



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
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## Memorandum

To: Gary Wheeler, Refuge Manager

From: McCrea Cobb, Wildlife Biologist

Subject: Results of aerial surveys of feral reindeer in the southern region of Kodiak Island, Alaska.

## SUMMARY

I surveyed for feral reindeer in the southern portion of Kodiak Island on July 5 and 6, 2011. A total of 315 reindeer were counted. The results from this survey represent a minimum count that is likely approaching a census of the population. Calf: cow ratios were low (10 calves: 100 cows), suggesting that low calf recruitment may be responsible for the apparent small and stable population size in recent years. The cause for low calf numbers is unknown, but may be due to brown bear predation or nutritional limitations.

## BACKGROUND

Thirty-two reindeer were introduced to the Lazy Bay region of Kodiak Island in 1921, and granted to the native peoples by the Department of the Interior. A cooperative was formed ("The Alitak Native Reindeer Corporation") in 1931 to manage the reindeer. Residents of Akhiok managed the herd, and the population grew throughout the 1940s and 1950s. The population reached a peak of approximately 3,000 head by 1950. A wildfire in the early 1950s destroyed a large portion of reindeer range, during which an estimated 1,200 reindeer escaped into the wild. Active management of the herds ended in 1961, and federal grazing leases were allowed to expire in 1964. Reindeer were not removed from the formerly leased lands, despite a letter from the US Bureau of Sport Fisheries and Wildlife that declared that any property not removed from the leased area would become US government property (June 10, 1963). The following year, the State of Alaska declared the reindeer to be feral and established an open season, no bag limit hunt on feral reindeer, with no same-day-airborne harvest. Shareholders of the Alitak Native Reindeer Corporation disputed the government's claim, but after negotiations with lawmakers, they agreed to sell the herd to the State for \$10 a head. However, the deal was never sealed for

unclear reasons. Despite this, harvest regulations continued to remain unchanged for the following 40 years.

Historical estimates of reindeer abundances are vague due to a lack of formal surveys. Reindeer were not surveyed until the late 1970s, when 250 reindeer were counted near the Ayakulik and Sturgeon Rivers. Since then, the population appears to have remained relatively stable at approximately 250 – 300 animals in the same region.

In 2002, ADF&G authorized same-day-airborne hunting of reindeer. However, concerns over a perceived decline in herd abundance prompted the Alaska Board of Game to reinstate a ban on same-day-airborne hunts in 2010. The change further restricted harvest potential by instating a 6-month hunting season, and limiting annual take to one reindeer per hunter. The impacts of these recent regulatory changes to reindeer abundances are unknown, however, there is concern that these changes may increase reindeer abundances and lead to associated degradation in fragile tundra habitat. Understanding the relationship between regulatory changes and reindeer abundances requires robust annual estimates of population abundance. To attempt to quantify the effect of harvest management on reindeer abundances, KNWR initiated annual surveys of reindeer abundance.

## STUDY AREA AND METHODS

Reindeer have historically inhabited southern Kodiak from Cape Karluk to the north, Alitak to the south, Red Lake to the east, and the Gulf of Alaska to the west (Figure 1). A diverse range of habitats are found within this region. Flat lowlands are dominated by heath and a mosaic of wetland types. Heath habitats are generally composed of Empetrium heath with fruticose lichens, racomitrium moss (*Racomitrium lanuginosum*), dwarf willows, and ericaceous dwarf shrubs like blueberry (*Vaccinium uliginosum*), cranberry (*Vaccinium vitis-idaea*), Labrador tea (*Ledum palustre*), and bearberry (*Arctostaphylos alpine*). Heath hummocks cover valley floors, extend over large regions, and include dense forbs such as fireweed (*Epilobium angustifolium*), goldenrod (*Solidago lepida*), lupine (*Lupinus nootkatensis*), and Jacob's ladder (*Polemonium acutiflorum*). The Ayakulik River valley and surrounding regions are composed of wetlands that include Bog Myrtle (*Myrica gale*) and sedge mosses, interspersed with small shallow ponds. Patches of wetland along the coastal flats include *Sphagnum* moss, sedges, grasses, cottongrass and rushes, with scattered forbs such as marsh five finger (*Comarum palustre*), sundew (*Drosera rotundifolia*) and cloudberry (*Rubus chamemorus*).

