically fly aerial surveys of Etolin Island to record visual sightings of individuals and groups of elk. Densely forested terrain and uncertainties about elk sightability prevent us from developing precise population estimates based on aerial elk surveys. We have however been able to obtain herd composition data and minimum population counts by conducting aerial surveys annually in July and/or August when elk tend to congregate in subalpine and alpine areas. We also record observations reported by other agency personnel and the public. We conduct elk and deer pellet counts on winter range periodically to assess relative density. We collect incisors from harvested elk and send them to a lab for aging. We ask successful hunters 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 include sporadic distributions of elk over relatively large areas, thick canopy cover, dense vegetation and poor elk sightability. In 2000 the elk population on Etolin was probably lower than the 350 estimated by a post-parturition model because factors such as predation and dispersal were not considered. In June 2003 we estimated Unit 3 had 350–450 elk with 75–100 on Zarembo and the rest on Etolin (ADF&G 2004). However, new data from radio collaring efforts and aerial surveys conducted since 2008 has resulted in an estimate of no more than 40 animals on Zarembo. The Etolin Island winter carrying capacity is estimated to be from 900 to 1,300 elk (David Person, ADF&G biologist, 2000, ADF&G elk technical committee oral presentation).

To date, the greatest number of elk observed on Zarembo Island occurred on 16 August 2004 when a single herd of at least 36 individuals was observed south of Baht Harbor. Despite annual attempts to locate, capture and radiocollar additional elk on Zarembo from 2009 to 2012, we observed few elk and did not successfully capture or radiocollar any. We are concerned that the Zarembo elk population may have further declined, moved to a different part of the island, or that some elk may have moved off the island. The greatest number of elk observed on Etolin Island occurred on 3 August 2011 when 196 elk were observed in 6 individual herds in the vicinity of Mount Etolin and Mount Shakes. However, we were not able to get sex and age composition on all of these animals. An unknown number of elk are also known to inhabit the western portion of Etolin Island in the vicinity of Johnson Cove, Three Way Passage and Rocky Bay; however, elk numbers are thought to be low in this area. A current subjective estimate of

the unit wide elk population is approximately 250–350 animals, with over 90% of those on Etolin, and the remainder on Zarembo.

Population Composition

An aerial survey of southern Etolin Island on 15 August 2010 yielded a total count of 91 elk in 1 herd comprised of 13 bulls, 59 cows, and 19 calves with a bull:cow ratio of 22:100 and a calf:cow ratio of 32:100. Because it can be difficult to detect small antlers from the air, it is possible that some younger bulls were misclassified as cows resulting in underestimates of bull:cow and cow:calf ratios. On Etolin, elk are usually found in groups of mixed sex and age. During aerial surveys, almost every large group of elk observed on Etolin Island included large and small bulls, cows, and calves.

We do not have data to make meaningful elk population composition estimates for Zarembo Island. Zarembo Island was originally thought to support 2 separate elk herds. However, information gained during aerial surveys and from a single cow elk radiocollared from 2008–2010 suggests that there is 1 main herd on the island which fragments into smaller groups during the winter and spring months.

Distribution and Movements

GPS data from radio-collared elk have provided us with valuable insight into the seasonal movement and habitat use patterns for elk in Unit 3. For both subspecies of elk present in this unit, the area below 150 meters adjacent to the coast is preferred winter and early spring habitat. Wintering areas are typically associated with gradually sloping beaches that tend to have more sedges and grasses above the mean high tide line than do steep rocky beaches. Elk on both Etolin and Zarembo appear to favor these areas as suitable overwintering areas. During the late spring and summer months, where such habitat is available to them, elk tend to move inland to high elevation subalpine and alpine habitat. On southern Etolin, during the summer months, elk tend to congregate in subalpine and alpine habitat on Mount Etolin and Mount Shakes, where elk have been observed above 3,000 feet.

MORTALITY

Harvest

Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g. RY 09 = 1 July 2009–30 June 2010). During the report period the following season and bag limit regulations applied to elk hunting in Unit 3.

On Etolin Island and the smaller associated islands located within the elk drawing and registration permit boundary (Figure 1), the season dates and bag limit are as follows:

Season and bag limit

1 bull by drawing permit only,
by bow and arrow only

or

1 bull by drawing permit only

Resident and Nonresident hunters

1 September–30 September
(General hunt only)

1 October–15 October
(General hunt only)

or

1 bull by drawing permit only

16 October–31 October
(General hunt only)

or

1 bull by registration permit only

15 November–30 November
(General hunt only)

In the remainder of Unit 3, outside the drawing and registration permit hunt boundary, the season extends from 1 August–31 December with 1 elk bag limit.

Board of Game Action and Emergency Orders. In January 2012, the Board of Game closed Zarembo, Bushy, Shrubby and the Kashevarof islands to elk hunting. This action was taken in response to the declining elk population and low bull:cow ratios on Zarembo, and concerns that elk were being illegally harvested on Zarembo during the general season hunt and reported as having been harvested on Bushy and Shrubby islands.

Hunter Harvest. In RY11, 10 elk were harvested in Unit 3, which was slightly above the preceding 10-year (RY01 to RY10) average annual harvest of 9 elk. We issued 26 archery-only and 100 rifle season drawing permits for elk hunting in Unit 3 (Table 2). Thirty-seven of those who obtained drawing permits hunted; they harvested 9 elk. In addition to drawing permits, we issued 48 registration permits for the RE325 elk hunt in November. A single Governors special permit was issued in 2011. A total of 22 permittees hunted but no elk were harvested. In addition to the 9 elk taken during all drawing and permit hunts, (Table 1), we also received 1 report of a cow elk harvested during the general season hunt outside the boundaries of the Unit 3 drawing permit area. The elk harvest data for each Unit 3 elk hunt during the report period are shown in Table 2.

In RY12, 8 elk were harvested in Unit 3. We issued 25 archery-only and 100 rifle season drawing permits. Fifty drawing permittees hunted and 8 elk were taken. In addition to drawing permits, we issued 48 registration permits for the RE325 elk hunt in November. A single Governors special permit was issued in 2012. A total of 23 registration permittees hunted but harvested no elk. We received no reports of elk being harvested outside the drawing permit area during the RY12 general season hunt.

Hunter Residency and Success. Seven nonresidents received an elk drawing permit in RY11; 1 hunted. No nonresidents received elk drawing permits in RY12. In both RY11 and RY12 nonlocal Alaska residents represented the largest group of both successful and unsuccessful hunters. Nonlocal residents took 16 of the 17 elk harvested during the report period (Table 3). A local resident took the one elk harvested during the general season elk hunt. The success rate for permit holders who actually hunted was 15% in RY11 and 11% in RY12. Most nonlocal resident hunters were from communities in Southeast Alaska, relatively close to the hunt area.

Harvest Chronology. In RY11 a total of 9 elk were taken during drawing and registration permit hunts and hunters had the best success (44%) during the first week of October followed by the second and third weeks of October, each with 22% of the annual harvest (Table 4). The remaining 11% of the RY11 elk harvest occurred during the second week of the September

