Northern Yellowstone Cooperative Wildlife Working Group

2005 Annual Report (October 2004-September 2005)

Member Agencies

Montana Fish, Wildlife & Parks

National Park Service, Yellowstone National Park

U.S. Forest Service, Gallatin National Forest

U.S. Geological Survey, Biological Resources Division

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November 9, 2005

This report was prepared to document achievements, record new goals, and provide a current source of biological information on the status of northern Yellowstone wildlife and wildlife-related studies to agency decision makers and the public. It has not been formally peer reviewed or disseminated by the agencies. It does not represent and should not be construed to represent any agency determination or policy.

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Introduction

On February 12, 1974, representatives from the Gallatin National Forest, Montana Fish and Game Commission, and Yellowstone National Park formed the Northern Yellowstone Elk Working Group to focus on the management of the northern Yellowstone elk population. Over time, the focus of this committee evolved by necessity and consensus from a single species interest group into a multiple species and wildlife habitat oriented working group. Thus, a revised Memorandum of Understanding with expanded goals and objectives, individual agency commitments, organizational procedures, and a name change to the Northern Yellowstone Cooperative Wildlife Working Group was completed in 1994. The National Biological Survey was added to the group as a technical support member. Subsequently, the National Biological Survey was transferred to the U.S. Geological Survey and renamed the Biological Resources Division. The Memorandum of Understanding was revised again in October 2004 to reflect changes since 1994 and increase the group's effectiveness.

The purpose of the Working Group is to cooperatively preserve and protect the long-term integrity of the northern Yellowstone winter range by increasing scientific knowledge of its species and habitats, promoting prudent resource management activities, and encouraging an interagency approach to data collection, answering questions, and solving problems. The Working Group is composed of one designated manager and one wildlife biologist from each member agency. The Gallatin National Forest, Montana Department of Fish, Wildlife, and Parks, and Yellowstone National Park are units of natural resource management agencies with responsibility for management of wildlife and their habitats on the northern Yellowstone winter range. The Northern Rocky Mountain Science Center is a research institution of the U.S. Geological Survey with responsibility for scientific investigation of natural resources and technical support for natural resources management, primarily for the Department of the Interior. Group funds are spent primarily on annual wildlife surveys.

The designated members of the Working Group during this report period were as follows:

Agency	Manager	Wildlife Biologist
National Park Service, Yellowstone National Park	Glenn Plumb	P. J. White
Montana Department of Fish, Wildlife and Parks	Kurt Alt	Tom Lemke
U.S. Forest Service, Gallatin National Forest	Ken Britton	Dan Tyers
U.S. Geological Survey	Peter Gogan	Kim Keating

The Working Group meets twice a year, typically in May and October. Additional meetings or subgroup meetings may be held, as necessary, to discuss issues and projects. All decisions are based on consensus and made following open discussion and debate. The Chair of the Working Group is rotated annually between member agencies. The Chair is responsible for producing an annual report that summarizes the group's activities on a federal fiscal year basis (i.e., October 1 through September 30). Additional information on the Working Group is available in the 2004 Memorandum of Understanding, which can be obtained from group members.

This report summarizes the cooperative activities conducted by the Working Group during October 1, 2004, through September 30, 2005. The report is organized by species and special project sections and includes a cost summary of cooperatively funded wildlife surveys.

Elk Surveys

The status and distribution of northern Yellowstone elk is monitored using aircraft to conduct annual winter counts, surveys of elk migrating north of Yellowstone National Park, late-winter classification surveys, and spring carcass counts. The Working Group also monitors the results of the general and late season elk hunts managed by Montana Fish, Wildlife, and Parks.

Cooperative Winter Elk Counts

Since 1986, the Working Group has conducted annual trend counts of northern Yellowstone elk during December/January using four Super Cub airplanes; each covering a segment of the winter range (both inside and outside the park). Ideally, the range is surveyed during one day prior to the start of the Gardiner Late Elk Hunt in the first week of January. Due to sightability (i.e., detection) bias, these aerial counts provide a variable underestimate of the elk population size. No counts were conducted during the winters of 1996 and 1997 and counts in 1989 and 1991 were deemed "poor" owing to unfavorable survey conditions.

On January 5, 2005, 9,545 elk were counted during good survey conditions. Approximately two-thirds of these elk were located within Yellowstone National Park, while one-third was located north of the park boundary. This year's count was higher than the 8,335 and 9,215 elk counted during winters of 2003 and 2004, respectively (Figure 1). This increase in counted elk likely reflects increased sightability of elk during the 2005 survey rather than a significant increase in elk numbers. Survey conditions were good owing to a significant snowstorm on December 31, 2004, that covered the landscape and caused elk to concentrate in relatively open areas at lower elevations where detection was likely higher in comparison to the last several mild winters. The long-term trend in counts of northern Yellowstone elk suggests their abundance has decreased approximately 50% during the past decade. Predation by wolves and other large carnivores, as well as moderate human harvests of antler-less elk during the Gardiner Late Elk Hunt, have been the primary factors contributing to this decreasing trend. Other factors include a substantial winter-kill owing to severe snow pack during 1997 and, possibly, drought-related effects on pregnancy and survival.

Elk Migration Surveys

Elk wintering north of Yellowstone Park are counted two to three times each year (early, mid- and late winter) between December and March. These counts are used to evaluate trends in abundance and distribution of elk wintering north of Yellowstone Park and help establish permit numbers for the Gardiner Late Elk Hunt. Surveys are flown before, during, or after the Gardiner Late Elk Hunt, but not on hunt days. The number of elk removed by late season hunters (legal and known illegal) before the survey date is added to the number of elk observed during the survey. One survey occurs after the late hunt, but before the major migration back into the park. This flight

attempts to count elk that may have migrated out of the park after the Gardiner Late Elk Hunt. The largest number of elk calculated for a single survey is considered that year's minimum estimate of elk wintering north of the park.

A minimum estimate of 3,243 elk wintered north of Yellowstone National Park during 2005 based on early- and late-winter airplane surveys (January 5 and March 7, 2005). This estimate equates to 34% of the early winter trend count (i.e., 9,545) for northern Yellowstone elk. The number of elk wintering north of Yellowstone National Park was within the State's management objective of 3,000-5,000 elk, which was established to help protect the long-term quality of winter range habitat north of the park. The number of elk wintering outside Yellowstone National Park in the last 6 years is considerably lower than the previous 5 years (Figure 2). Relatively large numbers of elk wintered north of the park (5,296-8,626 elk; mean = 6,923 elk) during 1995-1999. During 2000-2005, the number of elk wintering north of the park decreased to an annual average of 3,861 elk. An estimated 2,095 elk wintered north of Dome Mountain during 2005, which was within the State's management objective of 2,000-3,000 elk. In 5 of the last 6 winters, elk numbers north of Dome Mountain were less than 3,000 elk (i.e., 2.092-2,758) compared to 3,502-4,547 elk (mean = 3,807) in this area during 1996-1999 (Figure 3). Similar to recent years, the majority (80%) of elk were located north of Dome Mountain by late winter 2005.

These results indicate that a significant portion of the northern Yellowstone elk population still depends on winter range habitat north of Yellowstone National Park, despite a 50% decrease in total counts since 1995. The area north of Dome Mountain continues to be a critical "destination" winter range for up to a third of the entire northern Yellowstone elk population. From a habitat management perspective, lower elk numbers help protect the long-term quality of winter range habitat in this area. Also, elk use of private property north of Dome Mountain during late winter and early spring when low elevation grasslands green up could conflict with local ranching operations and create social and wildlife management problems.

Late Winter Elk Classification Surveys

Since 1986, the Working Group has conducted annual classification surveys of northern Yellowstone elk during February or March. A helicopter is used to survey randomly selected sampling units from the lower, middle, and upper elevation sectors of the range. The objectives of these surveys are to: 1) classify a representative sample of the population; 2) estimate the overall sex and age (adult, juvenile) structure of the population; and 3) obtain an index of winter calf survival and recruitment (i.e., calf:cow ratio). The survey was conducted from the ground during winter 1991. No classification estimates were obtained during winters 1993, 1994, and 1997.

On March 9, 2005, a total of 3,508 elk were classified as bulls, cows, or calves. Survey conditions were poor because patchy snow conditions made elk difficult to detect and several relatively large groups (>100 animals) were located in timbered areas where they could not be reliably classified. Thus, the classification results essentially reflect the composition of groups that were using open areas. Estimated sex and age ratios for classified elk were 13 calves and 20 bulls per 100 cows. Calf ratios averaged 11 calves per 100 cows inside the park (i.e., Gardiner to Lamar Valley) and 17 calves per 100 cows outside the park (i.e., Gardiner to Dome Mountain). The mean ratio of 13 calves per 100 cows is similar to the late-winter ratios during 2002-2004 (i.e., 12-14 calves per 100 cows, respectively), but less than the range of 22 to 34 calves per 100 cows observed during the previous 6 years (Figure

4). This is the fourth consecutive year of low recruitment estimates for northern Yellowstone elk, suggesting that relatively few immature female elk have entered the population in recent years. The estimated ratio of 20 bulls per 100 cows is lower than the average ratio (i.e., 46 bulls per 100 cows; range = 22-65 bulls per 100 cows) since 1995, but similar to the ratios of 21-22 bulls per 100 cows during 2003 and 2004 (Figure 5). The estimated ratios of bulls per 100 cows have varied substantially and inconsistently among successive years since 1995 (e.g., 17 and 54 adult bulls per 100 cows in 2000 and 2001, respectively), which likely reflects sampling bias and/or variations in elk distribution among units because it is unlikely that the proportion of adult bulls in the population has changed this quickly or erratically.

Gardiner Late Elk Hunt Statistics

The Gardiner Late Elk Hunt is a special, limited-access, management tool designed to harvest northern Yellowstone elk that migrate into Montana. Since 1976, this hunt has had two primary objectives: 1) help regulate the number of elk that winter north of Yellowstone National Park at levels that will maintain winter range habitat on a sustainable long-term basis without reducing forage productivity or plant species diversity; and 2) harvest elk in ways that will minimize the effect of hunting on migratory behavior, allowing traditional elk winter use to be distributed over the winter range in proportion to forage availability. To accomplish these objectives, the hunt was highly biased towards harvesting females so that elk numbers would not exceed the carrying capacity of the winter range and cause long-term changes in plant communities or declines in forage production. Also, Montana Fish, Wildlife, and Parks adopted a series of special regulations that control the timing of the harvest, total and daily numbers of hunters, distribution of hunters, and composition of the harvest, while providing non-hunting periods throughout the season.

Montana Fish, Wildlife, and Parks incrementally decreased the number of antler-less elk permits from 2,882 in 2000 to 1,400 permits in 2004 owing to decreases in elk abundance and migration north of Yellowstone National Park. This trend was continued during 2005, with the Department implementing a restrictive season type with 1,193 permits. Four hundred and fifty-seven elk (63 bulls, 352 cows, and 42 calves) were legally harvested during January 7-February 14 (Figure 6). Another 12 elk (1 bull, 9 cows, 2 calves) were illegally harvested. Overall success for 826 hunters was 55%, with success rates for the twelve 2-day hunt periods ranging from 25-86% (Figure 7).

As part of the Statewide Elk Management Plan, Montana Fish, Wildlife, and Parks expanded Elk Management Units 313 and 316 and placed more emphasis on recruitment estimates in choosing the recommended season type (e.g., restrictive, standard, liberal) for these units. Given the recent 50% decrease in counts of northern Yellowstone elk and recruitment estimates <20 calves per 100 adult females for 4 consecutive years, Montana Fish, Wildlife, and Parks proposed season tentatives of 100 antler-less and 48 antlered permits for the 2006 Gardiner Late Elk Hunt, which were approved by the Commission in July. The late hunt will be shortened to a 4-week season (January 6-30) in 2006 and each permittee will be allowed to hunt for 4 days.

