SCIENCE REVIEW OF 2023 ALBERTA FERAL HORSE MANAGEMENT FRAMEWORK

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ABOUT THE AUTHOR

As a long-practicing registered professional biologist (RPBio) in British Columbia, I have had a wide range of experience in wildlife research, environmental impacts, cumulative effects analysis, and management/conservation issues in western Canada. I have headed numerous research projects, including on Chilcotin free-roaming horses, mammal inventory in Yoho National Park, grizzly bears, black bears, western toads, mountain goats, Roosevelt elk, spirit (Kermode) bears, and other species. I am well familiar with the ecology of the Alberta Foothills having mapped and studied grizzly bear habitat in Kananaskis Country for three years with Dr. Stephen Herrero, and for producing a report for Alberta Fish and Wildlife on the history of the grizzly bear in K-Country. In Alberta, I was also a waterfowl researcher on the first environmental impact study of the Athabasca Tar Sands (Syncrude), and a wildlife researcher on a gas pipeline from Chief Mountain Alberta to Trail, British Columbia.

I have conducted considerable ungulate research, including on barren-ground caribou, bighorn sheep, Roosevelt elk, and mountain goats. In 2015/2016, I carried out a professional review of feral horse management in Alberta.

Over the past 20 years, my research on wild horses in the BC Chilcotin has included field research on habitat use and response to wildfires, as well as genetic studies. I have also worked with the Xeni Gwet'in-Tsilhqot'in Nation on a wild horse management plan and guidelines for wildlife and wild horse tourism viewing. I recently published a book on my wild horse research titled *The Wild Horses of the Chilcotin: Their History and Future*, which won the 2024 Basil Stuart-Stubbs Prize for the best scholarly book by a Canadian author on a BC subject. It was given a starred review by the US Booklist for a work judged to be outstanding in its genre.

I have produced over 100 wildlife reports, including a number of publications in peer-reviewed journals. I have produced or co-authored three reports on Chilcotin wild horses and have been a co-author of two peer-reviewed scientific papers related to wild horses, one on the diet of Chilcotin wolves and the other on the spread of the domestic horse across the Americas, which won the prestigious 2024 AAAS Newcomb Cleveland Prize for outstanding contribution to science.

Cover Photo by Duane Star Photography

ACRONYMS AND DEFINITIONS

AESRD	Alberta Environment and Sustainable Resources Development
AFAP	Alberta Forestry and Parks
AFHAC	Alberta Feral Horse Advisory Committee
AFHMF	Alberta Feral Horse Management Framework
AUM	Animal Units Month = Amount of dry forage that one animal unit (AU) consumes in a month
EMZ	Equine Management Zone(s)
Feral	I use feral to refer to recently escaped or released domestic barnyard-raised horses.
Free-roaming, Wild	I use wild or free-roaming for horses that have been shown to have occupied the landscape for numerous generations and centuries.
Grassland	A subset of rangeland to refer to habitats dominated by grasses and forbs
Native species	I use native to refer to both wildlife and foundation horses that have occupied the landscape for centuries and are considered a returned native species that evolved in North America.
OHV	Off-Highway Vehicle
Rangeland	All vegetation types used by livestock, wild ungulates, and wild horses for grazing, including grassland, grazeable forest, seral-stage clearcuts, roadsides, shrubland, and wetland/riparian areas

ABSTRACT

This independent evaluation of Alberta Forestry and Parks (AFAP) new 2023 Alberta Feral Horse Management Framework (AFHMF), which proposes to continue controversial population reductions in the six Equine Management Zones (EMZs) using a variety of evaluation criteria and means, found the Framework to be deficient in many science-based levels. Cattle outnumber wild horses by seven times during the active rangeland growing season and are responsible for historic over-grazing, yet their past and present impacts on rangeland health are insufficiently addressed in the AFHMF, as are the wide range of other cumulative effects on the rangeland, including invasive plant species, industrial forestry, oil and gas development, roads, trails, and extensive use by off-highway vehicles (OHV). In addition, the positive role that wild horses play as a valued ecosystem component, including contributing to carbon sequestration, are totally ignored.

The Framework provides no hard evidence to support the contention that the 1,100-1,500 free-roaming horses in the six EMZs have been or are a significant threat to rangeland health. In fact, a number of Foothills wild horse range studies over the past 40 years, where cattle far outnumbered wild horses during the active growing season, found little evidence of serious rangeland degradation caused by the wild horses. Most was considered localized. A study of Freedom of Information-obtained 2015 Foothills Rangeland Health and Riparian Reports found most of the site damage to be caused by other land-uses, including cattle, not wild horses. Using minimum wild horse population counts to set thresholds for horse control measures fails to take into account that the EMZ wild horse population, as with other wild horse populations elsewhere, undergoes significant population oscillations from year to year. Additionally, no attempt has been made to include or document incidents of capture, removal, and killings perpetrated on wild horses by various private interests both inside and outside the EMZs. As well, the AFHMF fails to take into account the role that natural ecosystem factors play in balancing horse numbers, such as predation (wolves, mountain lions, grizzly and black bears), extreme starvation winters, droughts, and emigration and immigration from one EMZ to another. Targeting the Foothills wild horses with intervention population control measures appears unwarranted and will do little, if anything, to protect and restore rangeland health without addressing all of the cumulative impacts on rangeland.

The AFHMF continues to posit that the Foothills wild horses are mostly mixed domestic breeds from recent times, when research by a world-recognized equine genetic expert

found that the subpopulation in the Sundre EMZ are primarily Spanish Iberian introduced by First Nations in earlier times. Another study found the introduced time frame was the early-mid 1600s. Unfortunately, AFAP has no plans to re-categorize the Foothills wild horses as a unique re-introduced native species that evolved in the Fescue grasslands ecosystem before becoming extinct about 5,000 years ago. Rather, they plan to continue to manage them as barnyard-type raised domestic horses under the archaic *Stray Animals Act*, which primarily serves cattle industry interests, not Foothills ecosystem integrity.

Irrespective of the government's overlook of the unique findings of Spanish Iberian bloodlines in the Sundre EMZ wild horse population, the Rocky Mountain Foothills horses are specially adapted to this challenging ecosystem and as such deserve to be preserved as a beneficial and positively contributing component.

Figure 1. A study by world equine genetics expert Dr. G. Cothran found that the core free-ranging horse population in the Sundre EMZ still bears the Spanish Iberian bloodlines of their forebears, brought in by First Nations from the south. A recent study on the early dispersal of the domestic horse via Indigenous trading routes across the Americas indicated horses were first introduced to the northern Rockies in the early-mid 1600s. They have thus survived in a wild and native state in the Foothills for about 400 years along with all the top predators, and for several centuries with over-wintering migrant prairie bison until the bison were eradicated. Yet the Alberta government continues to consider them as feral along with free-ranging barnyard-raised domestic cattle, sheep, and goats. These predominantly Spanish Iberian horses survived a century of Alberta settler bounty hunts and roundups and have adapted to major landscape habitat changes from cattle over-grazing, clearcut logging, oil and gas exploration and development, and other commercial and industrial activities. While many scientists now consider wild horses a returned native species, the Alberta government still classifies them under the *Stray Animals Act* similar to barnyard livestock and no status changes are being planned. Duane Starr Photography

SUMMARY OF FINDINGS

This is my second independent science review of the Alberta government's management of the Foothills wild horse population with a focus on evaluating the Alberta Forestry and Parks (AFAP) 2023 Alberta Feral Horse Management Framework (AFHMF) that proposes to continue population reductions in the six Equine Management Zones (EMZs) using a variety of evaluation criteria and means. The 2023 AFHMF is largely supported by five background reports on feral horses produced by the Alberta Office of the Chief Scientist that utilized reviews of only peer-reviewed documents to the exclusion of relevant non-peer reviewed government documents and non-government wild horse, wildlife, and rangeland studies.

