



Pronghorn

Management Plan for Pronghorn in Saskatchewan 2019-2028

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Executive summary

The *Saskatchewan Pronghorn Management Plan* was developed as an accompanying document to the *Saskatchewan Game Management Plan, 2018-2028* (GMP). The primary management goal for pronghorn is to maintain populations on the landscape to benefit all Saskatchewan people, as well as provide a consistent and sustainable harvest. This goal will be achieved through annual monitoring of the pronghorn population, further research on this species in Saskatchewan, engagement of researcher and stakeholder groups to fill data gaps and through the application of thresholds that will determine appropriate allowable harvest.

Pronghorn hunting seasons will be categorized as either liberal, base, restrictive or closed. These categories will provide transparent decision-making for harvest allocation of this species. Determination of the appropriate season in a given year will be made through the comparison of a variety of thresholds, including productivity, sex ratio and population estimate. In addition, variables such as human-wildlife conflict will be factored into season and quota decisions. These thresholds will be considered at the provincial and management unit level to best inform wildlife managers of appropriate direction. This plan is a living document and management strategies will be adapted as new information and techniques become available.

The *Saskatchewan Pronghorn Management Plan* is part of a suite of documents that comprise the GMP. The GMP provides a strategic framework for the conservation of Saskatchewan's wildlife and important habitats. Documents within the GMP include the *Core Document*, the *Allocation Framework* and species management plans for pronghorn, upland game birds, elk, moose, white-tailed deer, mule deer, and black bear. These species specific plans are intended to provide a foundation to sustainably manage each game species within established biological and social thresholds and function collaboratively with the *Allocation Framework*. This overarching strategic framework forms the basis for ensuring that game species and habitat are maintained for future generations.

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1.0 Plan overview

1.1 Purpose and Management Goal

The goal is to sustainably manage pronghorn and their habitats in Saskatchewan. This plan provides a framework for achieving this goal and establishes biological and social thresholds which will trigger management actions that maintain populations at desirable levels. Adaptive management principles will be implemented, such that the uncertainty inherent in wildlife management is acknowledged and flexible decision-making allows management strategies to be adjusted as outcomes from management actions and other events are better understood. Therefore, the plan is intended to be adaptive to changes in environmental and human elements of the landscape, as well as to an evolving understanding of the factors acting on pronghorn populations over time. Allocation of pronghorn harvest will be in accordance with the [Saskatchewan Game Allocation Framework](#).

1.2 Time frame

This plan is a living companion document to the [Saskatchewan Game Management Plan 2018-2028](#) and is intended to guide species management over a 10-year period with a five-year review.

2.0 Species status in Saskatchewan

2.1 Biology

Pronghorn, or pronghorn antelope, are an endemic artiodactylid or even-toed ungulate of the North American plains. They are not “true antelope” such as those found outside North America, but are rather the only remaining member of the family Antilocapridae. This means that their closest extant relatives are giraffes and okapi, rather than antelope or deer, as many think. Pronghorn are the only horned species known to shed their horn sheath on an annual basis and to have a bifurcated or pronged horn.

The breeding season of pronghorn varies across its range; however, peak breeding generally occurs in mid-September. This holds true for Saskatchewan, where peak breeding occurs from September 15 to September 25. Pronghorn have one of the longest gestation periods of any ungulate species, up to eight months. This results in the majority of kids being born in late May.

Pronghorn evolved in open landscapes, resulting in the development of extreme speed and sharp eyesight. They are the second fastest land mammal in the world, behind only the cheetah (*Acinonyx jubatus*). Evolving in open habitat has also left pronghorn with a reduced ability to navigate vertical barriers. Pronghorn are viewed as an iconic species of the prairie and have

become a symbol of grassland conservation efforts.

More detailed information on the ecology of pronghorn can be found in O’Gara and Yoakum (2004).

2.2 Characteristics relevant to management

Pronghorn are a gregarious species found in herds for much of the year. Herding normally occurs during late summer when adult bucks start to gather harems made up of females and fawns. Once breeding has been completed, pronghorn become more tolerant of one another and gather in larger herds comprised of all sexes and age classes. Due to their herding nature, diurnal activity patterns and preference for open landscapes, accurate population estimates can be obtained using visual survey techniques. In Saskatchewan, population indices are derived from ground-based surveys conducted in July.

Pronghorn are a highly sought after game species due to their low density and restricted Canadian range, which is currently limited to southern Saskatchewan and Alberta. Tag allocation is normally limited, leaving hunters to wait multiple years for an opportunity to harvest a pronghorn. Additionally, pronghorn viewing has become a popular activity with wildlife enthusiasts, due to it being considered an iconic species of native grasslands.

Recent observations of pronghorn in Saskatchewan have shown pronghorn utilizing more of the historical Saskatchewan range. Pronghorn have been observed in the vicinity of Maidstone, Aberdeen, Humboldt, Preeceville and near the Manitoba border. Individuals utilizing the fringe of the range are typically found at lower densities and are dependent to a greater degree on modified habitats. The factors contributing to these observations are unclear; theories include changes in agricultural practices and weather patterns.