Spring Elk and Mule Deer Carcass Counts

Fresh elk and deer carcasses in the Gardiner basin have been counted annually since 1989. The counts are made from a helicopter during spring mule deer surveys in late April or early May. The survey area includes open sagebrush/grassland winter range from Yankee Jim Canyon to Mammoth. The Gardiner basin has relatively mild winter conditions compared to ranges further inside Yellowstone National Park owing to its lower elevation and windswept slopes. The aerial count does not distinguish the age or sex of dead elk and deer. No count was conducted in 1993 and only a partial count was conducted in 2004.

Aerial surveys during April 25-28, 2005, detected 3 elk and 3 mule deer carcasses in the Gardiner basin area. An average of 5 elk (range = 3-9) and <1 deer (range = 0-2) carcasses have been observed per year during 1998-2005. Since 1989, the number of elk and deer carcasses counted from the air has fluctuated from 4 to 599 carcasses (Figure 8). The largest numbers of carcasses were observed following the severe winters of 1989 (206 elk and 38 deer carcasses) and 1997 (534 elk and 65 deer carcasses). Also, 93 carcasses were counted during 1995. Only 4 to 69 elk and deer carcasses (mean = 17) were counted following other winters. These results suggest that winterkill was occasionally an important limiting factor during severe snow pack winters prior to the biological recovery of wolves on the northern range. However, winterkill does not appear to be a major mortality factor in most years and has had a negligible effect on the population dynamics of northern Yellowstone elk and mule deer since 1997 (mean = 6 carcasses).

Mule Deer Surveys

The status and distribution of mule deer on the northern range is monitored using helicopters to conduct a classification survey during winter and total count, carcass count, and recruitment estimate during spring. These data are used by Montana Fish, Wildlife, and Parks to determine population trends and set harvest levels.

Winter Mule Deer Classification Survey

The Working Group has conducted aerial mule deer classification surveys in the Gardiner basin since 1990. The helicopter survey is flown in late December or early January, after the autumn hunting season and before antler shed. Portions of all major drainages in the Gardiner basin are sampled with a goal of observing at least 500 to 600 mule deer. The winter classification survey is not designed to obtain complete coverage of the Gardiner basin. These surveys were not flown during 2005 because the pilot for Montana Fish, Wildlife, and Parks was not available (Figure 9).

Spring Mule Deer Count and Recruitment Survey

The Working Group has conducted a spring helicopter survey of mule deer on the Gardiner basin winter range (Yankee Jim Canyon to Mammoth) since 1986, with the exception of 1993 when no survey was flown. The intent of the survey is to obtain a total count of mule deer and to classify a large sample of deer to estimate recruitment. Aerial surveys during April 25-28, 2005, detected 2,336 mule deer on their core winter range between Yankee Jim Canyon and Mammoth, which is the highest count since 1996 (Figure 10). A ratio of 52 fawns per 100 adults was

observed, which compares to an average spring recruitment estimate of 41 fawns per 100 adults (range = 14-57) during 1987-2005 (Figure 11). The growth rate of the population appears to be increasing in response to recent high recruitment, compared an average count of 2,032 (range = 1,616–2,544) mule deer during 1986-2005. The relative distribution of deer on winter range segments has remained similar since 1986, with the 53-76% of deer east of the Yellowstone River, 29-44% west of the Yellowstone River, and 1-9% inside Yellowstone National Park.

Pronghorn Surveys

The status and distribution of pronghorn is monitored using Super Cub airplanes to conduct a count in spring and classification in late summer. The spring counts have been conducted annually since 1988, with the exception of 1993 and 1994. Late summer classification surveys were initiated in 1998.

Spring Pronghorn Count

The 2005 count was conducted during good survey conditions on April 6, 2005. An airplane was used to survey between Reese Creek in the Gardiner basin and Soda Butte in the Lamar Valley. Two hundred and twenty pronghorn were observed, 11% of which were already in the migratory portion of their summer range (i.e., Mount Everts to the Lamar Valley). We detected 10 of 11 groups with radio-collared (i.e., marked) animals and derived a Petersen population estimate of 233 animals (95% CI = 133-301). Annual counts of Yellowstone pronghorn have remained relatively stable between 200-235 animals since 1995 (Figure 12).

In addition, a small number of pronghorn winter north of Yellowstone National Park in the Carbella/Point of Rocks area of the Paradise Valley. On March 21, 2005, Tom Lemke of Montana Fish, Wildlife, and Parks counted 42 pronghorn at low elevations near Rock Creek (Sec. 17, T7S, R7E). This is the largest number of pronghorn counted in this area in recent years. The landowner recently installed a pivot irrigation system between the road and river that likely increased forage productivity and availability.

Summer Pronghorn Classification Survey

An aerial composition survey of Yellowstone pronghorn was conducted on July 22, 2005. The objectives of this survey were to: 1) classify a representative sample of the population; 2) estimate the overall sex and age (adult, juvenile) structure of the population; 3) obtain an index of fawn survival and recruitment (i.e., fawn:adult female ratio); and 4) map the summer distribution of pronghorn. We classified 159 pronghorn (104 adult females, 30 adult males, and 25 fawns) in 36 groups. Observed sex and age ratios for these pronghorn were 24 fawns per 100 adult females (95% CI = 18-31) and 29 adult males per 100 adult females (95% CI = 23-36). Thirty-one percent (n = 41) of the observed adult pronghorn were non-migratory residents of the Gardiner basin, whereas 69% (n = 93) of the adults were migratory and summered in areas east of Mammoth. More fawns were observed in migratory groups (n = 21 fawns) than non-migratory groups (n = 4). However, the ratios of fawns per 100 adult females were similar between migratory (28 fawns per 100 adult females; 95% CI = 15-33) and non-migratory (14 fawns per 100 adult females; 95% CI = 5-38) groups, given the relatively wide confidence intervals around each estimate.

The results of this year's survey suggest that recruitment was similar to that observed during 1999-2002 and 2004, but somewhat lower than during 2003. Overall, recruitment of Yellowstone pronghorn has been chronically low since 1992 and evidence implicates coyotes as a significant limiting factor by contributing to substantial fawn mortality. Coyote densities were relatively high (i.e., 0.6 per square kilometer) in areas utilized by pronghorn prior to the mid-1990s; particularly in summer range areas (e.g., Lamar Valley). However, wolves kill coyotes through inter-specific aggression, and have purportedly reduced the resident coyote population by approximately one-half (i.e., 0.3 per square kilometer) in some areas of the pronghorn range. Thus, the restoration of wolves could possibly contribute to higher recruitment of Yellowstone pronghorn if total coyote densities (residents and transients) are substantially reduced in fawning and neonatal areas (i.e., mesopredator release hypothesis). However, coyotes have the ability to compensate for high mortality rates via higher reproduction, recruitment, and reduced dispersal as more pups remain philopatric with reduced intraspecific competition and increased carcass availability. Thus, intensive and persistent reductions would be needed to reduce coyote numbers and predation significantly and coyote populations can recover quickly from heavy exploitation. At this time, it is uncertain whether wolf-induced mortality of coyotes has been high enough to reduce coyote densities to levels where predation on pronghorn fawns would be significantly reduced.

Bighorn Sheep Surveys and Harvests

The status and distribution of bighorn sheep on the northern range is monitored using a helicopter to conduct a total count and recruitment estimate during spring. The Working Group also monitors the results of bighorn sheep hunts adjacent to Yellowstone National Park that are managed by Montana Fish, Wildlife, and Parks.

Spring Bighorn Sheep Surveys

The spring bighorn sheep surveys started in 1991 with an experimental helicopter survey in Tom Miner basin and Point of Rocks winter ranges. The survey area was expanded into the Gardiner basin (Yankee Jim to Mammoth) during 1992 and sheep were surveyed during the spring mule deer counts. In 1995, the Working Group initiated helicopter surveys of historic bighorn winter ranges in the interior of Yellowstone National Park from the Black Canyon of the Yellowstone River to the upper Lamar valley. During these surveys, sheep are classified as ewes, lambs, or rams, which are further classified by horn size.

Aerial surveys during April 25-28, 2005, detected 244 sheep (134 ewes, 45 lambs, and 65 rams) between Point of Rocks and Soda Butte on the northern range (Figure 13). One hundred and ninety-eight of these sheep were observed on winter ranges north of Mammoth (Figure 14). Sheep were detected in the following areas: Point of Rocks; Tom Miner basin; Yankee Jim Canyon/Corwin Springs/LaDuke; Travertine/Bear Creek/Deckard Flats; Beattie Gulch/Devil's Slide/Cinnabar Mountain; Mount Everts to Mammoth; Mount Norris to Tower Junction; and Black Canyon to Barronette Peak. A ratio of 34 lambs per 100 ewes was observed, which compares to an average spring recruitment estimate of 22 lambs per 100 ewes (range = 7-32) during 1995-2003. Recruitment has been relatively high (21-34 lambs per 100 ewes) since 1999 compared to 7-22 lambs per 100 ewes during 1995-1998.

The growth rate of the northern Yellowstone population appears to be increasing compared to the average count of 189 (range = 134-244) sheep since 1995. Sheep numbers and recruitment in the upper Yellowstone are at their highest levels since the early 1990s. Thus, there is reason for some guarded optimism regarding the future of this relatively small and isolated population. However, the Working Group is concerned about the small number of sheep ($\leq$5) observed on Travertine/Deckard Flats since 2000 and lack of sheep on the Hellroaring slopes since 1998.

Bighorn Sheep Harvests

Bighorn sheep in the surveyed populations are hunted north of Yellowstone Park in Hunting Districts 300, 303 and 305. Hunting District 300 is located in the Gallatin Mountain range between the Gallatin and Yellowstone Rivers from the Yellowstone Park boundary north to Moose Creek on the Gallatin side and Big Creek on the Yellowstone River side. Hunting District 303 is in the Absaroka Mountains north of the Park between the Yellowstone River and Hellroaring Creek. Hunting District 305 runs from the Park boundary near Beatie Gulch north to Sphinx Creek in the Gallatin Range. Sheep hunting in Hunting District 300 and 303 is regulated by an unlimited access season with a set harvest quota. Hunting District 305 was first opened in fall of 2000 and is a limited access one license per year by drawing. Hunters may take only mature legal rams. By Montana's definition, a ram is legal when a straight line extending from the front base of the horn through any portion of the eye opening intercepts any portion of the horn. If the horn is not long enough to be intercepted by the line, the ram is not legal. Most legal rams are at least 3-4 years old.

The sheep season ran from September 2-11, 2004, in Hunting District 300 and September 15 to October 31, 2004, in Hunting Districts 303 and 305. Hunting Districts 300 and 303 had a quota of 2 legal rams, while district 305 had one available license. All 62 applicants received a license in Hunting Districts 300 and 303, while 85 applicants applied for the one available license in Hunting District 305. A hunter who killed a legal ram was required to present the complete head and cape intact within 48 hours to any FWP office, game warden or designated employee. The season was closed in Hunting Districts 300 and 303 after a 48-hour notice from when the quota was reached.

In 2004, 38 sheep licenses were issued in Hunting District 300, 24 were issued in Hunting District 303, and one was issued in Hunting District 305. The Statewide Hunter Harvest Survey estimated that 46 out of the 63 hunters actually hunted for sheep. Two legal rams were harvested in Hunting District 300 and one legal ram was harvested in Hunting District 305. Since 1988, 1-7 rams have been harvested annually in Hunting District 300 and 303 (Figure 15). During this period, sheep regulations in Hunting District 303 have remained much the same. Hunting District 300 has experienced several short-term changes dealing with season length, quota numbers and no quotas. Not all of the rams surveyed occur in the hunting districts during the hunting seasons. These two unlimited access sheep seasons are supported by a small number of resident rams that remain outside YNP and some rams that migrate out of YNP during the hunting season. Hunting success in Hunting District 300 varies based largely on the distribution of sheep during the short ten-day season. Since the limited-entry Hunting District 305 was created in 2000, 4 out of a possible 5 rams have been harvested (Figure 15).

Mountain Goat Surveys

The status and distribution of mountain goats on the northern range is monitored using a Super Cub airplane to count goats in the southern portions of Hunting Districts 314 (Gallatin Range) and 316 (Cooke City), and adjacent areas inside Yellowstone Park, during September or October. The Working Group also monitors the results of mountain goat hunts in districts 314 and 316 that are managed by Montana Fish, Wildlife, and Parks.

