Elk

Management Plan for Elk in Saskatchewan

2025-2034

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This publication may be cited as:

Wildlife Unit. 2025. Management Plan for Elk in Saskatchewan. Fish and Wildlife Branch, Ministry of Environment, Government of Saskatchewan. 37 pp.

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Acknowledgements

Preparation of this document was made possible thanks to the valuable contributions of many individuals and agencies who collected and compiled the data that forms the basis of this plan.

Thank you to all staff in the Fish and Wildlife Branch for valuable input and critical reviews during plan development. Thank you to Alan Arsenault and Edward Kowal for their dedication on previous elk management plans and technical reports that provided a foundation for development of this plan.

We would also like to thank all individuals who take the time to participate in enjoying, managing and conserving elk and their habitats in Saskatchewan. It is your passion and continued dedication for wildlife that will ensure the preservation of Saskatchewan's game and non-game species into the future.

Executive Summary

The *Management Plan for Elk in Saskatchewan* was developed as an accompanying document to the *Saskatchewan Game Management Plan, 2018-2028*. The primary goal for Saskatchewan elk management is to maintain ecologically and socially sustainable elk populations on the landscape to benefit all Saskatchewan people, as well as to provide a sustainable harvest.

The purpose of the Elk Management Plan is to provide a transparent framework for elk management in the province over the next ten years. It highlights data sources and indicator thresholds that will guide elk management strategies. This plan also provides background on historic and current elk population sizes and trends, as well as ecological and socio-economic factors relevant to elk management in Saskatchewan.

Elk are unique among the various deer species in the province, in that these large deer tend to form in relatively large groups throughout the year and end to be locally abundant while not necessarily so in other areas. This unevenly distributed population poses challenges for game managers in terms of setting seasons and managing impacts on agricultural production, for example. Elk are also becoming more abundant in the south of the province, re-establishing in much of their traditional range.

Elk will be managed according to the hierarchy of priorities outlined in the *Game Allocation Framework and the Core Document. The Management Plan for Elk in Saskatchewan* is part of the suite of documents that comprise the Game Management Plan, which provides a strategic framework for the conservation of Saskatchewan's wildlife and wildlife habitats. Documents within the GMP include the Core Document, the *Game Allocation Framework* and management plans. Primary indicator thresholds have been defined separately for each of the four regionally distinct Elk Management Units (EMUs) in the province, including the Grassland, Parkland, Forest Fringe/Forest, and Island Forest Management Units (Figure 2). Indicator thresholds will be considered at both the Wildlife Management Zone (WMZ) level and the broader Elk Management Unit level to best inform appropriate management actions. Potential management actions based on population monitoring, habitat preservation, harvest allocation and wildlife-human coexistence objectives are outlined within to guide elk management priorities into the future. This plan is a living document and management strategies will be adapted as new information and monitoring tools become available.

This strategic framework forms the basis for ensuring that management of game species and their habitat is transparent and supports the sustainability of game for future generations of all Saskatchewan residents.

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1.0 Plan overview

1.1 Purpose and Management Goal

The primary goal for Saskatchewan elk management is to maintain ecologically and socially sustainable elk populations on the landscape to benefit all Saskatchewan people, and to provide a consistent and sustainable harvest. This plan provides a framework for achieving this goal and establishes thresholds that will trigger management action through adjustments to licensed hunting seasons and quotas. Adaptive management principles will be implemented to allow management strategies to be adjusted as new information is gathered. Allocation of elk for licensed hunting will be in accordance with the *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 elk management over a 10-year period from 2023 to 2032, with a five-year review in 2028.

2.0 Species Status in Saskatchewan

2.1 Biology

Elk are a gregarious and social species, occurring in groups of varying size, sex and age combinations throughout the year. Outside of the rut (breeding period), elk typically live in herds composed of cows and juvenile bulls or adult bull-only groups. In both cow and bull groups, the oldest animals tend to be dominant and influence group decision-making processes (Geist 2002). Many factors, including food availability and weather (particularly snow conditions), are known to influence elk aggregation patterns (Geist 2002). Typically, elk herd size is largest during the winter and gradually decreases through the spring calving season when cows seek isolation. As juvenile bulls mature, they spend a decreasing amount of time with cow-dominated herds.

In Saskatchewan, elk herds are not typically known to undergo large seasonal migrations as found elsewhere in North America (e.g. Rocky Mountains), although partial migration between calving, breeding and wintering grounds occurs. The average home range size of elk can vary from three to 245 km^2 (Beck et al. 2006). Elk often exhibit a high degree of home range fidelity, although a number of factors such as hunting pressure, snow depth and forage availability may influence or disrupt home range selection across a landscape (Boyce et al. 2003).

Elk have a polygamous mating system generally consisting of a mature, dominant bull and a harem of cows in estrous. The breeding period for elk (i.e. the rut) primarily occurs in a three to four-week period surrounding the autumn equinox (September 22), although several factors such as adult bull age, population density and hunting pressure may influence the timing of the rut (Haigh 2001; Noyes et al. 2002; Cook et al. 2004; Davidson et al, 2012). Analysis of 94 reproductive tracts collected from elk killed by Saskatchewan hunters during the 1989 and 1990 elk hunting seasons found several conception date “peaks” from September 10 to 18, September 21 to 25 and October 9 to 12 (Saskatchewan Department of Natural Resources, 1993). Elk are polyestrous, with estrus cycles lasting approximately 21 days and estrous typically lasting 12 to 24 hours (Hudson et al. 2002). Average pregnancy rates are approximately 20 per cent in yearling cows, 93 per cent in adult cows, and 86 per cent for old-aged cows less than 10 years old (Raithel et al. 2007). The average gestation period in elk is 247 days within five days (Haigh 2001), resulting in calving dates ranging from mid-May to the end of June. Twinning in elk is rare, with twinning rates typically below one per cent. The sex ratio of new-born elk is typically equal between males and females.

Relative to other members of the deer family, such as white-tailed deer and mule deer, elk populations can be considered slow growing, with a maximum annual rate of increase rarely exceeding 35 per cent under optimal conditions without predators (McCorquodale et al. 1988; Raedeke et al. 2002). Under less-optimal conditions (i.e. high predator density or limiting forage), population growth is slower, with mean annual population growth ranging from 15 per cent to 23 per cent in some populations (Bender and Piasecke 2010; Koetke et al. 2020). Elk can live to be over 20 years old, although life expectancy in hunted populations rarely exceeds 12 years. Excluding mortality due to hunting, annual adult survival rates in wild elk populations are typically quite stable, ranging from 0.64 to 0.95 for cows and 0.40 to 0.88 for bulls (Raithel et al. 2007; Brodie et al. 2013). Calf survival rates can be highly variable from year to year due to variation in predation and weather, ranging from 0.06 to 0.72 (Raithel et al. 2007). Adult sex ratios are typically skewed towards females because of the lower mortality rate of cows relative to bulls (Clutton-Brock et al. 1985). Adult sex ratios ranging from 15 to 55 bulls:100 cows are common, with an adult sex ratio of 25 bulls:100 cows generally considered necessary for optimal population performance (Raedeke et al. 2002).