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

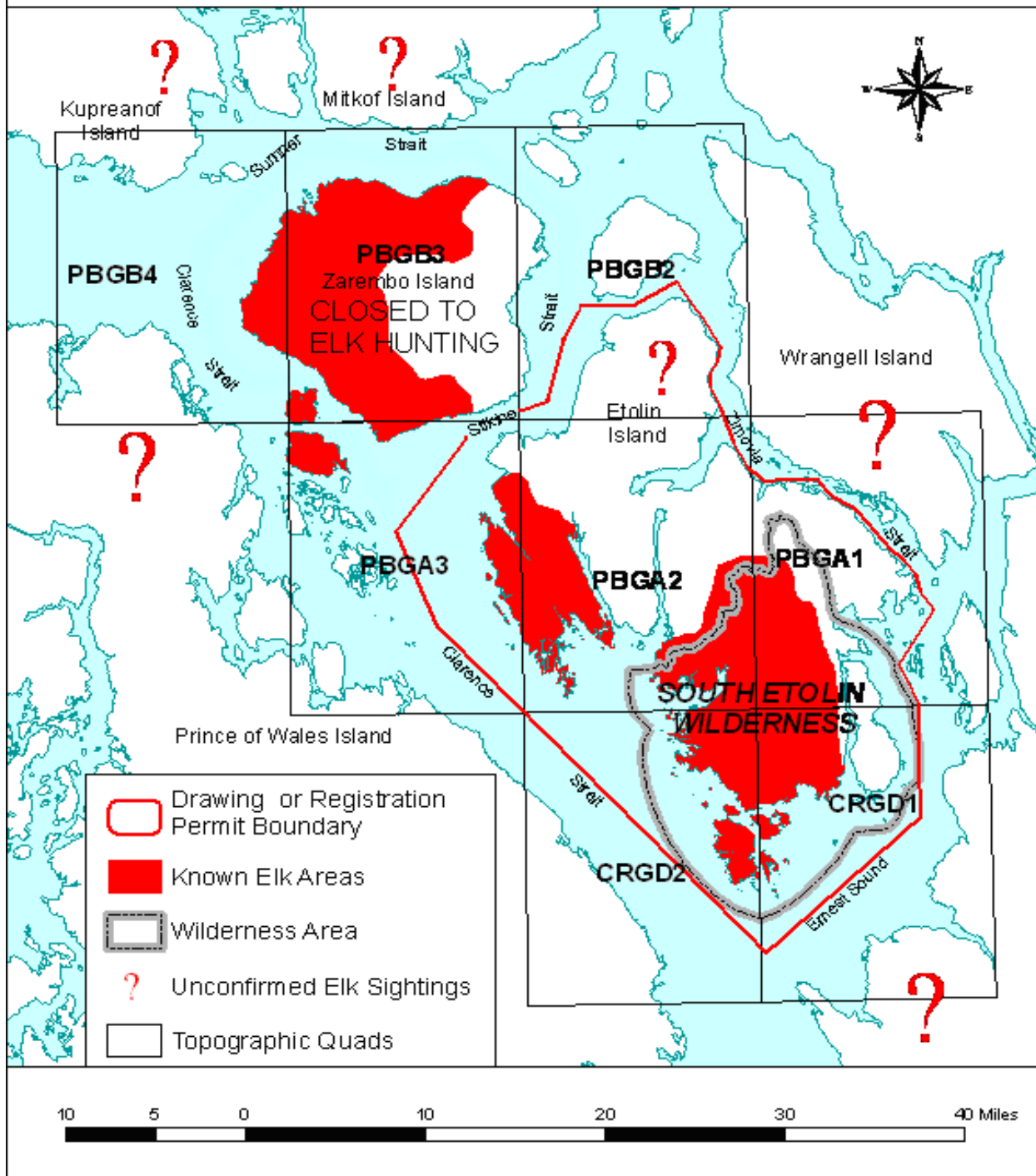


Figure 1. Elk hunting permit boundaries, with overlay of USGS map sections (e.g., PBGB4).

archery-only season. In RY12, a total of 8 elk were taken and hunters had the best success during the first week of October when 63% of the harvest occurred. The remaining 38% of the RY12 harvest occurred during the first week of the September archery-only hunt. During the report period, no elk were taken during the late-November registration permit hunt.

Harvest in Particular Areas (WAAs). In RY11, 10 elk were killed in 3 Unit 3 WAAs. WAA 1910 provided 60% of the harvest, WAA 1901 provided 30%, and WAA 1905 provided 10%. In RY12, all of the 8 elk killed were taken in WAA 1910.

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 RY11, 67% of successful elk hunters reported using aircraft to access their hunt areas, and 33% used boats. In RY12, half of the successful hunters reported using aircraft and half reported using boats to access their hunt areas (Table 5).

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. We know some poaching of the introduced elk occurs, but not how much.

RESEARCH

During the report period, we continued Unit 3 elk research activities initiated in 2008. The primary objectives of this elk radiocollaring effort are to: (1) delineate summer and winter ranges of elk; (2) identify calving and rutting areas; (3) identify habitats important to elk; and (4) facilitate locating herds for minimum population estimates and composition counts.

In 2008 and 2009, we successfully captured a total of 7 cow elk and fitted them with GPS radio collars, including 1 elk on Zarembo Island and 6 elk on Etolin Island. Attempts to collar additional elk on Etolin and Zarembo islands in 2010 were unsuccessful.

During 2011 we successfully captured and radiocollared 4 elk (1 bull; 3 cows) on southern Etolin Island. Because most GMU 3 elk reside within the South Etolin Wilderness where helicopter landings are heavily regulated, from 2008 to early 2011 our capture efforts on southern Etolin were largely restricted to state tidelands (below mean high tide) and a relatively small state in-holding at McHenry Anchorage. In August 2011 the department received a Minimum Requirements Decision Guide (MRDG) from the USDA Forest Service (USFS) authorizing a limited number of helicopter landings to facilitate elk research activities within the South Etolin Wilderness. The ability to land helicopters within the South Etolin Wilderness greatly increased elk capture and collaring success during the report period.

During 2012 we successfully captured 7 adult cow elk on southern Etolin Island and fitted them with remote download GPS and secondary VHF radio collars, thereby increasing our sample size

of radiocollared elk in Unit 3 from 4 to 11. The secondary VHF collars will remain on the elk long-term (5-7 years) and be used to locate elk during aerial survey efforts.

Of the 11 elk fitted with functioning radio collars in 2012, 1 was captured and collared in spring 2011, 3 were captured and collared during summer 2011, and 7 were captured and collared during summer 2012. The 11 elk radiocollared in 2011 and 2012 were all captured within the South Etolin Wilderness in accordance with the terms of the MRDG.

During a 5-day period in late-March 2013, we conducted a “ground-based” attempt to locate, capture and collar elk in the vicinity of Three-Way-Pass on the western lobe of Etolin Island. Although elk are known to occupy this portion of Etolin Island, we currently lack information on the abundance, distribution or seasonal movement patterns of elk in this area. Although no elk were captured, we were able to obtain a subjective assessment of elk use in this area. We now believe that the area may not support as many elk as previously thought, at least not during the early spring months. It remains a primary objective of our Unit 3 elk research efforts to put 1-2 GPS radio collars on elk occupying the western lobe of Etolin Island outside of designated Wilderness.

In 2011, we used ArcGIS software to conduct a preliminary analysis of available GPS location data to calculate home range sizes (100% convex polygon) for the 6 radiocollared elk for which we possessed ≥ 1 full year of GPS location data. Sample size included 5 cow elk collared on Etolin Island and 1 cow elk collared on Zarembo Island. On Etolin Island, where the number of successful GPS locations for 5 individual elk ranged from 2,349 to 5,289, total home range size ranged from 85.5 to 135.7 km² (median = 92.7 km²). The 1 collared elk on Zarembo had a home range size of 285 km², based on 4,434 successful relocations.

Complete analysis of GPS data from collared elk will be conducted when the sample size of collared elk has been increased and additional data has been recovered from elk currently fitted with GPS radio collars. Elk research results will be reported in a federal aid research project report and will be summarized in the next elk management report.

HABITAT

Assessment

Clearcut logging continues on Etolin and over the long term this will reduce the island’s elk carrying capacity. Prior to the Unit 3 elk introduction, the Etolin Island winter carrying capacity was estimated to be 856 elk and consisted of the following habitat: clearcut, 2.0 mi²; second growth, 2.2 mi²; nonforest or noncommercial forest, 72.9 mi²; old-growth forest, 124.4 mi² (ADF&G 1985).

As part of the proposed action for the Navy Timber Sale, the U.S. Forest Service plans to harvest 45.5 million board feet of old-growth forest from up to approximately 3,212 acres of federal land on northern Etolin Island in 1 or more timber sale offerings (U.S.D.A. Forest Service 2009). As part of the proposed action, an additional 6.6 miles of permanent and 6.3 miles of temporary road would be constructed on Etolin. Although little elk use has been documented within the boundaries of the Navy project area, proposed clearcut logging may influence the distribution of elk and provide some benefit to elk over the short term. Elk are able to exploit increases in forage in early-successional plant communities immediately after logging and may temporarily

benefit from clearcutting. However, this food source is lost approximately 20–25 years post-logging with canopy closure, and second-growth forests provide little elk habitat. Precommercial thinning and pruning of second-growth stands can extend the short-term benefits to elk, but the long-term effects of logging will be detrimental. Over the long term, the island's carrying capacity for elk is expected to decline.