A high percentage of pronghorn in Saskatchewan are migratory, resulting in seasonal movements inside and outside the province. This behavior poses specific challenges when attempting to manage the population, as herds may not visit the same areas in consecutive years or populations may shift due to weather and habitat conditions. In addition, some pronghorn herds are shared between Saskatchewan, Alberta and Montana, resulting in the need to consider the effects of all jurisdictional management strategies on these populations.

2.3 Historical population status

Earliest estimates of pronghorn populations, pre-settlement, place the North American herd at between 30-40 million animals (Nelson 1925). These vast herds were reduced to remnants by the end of the 19th century due to overharvesting, habitat loss and poor agricultural practices, all coupled with the natural effects of drought and severe winters (Killaby *et al.* 1992). Hornaday (1913) estimated the Saskatchewan population to be 2,000 in 1908 and five years later revised this estimate to 1,500. These estimates echoed concerns of early game wardens that expected the Saskatchewan pronghorn to be extirpated without drastic efforts (Killaby *et al.* 1992). By 1922-1924, the estimated pronghorn population of Saskatchewan was a meager 297 (Nelson 1925). Conservation efforts, including hunting season closures in Saskatchewan, Alberta and Montana, engagement of the ranching community in conservation measures, along with the establishment of the now delisted Menissawok National Park in Saskatchewan and Wawaskesy and Nemiskam National Parks in Alberta, designed for the preservation of pronghorn on the prairie (Sandlos 2011), allowed populations to recover. By 1936, they had reached a level where a limited hunting season could occur in Saskatchewan (Killaby *et al.* 1992).

Systematic pronghorn population surveys began in Saskatchewan in 1949 (Benson 1956). Between 1949 and 1980 Saskatchewan population estimates ranged between 8,000 and 20,000 animals. However, during the 1980s, numbers steadily increased due to mild winter weather patterns that greatly benefited survival rates (Killaby *et al.* 1992), as well, harvest allocation was provided through an either-sex licence. This combination led to populations that exceeded provincial goals (Arsenault 2008). These factors resulted in a historic population high of an estimated 33,000 animals in 1992 (Figure 1). As a result, the existing tag allocation was increased and a hornless season was opened in 1992 (Arsenault 2008). However, the effects of aggressive harvest strategies were magnified by several years of poor fawn recruitment, which resulted in a severe population decline (Figure 1), triggering season closures from 1997 to 2001. Populations began to increase during the 2000s but were again reduced by severe winter conditions in 2010-11 and 2012-13 (Figure 1) resulting in a province-wide season closure from 2011 to 2014. In 2015, populations once again reached a level where a limited hunting season could be offered in Saskatchewan.