Elk are generally classified as intermediate or mixed feeders and will switch their diet between grasses and woody browse depending on forage quantity and quality. Forage preference varies seasonally and annually. Forage conditions on winter ranges are often considered most limiting to elk populations, although summer and autumn forage quantity and quality are also critical to elk overwinter survival (Merkle et al. 2016). Throughout the year, elk will sometimes select agricultural crops over native grasses and woody browse due to the higher protein content and digestibility of crops (Mould and Robbins 1981). Alfalfa, barley, oats, peas and corn, when found in close proximity to available cover, are known to be preferred forage for elk (Hunt 1979). Vegetation regenerating following fire (one to six-years post burn) has been shown to provide forage nutritional quality equivalent to that of irrigated agriculture (Barker et al., 2019).

2.2 Characteristics Relevant to Management

As a social species, elk are often distributed in clumped herds rather than uniformly distributed across the landscape. This makes elk particularly hard to survey and extrapolate population estimates over broad areas. To date, population estimates have been generally derived from aerial surveys conducted in mid-to-late winter over small areas when elk are congregated in herds and vegetation cover is reduced allowing for greater sightability.

Elk are an important game species in Saskatchewan and are of considerable interest to a diverse group of First Nations and Métis and licenced hunters in the province. Elk are complex to manage as they are highly valued for hunting, ecotourism and wildlife viewing, and also pose potential for conflict due to agricultural damage, disease transmission and vehicle collisions. In Saskatchewan, the demand for elk hunting opportunities by licenced hunters has steadily increased over the past decade (see Section 2.7). Outside Saskatchewan's boreal forest, where elk are vulnerable to overhunting and the demand for elk far outweighs the supply, licensed harvest is managed through quota-limited draw seasons. Within and adjacent to the boreal forest, where elk vulnerability to hunters is lower and populations are generally higher, elk harvest strategies aim to provide regular (i.e. over the counter licence) seasons for licenced hunters. In Saskatchewan, elk management aims to maximize consistent hunter opportunity while accommodating the wide range of hunters interested in elk (e.g. meat harvest, trophy harvest) and preferences in hunting style (e.g. firearm type, early vs. late season). Saskatchewan's *Game Allocation Framework* outlines the broad principles that govern how harvestable game is allocated to hunters, as well as the tools and season structures available for elk harvest management strategies.

A large proportion of the elk occurring outside the provincial forest use wooded cover, forage or water on lands that support crop or livestock production. When desirable forage (e.g. corn, peas, tame or native pasture) is grown near adequate wooded cover and is left unprotected by prevention strategies, elk tend to capitalize on the availability of high-quality forage and cause crop depredation (i.e. feeding on or trampling of crops), compete with livestock for forage or cause damage to property (e.g. fences). Elk management must therefore be a co-operative effort between government agencies, hunters and landowners, consisting of both preventative damage-reduction strategies and population management. The Saskatchewan Crop Insurance Corporation (SCIC) offers a suite of preventative measures to deter wildlife from causing depredation, competition with livestock or damage to property, including compensation for eligible wildlife-related crop damage.

2.3 Population Status, Distribution and Range

Prior to European colonization, elk were the most widely distributed cervid throughout North America, with population estimates ranging between two and 10 million (O'Gara and Dundas 2002). Historically, elk occurred throughout Saskatchewan south of the Boreal Shield, with large populations occurring in the grassland and parkland regions of the province (O'Gara and Dundas 2002; Arsenault 1998). Following European colonization throughout the 1800s, elk underwent a catastrophic population collapse throughout much of their native range in Saskatchewan due to unregulated hunting and habitat loss (Arsenault 1998); Patterson 2014). By 1920, protective legislation was put in place to restrict elk hunting, allowing populations to slowly recover over the next 40 years. Starting in the late 1930s, significant effort was given to translocate elk throughout the province to re-establish populations within their historic range. Elk were re-established into the Cypress Hills; initially in 1937, with elk from Alberta, and again with elk taken from Fort à la Corne Forest in 1952 and 1953 (Loran et al. 1997). From 1982 until the early 2000s, more than 1,500 elk were translocated from Alberta and Saskatchewan to various regions of the province, resulting in the establishment of a number of viable populations that still occur today. Saskatchewan no longer translocates elk due to the risk of disease transmission. In Saskatchewan, licensed elk hunting resumed in 1958 following the successful re-establishment of elk within various regions of the province.

Today, elk in Saskatchewan occur at some of the northernmost extent of their North American range. Populations exist in relatively discrete populations within the Cypress Upland, Mixed Grassland and Aspen Parkland ecoregions, with more continuous distribution through the Boreal Transition and Mid-Boreal Upland ecoregions. A number of island forests also have elk populations, including Fort à la Corne Provincial Forest, Moose Mountain Provincial Park, and Cypress Hills Interprovincial Park. Further dispersal of elk into unoccupied habitat is possible in the future, particularly in places where human density is low, such as along the Saskatchewan and Frenchman River valleys. Elk distribution in the province is largely dependent on suitable habitat and its connectivity (e.g. connected regions of habitat without barriers to dispersal between them).

The precise population size of elk in Saskatchewan is unknown and difficult to estimate given the terrain and vegetative cover throughout the province. The provincial elk population size likely ranges from 10,000 to 15,000 animals. In comparison, elk population estimates in neighbouring Alberta are 26,000; 8,000 in Manitoba; 40,000 in British Columbia; and more than 160,000 in Montana. In Saskatchewan, aerial population surveys, which provide accurate estimates of population size, have been conducted on several elk populations since the late 1970s (Table 1). To date, only small-scale or non-standardized aerial surveys in the boreal elk range have been attempted. This is due to challenges posed by the naturally clumped distribution of elk, the large survey area size required and the fact that vegetation cover limits the ability to adequately survey this region.

Table 1. Aerial survey population estimates for elk in Saskatchewan

Survey area	Year	Population estimates	Density (km²)
Grassland/Parkland			
WMZ 1 (Wood Mountain Area)	2007-08	125	0.14
Matador (WMZ 14E)	1995-96	133*	0.05
	2005-06	359	0.12
Allan Hills (WMZ 22/30)	2000-01	80*	0.07
Duck Mountain Provincial Park (WMZ 37)	1989-90 1997-98 2019-20	214* 217 393	0.19 0.32 --
Dana Hills (WMZ 41)	2015-16	330	0.49
Thickwood Hills (WMZ 54)	1989-90	250*	0.12
	2000-01	172	---
Parkside (WMZ 54)	2015-16	139	0.25
WMZ 9/10	2022-23	142**	---
Island Forest			
Cypress East (WMZ 6/7E)	1990-91 1995-96 1999-00 2003-04 2006-07 2012-13	321 262 338 592 624 320	0.33 0.27 0.35 0.61 0.29 0.19
Cypress West (Saskatchewan WMZ 7W/Alberta WMU 624)	1990-91	859	0.66
	1995-96	654	0.5
	1999-00	1,120	0.86
	2003-04	741	0.57
	2016-17	400	0.30
Moose Mountain Provincial Park (WMZ 33)	1989-90	388*	0.24
	1997-98	289*	0.26
	2008-09	1,285	0.74
	2012-13	1,212	0.7
	2016-17	1,135	0.66
	2023-24	1,293	0.75
Fort à la Corne (FLC WMU)	1982-83	477*	0.5
	1989-90	523	0.16
	1994-95	538	0.17
	2005-06	620	0.29
	2021-22	101**	--
Forest Fringe/Forest			
WMZ 50	2021-22	460**	--
Prince Albert National Park/Cookson (WMZ 53)	1982-83	416*	0.07
	1990-91	429*	0.07
Meadow Lake (WMZ 55)	2021-22	204**	--
Porcupine Forest (WMZ 56/57)	1977-78	318*	0.03
	1981-82 2021-22	446* 33**	0.04 --
Bronson-Divide (WMZ 68 S/67) Bronson (East of Hwy. 21 – WMZ 68S)	1998-99 2016-17	424* 176	0.04 0.26

