South Dakota
SURVEY REPORT

Mountain Lion Population Status Update

2019 Biennial Report

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WILDLIFE SURVEY REPORT

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

Mountain lions (*Puma concolor*) are native to South Dakota and were historically considered numerous in the Black Hills. After near extirpation in the early 1900's due to unregulated harvest and bounties on mountain lions and their prey species, mountain lions were listed as a state threatened species in 1978. Mountain lion populations eventually rebounded, the species was reclassified as a big game animal in 2003, and the first regulated hunting season was established in 2005. Mountain lion hunting seasons in South Dakota provide an important recreational opportunity for resident sportsmen and women, and also provide a means to manage mountain lion populations.

The current goal for mountain lion management in the Black Hills of South Dakota is to manage mountain lion populations and habitats consistent with ecological, social, aesthetic, and economic values of South Dakota citizens while addressing the concerns and issues of both residents and visitors of South Dakota. The South Dakota Mountain Lion Management Plan was revised this year and will be finalized after formal adoption by the SDGFP Commission in October. The 2019-2029 management plan will be located at https://gfp.sd.gov/management-plans/.

This report provides a statewide overview of mountain lion surveys and assessments conducted by the South Dakota Department of Game, Fish, and Parks (SDGFP) and an update on the population status of mountain lions in the Black Hills.

POPULATION SURVEYS AND ASSESSMENTS

In general, mountain lions exhibit secretive behavior, occur in low densities, and occupy habitats with relatively dense vegetative cover and/or rough topography. These characteristics make estimates of population abundance and evaluations of population trend difficult. The SDGFP therefore uses numerous trend indicators to assess the mountain lion population in the Black Hills. The primary surveys and data used to assess trends include the following: 1) hunting season evaluations (harvest, harvest composition, harvest per unit effort), 2) documented mortalities (harvest/non-harvest, removals, densities), 3) DNA mark/recapture survey, and 4) observation reports.

Hunting Season Evaluations

There is currently an established season and harvest limits for the Black Hills Fire Protection District (BHFPD) of South Dakota, and a year-round season with no limit in the remainder of the state. All harvested mountain lions must be presented to a SDGFP representative within 24 hours of harvest for inspection and DNA sampling. Location of harvest, estimated age, sex, and weight are all recorded for each harvested mountain lion. Age estimates are categorized as: < one year old is a kitten (K), one – three-year-old is a sub-adult (SA), and > three years old is an adult (AD). Female mountain lions follow the same age estimation with the exception that a

female mountain lion is classified as an adult if there is evidence of lactation. Harvest surveys are also sent to all licensed hunters to compile additional mountain lion season information. Tissue samples are also collected from harvested mountain lions for genetic analyses used in mark/recapture population estimates. All harvest data are used to assess the impacts of harvest on population demographics and inform future hunting season structure and harvest limit.

Harvest

There were 3,373 mountain lion hunting licenses sold in 2018/19, and the hunting season for the BHFPD was December 26, 2018 – March 31, 2019. Regulations were in place to end the season immediately if the harvest limit of 60 mountain lions, or 40 females, was met at an earlier date. Within the BHFPD, the use of dogs to hunt mountain lions was prohibited except during specified hunting intervals in Custer State Park (CSP). The 2018/19 mountain lion season in the BHFPD ended on March 31 with 21 mountain lions harvested (13 males, 8 females; Table 1; Figure 1); 7 of these mountain lions were harvested with the aid of dogs in CSP.

Table 1. Mountain lion hunting season data for South Dakota, 2005/06 – 2018/19

	Licenses		BLACK HILLS HARVEST			PRAIRIE		Limit	Season
Year	Sold *	Season Dates	Males	Females	Total	HARVEST	Harvest Limit	Reached	Length(days)
2005/06	2,588	Oct.1 - Dec. 15	6	7	13	1	25 or 5 females	Female	24
2006/07	3,295	Nov. 1 - Dec. 31	7	8	15	1	25 or 8 females	Female	19
2007/08	4,070	Nov. 1 - Dec. 31	2	15	17	2	35 or 15 females	Female	23
2008/09	2,335	Jan.1 - Mar. 31	11	15	26	2	35 or 15 females	Female	45
2009/10	2,274	Jan.1 - Mar. 31	16	24	40	3	40 or 25 females	Total	41
2010/11	2,591	Jan.1 - Mar. 31	20	27	47	5	45 or 30 females	Total	52
2011/12	3,720	Jan.1 - Mar. 31	27	46	73	2	70 or 50 females	Total	61
2012/13	4,637	Dec.26-Mar. 31	26	35	61	6	100 or 70 females	Date	96
2013/14	3,856	Dec.26-Mar. 31	22	31	53	4	75 or 50 females	Date	96
2014/15	3,767	Dec.26-Mar. 31	21	22	43	5	75 or 50 females	Date	96
2015/16	3,681	Dec.26-Mar. 31	16	25	41	8	60 or 40 females	Date	97
2016/17	3,067	Dec.26-Mar. 31	14	16	30	5	60 or 40 females	Date	96
2017/18	3,384	Dec.26-Mar. 31	12	19	31	11	60 or 40 females	Date	96
2018/19	3,373	Dec.26-Mar. 31	13	8	21	10	60 or 40 females	Date	96

Outside of the BHFPD, the season is year-round and the use of dogs to pursue mountain lions is allowed on private land. A pursuit by dogs that originates on private land may cross over or culminate on property owned by the Office of School and Public Lands or the United States Bureau of Land Management. On the prairie, ten mountain lions (8 male, 2 female) were harvested in the 2018/19 season (April 1 – March 31).

Hunting seasons for mountain lions in South Dakota began in 2005; historical mountain lion harvest, season dates, and associated season data are depicted in Table 1. Mountain lion harvest peaked in 2011/12 at 73 total mountain lions, and has been trending downward in subsequent years (Figure 1). Harvest limits are established to ensure harvest levels do not

exceed management objectives, but limits have not been reached since the 2011/12 season, allowing hunting opportunity the entire hunting season.

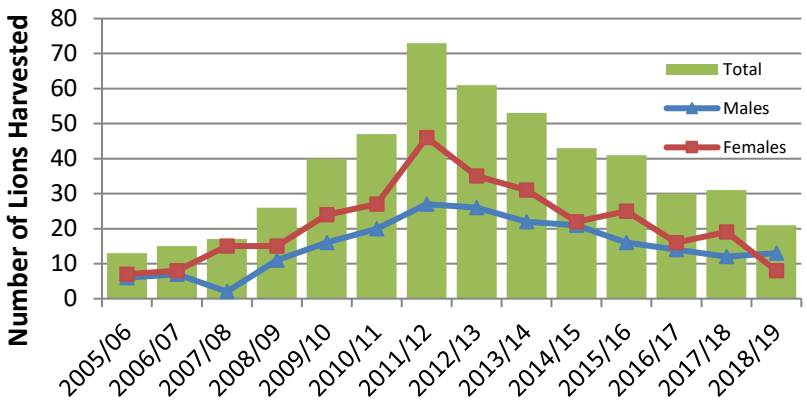

Figure 1. Mountain lion harvest in the Black Hills of South Dakota, 2005/06 – 2018/19 (April 1 – March 31).

