
South Dakota WILDLIFE REPORT

Elk Population Status Update

2020 Biennial Report

Prepared by:

Andrew J. Lindbloom, Senior Big Game Biologist

Lauren M. Wiechmann, Big Game Biologist

Andrew S. Norton, Senior Big Game Biologist

Steven L. Griffin, Big Game Biologist



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

Native to South Dakota, elk (*Cervus elaphus*) are the largest hunted member of the deer family (Cervidae) residing in the state. Extirpated in the late 1800s, the re-establishment of elk in South Dakota is a wildlife management success story. Today several thousand elk roam free, primarily in the Black Hills forested region along with several smaller herds occupying prairie and/or agriculture landscapes. Public demand for elk hunting opportunities is strong, with hunters submitting 30,782 applications for 1,336 available elk licenses in 2019.

Elk hunting seasons in South Dakota provide an important recreational opportunity for resident sportsmen and women, and also provide a means to manage elk populations. The current over-riding goal for elk management is to “manage elk 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” (South Dakota Game, Fish and Parks 2015). More specific information on elk management objectives, strategies, and research in South Dakota can be found in the South Dakota Elk Management Plan at <https://gfp.sd.gov/UserDocs/nav/ElkPlanApril2015Final.pdf>.

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

POPULATION SURVEYS AND ASSESSMENTS

Population Assessments

The majority of elk herds in South Dakota occur within the Black Hills. The current Black Hills population objective (excluding Custer State Park and Wind Cave National Park) is 7,000 wintering elk, but may range from 6,000 to 8,000 depending on habitat conditions (SDGFP 2015). The current population objective for Custer State Park (CSP) is 800 wintering elk, with a range from 700-900 depending on habitat conditions. These goals were developed after thorough analyses of elk population data, available habitat resources on public land, private land depredation issues, and substantial input from a wide variety of publics with an interest in elk management in South Dakota.

The primary surveys and data assessments used to evaluate elk population abundance and trends in the Black Hills include the following: 1) hunting season evaluations (harvest surveys, harvest age structure, disease testing), 2) herd composition surveys, 3) survival monitoring, 4) aerial sightability surveys, and 5) population modeling.

Survey data are lacking for most prairie units and elk densities are primarily managed to abate substantial agricultural damages on private property while at the same time to provide recreational hunting opportunity.

Hunting Season Evaluations

Elk hunting licenses in South Dakota are limited in all management units and issued through a lottery draw system. For all elk hunting units and seasons (excluding CSP), up to 50% of elk licenses allocated in each management unit are available to those who qualify for landowner/operator preference. Based on current South Dakota Administrative Rules (ARSD), the 2018 and 2019 hunting seasons in the Black Hills began with the archery season open September 1-30 (ARSD 41:06:43). The firearm season for “any elk” licenses ran Oct 1-31 (ARSD 41:06:26:01). Antlerless firearm hunting seasons were October 16-31, Dec 1-15, and Dec 16-31. Contingency licenses are made available for Black Hills units after the harvest seasons have been set if weather and range conditions necessitate a reduction to the grazing pressure on the landscape. No contingency licenses were issued in 2018 and 2019. Hunting seasons in CSP (ARSD 41:06:27, 41:06:28, 41:06:47, 41:06:48) are similar but may vary depending on Park objectives. Prairie elk hunting seasons (ARSD 41:06:59) vary and are a collaborative effort between SDGFP and private landowners to manage elk populations in agricultural settings.

There are currently eight elk management units in the Black Hills (Units H1, H2, H3, H4, H5, H7, H9, and CSP; Figure 1). Several of these units are further subdivided by area and season date for purposes of antlerless harvest management. In addition, there are currently seven prairie elk management units with hunting seasons (Units 09, 11, 15, 27, 35a, 35b, WRA; Figure 1).

Management objective directions (increase, maintain, or decrease) are set every two years when season recommendations are brought forward to the SDGFP commission (Figure 1). Elk management objectives for each management unit are based on elk population assessments, habitat conditions, and social considerations. Management objectives on the prairie can vary substantially between areas.

Harvest Surveys

All elk hunters, regardless of hunting success or participation, are currently surveyed to assess overall harvest and hunter success. In addition, all successful hunters are required to check-in any harvested elk to a SDGFP representative within 24 hours (ARSD 41:06:04:19). Hunter survey cards are emailed and/or mailed to all elk license holders to obtain information on the number of hunting recreation days, gender and age (adult/calf) of elk harvested, type of land hunted (public vs. private), number of elk shot but not recovered, and mean satisfaction of the hunt. All license holders who list an email in their licensing profile receive an email at the end of the season followed by two reminder emails over a 2-week period. All license holders that do not list an email, and those that do not respond to the email survey, are sent paper surveys followed by two or three subsequent mailings at 12-14 day intervals in order to maximize response rate and precision by limiting non-response bias.

