# SOUTH DAKOTA MOUNTAIN GOAT MANAGEMENT PLAN, 2018–2022

**SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS**
**PIERRE, SOUTH DAKOTA**

**WILDLIFE DIVISION REPORT 2018–01**
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This document is for general, strategic guidance for the South Dakota Department of Game, Fish and Parks (SDGFP) and serves to identify what we strive to accomplish related to mountain goat management. By itself this document is of little value; the value is in its implementation. This process will emphasize working cooperatively with interested publics in both the planning process and the regular program activities related to mountain goat management. This plan will be used by Department staff and Commission on an annual basis and will be formally evaluated at least every five years. Plan updates and changes, however, may occur more frequently as needed.

**ACKNOWLEDGEMENTS**

This plan is a product of substantial discussion and input from many wildlife professionals and the South Dakota public sector. In addition, those comments and suggestions received from private landowners, hunters, and those who recognize the value of mountain goats and their associated habitats were also considered.

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SDGFP Mountain Goat Management Plan Team that assisted with plan writing, data review and analyses, critical reviews and/or edits to the South Dakota Mountain Goat Management Plan – John Kanta, Brady Neiles, and Chad Switzer.

All text and data contained within this document are subject to revision for corrections, updates, and data analyses.

Cover photo was provided by Chad Lehman (SDGFP).

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DRAFT

**TABLE OF CONTENTS**



DRAFT

**LIST OF TABLES**



DRAFT

## LIST OF FIGURES



DRAFT

## LIST OF ACRONYMS

| | |
|---|---|
| CM | Centimeter |
| CSP | Custer State Park |
| FT | Feet |
| IKC | Infectious Keratoconjunctivitis |
| IN | Inch |
| KM | Kilometer |
| M | Meter |
| MI | Mile |
| MPB | Mountain Pine Beetle |
| N | Sample Size |
| PSI | Detection Probability |
| SDGFP | South Dakota Department of Game, Fish and Parks |
| SE | Standard Error |
| USDA | United States Department of Agriculture |
| USFS | United States Forest Service |

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## EXECUTIVE SUMMARY

Peter Norbeck was instrumental in introducing the mountain goat into the Black Hills in the 1920s. Throughout the early 1900s, mountain goats (*Oreamnos americanus*) were introduced outside of their endemic range into new areas of Alaska, Washington, Oregon, Idaho, Montana, Wyoming, South Dakota, Colorado, Utah, and Nevada. The mountain goat is an impressive mountain ungulate in its ability to negotiate steep terrain and cliffs and it provides hunting and viewing opportunities across the highest elevations of the Black Hills.

This management plan provides important historical background and relevant biological information for the sustainable management of mountain goats. Current mountain goat survey methodology and relevant biological literature are presented, along with a thorough discussion of objectives and strategies to guide management of this important resource into the future. This plan is intended to guide managers and biologists over the next five years, but should be considered a working document that will be amended as new biological and social data provide opportunities to improve management of mountain goat resources in South Dakota.

The management of mountain goats and their habitats can be challenging for wildlife and habitat managers. One challenge facing managers is maintaining open landscapes around granite outcroppings in a heavily forested ponderosa pine (*Pinus ponderosa*) ecosystem. Using tools such as prescribed burning and timber management in these landscapes can enhance mountain goat habitat. Additionally, the mountain pine beetle (*Dendroctonus ponderosae* Hopkins), a native insect, provides a natural disturbance creating habitat. Disease such as *Mycoplasma ovipneumoniae* can occur in bighorn sheep, domestics, and mountain goats in the Black Hills leading to possible deaths from pneumonia for both bighorn sheep and mountain goats. This pathogen has been linked to limiting recruitment of mountain goats in other areas of the west and is a concern for managers.

For the management of mountain goats the following objectives have been identified: 1) maintain, manage, and protect existing mountain goat habitat in the Black Hills; 2) determine status of mountain goat populations; 3) bi-annually review and set mountain goat management objectives; use harvest strategies to manage the population with the available resource; 4) management and monitoring of disease pathogens in mountain goat herds in the Black Hills; 5) continue to use science-based research, habitat inventories, and surveys to answer questions related to mountain goat ecology and public attitudes towards mountain goat management; and 6) inform and educate the public on mountain goat ecology, management, research, and provide viewing opportunities.

The "*South Dakota Mountain Goat Management Plan, 2018-2022*" will serve as the guiding document for decision making and implementation of actions to ensure mountain goat populations and their habitats are managed appropriately. South Dakota Department of Game, Fish and Parks will work closely with Black Hills National Forest, National Park Service, and sportsmen and women to overcome the challenges and take advantage of opportunities regarding the future management of mountain goats in South Dakota.

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## INTRODUCTION AND HISTORICAL BACKGROUND

The mountain goat (*Oreamnos americanus*) is native to the alpine mountain regions of northwestern North America. Its native range occurs from southeastern Alaska south into the Yukon and then south along the Columbia River in Washington and east into Idaho and western Montana (Figure 1; Rideout and Hoffman 1975, Côté and Festa-Bianchet 2003). Throughout the early 1900s, mountain goats were introduced outside of their endemic range into new areas of Alaska, Washington, Oregon, Idaho, Montana, Wyoming, South Dakota, Colorado, Utah, and Nevada (Rideout and Hoffman 1975, Laundré 1991, Côté and Festa-Bianchet 2003).

Their name is misleading as mountain goats are not a true goat and do not belong to the genus *Capra* (Côté and Festa-Bianchet 2003). Mountain goats belong to the family Bovidae, subfamily Caprinae, and tribe Rupicaprini where the Latin translation for *Rupes* is rock or crag, and C*apra* is translated to goat. *O. americanus* is the sole representative of the tribe Rupicaprini in North America. Not only is there little information on their life history through survival and reproduction studies, but there is also considerable dispute regarding the phylogenetic position of the genus *Oreamnos* (Hassanin et al. 1998). Based on cladistics most taxonomists place the mountain goat into a grouping of *Capricornis, Nemorhaedus,* and *Ovibos* (Cronin et al. 1996; Groves and Shields 1996; Hassanin et al. 1998). Côté and Festa-Bianchet (2003) indicate common ancestors of the mountain goat include the goral (*Nemorhaedus goral*), serow (*Capricornis sumatraensis*), and Japanese serow (*Capricornis crispus*) from Asia, and two species of chamois (*Rupicapra rupicapra* and *R. pyrenaica*) from Europe, Turkey, and the Caucasus.

Senator Peter Norbeck was an important historical figure and very influential for wildlife conservation in the state of South Dakota in the early 1900s. After helping to create Custer State Park (CSP), he orchestrated the restoration and reintroduction of many imperiled native species. Peter Norbeck was also instrumental in introducing the mountain goat into the Black Hills. In 1924, CSP obtained six animals from Alberta, Canada and placed them in an enclosure, or zoo, at CSP (Table 1). The mountain goats did not stay in captivity long, as two of the goats, an adult female and a yearling male, escaped the first night. By 1929, all remaining goats had escaped. These goats moved approximately 10 miles northwest onto the Black Elk Peak range (formerly known as Harney Peak). The introduced goats did very well in the granite outcroppings around Black Elk Peak and by the early 1950s there were an estimated 300 to 400 mountain goats. The population remained stable through the 1950s and 60s. From 1954 to 1968, 40 mountain goats were transplanted to Spearfish Canyon in the Black Hills and to the states of Wyoming and Colorado. The population declined through the 1970s likely due to overharvest and transplants. Hunter observations and department surveys conducted in 1981–1982 indicated a substantial decrease in the mountain goat population and by 1983 the mountain goat population was reported to be approximately 80 animals (Benzon and Rice 1987). By the 1990s the mountain goat population increased to an estimated 150 to 170 animals. In the early 2000s the mountain goat population started to decline again in the Black Hills and therefore South Dakota Game, Fish and Parks (SDGFP) captured and translocated 19 mountain goats from Colorado in 2006 and 21 mountain goats from Utah in 2013 (Table 1).