Enhancement

No habitat enhancement projects specifically intended to benefit elk have been attempted in the unit.

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. Research is needed to evaluate the extent of interspecific competition between introduced elk and 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 1 other island. If elk become widely distributed throughout Southeast Alaska, deer and elk may compete for resources and deer populations could decline as a result. Also, native moose have been increasing in both numbers and distribution throughout Unit 3 over the past few decades, and moose now occur on both Etolin and Zarembo Islands. This moose range extension may also affect deer and elk populations.

Despite initial radiocollaring and monitoring efforts in the years immediately following the 1987 elk introduction, little is currently known about the ecology and habitat relationships of Unit 3 elk. Research initiated in 2008 will help to identify seasonal movement patterns, provide information on summer and winter ranges, calving and rutting areas, and identify habitats important to Unit 3 elk. Having a sample of radiocollared elk will also facilitate locating herds for minimum population estimates and composition counts. Additional research is needed to develop reliable methods of inventorying Southeast Alaska elk populations so that population size and trend can be evaluated.

CONCLUSIONS AND RECOMMENDATIONS

We continue to receive unverified reports of elk sightings outside the Etolin and Zarembo Island complex, some of which appear credible. As elk disperse and the population increases, it will be important to monitor their numbers and distribution.

During the report period the department continued elk research efforts in Unit 3. Our understanding of the elk movement patterns and habitat use has been greatly enhanced through these efforts. We have also been able to use the collared animals to locate elk groups for minimal

counts as well as herd composition data. Based on aerial counts associated with recent radiocollaring efforts, we revised the estimated elk population on Zarembo Island downward. We recommend additional research to develop reliable methods of inventorying Southeast Alaska elk populations so that population size and trend can be evaluated. This data is essential for optimal management of this species.

LITERATURE CITED

- Alaska Department of Fish and Game. 1985. Biological feasibility of transplanting elk in Southeast Alaska.
- Alaska Department of Fish and Game. 1999. Draft Southeast Alaska Elk Management Plan. Alaska Department of Fish and Game, Division of Wildlife Conservation. Juneau.
- C. Brown, editor. 2004. Elk Management Report of Survey-Inventory Activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 13.0. Juneau.
- Burris, O. E. and D. E. McKnight. 1973. Game transplants in Alaska. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Game Technical Bulletin No. 4. Project W-17-R. Juneau.
- Kirchhoff, M. D. And D. N. Larsen. 1998. Dietary overlap between native Sitka black-tailed deer and introduced elk in Southeast Alaska. *Journal of Wildlife Management* 62(1):236-242.
- Paul, T. W. 2009. Game Transplants in Alaska. Technical Bulletin No. 4, second edition. Alaska Department of Fish and Game, Division of Wildlife Conservation, Juneau.
- U.S.D.A. Forest Service. 2009. Navy Timber Sale: Record of Decision. Tongass National Forest, R10-MB-632a. Wrangell Ranger District, Region 10. Wrangell, Alaska.

PREPARED BY:

Richard E. Lowell
Wildlife Biologist III

SUBMITTED BY:

Ryan Scott
Regional Management Coordinator

Please cite any information taken from this section, and reference as:

Lowell, R. E. 2014. Unit 3 elk management report. Pages 1–16 [*In*] Harper, P., editor. Elk management report of survey and inventory activities 1 July 2011–30 June 2013, Species Management Report ADF&G/DWC/SMR-2014-1. Alaska Department of Fish and Game, Juneau.

Table 1. Unit 3 elk harvest data for permit hunts only, regulatory years 1999 through 2012.

Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Harvest						Total Permit harvest ^b
					Bulls	(%)	Cows	(%)	Unk	Illegal	
1997	29	14	68	32	8	(100)	0	0	0	0	8
1998	31	32	55	45	9	(100)	0	0	0	0	9
1999	71	18	71	29	16	(100)	0	(0)	0	0	16
2000	72	18	86	14	8	(100)	0	(0)	0	0	8
2001	123	43	72	28	19	(100)	0	(0)	0	0	19
2002	123	27	85	15	13	(100)	0	(0)	0	0	13
2003	159	37	92	8	8	(100)	0	(0)	0	0	8
2004	156	40	87	13	12	(100)	0	(0)	0	0	12
2005 ^a	310	55	88	13	17	(100)	0	(0)	0	0	17
2006	272	51	99	1	1	(100)	0	(0)	0	0	1
2007	210	59	93	7	6	(100)	0	(0)	0	0	6
2008	171	58	97	3	2	(100)	0	(0)	0	0	2
2009	149	60	90	10	6	(100)	0	(0)	0	0	6
2010	181	71	88	12	6	(100)	0	(0)	0	0	6
2011	175	66	85	15	9	(100)	0	(0)	0	0	9
2012	174	56	89	11	8	(100)	0	(0)	0	0	8

^a First year of registration permit hunt RE325^b Does not include elk reportedly harvested outside the drawing hunt boundaries during the general season hunt.

Table 2 . Unit 3 elk harvest data by hunt number, regulatory years 2005 through 2012.

Hunt Nr	Regulatory Year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk	Illegal/unreported	Total harvest
DE318 Drawing Archery-only	2005	25	38	11	89	2	(100)	0	(0)	0	0	2
	2006	25	36	6	94	1	(100)	0	(0)	0	0	1
	2007	25	52	8	92	1	(100)	0	(0)	0	0	1
	2008	25	60	10	90	1	(100)	0	(0)	0	0	1
	2009	25	56	18	82	2	(100)	0	(0)	0	0	2
	2010	25	72	14	86	1	(100)	0	(0)	0	0	1
	2011	26	77	17	83	1	(100)	0	(0)	0	0	1
	2012	25	48	23	77	3	(100)	0	(0)	0	0	3
DE321 Drawing	2005	75	57	39	61	12	(100)	0	(0)	0	0	12
	2006	75	41	0	100	0	(0)	0	(0)	0	0	0
	2007	50	62	5	95	1	(100)	0	(0)	0	0	1
	2008	49	52	4	96	1	(100)	0	(0)	0	0	1
	2009	50	68	13	88	2	(100)	0	(0)	0	0	2
	2010	50	82	40	60	4	(100)	0	(0)	0	0	4
	2011	50	68	38	63	6	(100)	0	(0)	0	0	6
	2012	50	66	24	76	4	(100)	0	(0)	0	0	4
DE323 Drawing	2005	75	57	6	94	2	(100)	0	(0)	0	0	2
	2006	75	47	0	100	0	(0)	0	(0)	0	0	0
	2007	50	64	11	89	2	(100)	0	(0)	0	0	2
	2008	50	70	0	100	0	(0)	0	(0)	0	0	0
	2009	50	56	5	95	1	(100)	0	(0)	0	0	1
	2010	50	88	0	100	0	(0)	0	(0)	0	0	0
	2011	50	72	14	86	2	(100)	0	(0)	0	0	2
	2012	50	62	0	100	0	(0)	0	(0)	0	0	0
RE235 Registration	2005	133	53	2	98	1	(100)	0	(0)	0	0	1
	2006	93	63	0	100	0	(0)	0	(0)	0	0	0
	2007	83	57	6	94	2	(100)	0	(0)	0	0	2
	2008	46	51	0	100	0	(0)	0	(0)	0	0	0
	2009	24	54	9	91	1	(100)	0	(0)	0	0	1

Hunt Nr	Regulatory Year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk	Illegal/ unreported	Total harvest
	2010	55	47	4	96	1	(100)	0	(0)	0	0	1
	2011	48	54	0	100	0	(100)	0	(0)	0	0	0
	2012	48	49	0	100	0	(100)	0	(0)	0	0	0
SE318, SE320 and SE323 Governor's permits	2005	2	50	0	100	0	(0)	0	(0)	0	0	0
	2006	1	100	0	0	0	(0)	0	(0)	0	0	0
	2007	0	0	0	0	0	(0)	0	(0)	0	0	0
	2008	0	0	0	0	0	(0)	0	(0)	0	0	0
	2009	0	0	0	0	0	(0)	0	(0)	0	0	0
	2010	1	0	0	100	0	(0)	0	(0)	0	0	0
	2011	1	0	0	100	0	(0)	0	(0)	0	0	0
	2012	1	0	100	0	1	(0)	0	(0)	0	0	1
General Hunt; (outside drawing permit area)	2005	NA	NA	NA	NA	0	(0)	4	(100)	0	0	4
	2006	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
	2007	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
	2008	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
	2009	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
	2010	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
	2011	NA	NA	NA	NA	0	(0)	1	(100)	0	0	1
	2012	NA	NA	NA	NA	0	(0)	0	(0)	0	0	0
Total all hunts	2005	310	55	13	87	17	(81)	4	(19)	0	0	21
	2006	269	51	1	99	1	(100)	0	(0)	0	0	1
	2007	208	59	7	93	6	(100)	0	(0)	0	0	6
	2008	170	59	3	97	2	(100)	0	(0)	0	0	2
	2009	149	60	10	90	6	(100)	0	(0)	0	0	6
	2010	181	71	12	88	6	(100)	0	(0)	0	0	6
	2011	175	66	15	85	9	(90)	1	(10)	0	0	10
	2012	174	58	11	89	8	(100)	0	(0)	0	0	8

Table 3. Unit 3 elk hunter residency and success for permit hunts only, regulatory years 1999 through 2012^a.