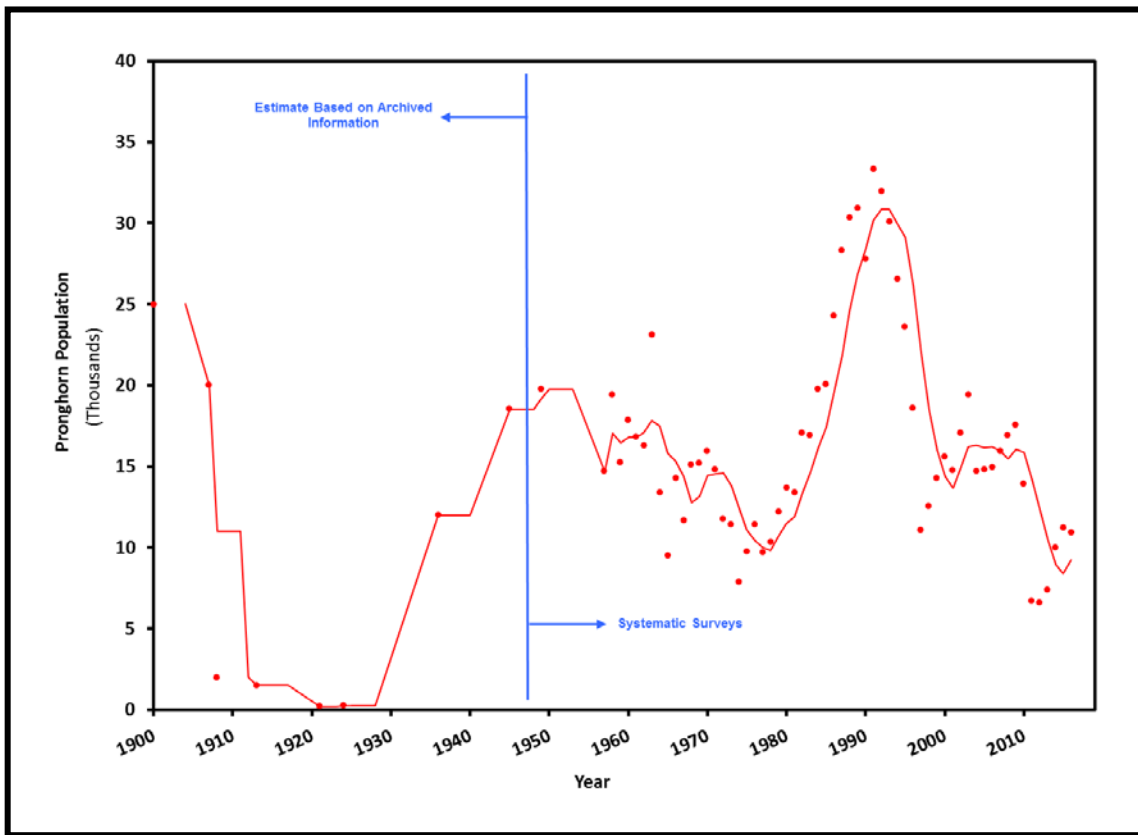


Figure 1. Historical pronghorn pre-hunt population estimates in Saskatchewan from 1900-2016.

2.4 Distribution/range

Historically, pronghorn ranged across much of the southern half of the province of Saskatchewan, from Prince Albert to the United States border and from Alberta to Manitoba (Figure 2) (O’Gara and Yoakum 2004). Currently, pronghorn distribution is restricted to the southwest corner of the province and corresponds closely with the mixed-grassland ecoregion of Saskatchewan (Killaby *et al.* 1992). In its natural state, this ecoregion is characterized by mid-grasses (e.g., wheat grasses and spear grasses) and short grasses (e.g., blue gramma grass), growing in mixed stands (Acton *et al.* 1998). The mixed-grassland ecoregion is a broad plain interrupted by deep valleys (e.g., Frenchman River) and rugged uplands (e.g., Cypress Hills, Wood Mountain Plateau, Old Man on His-Back Plateau) (Acton *et al.* 1998). Snowberry and sagebrush shrublands frequently occur in depressions and on sandy soils of the ecoregion. Approximately 50 per cent of this ecoregion has been cultivated.

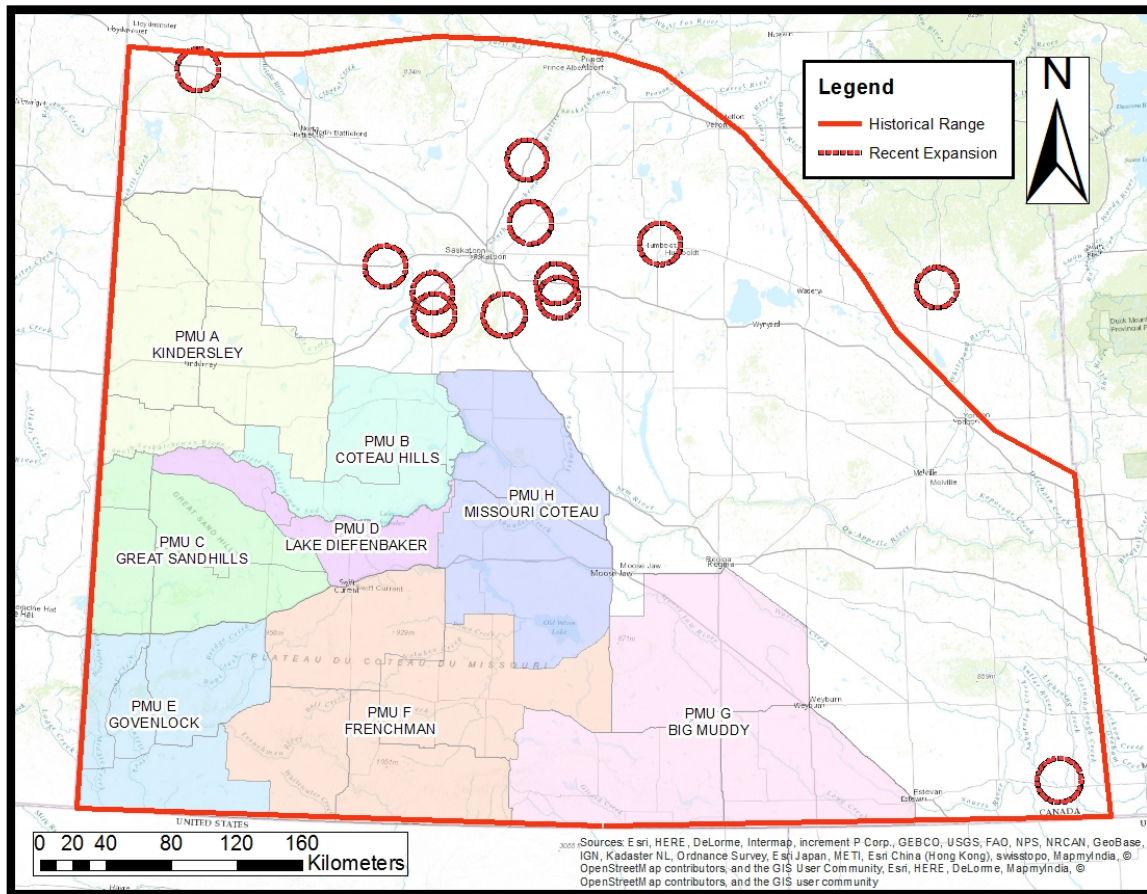


Figure 2. Pronghorn management units (PMU), historical range and recent observations in Saskatchewan.