The last Alberta Foothills wild horse population reduction was in 2015, generating considerable controversy and claims by some scientists and advocacy groups that there was not sufficient evidence of over-population and associated Foothills range health degradation linked directly to wild horse numbers to warrant population control measures. My 2015 field assessment and background science review confirmed this, concluding that many of the factors used to justify the culls were not supported by science-based facts and evidence of wild horse-caused range degradation that I looked for in the field. This lack of a science-based Alberta wild horse management approach was later confirmed by two other separate peer-reviewed scientific reviews.

<u>My key findings of the 2023 Alberta Feral Horse Framework (AFHMF) are:</u>

1. The 2023 AFHMF concerns related to the ecosystem and rangeland health of the Foothills EMZs are commendable and valid. The EMZs occupy an ecologically altered landscape that is a remnant of the 50-million year old Rough Fescue grassland ecosystem in which the re-introduced free-ranging horse of today evolved before going extinct in North America about 5,000 years ago. Today, the EMZs are highly modified and fragmented multi-use landscapes due to historic cattle over-grazing, invasive plant species, large-scale industrial developments (oil and gas, clearcut logging), roads, extensive OHV (off-highway vehicle) access, and other human uses. A recent "State of the Prairie" inventory of the Parkland Natural Region, which includes the six EMZs, showed that only 20% of native vegetation/features remain. Since 1990-2010, another 2% has been lost. Between 1958-1998, one area of the Rocky Mountain Forest Reserve of the EMZ had a 58% decrease of open grasslands due to extensive shrub encroachment from lack of wildfires. One of the most ecologically diverse grasslands in Alberta, the Alberta Foothills EMZ areas are, unfortunately, only 1.2% protected.

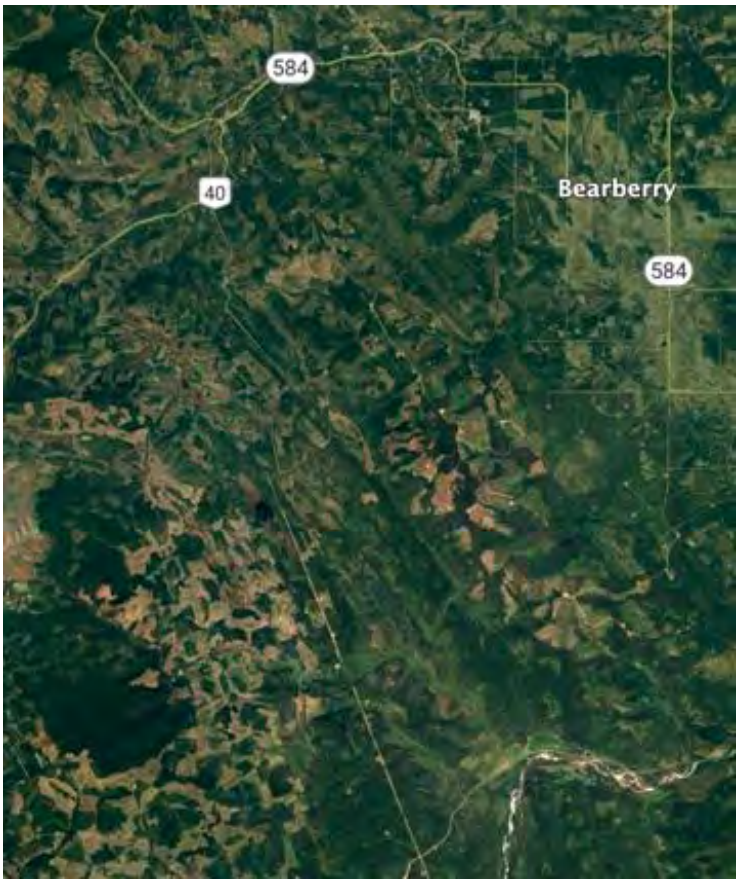

Figure 2. Baseline ecological context showing the highly modified roaded and clearcut Equine Management Zone (EMZ) west of Sundre, Alberta, in the Parkland Natural Region.

2. While studies elsewhere show free-ranging horses can make seasonally disproportionate use of riparian and grassland areas and cause habitat damage, I found no hard evidence that Alberta's free-roaming horse population has contributed in any significant way to the loss of 80% of the EMZ Parkland Natural Region's native grassland and vegetation features or is the serious threat to rangeland health as posited in the AFHMF. This is similar to a rangeland study of the US Great Basin wild horse region where no significant effects were found from long-term wild horse grazing on plant community composition, species richness, diversity, evenness, or dominance, except to reduce herbaceous biomass. Nor in reviewing the limited number of Alberta Foothills wild horse range and habitat use studies done over the past 40 years could I find hard evidence that horses are contributing significantly to rangeland degradation other than in minor ways at localized sites. An independent agrologist's assessment of the FOI'd 2015 Foothills Rangeland Health and Riparian documents for the Clearwater, Sundre, and Ghost EMZs found minimal evidence of free-roaming horse site damage to rangeland and riparian habitats when compared to the higher incidence of site damage identified from other causes: cattle, invasive plants, off highway vehicle (OHV) use, oil and gas development, and clearcut logging. The assessment concluded that a reduction in EMZ wild horse numbers would do little, if anything, to reverse these changes.

The AFHMF also ignores research on wild equids (Downer 2015) that suggests that the Foothills wild horses are actually beneficial to the EMZ Parkland Natural Region's native grasslands and vegetation features as well as rangeland health. Several studies have shown that the equid element actually complements cloven-hoofed ruminant herbivores, helping them to thrive to a greater degree, and also replenishes a greatly diminished megafauna that plummeted after the close of the last Ice Age and that are important in many respects, including seed dispersal and germination.

Given the wide range of cumulative effects on the Foothills rangeland, it is hard to imagine that rangeland health will be protected or restored by targeting only the management of wild horse numbers without addressing the obvious, much larger damages and degradation to rangeland from other man-caused industrial developments, land uses, and invasive plant species.

Figure 3. Example of extensive off highway vehicle (OHV) damage to rangeland health and wildlife riparian habitat in Alberta Foothills (Alberta Wilderness Association 2023). The 2023 Feral Horse Management Framework fails to integrate remedial actions for all cumulative grazing habitat losses. Simply targeting the control of wild horse numbers will make little difference, if any.

Figure 4. Damage to meadow/wetland habitat from OHV use. Alberta rangeland health report.