*** Estimates are based on a non-standardized survey design.** **** Value is a minimum count only, not a modelled estimate.**

2.5 Habitat Description

Elk are habitat generalists capable of adapting to a wide range of environmental conditions. Generally, optimal elk habitat consists of a mosaic of forage and cover habitat connected by travel corridors, in proximity to water, with minimal human disturbance. Given their ability to adapt to a variety of environmental conditions, the factors most important to elk will likely be landscape dependent (Boyce et al. 2003). For example, elk inhabiting forested environments are more likely to select for natural foraging sites such as grassland meadows or regenerating vegetation, compared to elk in non-forest ecosystems where cover and patch size are most important (Skovlin et al. 2002).

Human-related disturbance is one of the most important factors known to influence elk selection patterns on a landscape, as elk will avoid areas or adjust daily activity patterns (e.g. become nocturnal) to avoid features associated with human activity (Ciuti et al. 2012). Roads are often considered the most important modifier of elk habitat, as roads and trails facilitate human and predator access into elk habitat. The magnitude of the effect of roads on elk selection patterns is dependent on road density, size, traffic volume, and the amount of adjacent cover habitat (Sawyer et al. 2007; Cleveland et al. 2012). Elk habitat use has been observed to decline within three km of roads (Skovlin et al. 2002; Ciuti et al. 2012) and when road densities exceed 0.62 km/km^2 (Lyon 1983; Skovlin et al. 2002).

The amount of cover available to elk is important, particularly in hunted populations. Adequate cover reduces elk vulnerability to hunters and predators in addition to providing shelter from severe weather conditions (Skovlin et al. 2002). Although optimal cover varies based on a suite of factors (Hebblewhite and Merrill 2009), contiguous patch size of at least 200 hectares has been suggested as a minimum to maintain viable elk populations (Hillis et al. 1991). Ideal patch composition generally includes mature forest stands with a well-developed understory, although contiguous patches of grassland or rugged terrain can provide suitable cover habitat for elk. Elk may intermittently use smaller habitat patches with ample forage opportunities, provided larger patches of cover are accessible within the surrounding landscape (Brook 2010).

2.6 Limiting Factors

A variety of factors influence elk populations, including hunter-caused mortality, weather, predators, and disease. These factors may be additive (i.e. causing a direct decrease in the annual population growth rate) or compensatory (i.e. having little or no effect on the annual population growth rate). As with all members of the deer family, factors that affect adult female survival have the greatest potential to affect population growth, although adult female survival is typically stable and largely determined by hunter harvest in populations where harvest of females occurs (Gaillard et al. 2000; Raithel et al. 2007). Variability in juvenile survival often determines elk population trajectory over the short-term because calves are more susceptible to weather, predation, and other disturbances (Singer et al., 1997; Gaillard et al. 2000; Raithel et al. 2007). Therefore, obtaining a good understanding of juvenile recruitment, as well as adult survival, is important for understanding elk population dynamics.

i. Hunter-caused Mortality

Hunting is the primary source of adult mortality in most hunted elk populations (Raedeke et al. 2002) and is typically an additive mortality source (Brodie et al. 2013). Hunter harvest can account for more than 85 per cent of elk mortality in areas open to rifle hunting (Unsworth et al. 1993). As most elk harvest is focused on the adult segment of the population, which has the highest reproductive value and survival rate, hunting can limit elk population growth. However, the chosen harvest strategy (e.g. bull-only vs. antlerless harvest) will ultimately dictate the impact of harvest on survival rates and population growth. As such, harvest strategies are designed to ensure the long-term sustainability of Saskatchewan elk populations by first considering conservation of the species and harvest by First Nations and Métis rights holders before allocating additional hunting opportunity for licensed Saskatchewan resident hunters.

Hunter success can be highly variable depending on the overall vulnerability of an elk population to hunters. For instance, elk harvest mortality generally increases with increasing density of roads and trails that are accessible (Proffitt et al. 2013). Greater availability of escape cover and poor access to land can reduce elk susceptibility to harvest (Proffitt et al 2013). Differences in individual behaviour within a population may also make individuals either more or less susceptible to harvest (Ciuti et al. 2012). Balancing hunter success without overharvest needs to be carefully considered for sustainable elk management.

ii. Weather

Temperature, precipitation, and snowpack have significant impacts on elk population growth (Coughenour and Singer 1996; Post and Stenseth 1999). Generally, severe winter weather conditions limit elk population growth through increased mortality and reduced recruitment, as extreme cold and abnormal snow depth can lead to malnutrition and increased vulnerability to predation (Brodie et al. 2013). Elk populations co-existing with predators have lower survival rates in years with higher winter precipitation (e.g. snow depth less than 50 cm; Brodie et al. 2013). Severe winter conditions reduce pregnancy rates (Raithel et al. 2007), delay calving (Cook et al. 2004) and result in lighter birth mass (Albon et al. 1987). The timing of both spring and autumn plant cycles, which is in part related to precipitation and temperature, has also been shown to play an important role in influencing elk fitness (Albon et al. 1987; Merkle et al. 2016). Increased precipitation in spring can increase forage quality and quantity and consequently reduce elk mortality (Griffin et al. 2011).

Given that weather severity can affect survival and reproduction of elk populations, the impact of climate change on elk distribution and abundance may result in management challenges in the future. For example, forest ecosystems are expected to undergo more frequent droughts, wildfires, and insect outbreaks, which could alter the distribution and abundance of elk in the province. Although the effect of climate change on elk population abundance is unclear, a greater degree of population fluctuation and associated need for adaptive management is expected in the future. Adequately detecting abnormal climatic conditions (e.g. unusually severe winters) and adjusting management strategies accordingly is important to sustaining long-term population objectives.

iii. Predators

Predators including wolves, bears, and cougars regulate many elk populations throughout North America, including Saskatchewan. Whether predation is additive or compensatory to elk population growth will likely depend on interacting factors such as predator density and richness (Griffin et al. 2011), hunter harvest (Brodie et al. 2013), climate variability (Hebblewhite 2005), forage quantity and quality (Melis et al. 2009), disease prevalence (Krumm et al. 2010), elk behavioral traits (Ciuti et al. 2012) and population structure (Coulson et al. 2005). Predation on adult elk affects population dynamics in some systems (Laundré et al. 2014), although predators typically kill proportionally more calves, resulting in a relatively smaller effect on population dynamics (Griffen et al. 2011).