Harvest composition

Tends in harvest age and sex proportions are evaluated annually in the Black Hills (Figure 2). Since the first regulated hunting season in 2005, 59% of all adult/sub-adult mountain lions harvested in South Dakota have been females (34% adult, 25% sub-adult), whereas 41% have been males (21% adult, 20% sub-adult). Approximately 45% of all mountain lions harvested have been sub-adults. No apparent trends in overall sex and age compositions are suggestive of population changes.

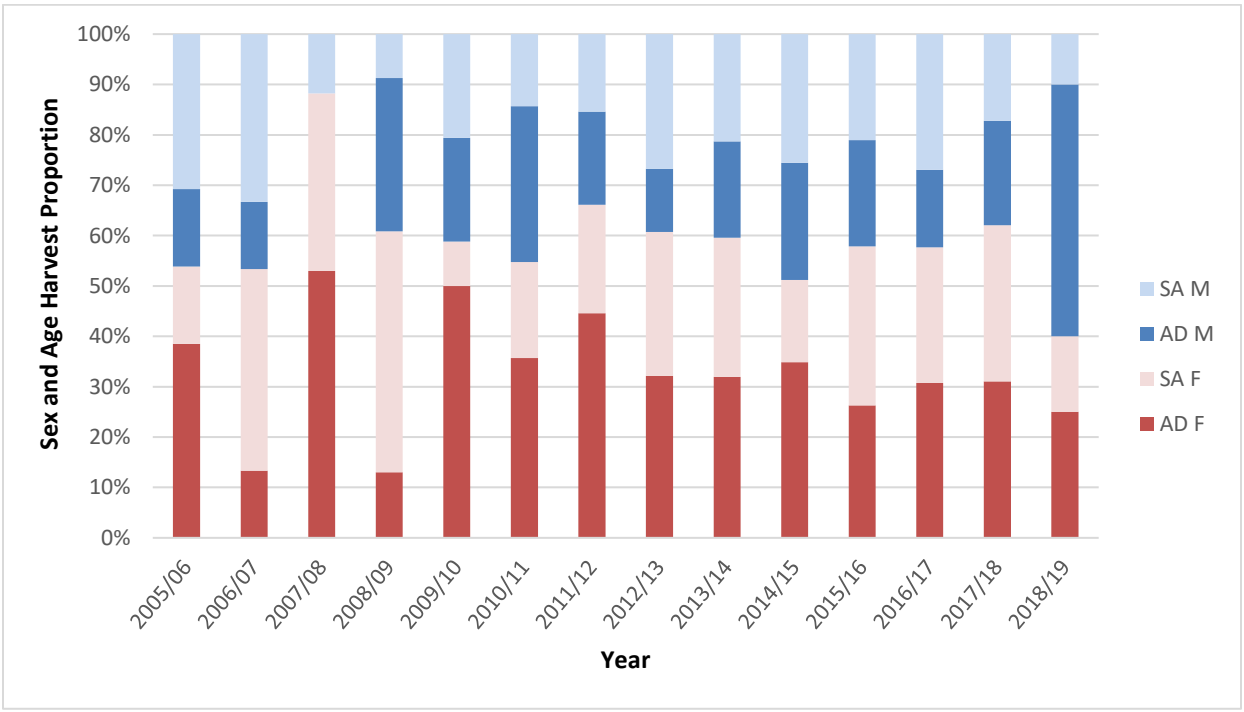

Figure 2. Sex and age harvest proportions of mountain lion harvest in the Black Hills of South Dakota, 2005/06 – 2018/19 (April 1 – March 31; SA = subadult, AD = adult, M = male, F = female).

Age and sex composition of harvest may be a useful index to mountain lion populations in Wyoming that are hunted primarily with the use of dogs (Anderson and Lindzey 2005). The majority of harvest in South Dakota, however, occurs without the use of dogs (dogs are only legal outside the BHFPD and in CSP during designated hunting intervals), and therefore interpretation of harvest composition trends may not be comparable. For example, after the state of Washington made it illegal to hunt mountain lions with dogs, subsequent harvest data showed that the median age of harvested mountain lions declined and percentage of females increased (Martorello and Beausoleil 2003).

Female age structure of harvested mountain lions is also evaluated, as research on some western mountain lion populations suggest relationships between mountain lion age or harvest age, and population trends (Anderson and Lindzey 2005, Stoner et al. 2006). The average age of harvested adult females in South Dakota since the 2005/06 hunting season has been 5.25 (n = 161), with most years averaging between four and six years of age (Figure 3). Although sample sizes are small due to less overall harvest, evaluations of the past 2 years of harvest age composition suggest an older age structure. Data will continue to be evaluated for long term trends.

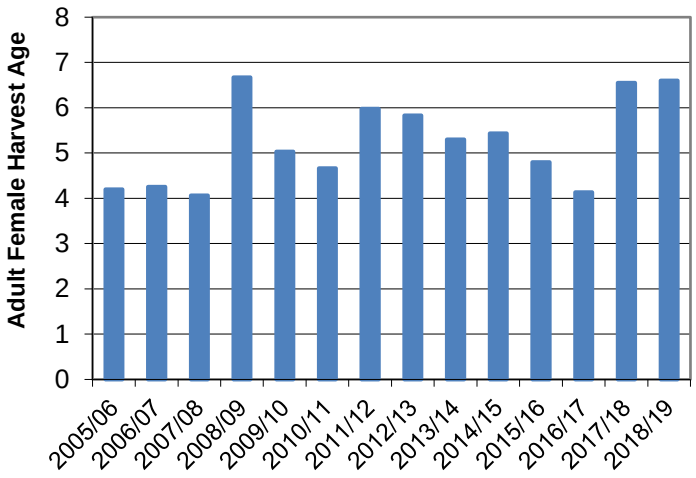

Figure 3. Average age of harvested adult female mountain lions in the Black Hills of South Dakota, 2005/06 – 2018/19 (April 1 – March 31).

Harvest per unit effort

Because mountain lion hunting in South Dakota is primarily conducted without the use of dogs, harvest success rates are low compared with other big game hunting seasons. Overall, hunting success for all licensed boot hunters in the BHFPD from 2005/06 – 2018/19 averaged 1.2%; hunting success for hunters using dogs in CSP averaged 53% during 2012/13 to 2018/19.

Hunting licenses for mountain lions in South Dakota were $28 in 2018/19, and each year hunter surveys conducted by SDGFP reveal that some hunters purchase licenses but do not actually hunt; in the 2018/19 season only about 40% of licensed hunters spent time hunting mountain lions in the BHFPD (Huxoll 2019; Table 2). Hunter surveys also collect hunter effort (# days hunted), which is used with active hunting participants to estimate Harvest per Unit Effort (HPUE) or Catch per Unit Effort (CPUE).

Catch per Unit Effort (CPUE) is a commonly collected harvest statistic that may be used to estimate abundance or population trend. Catch-effort methods are based on the general

Table 2. Harvest per unit effort (HPUE) for BHFPD mountain lion hunting seasons, 2008/09 – 2018/19 (April 1 – March 31).