3. The 2023 AFHMF document uses a "forage-availability approach" to set management thresholds for culling of wild horses in order to "prevent degradation of Crown resources such as grasslands, wetlands, and native wildlife" (p. 23). The Framework proposes that rangeland managers apportion the estimated rangeland forage supply in the six EMZs between natural plant community requirements, larger-scale ecosystem needs for other land uses such as elk, and allocatable forage such as grasses that can be sustainably removed by non-native species (e.g., cattle, horses, etc.). Threshold 1 would mean no action, Threshold 2 could lead to population control, and Threshold 3, the highest, would trigger immediate action for population control. These numerical feral horse limits that would trigger population control were based on four key indicators: feral horse population levels and trends, assessment of ecological health, assessment of wildlife population levels and trends, and assessment of forage utilization.
4. An assessment of the 2023 AFAP wild horse counts and new thresholds indicates that one EMZ (Sundre) could be subjected to population control measures in the near future. Three of the six EMZs are at low population levels not requiring control measures (Brazeau, Nordegg, Clearwater) and, based on 2022 minimum counts, the Elbow EMZ also does not currently require control measures. One EMZ (Ghost) is between acceptable and concern.

5. For what is claimed to be a science-based Feral Horse Management Framework guided by five Alberta Office of the Chief Scientist's background reports based only on peer-reviewed feral horse studies, considerable relevant data and information claimed to be used as "indicators" to determine new horse population thresholds for management action was found to be largely absent in the Framework document. This includes quantified background data on rangeland health and causative factors, wildlife population levels and trends, and quantified forage availability and utilization by wild horses, cattle, and elk. No data is provided on the increased forage availability from early seral clearcuts. Additionally, no hard evidence is provided in the Framework that quantifies range degradation exclusive to wild horses once population thresholds for population reductions are reached.

Figure 5. Studies show that free-roaming horses make considerable all-year use of early seral clearcuts and mostly avoid open rangelands used by cattle in summer although there is some difference between EMZs. Downer (2015) observed that horse use of clearcuts was accelerating their recovery of healthy soils and vegetation. Here, a herd of wild horses uses a recent clearcut west of Sundre. The 2023 AFHMF fails to quantify Foothills forage availability changes attributed to early seral clearcuts and shrub in-growth of grasslands grazing habitats. Julie Woodyer Photo.

6. No scientific accounting and background information is included in the 2023 Framework on the level of grazing intensity of the 8,544 cattle that utilize the 36 range allotments in the six EMZs (34,170 Animal Units Month-AUM) from June 15-October 15 versus some 1,428 horses (2023 minimal count). The ratio is one horse for every six head of cattle during the active growing season. Since cattle are the primary grazer on the open range during this critical rangeland forage growth period, omission of quantification of this intensive grazing component in the EMZs, while focussing exclusively on wild horses, is a glaring omission.

7. Wild horse numerical thresholds proposed to determine population control measures appear arbitrary and not biologically defensible on a number of grounds. For one thing, documented natural horse population dynamics, including dramatical year-to-year populations oscillations, naturally occurring density dependent population regulating factors (predation, droughts, severe winters), and undocumented horse removals and human-caused mortality are not given enough consideration and credence in the 2023 AFHMF.

   Using horse counts for population and trend analysis as the primary ecosystem indicator to ascertain Alberta EMZ horse culls is also unreliable since EMZ horse numbers undergo large population oscillations, as has been reported in US wild horse herds. Also, there is now some evidence that the rate of free-ranging horse population growth declines markedly at high densities but increases at low densities.

   Since the more reliable “distance sampling” helicopter free-roaming horse survey method was adopted in 2019 to supplement minimal counts, AFAP now considers just using the previous minimal counts unreliable. This would have thus included the past horse counts that were used to justify the 2015 cull in the Sundre EMZ. Large herd oscillations from year to year were ascertained from the more reliable AFAP 2017-2022/2023 counts of overall Foothills EMZs and, separately, the Sundre EMZ. For example, the Sundre EMZ minimum horse counts increased by 53% from 661 to 1015 horses from 2017-2018. Such a rapid increase is questionable since it is more than three times the average annual herd growth rate of 15% and nearly twice the maximum growth rate of 30% reported in US herds. Numbers in the Sundre EMZ then decreased by 37% over the next years from 1015 to 642 horses in 2022. According to the 2023 AFAP survey, horse numbers then increased rapidly again to 969 horses, but this is in dispute since longer flight transects were done compared to previous years and an independent survey carried out by trained observers sponsored by several horse advocacy groups following the same 2023 flight transects (except for the extra AFAP area) showed a minimal count of 684 horses. In 2024, another independent survey of the Sundre EMZ, including the larger 2023 AFAP survey area, tallied 612 wild horses, while AFAP wild horse counts of the same area documented 839 horses, also indicating a decline. However, discrepancies between the two separate horse surveys of the same area using the same methodology are indicative of a wide margin of error in the survey methods and interpretations that are not given credence by AFAP.

8. My review of the Alberta winter radio-telemetry studies of wolf and mountain lion predation on ungulates found that, although cougar and wolf winter predation mortality on free-roaming horses was generally low compared to wild ungulates, the role these large predators contribute to top down population regulation should not be under-valued, including their potential for inflicting high foal mortality in some years. In one US wild horse preserve, mountain lion predation on foals was shown to regulate the population. In the Foothills winter wolf and cougar study areas, wolves accounted for about 3.7% loss of the wild horse population, and only 3.3% of the mountain lion ungulate kill sites examined were wild horse. However, that cougar predation focussed on young mares could weaken recruitment of fertile females to the population, thereby acting as a vector of population control. A global review of wolves preying on wild horses showed that this reduced attacks on domestic livestock. Grizzly bears have been documented feeding on wild horse carcasses and also pursuing wild horses and possibly killing younger ones.

Figure 6. Foothills wild horses use considerable energy in winter to crater through sometimes deep snow for buried dry forage in a variety of habitats when domestic cattle are off the range. Severe Arctic winter conditions that follow warming Chinook winds sometimes cause starvation situations and horse die-offs from heavy crusting and icing of forage supply. Elk and wild horses have considerable dietary overlap, although horses graze more on sedge. Hairy wild rye (*Elymus innovatus*) was 28% of the later winter diet (Jan-March) of free-roaming horses in the Sundre EMZ, rough Fescue was 25%, and sedge (*Carex* spp.) was 35% (Salter and Hudson 1979). Horses in winter also keep forage and watering areas open that benefit wildlife (Downer 2014). Image: Duane Starr photography.

Figure 7. Severe winter conditions weaken wild horses and make them more susceptible to predation by wolves and mountain lions. In winter, some family herds may aggregate into large numbers as a greater protection against wolf predation. Duane Starr photography.

9. As to the general concerns in the AFHMF for free-roaming horses competing with elk for limited food resources and causing elk population declines and/or predation by top predators on free-roaming horses increasing the numbers of top predators resulting in population declines of elk, a recent published study of 26 years of Alberta elk hunter harvest data showed the opposite is true and that elk numbers in the Foothills region have mostly increased along with increased populations of grizzly bears, wolves, and mountain lions. In other words, varying levels of predation by the known main predators of wild horses (wolves, mountain lions) on varying numbers of free-roaming horses on shared rangeland with elk appears to have had little or no influence on the elk population and hunter harvest over a quarter of century. This study disputes any concerns and inferences by Alberta government range managers that free-roaming horses may be having a measurable negative effect on elk populations, at least for the time being.