The largest concentrations of pronghorn occur on the broad expanses of natural grassland habitat, typical of those portions of the ecoregion that have not been fragmented or lost to cultivation.

2.5 Habitat description

Pronghorn favour gently rolling habitat comprised of mixed or short grasslands and shrub steppes comprised of sagebrush and grass or juniper and grass shrub lands (O’Gara and Yoakum 2004). Rangelands with an average vegetation height of approximately 38 cm are considered to be optimal, while areas with average vegetation heights more than 60 cm show less use and those with average vegetation heights more than 76 cm are of minimal use to pronghorn (Yoakum 1980).

Annual precipitation of 25-38 cm has been shown to result in a higher density of pronghorn. Areas experiencing drought conditions have lower densities (O’Gara and Yoakum 2004). Accessible water sources are also an important factor determining pronghorn productivity, as areas with readily available water sources approximately every 1.6-3.2 km have higher productivity rates than those with fewer available water sources. Lack of reliable water sources can cause reduced fitness and result in lower pronghorn density (O’Gara and Yoakum 2004).

Winter habitat with accessible forage is necessary to sustain populations during severe conditions. The extent and quality of winter habitat are related to the distribution of preferred fall and winter forage (e.g., sagebrush and snowberry), and can limit the size of pronghorn populations in Saskatchewan (Dirschl 1963). When snow cover exceeds 10 cm, the availability of preferred forage is diminished. When snow depth exceeds approximately 25-30 cm, lack of available winter forage can cause increased mortality (O’Gara and Yoakum 2004). During these times, evergreen species such as sagebrush and juniper play an important role in survival, as this forage tends to remain available. Anthropogenic factors can exacerbate the effects of severe weather (e.g., drought, snow). Features such as fences, highways, intensive cattle grazing and industrial development can limit movements, increase stress and contribute to reduced fitness and mortality. Fence density can affect migratory routes and act to fragment otherwise suitable habitat (Suitor 2011, Poor *et al.* 2012, Poor *et al.* 2014, Jakes 2015).

2.6 Limiting factors

i. Habitat

The most significant threats to pronghorn populations in Saskatchewan are the destruction and degradation of crucial habitat. Maintenance of existing grasslands will be required to successfully manage pronghorn at or near current population levels. While pronghorn do use cultivated areas, the population densities in these areas are substantially lower than those found in native grasslands. Furthermore, cultivated areas provide little in the way of winter forage or cover, requiring pronghorn to move out of these areas in search of suitable habitat.

A portion of Saskatchewan pronghorn routinely migrate between summer and winter ranges both inside and outside the province. They are also known to move within seasons in response to food availability, usually determined by moisture and range conditions. Since migratory pronghorn populations rely on seasonal ranges that can be separated by large distances, connectivity between these habitat patches is essential (Suitor 2011, Gates *et al.* 2012, Jakes 2015). Jakes (2015) collared 185 female pronghorn across Alberta, Montana and Saskatchewan. Of this sample, 55 per cent undertook seasonal migrations,

including 36 individuals that used stopover sites in Saskatchewan, primarily during spring migration. A number of in-season movements for purposes of fawning or food foraging were also identified during this study.

Dispersal and gene flow among populations is also critical to the long-term viability of Saskatchewan's pronghorn populations. Maintenance of migratory routes is imperative to ensure the genetic exchange and immigration/emigration of Saskatchewan's pronghorn population. Impediments that sever connectivity to source populations can lead to isolation and reduced population size.

Natural resource extraction and associated road development not only increase fragmentation of remaining habitat but are negatively correlated with pronghorn population growth (Christie *et al.* 2015, Christie *et al.* 2016). Even in the absence of energy development, increasing road density can be enough to elicit avoidance behavior in pronghorn (Kolar 2009, Kolar *et al.* 2012) and is negatively correlated with winter survival rates (Taylor *et al.* 2016). Furthermore, natural resource extraction activities are a strong indicator of decreased habitat quality, particularly wintering habitat (Beckmann *et al.* 2012).

ii. Weather

Saskatchewan is the northern extent of the pronghorn range and is susceptible to extreme environmental conditions. Winter conditions consisting of snow depths greater than 10 cm can lead to reduced availability of forage. Snow depths exceeding 25 cm, particularly when these conditions persist for weeks, can prove to be fatal (Yoakum 2004). For example, the Saskatchewan pronghorn population was estimated to have declined by 50 per cent following the severe winters of 2010-2011 and 2012-2013. When preferred vegetation such as sagebrush and snowberry becomes completely covered by snow, malnutrition followed by starvation becomes prevalent. Under these conditions, pronghorn will seek out alternative food sources, such as hay stacks or grain piles (O'Gara and Yoakum 2004). In these situations, mass mortalities can occur due to rumen overload caused by consumption of readily fermentable carbohydrates (Wobeser 1984).