Year	Season Length (Days)	Lions Harvested	Licenses	Active Hunters	Average # Days	Man-Days Hunted	Harvest Per 1,000 Man-Days	% Change From Prior Year
2008/2009	45	26	2,428	1,646 (1,594, 1,698)	6.5	10,698 (10,003, 11,404)	2.43 (2.28, 2.60)	-
2009/2010	41	40	2,082	1,468 (1,423, 1,513)	6.2	9,100 (8,535, 9,678)	4.4 (4.13, 4.69)	81%
2010/2011	52	47	2,325	1,790 (1,749, 1,831)	6.6	11,814 (11,128, 12,508)	3.98 (3.76, 4.22)	-9%
2011/2012	61	69	3,482	2,646 (2,591, 2,701)	7.1	18,787 (17,831, 19,749)	3.67 (3.49, 3.87)	-8%
2012/2013	96	54	4,351	2,872 (2,804, 2,940)	7.3	20,966 (19,799, 22,143)	2.58 (2.44, 2.73)	-30%
2013/2014	96	44	3,293	1,861 (1,796, 1,925)	6.9	12,841 (11,920, 13,775)	3.43 (3.19, 3.69)	33%
2014/2015	96	38	3,210	1,689 (1,620, 1,758)	7.1	11,992 (11,053, 12,953)	3.17 (2.93, 3.44)	-8%
2015/2016	97	35	3,102	1,529 (1,462, 1,596)	7.1	10,856 (9,972, 11,759)	3.22 (2.98, 3.51)	2%
2016/2017	96	23	2,561	1,153 (1,093, 1,213)	6.9	7,956 (7,204, 8,727)	2.89 (2.63, 3.19)	-10%
2017/2018	96	22	2,878	1,199 (1,137, 1,261)	7.3	8,743 (7,973, 9,555)	2.52 (2.30, 2.76)	-13%
2018/2019	96	14	2,818	1,132 (1,066, 1,198)	6.9	7,810 (6,905, 8,746)	1.8 (1.60, 2.03)	-28%

* numbers in parentheses represent 95% confidence intervals; calculations do not include lions harvested or days hunted in CSP

assumption that one unit of sampling effort will catch a fixed proportion of the population, so that if samples are permanently removed, the decline in population size will produce a decline in CPUE (Seber 1982). Five western states currently report using CPUE evaluations when setting mountain lion harvest limits or hunting license numbers (WAFWA 2019, unpublished).

In terms of mountain lion population monitoring, CPUE may be defined as the number of mountain lions brought to bay in trees per day or as the number of mountain lions harvested per day. Some states use multiple CPUE indices in evaluation of mountain lion populations; e.g., South Dakota monitors mountain lions treed per 100 hours of effort in DNA sampling surveys, as well as boot hunter harvest of mountain lions per 1,000 days hunted (HPUE).

The relationship between CPUE and mountain lion abundance may or may not be apparent. Catch effort data and trends could potentially be impacted by variables other than mountain lion density, such as snow conditions, road closures, and harvest regulations. Choate et al. (2006) found that CPUE was a poor predictor of abundance of mountain lions in Utah, although some data suggested the relationship between CPUE and abundance was worth further investigation. Further evaluations of the same area over a longer time span by Wolfe et al. (2016) showed a strong positive relationship between the number of mountain lions treed per day during pursuit only seasons and an index to minimum annual mountain lion

abundance. CPUE estimators, however, require stringent assumptions that are likely violated at times (see discussion by Whittaker and Wolfe 2011) including demographic and geographic independence and constant catchability throughout the period of data collection. Regardless, the high correlation between mountain lions treed per day and mountain lion density found by Wolfe et al. (2016) suggest CPUE indices may be informative metrics in state management programs.

For the 2018/19 South Dakota mountain lion season, Harvest per Unit Effort was approximately 1.8 mountain lions per 1,000 hunted days and has trended downward since the 2009/10 season (Figure 4, Table 2). CPUE data that are collected during biopsy darting surveys are reported in the *DNA Mark/Recapture section* of this report.

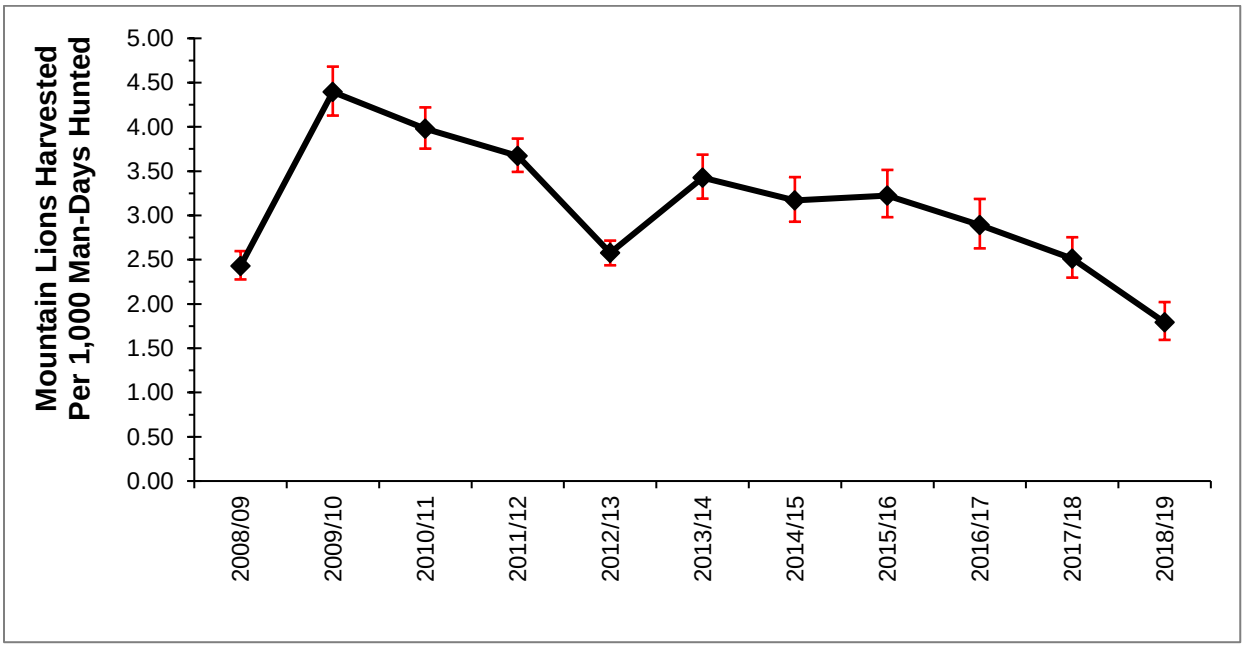

Figure 4. Mountain lion harvest per unit effort (HPUE) for the BHFPD seasons, 2008/09 – 2018/19 (April 1 – March 31). Red error bars represent 95% confidence intervals.