Mountain Goat Numbers and Surveys

Since the late 1980s, mountain goat numbers have increased substantially in the Absaroka and Gallatin Mountains north of Yellowstone National Park. Surveys by Montana Fish, Wildlife, and Parks have documented a two to three-fold increase in mountain goats in Hunting Districts 323 and 329 since 1988. Surveys and other observations indicate that mountain goats have expanded their range southward into Yellowstone National Park and along its northern border.

By 1996, mountain goat numbers increased sufficiently in both areas to warrant the creation of new Hunting Districts and a limited hunting season. Mountain goat hunting districts 314 (Gallatin Range) and 316 (Cooke City) were established in autumn 1996, with two either-sex licenses issued in each unit. Standardized fixed-wing mountain goat surveys began in 1997. Currently, the survey areas cover only the southern portions of each district where goat densities are the highest. Goats located just inside Yellowstone National Park are also counted on this flight. Additional goats occur farther north in lower numbers and are not currently surveyed. Hunting Districts 314 and 316 are surveyed every other year.

Montana Fish, Wildlife, and Parks was unable to survey for mountain goats in the Gallatin Range (H.D. 314), the Cooke City area of the Absaroka Mountains (H.D. 316), or adjacent areas inside Yellowstone National Park during autumn 2005 owing to the unavailability of airplane repair parts. However, park staff surveyed a smaller area in and adjacent to the park on September 26 and 28, 2005. One hundred and forty mountain goats (112 adults, 28 kids) were observed during these surveys. Goats were widely distributed, with observations on Bannock Peak, Three River's Peak, Miller Creek, Sepulcher Mountain, Bunsen Peak, Sheep Mountain, Bighorn Peak, King Butte, Meldrum Mountain, Mill Creek, Electric Peak, Pollux Peak, Abiathar Peak, Mineral Mountain, Cutoff Mountain, Barronette Peak, near Bliss Pass, near Sportsman's Lake, and near Elk Tongue and Hornaday Creeks. No goats were observed in the Washburn Range and only one goat was observed south of Abiathar Peak along the eastern boundary of the park. The composition of observed mountain goats was 25 kids per 100 adults.

These flights were not complete surveys of the Hunting Districts typically flown by Montana Fish, Wildlife, and Parks and, as a result, are not directly comparable to surveys conducted during previous years. However, survey results during 1997-2005 suggest that mountain goat numbers increased substantially in and adjacent to Yellowstone National Park during the past decade. Mountain goats thoroughly colonized and established breeding populations in and adjacent to the northeast (i.e., Cutoff Mountain, Barronette Peak, Wolverine/Abundance Peak, The Thunderer/Mount Norris) and northwest (i.e., Bighorn Peak, Sheep Mountain, upper Tom Miner basin, Sepulcher Mountain) portions of the park. Relatively high numbers of goats were observed in these areas during surveys in recent years, including numerous young-of-the-year. The composition (i.e., 25 kids per 100 adults) of observed

mountain goats during 2005 was within the range (13-48 kids per 100 adults) observed during 1997-2004. Colonization of the eastern boundary area of Yellowstone National Park south of The Thunderer and Mount Norris is occurring more slowly than in the northeast and northwest portions of the park. However, sporadic observations of females with young of the year suggest that mountain goats may eventually colonize this area.

Mountain Goat Harvests Adjacent to Yellowstone National Park

In 2004, 26 mountain goat licenses were issued in H.D. 314 and 316; 14 in H.D. 314 and 12 in H.D. 316. A total of 18 goats (10 males, 8 females) were harvested in autumn 2004; 10 in H.D. 314 and 8 in H.D. 316. From 1996-2004, 112 either-sex mountain goat licenses were issued in H.D. 314 and 316 and 85 goats were harvested by 107 participating hunters (i.e., 79% harvest success rate). In autumn 2005, 26 mountain goat licenses were again issued in H.D. 314 and 316.

Cooperative Wildlife Survey Funding

Members of the Working Group have mutually agreed to cooperatively support and fund regularly scheduled wildlife surveys to monitor population trends of elk ands other ungulate species on the northern Yellowstone winter range. Member agencies either pay the costs of surveys and other activities directly or contribute funds to the Yellowstone Wildlife Working Group Project Account (Project #53484), which was established by Montana Fish, Wildlife, and Parks to support these surveys and other Working Group projects. Unspent funds in this account are carried forward annually to include any existing funds. Expenditures by the Working Group during federal fiscal year 2005 were as follows:

Survey	Date	NPS	MFWP	USGS[a]	USFS	Total
Elk Count	January 5, 2005	$1,242	$561	$725		$2,528
Spring Mule Deer Survey	April 25-28, 2005	$933		$2,178		$3,111
Bighorn Sheep Survey	April 25-28, 2005	$1,314	$691		$968	$2,973
Pronghorn Count	April 6, 2005	$740				$740
Winter Mule Deer Survey	Not Conducted					
Elk Classification	March 9, 2005	$4,860				$4,860
Elk Migration Survey	March 7, 2005		$429			$429
Mountain Goat Survey	September 26/28, 2005	$1,421				$1,421
Pronghorn Classification	July 22, 2005	$914				$914
TOTAL		$11,424	$1,681	$2,903	$968	$16,976

[a] The actual expenditure was not available for the annual elk count. The estimate of $725 is based on a total of 5 flight hours @ $145/hour.

Special Projects

Working Group members participate in many special projects, including studies conducted by members from a mutually prioritized list of topics, assisting graduate students on northern range research studies or attempting to initiate outside interest in a particular research issue. Working Group involvement in special projects ranges from complete design and completion, technical/financial support and soliciting investigators to minor review of proposals. Working Group members participated in the following special projects during fiscal year 2005:

Pronghorn Project: A 3-year project was initiated in 2005 to obtain essential information for decision makers to proactively and adaptively manage Yellowstone pronghorn. The objectives of the project are to: 1) establish a rigorous demographic monitoring program of abundance and key vital rates (e.g., reproduction, survival); 2) conduct a tactical biological study of the ecological interactions among wolves, coyotes, and pronghorn to determine if there is differential recruitment among pronghorn fawning areas in relation to wolf and coyote densities and use areas; and 3) enumerate the precise staging areas, migration routes, and summer use areas of pronghorn to ensure that their migratory patterns are not adversely affected by proposed and future infrastructure projects. The movements of 28 radiocollared, adult female pronghorn were monitored during migration, birthing, and fawn rearing seasons in collaboration with biologists from the University of Idaho. We obtained >500 locations of pronghorn groups during May-September 2005 and >2,700 locations of one pronghorn fit with a GPS collar during February 2004 through February 2005. Eight aerial surveys of Yellowstone pronghorn were conducted between May and September 2005 to document spring and autumn migration patterns, delineate summer use areas, and assess recruitment. The Bernice Barbour Foundation graciously contributed $25,000 to the Yellowstone Park Foundation for this study.

Elk Calf Mortality Study: The Yellowstone Center for Resources, U.S. Geological Survey, and University of Minnesota continued a 3-year study (2003–2005) of mortality in northern Yellowstone elk calves. Montana Fish, Wildlife, and Parks also provided funding and staff participation. The primary objectives of the study are to: 1) estimate the relative causes and timing of calf deaths; 2) estimate calf survival rates; and 3) evaluate factors that may predispose calves to death. During May/June 2005, 56 calves ≤6 days old were captured, fit with ear-tag transmitters, and monitored daily. To date, 37 of these calves have died (36 predation; 1 non-predation). Preliminary determinations of causes of death for instrumented calves were 21 killed by grizzly and black bears, 6 by wolves, 4 by coyotes, 2 by wolves or coyotes, 2 by mountain lions, 1 by an unknown predator, and 1 non-predation death due to disease. Two other calves have unknown fates as we suspect one calf's transmitter was likely pulled out and the other possible mortality site was unable to be examined due to high water. These results were similar to those obtained during the first two years of study. Monitoring will continue through winter 2006.

Adult Elk Survival, Movements, and Habitat Use: The intensive 5-year program research (2000-2004) program on the initial effects of wolf recovery on northern Yellowstone elk was completed and grants (~$160,000/year) and partnerships that facilitated this effort concluded. However, the Yellowstone Center for Resources, in collaboration with the Working Group, U.S. Geological Survey, Biological Resources Division, Northern Prairie Wildlife Research Center, and Montana State University continued collecting information on key vital rates and limiting factors of Yellowstone elk during 2005. Eighteen adult female elk were captured and collared on the northern range (inside Yellowstone National Park) during February 2005. We monitored radio signals of 45 adult female elk on the

northern range from the ground twice per week during winter 2005 to obtain a gross estimate of survival. One collared elk was harvested during the Gardiner Late Elk Hunt and two collared elk died during the summer (1 possible wolf predation, 1 unknown cause of death). Aerial telemetry monitoring has been reduced to 2-4 times per year owing to lack of funding.

Chronic Wasting Disease (CWD) and Brucellosis Surveillance: Lymph node and brain stem tissue samples were collected from 313 elk at the check station during the 2005 Gardiner Late Elk Hunt. These samples were sent to the Colorado State Veterinary Laboratory in Fort Collins for ELISA screening. Three hundred and nine samples tested negative for CWD and six samples are still pending. Blood samples from 10 of 243 (4.1%) harvested elk tested positive for brucellosis, compared to 3.7% during 2004 and a range of 1-4% during the last 10 years. The State of Montana could increase surveillance and sampling efforts in the future if >5% of samples test positive for brucellosis. Substantially fewer samples for disease surveillance will be collected next year given the proposed level of 100 antler-less permits for the 2006 late hunt (i.e., ~40 harvested elk). Montana Fish, Wildlife, and Parks completed a "Chronic Wasting Disease Management Plan for Free Ranging Wildlife in Montana" during August 2005. Yellowstone National Park is working on a response plan for CWD.

Wolf Project: Preliminary data from the summer of 2005 indicates that the wolf population in Yellowstone National Park has declined. One pack (Biscuit Basin) moved out of the park, two others (Geode Creek, Specimen Ridge) appear to have dissolved, and the Swan Lake pack has declined from 12 to 3 wolves. Very high adult mortality was recorded over summer and pup survival for the northern range also appears to be low (~20%) due to a likely outbreak of disease (not confirmed but probably an outbreak of canine parvo-virus). In short, the current wolf population in the park is estimated to be down by 30% park-wide and 45% on the northern range. The number of packs on the northern range had declined from 7 to 5.

Beaver Surveys: Aerial surveys of Yellowstone National Park have been conducted since 1996 to record the number and location of active beaver colonies. Complete counts and comparisons for accuracy to ground counts have been conducted since 1998. Aerial surveys are conducted every other year and compared to a sample of colonies counted every year outside the park in the Gallatin National Forest (Dan Tyers, personal communication). Colonies are sampled by searching for food caches which are visible from aircraft flying at about 500 feet above the ground. Caches are collections of woody vegetation made by the beavers for use throughout the winter. Beaver colonies have been increasing on the northern range since surveys began. In 1996 there was one colony and in 2003 there were ten. The survey is scheduled to be flown again in 2005.

Wolverine Study: Yellowstone National Park and the U.S. Forest Service, Rocky Mountain Research Station began a comprehensive 5-year (2005–2009) field study to evaluate wolverine status, ecology, and interactions with humans in the eastern half of the greater Yellowstone ecosystem. The study area includes the eastern portion of Yellowstone National Park and the Gallatin, Shoshone, and Bridger-Teton National Forests. Other cooperators include the Wyoming Game and Fish Department, Rocky Mountain Cooperative Ecosystems Studies Unit, U.S. Forest Service Region 1 Carnivore Program, and the Yellowstone Park Foundation. The study is specifically designed to address and remedy the important information shortfalls that currently impede conservation planning and management of the species in this region. The goal is to improve existing information on wolverine and their

environmental requirements, particularly in context with broad-scale anthropogenic effects of park and national forest management. A second goal is to foster appreciation and support for wolverine conservation through public education. The objectives of the project are to: 1) collect basic data on the residency and breeding status of wolverines; 2) document aspects of their population, including sources of death, genetic characteristics, and extent of connectivity with other wolverine populations in the Northern Rockies; 3) document habitat requirements related to birthing dens and potential human disturbance; and 4) describe interactions with other carnivores such as wolves and grizzly bears. The study involves capturing wolverines in live traps during the winter and radio-marking them with GPS technology that provides location and movement information across a broad range of temporal and spatial scales. A detailed study plan was written during winter 2005 and distributed to relevant national forest units and state wildlife agencies for comment. The plan was approved by Yellowstone National Park. During the summer and autumn 2005, approximately 30 total live traps were constructed in the park and on the Shoshone and Gallatin National Forests. Efforts to capture wolverines in the traps will begin during early December and continue through March 2006. Other field work will include snow-tracking wolverines and documenting reproduction and natal dens.