10. In terms of Foothills wild horse bloodlines, the Chief Scientist and 2023 AFHMF strongly erred by relying solely on a peer-reviewed university-level genetics study that was severely constrained by its small sample size (0.1 % of the study area wild horse population) while ignoring a genetics study done by Dr. Gus Cothran, one of the world's equine genetics experts, that used a much larger sample size (15.5 % of the study area wild horse population). Despite this, the AFHMF wrongly attributed the Foothills wild horses to be largely mixed breeds, including draft horses, while Dr. Cothran's research found that the Sundre EMZ core foundation population was mainly Spanish Iberian. Another study found the introduced time frame was the early-mid 1600s. Unfortunately, AFAP has no plans to re-categorize the Foothills wild horses as a unique re-introduced native species that evolved in the Fescue grasslands ecosystem before going extinct about 5,000 years ago, rather, continues to manage them as barnyard-type raised domestic horses under the archaic *Stray Animals Act*, which primarily serves cattle industry interests, not Foothills ecosystem integrity.

11. In conclusion, although the goal of the new 2023 Alberta Feral Horse Management Framework (AFHMF) is to maintain grassland/rangeland health and ecological integrity under the Alberta Stray Animals Act, the proposed management approach represents a narrow conservation paradigm that horses are a non-native alien species and the assumption that the free-ranging horse population will have negative impacts on the ecosystem and on other species and, therefore, must have periodic population reductions. This means that management decisions on the fate of the Alberta Foothills free-roaming horse population and on rangeland health are being made outside of the bounds of cumulative effects and within the confines of the agricultural-livestock rangeland management prescriptions with a focus on cattle livestock allocations, which favours a priority for sustaining commercially grazed cattle allotments on Crown Land that were granted a long time ago. Overall, free-roaming horse ecology and their long-term positive role in ecosystem functioning and health as a returned native species, as well as concerns for addressing other cumulative human-caused degradations to range and ecosystem health, are still playing only a limited role in management decisions by Alberta government range managers. In addition, the drastic removal of the wild horses would disrupt harmonious symbiotic mutualisms that have become established over numerous generations between horses and many species of plants and animals, as well as soils.

    The cumulative impact issues surrounding the significant Foothills rangeland health damage and loss of native grassland habitat and ecological integrity resulting from a host of historic and recent man-made influences and industrial developments will not be resolved by the controversial periodic culling or population control through use of immunocontraceptives of the Foothills horse populations, as proposed by the 2023 Alberta Feral Horse Framework. These cumulative impacts include but are not limited to the higher ratio (6) of allotment cattle relative to wild horse numbers during the growing season, increasing summer residency of migrant elk from Banff National Park, shifting predator numbers and pressures on different large grazing prey species, harsh

"starvation" winters, new roads and clearcuts, wildfires, shrub encroachment of meadow habitats, increased oil and gas development, existing and new trails from uncontrolled off-highway (OHV) use, climate-change induced droughts, and other factors.

In other words, why target and isolate the Foothills free-roaming horse population for controversial control measures when there is so little evidence supporting the contentions and assumptions in the 2023 AFHMF that they are a serious threat to rangeland health and ignore the other more significant threats?

Figure 8. Lower Williams Creek, Sundre EMZ. Clearcut replanted to jack pine with evidence of both free-roaming horse and domestic cattle use, yet the habitat appears healthy. The blue bucket has an artificial salt block placed by ranchers for their cattle, which also attracts free-roaming horses, elk, and deer that, collectively, cause some localized range trampling. W. McCrory photo.

Figure 8a. Grizzly bear family in Lower Williams Creek cleaning up the carcass of a dead horse. Grizzly bears have also been documented in pursuit of wild horses and there is some evidence they have been able to kill younger horses, including foals, but more study is needed. Darrell Glover remote camera photo.

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1.0 INTRODUCTION

Today, a fluctuating number of about 1,000-1,500 wild horses survive in the Alberta Foothills, comprised of the six designated Equine Management Zones (EMZs). Next to the BC Chilcotin wild horse population (2,800), this is the second largest wild horse subpopulation remaining in Canada and is, therefore, nationally important.

For well over a century, Alberta settlers with cattle interests along with government range managers have sanctioned near-successful eradication programs of Alberta Prairie and Foothills free-roaming horses using various methods, including bounty hunts, round-ups for sale at slaughter houses, World War needs, aerial hunts, horses for adoption programs, and other methods. Historians estimate many thousands of wild horses have been removed from the range. The last 1,200 that lived on the shortgrass prairies at Canadian Forces Base Suffield in Southern Alberta were removed by the military in 1994.

In recent times, Foothills free-roaming horse control programs have become increasingly controversial causing government range managers to attempt to develop more scientific and systematic approaches to managing wild horse numbers within what they consider levels that will not cause further range health degradation. In January 2014, Alberta ESRD (Environment and Sustainable Resources Development) issued three horse capture permits to ranchers allowing the removal of up to 196 free-roaming horses from the Sundre EMZ. The minimal horse count in the EMZ for the year leading up to the 2014 horse cull was 541 horses. In other words, the cull authorized the removal of about 36% of the Sundre horse population. This did not happen. In February 2014, during the removal efforts, a two-week protest was held near one of the capture pens. In the end, only 15 horses had been captured when the capture season ended on March 1. Some of the horses were sent for adoption and some to slaughter. The minimum count in 2014 after the small number of removals was 444 horses, indicating either survey error or a decline from natural and unnatural causes.

Some scientists and horse advocate critics of the government's feral horse management approach have claimed that most often the wild horses are blamed for habitat degradation of the Foothills ecosystem without sufficient evidence and documentation, while damage from free-range domestic cattle, OHV use, and industrial developments go unaccounted for. Additionally, critics point out that little effort has been made by the Alberta government to try to understand the role of the wild horse population in an ecosystem context or the influence and role of First Nations husbandry, ignoring historical documentation that shows First Nations were responsible for introducing the horse several centuries before European settlement (Taylor et al. 2023).

In 2015, on behalf of wildlife protection NGO Zoocheck, I carried out an independent technical review of the Alberta government's management of free-roaming horses in the six Foothills EMZs. This included an exhaustive review of the scientific literature, government reports, press releases, anecdotal accounts, and other sources. I made several written requests to Alberta Environment and Sustainable Resource Development (ESRD)

for relevant data, including evidence of range damage by free-roaming horses. I also did several days of field surveys in the Sundre EMZ to search for evidence of wild horse range and riparian damage and damage to habitats caused by other grazing species, off-highway vehicles (OHVs), and industrial development (logging and oil/gas) (McCrory 2015). On July 7, 2016, I attended with my client and other interested parties a presentation and follow-up discussion in Calgary on Alberta feral horse management by ESRD personnel (McCrory 2016, *In file*).

I concluded, both in my 2015 report (McCrory 2015) and in a July 20, 2016 follow-up letter to Mike Alexander, Acting Head, Range Resource Program (McCrory 2016, *In file)*, that much of the Alberta feral horse management policy and program was not evidence-based, lacked scientific rigour with many information gaps including lack of proof of range damage by free-roaming horses, deficiencies in population estimates and dynamics, inaccuracies of the history and origins of the Foothills horses, and other significant gaps. In some instances, ESRD's factual claims were not supported by available research and, in fact, were contradicted by a number of scientific studies available to their technical staff members. The head of ESRD finally admitted in an email to me that she could not point to any sites in the EMZs where confirmed horse-caused range damage occurred.