Documented Mortalities

A total of 1,098 mortality events were documented in South Dakota from 1996/97 - 2018/19. Documented mortalities were similar between males (551) and females (532); sex was unknown for 15 mortalities. Mortalities were categorized as hunter harvest (576), SDGFP removal (145), vehicular accidents (121), unknown causes (59), public removal (48), mountain lion interaction (31), incidental (25), research related (21), sick (19), infanticide (17) emaciated mountain lions (13), illegal kills (12), and other (11; Figure 5). Variation in recovery or detection probability among cause-specific mortalities prevents comparison among categories. For example, vehicle mortalities have higher detection probabilities than illegal killing. Mortality

due to interactions or infanticide amongst mountain lions is difficult to detect but has been shown to occur through research of radio-collared mountain lions (Jansen 2011) and documentation of facial scarring in resident males. Thompson (2009) documented 89% (10 of 11) of captured resident male mountain lions had moderate to severe scarring primarily across the face and skull along with scarring of the forelimbs. The number of total annual mortality events increased from 1996/97 – 2010/11 and have been on a decreasing trend thereafter.

A total of 973 mortality events were documented in the BHFPD from 1996/97 - 2018/19. Mortalities were categorized as: hunter harvest (511), followed by SDGFP removal (127), vehicular accidents (112), unknown causes (56), public removal (28), mountain lion interaction (31), incidental (19), research related (21), sick (19), infanticide (17) emaciated mountain lions (13), illegal kills (9), and other (10). More females (298) were harvested than males (213) during established harvest seasons in the Black Hills. Conversely, more males (50) were harvested than females (15) during established harvest seasons on the prairie.

Within the Black Hills, more males were removed (96 total; 83 by SDGFP, 13 by the public) to address depredation or human safety concerns than females (59 total; SDGFP 44, public 15). This same trend followed on the prairie as SDGFP removed 15 male and three female mountain lions, and the public removed 16 males and four females (Figure 5).

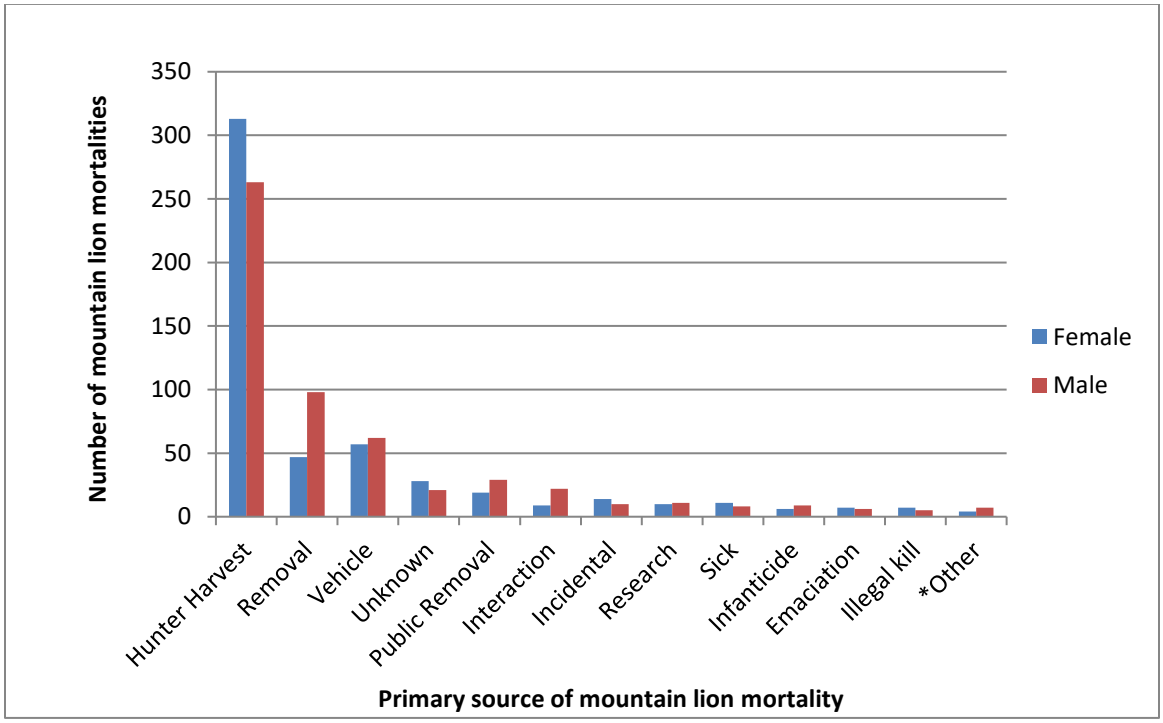

Figure 5. Comparison between male and female mountain lion mortalities in South Dakota, 1996/97 – 2018/19 (categories represent primary sources of mortality; *other includes drowning, electrocution, fire, wounding and miscellaneous events).

Harvest and Non-harvest Mortalities

All known mountain lion mortalities in South Dakota are recorded and the Black Hills mortalities are evaluated for population trend assessments. Mortalities that have been documented as a result of research and/or radio-collared animals are removed from trend datasets. The highest number of mountain lion mortalities within the Black Hills was 102 in 2011/12 (Figure 6). Harvest mortalities can be influenced by hunting season regulations, weather and other factors, and have been decreasing for the past seven years (Figure 6). The harvest limit in the BHFPD has not been reached in the past seven hunting seasons.

Non-harvest mortalities peaked at 42 mountain lions in 2010/11, declined to six in 2016/17, and increased to 21 and 19 in 2017/18 and 2018/19, respectively (Figure 6). Non-harvest mortality trend may reflect increases or decreases in the mountain lion population. However, factors influencing non-harvest mortality can be variable and may influence trend assessments.

The majority of the mountain lion population in South Dakota occurs within the Black Hills. Mountain lions are occasionally observed outside of the Black Hills area, but most are likely transient young male mountain lions. Since 2000, SDGFP has documented 125 mountain lion mortalities outside of the Black Hills Fire Protection District. Of those, 32 were female (five adults, 27 sub-adults) and 93 were male (13 adults, 78 sub-adults, two kittens).