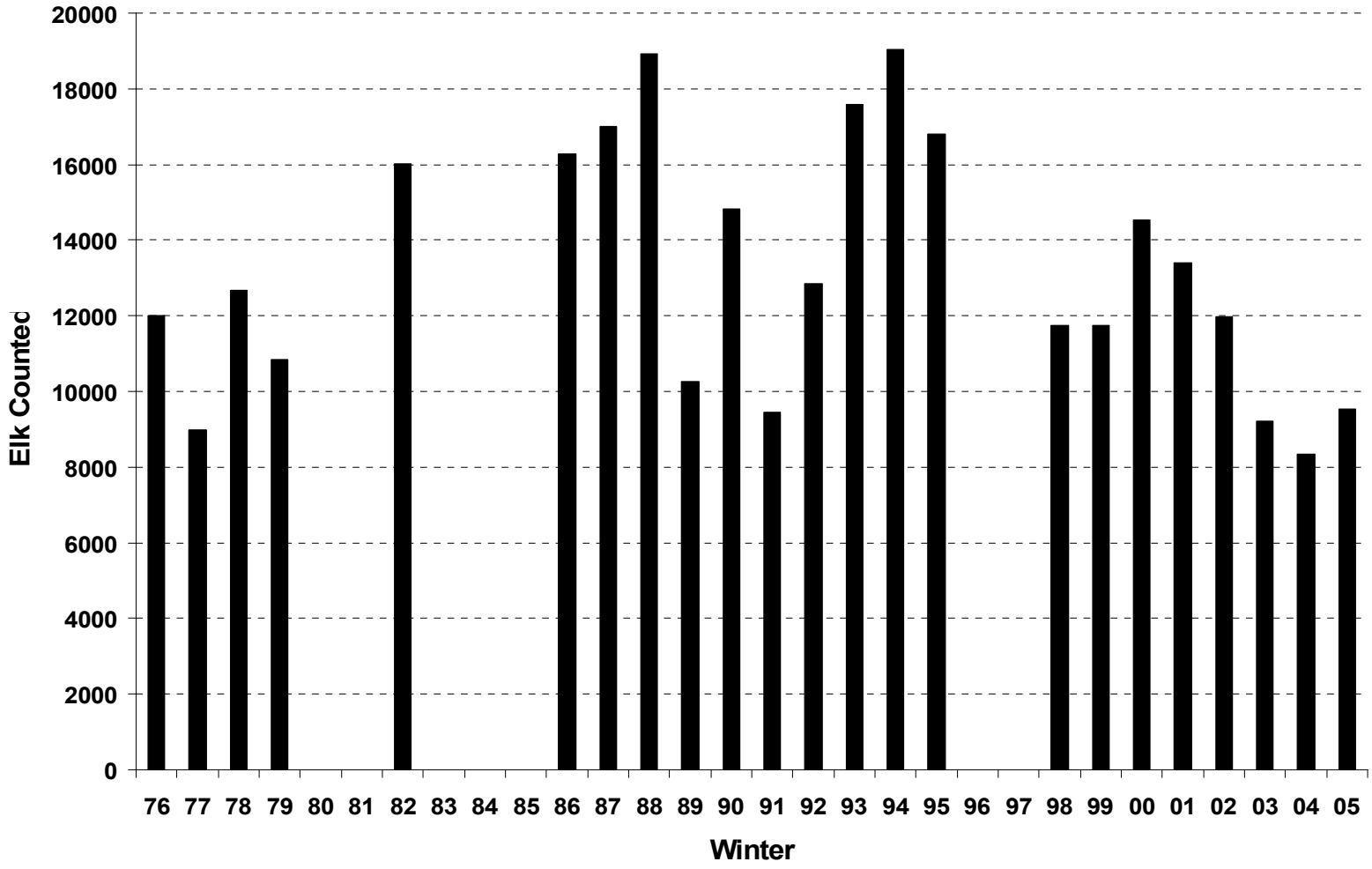

Figure 1. Cooperative winter counts of northern Yellowstone elk during 1976-2005. Winter "76" refers to the winter of 1975-76. Survey conditions were poor in 1977, 1989, and 1991.

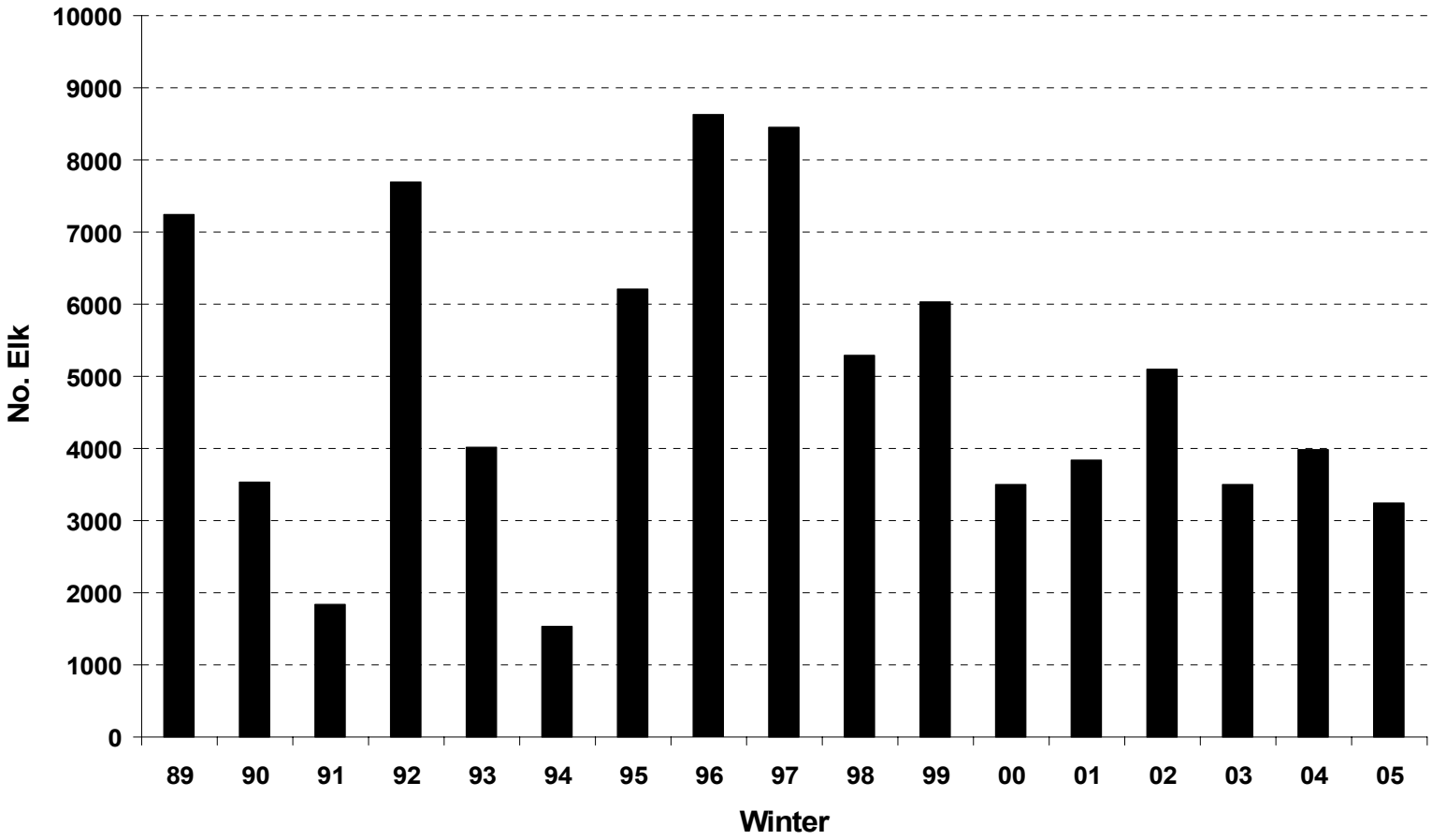

Figure 2. Estimated minimum number of northern Yellowstone elk that migrated north of Yellowstone National Park based on winter aerial counts during 1989-2005. Winter "89" refers to the winter of 1988-89.

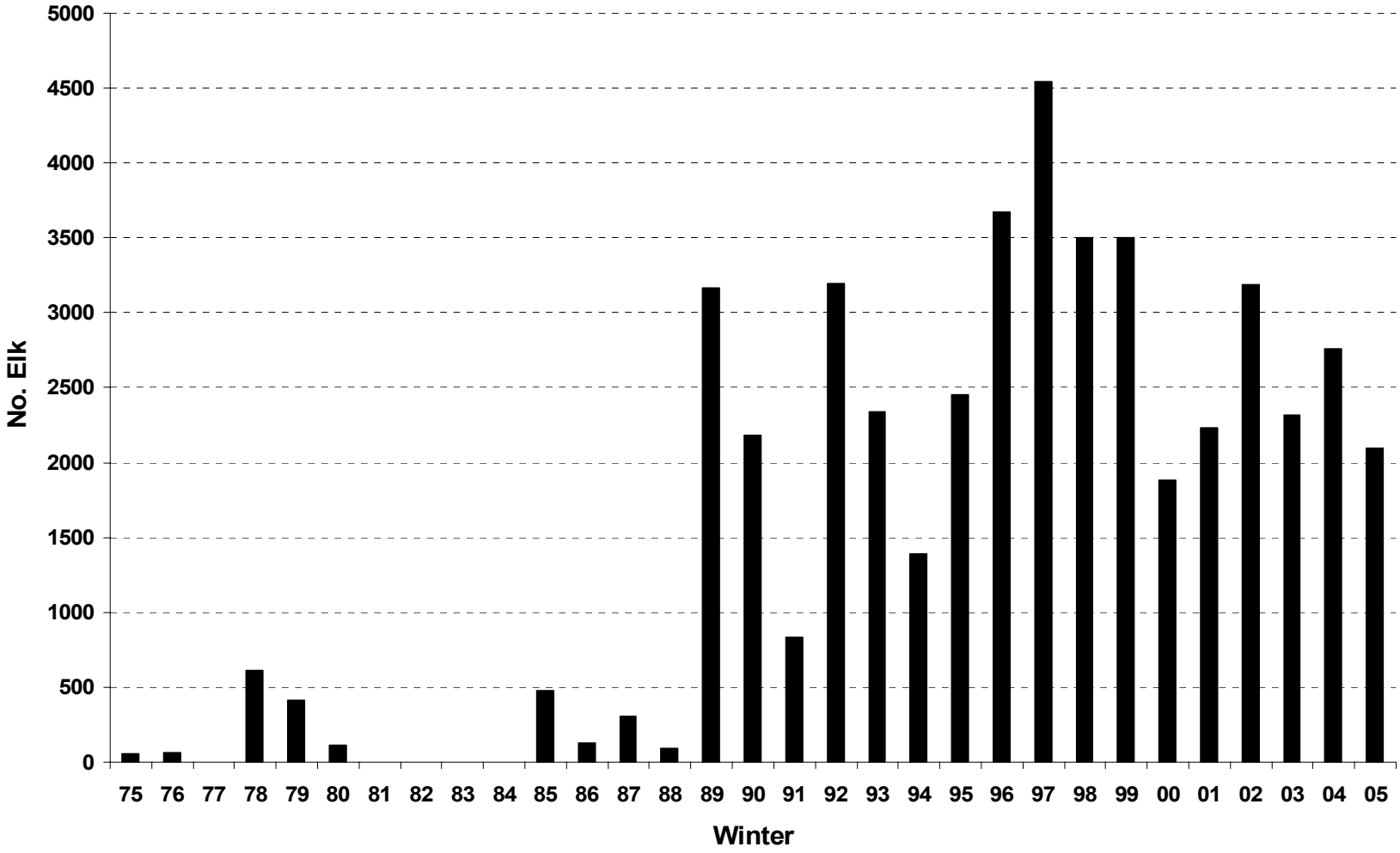

Figure 3. Maximum number of northern Yellowstone elk counted north of Dome Mountain during winter aerial counts, 1975-2005. Winter "75" refers to the winter of 1974-75.