Regulatory year	Unsuccessful					Successful					Total hunters
	Local ^b resident	Nonlocal resident	Nonresident	Total	(%)	Local resident	Nonlocal resident	Nonresident	Total	(%)	
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
2005 ^c	45	70	3	118	(87)	8	9	0	17	(13)	135
2006 ^c	65	61	3	129	(99)	0	0	1	1	(1)	130
2007	35	40	3	78	(93)	1	5	0	6	(7)	84
2008	24	40	2	66	(97)	2	0	0	2	(3)	68
2009	13	39	2	54	(90)	0	6	0	6	(10)	60
2010	14	32	0	46	(88)	0	6	0	6	(12)	52
2011	11	38	1	50	(85)	0	9	0	9	(15)	59
2012	16	49	0	65	(89)	0	8	0	8	(11)	73

^a Data are not available for hunters who harvested elk outside the drawing hunt boundaries during the general season hunt.

^b Residents of Petersburg, Wrangell, and Kake.

^c Includes both drawing and registration permit hunts.

Table 4. Unit 3 elk harvest chronology percent by harvest period for permit hunts only, regulatory years 1999 through 2012^a.

Regulatory year	Harvest period										n
	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	11/15– 11/21	11/22– 11/30	
1999	N/A	N/A	0	0	43	12	26	19	NA	NA	16
2000	N/A	N/A	12	0	25	25	25	13	NA	NA	8
2001	0	0	5	0	42	16	37	0	NA	NA	19
2002	0	0	8	0	31	23	15	23	NA	NA	13
2003	0	0	0	0	38	0	12	50	NA	NA	8
2004	8	8	0	0	34	8	8	34	NA	NA	12
2005	12	6	0	0	41	12	12	12	0	6	17
2006	100	0	0	0	0	0	0	0	0	0	1
2007	17	0	0	0	17	0	50	0	0	17	6
2008	0	50	0	0	0	50	0	0	0	0	2
2009	33	0	0	0	17	0	33	0	0	17	0
2010	17	0	0	0	67	0	0	17	0	0	6
2011	0	11	0	0	44	22	22	0	0	0	9
2012	38	0	0	0	63	0	0	0	0	0	8

^a Chronology data are not available for elk harvested outside the drawing hunt boundaries during the general season hunt.

Table 5. Unit 3 elk harvest percent by transport method for permit hunts only, regulatory years 1999 through 2010 ^a.

Regulatory year	Harvest percent by transport method								n
	Airplane	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk	
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
2005	6	94	0	0	0	0	0	0	17
2006	100	0	0	0	0	0	0	0	1
2007	0	100	0	0	0	0	0	0	6
2008	0	100	0	0	0	0	0	0	2
2009	33	67	0	0	0	0	0	0	6
2010	50	50	0	0	0	0	0	0	6
2011	67	33	0	0	0	0	0	0	9
2012	50	50	0	0	0	0	0	0	8

^a Transport method data are not available for elk harvested outside the drawing hunt boundaries during the general season hunt.

SPECIES
MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 115526
JUNEAU, AK 99811-5526

ELK MANAGEMENT REPORT

From: 1 July 2011
To: 30 June 2013

LOCATION

GAME MANAGEMENT UNIT: 8 (5,097 mi²)

GEOGRAPHICAL DESCRIPTION: Kodiak and adjacent islands

BACKGROUND

On 29 June 1925, the Alaska Territorial Governor approved a program to transplant Roosevelt elk (*Cervus elaphus roosevelti*) to the Kodiak–Afognak island group (Paul 2009). In late-August 1928, under a goat-elk exchange program with the State of Washington, 8 elk calves (3 males and 5 females) were captured from Ho Valley on the Olympic Peninsula and shipped from Port Angeles, Washington to Kodiak Island, Alaska. Upon arrival the calves spent their first year at the U.S. Agricultural Experiment Station at Kalsin Bay, on Kodiak Island. Because of grazing concerns from local ranchers, elk were removed from the Kalsin Bay Experiment Station and released near Litnik Bay on Afognak Island in the spring of 1929 (Troyer 1960). In the spring of 1930, 5 calves were reported on the island and in 1933 the Alaska Game Commission reported 30 or more elk, suggesting a flourishing population (Burris and McKnight 1973). An estimate made in September 1934 placed the population at 50 to 60 animals, and a 1937 commission report estimated 100 elk that January (Burris and McKnight 1973). On 3 December 1948, 162 elk were observed during an aerial survey and the total population was estimated to be no less than 212 (Batchelor 1965).

By 1948 the population exceeded 200 elk, thanks in part to protection by local residents, sufficient habitat, and minimal predation (Van Daele and Crye 2012). In the early 1950s the Afognak population was estimated at 300 animals, and in 1951, 2 elk were observed on nearby Raspberry Island. The first hunt occurred on Afognak Island in 1950 with a harvest of 27 bulls (Elkins and Nelson 1954). The season was closed in 1951 but resumed in 1952 and 1953. Following a season closure in 1954, a 15-day bull only elk season was opened for Afognak Island in 1955 and hunting has been allowed annually since. The season length was increased to 20 days in 1957 and 31 days in 1958, and in 1959 the first either-sex hunt was initiated. The population continued to prosper with an estimated 1,100 animals by 1961 (Batchelor 1965).

As the elk population grew, hunting seasons and bag limits were liberalized. In 1963 a 153-day season was established with a bag limit of 2 in the Tonki Cape area. By 1965 the population was estimated at 1,200–1,500 elk in 9 separate herds on Afognak Island and one herd on Raspberry Island. Despite a 153-day season and a 2-elk bag limit, harvest of Afognak elk was modest.

However, excessive harvest of the highly accessible Raspberry Island herd prompted managers to close the hunting season on Raspberry Island in 1968 (Alexander et al. 1968). A series of severe winters with heavy snow accumulation ending in 1972 caused extensive mortality, and reduced calf production and survival (Alexander 1973), reducing the population to about 450 (Burris and McKnight 1973). Hunting permits were reduced island-wide to allow the population to recover.

Management strategies were strongly influenced by population size, hunter access, and herd vulnerability. Drawing 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 because of logging road access and loss of cover (Van Daele and Crye 2012). By the mid-1980s, shorter seasons were imposed in east-central Afognak Island where logging was concentrated. The herd recovered to a high of 1,400 by the late 1980s and remained relatively stable through the 1990s with minor fluctuations correlated with winter severity (Van Daele and Crye 2012).

Beginning with the 1993 season, the road-accessible eastern and central portions of Afognak Island were merged with southwestern Afognak to form a single management area regulated by staggered drawing permit hunts, followed by a registration hunt. North Afognak was included in the registration hunt, while elk on Raspberry Island were subject to staggered drawing hunts. A harsh winter in 1998–1999 severely impacted ungulate populations on the archipelago, and elk herds on western Afognak and Raspberry islands declined (Van Daele 2000). As a result of winter mortality, the population fell below the management objective of 1,000, where it remained in 2012 with an estimated 685 elk in 8 herds.