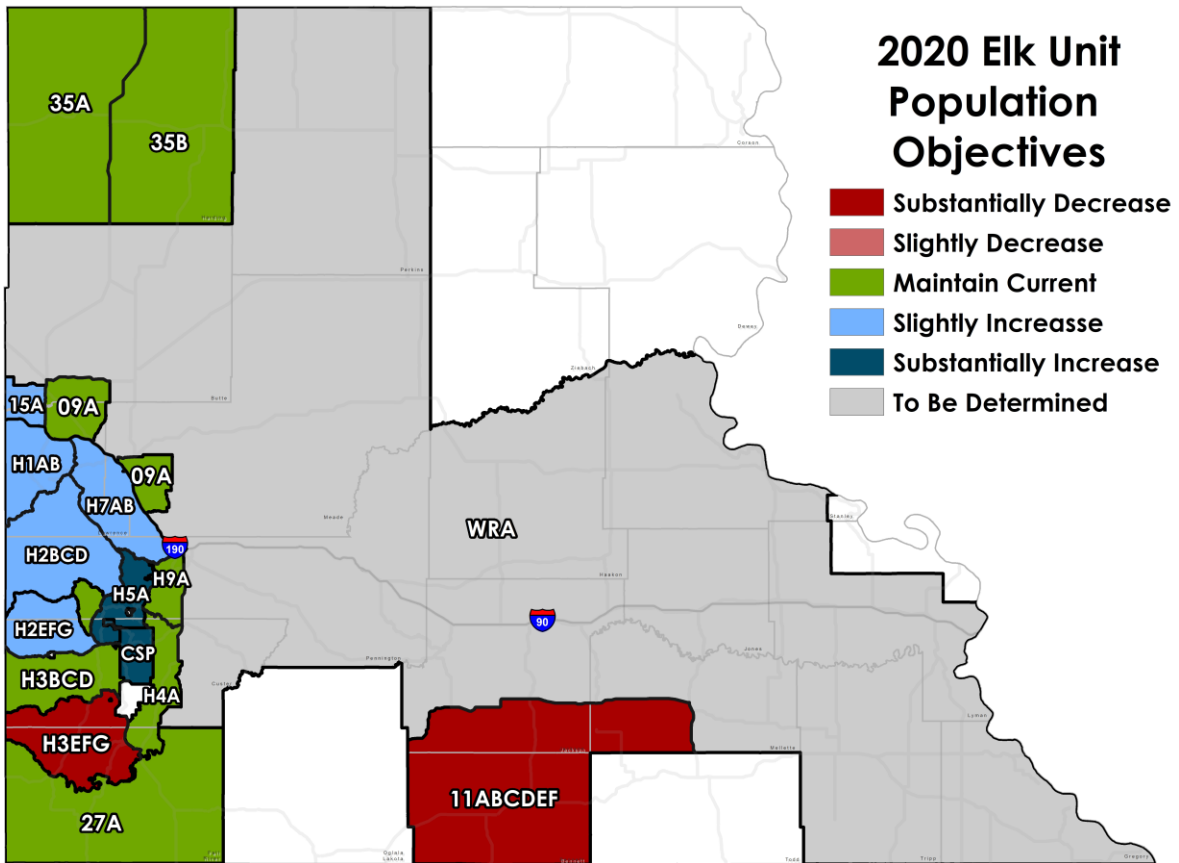


Figure 1. Population objective directions for elk units in South Dakota, 2020.

Returned hunter surveys are entered and summarized, and harvest statistics are generated for each unit. Proportional statistics from the sample are then accepted as representative of the unit population of hunters and applied to the total number of hunters in that unit. Hunters who do not respond to the survey are included in the hunter population when estimating harvest statistics. The minimum acceptable response rate has been established at 85%. Confidence intervals are calculated to monitor precision. Harvest information specific to each season, unit, and license type are published annually (Huxoll 2019).

Over the past 10 years, peak elk harvest occurred in 2016 and 2017 at 1,087 and 1,049, respectively (Figure 2). Significant increases in antlerless license types and subsequent cow harvest were obtained during these years to meet population management objectives (Figures 2 and 3). The availability of “any elk” license types has remained relatively stable since 2010 (Figure 3). From 2004 to 2019, the average number of “any elk” and antlerless elk licenses sold each year has been 653 and 932, respectively.

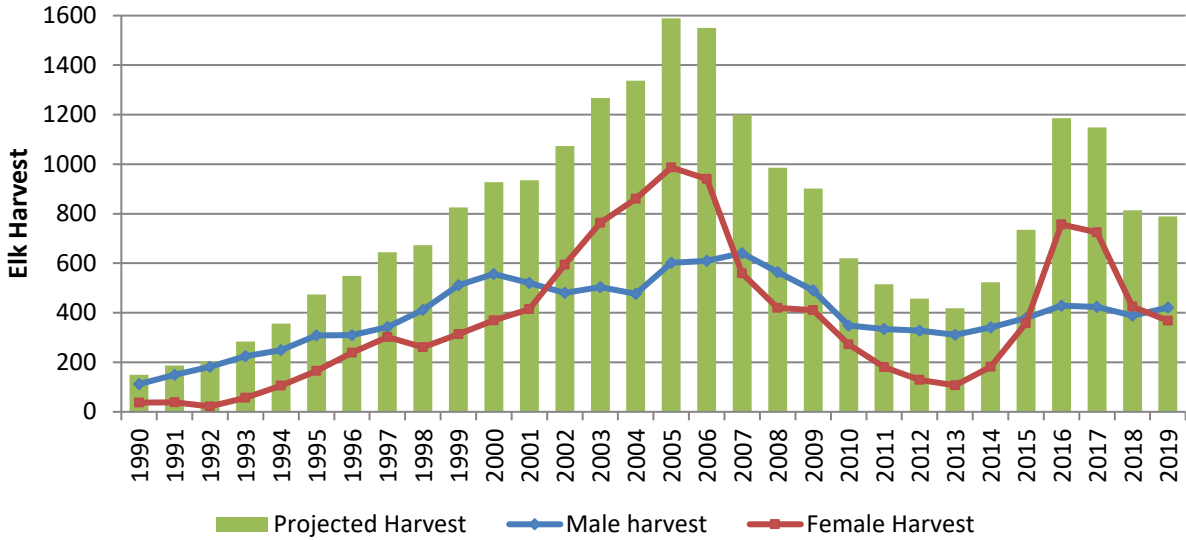


Figure 2. Harvest of elk from all hunting seasons in the Black Hills, 1990-2019.

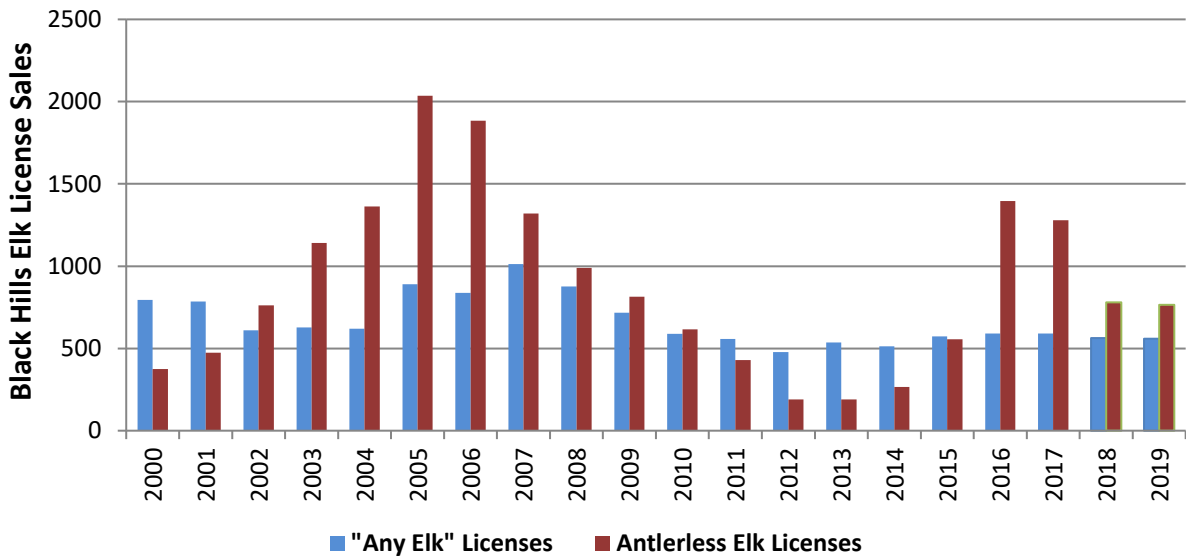


Figure 3. Total Black Hills elk license sales (firearm and archery) for antlerless and “any elk” license types, 2000-2019.