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The close proximity of mountain goat habitat with several tourist destinations affords the public a unique opportunity to view mountain goats in the Black Hills. In CSP, over 1.7 million visitors annually (SDGFP, unpublished data) have the opportunity to view and enjoy the behavior of mountain goats if they visit the Needles Eye area of the park. Mount Rushmore has over 2 million visitors annually (https://www.nps.gov/moru/learn/management/statistics.htm), and mountain goats can be seen in the area of the monument. Over 40,000 people hike Black Elk Peak in the Black Elk Wilderness (formerly Harney Peak; https://www.fs.usda.gov/recarea/blackhills/recarea/?recid=80906) and they have a great opportunity to view mountain goats in that scenic area. Viewable wildlife is an important component for local businesses and agencies in the Black Hills, but it also has its challenges related to disturbance, particularly as it relates to backcountry hiking/rock climbing and overlap with mountain goat parturition and kid rearing sites (see Challenges and Opportunities section).

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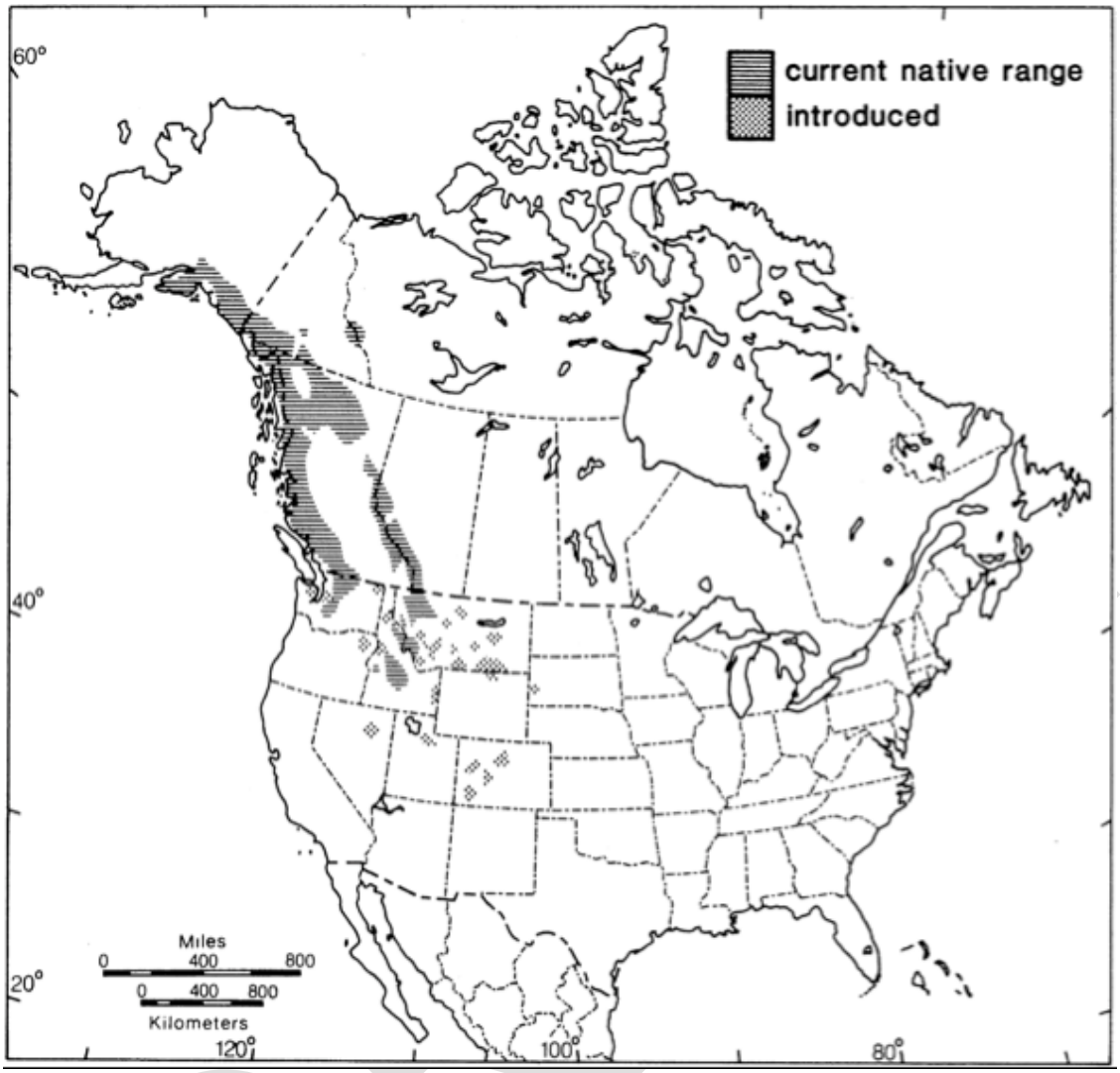


**Figure 1.** Mountain goat native and introduced distribution across North America; it is native from southeastern Alaska into the Yukon and south to the Columbia River in Washington and east into Idaho and western Montana. South Dakota has an introduced population. Map courtesy of Côté and Festa-Bianchet 2003.

**Table 1**. History of mountain goat translocations in South Dakota, 1924-2012.

| Year | Number Translocated | Capture Location | Release Location |
|---|---|---|---|
| 1924 | 6 | Alberta, Canada | Custer State Park, Black Hills, South Dakota |
| 1954 | 6 | Black Hills, South Dakota | Spearfish Canyon, Black Hills, South Dakota |
| 1960 | 8 | Black Hills, South Dakota | Wyoming |
| 1961-1968 | 26 | Black Hills, South Dakota | Colorado |
| 2006 | 19 | Colorado | Black Hills, South Dakota |
| 2013 | 21 | Utah | Black Hills, South Dakota |
| Totals | 86 | | |

**DESCRIPTION, BEHAVIOR, AND VITAL RATES**

Male and female mountain goats are very similar in appearance and both are characterized by a sturdy body with short legs, a coat of long and coarse white hairs during winter, prominent sharp black horns, and a short tail (Figure 2). Their hooves are separated by a large interdigital cleft and a soft pad protrudes beyond the outer cornified shell, which gives them good footing in vertical terrain (Brandborg 1955). The horns are conical in shape and slightly curved posteriorly; males will have larger bases compared to females. Horn curvature also differs between most males and females. Males exhibit a smooth, even curvature throughout the entire length of the horn, while females exhibit the greatest curvature near the tips; most female horns seem to make an abrupt curve about 2/3 of the way to the tips (Cowan and McCrory 1970). Black supraoccipital glands, swollen during the rut and more developed in males than in females, are located just behind the horns.

**Figure 2.** Radio-marked female with winter coat (left) compared to male after hair molt with a summer coat (right). Note the larger bases of horns of the male compared to the female. Black supraoccipital glands, which are typically swollen during the rut, are more developed in males than in females, and are located just behind the horns.

The glands are thought to be used for scent marking during the rut, however little information exists on the glands true function (Geist 1964). Females are fully developed with their mass gain at 6 years of age, whereas males may continue to increase in mass as they age (Côté 1999). Distinctly, at ≥5 years of age, males are roughly 40–60% heavier than females (Houston et al. 1989, Côté 1999). The winter coat (guard hairs can be >7 in long) is shed in May–August and the new hairs start growing before the molt is completed (Brandborg 1955). The summer coat is short (guard hairs 1–2 in long), and hairs develop from June to early fall. Growth of the winter coat is completed by November or early December (Holroyd 1967, Smith 1988). Adult males finish shedding their coat before females which is thought to be related to the energetically expensive process of lactation for females (Robbins 1993).