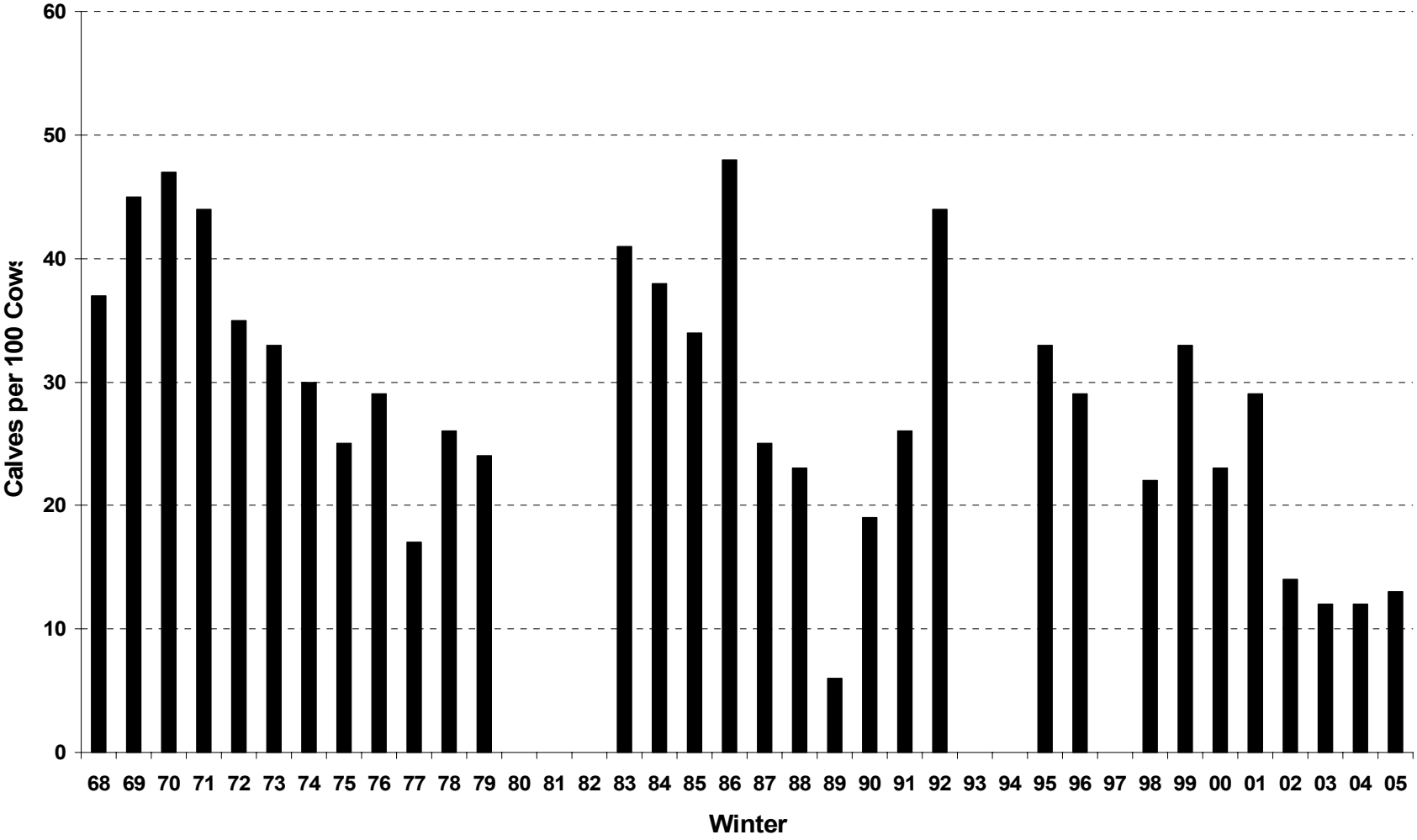

Figure 4. Number of calves per 100 cows observed during late winter classification surveys of northern Yellowstone elk, 1968-2005. Winter "68" refers to the winter of 1967-68.

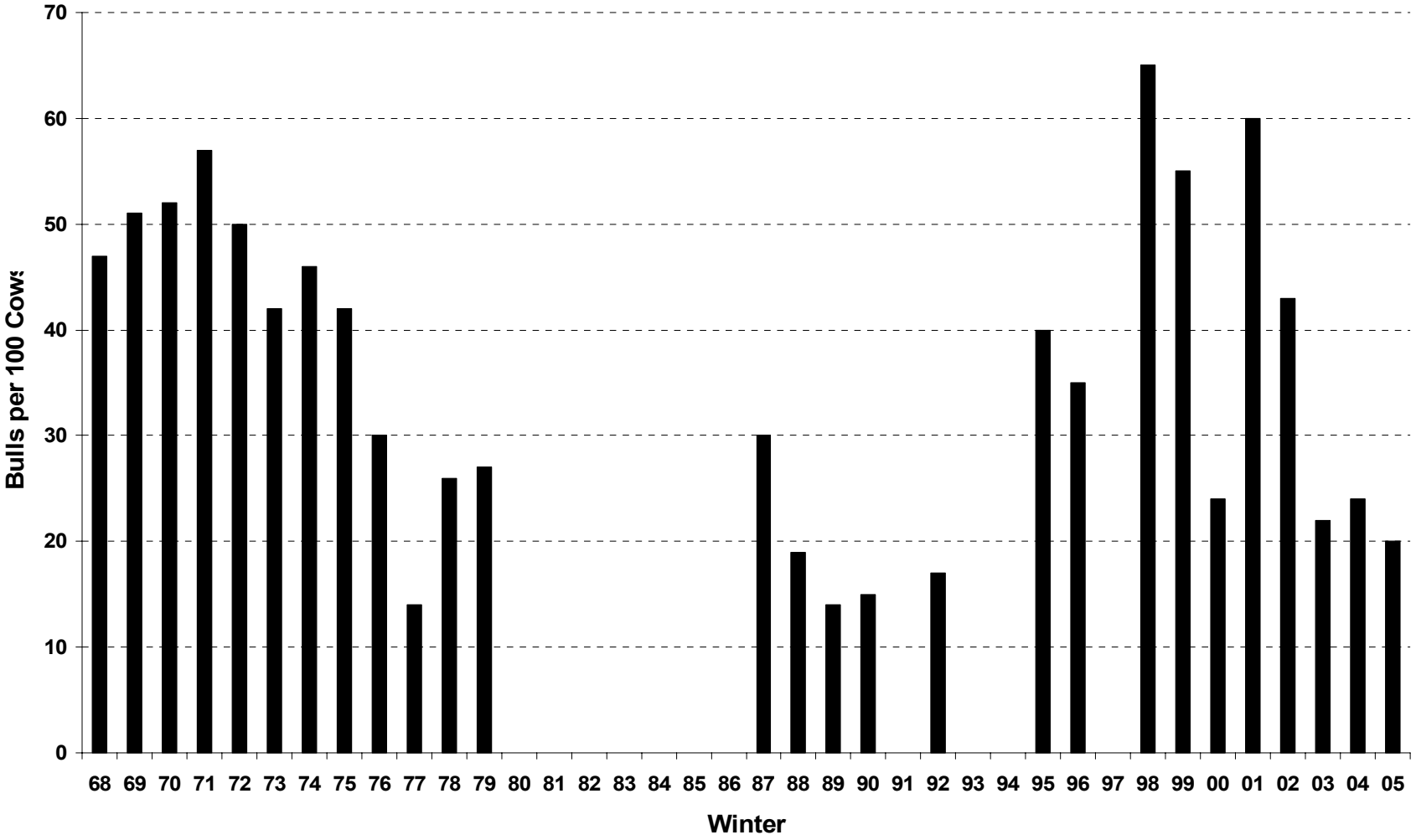

Figure 5. Number of bulls per 100 cows observed during late winter classification surveys of northern Yellowstone elk, 1968-2005. Winter "68" refers to the winter of 1967-68.

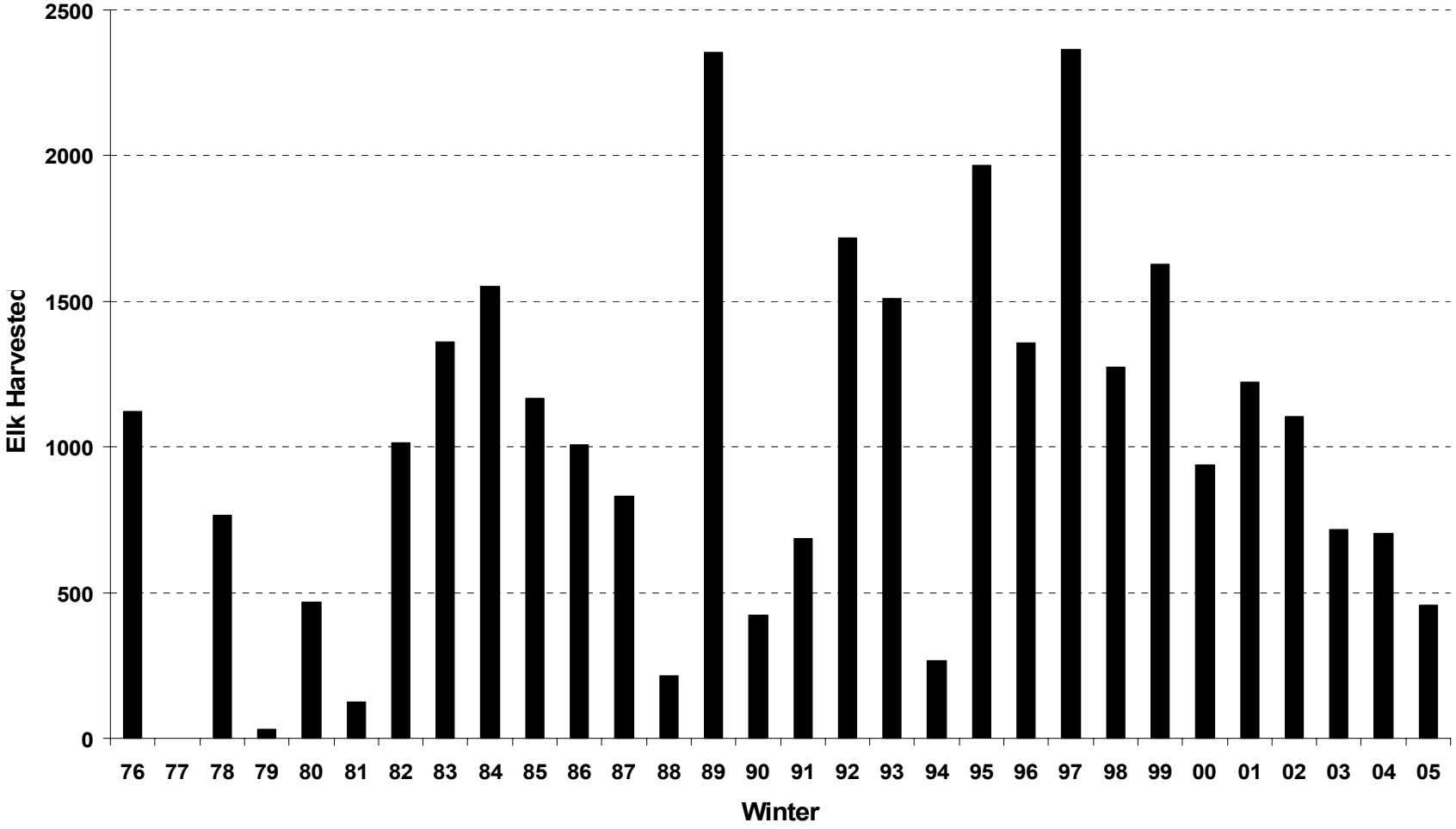

Figure 6. Number of northern Yellowstone elk legally harvested during the Gardiner Late Elk Hunt, 1976-2005. Winter "76" refers to the winter of 1975-76. No late hunt was held in 1977.