Public demand for firearm elk hunting licenses in the Black Hills is high, with nearly 12,400 hunters applying for approximately 1,100 licenses in 2019 (Table 1). Hunters spend an average of five days pursuing elk in the firearm season. Harvest rates vary across each hunting unit, but Unit 2 has higher elk densities and elk harvest rates than all other hunting units combined (Figure 4).

Firearm hunter success rates in the Black Hills have been 53-73% over that past 10 years. The Elk Management Plan Objective (SDGFP 2015; Objective 3, Strategy B) is to manage for a minimum of 60% hunter success for hunters with an “any elk” Black Hills and CSP firearm license type. Firearm hunters with “any elk” licenses experienced success rates of 87% in 2019, thus meeting and exceeding the minimum thresholds established in the Elk Management Plan. Harvest success can vary substantially between years and units, but firearm hunter success in the Black Hills has been increasing the past five years in most hunting units (Figure 5).

Table 1. Black Hills Firearm elk harvest, 2010-2019 (Huxoll 2019).

Year	# Apps 1 st Choice	Licenses Sold	Bulls Harvest	Cows Harvest	Total Harvest	Success Rate	Avg. Days Hunted	Average Satisfaction
2010	12,197	1,059	300	260	560	53%	6.64	4.47
2011	11,031	866	299	173	472	55%	6.8	4.64
2012	9,665	570	291	125	416	73%	6.37	5.3
2013	11,274	620	272	103	374	60%	6.63	4.65
2014	11,461	664	295	178	472	71%	5.85	5.46
2015	12,126	922	312	345	657	71%	6.66	5.54
2016	12,692	1,745	363	724	1,087	62%	4.59	5.42
2017	12,201	1,581	364	682	1,047	66%	4.77	5.5
2018	11,871	1,124	315	402	717	64%	5.08	5.36
2019	12,396	1,108	332	354	686	62%	5.00	5.48

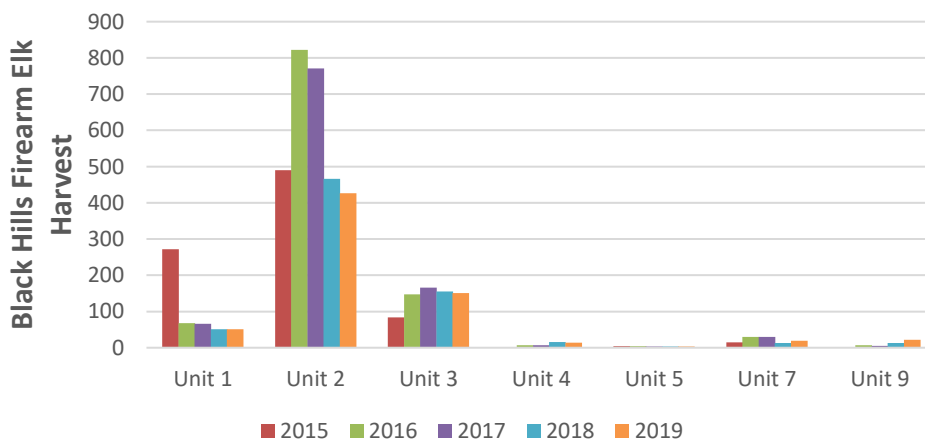


Figure 4. Black Hills firearm elk harvest for each elk hunting unit, 2015-2019.

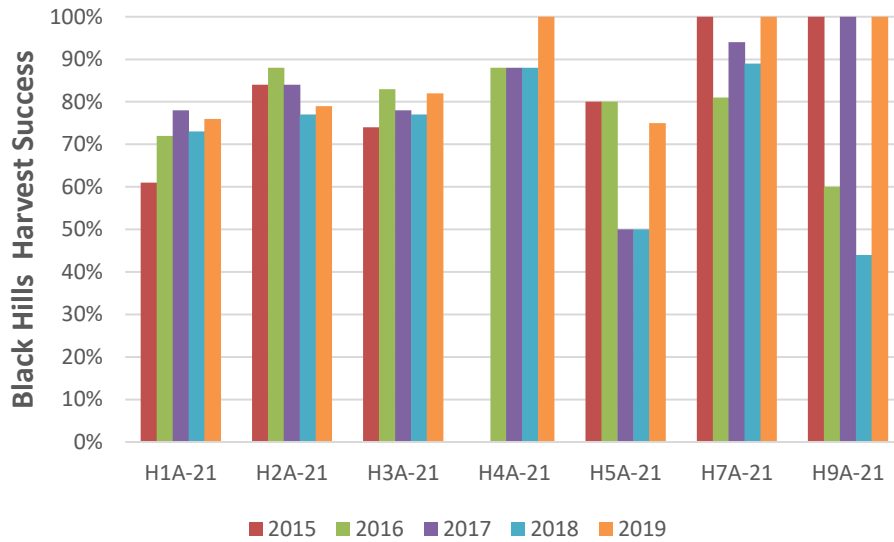


Figure 5. Black Hills firearm “any elk” license harvest success for each elk hunting unit, 2015-2019.

Nearly 5,400 hunters applied for 222 Black Hills Archery Elk licenses in 2019 (Table 2). Overall archery success rates have surpassed recent highs of 40% in 2014 to 42% in the 2019 season after several years of lower success rates. Cow harvest for the past two years has been nearly 20% of the total harvest, which is lower than the previous two years when the cow harvest rate averaged 40% of the total harvest (Table 2). The Black Hills Unit 2 maintains the highest numbers of elk, ultimately producing higher archery harvest rates in this unit compared to all other Black Hills elk units combined (Figure 6).

Table 2. Archery elk harvest in the Black Hills, 2010-2019 (Huxoll 2019).

