
South Dakota WILDLIFE REPORT

Pronghorn Population Status Update

2022 Biennial Report

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TABLE OF CONTENTS

TABLE OF CONTENTS.....	ii
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iii
INTRODUCTION.....	1
POPULATION SURVEYS AND ASSESSMENTS	1
Population Assessments	1
Hunting Season Evaluations.....	3
Harvest Surveys.....	4
Firearm Season	6
Custer State Park Season	7
Archery Season	8
Mentored Youth Season	9
Herd Composition Surveys.....	10
Aerial Surveys.....	11
Survival Monitoring.....	13
Population Modeling.....	15
SUMMARY	16
LITERATURE CITED	17
APPENDIX.....	18

LIST OF TABLES

Table 1. Harvest summaries for the 2012-2021 Firearm pronghorn seasons (includes Landowner own land season; Huxoll 2022).....	6
Table 2. Archery pronghorn harvest in South Dakota, 2012-2021 (Huxoll 2022).....	8
Table 3. Mentored Youth pronghorn harvest summaries, 2012-2021.....	9

LIST OF FIGURES

Figure 1. Data Analysis Units (DAUs) and firearm hunting units in South Dakota, 2022.....	3
Figure 2. South Dakota pronghorn hunting unit population objectives, 2022-2023.....	4
Figure 3. Statewide pronghorn harvest for all hunting seasons in South Dakota, 1988-2021.....	5
Figure 4. Total pronghorn harvest from Firearm, Archery, Mentored Youth, and Landowner-Own-Land hunting seasons in South Dakota, 2021.....	5
Figure 5. Statewide firearm harvest of pronghorn in South Dakota, 2012 – 2021.....	7
Figure 6. Statewide archery pronghorn harvest in South Dakota, 2012-2021.....	9
Figure 7. Statewide mentored youth pronghorn harvest in South Dakota, 2012-2021.....	10
Figure 8. Herd Composition survey results by DAU, 2021.....	11
Figure 9. Statewide fawn:100 doe estimates and average trend line depicting 60 fawns:100 does, 2012-2021.....	11
Figure 10. Adult pronghorn density estimates derived from spring aerial surveys in South Dakota, 2022.....	12
Figure 11. Adult pronghorn change in spring densities between aerial surveys conducted in 2019 and 2022 in South Dakota.....	13
Figure 12. Movements of GPS collared pronghorn in northwestern South Dakota, 2020 – 2021.....	
Figure 13. Movements of GPS collared pronghorn in central South Dakota, 2020 – 2021.....	
Figure 14. Statewide pronghorn pre-hunt population estimates and population objective range (shaded area), 2002-2022. Projection for 2022 is in part based on 3-year average of previous herd composition and will be adjusted later in the fall using actual recorded herd composition.....	16

INTRODUCTION

South Dakota's diverse landscapes of grassland, rangeland, and cropland areas are home to pronghorn (*Antilocapra americana*) across areas primarily west of the Missouri River. Commonly called antelope, pronghorn were nearly extirpated due to unregulated harvest and market hunting by the turn of the 20th century. Legislation created in the 1900s and hunting seasons established by the South Dakota Department of Game, Fish, and Parks (GFP) Commission allowed pronghorn populations to recover from historic lows. Pronghorn hunting seasons have occurred regularly since the 1940s, with hunters harvesting approximately 4,700 pronghorn during the 2021 hunting season.

Pronghorn hunting is a popular and much awaited outdoor activity for many sportsmen and women in South Dakota with approximately 9,000 licenses purchased in the 2021 hunting seasons. During the 2008 hunting seasons when pronghorn populations were at an all-time high, hunter participation peaked as well with over 15,000 hunting licenses purchased. Hunting remains the number one tool for managing pronghorn populations across South Dakota and harvest strategies are intended to ensure the well-being of the species and its habitat while maintaining populations at levels compatible with human activity and land use.

The South Dakota Department of Game, Fish, and Parks (GFP) serves to connect people and families to the outdoors through effective management of our state's parks, fisheries, and wildlife resources. South Dakota's pronghorn resources demand prudent and increasingly intensive management to accommodate numerous and varied public demands and growing impacts from people (SDGFP 2019). More specific information on pronghorn management objectives and strategies in South Dakota can be found in the South Dakota Pronghorn Management Plan at https://gfp.sd.gov/UserDocs/docs/PronghornPlan_FINAL.pdf.

The following report provides a statewide overview of pronghorn surveys and assessments conducted by the GFP and an update on the population status of pronghorn in South Dakota.

POPULATION SURVEYS AND ASSESSMENTS

Population Assessments

The pronghorn is the only member of the family Antilocapridae and is native only to North America. Today pronghorn populations in South Dakota persist at substantially lower numbers than were historically present. Pronghorn densities are greatest in the western rangelands of the state, and herds exist in most counties west of the Missouri river and some counties directly east of the river. Current populations are affected by weather extremes of drought and severe winters, harvest, decreasing available habitats due to conversion to agriculture, predation, and landowner tolerance.

The current statewide population objective is approximately 69,000 total pre-season pronghorn, but actual population abundance may range from 59,000 to 80,000. The statewide objective is a summation of all hunting unit objectives (Appendix A). Pronghorn densities will vary by management unit, but the overall average throughout the pronghorn range in the state will be approximately 1.6 pronghorn per square mile when objectives are reached. Objective densities within each management unit range from a low of 0.05 pronghorn/sq. mile in the Hyde/Hand/Buffalo unit to a high of 5.9 in the West Harding unit. Pronghorn unit objectives may fluctuate due to landowner tolerances, which are often influenced by winter severity, crop rotation, and changing habitat conditions due to drought and/or livestock grazing. Unit population objectives were developed after thorough analyses of pronghorn population data, recreation opportunities, private land depredation issues, and substantial input from a wide variety of publics with an interest in pronghorn management in South Dakota.

South Dakota has the 5th largest pronghorn population in North America with an estimated 47,700 animals in 2017 (Schroeder 2018). Growth rates of pronghorn populations are highly influenced by annual survival of adult does and fawn recruitment rates, which can fluctuate substantially from year to year and area to area. Therefore, annual management surveys are critical to properly assess abundance and trends of populations and ultimately drive management decisions to reach population objectives. Numerous surveys are completed by GFP to manage this important resource for both consumptive and non-consumptive users.

Pronghorn management and surveys in South Dakota include the following: 1) hunting season evaluations, 2) herd composition surveys, 3) aerial surveys, 4) survival monitoring, and 5) population modeling. Survey data are annually compiled and analyzed biennially for trends or model projections to estimate pre-season population abundance for each hunting management unit in the state. Some datasets like survival and herd composition are analyzed at a larger scale (Data Analysis Unit; DAU) due to sampling limitations, which is a more biologically meaningful evaluation and improves inference (Figure 1).