Since then, several other researchers have criticized the lack of scientific rigour and an evidence-based approach to Alberta free-roaming horse management, including a peer-reviewed paper in the *Journal of Rangeland Ecology and Management* that compared Alberta free-ranging horse management strategies to other jurisdictions (Zomorodi and Walker 2019), as well as a University of Saskatchewan graduate thesis (Boyce 2022).

The goal of my 2023-2024 review was to independently examine for scientific rigour and accuracy the new 2023 Alberta Feral Horse Management Framework (AFHMF) that the authors, Alberta Forestry and Parks (AFAP), claim is "science-based." This also includes a partial review of the five background reports on feral horses prepared by the Alberta Office of the Chief Scientist.

Hereafter, the 2023 Feral Horse Management Framework will be referred to as the AFHMF and Alberta Environment and Protected Areas (formerly Alberta Environment and Parks), which changed in 2023 to Alberta Forestry and Parks, will be referred to as AFAP. Since people often use rangeland and grassland interchangeably, I use grassland as a subset of rangeland to refer to habitats dominated by grasses and forbs, and rangeland to include all types of vegetation that are used by livestock and wild ungulates for grazing, including grassland, grazeable forest, shrubland, and wetland/riparian areas.

My review focusses mostly on the Sundre EMZ since it has the highest horse population of the six foothills EMZs, has in the past had controversial culls, and is also the one EMZ, according to the 2023 AFAP Feral Horse Management Framework, that currently has high enough numbers to trigger control measures.

2.0 THE STUDY AREA

The study area is the six Alberta Foothills Equine Management Zones (EMZs) (Figure 9). From north to south the EMZs are: Brazeau, Nordegg, Clearwater, Sundre, Ghost River, and Elbow River. The Elbow River Equine Management Zone, which includes a portion of Kananaskis Country, is the only one that is isolated from the others. Each of these zones is broken into District Units for the purposes of range allotments, range health assessments, and management plans. There are 36 cattle range allotments in the six EMZs supporting about 8,544 cattle.

Biogeographically, the Foothills are also known as the Parkland Natural Region, a remnant of the 50-million-year-old Rough Fescue grassland ecosystem, one of the most ecologically diverse grasslands in Alberta. Very little of the Alberta Foothills (1.2%) has any protection. It is a highly modified and fragmented multi-use landscape due to past cattle over-grazing (Willoughby 2001), industrial developments (oil and gas, clearcut logging), extensive OHV access, and invasive plant species, including deliberately introduced non-native plant species for the reclamation of disturbed areas. The Foothills region contains over 36,000 wells, numerous pipelines, and thousands of kilometers of seismic exploration roads/cutlines (Conservation Biology Institute 2007). A recent "state of the prairie" inventory of the Parkland Natural Region showed that only 20% of the native vegetation/features remain. Another 2% has declined since 1990-2010 (Prairie Conservation Forum 2019).

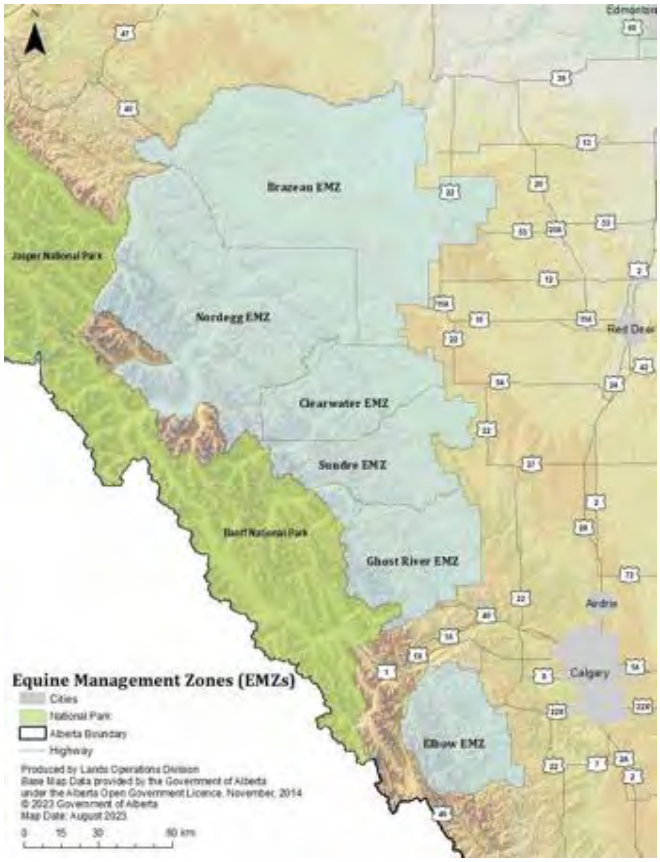

Figure 9. Alberta Foothills Equine Management Zones (AFAP 2023).

3.0 RESULTS AND DISCUSSION

Current Ecological State of the Foothills Rangeland

I agree with the AFHMF's concerns related to the ecosystem and rangeland health of the highly modified Foothills EMZs. Burkinshaw and Bork (2009) documented a 58% decrease of open grasslands over a 40-year period between 1958 and 1998 in an area of the Rocky Mountain Forest Reserve due to extensive shrub encroachment, which represents a significant reduction of grazing capacity for herbivores. A recent "State of the Prairie" inventory of the Parkland Natural Region, in which the six Alberta EMZs occur, showed that only 20% of the native vegetation/features remain, having declined by approximately 2% from 1990-2010 (Prairie Conservation Forum 2019). Unfortunately, this latter study does not make clear how much of this past and recent loss of native vegetation has been caused by clearcut logging, oil and gas development, off-highway vehicle (OHV) use, over-grazing by free-ranging horses, or cattle, or wildlife, and any other causative factors; nor are these causative factors, other than the potential from horses, addressed in detail in the 2023 AFHMF, which claims to use an ecosystem-based approach.

The following discussion covers the following 12 topics:

- Outline and approach of the 2023 Alberta Feral Horse Management Framework (AFHMF).
- Rangeland health and rangeland degradation. What are they?
- Evaluation of science-based information provided or claimed to be provided in the AFHMF and Office of the Chief Scientist feral horse management reports.
- 2023 AFHMF: How reliable is using AFAP annual free-roaming horse minimum counts to ascertain population control measures in the Foothills EMZs?
- 2023 AFHMF: Does the new framework adequately consider natural ecosystem horse population controls, such as predation?
- Are AFHMF population thresholds of free-roaming horse numbers leading to culls or other population control measures supported by hard evidence of damage to range health caused by horses (e.g., Sundre EMZ)?
- Does the AFHMF target include not only horse control measures but also other measures to improve rangeland health that address the numerous cumulative effects on the Foothills rangeland and ecosystem health?
- Do the AFHMF and Chief Scientist's feral horse reports include information on cattle numbers and address grazing impacts of cattle use conterminous with wild horse habitats?
- Are AFHMF and the Chief Scientist's concerns over impacts of Foothills free-roaming horses on ungulate populations valid?
- Are ancestry (genetics) and timeline of origins of Foothills wild horses accurately represented in the AFHMF and Chief Scientist's background report based on the latest peer-reviewed and non-peer-reviewed studies?