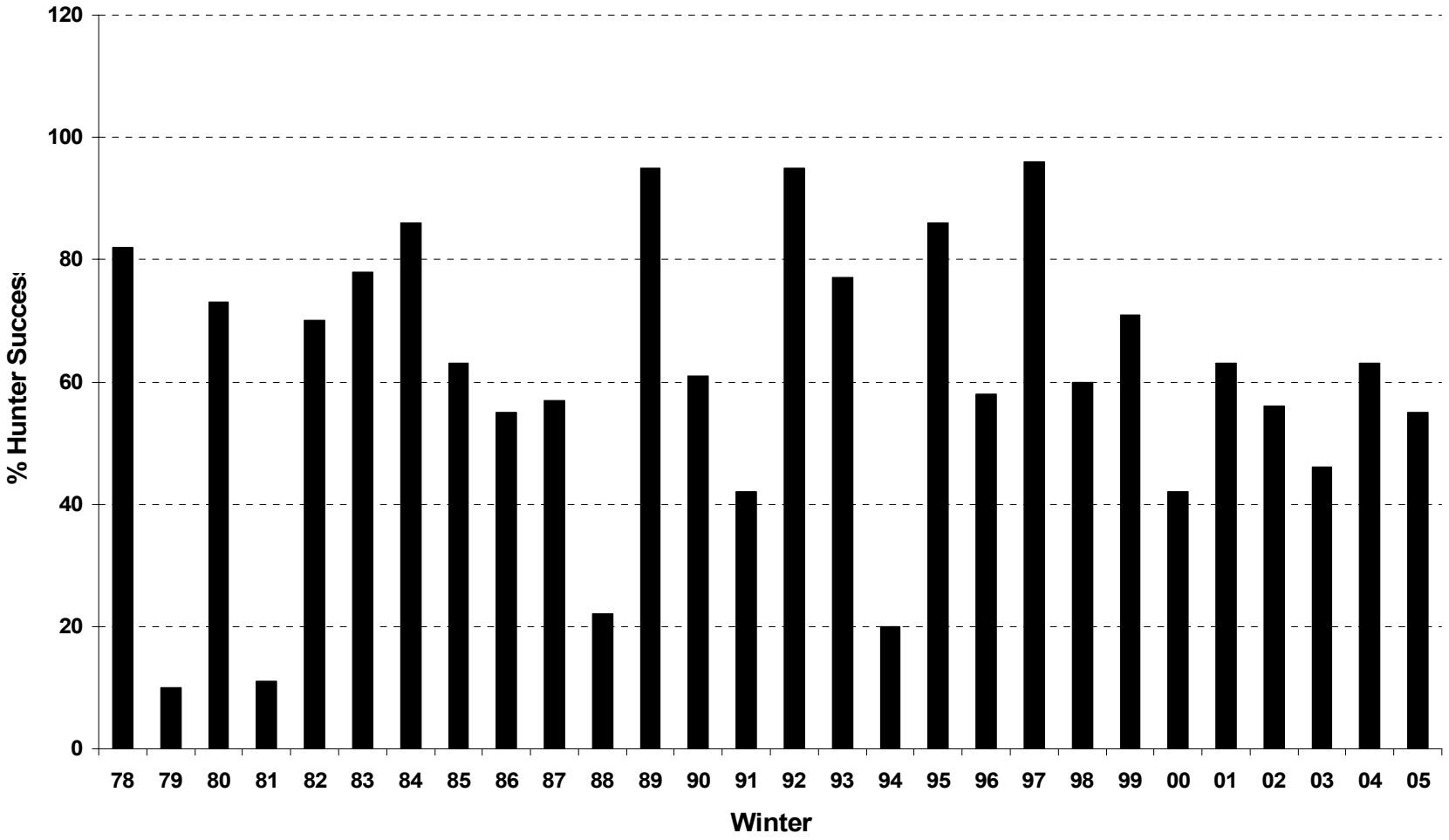

Figure 7. Percent hunter success during the Gardiner Late Elk Hunt, 1978-2005. Winter "78" refers to the winter of 1977-78.

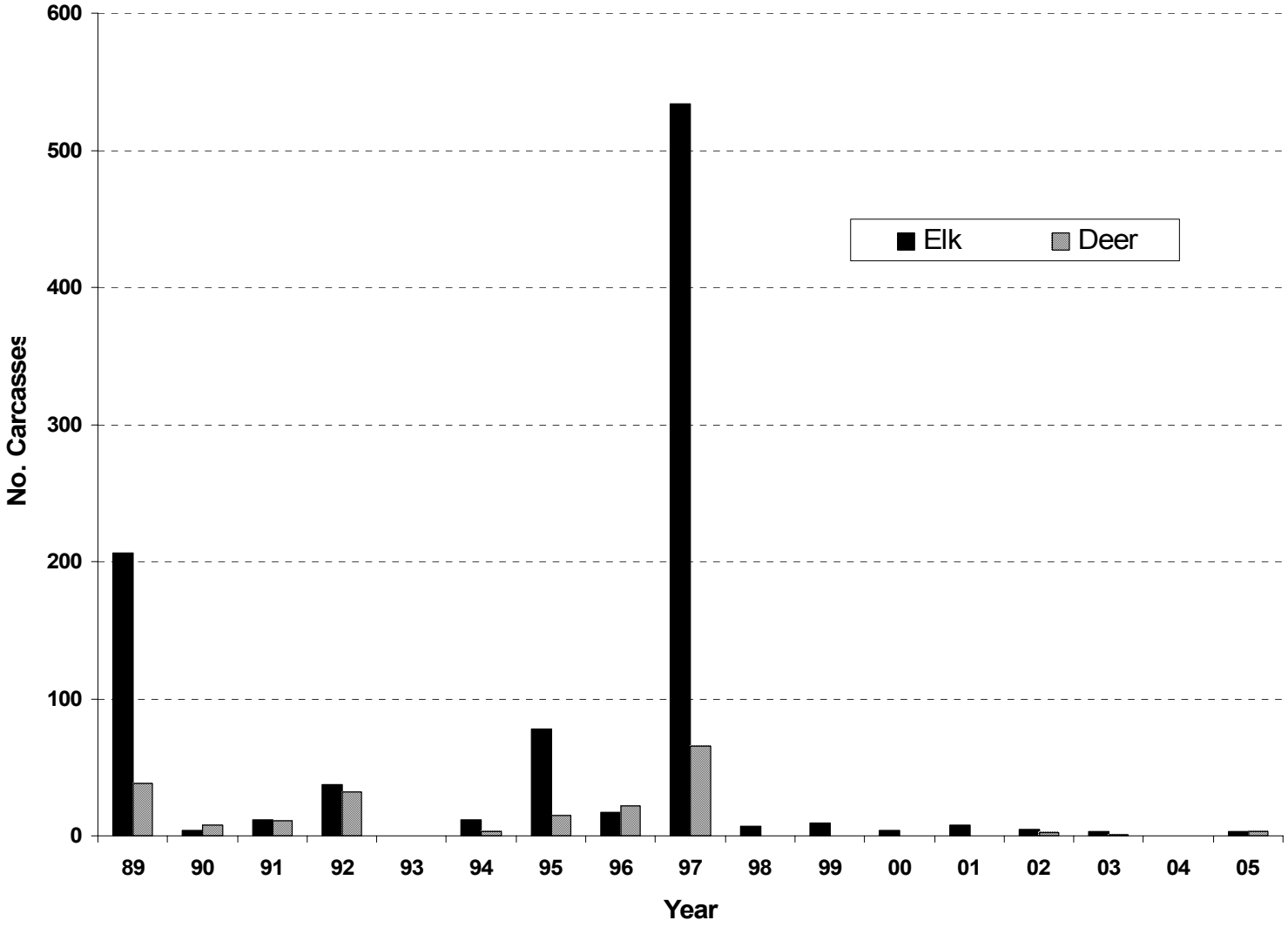

Figure 8. Results of spring helicopter surveys for carcasses in the Gardiner basin during 1989-2005. No surveys were conducted during 1993 and 2004.

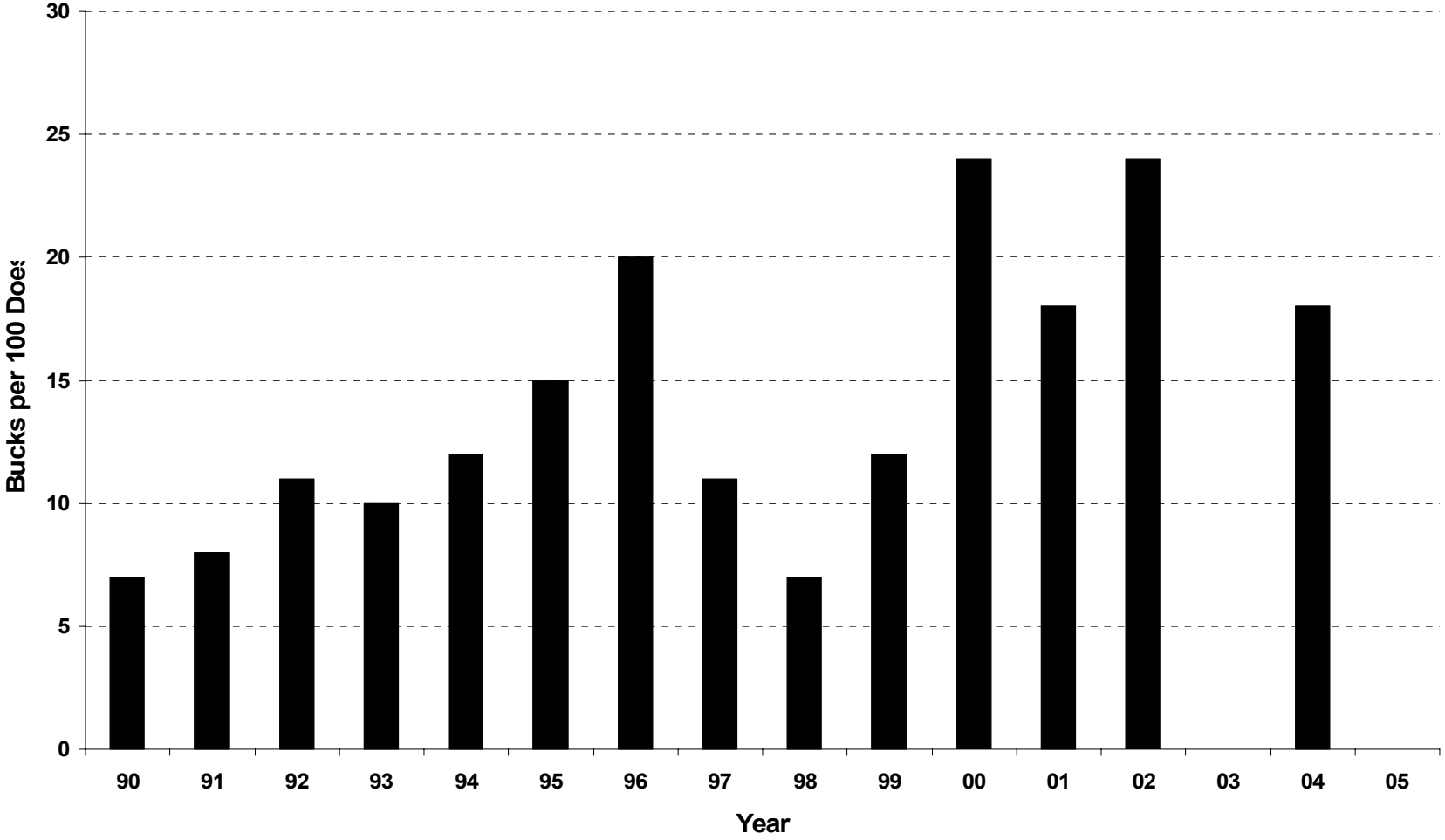

Figure 9. Number of mule deer bucks per 100 does observed during early winter classification surveys in the Gardiner basin, 1990-2005. Winter "90" refers to the winter of 1989-90. No surveys were conducted during 2003 and 2005.