Both pilot and observer surveyed for reindeer by scanning the ground on opposite sides of the aircraft. The pilot attempted to remain at or around 200 m above the ground and at a speed of 200 km/h. Flatlands were surveyed using line transects to maximize our field of view. Using GPS, the pilot strived for linear transects separated by 1.5 km. Small valleys were surveyed, when feasible. Upon encountering reindeer, they were circled, photographed (Nikon D80 with 18 – 135mm lens), and a waypoint was taken using a hand-held GPS unit (Garmin GPSMap 76CSx). Group sizes and calves were enumerated by entering photographs into ArcGIS 9.3 (ESRI 2009), manually marking individual reindeer with points, and tallying the number of points within the associated attribute tables.

## RESULTS

Surveys were conducted on July 5 and 6, 2011 from an Aviat Husky aircraft piloted by Isaac Bedingfield, USFWS (Figure 2). McCrea Cobb was the observer. A total of 315 reindeer were counted in 4 groups (Figure 3). We counted 29 calves (10 calves: 100 cows). Herd sizes ranged from 2 to 297 reindeer. We counted 11 reindeer on July 5 and 313 reindeer on July 6. A herd of 9 reindeer were counted both days and had moved less than 1 km. We surveyed 8 hours and 30 minutes for a total of 883 linear km (548 mi). Survey conditions were excellent on July 5 (clear to partly cloudy skies with calm to light winds), but fair to poor on July 6 (overcast skies and moderate air turbulence due to 10 - 20 knot winds).

Given that this is the first Kodiak reindeer survey using this method, I cannot make any reliable conclusion concerning population trend. However, results from opportunistic surveys conducted since 2008 suggest that reindeer population may be stable to increasing (Figure 4).

## DISCUSSION

The 315 reindeer surveyed likely represents the majority of the total estimated population. ADF&G biologists estimate the reindeer population is between 250 and 350 animals, based on opportunistic aerial counts (Van Daele and Crye 2011). An aerial count by Alaska Wildlife Trooper Alan Jones was conducted soon after this survey (July 18), and 335 reindeer were counted.

The reindeer population size is thought to have stabilized at approximately 250-350 animals since the 1990s. Although there were public concerns over a perceived decline in reindeer abundances between 2003 and 2008 due to overharvest, data does not support this conclusion. Harvest reporting data indicate that legal harvests have been small continually from 1998 to 2010, never exceeding 31 reindeer/year ( $\bar{x} = 16$  reindeer/year). Although the number of illegally harvested and unreported harvests is unknown, ADF&G estimates these to be 15% of the reported harvest (2-4 reindeer/year). Given that harvest levels have been small, and the majority of harvested reindeer have been males ( $\bar{x} = 69\%$ ), it is unlikely that hunting is driving reindeer population dynamics on Kodiak.

My estimate of calf abundance (10 calves: 100 cows) was unexpectedly low, given the lack of wolves and higher historical abundances of reindeer on Kodiak. Compared to other regions in Alaska, Kodiak's calf:cow ratio were lower than caribou herds experiencing low predation rates (Keech 2007) but higher than herds experiencing heavy wolf predation pressure (USFWS 2010). Fall calf: cow ratios in the Delta caribou herd averaged 26 calves: cow between 2001 and 2006 (Keech 2007). The Denali herd averaged 13 calves: cow and the Macomb herd averaged 17 calves: cow from 1990 – 2000 (Valkenburg et al. 2004). Results from future surveys of Kodiak's reindeer will determine whether this year's finding is unique, or if calf recruitment is persistently low.