Year	# Apps 1 st Choice	Licenses Sold	Bull Harvest	Cow Harvest	Total Harvest	Success	Avg. Days Hunted	Average Satisfaction
2010	3,761	144	34	6	40	28%	11.88	5.16
2011	3,486	126	24	8	32	25%	11.42	5.01
2012	3,228	97	33	4	38	39%	11.94	5.34
2013	3,952	107	33	3	36	34%	11.97	5.59
2014	4,256	106	38	4	42	40%	11.68	5.61
2015	4,761	196	55	12	66	34%	11.74	5.39
2016	4,965	280	57	25	82	29%	11.11	5.4
2017	4,892	269	50	20	70	26%	11.29	5.6
2018	5,006	219	65	19	84	38%	11.70	5.5
2019	5,382	216	77	14	91	42%	11.08	5.6

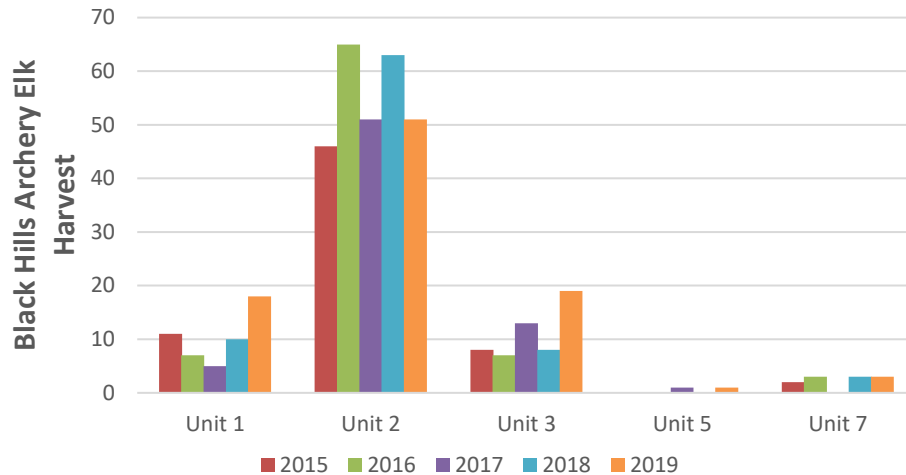


Figure 6. Black Hills Archery elk harvest, 2015-2019.

The 2019 elk season in Custer State Park began with the CSP archery season which was open September 1-30 (ARSD 41:06:28). The “any elk” CSP firearm season was open October 1 – October 31 (ARSD 41:06:27). There was no “antlerless-only” CSP firearm season in 2019. In 2019, CSP hunters with an “any elk” firearm license averaged 89% success for the nine licenses issued, while CSP archery license holders averaged 100% success for the three licenses issued (Table 3).

The Prairie Elk season dates vary based on the movement of elk and the management objectives within each unit, but start as early as July and some contain a late season in December (ARSD 41:06:49). The number of licenses sold has remained relatively consistent over the past four years. Overall success rates have increased in the last two years with a high of 79% in 2018 (Table 4).

Harvest Age Structure

Successful hunters are required to check-in harvested elk to a SDGFP representative within 24 hours (ARSD 41:06:04:19), at which time the middle two incisor teeth are removed from the harvested elk for aging purposes. Numerous check stations throughout the Black Hills are also established during the elk season to provide better convenience for hunters. Age structure data are used to assess herd status and evaluate harvest strategies.

The South Dakota Elk Management Plan (SDGFP 2015; Objective 3, Strategy C) establishes a harvest age threshold as follows: “manage combined Black Hills elk management units for an average minimum bull harvest age structure of 30% bulls 4+ years or older, and manage CSP for a minimum of 60% bulls 4+ or older”. In 2019 approximately 720 usable teeth were returned from hunters. All Black Hills teeth visually determined to be > 1 year of age were sent to Matson’s Laboratory (Manhattan, MT) to be aged using cementum annuli techniques. Of the 359 Black Hills firearm and archery bull teeth aged, 74% were assessed to be 4+ years of age or

Table 3. Elk harvest in Custer State Park, 2015-2019 (Huxoll 2019).

Hunting Season	Year	Applications	Licenses	Harvest		Success	Avg. Days Hunted	Average Satisfaction
				Bull	Cow			
Archery	2015	3,600	4	3	0	75%	16.3	6.5
	2016	3,707	3	1	0	33%	15	6
	2017	3,704	3	1	0	33%	9.7	5.7
	2018	3,772	3	2	0	50%	11.0	5.5
	2019	4,055	3	3	0	100%	5.0	7.00
Firearm "Any Elk"	2015	9,136	8	8	0	100%	1.9	6.88
	2016	8,958	9	8	0	89%	2.8	6.56
	2017	8,828	9	8	0	88%	2.3	6.71
	2018	8,670	9	8	0	86%	5.7	5.71
	2019	8,949	9	8	0	89%	2.8	6.25
Firearm Antlerless Elk	2011-15	Closed	-	-	-	-	-	-
	2016	3,138	20	0	18	90%	2.2	6.2
	2017	3,436	29	1	24	86%	2.1	5.83
	2018	3,175	23	0	4	19%	3.35	2.19
	2019	Closed	-	-	-	-	-	-

Table 4. Prairie Firearm Elk harvest, 2010-2019 (Huxoll 2019).

Year	Licenses Sold	Bull Harvest	Cow Harvest	Total Harvest	Success	Avg. Days Hunted	Average Satisfaction
2010	134	24	27	51	38%	3.92	4.00
2011	128	20	15	35	27%	4.03	4.02
2012	97	26	20	46	47%	5.22	4.72
2013	96	18	13	30	32%	4.81	4.15
2014	92	33	25	59	64%	3.73	5.31
2015	98	29	25	54	55%	4.59	5.34
2016	148	32	27	60	40%	4.76	4.68
2017	149	41	34	75	50%	6.43	4.81
2018	139	59	51	109	79%	5.55	5.58
2019	140	41	50	91	65%	5.73	5.43

older (Figure 7). For CSP, 100% of the bulls harvested (11) were 4+ years of age. The minimum thresholds identified in the Elk Management Plan were met and exceeded. Analysis of elk teeth using cementum annuli techniques the past 3 years appears to have increased the percentages of harvested animals being aged as 4+ years of age; therefore, a re-evaluation of harvest age thresholds is warranted and planned for the next elk management plan update.

Elk harvest ages in the Black Hills have been very similar the past three years (Figure 7). The 20-year average for Black Hills unit bulls harvested in the firearms and archery seasons combined is 3% calves, 7% yearlings, 51% 2-3 year-olds, and 39% 4+ year-olds.