The relative impact of predation on elk survival likely varies across space and time. In Saskatchewan, predator diversity and abundance vary regionally, with generally higher densities of wolves (*Canis lupus*), bears (*Ursus americanus*) and coyotes (*Canis latrans*) throughout the boreal plain and some island forests, and higher cougar (*Puma concolor)* density in the Cypress Hills. Elk are often a primary prey species of wolves, which have been shown to limit elk population growth in some systems (Vucetich et al. 2005). Although the effect of wolves on elk survival vary, research suggests that the presence of wolves will, on average, decrease elk recruitment rates by five calves:100 adult cows (Lukacs et al. 2018). Cougars have been shown to be important predators of some elk populations, especially where bears and wolves are absent or at low density (Eacker et al. 2016). Coyotes can be a source of elk calf mortality (Griffin et al. 2011), although their contribution to elk calf predation in multi-predator environments is expected to be low.

iv. Disease

Chronic wasting disease (CWD) is a transmissible spongiform encephalopathy fatal to members of the deer family (*Cervidae*), that was first detected in Saskatchewan in a farmed elk in 1996. In 2000, the first wild case was detected in mule deer. Since 1997, there has been an increase in the proportion of CWD positive elk detected province wide, although to date elk have not been a specific target of the CWD surveillance program with limited data on CWD occurrence in this species. Elsewhere, CWD prevalence rates greater than 13 per cent have been found to significantly reduce the probability of survival in elk (Monello et al. 2013), with predation and severe weather magnifying the negative effects of chronic wasting disease on population growth (Sargeant et al. 2011). Targeted CWD surveillance in elk is needed to further elucidate the risk to provincial populations and the need for management specific to elk populations. CWD is a cervid-specific disease and there is currently no evidence of natural CWD transmission from cervid species to domestic species such as cattle or sheep.

Bovine tuberculosis (*Mycobacterium bovis*) is a contagious and communicable disease caused by bacteria that can affect elk populations. In North America, bovine tuberculosis (bTB) only persists in free-ranging elk in and around Riding Mountain National Park (RMNP), Manitoba. Although there have been periodic outbreaks of bTB in cattle in recent years (e.g. Jenner, AB in 2016; Pelly, SK in 2023) the risk of infection to elk is currently considered low and no evidence of bTB has been found in free-ranging elk in Alberta or Saskatchewan.

Meningeal worm (*Parelaphostrongylus tenuis*), a parasitic nematode that inhabits the brain and spinal cord, is believed to have limited the success of some reintroduced elk populations in North America overlapping with white-tailed deer, the natural host of *P. tenuis* (Samuel et al. 1992; Chitwood et al. 2018). The parasite has been associated with significant non-hunting related mortality in some elk populations in Eastern North America (Larkin et al. 2003; Chitwood et al. 2018). Given the high degree of overlap between elk and white-tailed deer in Saskatchewan, it is likely that *P. tenuis* infection results in some limited elk mortality each year. Changing environmental conditions and white-tailed deer abundance may result in parasite range expansion and intensity, which may cause the parasite to become more problematic in the future, particularly in naïve populations with low levels of immunity to the parasite.

Climate change and landscape level changes may impact host-pathogen dynamics and the incidence and intensity of parasitic diseases in wildlife populations over the next decades. A warming climate and shifting host populations may result in more suitable habitat for parasites and vectors, whose range was previously limited. Ongoing regular monitoring work to establish the health and condition of elk populations across the province and monitoring trends over time will be essential to observe changes and detect novel parasites or pathogens that may impact elk populations in the future.

Table 2. Selected diseases and pathogens affecting wild Saskatchewan elk

Disease	Transmitted to Humans	Clinical Signs in Animals	Known Distribution
Prion			
Chronic wasting disease	No known transmission to humans to date	Fatal neurological disease. Condition may vary from healthy looking to emaciated.	Southern SK and Boreal Forest Fringe
Parasites			
Lungworm	No	Rarely fatal. Cough, emaciation, lethargy with high parasite burden. Adult worms present in lungs	Province-wide
Meningeal (brain) worm	No	Typically, fatal. Neurological symptoms (circling, head tilt)	Eastern-Central SK
Giant liver fluke	No	Sometimes fatal. Cause of liver damage. Cavities with purple-gray, flat, oval-shaped worm's or black fluid in liver	Boreal Forest Fringe, Cypress Hills
Hydatid disease (Echinococcus granulosus)	Yes	Rarely fatal. Large fluid filled cysts containing parasites found in lungs or liver	Province-wide
Arthropod			
Winter (moose) tick	No	Loss of hair, irritation. Rarely causes loss of body condition in elk	Province-wide

2.7 Human Dimensions of Elk Management

Elk are a majestic, fascinating species and are highly valued and appreciated by First Nations and Métis, photographers, shed hunters, nature enthusiasts, agricultural producers, and hunters. At the same time, elk have the potential to cause conflict with humans via damage to agricultural products, disease transmission and vehicle collisions. This complexity surrounding elk management requires open communication and a collaborative approach to problem solving among user-groups (Chase, Siemer and Decker 2002).

Elk are, and have historically been, an important part of North American First Nations and Métis ways of life (McCabe 2002). On the Northern Great Plains including Saskatchewan, elk supplemented bison (*Bison bison*) as a source of food, although in the parkland and southern boreal, elk would have likely been a staple food source for many First Nations and Métis people (McCabe 2002). Today, elk remain an important part of First Nations and Métis diet, culture, story and spirituality.

Elk are an important game species for First Nations, Métis and Saskatchewan licenced hunters, and hunting plays an important role in regulating elk populations. Elk hunting also plays an important part in the Saskatchewan economy, from licences sales to supporting businesses that provide hunting services and equipment, to the jobs created by the popularity of hunting activities (Derek Murray Consulting Associates 2006).

The number of licenced elk hunters in Saskatchewan is stable to increasing, with 5,449 regular elk and 4,943 draw elk licences purchased in 2023 (Figure 1). The number of draw applications to hunt elk in Saskatchewan has also significantly increased over the last decade, with 36,080 hunters applying to hunt elk with a total draw quota of 6,065 licences in 2023. Similarly, the total revenue generated from elk licence fees is rising, with 2023 Saskatchewan resident and draw elk licence sales estimated at $239,940 and $345,265, respectively. The annual revenue added from elk hunters to the outdoor industry, and to rural business in the province, is also of importance. In Saskatchewan, First Nations outfitters may guide for elk on reserve land. Off reserve lands, licenced outfitters are limited to guiding Saskatchewan residents who hold a valid regular elk licence.