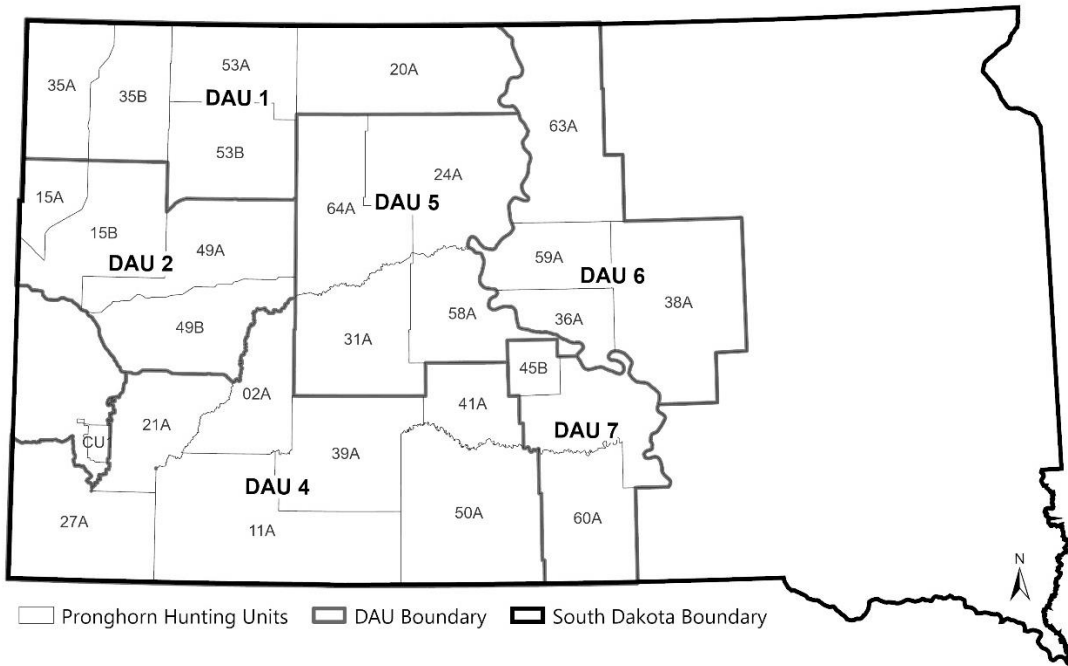


Figure 1. Data Analysis Units (DAUs) and firearm hunting units in South Dakota, 2022.

Hunting Season Evaluations

Managing wildlife populations within various social tolerances, hunter desires, and expectations of the public is a challenging task. Pronghorn hunting is a popular and much awaited outdoor activity for many sportsmen and women in South Dakota. The high demand for pronghorn hunting opportunities amongst the numerous pronghorn seasons requires careful consideration by GFP to provide the highest amount of hunting opportunity in the most fair and equitable manner in accordance with current pronghorn population management objectives.

There are currently 28 pronghorn firearm management units within the state's pronghorn range. Numeric objectives have been established for each unit (Appendix A) and license allocations are set to align population growth rates towards objectives. Management objective directions (increase, maintain, or decrease) for each unit are determined approximately every 2 years to provide a quick assessment on management direction needed to reach stated objectives (Figure 2).

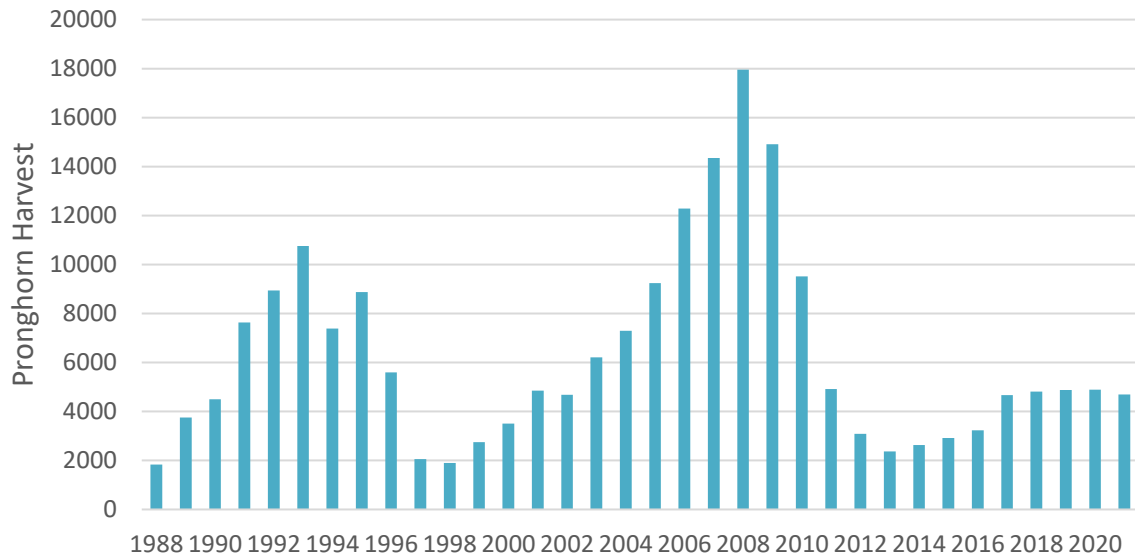


Figure 3. Statewide pronghorn harvest for all hunting seasons in South Dakota, 1988-2021.

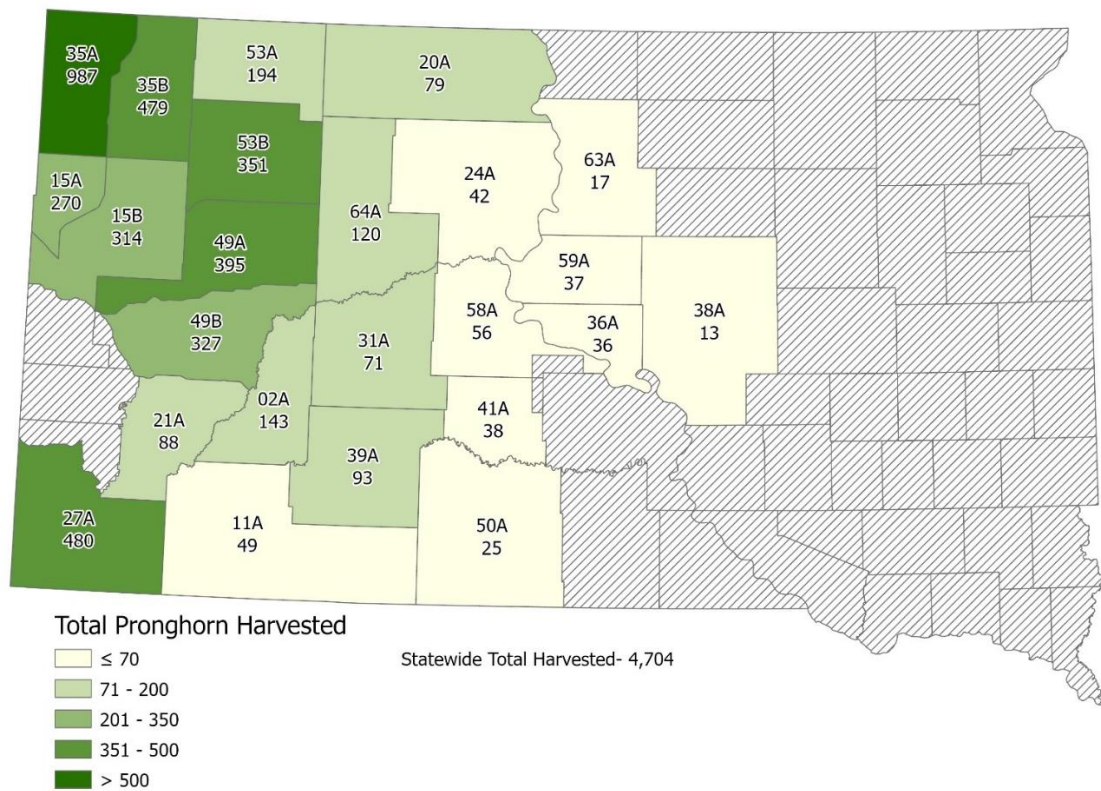


Figure 4. Total pronghorn harvest from Firearm, Archery, Mentored Youth, and Landowner-Own-Land hunting seasons in South Dakota, 2021.