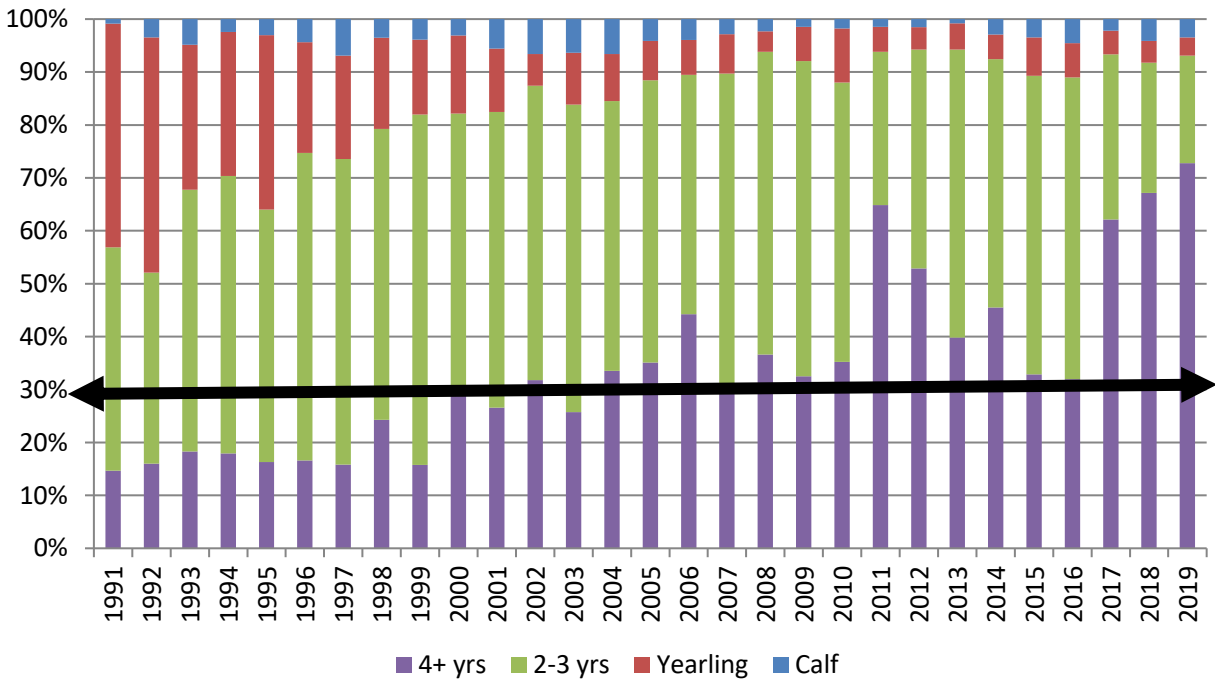


Figure 7. Age distribution of hunter harvested bull elk in the firearm and archery seasons within the Black Hills (excluding CSP), 1991-2019. The 30% minimum threshold for bull harvest in the 4+ age category is identified by the horizontal line.

CWD Testing of Harvested Elk

The first documentation of Chronic Wasting Disease (CWD) in free-roaming wildlife in South Dakota was in 2001 in a white-tailed deer in Fall River County. The first free-roaming elk that tested positive for CWD was found in 2002 within Wind Cave National Park (WICA). Since 2002, CWD has been found in a total of 232 elk from a sampling effort of over 7,450 elk in and around the Black Hills (152 CWD positive elk were collected from within WICA). A voluntary testing program is in place for hunters to submit samples from harvested elk and receive CWD test results. In the past two years, just over 400 elk have been tested with 35 returning positive for CWD (18 positive CWD results are from WICA). The locations of these CWD positive elk are

focused in and around WICA but have recently expanded into the Jasper Burn area near Jewel Cave and into the central Black Hills (Figure 8). Recent research conducted in Colorado suggests that in areas of high CWD prevalence, CWD can reduce survival rates of cow elk and decrease elk population growth (Monello et al. 2014). The long-term impacts of CWD on elk populations in South Dakota are concerning but remain largely unknown.

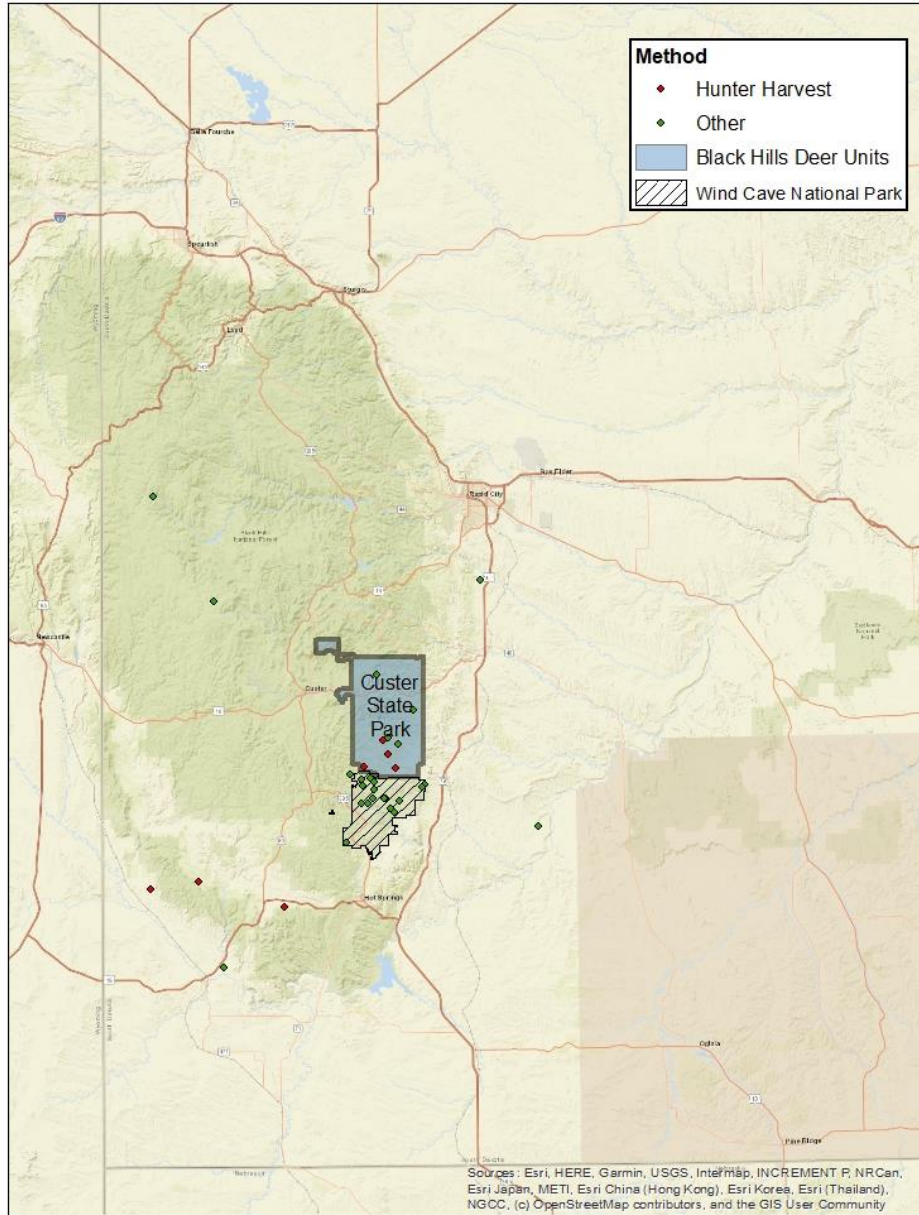


Figure 8. Map of CWD positive elk collected from hunter harvest or other collection methods, 2019-2020.