Drought is a significant factor in determining annual pronghorn distribution and can result in population declines, similar to those seen in severe winters. However, this phenomenon is poorly understood (O'Gara and Yoakum 2004).

iii. Predators

There is limited data on the impact of predation on pronghorn populations in Saskatchewan. In other jurisdictions, coyotes (*Canis latrans*) constitute the major

component of fawn mortality and can be a limiting factor to populations (Glasgow 1990, Canon 1995, O’Gara and Yoakum 2004, Jacques 2006). Low vegetation cover due to drought, poor range management or habitat alteration may also lead to higher rates of predation on fawns (McNay 1980).

Other known pronghorn predators include bobcats (*Lynx rufus*), golden eagles (*Aquila chrysaetos*), red fox (*Vulpes vulpes*), domestic dogs (*Canis lupus familiaris*) and badgers (*Taxidea taxus*) (McNay 1980).

iv. Disease

No significant disease outbreaks have been recorded in the pronghorn population of Saskatchewan, although certain diseases, such as pneumonia and polioencephalomalacia, seem to be persistent. A summary of selected diseases known to affect pronghorn is contained in Table 1. Data and monitoring are required to understand the role of disease in population dynamics, as well as document newly emerging disease issues.

Table 1. Selected diseases and pathogens affecting pronghorn (update from information provided in Arsenault 2008).

Disease/Pathogen	Common Name or Abbr.	Symptoms	Diagnosed in Saskatchewan	Nearest diagnosed
Viral				
Orbivirus	Bluetongue and epizootic hemorrhagic disease	Fatal, internal hemorrhage, central nervous system depression	No	S.E. Alberta (Chalmers <i>et al.</i> 1964, Leighton 2011, Pybus <i>et al.</i> 2014)
Bovine Virus Diarrhea	BVD	Fertility issues, fever, diarrhea	Yes (Barrett and Chalmers 1975)	
Encephalomyelitis	Western equine encephalitis (WEE) and Eastern equine encephalitis (EEE)	Brain inflammation, central nervous system impairment	Yes (Barrett and Chalmers 1975)	
Infectious Bovine Rhinotracheitis	IBR	Respiratory issues, fever	Yes (Barrett and Chalmers 1975)	
Parainfluenza	PI	Respiratory issues, fever	Yes (Barrett and Chalmers 1975)	
Rabies	Rabies	Fatal, erratic behaviour, convulsions, paralysis	Yes (CWHC 2017)	
Bacteria				
Actinomycosis/Fusobacterium	Lumpy jaw	Bone loss, skull deformities	Yes (CWHC 2017)	
Chlamydia	Chlamydia	Pneumonitis	Yes (Barrett and Chalmers 1975)	
Clostridium	botulism, tetanus, gangrene, blackleg, enterotoxemia	Various	Yes (CWHC 2017)	
Necrobacillosis	Foot rot	Foot rot, liver abscesses	Yes (Wobeser <i>et al.</i> 1975)	
Nematodes				
Protostrongylus	lungworm	Reduced fitness, pneumonia	Yes (CWHC 2017)	
Miscellaneous				
Polioencephalomalacia	PEM	Brain lesions	Yes (Wobeser <i>et al.</i> 1983)	N/A
Rumen overload	RO	Decreased blood pressure, loss of kidney function, death	Yes (Wobeser 1984, CWHC 2017)	
Pesticide exposure	Poisoning	Various based on agent	Yes (CWHC 2017)	
Chronic wasting disease	CWD	Degeneration of central nervous system	No	

v. Other mortality

Seasonal migrations and in-season movements are critical to maintaining pronghorn populations; therefore, factors that impede these movements can negatively affect populations. These include barriers such as roadways and impassable fences. These features can increase stress, reduce fitness and contribute to mortality (O’Gara and Yoakum 2004, Harrington and Conover 2006, Kolar 2009, Kolar *et al.* 2012). Difficulty navigating under low fences can leave pronghorn with characteristic injuries and loss of hair to their backs (Gates *et al.* 2012), which can lead to infection and death.

2.7 Human elements

Traditionally, Indigenous peoples hunted pronghorn across the Northern Great Plains (Lubinski 1999). Evidence of communal kill sites, including bone beds, drive fences and traps, have been discovered in the adjacent jurisdictions of Alberta and Montana (Lubinski 1999, Brink 2013). Currently, pronghorn are a highly sought after game species, due to their unique appearance and limited distribution in Canada. First Nations hunting continues today, but there is no data on annual harvest. In addition, First Nations can outfit on reserve lands. Licensed hunting opportunities are normally limited to the big game draw, and hunters frequently wait years to get drawn for an opportunity to harvest a pronghorn. Additionally, pronghorn viewing is a popular activity among wildlife enthusiasts and photographers alike.

2.7.1 Human-wildlife interactions

i. Crop depredation

As with all big game species in Saskatchewan, crop-depredation is an ongoing concern for producers and wildlife managers. Information on agricultural losses from wildlife is made available annually to ministry staff by the Saskatchewan Crop Insurance Corporation (SCIC). This information is reviewed by wildlife managers to adaptively manage pronghorn in Saskatchewan. Losses due to trampling or feeding by pronghorn are small, relative to other big game species.

ii. Vehicle-wildlife collisions

Vehicle collisions are a persistent, albeit likely minor, source of mortality under normal circumstances in Saskatchewan. Vehicle-wildlife collision data are collected by the Saskatchewan Government Insurance (SGI). Currently, SGI does not differentiate pronghorn from other types of wildlife, and it has not been possible to identify the frequency or distribution of these occurrences.