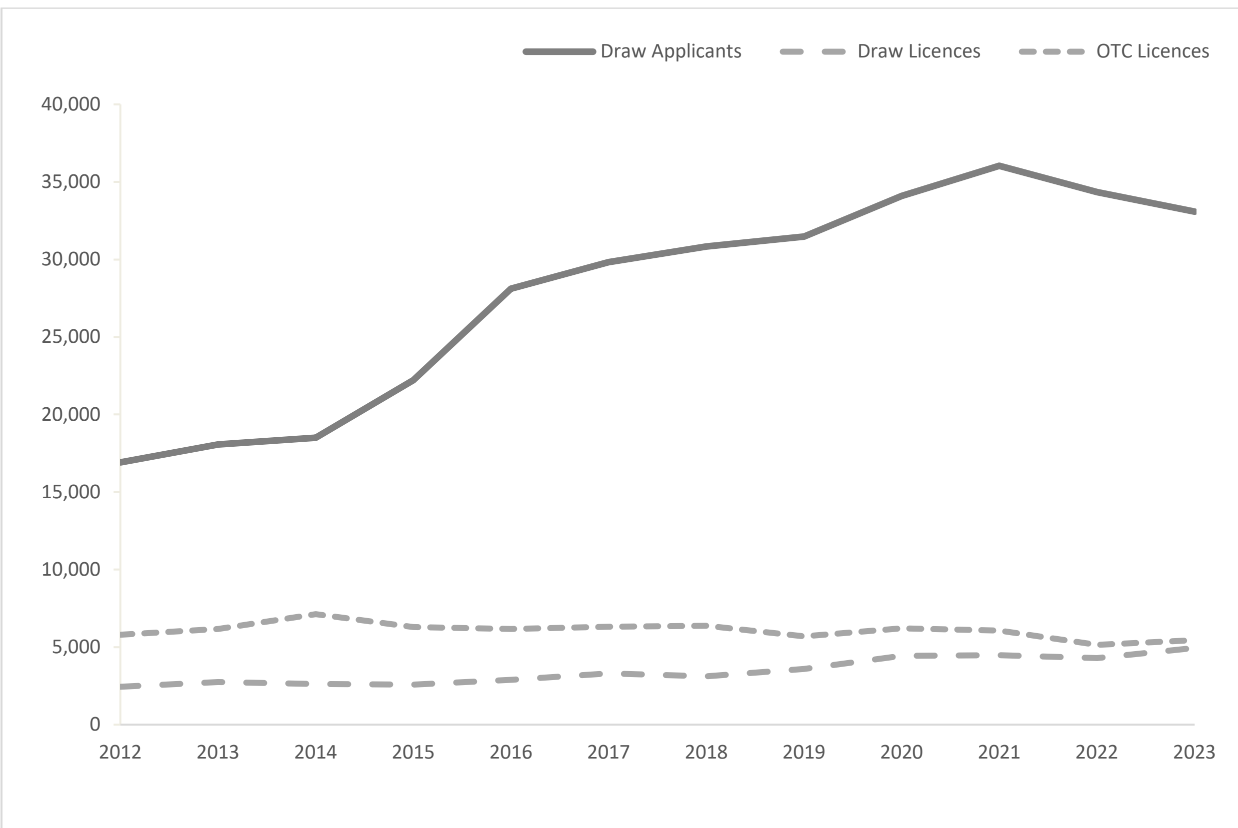

Figure 1. Trends in the number of licenced Saskatchewan elk hunters, 2007-2023

One of the most significant sources of elk-human conflict in Saskatchewan stems from elk depredation of agricultural crops and forage. To mitigate losses incurred from wildlife damage, the Saskatchewan Crop Insurance Corporation (SCIC) offers a suite of preventative measures that support elk-human coexistence by deterring wildlife from causing depredation, competition with livestock or damage to property. From 2019-2023 (5-yr average) and 2014-2023 (10-yr average), annual indemnity payments due to elk damage across Saskatchewan averaged $6.79 million and $4.69 million respectively, comprising an average of 27 per cent and 21 per cent of annual indemnity paid out due to damage by all species in these periods. It is important to note that variation in annual indemnity payments may more accurately reflect differences in winter conditions, and therefore food availability, or crop value than direct fluctuation in local elk population size. During the winter, elk behaviour is largely driven by food availability, so elk from across the broader landscape may temporarily congregate at accessible sources of food (e.g. bale yards and cattle feeding locations). Harsher winter conditions or easier access to agricultural products may drive more elk to congregate.

Therefore, elk management must be a co-operative effort between agricultural producers, government agencies, and user-groups to employ strategies that support elk-human coexistence. This is characterized by the long-term persistence and social legitimacy of elk and tolerable levels of risk for agricultural producers (Carter and Linnell 2023; König et al. 2020).

3.0 Monitoring and Management

Collecting information on elk populations over time is necessary to inform effective management decisions. Elk populations in Saskatchewan are monitored using a variety of data sources, including local experiential knowledge maps created from the field reports of ministry staff, SCIC and stakeholder groups, aerial population surveys, hunter harvest surveys, population model predictions and information on factors that can limit population growth (e.g. predators and winter severity). Typically, population monitoring occurs at the scale of the wildlife management zone, although data may be aggregated at larger scales when data is scarce, or to align broad-scale management objectives across elk management units. Monitoring strategies will be evaluated and adapted over time to provide consistent and cost-effective population estimates.

Elk management in Saskatchewan aims to maintain ecologically sustainable populations within suitable habitat, while supporting elk-human coexistence and providing hunting opportunities when a harvestable surplus allows. As elk populations in Saskatchewan are regionally distinct, harvest strategies that reflect this regional variation are necessary for effective management. Four elk management units (EMUs), namely the Grassland, Parkland, Forest Fringe/Forest and Island Forest EMUs, have been developed to guide elk monitoring and management at a broad scale, with fine-scaled management decisions (e.g. quota adjustments) typically occurring at the scale of the wildlife management zone (Figure 2). The Grassland, Parkland, Forest Fringe and Forest Management EMUs align with Big Game Management Units used for white-tailed deer, moose and black bear, whereas the Island Forest Management Unit was specially designated to reflect regionally unique elk management scenarios.

The Grassland EMU is comprised of wildlife management zones in the southwest and central regions of the province where large patches of suitable elk habitat on native grasslands, pastures and isolated patches of forest exist (Figure 2). The Grassland EMU contains some of the largest contiguous tracts of habitat outside the boreal forest and provides reasonable opportunity for hunter access through community pasture agreements. As much of this EMU is privately owned or managed, supporting positive hunter-landowner relations will be considered in the harvest strategy decision-making.

The Parkland EMU is made up of wildlife management zones that predominantly include the Aspen Parkland ecoregion of Saskatchewan and includes large amounts of ideal elk habitat comprised of mixed forest transitioning to large productive grasslands (Figure 2), supporting moderate to high elk densities. The region also includes a high degree of agricultural activity and a large rural population, resulting in challenges to human-elk coexistence. As much of the landscape is privately owned, hunter access to elk in parts of this region may be limited.

The Forest Fringe/Forest EMU is made up of wildlife management zones occurring within or directly adjacent to the boreal forest and provincial forest fringe boundary (Figure 2). This region generally contains the highest and most distributed elk populations, greatest amount of suitable habitat, greatest potential for elk-human coexistence and a high degree of accessibility to elk for hunters on provincial crown forest. Although the Forest Fringe/Forest EMU contains the largest and most widely distributed elk populations in the province, elk in the region are also more vulnerable to large population fluctuations due to severe winters and abundant predators than elk in other regions. The Forest Fringe/Forest EMU is an important destination for Saskatchewan licenced hunters, due to historically consistent elk hunting opportunity through regular elk licences and reliable hunting access in provincial forests.

The Island Forest EMU contains wildlife management zones and special management units comprised of unique habitat that have historically provided unique hunting opportunities or challenges to elk management because of their characteristic habitat composition (Figure 2). The Island Forest EMU includes WMZ 6, 7E, 7W (including Cypress Hills Interprovincial Park West Block), WMZ 33 (including Moose Mountain Provincial Park), Greenwater Provincial Park, and Fort a la Corne Wildlife Management Unit. Historically, many Island Forest elk populations have been uniquely managed, partly due to the amount of public land (e.g. provincial forest, provincial park) that is available for additional management opportunities (e.g. extended hunting seasons). Given limited predation pressure, easy access to agricultural products as forage, and the high degree of suitable elk habitat, elk populations within the Island Forest EMU have considerable potential to reach high population densities and exceed human-elk coexistence targets. Within the Island Forest EMU, unique season structures and licence types may be implemented to help address significant agricultural damage while ensuring equitable allocation of hunting opportunities for all hunters.