Herd Composition Surveys

Pre-hunting season herd composition surveys are completed by driving roads or hiking in areas of known elk concentrations in August. Surveys are concentrated in locations across the Black Hills according to where elk are distributed and can be observed. All elk herds that are observed in their entirety are classified to numbers of calves, cows, and bulls. Location and date of observations are also recorded in order to reduce double-counting occurrences. Herd composition survey data are analyzed to assess sex and age ratios.

Sex ratios are calculated as bulls:100 cows, but potentially could under-represent bulls as large calf/cow groups are likely more detectable during this time of year. Elk survey protocol during previous years allowed surveys to be completed in both August and September, but annual differences in ratios could be reflective of monthly observations if sampling strategies differed between years.

Age ratios are calculated as calves:100 cows and are used as an indicator of fall recruitment into the population. An annual recruitment rate is derived using fall age ratio data along with previously gathered survival rates of radio-collared calves from October through May (Simpson 2015).

In 2019, 1,363 elk were classified throughout the Black Hills and 188 in CSP during the fall herd composition survey. Age and sex ratios, along with binomial (95%) confidence intervals using groups as the sampling unit were calculated for each Black Hills and CSP. Herd composition in the Black Hills was 28 bulls:100 cows (95% CI: 24-32) and 43 calves:100 cows (95% CI: 37-48, Figures 9 and 10). The long-term 15-year bull ratio is 30 bulls:100 cows, while the 3-year average (2017-19) that is used in modeling predictions of future populations is 27 bulls:100 cows. The long-term 15-year fall recruitment average is 48 calves:100 cows, while the 3-year average is 43 calves:100 cows. In CSP, herd composition was 25 calves:100 cows (95% CI: 17-37) and 28 bulls:100 cows (95% CI: 19-39) in 2019 (Figures 9 and 10).

Survival Monitoring

Obtaining knowledge of calf and adult elk survival rates is useful for understanding population dynamics and projecting elk trends in the Black Hills. Annual rates of change within an elk population are influenced primarily by adult female survival. Another important metric is number of calves that reach one year of age. In 2012 and 2013, 71 neonatal calves ≤ 10 days old were captured and fitted with VHF radio collars. Data from the collars suggested a high survival rate, 75% (95% CI = 56-84%), from birth to one year old, and 12 of 16 mortalities were caused by mountain lion predation (Simpson 2015). Since 2015, adult cow survival in the Black Hills has been monitored annually by maintaining a representative sample of radio collared cow elk. As of March 2020, there were 149 cows being monitored approximately once monthly to assess annual survival rates and cause-specific mortality. Additional adult cow elk will be captured and collared as needed to maintain adequate sample sizes.

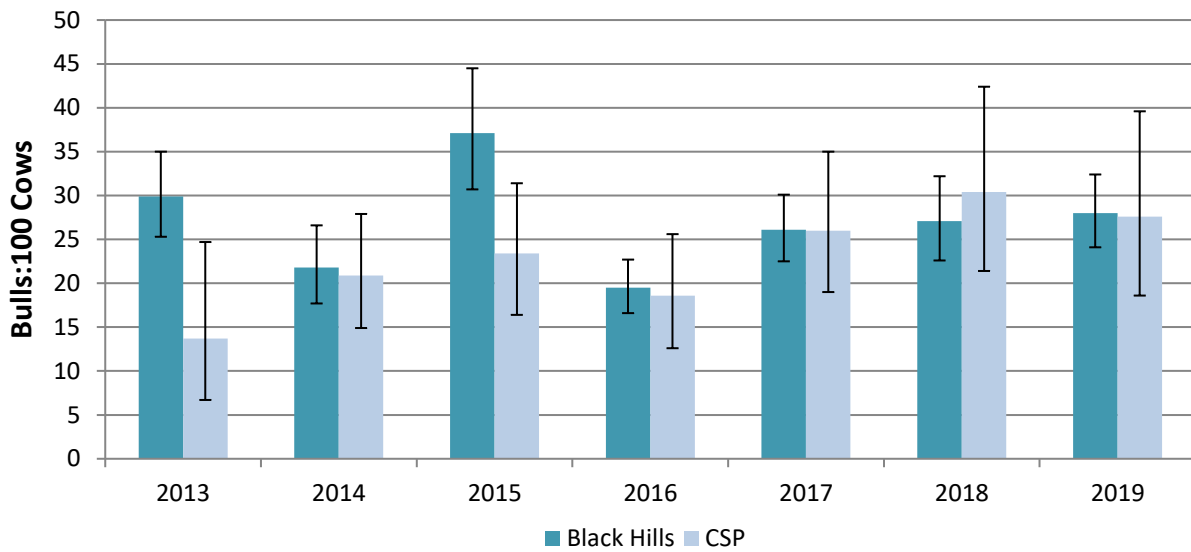


Figure 9. Fall sex ratios of elk (with 95% error bars) in the Black Hills and CSP, 2013-2019.

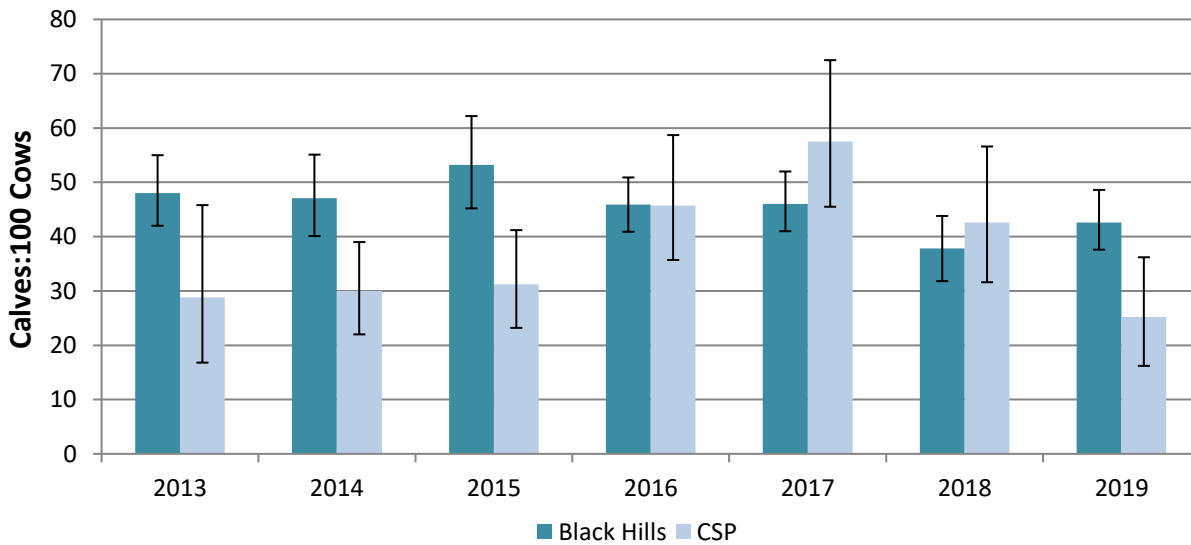


Figure 10. Fall age ratios of elk (with 95% error bars) in the Black Hills and CSP, 2013-2019.