Breeding occurs from late October to early December, and typically peaks in mid-November (Brandborg 1955, Geist 1964, Chadwick 1983). Timing of the rut may vary according to latitude, but little is known about the mating system of mountain goats (Côté and Festa-Bianchet 2003). Estrus is thought to last roughly 2 days where males follow females and defend them from

other males (Geist 1964). It is not clear whether a male can defend more than one female at a time during breeding. Mountain goats give birth from mid-May to early June, and it is thought that the parturition window is short, where roughly 80% of kids are born within 2 weeks of the first birth (Holroyd 1967, Rideout 1975, Côté and Festa-Bianchet 2001a). Gestation is approximately 190 days (Côté and Festa-Bianchet 2003).

Females in stable populations typically produce a single kid, but varied frequencies of twinning have been reported. Twins have been reported at a frequency of 18% and 33% in British Columbia and Idaho, respectively (Hayden 1984, Foster and Rahs 1985). Interestingly, triplets have been reported when conditions are conducive for rapid population growth (Lentfer 1955). At Caw Ridge, Alberta, there were only 2 cases of twinning observed out of 300 parturitions (Côté and Festa-Bianchet 2003). Certainly, it appears litter size may be related to resource availability as scattered information suggests that twinning is more common in introduced and rapidly growing populations than in either native or established and stable populations (Côté and Festa-Bianchet 2003). Kid production gradually increases for females from 3 through 6 years of age, and then remains stable until about 10 years of age, and finally declines in very old females. At Caw Ridge, Alberta, kid production increased from 4% for females 3 years old to 50% at 4 years old, 74% at 5 years old, and 84% at 6 years old, and then remained stable at roughly 84% until 10 years old, then declined to 73% for females older than 10 years old (Côté and Festa-Bianchet 2001b, Festa-Bianchet and Côté, unpublished data). Similar age-related patterns in productivity have been reported for other goat populations (Bailey 1991). Therefore, age-specific productivity in mountain goats fits the classical, inverse-U shape reported for most ungulates (Gaillard et al. 2000).

Female age structure can be critically important in kid production as older females produce more kids than females <3 years of age. At Caw Ridge, Alberta, the proportion of females 3 years and older seen with a kid ranged from 45% to 85% and averaged 63% from 1991 to 2000 (Côté and Festa-Bianchet 2003). When 2-year-old females were included, the proportion with kids ranged from 39% to 71% and averaged 54.5% (Côté et al. 2001). Transplanted mountain goats had fewer kids (15.4%, $n$ = 10 nannies) than resident mountain goats (57.1%, $n$ = 16 nannies) during a study from 2004-2009 in the Black Hills, but age of females was not compared due to sample size constraints (Broecher 2013).

Survival for the first year of life is typically lower and much more variable than adult survival, as is typical of ungulates (Gaillard et al. 2000, Côté and Festa-Bianchet 2003). Research indicates annual kid survival can vary from 46–92% (Smith 1976, Côté and Festa-Bianchet 2001a). Winter weather, and particularly greater snow depth and longer duration of snow cover can have a negative effect on kid survival (Brandborg 1955, Smith 1976, Chadwick 1983). Survival of yearling and adult mountain goats suggests an age-specific survival pattern similar to that of other ungulates (Gaillard et al. 2000). Survival of yearlings is higher than kid survival but lower than adult survival, male survival is lower than female survival, and survival decreases in older goats of both sexes (Smith 1986). Annual survival of adult females (≥2 years of age) at Caw Ridge, Alberta, varied from 89% to 97%, whereas it ranged from 50% to 94% for adult males (Smith 1986). Annual survival rates ranged from 36–100% for transplanted mountain goats and 70–100% for resident mountain goats from 2004-2009 in the Black Hills (Broecher 2013). The

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effects of predation on a mountain goat herd may vary substantially according to the presence of individual predators that specialize on this species. Puma (*Puma concolor*) predation of radio-marked mountain goats has been documented in the Black Hills (Broecher 2013, SDGFP, unpublished data). Most mountain goat populations are too low in density to provide a consistent prey base for a population of predators, and a single puma, bear (*Ursus spp*.), or wolf (*Canis lupis*) pack that specialized on preying on mountain goats could have a strong negative impact on a local herd (Côté and Festa-Bianchet 2003). Consequently, the effects of predation on mountain goat population dynamics may be density independent (Côté and Festa-Bianchet 2003).

Native mountain goat populations may be susceptible to annual harvest rates greater than 2–3%, possibly because kid production is low and the late age at which first reproduction occurs for females (Côté and Festa-Bianchet 2001b). For native populations in British Columbia and Washington it was recommended that harvest should not exceed 4% of the population (Hebert and Turnbull 1977, Rice and Gay 2010). It is likely that sustainable harvest rates are substantially greater in introduced mountain goat populations with good range conditions and in areas with fewer large carnivores (Côté and Festa-Bianchet 2003). Adams and Bailey (1982) found that an annual harvest rate of 7% was sustainable in an introduced mountain goat population in Colorado, but harvest rates of 7.5% or more would cause the population to decline. Hunting can quickly be an additive source of mortality in native populations if not monitored closely (Hebert and Turnbull 1977, Kuck 1977, Smith 1986, Côté and Festa-Bianchet 2003). Small isolated populations, like the mountain goat population that occurs in the Black Hills, face increased risk of declines that make them particularly susceptible to over-harvest and slow to recover from population declines (Smith and DeCesare 2017). Therefore, wildlife managers should be conservative when setting harvest goals (Côté et al. 2001). Generally, populations of 50 individuals or less should not be harvested, but larger populations (≥100) or those where the proportion of males in the harvest is high (90 to 100%) may sustain ≤4% harvest (Rice and Gay 2010). However, variation of vital rates among years may lead to population declines with harvest at these levels and continued population monitoring is essential for hunted populations (Smith 1986, Côté and Festa-Bianchet 2003, Rice and Gay 2010). A safe management strategy for native populations of mountain goats would be a 2–3% annual harvest with an emphasis on harvesting males where education of hunters to distinguish males from females is taught (Côté and Festa-Bianchet 2003).

**HABITAT SELECTION AND RANGE**

There are a number of hypotheses as to why South Dakota's mountain goat population has fluctuated over time but the leading hypothesis may be related to habitat degradation due to ponderosa pine (*Pinus ponderosa*) encroachment and the potential for increased predation due to lack of visual detection under dense vegetation conditions. Mountain goats live in some of the most rugged terrain in North America, and they need foraging areas close to cliffs or rocky ledges on which they depend to escape predators (Brandborg 1955, McFetridge 1977, Gross et al. 2002, Côté and Festa-Bianchet 2003). Mountain goats often forage in open, grassy alpine meadows and subalpine habitats in their native range (Festa-Bianchet and Côté 2008). Female and juvenile groups rarely wander far from steep, broken, rocky terrain which is often called

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escape terrain (McFetridge 1977). Thus, to avoid predators, mountain goats tend to select foraging sites within 1,300 ft (400 m) of escape terrain that includes rock ledges, outcrops, and cliffs. They may also use escape terrain as birthing sites. In the northern Rocky Mountains, typical elevation ranges from 4,920 to 8,860 ft (1500 to 2,700 m; Smith 1977), but goats can be seen at >13,120 ft (4,000 m) in Colorado (Hibbs 1967). On the west coast of British Columbia and Alaska, some winter ranges are near sea level (Hebert and Turnbull 1977). In the Black Hills, mountain goats inhabit areas where elevations range from 4,000 (1,220 m; Battle Creek) to 7,250 ft (2,210 m; Black Elk Peak). Mountain goats can shift their resource selection patterns in response to changes in food availability because of snow accumulation, moisture, wind, and solar exposure (Wisdom et al. 2000).