Since low calf recruitment on Kodiak may explain the unexpectedly stable and small reindeer population sizes, understanding the cause for this observation is worthy of further study. An obvious potential explanation for low calf recruitment is predation. In general, caribou calf

mortality generally occurs during the first 2 weeks after birth and is usually caused by wolf predation (Whitten et al. 1992, Adams et al. 1995), although grizzly bears can also be effective predators of young caribou (Young and McCabe 1997). Brown bears are common within Kodiak reindeer range. The effect of bears on reindeer is unknown, but it is likely that some bears may have learned to exploit this resource.

Low calf recruitment may also be caused by poor nutritional condition, driven by inadequate forage abundance or quality. The nutritional condition of caribou can affect numerous aspects of their life history, including onset of maturity (Adams and Dale 1998a), timing and synchrony of parturition (Adams and Dale 1998b), and calf birth weights (Adams 2005) and growth rates (Adams 2003). All these factors in turn can affect calf survival and recruitment rates. Increased reindeer calf mortality and reduced reproduction has been associated with limited winter forage availability, particularly related to lichen species (Skogland 1985). The winter of 2010-11 was average to mild on Kodiak. The winter of 2010-2011 was average to mild, and therefore did not likely contribute substantially to calf mortality. Total snowfall (2,187 cm) was below the 10-year average (2,434 cm), and the average winter (November – March) temperature (1.47°C) was warmer than average (1.19°C). In general, ADF&G does not receive hunter reports of malnourished reindeer on Kodiak. More data is needed to better understand the relationship between Kodiak reindeer survival and their nutritional limitations.

Survey conditions were better and more reindeer were counted than the previous survey attempt (October 27, 2010). Reindeer were easier to spot: their dark pelage contrasted with the green and brown terrain, and the terrain was completely snow-free. Reindeer were also more aggregated during this survey period. Caribou and reindeer surveys in other Alaska refuges generally occur either in July, when heat intolerance and attempts to avoid insects drive caribou into large groups in open areas, or winter, when complete snow cover allows for easier visibility. When demographic data is needed, surveys are conducted during the pre- and post-calving periods (April/May and June/July). Given that KNWR's primary survey goal is to quantify a minimum count, and secondarily to acquire demographic data, I recommend that future surveys occur in early/mid-summer (June/July). In addition, I recommend that future attempts to survey for reindeer on Kodiak be limited to periods with low wind speeds ( $\leq 15$  knots). Limiting surveys to these conditions will increase sightability by reducing turbulence and allowing for lower elevation flights through narrow valleys.

Even under ideal conditions, locating reindeer groups on Kodiak requires lengthy flight times. The efficiency of future surveys could be greatly improved by marking a small number of representative reindeer with radio telemetry collars, which would facilitate finding groups. A similar approach has been employed by ADF&G to survey elk herds on Afognak Island (Van Daele and Crye 2008). This method has been successfully used to quantify an abundance estimate with confidence intervals of threatened woodland caribou in British Columbia (Seip and Jones 2011). Kodiak National Wildlife Refuge has also successfully employed radio telemetry collars to aid in population surveys of the Nushagak Peninsula caribou herd (Aderman 2009). Given the small population size and herding behavior of Kodiak's reindeer, only a small number of collared animals would be needed to achieve the goal of locating the herds. If this technique is pursued, I recommend working in cooperation with ADF&G staff, who have expressed interest

in working with KNWR staff on a joint research program to investigate the ecology and population dynamics of Kodiak's reindeer.