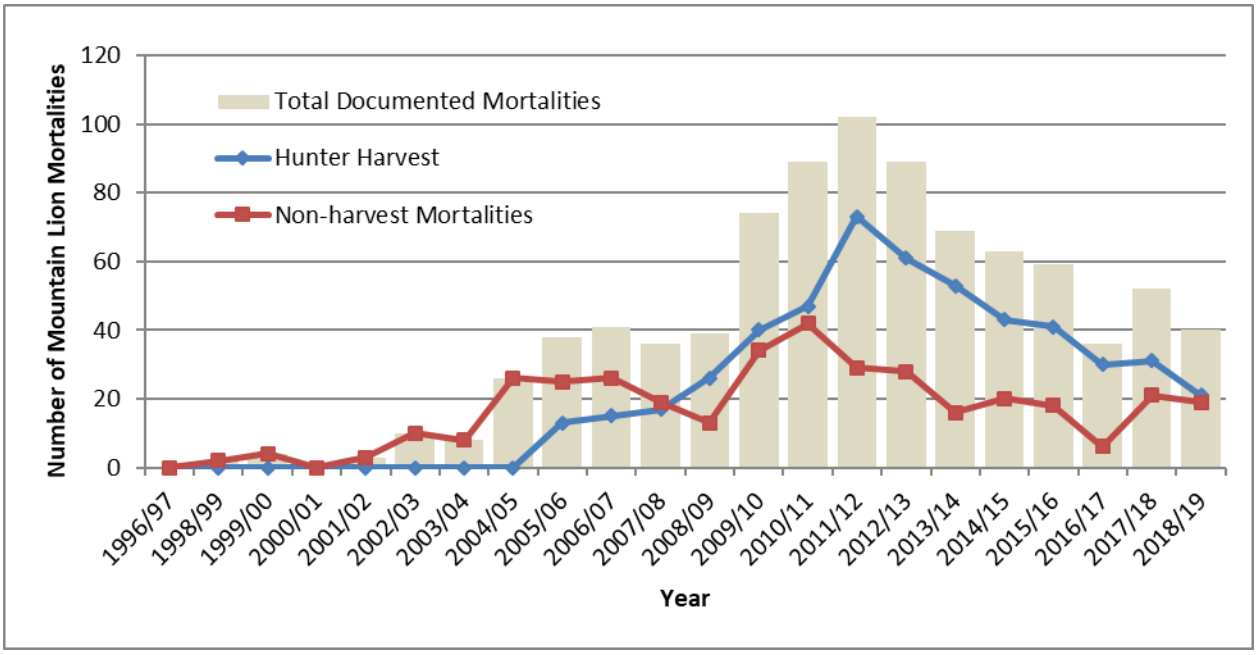

Figure 6. Harvest and non-harvest mountain lion mortalities documented in the Black Hills Fire Protection District, South Dakota, 1996/97 – 2018/19 (April 1 – March 31).

Mountain lion removals

In South Dakota, mountain lions are removed by SDGFP due to concerns involving livestock depredation, attacks on pets or mountain lions that pose a substantial threat to public safety. The most mountain lions annually removed within the BHFPD by SDGFP was 19 in 2009/10, and the number of removals decreased to zero in 2016/17 before increasing back up to eight in 2018/19 (Figure 7). SDGFP will remove a mountain lion for attacking domestic animals, but may not remove a mountain lion for attacking or killing pets that are free-roaming or that provoke a mountain lion. Feeding of prey species, such as deer and turkey, in urban areas or near rural homes is discouraged as it can lead to an increased presence of mountain lions. SDGFP encourages problem prevention whenever possible when dealing with mountain lion incidents.

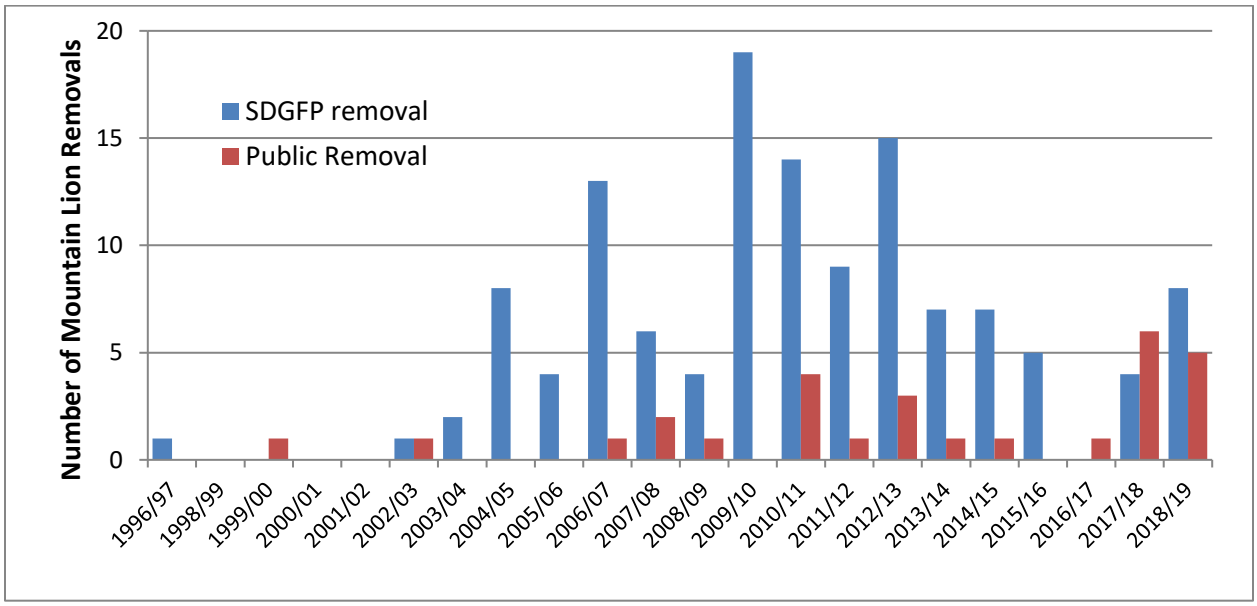

Figure 7. Mountain lion removals by SDGFP and the public within the Black Hills Fire Protection District, South Dakota, 1996/97 – 2018/19 (April 1 – March 31).

Under South Dakota codified law § 46-6-29.2, killing of a mountain lion is permitted if reasonably necessary to protect the life of a person or if a mountain lion is posing an imminent threat to a person's livestock or pets. If a person kills a mountain lion pursuant to state law, they must contact SDGFP within twenty-four hours of killing the mountain lion. Public removals of mountain lions within the BHFPD peaked at four removals in 2010/11 before declining again (Figure 7). In 2017/18 and 2018/19, public removals were recorded at six and five removals, respectively, and were the highest number of removals recorded (Figure 7). Within the BHFPD, total mountain lion removals recorded from 1996/97 to 2018/19 include 62% males and 38% females; ages of all removals includes 21% adults (AD; 32), 55% sub-adult (SA; 85), and 24% kittens (K; 38; Table 3).

Table 3. Age and sex of mountain lions removed in the BHFPD, South Dakota, 1996/97 – 2018/19.

Removal Type	Sex	Age			Total
		AD	SA	K	
Public Removals (n = 28)	male	1	9	3	13
	female	4	7	4	15
SDGFP Removals (n = 127)	male	17	48	18	83
	female	10	21	13	44

Mortality densities

Total mortality densities are evaluated in relation to thresholds defined for adjacent mountain lion populations in Wyoming. Based on Anderson and Lindzey (2005) and evaluations of harvest densities in Wyoming (Wyoming Game and Fish 2006), the Wyoming Game and Fish Department (WGFD) uses the following harvest densities (along with evaluation of other criteria) for establishing source-stable-sink mountain lion management (Cougar Management Guidelines Working Group 2005):

- Reduce lion population: > 8 lions/1,000 km^2
- Maintain lion population: 5-8 lions/1,000 km^2
- Increase lion population: < 5 lions/1,000 km^2

Human caused mountain lion mortality densities in the BHFPD are monitored by the state wildlife agencies of both South Dakota and Wyoming. Using criteria established in Wyoming, mortality densities in South Dakota have been sufficient to lower mountain lion populations in the Black Hills from approximately 2009/10 to 2015/16 (Figure 8). Mortality densities over the past three years in South Dakota, however, would suggest an approximate stable to increasing mountain lion population.