- Classification or misclassification? Are Foothills wild horses non-native feral livestock or a returned native wild species?
- Does the AFHMF and Chief Scientist's approach of restricting their "science" to only peer-reviewed publications and university graduate-level theses limit the scope and quality of the new feral horse framework?

3.1 Outline and Approach of the 2023 Alberta Feral Horse Management Framework (AFHMF)

3.1.1 2023 Alberta Feral Horse Management Framework (AFHMF) & Office of the Chief Scientist feral horse management reports

The 44-page 2023 Alberta Feral Horse Management Framework (AFHMF) was developed by the Alberta Feral Horse Advisory Committee (AFHAC) in cooperation with government staff members. The role of the AFHAC was to advise the government on culls and other population control methods. The Committee will also transition from being advisory to being responsible for implementation of the new horse management framework (plan) that claims to be "based on the best available science while considering the ecological integrity of their habitats."

The government-appointed AFHAC functioned from 2013-2017 and then started again in 2021 with a terms of reference from the province. It is comprised of representatives from public wild horse interest groups, ranchers, fish and game clubs, and government rangeland managers.

The Alberta Office of the Chief Scientist provides independent scientific advice to address complex environmental challenges and opportunities that the province faces. The Alberta Office of the Chief Scientist and researchers working on feral horse studies provide support to the Committee. In 2023, five different reports on feral horses were provided by the Chief Scientist's Office to the Committee, comprised of summaries of reviews of only peer-reviewed scientific literature on the following topics:

- Survey methods to monitor Alberta's feral horse populations
- Fertility control methods for feral horses
- Relationship of feral horses and coexisting ungulates
- Feral horse impacts on rangeland ecosystems
- Feral horse population dynamics and Alberta population trends

The fact that the Chief Scientist did not start to provide background science information on feral horses to the AFHAC until 2023 may be a result of past criticisms that Alberta's free-roaming horse management was not very evidence-based (McCrory 2015, 2016; Boyce 2022; Zamorodi and Walker 2019).

The 2023 AFHMF document proposes to use a "forage-availability approach" to set management thresholds for feral horses (p. 23) in order to "prevent degradation of Crown resources such as grasslands, wetlands, and native wildlife." The government framework

proposes that rangeland managers apportion the estimated rangeland forage supply in the six EMZs as follows:

a). Natural plant community requirements

b). Larger-scale ecosystem needs for other land uses and to meet the habitat and diet requirements of native species (e.g., elk), and to provide a buffer against drought, flood, or other environmental influences

c). Allocatable forage: palatable forage, such as grasses that can be sustainably removed by non-native species such as cattle, horses, etc.

Based on this approach, the 2023 Framework proposes three feral horse population threshold ceilings (1, 2, and 3) for each EMZ and, when threshold 2 or 3 is reached, control measures will be implemented to reduce herd numbers in order to *mitigate the environmental, social, and financial risks and costs associated with declining ecosystem health*. Population numbers are determined each year by winter helicopter "distance sampling" surveys to supplement minimum counts in select EMZs (AFHMF p. 30). Distance sampling was added in 2019, positing a more reliable approach.

Threshold 1: Horse population acceptable.

Threshold 2: Population level a concern. Different management actions are recommended to *reduce herd size* to avoid the risk of exceeding Threshold 2. The horse number for each EMZ for Threshold 2 *represents a population cap for the feral horse populations.*

Threshold 3: Population levels unacceptable. Immediate management actions to reduce herd size/density.

According to the AFHMF (p. 24), establishment of the Threshold 2 numerical population cap is based on a combination of four key indicators:

- Feral horse population levels and trends
- Assessment of ecological health
- Assessment of wildlife population levels and trends
- Assessment of forage utilization

My assessment of the 2023 counts and new thresholds indicates that one EMZ (Sundre) could be subjected to population control measures in the near future. Three of the six EMZs are at low population levels not requiring control measures (Brazeau, Nordegg, Clearwater) and, based on 2022 minimum counts, the Elbow EMZ also does not require control measures. One EMZ (Ghost) is between acceptable and concern.

This evaluation is based on the following. The Brazeau EMZ (N=18) is at the acceptable Threshold 1; Nordegg EMZ (N=33) is below Threshold 1, and Clearwater EMZ (N=97) is near Threshold 1. Based on the 2022 minimal count, the Elbow EMZ (N=84) is just at Threshold 1. Based on the 2023 minimal count data, the Ghost River EMZ (N=311) is 85 animals above Threshold 1. The Sundre EMZ (N=969) exceeds acceptable Threshold 1 by 341 animals and is near Threshold 2 (requiring control). However, as will be seen from my evaluation later in my report, the AFAP 2023 count of 969 is questionable since it

represents a population increase from the previous year that is beyond the 30% maximum annual reproductive capacity of feral horse populations and is contradicted by an independent survey using the same survey methods and flight lines that found fewer numbers.

On the surface, the population threshold method appears to be a reasonable, science-based approach to prevent damage to rangeland health from what is assumed to be caused by over-grazing by too many free-roaming horses. How science-based is the new Framework threshold approach and the aerial survey methods used to ascertain the thresholds? Is the 2023 AFHMF assumption correct and science-based such that once horse numbers reach certain levels they will cause range health damage if not controlled? Will periodically controlling horse numbers resolve rangeland health issues over the long term?

3.2 Evaluation of Science-Based Information Provided or Claimed to be Provided in the AFHMF and Office of the Chief Scientist Feral Horse Management Report

Do the 2023 AFHMF document and Office of Chief Scientist's five feral horse background documents include all of the relevant background information they claim to provide in order to make sound, science-based management decisions? My review found the answer is NO; only partially available information is provided for reasons that are not understood.

While the Alberta government has made recent noteworthy progress to adopt a more systematic, science-based approach to management of the Foothills free-roaming horses, in some cases my review found only half-measures have been taken to attempt to create a robust, credible science-based framework. Deficiencies include a number of information gaps, including a failure to review and include all available information on horse genetics and origins, including valid non-peer-reviewed studies; a general lack of quantified evidence from the EMZs that horses are responsible for the deterioration of, or are a threat to, rangeland health at past and current population levels, and a lack of providing "science-based" evidence of variables on carrying capacity, ecological health, wildlife population levels and trends, and forage utilization claimed to have been used to determine EMZ horse population threshold levels that would trigger control measures.

Such a lack of scientific rigour in some aspects of the AFHMF indicates that management is still skewed exclusively towards targeting the control of wild horse numbers, while there is no inclusion of control or remedial measures for reducing or restoring range damage documented in Rangeland Health Reports caused by cattle, OHV use, oil and gas development, and clearcut logging. These are not analyzed or included in the Framework, which, to be effective from an ecological integrity perspective, should represent an overall, cohesive ecosystem-based approach addressing all cumulative effects and measures for grassland/riparian habitat restoration instead of targeting only the culling of wild horses.