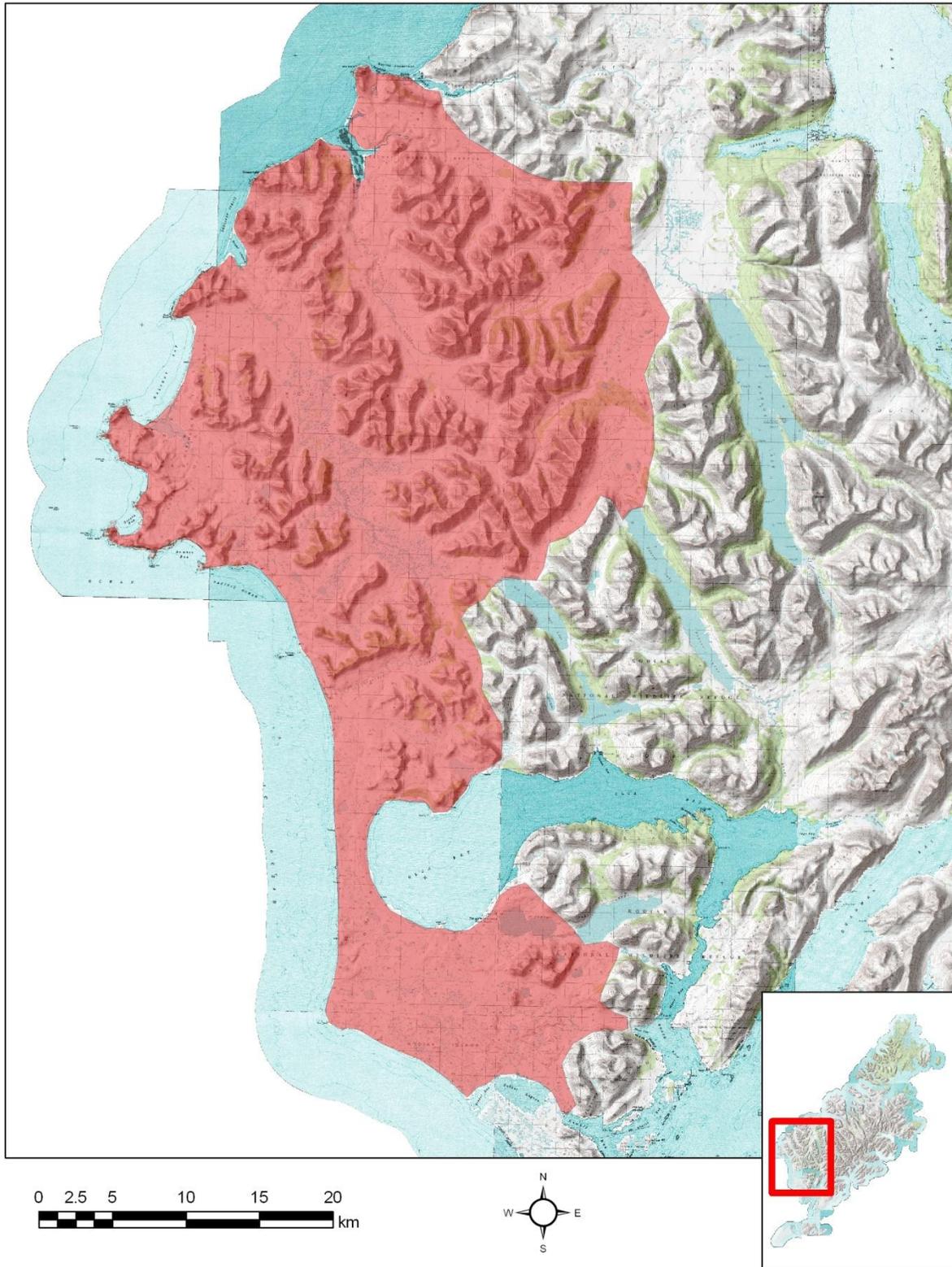


Figure 1. Estimated historical range of reindeer on Kodiak Island, Alaska, based on annual survey data and historical accounts.



Figure 2. Observer flight track for the reindeer survey on Kodiak Island, July 5 and 6, 2011.