Along the scale of grazers to browsers, mountain goats are classed as intermediate browsers (Hofmann 1989). They eat a diversity of forage and diets are similar in summer and winter and are largely dominated by grasses (Saunders 1955, Hibbs 1967, Laundré 1994). Laundré (1994) summarized 10 foraging studies on the feeding habits of mountain goats and found that summer diet included 52% grass, 30% forb, and 16% browse. Goats are generalist herbivores and seem to eat what is available in their respective systems. In the spring, they seek newly growing herbaceous plants (Dailey et al. 1984). In winter, the average diet shifted to 60% grass, 8% forb, and 32% browse (Laundré 1994). Snow cover can also influence diet as forbs and ferns decreased in the diet of mountain goats in southeast Alaska when snow depth increased to >50 cm (Fox and Smith 1988). When forage is restricted in winter, goats may also eat twigs and needles of coniferous trees such as Engelmann spruce (*Picea engelmanii*) and alpine fir (*Abies lasiocarpa*; Saunders 1955, Geist 1971, Adams and Bailey 1983, Fox and Smith 1988). Substantial use of lichens and mosses in winter was documented in South Dakota and southeast Alaska (Harmon 1944, Fox and Smith 1988).

The core area for mountain goats in the Black Hills occurs from the town of Custer, South Dakota, and northeast with Mount Rushmore and Black Elk Peak near the center of the core area (Figure 3). Important core area range also occurs into the Grizzly Creek drainage near Keystone, South Dakota. The primary range extends over 107,000 acres as of 2017. Mountain goats utilize the granite outcroppings found in this area. During the morning hours they feed at the base of these outcroppings in open areas, and then move to the top during the day to sun themselves when cool, or utilize caves and crevices to find shade when hot (SDGFP, unpublished data).

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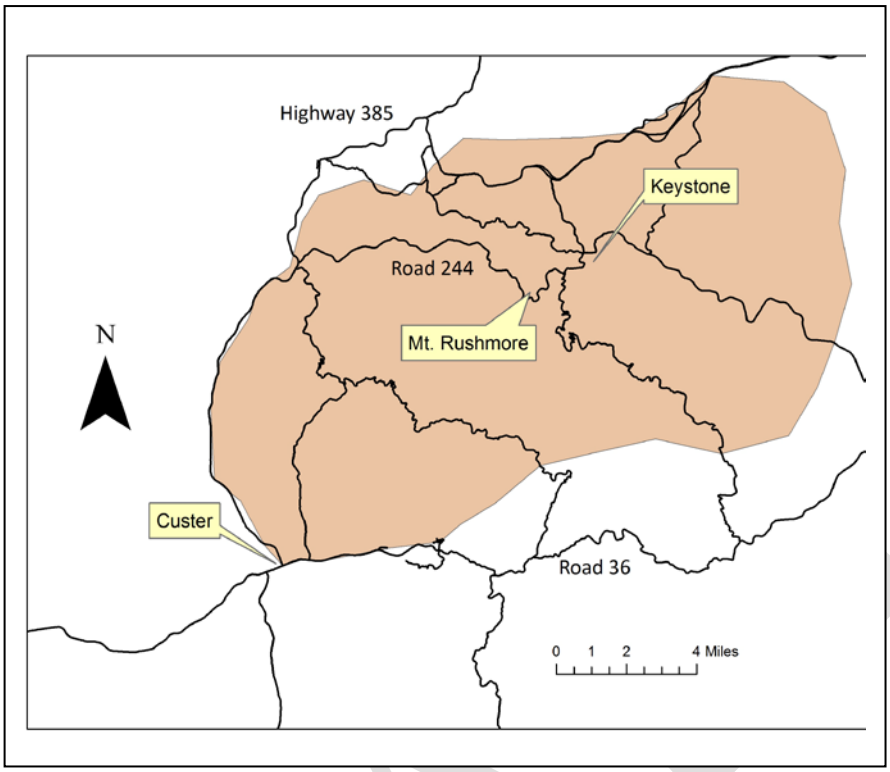


**Figure 3.** Mountain goat core use area in the Black Hills of South Dakota. Their primary range includes granite outcroppings and extends over 107,000 acres.

## SURVEYS AND MONITORING

Prior to helicopter surveys in 2007, surveys of mountain goats included baiting and trapping, ground counts, and harvest information (Richardson 1971). The first aerial survey to estimate the mountain goat population in South Dakota was conducted in 1983. Benzon and Rice generated population estimates in 1986 and 1987 using helicopter aerial survey and mark-resight methodology. Population estimates from 1994–2006 were obtained from aerial surveys conducted with a helicopter. Minimum counts from the survey were adjusted using a detection probability generated from research conducted from 1983–1986 (Benzon and Rice 1987). Population estimates prior to 2007 surveys indicate the Black Hills population has fluctuated greatly from 80–400 animals from the 1940s through the 1980s (Richardson 1971, Benzon and Rice 1987). Mountain goat abundance estimates have been generated through aerial surveys using helicopters and radio-collared mountain goats since 2007 (Table 2). The mean detection rate from 2007-2013 was 0.189 (SE = 0.02, n = 270 individuals over 18 flights). The mean resighting rate was 0.39 for marked animals (SE = 0.10) in 2014, and 0.36 (SE = 0.10) in 2016 with detection being greater than observed from 2007–2013. A Hughes MD500D helicopter was not used until 2012. This helicopter allows observers to fly lower and slower which may explain why detection rates increased in recent surveys. If the radiomarked sample size of mountain goats gets so small as to preclude estimating population size using mark-resight, managers will utilize minimum counts and occupancy modeling data to set seasons.

**Table 2**. Survey data for estimating abundance for mountain goats in the Black Hills, South Dakota, 1948-2016.

| Year | Minimim Count | Population Estimate | 95% Confidence Interval | Method[a] |
|---|---|---|---|---|
| 1948 | - | 64 | NA | Ground count |
| 1951 | - | 337 | NA | Ground count |
| 1983 | 41 | - | NA | Helicopter |
| 1984 | 12 | - | NA | Helicopter |
| 1985 | 34 | - | NA | Helicopter |
| 1986 | 26 | 115 | NA | Helicopter |
| 1987 | 31 | 125 | NA | Helicopter |
| 1988-1990 | - | - | - | - |
| 1991 | - | 150-170 | NA | Ground count |
| 1992-1993 | - | - | - | - |
| 1994 | 54 | 157-234 | NA | Helicopter |
| 1995 | 68 | 213 | NA | Helicopter |
| 1996 | 43 | 197 | NA | Helicopter |
| 1997 | 38 | 170-190 | NA | Helicopter |
| 1998 | 18 | 140-180 | NA | Helicopter |
| 1999 | 32 | 140-180 | NA | Helicopter |
| 2000 | 47 | 140-180 | NA | Helicopter |
| 2001 | 15 | 140-180 | NA | Helicopter |
| 2002 | 25 | 160 | NA | Helicopter |
| 2003 | 26 | 150 | NA | Helicopter |
| 2004 | 15 | 125 | NA | Helicopter |
| 2005 | 21 | 90 | NA | Helicopter |
| 2006 | 20 | 70 | NA | Helicopter |
| 2007 | 15 | 62 | 53-71 | Helicopter-Sightability |
| 2008 | 23 | 71 | 60-81 | Helicopter-Sightability |
| 2009 | 20 | 56 | 48-65 | Helicopter-Sightability |
| 2010 | 23 | 76 | 64-88 | Helicopter-Sightability |
| 2011 | 18 | 55 | 46-63 | Helicopter-Sightability |
| 2012 | 34 | 104 | 89-120 | Helicopter-Sightability |
| 2013 | 37 | 111 | 95-127 | Helicopter-Sightability |
| 2014 | 99 | 121 | 99-207 | Helicopter-Log-normal Mark-Resight |
| 2016 | 106 | 133 | 106-236 | Helicopter-Log-normal Mark-Resight |

[a]Ground counts were used from 1948–1951. A helicopter survey was used from 1983–2006 using a mix of mark-resight and detection probability adjustments. Using helicopters, a sightability model was used to estimate population size using radio-collars and the mean detection rate from several flights conducted from 2007–2013. Using helicopters from 2014–2016, a Poisson log-normal mark-resight estimate was used to estimate population size from radio-marked mountain goats.