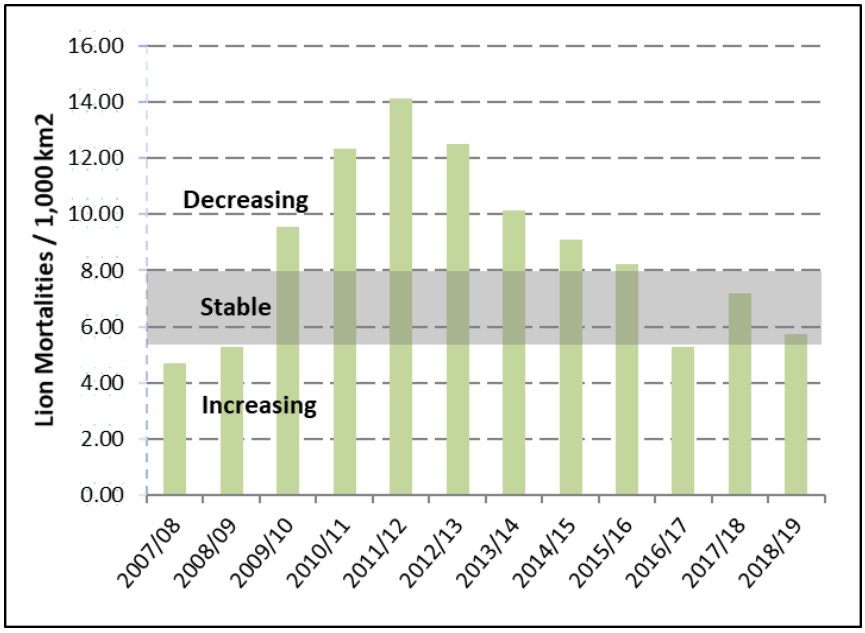

Figure 8. Human-caused mountain lion mortality densities (lions per 1,000 square kilometers) in the Black Hills of South Dakota, 2007/08 – 2018/19 (April 1 – March 31). Potential stable population threshold (5-8 mortality density) identified by shaded horizontal bar.

DNA Mark/Recapture Survey

Mountain lion population estimates are derived using the Lincoln-Petersen mark-recapture method, with the Chapman modification to account for small sample sizes. Beginning in 2013/14, after completion and evaluation of research conducted by Juarez (2014), the SDGFP began using biopsy-darting as the primary method to mark mountain lions immediately prior to the season; radio-collared mountain lions from previous research are also utilized to assess availability. In December of 2018, SDGFP used three houndsmen teams (SDGFP, WGFD, private contractor) to collect 74 samples. After DNA analyses were conducted by the USFS National Genomics Center for Wildlife and Fish Conservation and data were further reviewed, there were DNA samples from 57 individual adult and sub-adult mountain lions that were considered available for harvest for the first day of the 2018/19 hunting season. The 96-day hunting season is considered the recapture event, and during that time 20 adult and sub-adult mountain lions were harvested; 5 were either previously DNA sampled or had a functioning radio-collar. The inputs for the 2018/2019 Lincoln-Petersen mark-recapture estimate are as follows; *M* = 57, *C* = 20, *R* = 5. Lincoln-Petersen mark-recapture Chapman estimates are derived using:

$$N = \frac{(\mathrm{M}+1)(\mathrm{C}+1)}{\mathrm{R}+1} - 1$$

N = Estimate of adult/sub-adult population size
M = Total number of adults captured and marked on the first visit
C = Total number of adults captured on the second visit
R = Number of adults captured on the first visit that are then recaptured on the second visit

95% confidence intervals are then formulated using the variance estimator below:

$$var\ (N) = \frac{(\mathrm{M}+1)(\mathrm{C}+1)(\mathrm{M}-\mathrm{R})(\mathrm{C}-\mathrm{R})}{(\mathrm{R}+1)(\mathrm{R}+1)(\mathrm{R}+2)}$$

Vital rates from radio-collared individuals and recruitment data from previous research studies in the Black Hills (e.g., Thompson 2009, Jansen 2011) were used as input variables to calculate the total mountain lion population. Age and sex composition of starting populations was based on the 3-year average composition of harvested mountain lions. The 2018/19 preseason population estimate for the Black Hills was approximately 262 total mountain lions (95% CI: 106-556), of which 203 were adults/sub-adults. Population estimates have low precision but appear to be near management objective the past few years (Figure 9).

Catch per unit effort (CPUE) data are also recorded during DNA collection efforts and are evaluated annually (Table 4). During 2015-2018, CPUE has been very consistent at approximately 10-11 mountain lions treed per 100 hours, but increased to over 13 in 2018.

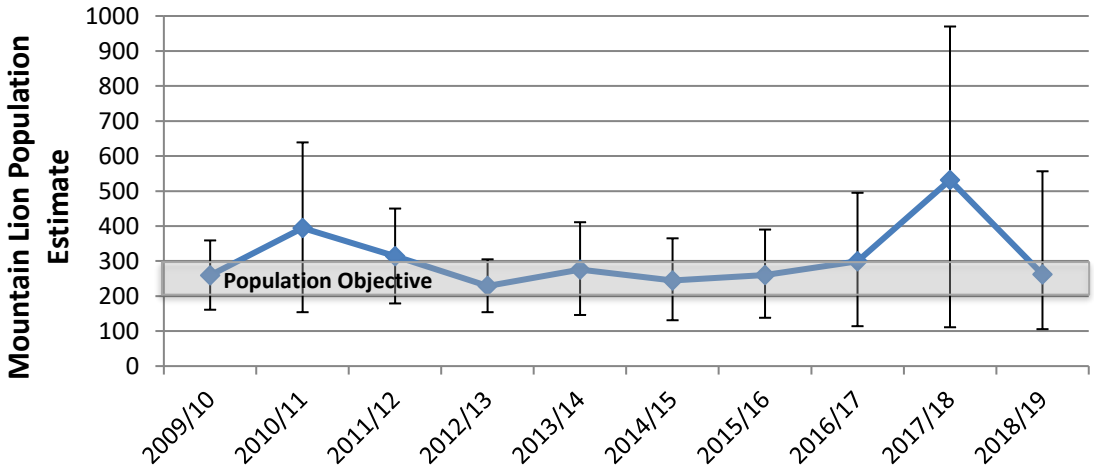

Figure 9. Mark/recapture estimates of the mountain lion population in the Black Hills of South Dakota, 2009/10 – 2018/19 (April 1 – March 31). Current population management objective (200-300) identified by shaded horizontal bar.

Table 4. Catch per unit effort data collected during annual biopsy surveys of mountain lions in the Black Hills of South Dakota, 2013 – 2018.

Year	hours	lions	hrs/lion	catch/100 hrs
2013	319	26	12.3	8.2
2014	615	31	19.8	5.0
2015	508	56	9.1	11.0
2016	578	63	9.2	10.9
2017	551	63	8.7	11.4
2018	565	75	7.5	13.3

Observation Reports

All mountain lion observations reported by the public are documented and evaluated for trend assessments along with other mountain lion population data. Observation reports have been on a decreasing trend since they peaked in 2004/05 at 406 total reports (Figure 10). Because SDGFP encourages the public to report any observations of mountain lions and documents all such observations, it is important to report these data. Interpretation of observational data is challenging, however, because reporting rates from the public are unknown and likely variable which impacts data trend evaluations. It is likely that only significant increases or decreases to the mountain lion population would be documented with observation report data.