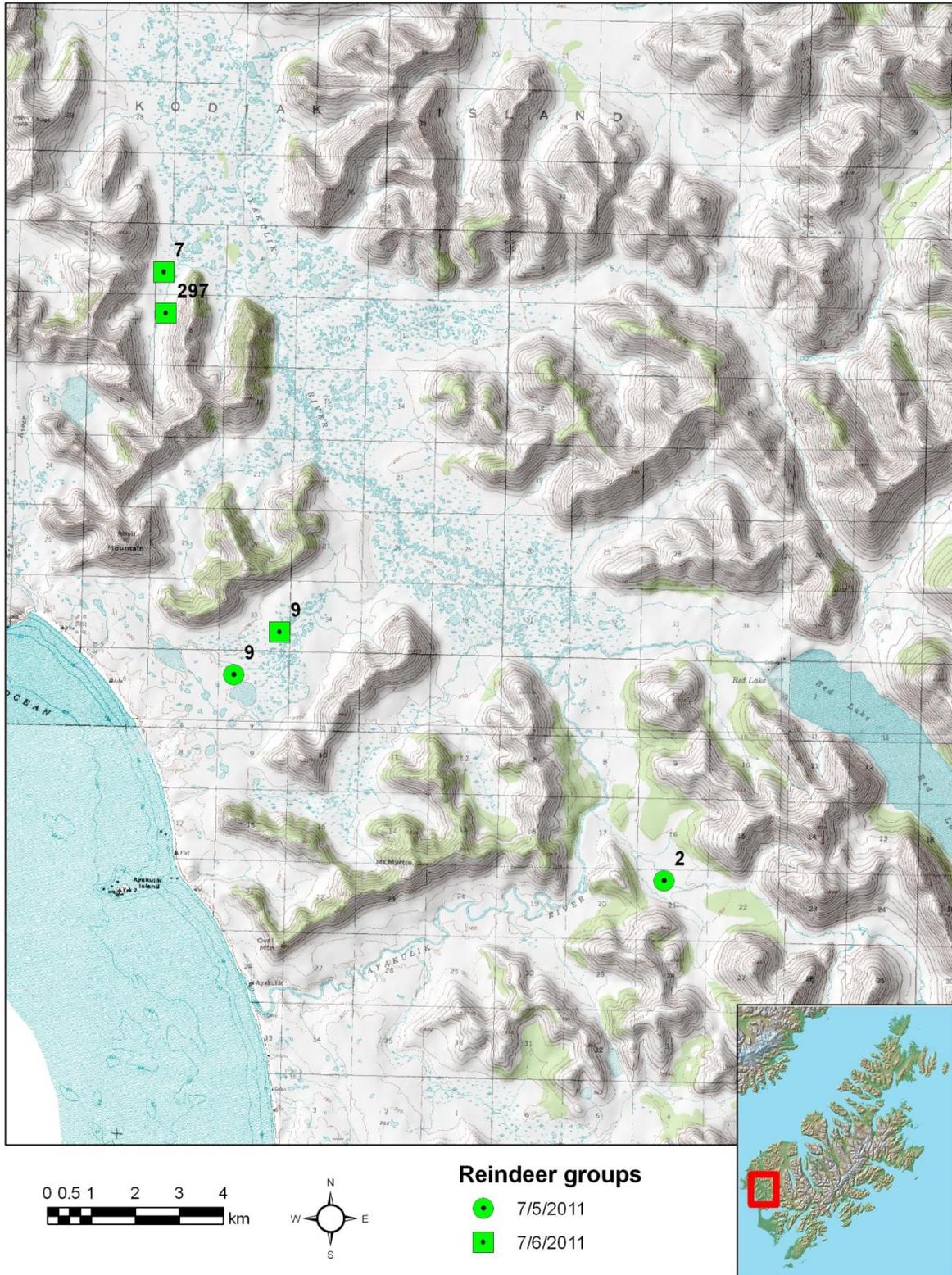


Figure 3. Locations of reindeer groups surveyed during the reindeer survey, July 5 and 6, 2011. The nine reindeer observed both days near Booth Lake are the same individuals. A total of 315 reindeer were counted.