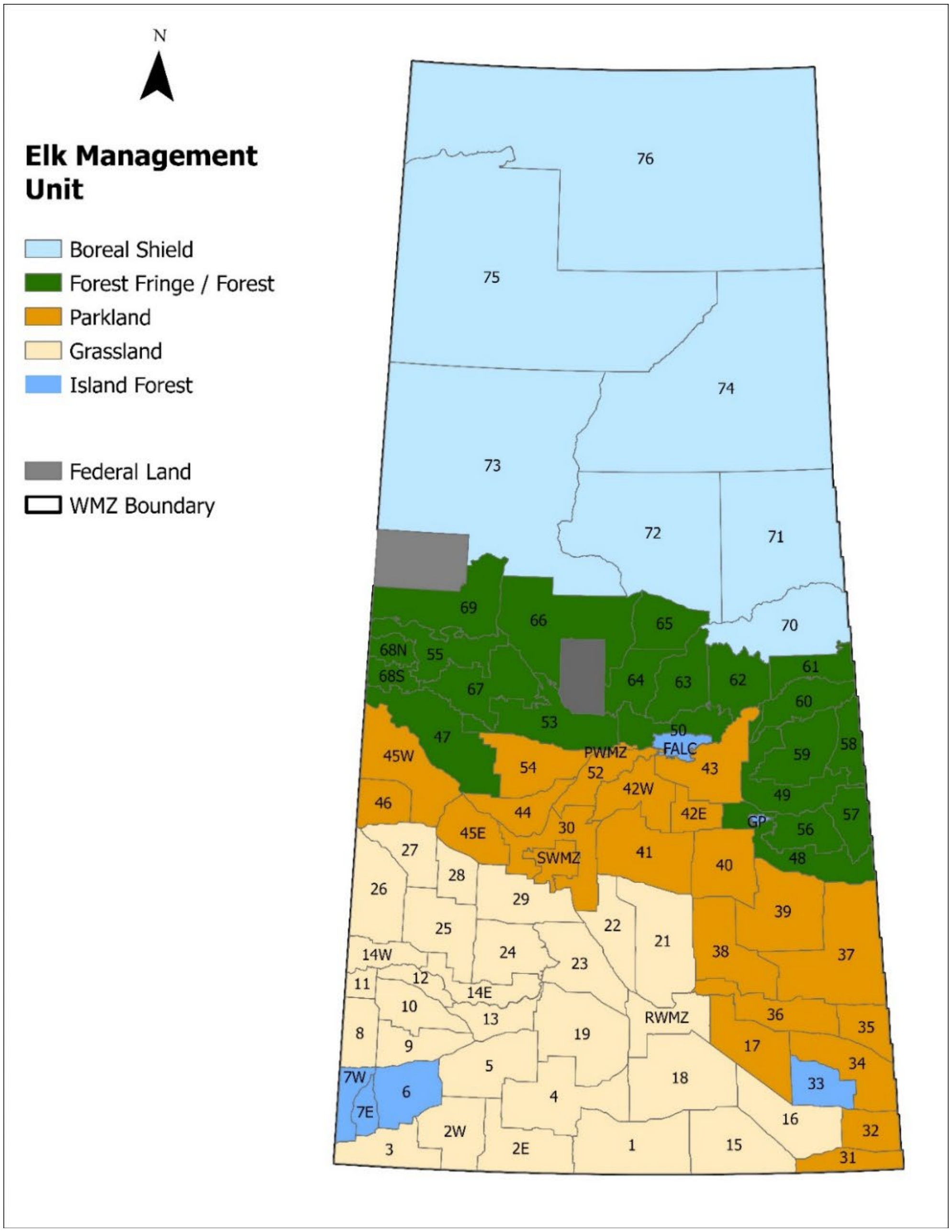

Figure 2. Saskatchewan Elk Management Units, including wildlife management zones for reference. The Boreal Shield is not considered part of an EMU due to few resident elk populations

3.1 Management Objectives and Actions

Objective 1: Monitor elk populations over time to ensure management strategies are effective and adaptive.

Actions:

- Annually monitor elk population trends with local experiential knowledge maps created from the field reports of ministry staff, SCIC staff and stakeholder groups, results of the Hunter Harvest Survey, Saskatchewan Crop Insurance Corporation annual reports, population model predictions and aerial survey population estimates.
- Standardize collection of local experiential knowledge when gathering information from ministry staff, SCIC staff and other stakeholder group using knowledge mapping.
- Estimate population abundance using predictive elk population models where population knowledge gaps exist and data is available.
- Regularly review reliable and cost-effective survey methodologies for estimating elk population size.
- Develop a Winter Severity Index to include in predictive modelling of elk recruitment and survival in the Forest Fringe/Forest EMU.
- Annually monitor the occurrence of infectious diseases in Saskatchewan wild elk.
- Monitor the sustainability of elk populations in each wildlife management zone as new ecological and socio-economic information pertinent to elk management becomes available.

Objective 2: Support habitat management initiatives that benefit elk.

Actions:

- Provide information, analysis and recommendations during forestry planning processes to consider elk habitat retention and minimize disturbance in important areas.
- Develop an elk habitat suitability model for Island Forest and Forest Fringe/Forest EMUs using presence/absence data collected through all survey sources.
- Provide expertise on land development activities to encourage elk habitat retention in project planning.
- Support initiatives to secure elk habitat in key areas that are important to sustain elk populations and hunting opportunities. Such opportunities include habitat purchase, easements, and incentives through the Fish and Wildlife Development Fund, Nature Conservancy of Canada, and Nature Saskatchewan. For details, see Habitat Conservation in the *Game Management Plan: Core Document*.

- Ensure that elk habitat is captured sufficiently in the forthcoming Habitat Management Plan.

Objective 3: Define management targets and allocate harvestable surplus through a sustainable harvest strategy.

Actions:

- Manage elk populations to support elk conservation and provide hunting opportunities for First Nations and Métis and licenced hunters as per the *Game Management Plan* and *Game Allocation Framework.*
- Review annual survey data and reports of population abundance in conjunction with thresholds laid out in this document, and the *Game Allocation Framework*, to determine licence quotas and season dates.
- Monitor the supply and demand of elk harvest opportunities to ensure licenced harvest management strategies are effective, consistent, diverse and maximize available hunting opportunity.
- Provide a diversity of regular and draw licenced hunting seasons throughout the peak of the rut when elk population levels are adequate.

Objective 4: Enhance our understanding of the human dimensions of elk management and support human – elk coexistence in Saskatchewan.

Actions:

- Ensure elk management decisions balance the values, preferences and concerns of Saskatchewan residents and ensure that processes to provide input relevant to elk management are transparent and inclusive.
- Support improved communication with elk user-groups around elk ecology and management.
- Promote and enhance public engagement and co-operative data collection initiatives that yield useful information for elk management in Saskatchewan.
- Review ways to better understand the key issues surrounding the human dimensions of elk management in Saskatchewan, with the intention to inform elk management actions.
- Provide technical assistance around elk ecology and management and promote the SCIC Big Game Damage Prevention program for Saskatchewan residents with elk damage concerns.
- Support non-consumptive uses of elk that are not detrimental to the species (i.e. shed hunting, photography, viewing).