Within the Black Hills, adult cows are captured via helicopter dart gunning and chemically immobilized using a combination of butorphanol, azaperone, and medetomidine (BAM; ZooPharm, Laramie, WY). Immobilized animals have traditionally been monitored with VHF radio collars, but all 35 captured cow elk in 2020 were fitted with GPS collars to provide additional data on elk movements and habitat use. Blood samples were collected in previous years to evaluate pregnancy status, but these efforts were ceased in 2019 because precise ages are not collected on collared animals and thus results were determined to be of minimal value.

Monitoring alive or dead status occurs within 12-16 days post-capture and all mortalities (<16 days post capture) are labeled as capture-related mortalities, except for vehicle mortalities. Monitoring then occurs one time each month between the 1st -15th for each collared individual. All mortalities are investigated to verify death of the animal via physical evidence. In most cases, cause-specific mortality is not identifiable except for vehicle collisions and hunter harvest. Hunter harvest is an important metric used in population modeling and collar reporting by hunters is a vital step in obtaining the most accurate data possible. Survival rates were calculated from time-to-event data using a hierarchical piecewise constant hazard model, smoothed among monthly intervals. The multinomial distribution partitioned hazards to estimate cause-specific mortality rates that were used in population projection models (Table 5). Population models are heavily data driven and reliable abundance and trend estimates require statistically valid survival estimates.

Table 5. Black Hills adult (>1-year-old) cow elk annual survival and cause-specific mortality rates, 2015-2019.

Year	Survival	Harvest Rate	Other Mortality Rate	# Monitored
2015	87% (78 - 94%)	7% (2 - 13%)	6% (2 - 12%)	81
2016	76% (67 - 83%)	20% (13 - 28%)	5% (2 - 9%)	102
2017	70% (61 - 78%)	21% (14 - 30%)	9% (4 - 15%)	109
2018	82% (75 - 88%)	10% (6 - 16%)	8% (4 - 13%)	116
2019	85% (78 - 91%)	9% (5 - 14%)	6% (3 - 11%)	141

Aerial Sightability Surveys

In 2009, efforts began to develop an elk aerial sightability model specific to the Black Hills of South Dakota (Jarding 2010, Phillips 2011, SDGFP unpublished). The resulting model estimated elk sightability as $\mu = 0.1446 - 0.0361 (\% \text{ visual obstruction}) + 0.1001 (\text{group size}) + 0.0158 (\% \text{ snow cover})$ and is currently used to correct for elk missed during the aerial survey in the Black Hills.

Aerial surveys of the entire Black Hills have been completed in 2013, 2016, and 2020. In 2020, approximately 277 hours of elk surveys within the Black Hills were conducted from February 06 to March 01, using three R-44 helicopters each carrying two observers and a pilot. The Black Hills was divided into 252 South Dakota subunits and 21 Wyoming



Figure 11. Photo of elk herd during aerial sightability survey, 2016.

subunits; 100% of these subunits were flown. Helicopter survey crews flew systematic search patterns (i.e., transects) within each subunit, spaced 650-1000 ft. apart, at speeds of 40-50 mph, and heights of 100-150 ft. above ground level. To avoid double counting, adjacent subunits were flown with minimal time delays. Once a group of elk was detected the search pattern was interrupted to record information on group size, % visual obstruction, % snow cover, and to record a GPS location. Pictures were taken and analyzed for groups that exceeded 50 individuals to ensure accurate counts (Figure 11).

A total of 5,834 elk were counted in 2020 in the Black Hills hunting units excluding CSP and WICA National Park. The Program R “sightability model package” was used to formulate the corrected population estimate and 95% confidence interval using the Wong variance estimator. The 2020 sightability model winter estimate of elk in the Black Hills (excluding CSP and WICA) was 6,483 (95% CI: 6,098 – 7,958) elk.

Within CSP, 435 elk were counted and the model adjusted 2020 estimate was 457 (95% CI: 442 – 544). Survey crews also counted 1,519 elk in portions of the Wyoming Black Hills, with a model adjusted estimate of 1,687 (95% CI: 1,584 - 2,118) elk.