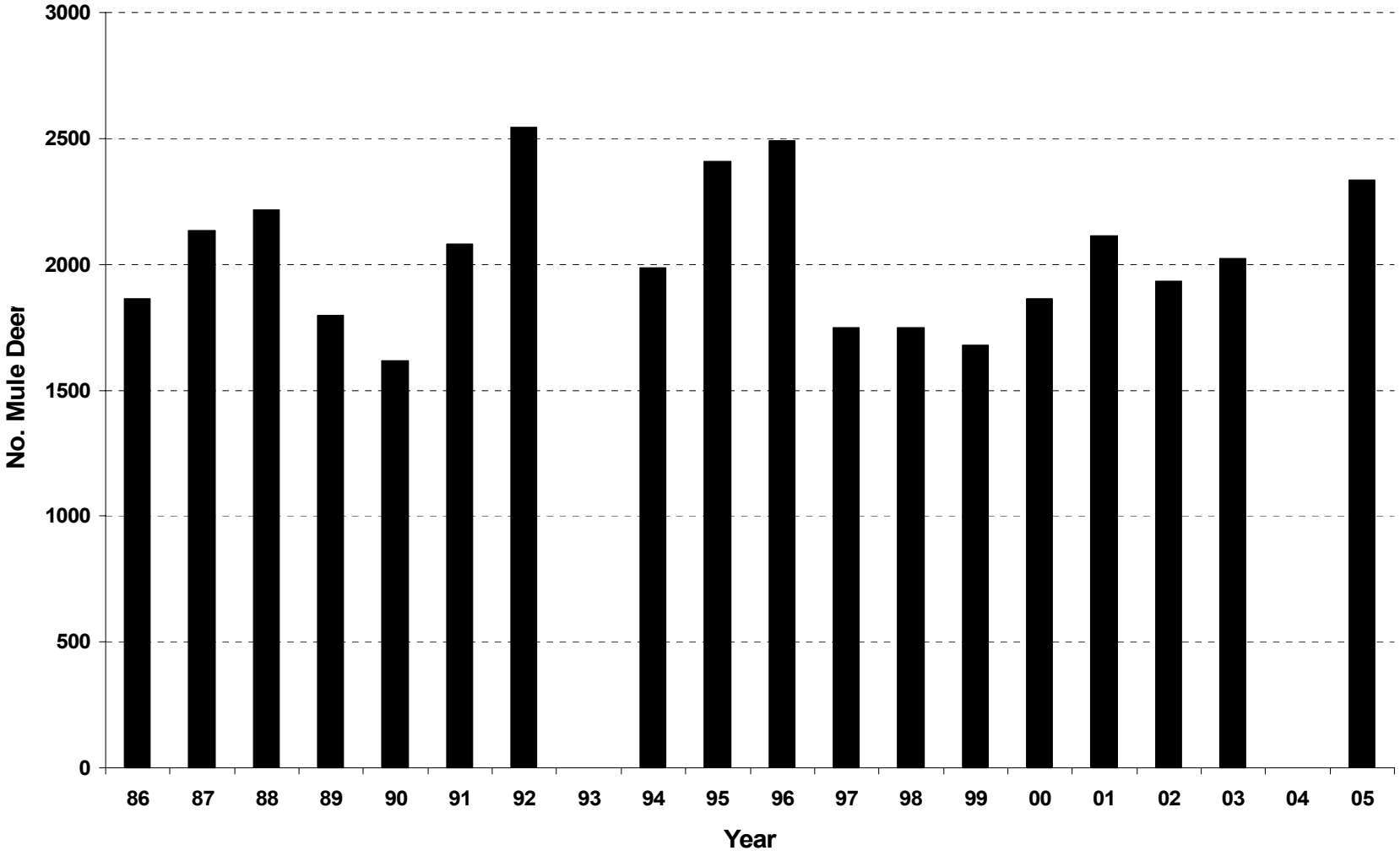

Figure 10. Spring helicopter counts of mule deer in the Gardiner basin during 1986-2005. No surveys were conducted during 1993 and 2004.

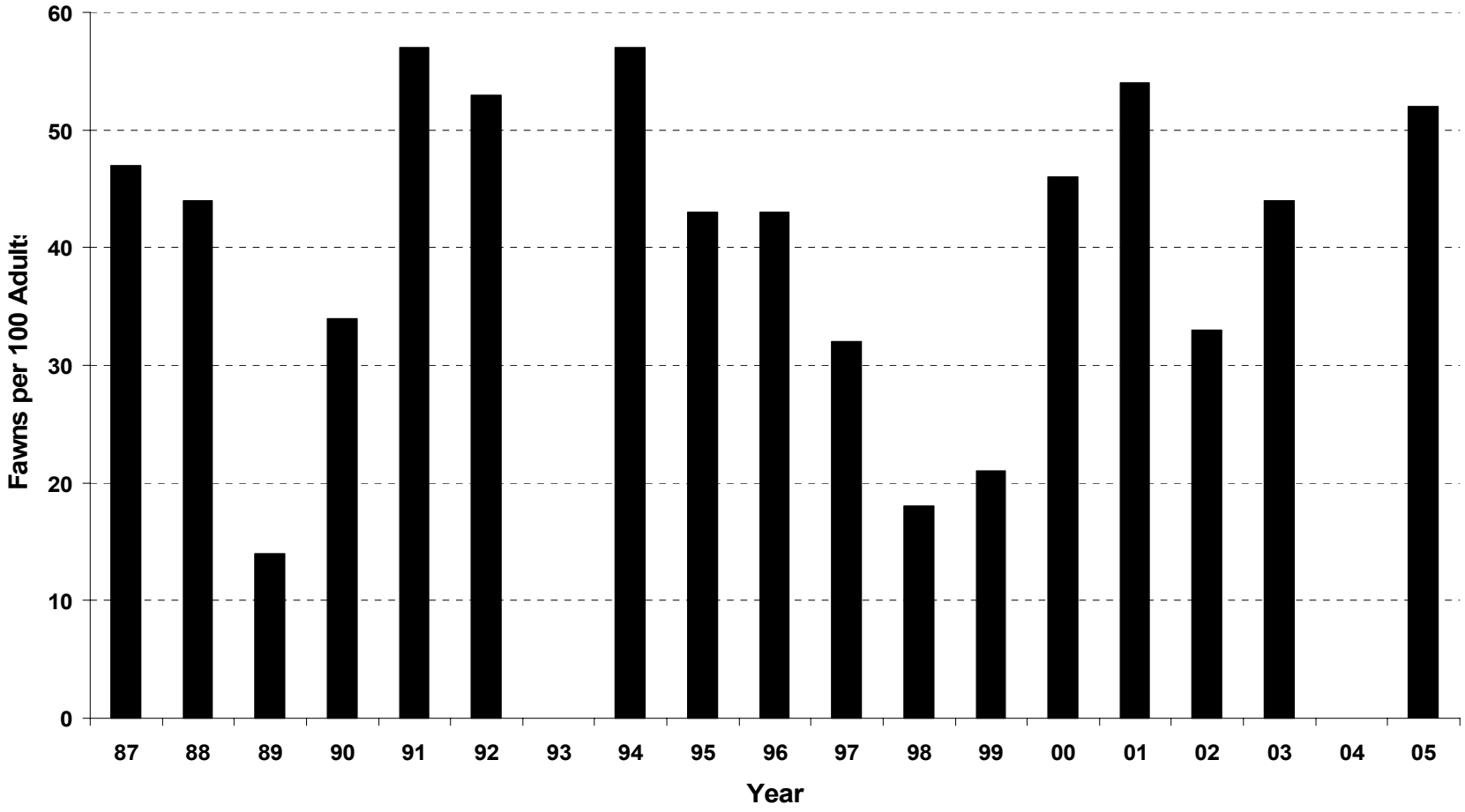

Figure 11. Number of mule deer fawns per 100 adults observed during spring classification surveys in the Gardiner basin, 1987-2005. No surveys were conducted during 1993 or 2004.

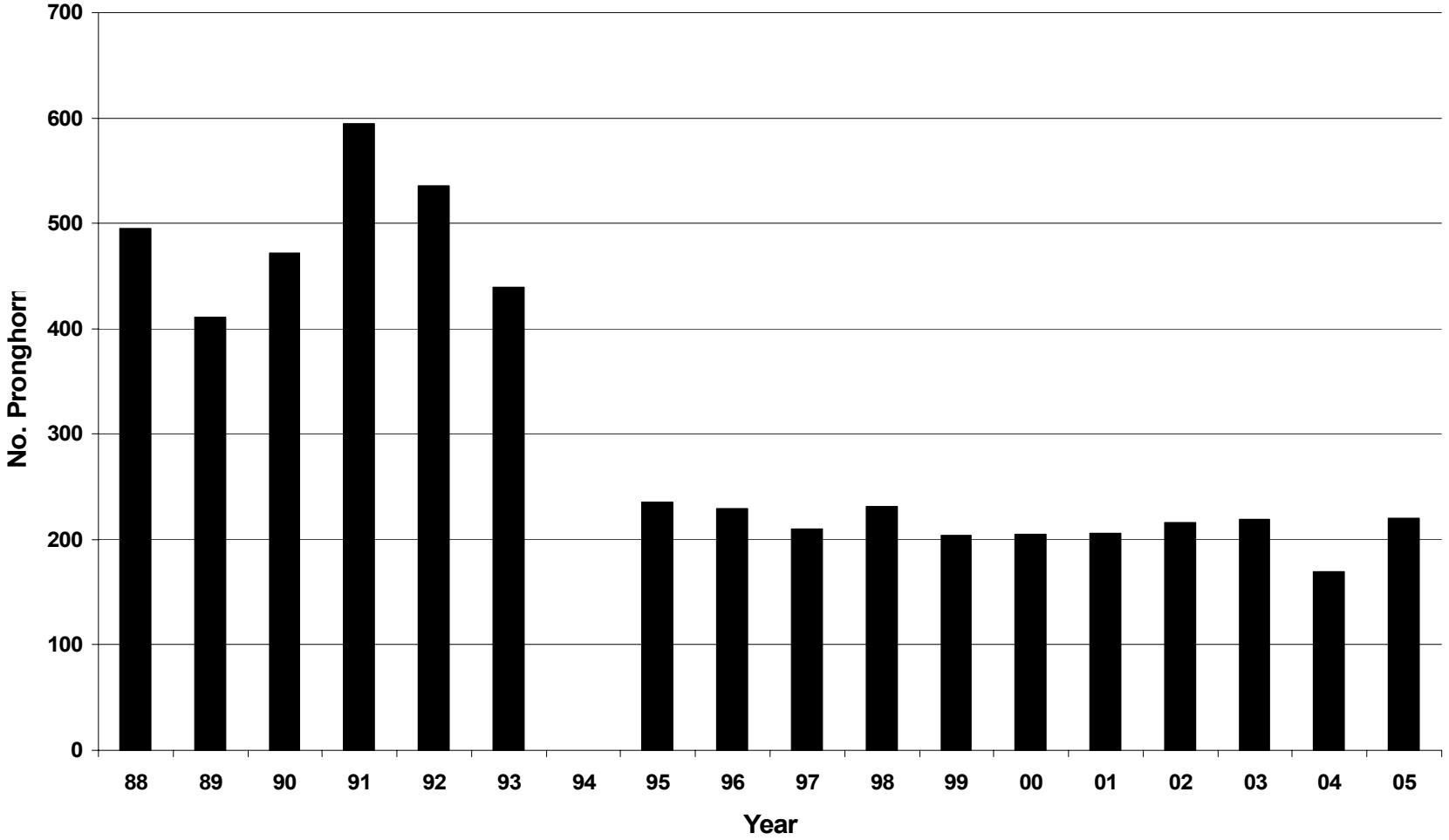

Figure 12. Spring aerial counts of Yellowstone pronghorn, 1988-2005. No survey was conducted in 1994 and survey conditions were poor for the 2004 count.