3.2 Management Thresholds

Management thresholds will be used to objectively inform when to implement a liberal, base, restrictive or closed harvest strategy. Thresholds are based on annual assessments of population status and hunter harvest success analyzed at the WMZ-scale. While precise management actions may vary across EMUs, in general harvest strategies can be described as follows:

> **Liberal harvest strategy** (usually implemented when populations are deemed high): A liberal harvest strategy provides the most licenced hunting opportunity and is implemented when populations can sustain considerable harvest pressure. A liberal harvest strategy may also be applied when a population exceeds the social tolerance in a region (i.e. how acceptable wildlife and their behaviours are). The objective of a liberal harvest strategy is to reduce overabundant elk populations by providing elevated licenced harvest opportunity of antlerless individuals to limit population growth.
>
> **Base harvest strategy** (usually implemented when populations are at or near their long-term average or target level): A base harvest strategy balances licenced hunting opportunity with modest and sustainable harvest pressure on males, females and calves. This is generally the harvest strategy that wildlife managers strive to maintain, as an elk population at this level is expected to be biologically sustainable, within the limits of social tolerance and able to withstand hunting pressure. The objective of a base harvest strategy is to maintain elk populations at or near current levels.
>
> **Restrictive harvest strategy** (usually implemented when populations are below their long-term average or target level): A restrictive harvest strategy provides limited licenced hunter opportunity on the male component of the populations, as the harvestable surplus of elk is lower than what is expected in a base harvest strategy. The objective of a restrictive harvest strategy is to increase elk populations above current levels through a reduction in harvest pressure on cows.
>
> **Closed harvest strategy** (usually implemented when populations are considered critically low): A closed harvest strategy halts licensed elk hunting entirely and is implemented when a population does not have a harvestable surplus that can be allocated for licenced hunting. Closed seasons remain in effect until populations have recovered. The objective of a closed harvest strategy is to grow elk populations to a level where both First Nations and Métis and licensed harvest may be sustained.

Population status and harvest success rate are the two primary indicators that guide elk management in Saskatchewan (Table 3). Population status will incorporate all available population data at the wildlife management zone scale, including local experiential knowledge, aerial survey results and modelled population estimates. Local experiential knowledge will provide annual estimation of elk populations at the wildlife management zone scale. Aerial surveys provide accurate population estimates and will be used where possible to validate local experiential knowledge. Population models are built at the zone level using population estimates based on aerial survey results or local experiential knowledge, elk mortality rates from the annual mandatory hunter harvest survey and vital rates from neighboring jurisdictions. These models are used to assess the effect of harvest strategies by predicting future population trends.

Hunter harvest success rates are collected annually using the mandatory Saskatchewan Hunter Harvest Survey. To address variability in hunter harvest success rates, multi-year floating averages will be used to evaluate relationships between harvest success, the estimated number of elk harvested and population trends. Although the hunter success rate indicator is the most consistent data source available, it may not consistently be a precise reflection of population abundance as it may be influenced by a number of factors such as accessibility to elk (e.g. amount of public land, amount of escape cover), the number of licences issued in a given year (i.e. hunter competition), and annual variation in weather conditions (e.g. winter severity, drought). Improving our understanding between harvest success rates and population abundance in each elk management unit will require further exploration throughout the duration of this plan.

In addition to these primary indicator data sources, other secondary indicators that will influence management decisions include annual crop damage claims, weather severity, hunter effort, predator abundance and risk of disease transmission. In the cases of conflicting evidence, a weight of evidence approach, in addition to expert opinion, will be used when evaluating harvest strategies. Management strategies may be adjusted, or new management strategies may be implemented throughout the course of this plan as new information becomes available. Similarly, additional primary threshold indicators may be considered if future surveillance methods provide this data.

In the Parkland, Grassland and Island Forest EMUs, each indicator will be evaluated annually using a multi-year floating average to avoid attempting to manage to natural year-to-year variation, while allowing for adequate flexibility to address management concerns. In the Forest Fringe/Forest EMU, harvest strategies will be evaluated using three-year floating averages. One year of extreme conditions (e.g. extreme winter causing severe population to decline) may supersede the use of multi-year averages to avoid a lag in adaptive management. Harvest scenarios will typically be in place for a minimum of two years barring new population information, or a unique event that requires immediate management attention.

Where licenced hunter demand exceeds allowable harvest of elk, hunting opportunity is allocated through the Big Game Draw (see *Game Allocation Framework* for further details). This is the case throughout the Grassland, Parkland and Island Forest EMUs, where elk licences are allocated solely through the Big Game Draw. In the Forest Fringe/Forest EMU, liberal and base management strategies consist of offering regular (i.e. over-the-counter) licences in addition to a draw antlerless season. The use of regular licences during a liberal or base harvest strategy is supported in the Forest Fringe/Forest EMU because hunter success – and consequently, the risk of over-harvest – is relatively low. See Table 3 and the Appendix for further details regarding harvest strategies, threshold indicators and seasons.

Table 3. Management strategies and indicator thresholds across Elk Management Units

Recommended harvest strategy	Elk Management Unit	Management action examples	*Indicator thresholds*	
			Population status	Hunter success
Liberal	Grassland and Parkland	Either-sex draw (including additional winter shoulder season) and antlerless draw (including additional winter shoulder season)	Population above management targets (>30%)	Draw either-sex success rate >75% Draw antlerless success rate >55%
	Forest Fringe/ Forest	Regular either-sex season (including firearm-specific season) and antlerless draw (including firearm-specific season and additional winter shoulder season)	Population above management targets (>30%)	Regular success rate >30% Draw antlerless success rate >50%
	Island Forest	Either-sex draw (including additional winter shoulder season) and antlerless draw (including additional winter shoulder season)	Population above management targets (> 30%)	Draw either-sex success rate >50% Draw antlerless success rate >25%
Base	Grassland and Parkland	Either-sex draw (including additional winter shoulder season) and antlerless draw (including additional winter shoulder season)	Population near management targets (+/- 30%)	Draw either-sex success rate 35–74% Draw antlerless success rate 25–54%
	Forest Fringe/ Forest	Regular bull-only season (including firearm-specific season) and antlerless draw (including firearm-specific season and additional winter shoulder season)	Population within management targets (+/- 30%)	Regular either-sex success rate 16 – 29% Draw antlerless success rate 25-50%
	Island Forest	Either-sex draw (including additional winter shoulder season) and antlerless draw (including winter shoulder season)	Population near management targets (+/- 30%)	Draw either-sex success rate 25–50% Draw antlerless success rate 15–24%
Restrictive	Grassland and Parkland	Bull-only draw (including additional winter shoulder season)	Population below management targets (>30% to 60%)	Draw either-sex or bull-only success rate 15–34% Draw antlerless success rate 10–24%
	Forest Fringe/ Forest	Bull-only draw (including firearm-specific season)	Population below management targets (> 30% to 60%)	Regular either-sex or bull-only success rate 10- 15% Draw antlerless success rate <25%
	Island Forest	Bull-only draw	Population below management targets (> 30% to 60%)	Draw either-sex or bull-only success rate 15-24% Draw antlerless success rate <15%
Closed	Grassland and Parkland	Season closed	Population below management targets (>60%)	
	Forest Fringe/ Forest	Season closed	Population sig. below management targets (>60%)	
	Island Forest	Season closed	Population significantly below management targets (>60%)	

4.0 Future Research and Monitoring Needs

Elk are a highly valued species in Saskatchewan. As the demand for elk hunting opportunity in the province continues to grow alongside changing land use goals in the rural landscape, the need for accurate and reliable data sources will be essential for informing adaptive and science-based elk management. Currently, there are considerable data gaps around elk population demographics and the social tolerance of elk throughout much of the province. There remains considerable opportunity for developing monitoring initiatives to collect local experiential knowledge (Patterson 2014) and Indigenous knowledge (Thompson et al. 2020). The following includes a short list of data deficiencies and possible opportunities to improve elk management over the course of this plan.