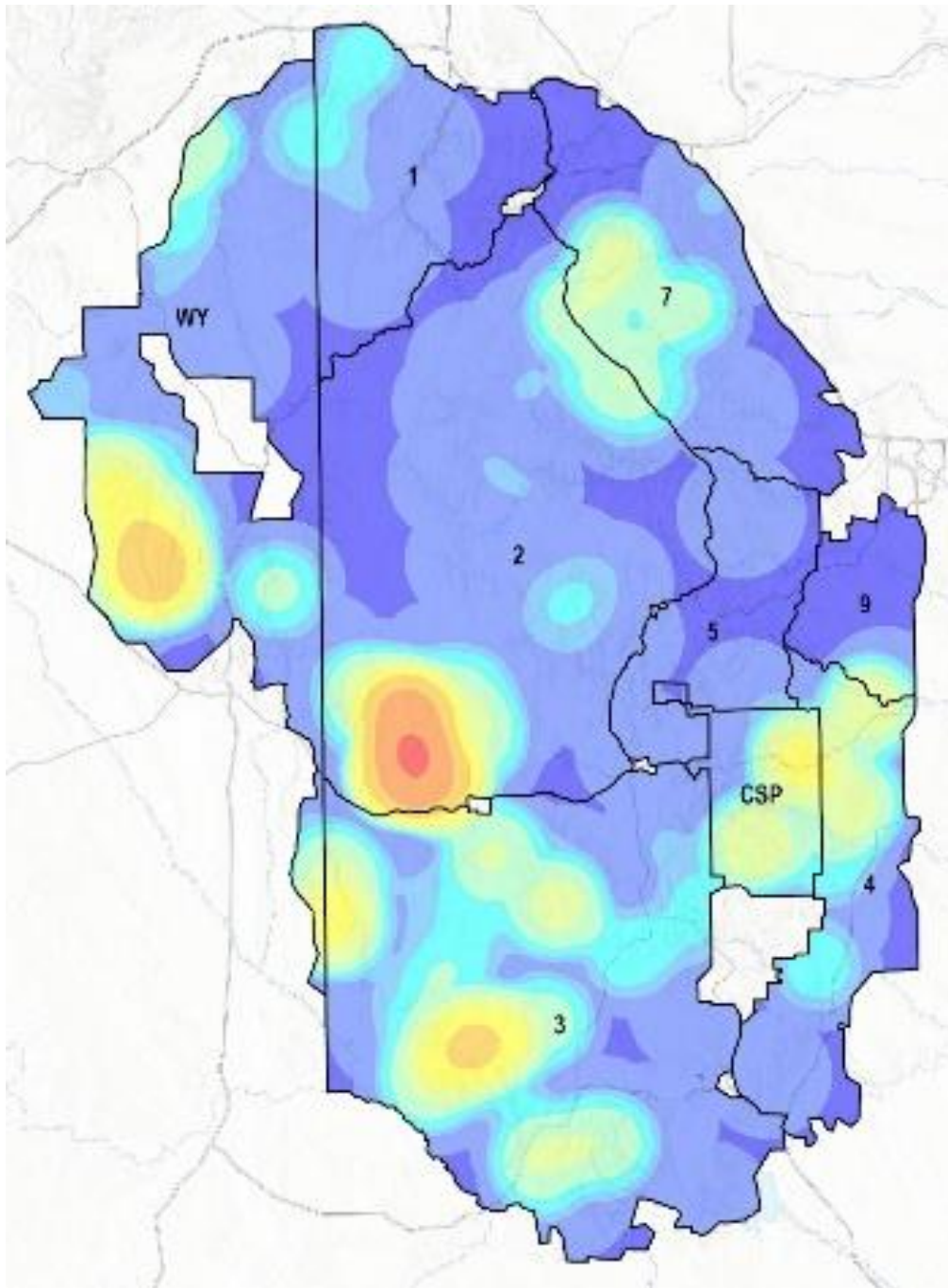


Figure 12. Aerial Sighting survey heat map of elk counts in 2020.

Aerial surveys provide great information on the wintering distribution of elk in the Black Hills (Figure 12). The Black Hills population objective (excluding CSP and WICA) is 7,000 wintering elk, ranging from 6,000 to 8,000 depending on habitat conditions (SDGFP 2015). Assessing elk unit densities during the fall hunting seasons is accomplished by distributing the Black Hills

winter estimate into each elk unit using previous years' average harvest proportions. Unit license allocations and unit population estimates and trends are then combined to ensure overall Black Hills elk are managed within the established objective range.

Future aerial elk surveys are planned to be conducted every three to four years (SDGFP 2015). The next survey of the Black Hills is scheduled for 2024. Population estimates from aerial surveys will be compared with modeled population projections to validate modeling efforts in years without surveys.

Population Modeling

Population projection models are used to annually estimate abundance and rate of population change for 3 of every 4 years when aerial estimates are not available. Data from aerial surveys in 2020 resulted in an estimate of 6,483 elk wintering in the Black Hills. Population projections incorporate herd composition ratios, survival, and additive changes to hunter harvest. A 3-year average of 27 adult bulls:100 adult cows from 2017-2019 fall herd composition data was used to estimate adult bulls and adult cows on September 1 (fall) from the 2020 aerial survey estimate, assuming 100% survival from the aerial survey to the hunting season. Calves were recruited into the fall population by multiplying the adult cows by the 2017-2019 average of 43 calves:100 adult cows. Annual (Sep. 1 to Aug. 31) calf survival (75%), adult female survival (79%), and adult bull survival (70%), estimated from radio collared elk in the Black Hills, is used to project each population cohort to the next year. To predict how tag recommendations may impact growth rates, change in harvest is assumed to be additive. Changes in license type allocations from the previous year are multiplied by 5-year average license type success rates, and the resulting harvest difference is added to or subtracted from the population projection each year.

A different projection model is used in CSP to estimate abundance and rate of change during years when aerial estimates are not available. Data from aerial surveys in 2020 resulted in an estimate of 457 elk wintering in CSP. The aerial survey estimate is used to project the population through time using a Lefkovitch matrix model. The matrix model is a post-breeding model which includes male and female calves, male and female yearlings, 2+ year old males, 2-7 year-old females, and 8+ year-old females. Survival rates, pregnancy rates, and fecundity were used to estimate future abundance. Confidence intervals for annual abundance estimates are developed using Monte Carlo simulation methods, which fully accounts for uncertainty in all input variables. To predict how different tag recommendations may impact growth rates, change in harvest is assumed to be additive, and various harvest simulations are conducted to ensure CSP is maintaining the elk population objective.

SUMMARY

The SDGFP conducts several surveys and assessments to better understand elk population abundance and trends in the Black Hills. SDGFP establishes hunting unit objectives to manage elk densities towards the overall population objective of 6,000 to 8,000 wintering elk in the Black Hills and 700 to 900 wintering elk in Custer State Park, all dependent upon habitat conditions (SDGFP 2015). Surveys are completed annually or periodically to assess harvest, disease, herd composition, reproduction, survival, and abundance.

Hunter surveys and mandatory elk check-ins are conducted annually to estimate harvest, hunter success and satisfaction, and harvested elk age structure. Minimum harvest success thresholds for hunters with “any elk” licenses in the Black Hills and CSP were established in the South Dakota Elk Management Plan (SDGFP 2015); both success thresholds are being met and exceeded. In addition, minimum harvest age thresholds established in the Elk Management Plan were also exceeded the past few years.

Annual herd composition surveys provide critical information on fall recruitment and bull to cow ratios of the elk herd. Over the past three years, calf-to-cow and bull-to-cow ratios in the Black Hills have averaged 43 calves:100 cows and 27 bulls:100 cows, respectively. Annual capture and radio collaring efforts provide an opportunity to gather important data on survival rates; monitoring of radio collared adult cow elk survival provides insights on the impacts of antlerless harvest rates and population trends. Annual cow survival rates have been presumably impacted by recent increases in antlerless licenses, decreasing from 87% in 2015 to 70% in 2017. However, cow survival increased to 82% in 2018 and 85% in 2019 after antlerless license were decreased.

Sightability surveys are completed every three to four years and provide periodic abundance estimates of wintering elk herds, and important “anchor points” for population models. Aerial surveys completed in the winter of 2015/2016 resulted in an elk estimate of approximately 7,200 in the Black Hills and 450 in CSP. Population models projected the Black Hills elk population to slightly decrease through the winter of 2019/2020 at which time the aerial survey population estimate was slightly below 6,500 elk. Assuming future elk population demographics are similar to current observations, elk abundance is projected to remain relatively stable to slightly increasing at current harvest rates.

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