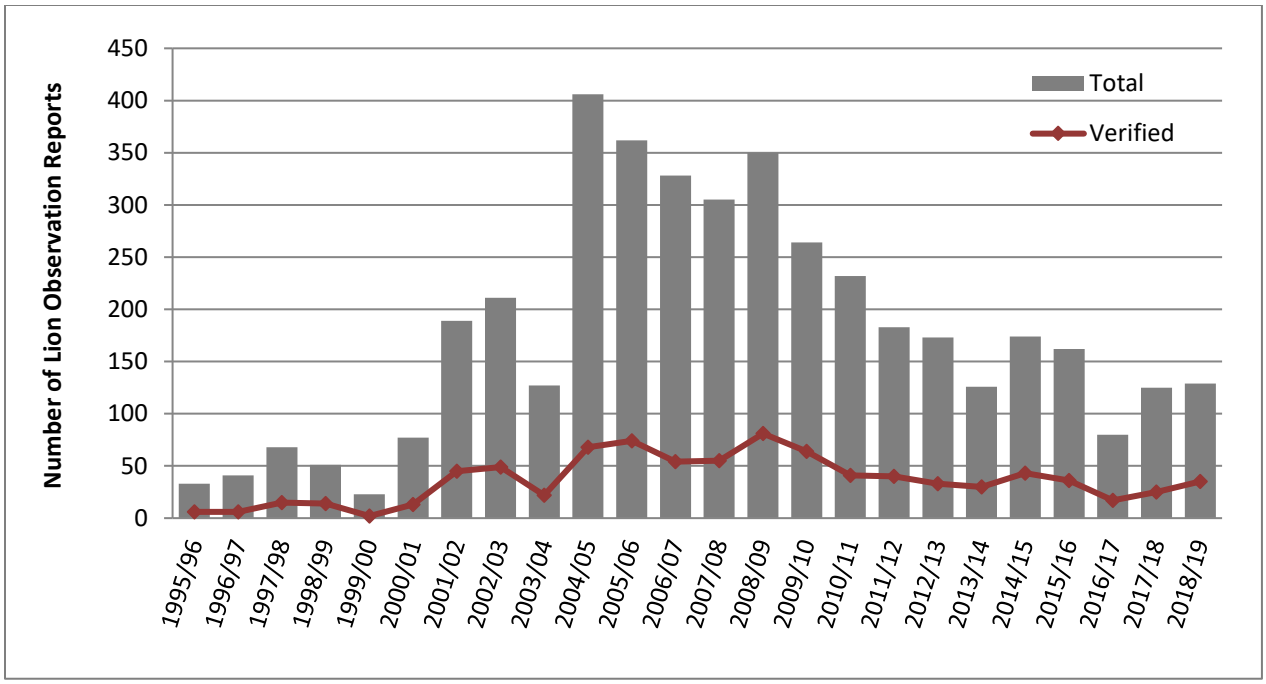

Figure 10. Mountain lion observation reports in South Dakota, including total number of reports and those verified by SDGFP, 1995/96 – 2018/19 (April 1 – March 31).

SUMMARY

The South Dakota Game, Fish, and Parks conducts several surveys and assessments to better understand mountain lion population abundance and trends in the Black Hills. Data from hunting seasons and hunter surveys are evaluated annually, such as harvest, harvest sex and age composition, female proportions in the harvest, and harvest per unit effort. Lion mortality data, including harvest, non-harvest, removals, and total mortality densities are also assessed for any apparent trends. In addition, DNA biopsy-darting surveys are conducted annually prior to each hunting season in order to complete mark/recapture estimates and evaluations of catch per unit effort. Furthermore, all observation reports from the public are recorded into a database and evaluated.

This report provides the most recent mountain lion survey data and analyses completed in South Dakota. Caution is warranted when comparing data in South Dakota with trend indicators developed for mountain lion populations in western states with substantially different habitats, predator and prey densities, and data collection methods (e.g., dog hunting vs. no dog hunting). Additionally, it should be noted that not all trend indices assessed by the SDGFP are in agreement. Given these considerations, however, most survey data and evaluations of mountain lion trend indicators suggest that the mountain lion population in the Black Hills is stable to slightly increasing.

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APPENDIX

Appendix A. Documented mountain lion mortalities in South Dakota, April 1, 2017 – March 31, 2019. (A=Adult, SA=Subadult, K=Kitten under 1 year of age).

Date Died or Reported	Adjusted Year	Sex	Age Class	Classification of Death	County	Black Hills or Prairie
04/13/2017	2017	F	SA	Removal	Custer	Black Hills
05/10/2017	2017	M	SA	Removal	Lawrence	Black Hills
06/02/2017	2017	M	A	Vehicle	Meade	Black Hills
06/09/2017	2017	F	SA	Incidental	Bennett	Prairie
07/22/2017	2017	M	SA	Vehicle	Lawrence	Prairie
08/04/2017	2017	M	SA	Public Removal	Lawrence	Black Hills
09/20/2017	2017	F	SA	Public Removal	Custer	Black Hills
09/27/2017	2017	M	SA	Hunter Harvest	Lawrence	Prairie
10/15/2017	2017	M	SA	Hunter Harvest	Jackson	Prairie
10/15/2017	2017	M	SA	Vehicle	Pennington	Black Hills
10/17/2017	2017	F	SA	Public Removal	Lawrence	Black Hills
10/24/2017	2017	M	SA	Public Removal	Butte	Prairie
10/27/2017	2017	F	A	Incidental	Bennett	Prairie
11/12/2017	2017	M	SA	Hunter Harvest	Gregory	Prairie
11/15/2017	2017	M	SA	Hunter Harvest	Bennett	Prairie
11/17/2017	2017	M	SA	Hunter Harvest	Jackson	Prairie
11/28/2107	2017	M	SA	Hunter Harvest	Meade	Prairie
11/30/2017	2017	F	A	Unknown	Custer	Black Hills
12/17/2017	2017	M	K	Research	Pennington	Black Hills
12/24/2017	2017	M	SA	Hunter Harvest	Fall River	Prairie
12/26/2017	2017	F	SA	Hunter Harvest	Pennington	Black Hills
12/26/2017	2017	M	SA	Hunter Harvest	Pennington	Black Hills
12/27/2017	2017	F	A	Hunter Harvest	Pennington	Black Hills
12/27/2017	2017	F	A	Hunter Harvest	Lawrence	Black Hills
12/27/2017	2017	F	SA	Hunter Harvest	Custer	Black Hills
12/28/2017	2017	F	SA	Hunter Harvest	Custer	Black Hills
12/29/2017	2017	F	A	Hunter Harvest	Pennington	Black Hills
01/02/2018	2017	F	SA	Hunter Harvest	Pennington	Black Hills
01/02/2018	2017	M	A	Hunter Harvest	Custer	Black Hills
01/03/2018	2017	F	A	Hunter Harvest	Custer	Black Hills
01/03/2018	2017	M	A	Hunter Harvest	Custer	Black Hills
01/03/2018	2017	M	SA	Hunter Harvest	Custer	Black Hills
01/04/2018	2017	M	A	Hunter Harvest	Bennett	Prairie
01/08/2018	2017	M	SA	Removal	Fall River	Black Hills
01/14/2018	2017	F	A	Hunter Harvest	Bennett	Prairie