Starting in regulatory year (RY) 2003 (RY03 = 1 July 2003–30 June 2004), Afognak Island was divided into 3 drawing hunt areas. Hunt areas were designed to address concerns associated with access fees on private lands, decreased bull and calf percentages, and unclear hunt boundaries (Van Daele and Crye 2012). Each hunt area opens for drawing hunts from 25 September–22 October. If harvest objectives are not achieved for individual herds the area is reopened as a registration hunt. Registration hunts occur from 23 October–30 November or until harvest objectives are reached at which time the registration hunt is closed by emergency order. Raspberry Island remains a drawing hunt only area and is comprised of 3 staggered drawing hunts occurring from 1 October–30 November. This hunt management strategy has continued through this reporting period.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

The management objective is to maintain a combined population of 1,000 elk on Afognak and Raspberry islands. Elk are managed for sport and subsistence hunting opportunities by all user groups with emphasis on managing the Raspberry Island population for trophy sized bulls. We strive to manage the Raspberry Island elk herd at a maximum of 150 animals with a minimum bull:cow ratio of 15:100. The Afognak Island elk population is managed by a combination of drawing and registration hunts until the desired harvest quotas are reached. We attempt to

maintain at least 2–3 active radio collars in each elk herd to facilitate composition counts and gather recruitment information.

METHODS

Aerial Surveys

We conducted aerial composition counts of each herd between July and September to estimate elk abundance, distribution, and cow:calf ratios. Surveys were conducted using fixed wing aircraft with 2 observers (biologist and pilot). Surveys were focused in established elk hunt areas on Afognak and Raspberry islands and elk were located using radio telemetry. Surveys were flown at various above ground distances to maximize elk sightability and identification. Adults and calves were counted independently by the pilot and biologist until consensus was reached. Observers recorded a Global Positioning System (GPS) waypoint when the aircraft was directly above the herd or when the herd was perpendicular to the aircraft's flight path. It is important to note detection can be compromised due to vegetation and complete counts cannot always be obtained for each herd.

Capture and Collaring

Every 2–3 years we capture elk and deploy very high frequency (VHF) and GPS radio transmitters to monitor seasonal herd movements and distribution, and facilitate composition counts. Routine radiotracking flights were made throughout this reporting period to conduct herd composition counts.

Harvest and Hunter Effort Data

We collected data on harvest and hunting effort from mandatory hunter reports submitted for all permit hunts. Staff receives additional information from hunter interviews conducted opportunistically.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Aerial composition surveys indicate a relatively stable trend in the Unit 8 elk population during this reporting period (Table 1). The population on Raspberry and Afognak islands was estimated at 711 animals in RY11 and 685 in RY12. These estimates are slightly higher than the previous reporting period (600 and 610 in RY09 and RY10, respectively); and do not notably deviate from the 5-year average ($\bar{x} = 720$). During the previous 5 years (RY06–RY10) population estimates ranged 600–920. Overall, elk herd estimates have been below management objectives for the past 15 years, likely due to multiple factors including reduced habitat availability and high winter mortality. Increased snow accumulation combined with extended periods of cold weather during the harsh winters of 2006–2007 and 2007–2008 likely contributed to a reduction in herd size.

Population Composition

Obtaining calf:cow and bull:cow ratios continues to be challenging. Distinguishing yearling (spike) bulls in velvet from cows and estimating elk numbers in dense cover can be difficult during aerial surveys. Dense vegetation and challenging terrain complicate yearling bull identification and prevent reliable estimates of elk occupying thick cover. In 2007–2008 bad weather prevented elk surveys from occurring and no data was collected using aerial surveys. However, elk were counted opportunistically during unrelated flight operations and data were incorporated into recent estimates (Table 1). Aerial survey results indicate the elk population was composed of 20% calves in RY11 and 17% calves in RY12. The 5-year average prior to this reporting period (RY06 through RY10, excluding RY07) was 16.0%, slightly lower than calf estimates observed this period. The ratio of calves:100 cows was 27 in RY11 and 24 in RY12. The 5-year average prior to this reporting period (RY06 through RY10, excluding RY07 because data weren't available) was 20, indicating increased calf production occurred during this reporting period. Further, it is important to note, due to the difficulty in distinguishing spike bulls from cows, survey results may overestimate cow numbers (misidentify yearling bulls as cows) thereby underestimating the calf:cow ratio. The ratio of calves:100 cows may be slightly higher than observed, indicating increased productivity this period. The bull:100 cow ratio was 9 in RY11 and 12 in RY12, similar to the 5-year average (RY06 through RY10, excluding RY07) of 10.

Distribution and Movement

Elk herd movements and distribution monitored by composition counts, hunter and logger reports, and radiotelemetry relocations indicated there were at least 7 separate herds on Afognak Island and 1 on Raspberry Island. Movements from radiotracking activities suggest female elk restrict their movements during the breeding season and have reduced distribution during the rut (i.e., September, October). Similar to other findings (Franklin et al. 1975, Vore and Schmidt 2001) female elk appear to become isolated from the herd post partum as they nurse and care for young. Additionally, historical data suggests elk shift their distribution seasonally to occupy areas with increased forest cover during the winter months. However, aerial survey flights and observed locations were too infrequent to provide reliable conclusions regarding seasonal habitat use and distribution. To further investigate this observation, a recent GPS radiotelemetry study was implemented that will further provide insight into this observation.

MORTALITY

Harvest

<u>Season and Bag Limits</u>	<u>Hunt #</u>	<u>Resident and Nonresident Open Seasons</u>
Unit 8, Raspberry Island:		
1 bull by drawing permit; up to 100 permits will be issued	DE702, DE704	1 October–22 October
1 antlerless elk; up to 200 permits will be issued	DE706	23 October–30 November

<u>Season and Bag Limits</u>	<u>Hunt #</u>	<u>Resident and Nonresident Open Seasons</u>
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	DE711	25 September–9 October
1 antlerless elk by drawing permit; up to 500 permits will be issued	DE713	8 October–22 October
1 elk by registration permit only	RE755	23 October–30 November
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	DE721, DE723	25 September–22 October
1 elk by registration permit only	RE755	23 October–30 November
Remainder of Unit 8:		
1 elk by drawing permit only; up to 500 permits may be issued	DE715, DE717	25 September–22 October
1 elk by registration permit only	RE755	23 October–30 November

A federal subsistence elk hunt open to all Unit 8 residents occurred 15 September–30 November on Kodiak National Wildlife Refuge lands on northwestern Afognak.

Board of Game Actions and Emergency Orders: The Board of Game took no actions regarding elk hunting in Unit 8 during this reporting period. Prior to each hunting season, we analyzed survey results and estimated herd sizes to derive harvest limits for each herd. Harvest limits were established as 10–15% of the population, with modifications to accommodate population trends and the sex ratio of the harvest. When harvest limits for a herd were achieved we issued emergency orders closing hunting in areas occupied by that herd.

In 2011, we issued 2 emergency orders (EO). The first EO was issued on 23 October closing elk hunting on the southwestern portion of Afognak Island. This EO also restricted all other portions of hunt RE755 on Afognak Island to antlerless (cow) elk harvest only. To protect the Duck Mountain, Seal Bay and Portage herds from overharvest, the second emergency order was issued on 6 November closing hunting east of a line from the west head of Kazakof (Danger) Bay to the head of Big Waterfall Bay.

In 2012, we issued 2 emergency orders. The first EO was issued on 23 October, closing the southeastern portion of RE755 (circumscribed by a line running from the head of the northwest arm of Kazakof Bay to the peak of Shepard's Ridge to the north tip of Gretchen Lake to the western side of the mouth of Saposa Bay). Hunt RE755 was also restricted to the harvest of antlerless (cow) elk only. The second emergency order on 3 November closed all of RE755 except for the area south and west of a line from the head of Back Bay to Hatchery Peak to the head of Malina Bay on Afognak Island.

Hunter Harvest: Annual elk harvest during this reporting period was 41 in both the RY11 and RY12 seasons. Harvest increased slightly compared to the previous reporting period (RY09–RY10, $\bar{x} = 34$) yet remained lower than the 5-year (RY06–RY10) mean harvest of 69.8 (Table 2). Mean hunter success was 23.5% this reporting period with 25% and 22% of hunters successful during the RY11 and RY12 seasons, respectively. Hunter success was up considerably when compared to the previous reporting period mean of 15%, and slightly higher than the previous 5-year mean of 21%. However, the number of hunters afield during the RY11 and RY12 seasons averaged 173 (163 and 183, respectively), 22% lower than the previous reporting period mean ($\bar{x} = 221$) and 44% less than the previous 5-year mean ($\bar{x} = 307.5$). The percentage of bulls in the harvest decreased below the previous 5-year mean (54%); during RY11 (44%) and RY12(46%; Table 2).