In Alberta, Mitchell (1980) reported large amounts of snow cover, causing pronghorn to congregate near roadways, resulting in numerous collisions and large numbers of animals being killed in a short period of time. Reports of pronghorn being struck on railways in Saskatchewan are lacking. However, the significant snow depth of the winter of 2011-2012 led to high pronghorn mortality as a result of collisions with trains in Northern Montana.

iii. Economic benefit

Hunting is the primary economic benefit of the Saskatchewan pronghorn population. From 2002-2010, a total of 8,278 either-sex pronghorn licenses were sold in Saskatchewan, totaling an average of \$34,000 per year in licence sales. Pronghorn

hunting also has broader economic impacts. Killaby *et al.* (1992) reported that the total dollar value spent in 1989 by Saskatchewan pronghorn hunters was approximately \$1.3 million. If these same metrics are applied to the extremely limited pronghorn hunting season of 2016 (140 tags available), with adjustment for inflation, approximately \$70,000 of revenue to the Saskatchewan economy was generated from a meager 319 hunter-days. Additionally, wildlife viewing has become an increasingly popular activity. Pronghorn viewing benefits the economy as they are considered an iconic prairie species.

3.0 Monitoring and management

Pronghorn populations in Saskatchewan were monitored through the use of aerial surveys until 2009. Since that time efforts have been undertaken to monitor the population through a ground-based survey, which determines the population trend rather than density.

Management of pronghorn is achieved through alteration of harvest strategies including changes to the number of licences allocated and changes in the variety of hunt opportunities available in a given year.

Pronghorn management in Saskatchewan utilizes designated pronghorn management units (PMU). PMUs consist of a number of individual wildlife management zones (WMZ) which have similar geographic, ecological and land use characteristics (Figure 2). PMUs were restructured in 2015 based on current knowledge of pronghorn distribution, movements and habitat use. Currently, there are eight PMUs delineated in the province. PMUs are managed individually due to differences in habitat, topography and land use. As such, management strategies may not be applied uniformly across the pronghorn range of Saskatchewan in any given year. Differences in pronghorn movement, range condition and human-wildlife conflict may result in a variety of management strategies throughout the different PMUs.

Pronghorn management is unique among big game species in Saskatchewan. Due to the nomadic behaviour they exhibit, annual surveys must be completed in mid-summer to gain an accurate depiction of a given year's population distribution.

As a result, tentative draw quotas are developed using the previous year's survey data, hunter harvest data and information on winter severity in the spring. Final quotas are developed only after the results from the annual survey are analyzed. This culminates in final draw results being postponed later than other big game draw results, until mid-July.

3.1 Management objectives and actions

Objective 1: Pronghorn populations will be monitored on an annual basis.

Actions:

- Pronghorn surveys will be undertaken annually to monitor populations.
- Survey methods will be reviewed on an annual basis to ensure scientific rigor and validity of current methodology. Techniques, survey methods and technology that increase the accuracy and quality of data and are consistent with adjacent jurisdictions will be viewed as the preferred survey approach.
- Annual field checks will be undertaken to collect information on harvest, hunting effort and to collect biological samples.
- Annual pronghorn fawn and winter counts will be conducted to determine vital rates for Saskatchewan.
- Disease monitoring will occur opportunistically to ensure disease outbreaks are detected in a timely manner and that proper management activities are employed quickly and efficiently.
- Data from weather monitoring stations, located within the pronghorn range of Saskatchewan, will be evaluated to determine the effect of severe weather events on population numbers.
- Research projects focused on pronghorn biology, pronghorn habitat and/or factors affecting pronghorn survival and movements in Saskatchewan will be developed by 2022.

Objective 2: Management of pronghorn habitat will be viewed as an integral part of management of the species and efforts will be made to increase availability to and connectivity of quality habitat starting in 2019.

Actions:

- Data from relevant research (e.g. Suitor 2011, Poor 2012, Jakes 2015) will be used in conjunction with ongoing habitat mapping to determine key areas to focus resources for habitat projects.

- Determination and delineation of crucial pronghorn habitat will be undertaken to create mapping that will assist in species management and to direct conservation measures. Final mapping will be complete in 2020.
- Commencement of a “smooth wire initiative”, similar to projects occurring in adjacent jurisdictions, will begin in 2019. This will involve the dissemination of information to agricultural producers and wildlife organizations, procurement of resources and materials, and solicitation of interested partners.
- Partnerships with key stakeholders, including pasture managers, South of the Divide Working Group, NGOs, other provincial and state jurisdictions and the federal government will be utilized to ensure the implementation of habitat projects.
- Starting in 2020, creation of a fence line database within pronghorn habitat will occur in collaboration with other jurisdictional agencies.
- Develop a policy and regulatory framework to ensure crucial habitats are protected. Link with existing or developing frameworks where applicable.
- Projects to increase range-wide pronghorn habitat connectivity will be promoted in collaboration with representatives of the Northern Sagebrush Steppe Initiative co-operators.
- Research projects focused on pronghorn habitat and/or movements in Saskatchewan will be developed by 2022, to best inform and focus habitat initiatives.