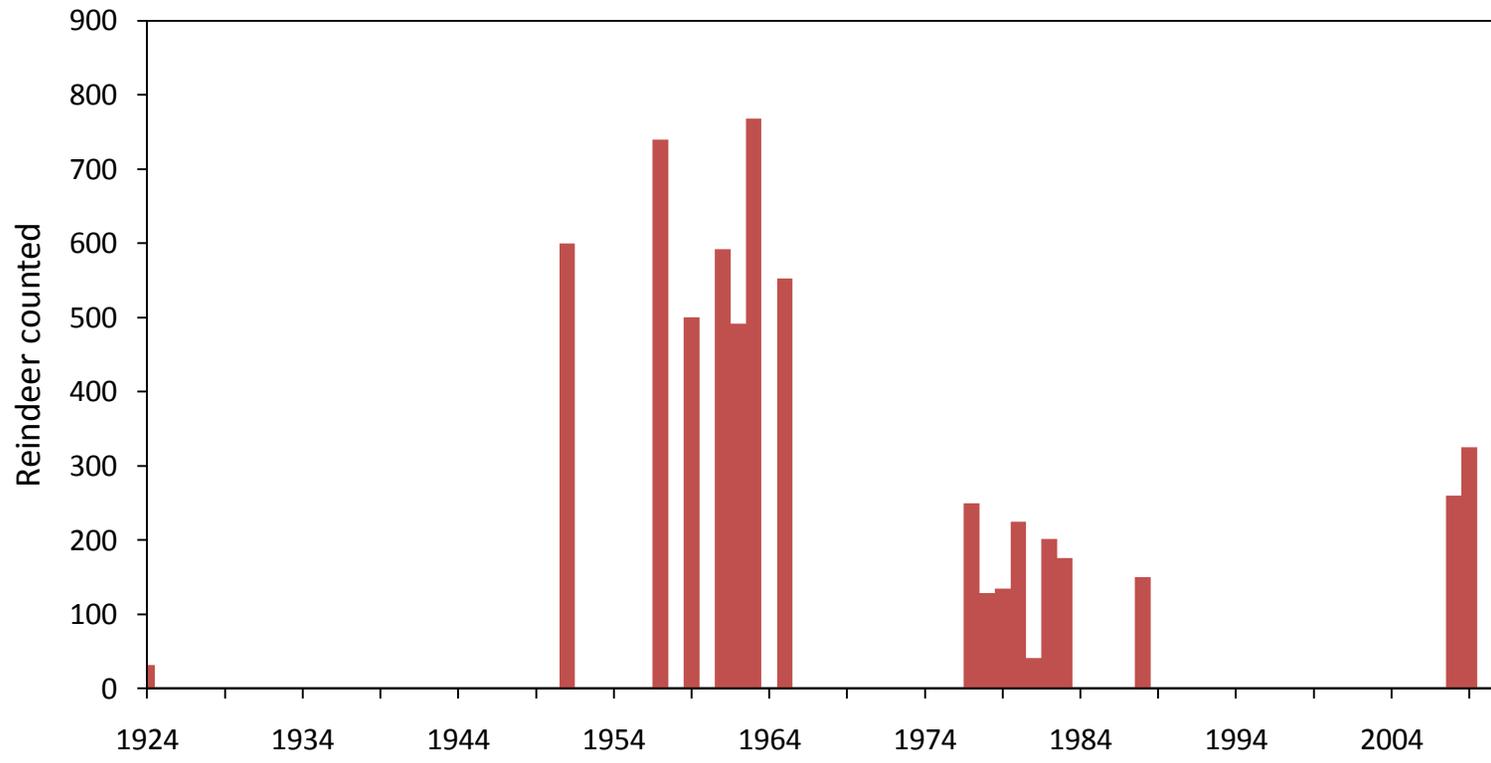


Figure 4. Aerial counts of reindeer on Kodiak Island, Alaska, 1924-2011. Counts are generally incomplete and often opportunistic, and therefore do not likely represent population estimates. Recent counts (2008-2011) are likely more representative of the reindeer population size.

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