Since the inception of the federal subsistence hunt in RY98, only 2 elk have been harvested (one female in RY03 and one female in RY10).

Permit Hunts: Drawing permit hunt administration on Raspberry Island and Afognak Island remained mostly unchanged during this report period. Over half of the permittees receiving permits did not hunt (62% in RY11; 58% in RY12), continuing the pattern observed during the previous 5 years ($\bar{x} = 54.6\%$; Table 2). Registration permit hunts commenced following the drawing hunts for all hunt areas except Raspberry Island, and the number of registration permits decreased from a 5-year average of 277 (RY06 through RY10) to 171 in RY11 and 182 in RY12 (Table 2).

Hunter Residency: Elk hunters in this period ($\bar{x} = 177$, Table 3) were mostly nonlocal and local residents ($\bar{x} = 157$). Nonlocal residents accounted for 51% of all elk hunters in RY11 and 52% in RY12; local residents made up 44% and 47% in RY11 and 2012–13, respectively. Nonresidents made up the difference with 5% in RY11 and 1% in RY12. The number of nonresidents and nonlocal residents declined following the harsh winter of RY07 (Table 3).

Harvest Chronology: During this reporting period, hunters were most successful early in the season with 66% and 81% of the harvests taking place between late-September (21–30 September) and mid-October (1–20 October) on Afognak Island and 100% and 75% of the harvests taking place during the same period on Raspberry Island in RY11 and RY12, respectively (Table 4).

Transportation Methods: Aircraft and boats were the primary methods of transportation for elk hunters in Unit 8 (Table 5). Use of highway vehicles varied with the level of logging activity on Afognak Island and the vehicle use policies of logging companies and landowners. Tracking harvest acquired using a highway vehicle is difficult because hunters often record their mode of transportation as the vehicle they used to arrive on Afognak rather than the transportation used during the actual hunt.

Other Mortality

Documenting mortality from sources other than hunting is seldom possible because of the remote setting of Afognak and Raspberry islands. Predation of adult elk by brown bears undoubtedly occurs, but is probably not common (Zager and Beecham 2006). We received multiple reports of winter-killed elk during the winter of RY11. The winter of RY11 was severe with deep snow persisting throughout winter. The winter of RY12 was comparatively mild reducing the impact on the elk population. Although wounding loss and illegal harvest likely occur, we estimate the impact on the overall population to be minimal.

HABITAT ASSESSMENT

Commercial logging of Sitka spruce (*Picea stichensis*) on Afognak Island continued during this reporting period and may significantly impact elk habitat. Timber harvesting expanded in the Marka Creek drainage, Duck Mountain, Afognak Bay, and east of Paramanof Bay areas. The Alaska Department of Fish and Game (ADF&G) continued to review timber harvest plans that private timber owners were required to submit to the Alaska Department of Natural Resources. A representative of ADF&G Habitat Division made monthly on-site inspections of logging activities throughout the summer months to ensure logging activities adhered to commercial harvest regulations. Current laws do not contain provisions for protecting terrestrial wildlife, so reviews are strictly advisory.

Representatives from the logging companies and the Native corporations are working closely with ADF&G staff to investigate the potential long-term effects of logging on elk habitat. We are seeking cost-effective methods to improve elk habitat and are monitoring seasonal elk movements and distribution relative to current and historical logging operations. We have been working closely with Afognak and Koniag Native Corporations and their respective logging affiliates to identify areas that are suitable for habitat enhancement to benefit wildlife.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Active logging and associated road construction on Afognak Island continued throughout this reporting period. These activities altered elk habitat and provided greater access for hunters. In recent years, cooperation with landowners and logging operators has improved tremendously, and we have been able to work together to minimize adverse impacts on wildlife and seek ways

to improve elk habitat. Afognak Native Corporation maintained a security patrol to ensure compliance with access restrictions on private lands. Security staff routinely shares wildlife and hunter information with ADF&G staff, providing a better understanding of the situation on Afognak.

Fixed-winged aircraft seem to have little direct impact on elk, but helicopters typically prompt flight responses from both individuals and groups (Stankowich 2008). In April of 2002, a memorandum of agreement among ADF&G, U.S. Fish and Wildlife Service, and U.S. Coast Guard regarding flight operations over the Kodiak Archipelago was finalized to minimize elk and other wildlife species disturbances from helicopter flight operations.

CONCLUSIONS AND RECOMMENDATIONS

Throughout the 1980s and 1990s, the elk population in Unit 8 increased to at least 1,400 animals. Winter mortality during 1997–1998 and 1998–1999 curtailed that trend. During the first half of 2000 the population rebounded, but remained below 1,000 elk. Harsh winters in 2006–2007, 2007–2008, and 2008–2009 continued the trend and the estimated population declined to 640 elk in 2008–2009, the lowest level since the late 1970s. The population continues to slowly rebound and has attained the highest estimate ($n = 685$) since the severe winter of 2008–2009. Substantial reductions in permits and harvest targets are necessary to rebuild the population to objective levels.

Changes in the habitat, access, and land management practices on Afognak during the past 30 years have made management of elk and other big game on the island challenging. Timber management practices can destroy or enhance elk habitat, so cooperative work with land managers is crucial. One of the highest priorities for our elk management program is to develop a formal, long-term, cooperative big game research and management program with all land managers on Afognak Island. This program should initially focus on elk and timber management, but eventually expand into research on deer and brown bear populations and their interactions with elk. This research will enhance our understanding of how to effectively manage these populations, and will help Native corporations effectively manage their lands to benefit wildlife and their shareholders.

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

- Manage the Raspberry Island elk herd to encourage growth of the herd to a maximum of 150 elk with a minimum bull:cow ratio of 15:100. In the past 40 years population data have shown three distinct peaks (1965, 1987, and 1997) in which the herd reached a maximum of 220 animals before suffering significant declines. This suggests the island can support no more than 200 elk at a time.
- Manage Afognak Island elk hunting with drawing permits, followed by registration permits if surplus elk are available.
- Work cooperatively 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 of Alaska, the Kodiak National Wildlife Refuge, and landowners.

- Work cooperatively with Native land managers to devise methods of improving elk habitat while recognizing economic goals of the corporations.
- Maintain at least 2–3 active radio collars in each elk herd.
- Use data from GPS radio collars to investigate spatial and temporal shifts in seasonal elk habitat and resource use.

LITERATURE CITED

- Alexander, J. E. 1973. Seasonal movements of elk. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration Final Report.
- Alexander, J., W. Griffin, and H. Wood. 1968. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration Project Report, Project W-15-R-2 and 3, Work Plan Q, Elk Studies, Juneau.
- Batchelor, R. F. 1965. The Roosevelt elk in Alaska—its ecology and management. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration Project Report, Project W-6-R-S, Work Plan D, Juneau.
- Burris, O. E., and D. E. McKnight. 1973. Game transplants in Alaska. Alaska Department of Fish and Game. Technical Bulletin Number 4. Juneau.
- Elkins, W. A. and U. C. Nelson. 1954. Wildlife introductions and transplants in Alaska. Proceedings of the 5th Alaska Science Conference.
- Franklin, W. L., A. S. Mossman, and M. Dole. 1975. Social organization and home range of Roosevelt elk. *Journal of Mammalogy* 56:102–118.
- Paul, T. W. 2009. Game transplants in Alaska. Technical bulletin No. 4, second edition. Alaska Department of Fish and Game. Juneau.
- Stankowich, T. 2008. Ungulate flight responses to human disturbance: a review and meta-analysis. *Biological Conservation* 141:2159–2173.
- Troyer, W. A. 1960. The Roosevelt elk on Afognak Island, Alaska. *Journal of Wildlife Management* 24:15–21.
- Van Daele, L. J. 2000. Unit 8 elk management report. Pages 6–18 [In] M. V. Hicks, editor, Elk survey-inventory management report, 1 July 1997–30 June 1999 Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Program, Project 13.0.
- Van Daele, L. J., and J. R. Crye. 2012. Unit 8 elk management report. Pages 17–32 [In] Harper, P., editor. Elk management report of survey and inventory activities 1 July 2009–30 June 2011, Species Management Report ADF&G/DWC/SMR-2012-2. Alaska Department of Fish and Game, Juneau.