Date Died or Reported	Adjusted Year	Sex	Age Class	Classification of Death	County	Black Hills or Prairie
01/14/2018	2017	M	A	Hunter Harvest	Lawrence	Black Hills
01/16/2018	2017	M	SA	Hunter Harvest	Lawrence	Black Hills
01/19/2018	2017	F	SA	Hunter Harvest	Lawrence	Black Hills
01/20/2108	2017	F	SA	Hunter Harvest	Lawrence	Black Hills
01/24/2018	2017	F	SA	Hunter Harvest	Jackson	Prairie
01/27/2018	2017	M	A	Hunter Harvest	Custer	Black Hills
01/29/2018	2017	F	K	Vehicle	Lawrence	Black Hills
02/04/2018	2017	F	SA	Hunter Harvest	Custer	Black Hills
02/06/2018	2017	F	A	Hunter Harvest	Pennington	Black Hills
02/06/2018	2017	F	SA	Hunter Harvest	Lawrence	Black Hills
02/06/2018	2017	F	A	Public Removal	Custer	Black Hills
02/11/2018	2017	F	A	Hunter Harvest	Custer	Black Hills
02/10/2018	2017	M	A	Hunter Harvest	Gregory	Prairie
02/14/2018	2017	M	K	Vehicle	Lawrence	Black Hills
02/14/2018	2017	F	K	Vehicle	Lawrence	Black Hills
02/15/2018	2017	F	A	Hunter Harvest	Pennington	Black Hills
02/21/2018	2017	M	A	Hunter Harvest	Custer	Black Hills
02/25/2018	2017	F	A	Hunter Harvest	Pennington	Black Hills
02/25/2018	2017	F	K	Public Removal	Pennington	Black Hills
03/02/2018	2017	F	A	Hunter Harvest	Custer	Black Hills
03/03/2018	2017	M	K	Public Removal	Pennington	Black Hills
03/05/2018	2017	M	K	Hunter Harvest	Custer	Black Hills
03/05/2018	2017	M	K	Removal	Custer	Black Hills
03/18/2018	2017	M	K	Unknown	Pennington	Black Hills
03/23/2018	2017	F	K	Vehicle	Meade	Black Hills
03/26/2018	2017	M	SA	Hunter Harvest	Custer	Black Hills
03/27/2018	2017	M	A	Interaction	Lawrence	Black Hills
03/27/2018	2017	M	A	Hunter Harvest	Custer	Black Hills
03/27/2018	2017	F	K	Hunter Harvest	Custer	Black Hills
03/27/2018	2017	F	SA	Hunter Harvest	Custer	Black Hills
03/28/2018	2017	F	A	Vehicle	Custer	Black Hills
03/29/2018	2017	M	K	Unknown	Pennington	Black Hills
03/31/2018	2017	M	SA	Hunter Harvest	Pennington	Black Hills
04/27/2018	2018	F	SA	Vehicle	Pennington	Black Hills
04/29/2018	2018	M	A	Removal	Oglala Lakota	Prairie
05/07/2018	2018	F	A	Vehicle	Fall River	Black Hills
05/28/2018	2018	F	K	Public Removal	Fall River	Black Hills
06/01/2018	2018	M	K	Removal	Fall River	Black Hills
07/16/2018	2018	F	K	Public Removal	Lawrence	Black Hills
07/17/2018	2018	F	SA	Removal	Lawrence	Black Hills

Date Died or Reported	Adjusted Year	Sex	Age Class	Classification of Death	County	Black Hills or Prairie
07/23/2018	2018	F	SA	Vehicle	Butte	Prairie
08/07/2018	2018	F	A	Public Removal	Lawrence	Black Hills
08/17/2018	2018	M	A	Vehicle	Meade	Black Hills
09/02/2018	2018	F	SA	Hunter Harvest	Harding	Prairie
10/06/2018	2018	F	SA	Public Removal	Pennington	Black Hills
10/09/2018	2018	M	SA	Removal	Lawrence	Black Hills
10/25/2018	2018	M	SA	Vehicle	Meade	Black Hills
10/26/2018	2018	M	SA	Removal	Pennington	Prairie
09/26/2018	2018	F	SA	Hunter Harvest	Pennington	Prairie
11/04/2018	2018	M	SA	Hunter Harvest	Butte	Prairie
11/11/2018	2018	M	SA	Vehicle	Lawrence	Black Hills
11/12/2018	2018	M	SA	Removal	Pennington	Black Hills
12/26/2018	2018	M	A	Hunter Harvest	Lawrence	Black Hills
12/26/2018	2018	M	SA	Hunter Harvest	Custer	Black Hills
12/26/2018	2018	M	A	Hunter Harvest	Custer	Black Hills
12/26/2018	2018	F	SA	Unknown	Custer	Black Hills
12/28/2018	2018	M	A	Hunter Harvest	Custer	Black Hills
12/29/2018	2018	F	SA	Hunter Harvest	Pennington	Black Hills
12/30/2018	2018	F	A	Hunter Harvest	Lawrence	Black Hills
12/31/2018	2018	M	K	Hunter Harvest	Lawrence	Black Hills
01/01/2019	2018	F	A	Hunter Harvest	Lawrence	Black Hills
01/04/2019	2018	M	A	Hunter Harvest	Lawrence	Black Hills
01/05/2019	2018	F	A	Hunter Harvest	Pennington	Black Hills
01/16/2019	2018	M	SA	Hunter Harvest	Lawrence	Black Hills
01/19/2019	2018	F	SA	Hunter Harvest	Pennington	Black Hills
01/23/2019	2018	M	A	Hunter Harvest	Meade	Prairie
01/28/2019	2018	F	SA	Incidental	Bennett	Prairie
02/04/2019	2018	M	A	Hunter Harvest	Custer	Black Hills
02/05/2019	2018	M	SA	Hunter Harvest	Lawrence	Prairie
02/08/2019	2018	M	A	Hunter Harvest	Custer	Black Hills
02/09/2019	2018	M	A	Hunter Harvest	Lawrence	Black Hills
02/10/2019	2018	M	SA	Removal	Custer	Black Hills
02/11/2019	2018	M	K	Removal	Pennington	Black Hills
02/11/2019	2018	M	K	Removal	Pennington	Black Hills
02/14/2019	2018	F	A	Removal	Pennington	Black Hills
02/16/2019	2018	M	SA	Hunter Harvest	Meade	Prairie
02/16/2019	2018	M	A	Hunter Harvest	Lawrence	Black Hills
02/20/2019	2018	F	SA	Hunter Harvest	Custer	Black Hills
02/20/2019	2018	M	SA	Hunter Harvest	Lawrence	Prairie
02/21/2019	2018	M	A	Hunter Harvest	Custer	Black Hills

Date Died or Reported	Adjusted Year	Sex	Age Class	Classification of Death	County	Black Hills or Prairie
02/22/2019	2018	M	A	Hunter Harvest	Pennington	Black Hills
02/22/2019	2018	F	K	Removal	Pennington	Black Hills
02/23/2019	2018	M	SA	Hunter Harvest	Fall River	Prairie
02/24/2019	2018	M	SA	Hunter Harvest	Fall River	Prairie
03/08/2019	2018	M	A	Hunter Harvest	Fall River	Prairie
03/09/2019	2018	F	A	Hunter Harvest	Custer	Black Hills
03/30/2019	2018	F	A	Hunter Harvest	Custer	Black Hills