Firearm Season

Firearm pronghorn hunting licenses in South Dakota are limited in all management units and issued through a lottery draw system. The firearm season is open for 16 consecutive days beginning on the Saturday closest to October 1 (South Dakota Administrative Rules [ARSD] 41:06:23:01), which in 2021 was Oct 2-17. A total of 5,047 resident and 160 nonresident firearm licenses were sold in 2021.

Public demand for firearm pronghorn hunting licenses is relatively high, with 11,931 first choice resident applicants for 4,715 licenses available and 1,316 first choice nonresident applicants for 142 available licenses in 2021 (Huxoll 2022). Hunters spent an average of 5.11 days pursuing pronghorn in the 2021 firearm season and harvested a total of 3,552 animals (Table 1). Firearm hunter success rates over the past 10 years for all license types varied from a low of 48% in 2013 to a high of 70% in 2016. Most of the harvest over the past 10 years by firearm hunters has been buck pronghorn, although approximately 1,000 does have been harvested annually the past 5 years (Figure 5).

Table 1. Harvest summaries for the 2012-2021 Firearm pronghorn seasons (includes Landowner own land season; Huxoll 2022).

Year	License Sold		Harvest			Success	Avg. Days Hunted	Avg. Satisfaction
	Resident	Nonres	Males	Females	Total			
2012	3,965	0	1,695	942	2,637	53%	2.05	4.79
2013	3,467	0	1,454	480	1,935	48%	1.76	4.72
2014	2,991	61	1,770	314	2,083	66%	1.99	5.12
2015	3,260	62	1,910	314	2,224	64%	2.08	5.23
2016	3,266	62	2,112	350	2,461	70%	2.04	5.42
2017	5,286	146	2,692	1,093	3,785	64%	2.22	5.26
2018	5,412	127	2,845	1,000	3,845	63%	2.12	5.27
2019	5,096	139	2,629	1,249	3,878	64%	1.91	5.33
2020	5,139	140	2,416	1,272	3,687	60%	2.13	5.06
2021	5,047	160	2,401	1,152	3,552	59%	2.13	5.11

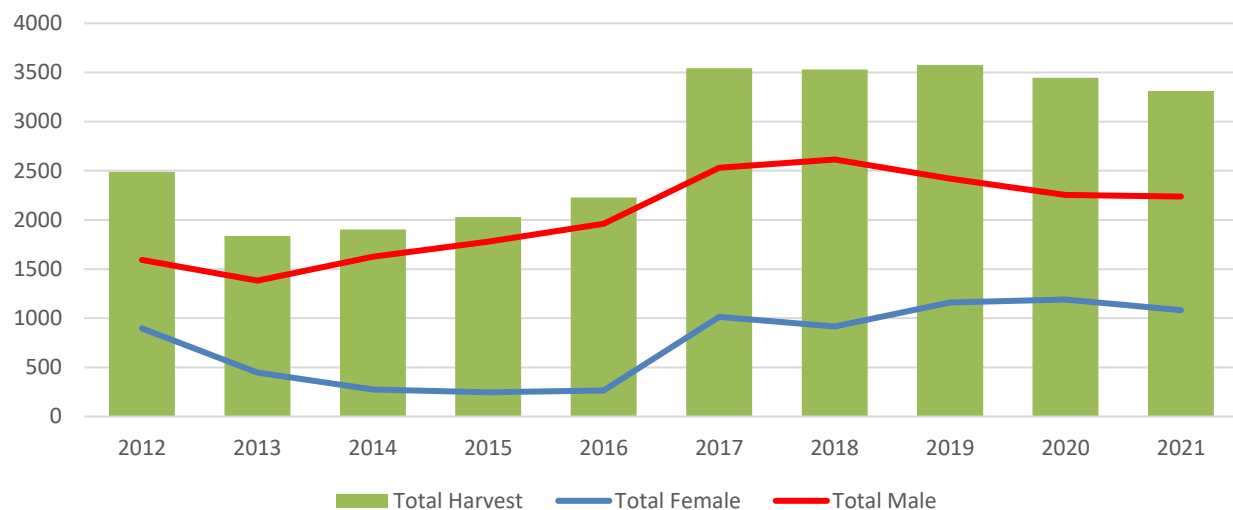


Figure 5. Statewide firearm harvest of pronghorn in South Dakota, 2012 – 2021.

For all pronghorn firearm hunting units (excluding CSP), up to 50% of pronghorn licenses allocated in each management unit are available to those who qualify for landowner/operator preference. Resident landowners/operators, including any immediate family living at home, who have not already been issued a pronghorn license that allows the harvest of a buck, may purchase a reduced-price license to hunt on their own land. These license types have been available to eligible resident landowner/operators since 1981 and are authorized by SDCL § 41-6-19.3. Harvest statistics for Landowner-own-land (LOL) hunters are included in the previous firearm table. In 2021, of the 3,552 pronghorn harvested during the firearm season, 163 bucks and 75 does were harvested by LOL hunters.

Custer State Park Season

The Custer State Park pronghorn population is below objective and therefore the hunting season has been closed since 2017. The projected preseason population estimate for 2022 is approximately 105 total pronghorn. This is a highly sought-after hunt, and the last time a season was held in 2016 there were 1,223 applicants for 3 licenses. Hunter satisfaction, based on a numerical scale from 1 (very dissatisfied) to 7 (very satisfied), averaged 7.00 for the season.

As outlined by Strategy 3D of the South Dakota Pronghorn Management Plan 2019-2029 (GFP 2019), GFP will manage pronghorn in CSP primarily for quality wildlife viewing opportunities, with limited hunting opportunities provided as follows:

1. “Any antelope” licenses will be set at 3% of the pre-season CSP pronghorn population estimate. No licenses will be issued if the CSP pre-season population estimate is < 135 pronghorn.
2. “Doe/kid” licenses will be set at 3% of the pre-season CSP pronghorn population estimate. No licenses will be issued if the CSP pre-season population estimate is < 250 pronghorn.

Archery Season

The 2021 pronghorn hunting season began with the archery season opening on the 3rd Saturday in August (August 21) and continuing until October 31 (except closed during firearm season; ARSD 41:06:24:01). There were unlimited statewide “any antelope” archery licenses available to resident and non-resident hunters.

Public demand for archery pronghorn hunting opportunities has steadily increased the past 10 years (Table 2). Resident hunters have increased from 1,212 in 2012 to 2,142 in 2021, while nonresidents have increased from 255 to 877 over the same period. In 2021, archery hunters hunted an average of 3.9 days pursuing pronghorn and harvested a total of 642 bucks and 94 does. Archery harvest has steadily increased the past 10 years, with the bulk of the harvest being bucks (Figure 6). Overall success was 24% in 2021, but over the past 10 years has ranged from 22% to 28%.