Vore, J. M. and E. M. Schmidt. 2001. Movement of female elk during calving season in northwest Montana. Wildlife Society Bulletin 29:720–725.

Zager, P., and J. Beecham. 2006. The role of American black bears and brown bears as predators of ungulates in North America. Ursus 17:95–108.

PREPARED BY:

Nathan Svoboda
Area Wildlife Biologist

John R. Crye
Wildlife Biologist I

SUBMITTED BY:

Gino Del Frate
Management Coordinator

Svoboda, N. J., and J. R. Crye. 2014. Unit 8 elk management report. Pages 17–35 [*In*] Harper, P., editor. Elk management report of survey and inventory activities 1 July 2011–30 June 2013, Species Management Report ADF&G/DWC/SMR-2014-1. Alaska Department of Fish and Game, Juneau.

Table 1. Unit 8 aerial elk composition counts and estimated population by herd, regulatory years 2004 through 2012.

Herd	Regulatory year	Classified elk				Bulls: 100 cows	Calves: 100 cows	Total elk observed	Estimated population
		Bulls	Cows	Calves	(%)				
Raspberry Island	2004	9	50	15	(20)	18	30	74	100
	2005	14	64	15	(16)	22	23	93	100
	2006	19	62	11	(12)	31	18	92	100
	2007	--	--	--	--	--	--	--	90
	2008	6	41	14	(23)	15	34	61	85
	2009	7	37	13	(23)	19	35	57	75
	2010	10	47	11	(16)	21	23	68	85
	2011	6	59	15	(19)	10	25	80	85
	2012	12	69	19	(19)	17	28	100	100
Seal Bay	2004	--	--	--	--	--	--	--	80
	2005	0	26	8	(24)	--	31	34	100
	2006	--	--	--	--	--	--	--	100
	2007	--	--	--	--	--	--	--	90
	2008	2	51	12	(18)	4	24	65	80
	2009	--	25 ^a	--	--	--	--	25	100
	2010	--	24	11	(31)	--	46	35	100
	2011	0	55	16	(23)	--	29	71	100
	2012	0	20	6	(23)	--	30	26	100
Duck Mountain	2004	0	48	12	(20)	0	25	60	120
	2005	--	--	--	--	--	--	--	120
	2006	1	3	2	(33)	33	67	6	100
	2007	--	--	--	--	--	--	--	90
	2008	3	58	13	(18)	5	22	74	70
	2009	--	25 ^a	--	--	--	--	25	80
	2010	1	15	1	(6)	7	7	17	80
	2011	5	22	11	(29)	23	50	38	100
	2012	--	24 ^a	--	--	--	--	24	90

Table continues next page

Herd	Regulatory year	Classified elk						Total elk observed	Estimated population
		Bulls	Cows	Calves	(%)	Bulls: 100 cows	Calves: 100 cows		
Portage Lake	2004	--	--	--	--	--	--	--	60
	2005	--	7 ^a	--	--	--	--	7	60
	2006	1	10	0	(0)	10	0	11	80
	2007	--	--	--	--	--	--	--	72
	2008	4	58	0	(0)	7	0	62	70
	2009	--	6 ^a	--	--	--	--	6	70
	2010	--	85 ^a	--	--	--	--	85	50
	2011	6	65	14	(16)	9	22	85	85
	2012	--	20 ^a	--	--	--	--	20	85
Marka	2004	25	87	29	(21)	29	33	141	180
	2005	7	81	19	(18)	9	23	107	180
	2006	--	60 ^a	--	--	--	--	60	150
	2007	--	26 ^a	--	--	--	--	26	135
	2008	--	45 ^a	--	--	--	--	45	110
	2009	--	70 ^a	--	--	--	--	70	75
	2010	1	89	25	(22)	1	28	115	125
	2011	12	32	9	(17)	38	28	53	130
	2012	7	104	29	(21)	7	28	140	125
Malina Lake	2004	14	90	11	(10)	16	12	115	170
	2005	26	140	22	(12)	19	16	188	220
	2006	15	121	14	(9)	12	12	150	210
	2007	--	--	--	--	--	--	--	190
	2008	3	74	25	(25)	4	34	102	150
	2009	5	78	15	(15)	6	19	98	125
	2010	4	75	17	(17)	5	23	96	110
	2011	3	95	25	(20)	3	26	123	125
	2012	18	84	22	(18)	21	26	124	130

Table continues next page

Herd	Regulatory year	Classified elk					Bulls: 100 cows	Calves: 100 cows	Total elk observed	Estimated population
		Bulls	Cows	Calves	(%)					
Waterfall	2004	--	93 ^a	--	--	--	--	--	93	150
	2005	--	43	6	(12)	--	--	14	49	150
	2006	6	13	--	--	46	--	--	19	150
	2007	--	63 ^a	--	--	--	--	--	63	135
	2008	3	7	0	(0)	43	0	0	10	50
	2009	--	--	--	--	--	--	--	--	50
	2010	--	30 ^a	--	--	--	--	--	30	35
	2011	3	55	13	(18)	5	24	71	71	71
	2012	2	--	--	--	--	--	2	40	40
Tonki Cape	2004	3	0	0	(0)	--	0	3	30	30
	2005	--	--	--	--	--	--	--	30	30
	2006	--	--	--	--	--	--	--	30	30
	2007	--	--	--	--	--	--	--	27	27
	2008	--	--	--	--	--	--	--	25	25
	2009	--	--	--	--	--	--	--	25	25
	2010	--	--	--	--	--	--	--	25	25
	2011	--	--	--	--	--	--	--	15	15
	2012	--	--	--	--	--	--	--	15	15
Total all herds	2004	51	368	67	(14)	14	18	486	890	890
	2005	47	354	70	(15)	13	20	471	960	960
	2006	42	269	27	(8)	16	10	338	920	920
	2007	--	89 ^a	--	--	--	--	89	830	830
	2008	21	334	64	(15)	6	19	419	640	640
	2009	12	115	28	(18)	10	24	155	600	600
	2010	16	250	65	(20)	6	26	331	610	610
	2011	35	383	103	(20)	9	27	521	711	711
	2012	39	321	76	(17)	12	24	436	685	685

^a Includes all adults, not differentiated by sex.

Table 2. Unit 8 elk harvest data by permit hunt, regulatory years 2006 through 2012.

Hunt Area/Number	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls	(%)	Cows	(%)	Unk.	Illegal/unreported	Total harvest
Raspberry Is. (Drawing Hunts DE 702–706)	2004	80	58	69	31	8	(80)	2	(20)	0	0	10
	2005	80	50	78	22	4	(44)	5	(56)	0	0	9
	2006	80	61	77	23	6	(86)	1	(14)	0	0	7
	2007	80	55	80	20	3	(43)	4	(57)	0	0	7
	2008	100	33	73	27	8	(67)	4	(33)	0	3	15
	2009	50	50	64	36	6	(67)	3	(33)	0	0	9
	2010	36	56	63	37	3	(50)	3	(50)	0	0	6
	2011	36	71	70	30	2	(67)	1	(33)	0	0	3
	2012	36	56	75	25	3	(75)	1	(25)	0	0	4
SW Afognak Is. (Drawing Hunts DE 711 & 713)	2004	115	55	88	12	1	(17)	5	(83)	0	1	7
	2005	115	62	64	36	3	(20)	12	(80)	1	0	16
	2006	115	76	78	22	1	(17)	5	(83)	0	0	6
	2007	115	63	88	12	3	(60)	2	(40)	0	0	5
	2008	115	75	79	21	1	(17)	5	(83)	0	1	7
	2009	85	62	78	22	3	(43)	4	(57)	0	0	7
	2010	85	75	86	14	2	(67)	1	(33)	0	0	3
	2011	85	61	72	28	4	(44)	5	(56)	0	0	9
	2012	85	69	81	19	1	(20)	4	(80)	0	0	5
Remainder of Unit 8 (Drawing Hunts DE 715 & 717)	2004	122	50	64	36	17	(81)	4	(19)	1	0	22
	2005	138	55	55	45	19	(70)	8	(30)	0	1	28
	2006	139	59	66	34	17	(89)	2	(11)	0	0	19
	2007	150	60	75	25	14	(93)	1	(7)	0	0	15
	2008	150	54	78	22	9	(60)	6	(40)	0	0	15
	2009	70	63	83	17	1	(25)	3	(75)	0	0	4
	2010	70	58	79	21	4	(67)	2	(33)	0	0	6
	2011	70	55	61	39	8	(67)	4	(33)	0	0	12
	2012	70	59	52	48	8	(57)	6	(43)	0	0	14