Objective 3. Define pronghorn management targets and allocate surplus through a sustainable harvest strategy on an annual basis.

Actions:

- Data obtained from annual surveys will be used in conjunction with thresholds, laid out in this document, and the [Game Allocation Framework](#) to determine allocation of the allowable harvest.
- Pronghorn harvest data obtained from hunter harvest surveys will be reviewed annually and, where appropriate, incorporated into management decisions and allocation of allowable harvest.

- Develop strategies to collect data related to First Nations harvest of pronghorn.
- Harvest strategies will be developed to maximize harvest opportunities while ensuring population sustainability, consistent hunting seasons and quality hunting opportunities.

Objective 4. Pronghorn management will include the annual monitoring of human-wildlife interactions and enhance our understanding of stakeholder perceptions, values and tolerance of wildlife.

Actions:

- Saskatchewan Government Insurance (SGI) will be engaged to assist in quantifying vehicle-wildlife collision statistics on a species by species basis.
- Saskatchewan Crop Insurance Corporation (SCIC) data will be used to assist in quantifying pronghorn crop depredation.
- Data from SGI and SCIC, in conjunction with information from individual producers and ministry representatives, will be utilized to determine where and when management action is required to alleviate conflict situations.

3.2 Management thresholds and considerations

Management thresholds have been set to suggest when to implement a liberal, base, restrictive or closed harvest strategy. Variations exist among species but, in general, these thresholds can be described as follows:

Liberal harvest strategy (generally used in conjunction with high populations):

A liberal harvest strategy provides more hunting opportunity and is implemented when populations are able to sustain considerable harvest pressure. Liberal harvest strategies are often enacted with the goal of reducing overabundant big game populations by targeting the reproductive cohort. Examples of management actions under a liberal strategy might include increased quotas and doe harvest.

Base harvest strategy (generally used in conjunction with normal populations):

A base harvest strategy is utilized when populations are in the range of the long-term average. Wildlife managers generally aim to maintain populations at a base level in order

to provide consistent harvest opportunity within social tolerance limits. The objective of base harvest strategies, therefore, is to maintain populations at or near the existing levels.

Restrictive harvest strategy (generally used in conjunction with low populations):

A restrictive harvest strategy provides less hunting opportunity, is often implemented when populations are in decline or hunter demand exceeds the supply of game.

Restrictive strategies will employ actions such as more restrictive quotas and no doe allocation.

Closed season (generally used in conjunction with critically low populations):

A closed harvest strategy limits recreational hunting completely and is implemented when a population can no longer maintain a harvestable surplus. Closed seasons

remain in effect until populations have recovered to where a meaningful recreational harvest can be implemented.

Thresholds for specific factors are not viewed independently. Rather they are viewed in tandem with other factor thresholds before triggering a management action. In any given year one factor might suggest a liberal management action while a different factor might suggest a restrictive action or vice versa. Thus the need to have a fluid view of all factors influencing species survival and vital rates, primary and non-primary (e.g., disease, collision data and anecdotal assessments).

Pronghorn population management will utilize a combination of metrics to create thresholds that will trigger associated management actions (Table 2 and Appendix A). These will be reviewed on an annual basis after surveys are completed to determine sustainable harvest numbers for a given year. Population thresholds and associated management decisions will aim to maintain stable, healthy pronghorn populations and to offer an annual sustainable harvest opportunity. Management thresholds will be considered based on the preponderance of evidence, as it will be a frequent situation when all thresholds do not coincide.

Deliberation of all thresholds and factors affecting pronghorn will be required to determine the most appropriate management action. Status of the population relative to management thresholds will be determined through annual mid-summer surveys in each PMU.

Management objectives will be to maintain pre-harvest pronghorn population demographics of 40-50 bucks, and 50-60 kids per 100 does. This strategy will be used to maintain a minimum post-harvest sex ratio of 25 bucks per 100 does, which is considered to be biologically sound for future recruitment (O’Gara and Yoakum 2004). Maintaining a ratio of 50-60 kids per 100

does is consistent with Saskatchewan's long-term average kid to doe ratio of 58 kids per 100 does and will provide strong annual recruitment. The long-term population objective is a dynamic metric set to provide a benchmark of the desired provincial population. Managing for +/- 20 per cent of a long-term population objective will provide a buffer to allow the pronghorn population to deal with stochastic events that regularly impact pronghorn populations in Saskatchewan while maintaining allowable harvest. Due to the limited populations found in the fringe portion of the pronghorn range (PMU B, D, G and H), data may be reviewed at the provincial level to determine management strategies.