Table 2. Archery pronghorn harvest in South Dakota, 2012-2021 (Huxoll 2022).

Year	Licenses Sold		Harvest		Success	Avg. Days Hunted	Avg. Satisfaction
	Resident	Nonresident	Bucks	Does			
2012	1,212	255	297	22	22%	3.8	4.74
2013	1,164	280	292	38	23%	3.77	4.97
2014	1,165	354	356	28	25%	3.94	5.19
2015	1,372	372	411	52	27%	4.07	5.26
2016	1,523	400	466	42	26%	3.8	5.33
2017	1,569	521	529	52	28%	4	5.44
2018	1,632	570	529	56	27%	4.17	5.43
2019	1,781	633	533	72	25%	3.79	5.4
2020	2,141	720	719	92	28%	3.81	5.28
2021	2,142	877	642	94	24%	3.92	5.27

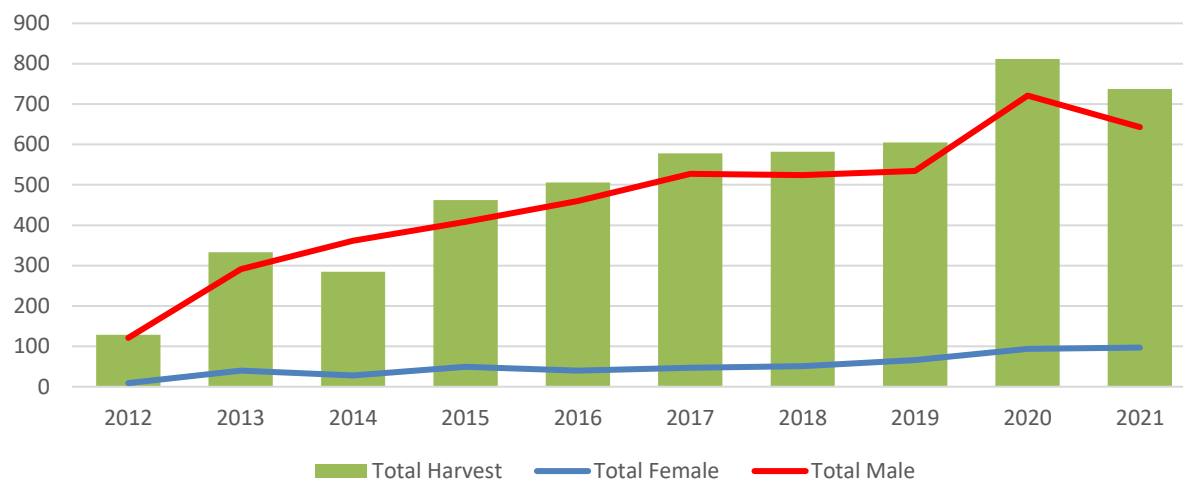


Figure 6. Statewide archery pronghorn harvest in South Dakota, 2012-2021.

Mentored Youth Season

The Mentored Youth licenses are valid during the Archery and Firearm Pronghorn seasons. Mentored hunters hunted an average of 1.71 days in 2021 and experienced overall success rates of 48% (Table 3). Participation in mentored hunting has increased the past 10 years, with nearly 850 youth hunting in 2021. The increase in mentored youth hunters has also been accompanied with increased harvest, with 405 mostly doe pronghorn being harvested in 2021 (Figure 7).

Table 3. Mentored Youth pronghorn harvest summaries, 2012-2021.

YEAR	Licenses Sold	Harvest				Success	Avg. Days Hunted	Avg. Satisfaction
		Buck fawns	Doe Adults	Doe fawns	Total			
2012	316	15	101	11	128	40%	1.61	5.66
2013	350	14	80	14	108	31%	1.32	5.35
2014	361	16	126	22	163	45%	1.58	5.58
2015	493	32	165	32	230	47%	1.71	5.72
2016	538	28	225	14	267	50%	1.83	5.72
2017	629	36	244	26	305	49%	1.79	5.64
2018	824	41	294	45	380	46%	1.65	5.5
2019	853	56	282	52	390	46%	1.46	5.61
2020	918	43	305	47	395	43%	1.75	5.37
2021	847	19	356	30	405	48%	1.71	5.24

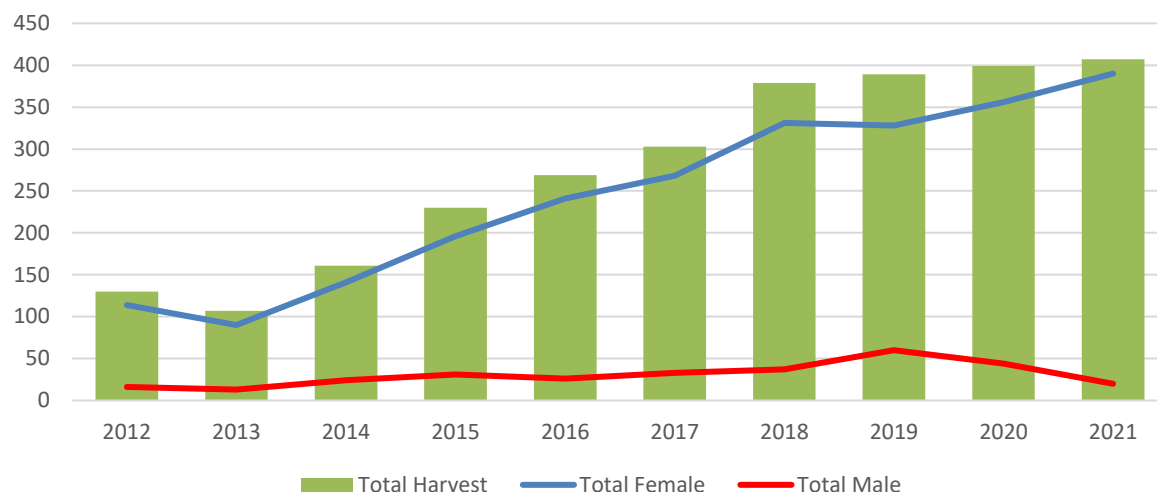


Figure 7. Statewide mentored youth pronghorn harvest in South Dakota, 2012-2021.

Herd Composition Surveys

Pronghorn herd composition data are collected via opportunistic ground counts across the entire pronghorn range in South Dakota. Surveys are completed from September 1-30. The sample size minimum is 200 unique groups per DAU, with counts distributed across the entire DAU as much as feasible.

GFP survey personnel classified 4,908 fawns, does, and bucks in September of 2021 to estimate sex and age ratios. Age ratios are calculated as fawns per 100 does and represent fall recruitment into the population. DAU estimates of fawn:doe ratios in 2021 (Figure 8) ranged from a low of 37:100 in DAU 6 ($n = 206$ does) to a high of 53:100 in DAUs 2 and 3 ($n = 1289$ does combined). The statewide 2021 fawn:doe ratio of 48 (95% CI: 45-52) fawns per 100 does is currently well below the 10-year average of 60 fawns per 100 does (Figure 9), which could possibly be attributed to recent impacts of drought on available forage and hiding cover. The statewide 2021 buck:doe sex ratio of 37 is similar to the 10-year average of 36 bucks per 100 does.