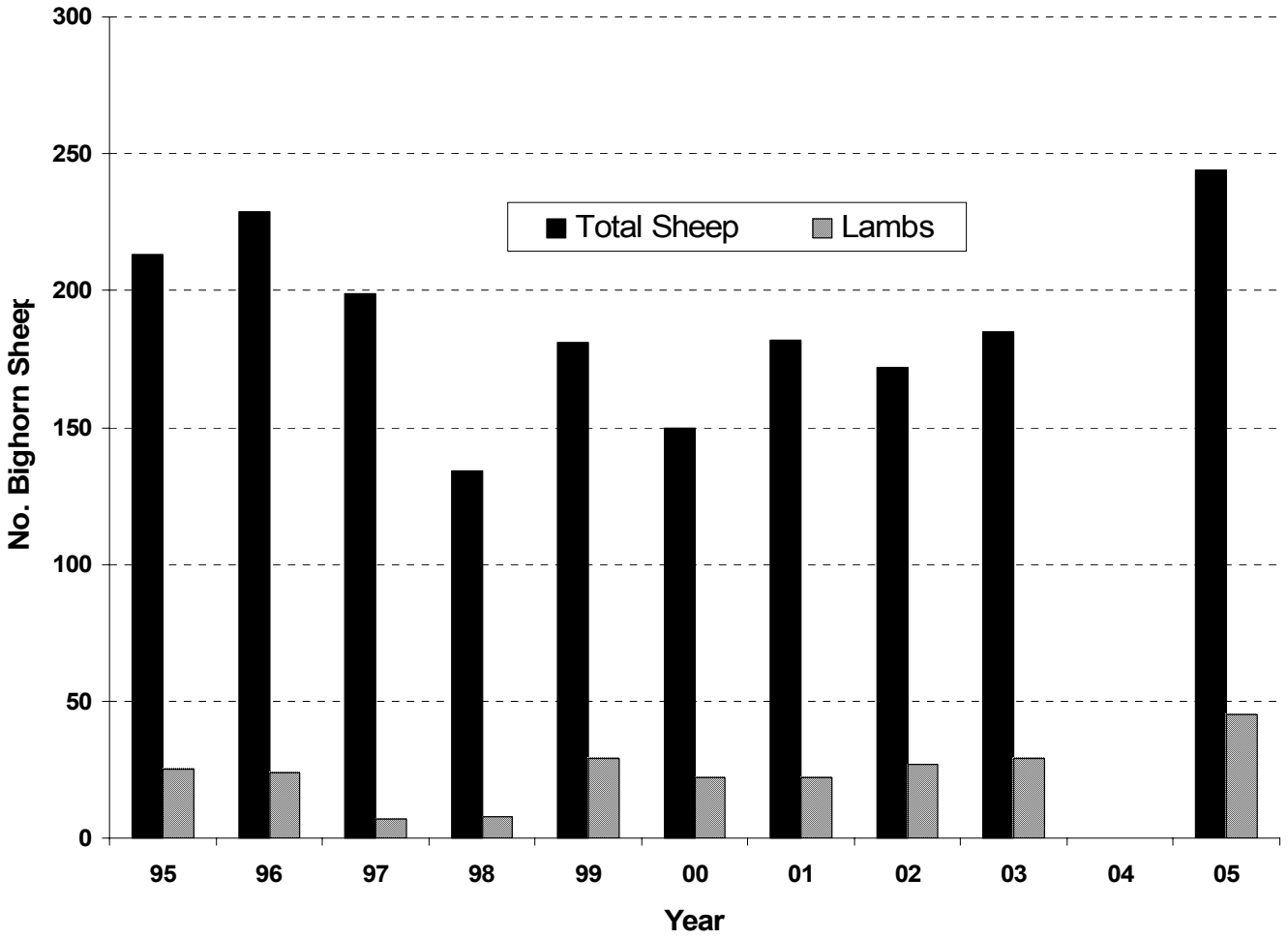

Figure 13. Number of bighorn sheep observed between Soda Butte and Point of Rocks during spring aerial surveys, 1995-2005. Incomplete survey results during 2004 are not reported.

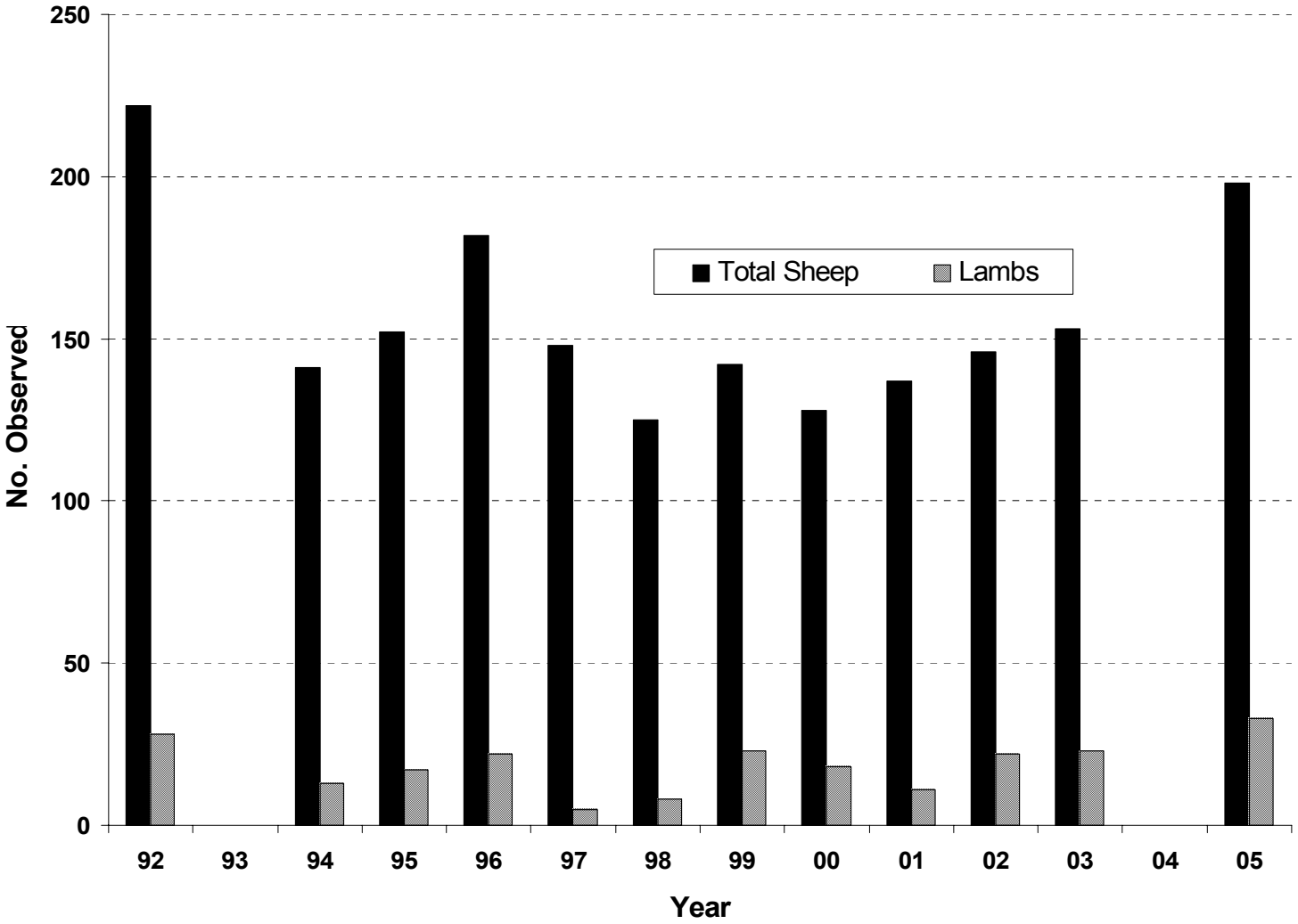

Figure 14. Number of bighorn sheep observed between Mammoth and Point of Rocks during spring aerial surveys, 1992-2005. Incomplete survey results during 2004 are not reported.

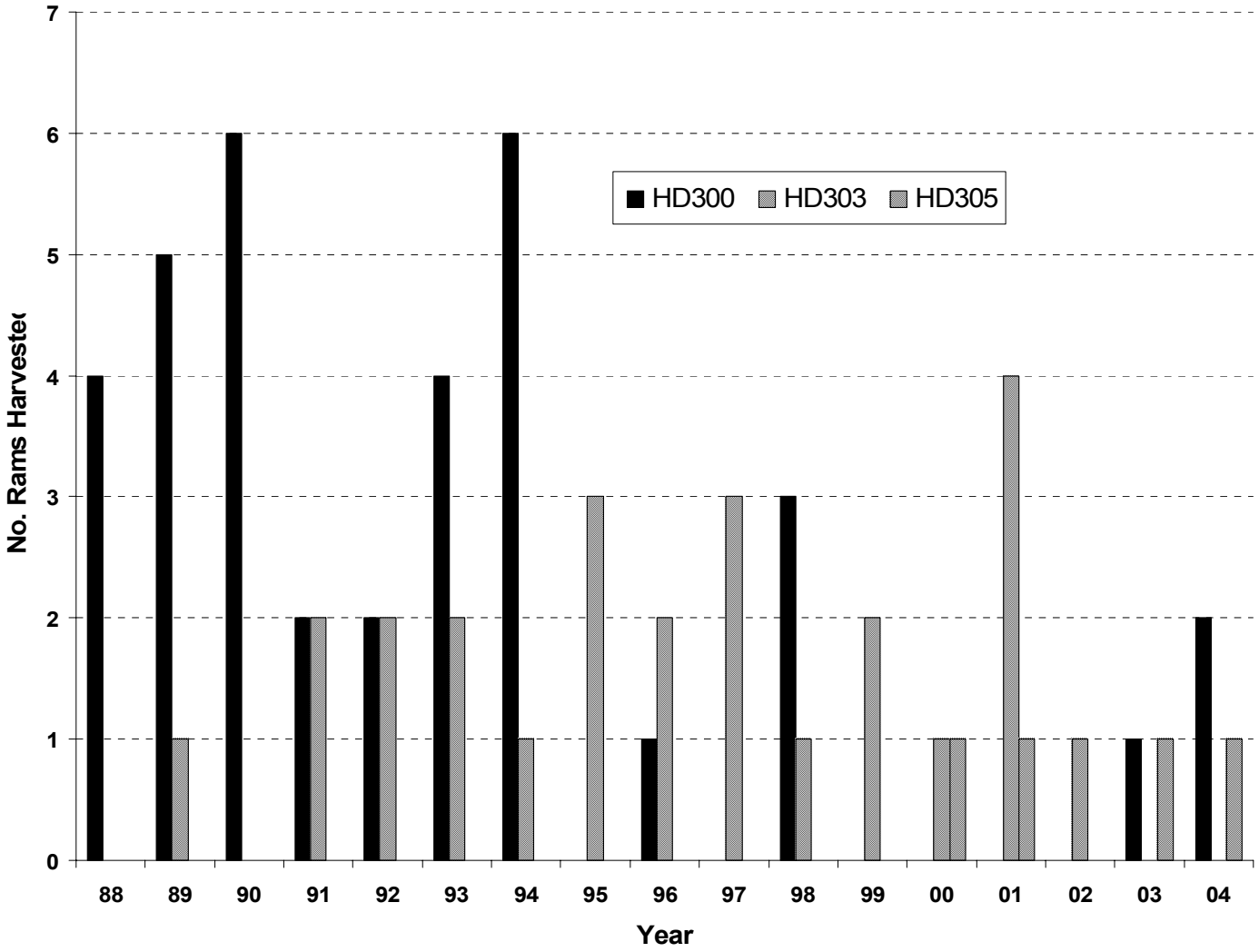

Figure 15. Bighorn sheep harvest in Hunting Districts 300, 303 and 305 during 1988-2004.