In an effort to maintain consistent annual harvest opportunities and stable pronghorn populations, the harvest will be allocated through an either-sex draw licence. Doe/fawn kid allocation will be utilized in an effort to meet management objectives and increase pronghorn hunting opportunities, particularly during liberal seasons. This management strategy will provide wildlife managers with tools required to deal with fluctuating pronghorn populations and locally abundant populations and to balance herd structure.

Pronghorn seasons will be based on the [Game Allocation Framework](#) and will strive to strike a balance between the desires of all hunters and the biological requirements of pronghorn during the breeding season. As such, pronghorn season dates and length will be standardized and maintained whenever possible with adjustments primarily made to draw quotas in order to achieve harvest objectives.

In addition to the aforementioned thresholds, a variety of factors will be considered in the formulation of pronghorn seasons. Environmental factors, such as severe winters and drought, and social factors, such as crop depredation and other wildlife conflict situations, will be reviewed on an annual basis to fine tune management decisions. These considerations will be assessed at either the management unit or provincial level, providing pronghorn managers more information to implement strategies at all scales.

Table 2. Thresholds identified for pronghorn that trigger management actions.

Recommended harvest strategy	Associated management actions	Thresholds*		
		Productivity	Sex ratio	Population estimate
Liberal	Liberal draw licence allocation and hornless allocation in management units with populations exceeding thresholds.	> 60 kids /100 does	>50 bucks /100 does	> +20 per cent above long-term objective
Base	Draw licence allocation, as well as hornless allocation where management units are exceeding goals.	40-60 kids /100 does	40-50 bucks/100 does	+/-20 per cent of long-term objective
Restrictive	Limited draw licence allocation and hornless allocation in extreme cases only.	30-39 kids /100 does	30-40 bucks /100 does	≤ -20 per cent of long-term objective
Closed	No licence allocation.	< 30 kids /100 does	< 30 bucks/100 does	< -40 per cent of long-term objective

*Thresholds will be considered at the PMU level unless data is limited, at which time province-wide data will be considered in determining individual management strategies.

4.0 Future research and monitoring needs

Current information regarding pronghorn in Saskatchewan is limited. In order to understand the nuances specific to the ever changing condition of pronghorn provincially, future research and monitoring will be required to address the following data deficiencies.

i. Pronghorn vital rates

Current data on annual productivity, recruitment, predation, mortality, longevity and dispersal are limited for Saskatchewan. These values will be important to effectively manage populations for long-term viability. Research addressing these data gaps will be imperative for implementing appropriate measures that balance all factors involved in maintaining a sustainable pronghorn population in a modern landscape.

ii. Continued and improved annual monitoring

Due to the migratory nature of pronghorn, it is accepted throughout North America that an annual population survey is required to effectively monitor populations and set proper harvest quotas. Since 2009, Saskatchewan pronghorn populations have been monitored annually using a ground-based survey methodology. This survey has provided wildlife managers with an understanding of current population trends, but it lacks the statistical rigor of standard survey methodologies. Efforts to improve annual monitoring and align with methodologies of adjacent jurisdictions will provide stronger data and create a consistent approach to the management of shared pronghorn populations.

iii. Habitat characteristics

Quality habitat mapping is required to develop standards and guidelines that can inform land managers and proponents of development of possible risks associated with activities on the landscape. In terms of pronghorn, identifying areas of crucial wintering and fawning habitat and connectivity are of the utmost importance. Currently, areas of crucial wintering and fawning habitat have not been delineated in Saskatchewan. Suspected pronghorn migration routes have been determined for Saskatchewan (Suitor 2011, Jakes 2015). Research is required to verify these routes and determine bottlenecks and pinch points that may cause difficulties for movement. Furthermore, verification of these migratory routes will be important in focusing efforts to reduce barriers to movement and maintain connectivity through the pronghorn range of Saskatchewan.

5.0 Summary

The framework outlined in this document uses the best available information to make science-based decisions regarding pronghorn populations to ensure these species and their habitats are sustained into the future. This approach will be regularly reviewed and continue to adapt as better information becomes available and additional thresholds are developed. Continued engagement of hunters, landowners, naturalists and the general public will be crucial to evaluating the management strategies implemented, and all interested individuals are encouraged to become engaged in the process by participating in wildlife surveys, including the hunter harvest survey and Pronghorn X-ing App, and communicating information to the provincial pronghorn biologist.

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Appendix 1.0

Recommended Season Date Structure:

Draw Season

Management Action	PMU	Archery	Muzzleloader	All Weapons
Liberal	PMU A - H	Sept. 1 - 19	Oct. 1 - 19	Oct. 20 - Nov. 9
Base	PMU A - H	Sept. 1 - 19	Oct. 1 - 19	Oct. 20 - Nov. 9
Restrictive	PMU A - H	Sept. 1 - 19	Oct. 1 - 19	Oct. 20 - Nov. 9

Limited Doe/fawn Season

Management Action	PMU	Archery	Muzzleloader	All Weapons
Liberal	PMU A - H	Sept. 1 - 19	Oct. 1 - 19	Oct. 20 - Nov. 9
Base	PMU A - H	Sept. 1 - 19	Oct. 1 - 19	Oct. 20 - Nov. 9
Restrictive	PMU A - H	Closed	Closed	Closed