Table continues next page

Hunt Area/Number	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls	(%)	Cows	(%)	Unk.	Illegal/ unreported	Total harvest
East Afognak (Drawing Hunts DE 721 & 723)	2004	150	66	71	29	8	(57)	6	(43)	0	1	15
	2005	150	62	74	26	12	(86)	2	(14)	0	0	14
	2006	150	60	71	29	12	(71)	5	(29)	0	0	17
	2007	148	59	63	37	12	(55)	10	(45)	0	0	22
	2008	151	64	65	35	11	(58)	8	(42)	0	0	19
	2009	70	58	76	24	2	(29)	5	(71)	0	0	7
	2010	70	78	67	33	4	(80)	1	(20)	0	0	5
	2011	70	64	80	20	4	(80)	1	(20)	0	0	5
	2012	70	62	58	42	7	(64)	4	(36)	0	0	11
Remainder of Unit 8 (Registration Hunt RE 755)	2004	378	45	80	20	29	(71)	12	(29)	0	0	41
	2005	320	47	69	31	30	(60)	20	(40)	1	0	51
	2006	384	42	75	25	34	(61)	22	(39)	0	0	56
	2007	289	38	82	18	25	(78)	7	(22)	0	0	32
	2008	229	42	71	29	9	(24)	29	(76)	0	1	39
	2009	254	46	91	9	5	(42)	7	(58)	1	0	13
	2010	229	48	94	6	0	(0)	7	(100)	0	0	7
	2011	171	62	82	18	0	(0)	12	(100)	0	0	12
	2012	182	52	92	8	0	(0)	7	(100)	0	0	7
Federal Subsistence	2004	14	67	100	0	0	0	0	0	0	0	0
	2005	15	50	100	0	0	0	0	0	0	0	0
	2006	12	43	100	0	0	0	0	0	0	0	0
	2007	6	20	100	0	0	0	0	0	0	0	0
	2008	3	33	100	0	0	0	0	0	0	0	0
	2009	0	0	0	0	0	0	0	0	0	0	0
	2010	1	0	0	100	0	0	1	(100)	0	0	1
	2011	0	0	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	0	0	0	0

Table continues next page

Hunt Area/Number	Regulatory Year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Bulls	(%)	Cows	(%)	Unk.	Illegal/ unreported	Total harvest
Total all hunts	2004	859	52	78	22	63	(68)	29	(32)	1	2	95
	2005	818	54	68	32	68	(59)	47	(41)	2	1	118
	2006	880	54	73	27	70	(67)	35	(33)	0	0	105
	2007	788	51	78	22	57	(70)	24	(30)	0	0	81
	2008	748	56	73	27	38	(42)	52	(58)	0	5	95
	2009	529	53	84	16	17	(44)	22	(56)	1	0	40
	2010	491	59	86	14	13	(46)	15	(54)	0	0	28
	2011	432	62	75	25	18	(44)	23	(56)	0	0	41
	2012	443	58	78	22	19	(46)	22	(54)	0	0	41

Table 3. Unit 8 elk hunter residency and success, regulatory years 2004 through 2012.

Regulatory Year	Successful					Unsuccessful					Total hunters ^c
	Local ^a resident	Nonlocal resident	Nonresident	Total ^b	(%)	Local ^a resident	Nonlocal resident	Nonresident	Total	(%)	
2004	52	34	6	92	(23)	154	138	9	301	(77)	393
2005	67	39	9	115	(32)	128	103	10	241	(68)	356
2006	56	41	8	105	(27)	148	130	10	288	(73)	393
2007	49	24	8	81	(22)	152	125	16	293	(78)	374
2008	60	26	4	90	(28)	135	89	14	238	(72)	328
2009	22	15	2	39	(16)	107	91	7	205	(84)	244
2010	23	2	3	28	(14)	82	82	5	169	(86)	197
2011	27	13	1	41	(25)	45	70	7	122	(75)	163
2012	21	20	--	41	(23)	64	74	3	141	(77)	182

^a "Local resident" includes hunters who live in 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), regulatory years 2006 through 2012.

Area	Regulatory Year	Harvest periods (percent)							<i>n</i>
		21–30 Sep	1–10 Oct	11–20 Oct	21–31 Oct	1–10 Nov	11–20 Nov	21–30 Nov	
Raspberry Island	2004	0 (0)	3 (30)	5 (50)	0 (0)	0 (0)	1 (10)	1 (10)	10
	2005	0 (0)	3 (38)	2 (25)	0 (0)	0 (0)	3 (38)	0 (0)	8
	2006	0 (0)	4 (57)	2 (29)	0 (0)	0 (0)	1 (14)	0 (0)	7
	2007	0 (0)	3 (43)	0 (0)	2 (29)	0 (0)	0 (0)	2 (29)	7
	2008	0 (0)	6 (50)	1 (8)	3 (25)	0 (0)	2 (17)	0 (0)	12
	2009	0 (0)	3 (33)	3 (33)	3 (33)	0 (0)	0 (0)	0 (0)	9
	2010	0 (0)	2 (33)	1 (17)	2 (33)	0 (0)	1 (17)	0 (0)	6
	2011	0 (0)	2 (67)	1 (33)	0 (0)	0 (0)	0 (0)	0 (0)	3
	2012	0 (0)	1 (25)	2 (50)	1 (25)	0 (0)	0 (0)	0 (0)	4
Afognak Island	2004	12 (15)	15 (18)	14 (17)	15 (18)	12 (15)	9 (11)	5 (6)	82
	2005	22 (21)	17 (16)	15 (14)	19 (18)	14 (13)	7 (7)	12 (11)	106
	2006	20 (20)	7 (7)	13 (13)	23 (23)	7 (7)	16 (16)	12 (12)	98
	2007	23 (31)	9 (12)	10 (14)	12 (16)	7 (9)	10 (14)	3 (4)	74
	2008	14 (18)	12 (15)	15 (19)	20 (26)	15 (19)	2 (3)	0 (0)	78
	2009	8 (27)	6 (20)	4 (13)	5 (17)	2 (7)	3 (10)	2 (7)	30
	2010	7 (32)	2 (9)	6 (27)	0 (0)	2 (9)	3 (14)	2 (9)	22
	2011	8 (21)	8 (21)	9 (24)	2 (5)	10 (26)	0 (0)	1 (3)	38
	2012	9 (24)	13 (35)	8 (22)	6 (16)	0 (0)	1 (3)	0 (0)	37

Table 5. Unit 8 elk harvest by transport method (percent in parentheses), regulatory years 2006 through 2012.

Regulatory Year	Airplane	Horse	Boat	ORV	Highway vehicle	Unknown	<i>n</i>
2004	30 (33)	2 (2)	36 (39)	1 (1)	21 (23)	2 (2)	92
2005	39 (34)	0 (–)	50 (43)	0 (–)	26 (23)	0 (0)	115
2006	38 (36)	0 (–)	35 (33)	0 (–)	28 (27)	4 (4)	105
2007	32 (40)	0 (–)	28 (34)	0 (–)	20 (25)	1 (0)	81
2008	22 (24)	0 (–)	41 (46)	1 (1)	25 (28)	1 (1)	90
2009	17 (44)	0 (–)	15 (38)	0 (–)	7 (18)	0 (–)	39
2010	4 (14)	0 (–)	14 (50)	0 (–)	10 (36)	0 (–)	28
2011	14 (34)	0 (–)	12 (29)	0 (–)	14 (34)	1 (–)	41
2012	17 (41)	0 (–)	13 (32)	0 (–)	11 (27)	0 (–)	41