Additionally, mountain goat age and gender ratio estimates have been collected from the ground using binoculars to count mountain goats in the core area of their range since 2014. Data are collected by volunteers and department staff in late April. Mature billy:mature nanny ratios have varied from 0.19–0.44, and the kid:mature nanny ratios have varied from 0.23–0.93 (Table 3).

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**Table 3**. Survey data from ground counts in the Black Hills, South Dakota, 2014-2016.

| Year | Mature Billy:Mature Nanny Ratio | Kid:Mature Nanny Ratio | Method |
|---|---|---|---|
| 2014 | 0.19 | 0.23 | Ground Counts |
| 2015 | 0.44 | 0.93 | Ground Counts |
| 2016 | 0.39 | 0.31 | Ground Counts |

Occupancy estimates have also been generated with data collected during helicopter aerial surveys (Table 4). We provide estimates across 2 time periods for both detection probability (psi) and also for occupancy lambda, or growth in occupancy (lambda). We have data from 2013-2014 and from 2014-2016. Occupancy lambda of mountain goats has been positive since we started collecting occupancy data in 2013.

**Table 4**. Occupancy estimates using aerial surveys for mountain goats in the Black Hills, South Dakota, 2013-2016.

| Time Period | PSI (Detection Probability) (95% CI) | Lambda (Occupancy Estimate) (95% CI) |
|---|---|---|
| 2013-2014 | 0.39 (0.29-0.49) | 1.30 (0.93-1.68) |
| 2014-2016 | 0.45 (0.32-0.57) | 1.15 (1.01-1.29) |

## MOUNTAIN GOAT HUNTING- HISTORICAL HARVESTAND LICENSES

Mountain goats are hunted in a hunting unit located in the Black Hills (Figure 4). The first season for mountain goats was held in 1967 and 25 licenses were offered (Figure 5, Table 5). Licenses were decreased to 15 in 1971 and there were no seasons held in 1972, 1974 and 1975 likely due to overharvest, particularly of nannies and the reduction in herd size from transplanting mountain goats in the 1960s (Benzon and Rice 1987). The mountain goat season was closed from 1982–1984 due to a declining population. The season reopened again in 1985 with a limited harvest compared to prior seasons. The season was closed once again from 2007–2014 due to a decline in the population. Since 2015, there have been 2 licenses offered each year to hunters (Figure 6). In 2016, the mark-resight mountain goat population estimate was 133, and a harvest of 2 males was 1.5% of the population, a conservative harvest based on recommendations for harvest in native populations (Côté and Festa-Bianchet 2003, Rice and Gay 2010).

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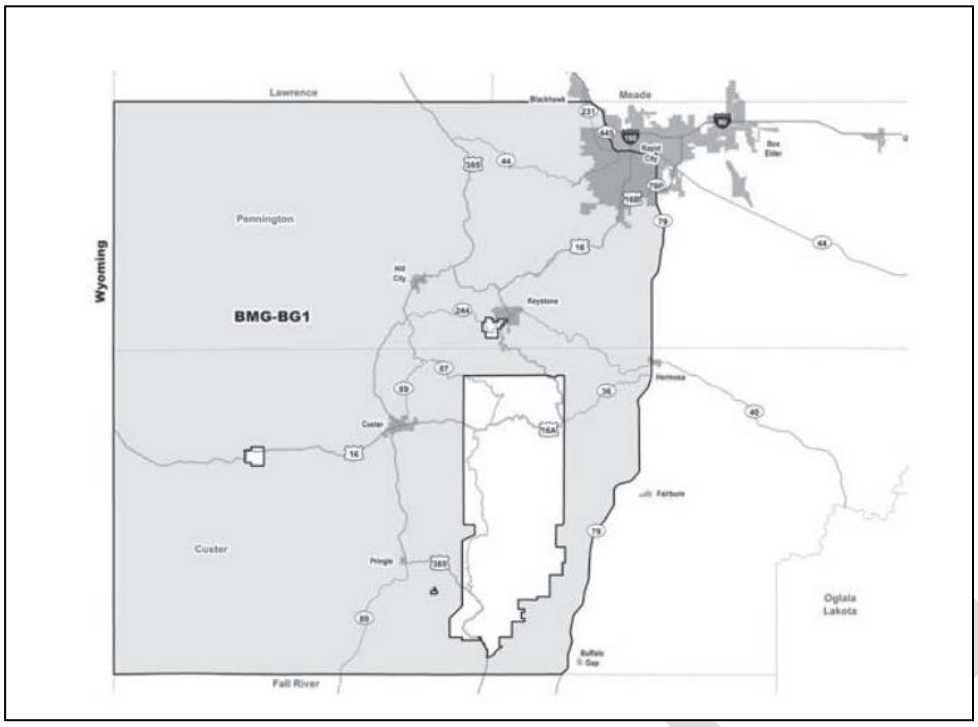


**Figure 4.** Mountain Goat Hunting Unit Map for South Dakota in 2017.

**Figure 5.** Mountain goat harvested from first hunting season in 1967.

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**Figure 6.** Mountain goat harvested from 2016 season.

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**Table 5**. Historical harvest of mountain goats in the Black Hills, South Dakota, 1967-2016.

| Year | Licenses Issued | Total Harvest | Male | Female | Unknown |
|---|---|---|---|---|---|
| 1967 | 25 | 24 | 13 | 11 | 0 |
| 1968 | 25 | 21 | 13 | 8 | 0 |
| 1969 | 25 | 24 | 19 | 5 | 0 |
| 1970 | 25 | 24 | 14 | 10 | 0 |
| 1971 | 15 | 12 | 5 | 7 | 0 |
| 1972 | | | No Season | | |
| 1973 | 15 | 12 | 3 | 9 | 0 |
| 1974-1975 | | | No Season | | |
| 1976 | 15 | 12 | 4 | 8 | 0 |
| 1977 | 10 | 9 | 1 | 1 | 7 |
| 1978 | 10 | 9 | 4 | 5 | 0 |
| 1979 | 10 | 10 | 6 | 4 | 0 |
| 1980 | 10 | 10 | 6 | 4 | 0 |
| 1981 | 10 | 10 | 8 | 2 | 0 |
| 1982-1984 | | | No Season | | |
| 1985 | 4 | 4 | 3 | 1 | 0 |
| 1986 | 3 | 3 | 2 | 1 | 0 |
| 1987 | 5 | 5 | 5 | 0 | 0 |
| 1988 | 5 | 5 | 4 | 1 | 0 |
| 1989 | 5 | 5 | 1 | 4 | 0 |
| 1990 | 4 | 4 | 3 | 1 | 0 |
| 1991 | 4 | 4 | 4 | 0 | 0 |
| 1992 | 4 | 4 | 2 | 2 | 0 |
| 1993 | 4 | 4 | 3 | 1 | 0 |
| 1994 | 4 | 4 | 3 | 1 | 0 |
| 1995 | 4 | 4 | 3 | 1 | 0 |
| 1996 | 5 | 5 | 1 | 4 | 0 |
| 1997 | 4 | 4 | 3 | 1 | 0 |
| 1998 | 4 | 4 | 4 | 0 | 0 |
| 1999 | 4 | 4 | 4 | 0 | 0 |
| 2000 | 4 | 3 | 3 | 0 | 0 |
| 2001 | 4 | 4 | 2 | 2 | 0 |
| 2002 | 3 | 3 | 2 | 1 | 0 |
| 2003 | 3 | 3 | 1 | 2 | 0 |
| 2004 | 3 | 3 | 1 | 2 | 0 |
| 2005 | 2 | 2 | 0 | 2 | 0 |
| 2006 | 2 | 1 | 0 | 1 | 0 |
| 2007-2014 | | | No Season | | |
| 2015 | 2 | 2 | 1 | 1 | 0 |
| 2016 | 2 | 2 | 2 | 0 | 0 |
| Total | 283 | 263 | 153 | 103 | 7 |