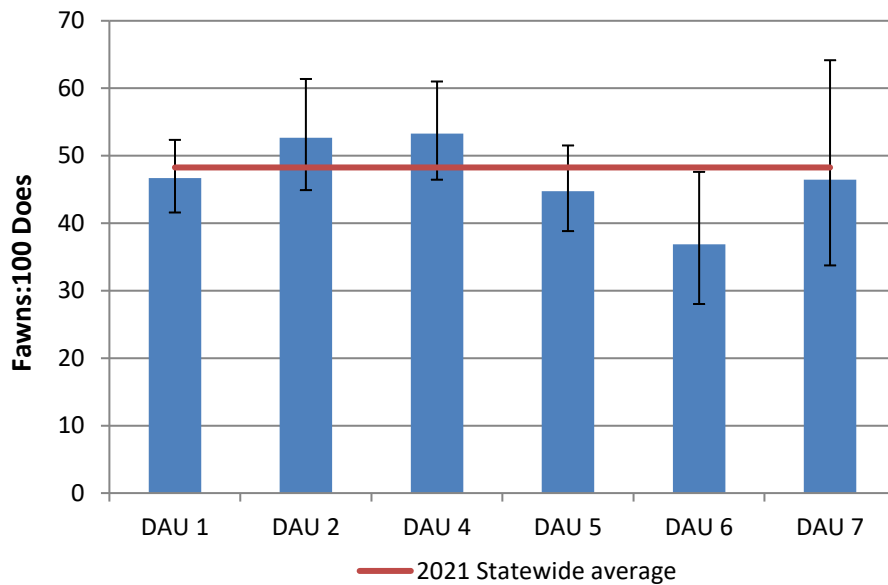


Figure 8. Herd Composition survey results by DAU, 2021.

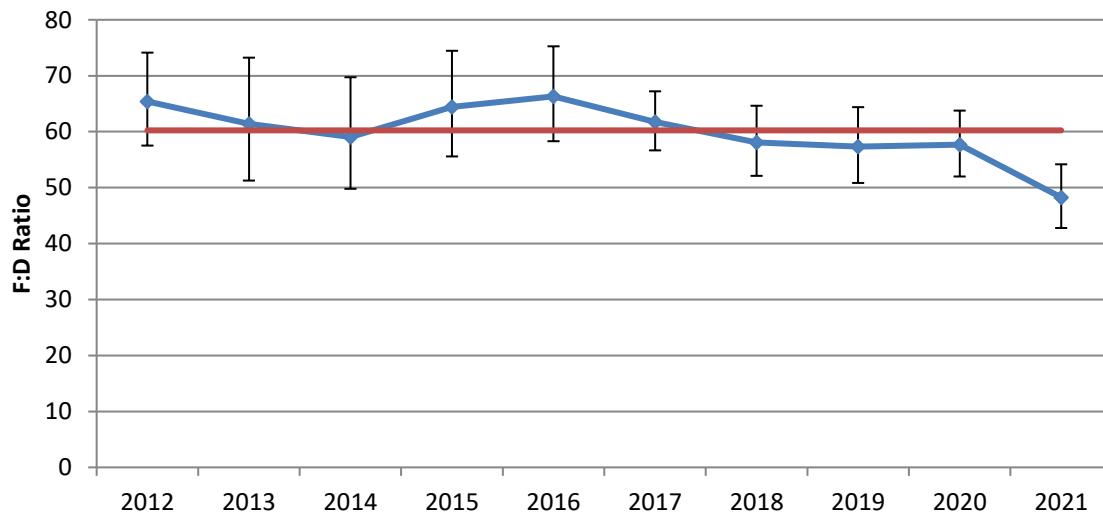


Figure 9. Statewide fawn:100 doe estimates and average trend line depicting 60 fawns:100 does, 2012-2021.

Aerial Surveys

Spring adult pronghorn estimates are generated usually biennially through aerial surveying procedures. To prioritize funds available for habitat and access programs, budget adjustments were made to several Department programs and the aerial survey was not conducted in 2021. The survey is conducted from May to mid-June, during spring vegetative green-up. A fixed-

winged aircraft is flown at speeds <100 mph, and altitudes between 100 to 200 feet above ground level. In units west of the Missouri River, aerial strip transects are flown 1.5 miles apart, with transect widths of 0.5 miles. Two observers (one being the pilot) record and classify all adult pronghorn (neonates are not counted) observed ≤ 0.25 miles of each side of the aircraft. Results from sampled areas (an approximate systematic third of each unit) are used to estimate pronghorn densities in un-sampled areas. In units east of the Missouri River, the entire area is surveyed, but transect widths are increased to 1 mile. Flight results are used to map spring densities of pronghorn across the state (Figure 10), although actual densities may vary between spring surveys and fall hunting seasons.