While the five feral horse background reports by the Chief Scientist provide a fairly comprehensive scholastic review of peer-reviewed scientific literature from many countries, my review concluded that, because of information gaps and partial conclusions that omitted key field evidence from relevant published and unpublished works, these

background documents would lead one to conclude that Alberta free-roaming horses are bad for the grassland ecosystem, despite the species having evolved in North America and representing many ecosystem benefits. For example, one major information gap involves the Chief Scientist's Office limiting their review to peer-reviewed feral horse studies across the globe, while ignoring available Alberta reports that pertain to the health of the Foothills free-roaming horse equine management zones (EMZs), such as Rangeland Health Reports. Another major information gap involved limiting science background reviews to only the impacts of feral horses and not to other significant human influences that impact Foothills grassland ecosystems, including cattle, OHV use, oil and gas development, and clearcut logging. I also found a citation that involved quoting the Salter and Hudson (1979) Foothills range research pointing out that "risks of adverse effects of grazing by feral horses is likely greatest in grasslands that experience heavy use" while omitting key information and context from Salter's research that found very little evidence that free-roaming horses were actually causing range damage. Because of these academic limitations, the Chief Scientist reports cannot be considered fully "state of current knowledge."

My conclusions of the conservation-oriented and evidence-based deficiencies in the 2023 Alberta Feral Horse Framework and the Alberta Office of the Chief Scientist's five feral horse background documents, despite some improvements in an attempt to be more science- and ecosystem-based, are consistent with the findings of other independent researchers who have previously examined Alberta's feral horse management (Boyce et al. 2021, Boyce 2022, and Zomorodi and Walker 2019). A published paper (Boyce et al. 2021), which reviewed free-ranging horse management in New Zealand and Canada (including Alberta), concluded that:

> *Seldom in Canada and New Zealand have data been sought that fully assess the role feral horses play in ecosystems, consider whether those roles might be neutral or even positive regarding ecological resilience and biodiversity, or understand the impact of their removal. Instead, much of the research has been framed around a conservation paradigm that non-native horses will have negative impacts on ecosystems and other species. Our research experiences to date in the regions we have studied feral horses highlight a general lack of scholarly interest in research extending beyond population control or quantifying negative impact, and feral horse ecology plays a minor role, if any, in decision-making processes (Bhattacharyya & Murphy 2015, Boyce et al. 2021, Linklater et al. 2002).*

3.2.1 2023 AFHMF

According to the AFHMF (p. 24), establishment of the Threshold 2 numerical limit is based on a combination of four key indicators:

- Feral horse population levels and trends
- Assessment of ecological health
- Assessment of wildlife population levels and trends
- Assessment of forage utilization

However, other than feral horse population data, **no** background data or information is provided in the "science-based" AFHMF document about ecological health, wildlife populations, and forage utilization indicators. This is a glaring omission of key evidence that is difficult to understand when the report is alleged to be science-based.

The AFHMF document (p. 21) claims that government rangeland managers apportioned the estimated rangeland forage supply in the six EMZs for natural plant community requirements, large-scale ecosystem needs, and allocatable forage for non-native species (cattle, horses, etc.). The framework (p. 23) also claims to have "developed a generalized landscape scale carrying capacity for non-wildlife grazers (cattle and feral horses) and that forage availability estimations also capture forage provided by cutblocks" and then also claims that "draft carrying capacities are provided in this plan." However, while this would appear to be a comprehensive approach, other than generalizations, **no** quantification by way of datasets or maps are presented in the Framework plan on forage carrying capacity, including that provided by cutblocks and the wetlands/bogs that are used by wild horses in the winter when the ground is frozen, while in the growing season many of these wetlands/bogs are too wet to support large herbivores.

Carrying capacity is determined from data acquired through range surveys, ecological classification, reference sites, grazing and forage growth studies, and long-term monitoring of rangeland health compared to historic stocking rates. This includes mapping of ecological units (Alberta Sustainable Resource Development, Public Lands and Forests 2004). However, according to a review by Willoughby et al. (2005) there is little information on forage productivity of Alberta vegetative communities used for grazing that would foster the formulation of reliable and non-detrimental carrying capacities for the main grazing species in the Foothills. According to this 2005 government rangeland review:

> *…there is little data on the levels of utilization which are detrimental to a plant community's health. Traditionally, these community types have been rated at 5 ac/AUM or 60 ac/head/year, but recent work has shown that productivity can vary significantly depending upon the ecological conditions of the site.*

Unless things have changed since then, it is hard to imagine, if, as the above-mentioned Alberta published study shows, there is little data on the levels of utilization detrimental to the health of plant communities (underlined for emphasis), how was AFAP able to ascertain reliable and rigorous carrying capacities to determine population threshold levels of free-roaming horses for culling and other control purposes? As already noted, AFAP does not provide this information in the science-based Framework.

3.2.2 Rangeland health and rangeland degradation. What are they?

One limitation of the 2023 AFHMF is that no definitions of rangeland health and rangeland degradation are provided, leaving interpretations of the current grazing status range habitats open to subjectivity and debate. According to an expert rangeland review, widely different environmental conditions and impacts of multiple disturbances makes rangeland

health difficult to define. Some rangeland managers use the climax model for plant communities that may never have existed or without knowing what a climax community consisted of. Another model uses multiple steady states where managers expect to see any number of ecologic states and where "rangeland health" is not dependent on the existence of a specific type of plant community. This model incorporates change as a component of ecologic health where the range manager strives to achieve or maintain rangeland health and where the ecologic definition of health depends on relatively 'recent' environmental conditions and the current mix of plants in the community (Encyclopedia of Soils in the Environment 2023).

3.2.3 Chief Scientist's five feral horse background reports

I carried out only a partial review of the Alberta Office of the Chief Scientist's (Alberta Environment and Protected Areas EPA) five 2023 "state of current knowledge" background reports on feral horses (ecological impacts on rangeland ecosystems, population dynamics/trends, fertility control, survey methods, and relationships to ungulates) that support the work of the Feral Horse Advisory Committee. Although these reports in general provide a useful scholastic review, I found their value somewhat limited for the following reasons:

a) Limiting their review to peer-reviewed publications to the exclusion of key available and relevant information in various documents produced by professionals that were not peer reviewed, thereby not presenting a more balanced and comprehensive dataset. These include but are not limited to:

   - Excluding a genetic study of Sundre EMZ free-roaming horses by world-recognized genetics expert Dr. Cothran, which had a much larger credible sample size than a university study by Christina Tollett that the author claimed had too small a dataset to be used to draw conclusions (See section 3.0).
   - Excluding a detailed analysis of many years of available Rangeland Health and Riparian reports.
   - Including a review of the global impacts of feral horses focused on documented negative habitat impacts to the exclusion of available research that demonstrates the value of free-roaming horses to ecosystem functioning and health.

b) Quoting material out of context: A citation that involved quoting the Salter and Hudson (1979) Foothills range research pointing out that "risks of adverse effects of grazing by feral horses is likely greatest in grasslands that experience heavy use" while omitting key information and context from Salter's research that found very little evidence that free-roaming horses were causing range damage.

c) Failing to research positive contributions of wild horses to the Foothills ecosystem (see Downer 2015). This also includes the role that equids play in carbon sequestration and mitigation of climate change (Downer 2023). See also Hewins et al. (2018) and Lysing (2016). This includes a world-wide review of wolves and free-ranging horses that

concluded that grazing helps control plant biomass and reduces the risk of wildfires as well as providing a stable food source for large predators, which in turn reduces wolf attacks on economically valuable livestock such as cattle (Freitas et al. 2021).