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## CHALLENGES AND OPPORTUNITIES

### Habitat

Landscape use of mountain goats in most of their native range includes extremely remote and rugged alpine and subalpine habitats (Festa-Bianchet and Côté 2008). Mountain goats can also survive in lower elevation habitats along coastal areas (Hebert and Turnbull 1977). The Black Hills lies outside the native range of mountain goats and is not typical mountain goat habitat. This poses some challenges in providing conditions suitable for their survival and reproduction. When compared to the native range of mountain goats, the Black Hills are characterized by lower elevations with a dominant ponderosa pine vegetation community that regenerates seedlings at a fast rate (Shepperd and Battaglia 2002). These conditions are most likely not optimal for mountain goat survival and reproduction. However, mountain pine beetle (MPB) (*Dendroctonus ponderosae* Hopkins) epidemics have created a natural disturbance with significant tree mortality creating openings in the overstory in much of the mountain goat core area (Figure 7). Mountain pine beetle disturbance has occurred in areas with steep, rugged terrain, or areas with rugged granite outcroppings in the core area of mountain goats since 2004, and such a disturbance may have provided improved conditions to enhance mountain goat vital rates. Removal of dense ponderosa pine stands immediately adjacent to or in their escape cover could have improved the ability of mountain goats to visually detect predators. Further, foraging habitat may have improved due to the removal of the overstory. Since 2007, we have documented potential increases in mountain goat populations that correlates with MPB disturbance in their core area (Tables 2–4, Figure 7).

Wildfires have also proven to be responsible in creating habitat for mountain goats in the Black Hills. A prime example was the Battle Creek wildfire of 2002. This wildfire burned approximately 11,300 acres primarily in the Battle Creek drainage adjacent to the historic mountain goat core area (Figure 3). Within approximately two years, mountain goats inhabited the burn area and were observed utilizing the area in all seasons including parturition in the spring.

Collaborating with the United States Forest Service (USFS), National Park Service, and private landowners to prevent future pine regeneration in rugged granite outcropping areas will be an important habitat management strategy. Although much of the mountain goat core range is within wilderness or inoperational areas for timber management, programs such as mechanical thinning of pine regeneration or prescribed burning can be used to maintain the open conditions necessary for their enhanced survival and recruitment. There has been some limited opportunity to implement patch clear cut timber management in the mountain goat core range. A few patch clear cuts were implemented by the USFS in the late 2000s in the mountain goat core range. Patch clear cut timber management adjacent to escape terrain or rugged outcroppings in mountain goat core range will be an important habitat management practice to pursue into the future.

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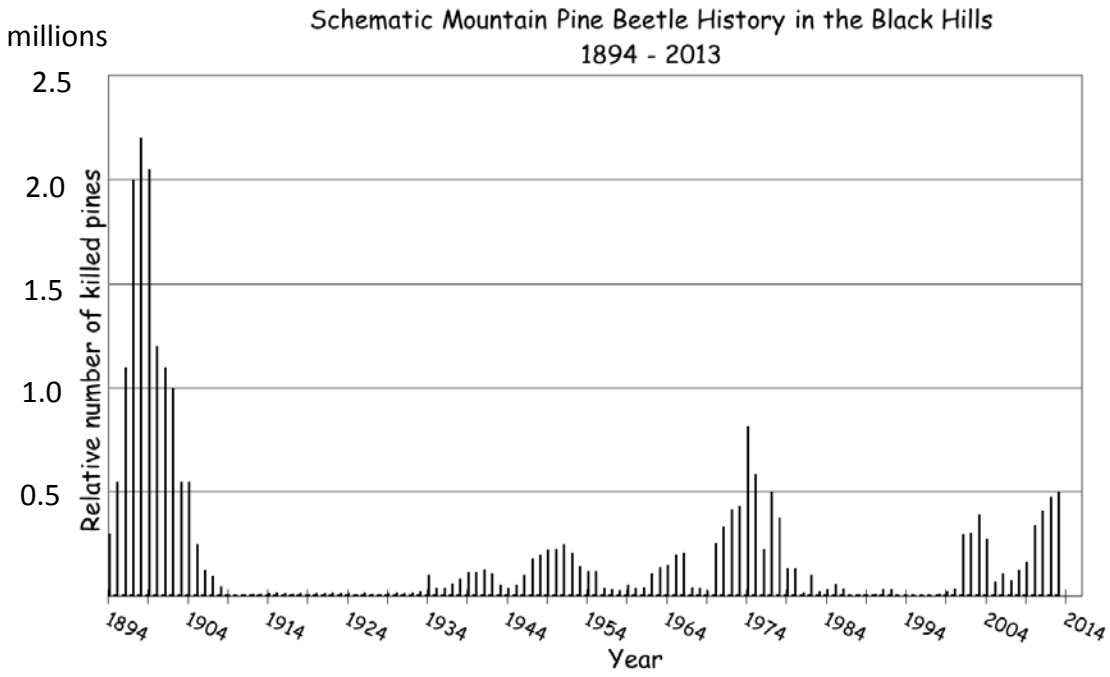


**Figure 7.** Within the forests of the Black Hills, there has been a continuous endemic and several epidemics of MPBs over the last 120–125 years. There is an uncertainty about how many trees were killed but estimates have been provided by Graves (1899), Hopkins (1910), Murdock (1910), Furniss (1997), Thompson (1975), Lessard et al. (1987), Freeman (2015), Harris (2003, 2004, 2005, 2006, 2010, 2011, 2012, 2013, 2014), and Harris et al. (2001, 2002).

**Human Encroachment of Mountain Goat Habitat**

The increasing demand for use of public lands for recreational activities has contributed to mounting anthropomorphic pressure on remote public lands worldwide (Knight and Guzwiller 1995, Buckley 2004). Mountain goats are sensitive to human disturbances and likely modify their use of space as a result of these recreational activities (Côté et al. 2013, Richard and Côté 2016). Female mountain goats appear to cover larger areas as an antipredator strategy and when some of their habitats are destroyed or rendered unusable by human disturbance mountain goats can be forced to use a smaller area (Festa-Bianchet and Côté 2008). A study of mountain goat ecology related to human disturbance on Caw Ridge in Alberta, Canada provides evidence that a reduction in habitat could increase mortality of mountain goats by removing potential areas of dispersion, or by decreasing their areas of use. If goats had fewer areas of escape terrain, and were located at predictable locations they were more susceptible to puma predation (Festa-Bianchet and Côté 2008). Caw Ridge in Alberta is similar to the Black Hills in that it has limited escape terrain and it is critical that those areas remain secure from human disturbance as to not increase the probability of predation risk (Festa-Bianchet and Côté 2008). The road density for the Black Hills National Forest averages 5.15 mi/mi$^2$ (3.2 km/km$^2$; T. Mills, Black Hills National Forest, personal communication); many of the road systems receive moderate to high vehicle traffic during spring and summer (Montgomery et al. 2013). Current

road densities in the Black Hills are over 4 times higher than the national average for USFS National Forests from across the United States (United States Department of Agriculture [USDA] Forest Service 2017; https://www.fs.usda.gov/activity/blackhills/recreation/hiking). In addition to the road systems, there are 450 miles of hiking trails (USDA Forest Service 2017; https://www.fs.usda.gov/activity/blackhills/recreation/hiking). Given the sensitivity of mountain goats to human disturbance it would seem reasonable that such high road and trail system density in the Black Hills has the potential to modify their behavior and space use. Mountain goats are highly susceptible to human disturbance and can suffer from increased predation when prevented from using certain sections of their traditional range (Festa-Bianchet and Côté 2008). The most sensitive time of disturbance occurs during mountain goat parturition when females become solitary, disperse to remote escape terrain, and avoid predation and human disturbance during the birthing and bonding process (Festa-Bianchet and Côté 2008). Displacement of mountain goats from important parturition sites or kid rearing sites during this sensitive bonding period could have negative consequences for kid survival (Festa-Bianchet and Côté 2008). Remote hiking in the Black Elk Wilderness and interest in rock climbing has increased significantly over the last 20 years, particularly in the mountain goat core area. Habitat vital to mountain goat parturition, kid rearing, escape terrain and predator avoidance is also prime locations for hiking and rock climbing in the Black Hills. It is hypothesized that rock climbing may present a significant disturbance to mountain goats in their core area and may play a role in the decreased survival of kids in the Black Hills. Rodrick and Milner (1991) recommend that recreational activities that occur within 1.0 mi (1.6 km) of any winter or breeding range be evaluated for potential wildlife disturbance and potential space use conflicts. Richard and Côté (2016) recommend limiting human disturbance from recreation within a 0.62 mi (1-km) buffer radius of mountain goat use areas. As trail and road systems are proposed or altered it would be important to evaluate mountain goat space use in that decision-making process.