2022 Spring Pronghorn Density

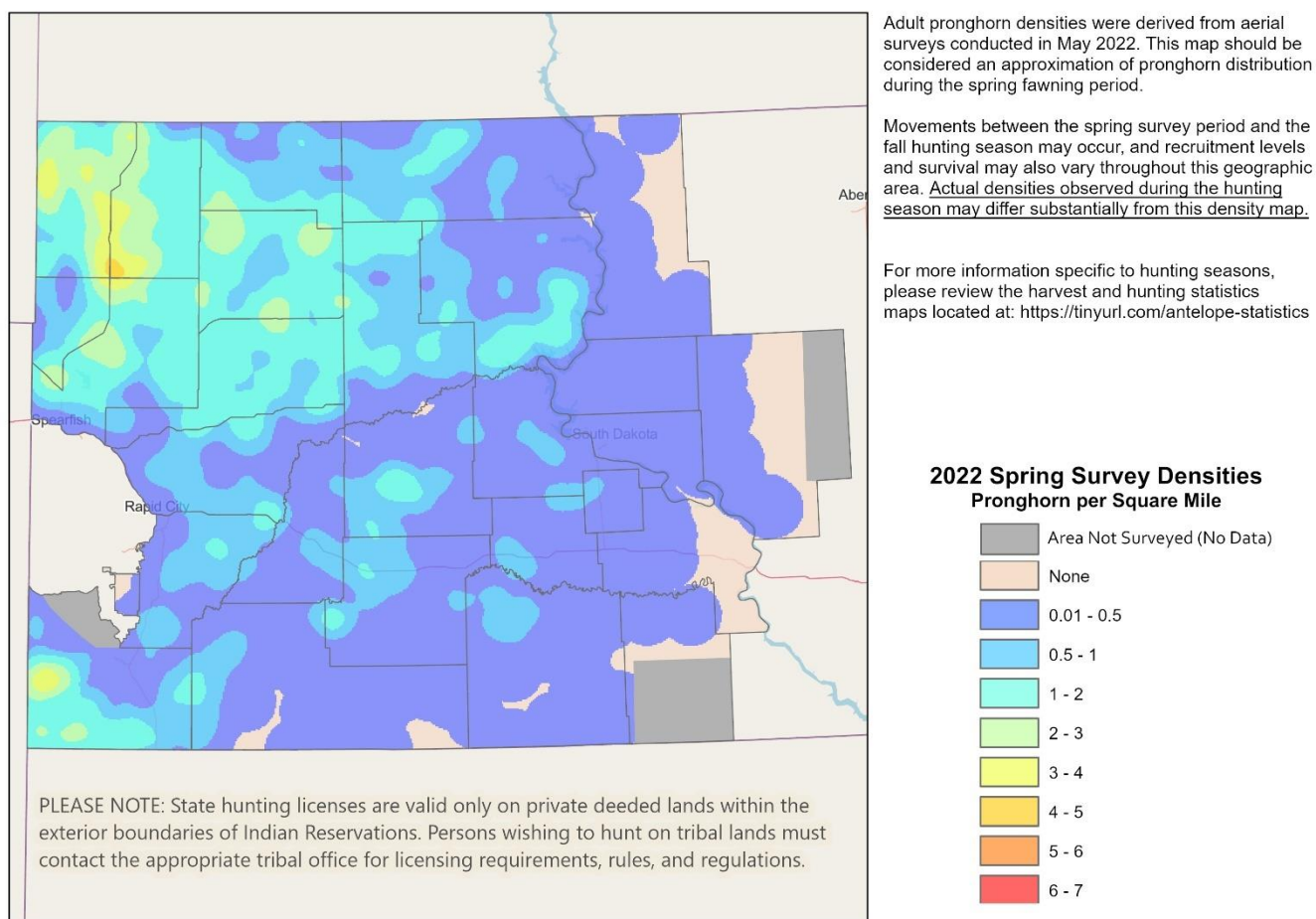


Figure 10. Adult pronghorn density estimates derived from spring aerial surveys in South Dakota, 2022.

No sightability correction factor is used to account for potential pronghorn missed during the survey, resulting in an assumption of 100% detection probability. If detection probability is less than 100%, total population estimates will be biased low. Assuming independence among

hunting units, the total statewide and DAU spring population estimates were calculated by summing total population and variance across hunting units (Thompson 2002). The statewide spring estimate in 2022 was 28,354 (95% CI = 22,982-33,726). This is a decline in the estimated population of 33,760 adult pronghorn during the last flights of 2019, with some herds seeing greater decreases in abundance than others (Figure 11).

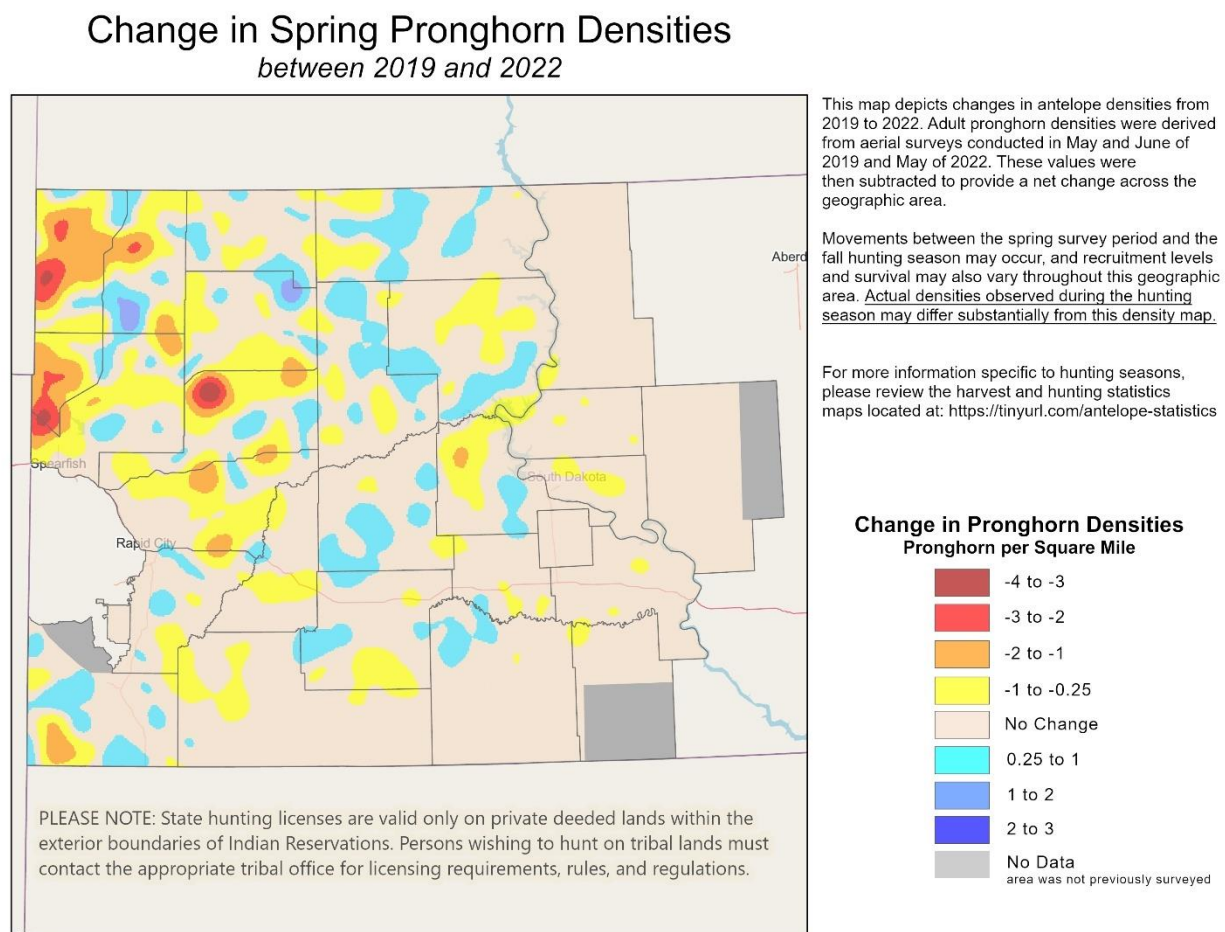


Figure 11. Adult pronghorn change in spring densities between aerial surveys conducted in 2019 and 2022 in South Dakota.

Survival Monitoring

Understanding population dynamics of pronghorn and determining annual rates of population change (λ) requires knowledge of juvenile and adult survival rates. Annual rates of change within a pronghorn population are influenced primarily by adult survival and the number of fawns that reach one year of age.

Increased efforts to obtain statistically and biologically meaningful survival estimates (sample sizes >100 individuals) within a defined DAU occurred from 2017-2022. Pronghorn were last

captured in 2022 in DAUs 1 and 6 to maintain approximate sample size goals of 100 adults and 100 juveniles. Currently, GFP continues to monitor these animals as part of a collaborative research project with the University of Montana.

Within the active monitoring areas, adult females (≥ 17 months) and juveniles (~ 8 months) are captured via helicopter net gun and fitted with a Global Positioning System (GPS) radio-collar during the winter months. Monitoring for a live/dead status occurs within 16 days post-capture and all mortalities (< 16 days post capture) are labeled as capture-related mortalities, with the exception of vehicle mortalities. All mortalities are investigated to verify death of the animal via physical evidence. In most cases, cause-specific mortality is not identifiable with the exception of vehicle collisions and hunter harvest.