Data deficiency 1: Improve our understanding of ways to encourage coexistence with elk in Saskatchewan.

Wildlife management decisions are made by considering both the ecology of a species and the human dimensions of managing a species, including elements that best support human coexistence with a species. Traditionally, social tolerance has been captured through interactions with stakeholder groups in wildlife advisory roles, responding to public concerns, and indirectly through the evaluation of wildlife damage of agricultural crops and property. Although each of these measures have provided insight into public perceptions of wildlife, developing a standardized approach to better understand stakeholder values, perceptions and tolerances of elk will better align elk management targets with an accurate understanding of the limitations to human-elk coexistence.

Data deficiency 2: Improve survey methodology for estimating elk abundance in forested landscapes.

Current aerial survey methodology used to assess elk population abundance in Saskatchewan involves intensive flying effort and expense, which limit these surveys to relatively small geographic areas. Elk are notoriously difficult to survey over large areas given their clumped distribution, although several effective aerial survey methodologies have been developed. As the aerial survey remains the standard for obtaining ungulate population estimates, applying new survey methodologies and equipment (e.g. aerial infrared technology and ground-based camera trapping) may provide more cost-effective and accurate elk population estimates.

Data deficiency 3: Develop a better understanding of elk movement and vital rates in Saskatchewan.

Predicting elk population trajectory and movement patterns is necessary for evaluating the effectiveness of current management strategies and ensuring management targets are met. To accurately predict population trajectory, it is necessary to have information on current population abundance, as well as key population vital rates like survivorship (i.e. how many individuals survive from one year to the next) and recruitment (i.e. how many individuals born into the population survive to adulthood). Understanding movement rates is necessary to predict where elk may recolonize new regions of the province or to identify critical habitat regions (e.g. calving areas, vital foraging areas, migratory routes). Obtaining a better understanding of elk vital rates and movement patterns, particularly in the Forest Fringe/Forest and Grassland EMUs, will be important in understanding and effectively managing for sustainable elk populations in the future.

5.0 Summary

The framework outlined in this document uses the best available information to make science-based decisions regarding elk populations to ensure elk are sustained into the future. This framework will be regularly reviewed and adapted as information becomes available and additional ecological and socio-economic thresholds are developed. The continued engagement with First Nations and Métis, landowners, nature enthusiasts, agricultural producers, hunters, and the general public will be crucial to evaluating the management strategies described herein. All interested individuals are encouraged to engage in elk management by participating in the annual mandatory Hunter Harvest Survey and openly communicating about elk management with the provincial elk biologist and local ministry staff.

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Appendix

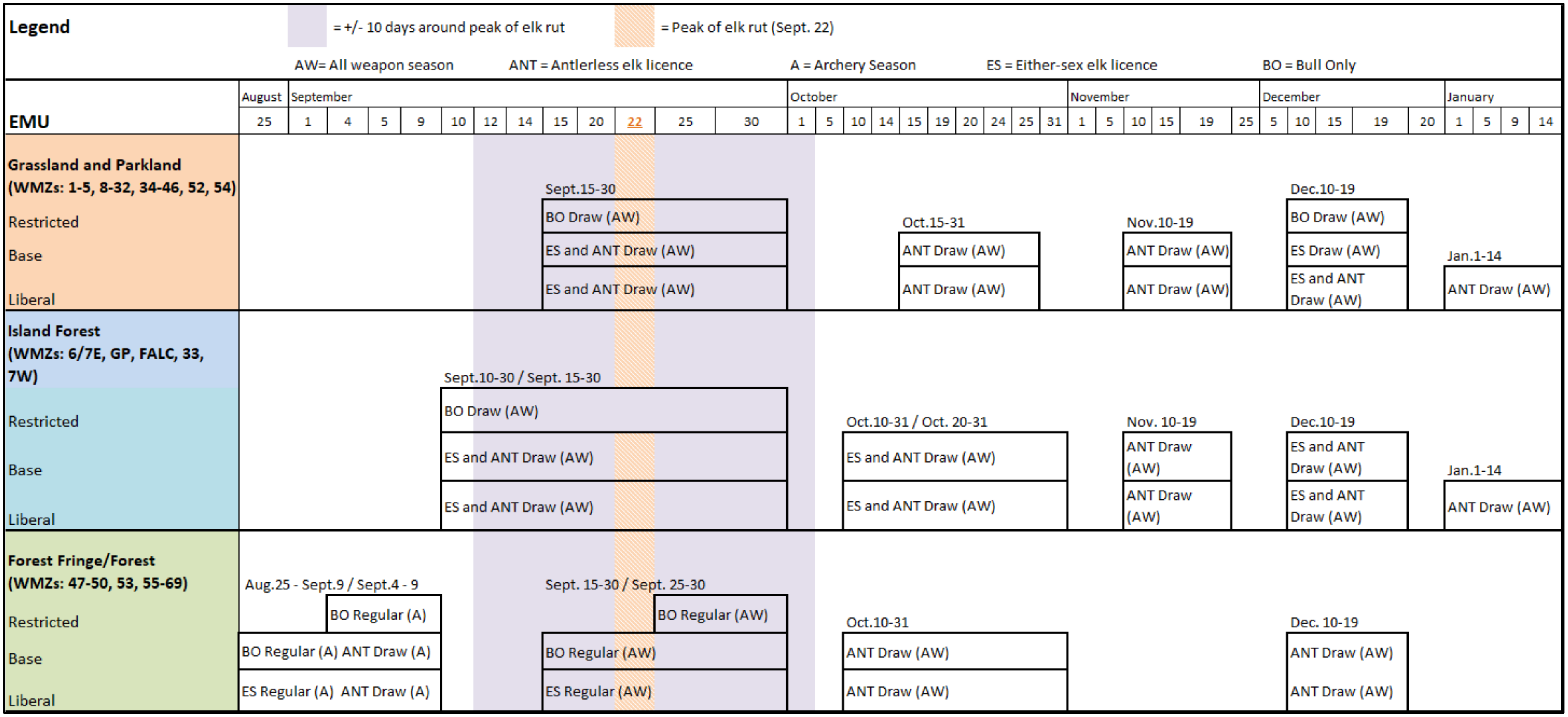

Figure 3. Examples of recommended elk seasons in liberal, base and restricted harvest sencarios for elk management units in Saskatchewan.