**Disease**

Contagious ecthyma, also referred to as sore mouth, is a viral disease typically found in domestic sheep and goats which can cause a sore mouth, lesions on lips, muzzle, and occasionally on the udder and hooves (Samual et al. 1975). This disease has been documented in both mountain goats and bighorn sheep (*Ovis canadensis*) and can lead to death in both species (Samual et al. 1975). Contagious ecthyma has not been documented in mountain goats in the Black Hills.

Infectious keratoconjunctivitis (IKC or pinkeye) caused by an infection with *Mycoplasma conjunctivae* is an ocular disease that can cause temporary or permanent blindness in mountain goats (Jansen et al. 2006, Jones 1991). Pinkeye is a highly contagious infection that spreads through contact and is common in domestic sheep and goats (Giacometti et al. 2002). Signs of pinkeye include watery, red swollen eyes, and cloudiness in the white part of the animal's eyes. As pinkeye progresses there is commonly swelling and tearing in the eyes and yellow or green pus will drain from the eyes and dry into crusts (Thorne 1982). Mountain goats infected with pinkeye may have difficulties foraging and are susceptible to falls from rugged habitat. Blindness caused by IKC has been documented in mountain goats in the Black Hills. To our

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knowledge this has not been previously documented in North America with mountain goats. However, cases of this disease in other wild Caprinae such as the Pyrenean chamois (*Rupicapra pyrenaica*) in Spain have led to deaths due to blindness, corneal opacity, and ulceration (Marco et al. 2009). This disease is a common ocular infection of domestic sheep and goats, but it also occurs frequently in wild Caprinae such as Alpine chamois (*Rupicapra rupicapra*), Alpine ibex (*Capra ibex*), European mouflon (*Ovis orientalis musimon*), and Himalayan tahr (*Hemitragus jemlahicus*; Giacometti et al. 2002). In North America, IKC has been documented in mule deer (*Odocoileus hemionus*; Taylor et al. 1996), white-tailed deer (*Odocoileus virginianus*; Thorne 1982), pronghorn (*Antilocapra americana*; Thorne 1982), moose (*Alces alces*; Thorne 1982), and bighorn sheep (Bear and Jones 1973, Jansen et al. 2006).

A potentially more concerning threat is *Mycoplasma ovipneumoniae* which can occur in bighorn sheep, domestics, and mountain goats in the Black Hills leading to possible deaths from pneumonia for both bighorn sheep and mountain goats. Pneumonia deaths related to *Mycoplasma ovipneumoniae* and other forms of bacteria have been the primary mortality factor limiting bighorn sheep herds in the Black Hills (T. Haffley, SDGFP, personal communication, Smith et al. 2014) and throughout the west (Tom Besser, Washington State University, personal communication). This pathogen has been linked to limiting recruitment of kids in a population of mountain goats in Nevada (P. Wolff, Nevada Department of Wildlife, personal communication). Bighorn sheep herds in the East Humboldt Range and Ruby Mountains of Nevada have suffered an all-age pneumonia die-off with an estimated loss of 90% in each herd and sympatric mountain goats also experienced pneumonia with an estimated 10–20% loss in both herds (P. Wolff, Nevada Department of Wildlife, personal communication). This particular strain of *Mycoplasma ovipneumoniae* in Nevada appeared to influence bighorn sheep vital rates more dramatically than mountain goats. However, the East Humboldt herd in Nevada has had poor kid recruitment since the initial die-off (P. Wolff, Nevada Department of Wildlife, personal communication). The Willard Mountain mountain goat population in Utah has tested positive for *Mycoplasma ovipneumoniae* but their vital rates and population growth do not appear to be negatively affected (R. Robinson, Utah Division of Wildlife Resources, personal communication). A mountain goat tested positive for a new strain of *Mycoplasma ovipneumoniae* in the Black Hills in 2016 and we will continue to monitor the influence such pathogens may have on mountain goats in the Black Hills. Unfortunately, mountain goats may be a reservoir for transmission of a new strain of *Mycoplasma ovipneumoniae* to populations of bighorn sheep, and vice-versa, and is a concern for wildlife managers. Continued monitoring and research of the disease, and its various strains in the Black Hills, may provide insights into potential for disease transfer and implications for population growth for both species.

## GOALS, OBJECTIVES & STRATEGIES

### Guiding Principles

The following statements have guided the development of the mountain goat management plan goals and objectives and reflect the collective values of the SDGFP in relation to management of mountain goats in South Dakota:

DRAFT

- that wildlife, including mountain goats, contributes significantly to the quality of life in South Dakota and therefore must be sustained for future generations.
- that recreational hunting is a legitimate use of mountain goats, and must be encouraged and preserved.
- that the collaboration among various agencies, including the National Park Service, USFS and the State, is critical for the future of mountain goats and their habitats in the Black Hills, and is deserving of recognition and respect.
- that reasonable regulations are necessary for equitable distribution of the benefits of wildlife, including mountain goats, and to promote ethical and safe behavior.
- that the future of wildlife, including mountain goats, depends on a public that appreciates, understands, and supports wildlife and in the public's right to participate in decisions related to wildlife issues.

## GOALS, OBJECTIVES & STRATEGIES

The goal for mountain goat management in South Dakota is to maximize user opportunity while maintaining populations consistent with ecological, social, aesthetic, and economic values of the people of South Dakota and our visitors.

### Objectives and Strategies

**Objective 1.** Maintain, manage, and protect existing mountain goat habitat in the Black Hills.

Strategy A: Maintain existing partnerships with the USFS, and other state, local, and private conservation partners to support programs and practices encouraging proper mountain goat habitat management on public and private lands.

Strategy B: Continue to support and utilize SDGFP's forest service liaison position in USFS planning processes to assure mountain goat habitat needs are considered.

**Objective 2.** Determine status of mountain goat populations.

Strategy A: Annually implement surveys including ground and hunter harvest.

Strategy B: Bi-annually conduct helicopter aerial survey utilizing a Hughes MD500D helicopter to obtain minimum counts and generate occupancy estimates.

Strategy C: Supplement survey data with research findings when available.

**Objective 3.** Bi-annually review and set mountain goat management objectives; use harvest strategies to manage the population with the available resource.

DRAFT

Strategy A: Bi-annually review mountain goat harvest strategies, license allocation, hunting unit boundaries, and develop 2-year hunting recommendations based on available biological data, public input, and staff recommendations.

Strategy B. Harvest will not exceed 4% of the minimum number counted within the mountain goat core area as determined during bi-annual surveys. When the minimum number counted reaches less than 50 individuals the season will be closed. Other demographic data can be used in assessing season closures and the season can be closed with minimum counts of greater than 50.

**Objective 4.** Manage and monitor disease pathogens in mountain goat herds in the Black Hills.

Strategy A. Continue to inventory and document domestic sheep and goats in areas adjacent to mountain goat herds.

Strategy B. Work with conservation organizations to develop cooperative programs to discourage domestic sheep and goat ownership in areas adjacent to mountain goat herds.