All capture, monitoring, and mortality data are collected using handheld electronic devices (i.e., cell phones and tablets) and later stored in a centralized database. Annual survival rates are calculated using known fates interval-censored logistic regression models in Program R. The use of GPS collars provides additional data to the study to evaluate resource use and movements (Figures 12 and 13). Formal analyses and write-up will occur in approximately 2 years when the PhD graduate student from the University of Montana completes a dissertation, but pronghorn movements and dispersal are widespread.

As of June 2022, there were approximately 296 adult and 152 juvenile pronghorn being monitored to assess annual survival rates. To prioritize funds available for habitat and access programs, budget adjustments were made to several Department programs, thus additional pronghorn capture and collaring studies have been currently discontinued.

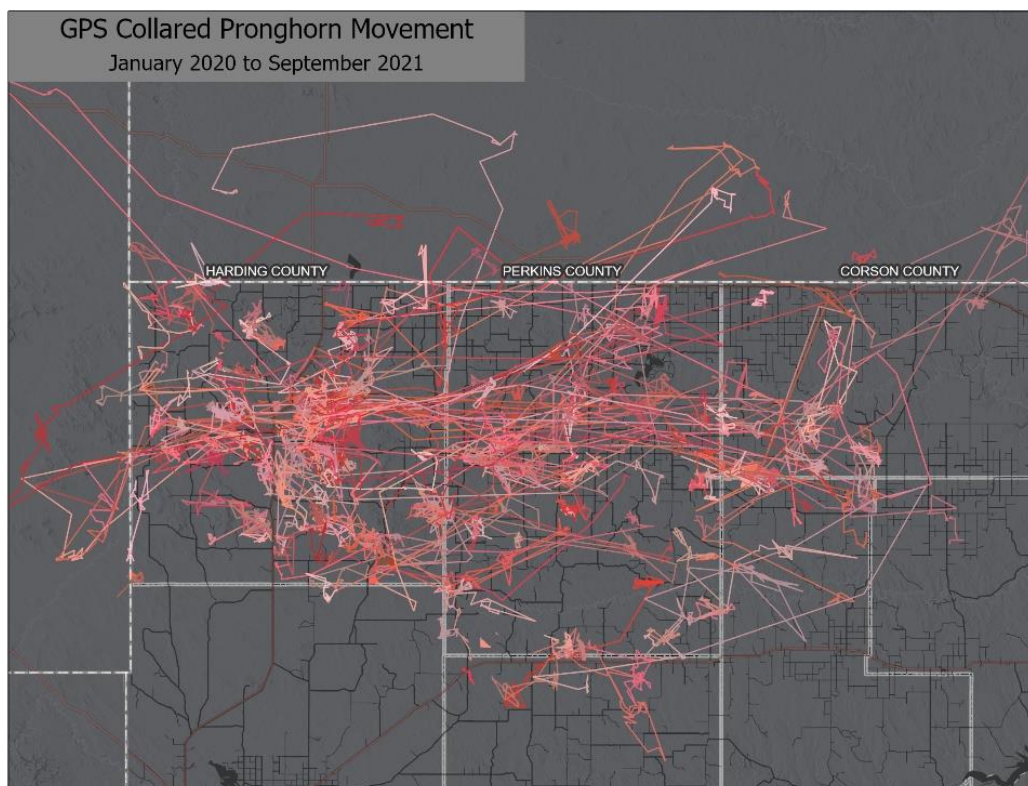


Figure 12. Movements of GPS collared pronghorn in northwestern South Dakota, 2020 – 2021.

Population Modeling

Biennial pre-hunt unit pronghorn estimates are projected from adult spring aerial survey estimates, explained in the *Aerial Surveys* section, using information learned from previous survival and herd composition surveys. After sightability and adult mortality from the spring survey to the hunting season is accounted for (based on most recent survival analyses), pre-hunt adult male and adult female cohorts are projected to the fall by multiplying the adjusted spring estimate by adult sex ratios, calculated from the most recent 3-year average of herd composition data. Pre-hunt fawns are estimated by multiplying pre-hunt adult females by fawns per adult female (age ratio), calculated from the most recent 3-year average of herd composition data. Male and female recruitment from birth to fall is assumed to be equal.

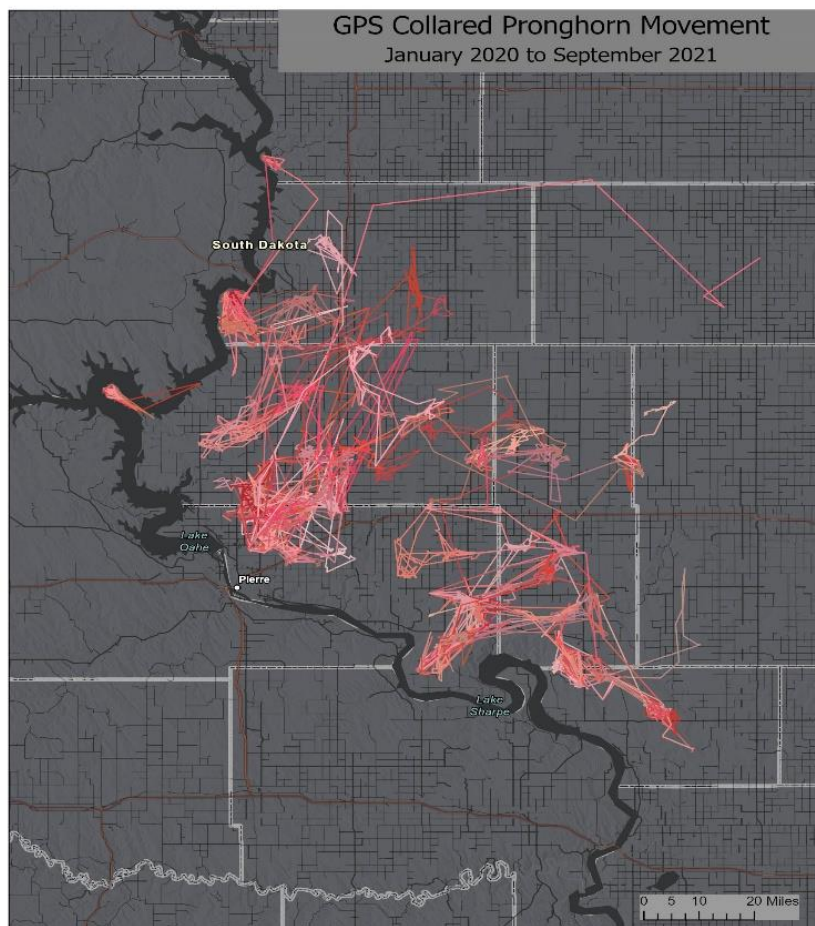


Figure 13. Movements of GPS collared pronghorn in central South Dakota, 2020 – 2021.

Because aerial surveys for pronghorn are generally conducted biennially, pre-hunt population abundance and trends for units are projected during years without surveys using herd composition and winter severity data. Sex and age (young-of-year and adult) cohort-specific estimates of annual survival rates are predicted using a function related to a winter severity index (accumulated snow fall and minimum temperature during winter months; Baccante and Woods 2010). Cohort-specific survival rates are multiplied by cohort populations to project the adult population by sex to the next hunting season. Pre-hunt fawns are estimated by multiplying pre-hunt adult females by fawns per adult female (age ratio), calculated from the most recent 3-year average of herd composition data.