Strategy C. Manage and monitor mountain goat disease events and attempt to mitigate losses of goats through disease mitigation management when feasible; implement testing and removal of mountain goats that are identified as shedders of *Mycoplasma ovipneumoniae* in populations that are experiencing pneumonia die-offs in an attempt to recover these populations at a faster rate.

**Objective 5.** Continue to use science-based research, habitat inventories, and surveys to answer questions related to mountain goat ecology and public attitudes towards mountain goat management.

Strategy A: Annually evaluate and prioritize research/survey needs. Develop research/survey proposals and seek funding opportunities.

Strategy B: Use research/survey findings to guide mountain goat management where available and feasible.

**Objective 6**. Inform and educate the public on mountain goat ecology, management, research, and provide viewing opportunities.

Strategy A: Provide an electronic copy of the "South Dakota Mountain Goat Action Plan 2018–2022" on the department's website. Printed copies will be available upon request by March 2018.

DRAFT

Strategy B: Use all available media to educate and inform the public regarding mountain goat status, ecology, and harvest.

Strategy C: Brief mountain goat hunters annually in accurately determining gender of mountain goats and encourage harvest of males as harvest of females contributes to additive mortality.

Strategy D: Promote viewability of mountain goats for the enjoyment of the public. Opportunities exist where tourism viewsheds such as Mount Rushmore and the Needles Eye provide the public a unique setting to observe their behavior as a quality experience.

DRAFT

**Table 6.** Implementation schedule and primary responsibility.

| Goals, Objectives & Strategies | 2018 | 2019 | 2020 | 2021 | 2022 | Primary Responsibility |
|---|---|---|---|---|---|---|
| **GOAL:** The goal for mountain goat management in South Dakota is to maximize user opportunity while maintaining populations consistent with ecological, social, aesthetic, and economic values of the people of South Dakota and our visitors. | | | | | | |
| **OBJECTIVE 1:** Maintain, manage, and protect existing mountain goat habitat in the Black Hills. | | | | | | |
| **Strategies** | | | | | | |
| **Strategy A:** Maintain existing partnerships with the US Forest Service, and other state, local, and private conservation partners to support programs and practices encouraging proper mountain goat habitat management on public and private lands. | ✓ | ✓ | ✓ | ✓ | ✓ | Senior Biologist<br>Regional Wildlife Manager<br>Administration<br>Habitat Program Administrator<br>USFS–SDGFP liaison |
| **Strategy B:** Continue to support and utilize SDGFP's forest service liaison position in USFS planning processes to assure mountain goat habitat needs are considered. | ✓ | ✓ | ✓ | ✓ | ✓ | Administration<br>Reg. Terrestrial Res. Supervisor<br>Habitat Program Administrator<br>USFS–SDGFP liaison |
| **OBJECTIVE 2:** Determine status of mountain goat populations. | | | | | | |
| **Strategies** | | | | | | |
| **Strategy A:** Annually implement surveys including ground and hunter harvest. | ✓ | ✓ | ✓ | ✓ | ✓ | Regional Wildlife Manager<br>Senior Biologist<br>Harvest Survey Coordinator |
| **Strategy B**. Bi-annually conduct helicopter aerial survey utilizing Hughes MD500D helicopter to obtain minimum counts and generate occupancy estimates. | ✓ | | ✓ | | ✓ | Regional Wildlife Manager<br>Senior Biologist<br>Harvest Survey Coordinator |
| **Strategy C**. Supplement survey data with research findings when available | ✓ | ✓ | ✓ | ✓ | ✓ | Senior Biologist<br>Regional Wildlife Manager |
| **OBJECTIVE 3:** Bi-annually review and set mountain goat management objectives; use harvest strategies to manage the population with the available resource. | | | | | | |
| **Strategies** | | | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| **Strategy A:** Bi-annually review mountain goat harvest strategies, license allocation, hunting unit boundaries, and develop 2-year hunting recommendations based on available biological data, public input, and staff recommendations. | | ✓ | | ✓ | | Senior Biologist<br>Reg. Terrestrial Res. Supervisor<br>Regional Wildlife Manager<br>Administration |
| **Strategy B:** Hunting can quickly be an additive source of mortality in mountain goat populations, particularly when nannies are harvested. Harvest will not exceed 4% of the minimum number counted within the mountain goat core area as determined during bi-annual surveys. When the minimum number counted reaches less than 50 individuals the season will be closed. If surveys indicate poor kid recruitment and/or a population with proportionally fewer mature nannies of reproductive age, the season can be closed with minimum counts of greater than 50. | ✓ | ✓ | ✓ | ✓ | ✓ | Senior Biologist<br>Reg. Terrestrial Res. Supervisor<br>Regional Wildlife Manager<br>Administration |
| **OBJECTIVE 4:** Management and monitoring of disease pathogens in mountain goat herds in the Black Hills. | | | | | | |
| **Strategies** | | | | | | |
| **Strategy A:** Continue to inventory and document domestic sheep and goats in areas adjacent to mountain goat herds. | ✓ | ✓ | ✓ | ✓ | ✓ | Regional Wildlife Manager<br>Reg. Terrestrial Res. Supervisor |
| **Strategy B**. Work with conservation organizations to develop cooperative programs to discourage domestic sheep and goat ownership in areas adjacent to mountain goat herds. | ✓ | ✓ | ✓ | ✓ | ✓ | Regional Wildlife Manager<br>Reg. Terrestrial Res. Supervisor |
| **Strategy C**. Manage and monitor mountain goat disease events and attempt to mitigate losses of goats through disease mitigation management when feasible; implement testing and removal of mountain goats that are identified as shedders of *Mycoplasma ovipneumoniae* in populations that are experiencing pneumonia die-offs in an attempt to recover these populations at a faster rate. | ✓ | ✓ | ✓ | ✓ | ✓ | Senior Biologist<br>Regional Wildlife Manager<br>Reg. Terrestrial Res. Supervisor |
| **OBJECTIVE 5:** Continue to use science-based research, habitat inventories, and surveys to answer questions related to mountain goat ecology and public attitudes towards mountain goat management. | | | | | | |
| **Strategies** | | | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| **Strategy A:** Annually evaluate and prioritize research/survey needs. Develop research/survey proposals and seek funding opportunities. | ✓ | ✓ | ✓ | ✓ | ✓ | Reg. Terrestrial Res. Supervisor<br>Regional Wildlife Manager<br>Senior Biologist |
| **Strategy B:** Use research/survey findings to guide mountain goat management where available and feasible. | ✓ | ✓ | ✓ | ✓ | ✓ | Reg. Terrestrial Res. Supervisor<br>Regional Wildlife Manager<br>Senior Biologist |
| **OBJECTIVE 6:** The SDGFP will inform and educate the public on mountain goat ecology, management, and research. | | | | | | |
| **Strategies** | | | | | | |
| **Strategy A:** By March 2018, provide an electronic copy of the "South Dakota Mountain Goat Action Plan 2018–2022" on the department's website. Printed copies will be available upon request. | ✓ | | | | | Communications Staff |
| **Strategy B:** Use all available media to educate and inform the public regarding mountain goat status, ecology, and harvest. | ✓ | ✓ | ✓ | ✓ | ✓ | Communication Staff |
| **Strategy C**: Brief mountain goat hunters annually in accurately determining gender of mountain goats and encourage harvest of males as harvest of females contributes to additive mortality. | ✓ | ✓ | ✓ | ✓ | ✓ | Regional Wildlife Manager<br>Regional Staff |
| **Strategy D**: Provide viewability of mountain goats for the enjoyment of the public. Opportunities exist where tourism viewsheds such as Mount Rushmore and the Needles Eye provide the public a unique setting to observe their behavior as a quality experience. | ✓ | ✓ | ✓ | ✓ | ✓ | Regional Wildlife Manager<br>Regional Staff |

DRAFT

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