In 2022, based on aerial surveys and previous fall recruitment, the pronghorn preseason population is estimated at 36,924 (95% CI = 23,375 – 46,567). These estimates are substantially lower than the record population of approximately 82,000 in 2008 but higher than the 34,000 in 2011 (Figure 14). Conservative harvest rates and adequate environmental conditions

allowed pronghorn populations to slowly increase from 2011 to 2019, but low adult survival documented in 2020 and record low recruitment in 2021 have resulted in lower populations in 2022. Late winter storms, drought, and potentially disease and other factors have likely caused varying degrees of population depression across the state.

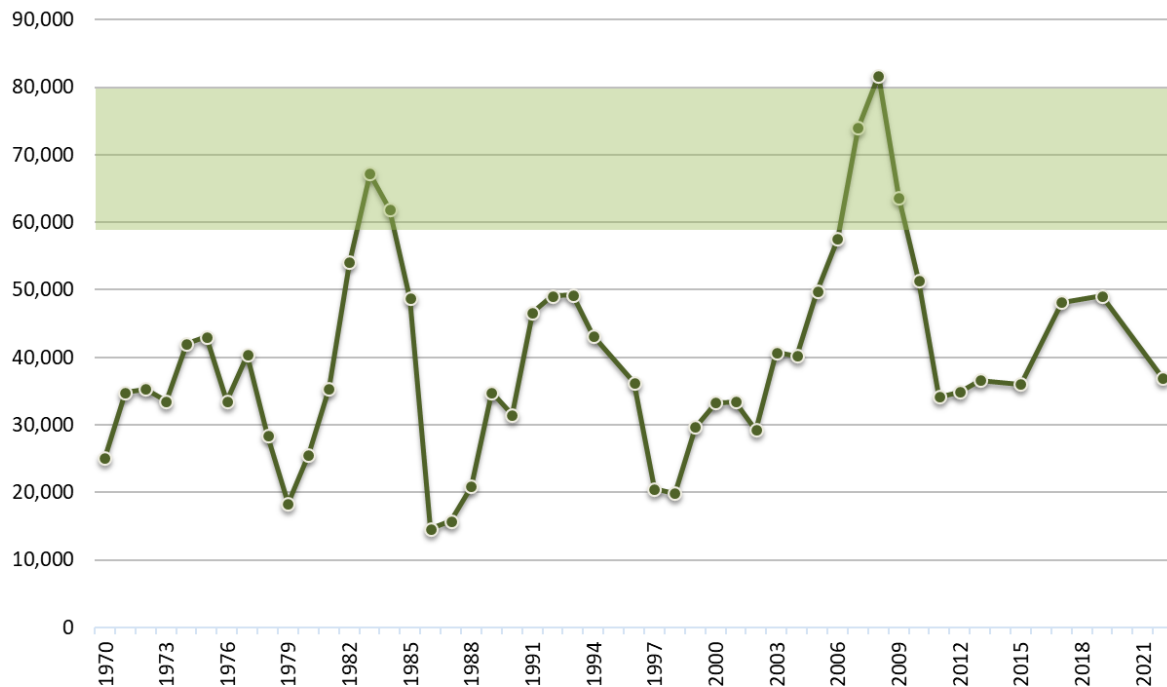


Figure 14. Statewide pronghorn pre-hunt population estimates and population objective range (shaded area), 2002-2022. Projection for 2022 is in part based on 3-year average of previous herd composition and will be adjusted later in the fall using actual recorded herd composition.

SUMMARY

The GFP establishes hunting unit objectives based on habitat and social tolerances. The overall statewide pronghorn objective, a summation of unit objectives, is 69,000 (range 59,000-80,000; GFP 2019). All management unit objectives are based on annual collection and evaluation of pronghorn biological data, habitat resources, weather data, private land depredation issues, and substantial input from a wide variety of publics with an interest in pronghorn management in South Dakota. The GFP adopts harvest strategies that progressively allow the pronghorn population to reach these unit objectives.

Several surveys and assessments are completed by GFP to better understand pronghorn population abundance and trends in South Dakota. Annual herd composition surveys provide critical information on fall recruitment and buck to doe ratios of pronghorn herds across the

state. The fall of 2021 fawn:doe ratios were a record low of 48 fawns: 100 does, which has had a negative effect on pronghorn growth rates. Recent survival monitoring and current research suggest adult female survival over summer months has been lower than average which also negatively affects growth rates. Survival also appeared low in 2020 for various age cohorts and areas. Aerial surveys corroborate these concerning demographics, and the results of aerial surveys in 2022 show adult populations are down to 28,354, about 16% lower than the 2019 survey. Current statewide models estimate the 2022 preseason pronghorn populations at approximately 36,924 (95% CI = 23,375 – 46,567) which is well below the objective range of 59,000 – 80,000.

Assuming future pronghorn population demographics are similar to current observations, GFP will be decreasing harvest rates substantially in order to improve pronghorn herd growth and better manage unit populations towards established objectives.

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APPENDIX

Appendix A. Population objectives for pronghorn management units in South Dakota, 2022-2023.

Unit	Unit#	sq mi	<u>Population Objective</u>		Density/sq mi
			Objective	Range (+/- 15%)	
Pennington	02A	1,263	2,000	1,700 2,300	1.58
Bennett/Shannon	11A	3,290	2,000	1,700 2,300	0.61
NW Butte	15A	624	2,500	2,130 2,880	4.01
Butte	15B	1,808	8,000	6,800 9,200	4.42
Corson	20A	2,529	2,500	2,130 2,880	0.99
Custer	21A	1,322	2,500	2,130 2,880	1.89
Dewey	24A	1,657	2,500	2,130 2,880	1.51
Fall River	27A	2,213	5,000	4,250 5,750	2.26
Haakon	31A	1,828	2,000	1,700 2,300	1.09
West Harding	35A	1,351	8,000	6,800 9,200	5.92
East Harding	35B	1,332	6,000	5,100 6,900	4.50
Hughes	36A	1,666	550	470 630	0.33
Hyde/Hand/Buffalo	38A	2,796	150	130 170	0.05
Jackson	39A	1,872	1,500	1,280 1,730	0.80
Jones	41A	924	600	510 690	0.65
Lyman	45A	1,499	400	340 460	0.27
FPNG	45B	373	250	210 290	0.67
North Meade	49A	1,722	6,000	5,100 6,900	3.48
South Meade	49B	1,706	2,000	1,700 2,300	1.17
Mellette/Todd	50A	1,309	700	600 810	0.53
North Perkins	53A	1,359	4,000	3,400 4,600	2.94
South Perkins	53B	1,599	5,000	4,250 5,750	3.13
Stanley	58A	1,398	1,000	850 1,150	0.72
Sully	59A	1,070	400	340 460	0.37
Tripp	60A	1,616	150	130 170	0.09
Walworth/Potter/Campbell	63A	1,642	300	260 350	0.18
Ziebach	64A	1,972	3,000	2,550 3,450	1.52
CSP	CSP	110	350	300 400	3.18
Total		43,851	69,350	59,000 80,000	1.58