3.3 2023 AFHMF: How Reliable is Using AFAP Annual Free-Roaming Horse Minimum Counts to Ascertain Population Control Measures in the Foothills EMZs?

Problems with using horse population threshold levels

In the following discussion I show that using annual horse count thresholds to determine horse control measures is an unreliable method since horse populations, if left unmanaged, naturally undergo quite dramatic population oscillations for reasons that are not fully understood. Free-ranging horse population growth may also decline markedly at high densities but increase at low densities. These dramatic population year-to-year variations include wild horse populations in the US where, other than mountain lions (and in some areas black bears), the other large predators, wolves and grizzly bears, which are known to prey on wild horses, have been eradicated. In addition, the distance sampling aerial survey approach used to supplement minimum counts relies on certain assumptions which could prove problematic in a complex landscape like the Parkland Natural Region, which has been severely modified by human use. Double counting is also not taken into account and addressed as a possible error. Nor are undocumented removals by humans and human-caused mortality taken into account (Downer 2105).

According to my 2015 analysis of the Alberta government's previous annual counts of minimal free-roaming horse numbers in the six EMZs, I concluded that the survey methods had a wide range of error that limited the value of annual counts in making management decisions based on population trends, including the implementation of controversial wild horse culls (McCrory 2015). This was finally acknowledged by AFAP in 2019: p*rior to 2017…the information collected cannot be effectively used for population trend and density analyses* (Alberta Environment and Parks 2019. Eds. Note: After posting this statement, it later disappeared). In other words, in 2014 the government used what they now consider to be unreliable counts to approve a cull of 193 horses, or 36% of the wild horse population from the Sundre EMZ (in the end only 15 horses were removed).

Since 2017, the government has attempted to adopt a more science-based approach to estimating horse numbers and population trends. In 2019, they shifted the annual horse minimum helicopter counts to the "distance sampling" method (Alberta Environment and Parks 2019) to supplement minimum counts in certain EMZs (AFHMF p. 30). The counts are used to statistically estimate horse density (# horses/km^2). The other change in relation to the government's attempt to systemize more reliable horse counts was for the Office of the Chief Scientist in 2023 to provide the Alberta Feral Horse Advisory Committee with two background reports on the subject: one related to feral horse population dynamics and Alberta population trends (Alberta Office of The Chief Scientist 2023c) and the other on survey methods to monitor Alberta feral horse populations (Alberta Office of The Chief Scientist 2023e).

According to the Alberta Chief Scientist review of current knowledge of feral horse population dynamics and population trends (Alberta Office of The Chief Scientist, 2023c), free-roaming horses across the western US have annual growth rates between 5-30% (Wallace et al. 2021, Wolfe 1986). Wolfe (1986) considers 15% a more realistic average growth rate from most North American wild horse populations. These reproductive rates are in arid or semi-arid ecosystems, where two of the original large carnivores, the grey wolf and grizzly bear, have been extirpated.

Noteworthy is that free-roaming horses also have population dynamics characterized by large oscillations with steep increases followed by large, potential crashes compared to other ungulates. This is likely because of their higher fertility and survival rates together with reproduction at the expense of maternal survival relative to males. There is also now some evidence that the rate of free-ranging horse population growth declines markedly at high densities but increases at low densities (Grange et al. 2009).

These dramatic free-ranging horse population oscillations are reflected in some years in the recent AFAP helicopter minimal horse counts for the six Foothills EMZs, including Sundre; keeping in mind, as noted previously, that AFAP now considers the regular minimal counts prior to and including 2017 not useful for determining population trends as variations between surveys, such as visibility of horses and differences in survey flight paths, may account for some of the number shifts and not actual variations on population numbers.

The following summary tables were obtained from the Feral Horse Advisory Committee by Darrell Glover (pers. comm.).

Equine Zone	2018	2019	2021	2022	% of 2018 numbers
Brazeau	8	16	0	0	0.0
Nordegg	53	114	39	20	37.7
Clearwater	143	101	118	79	55.2
Sundre	1015	981	763	642	63.3
Ghost	371	379	313	353	95.1
Elbow	122	88	81	84	68.9
TOTAL	**1712**	**1679**	**1314**	**1178**	68.8

Equine Zone	2013	2014	2015	2016	2017	2018	2019	2021	2022	% change 2013-2022
Brazeau	48	9	na	4	0	8	16	0	0	0.0
Nordegg	83	80	na	19	36	53	114	39	20	24.1
Clearwater	69	51	na	45	110	143	101	118	79	114.5
Sundre	541	448	474	544	661	1015	981	763	642	118.7
Ghost	173	242	171	187	316	371	379	313	353	204.0
Elbow	66	50	64	55	79	122	88	81	84	127.3
TOTAL	**980**	**880**	**709**	**854**	**1202**	**1712**	**1679**	**1314**	**1178**	120.2

Sundre EMZ horse counts from 2017-2024

Annual counts constitute only one element of information gathering to determine population thresholds, the limitations of which should have been clearly spelled out in the AFHMF document.

Not only are there limitations in the counting methods themselves, but there are also major pitfalls in their interpretation, suggesting a wide margin of scientific error. For example, from 2017-2018, AFAP minimum horse counts for Sundre EMZ increased by 53% (661 to 1015 horses = +355 horses), which is nearly twice the average reproductive rate reported in US herds (Wolfe 1986). However, from 2018-2019, counts appeared stable with only a small decline of 3% from 1015 to 981 horses (-34 horses).

Another researcher (Boyce 2022), using an entirely different methodology (remote camera detections and space-to-event (STE)) for a horse density model for the Sundre EMZ from 2017-2019, found that abundance estimates were similar to AFAP minimal counts, except for 2017. Unlike the AFAP results of a small decline from 2018-2019, Boyce (2022) estimated a decline of 14%.

The decrease continued west of Sundre through 2019-2021 (no AFAP count was done in 2020) from 981 to763 horses (-218 horses = 22%) and through 2021-2022 down to 642 horses (-121 horses = 19%). In 2022, Help Alberta Wildies Society (HAWS) and Zoocheck carried out a helicopter monitoring survey using the same flight transects and counted 659 horses, very close to the AFAP results.

Another example of discrepancies in interpretation of the surveys are the 2023 AFAP horse counts, which increased dramatically to 969 horses from the previous year, a sudden increase of +327 horses or 34%, higher than the top increase of 30% recorded in US horse populations by Wallace et al. (2021). Additionally, there is now some discussion concerning the discrepancy between the 2023 AFAP 969 horses and the independent NGO Help Alberta Wildies Society (HAWS)/Zoocheck helicopter monitoring surveys that flew the same flight transects and found 684 horses (606 adults, 78 subadults). While the HAWS/Zoocheck 2023 aerial survey followed the same 2022-2023 main flight paths as the AFAP, it did not cover the added area that AFAP flew where few horses were located. If the HAWS/Zoocheck surveys are the most accurate, the horse numbers may not have increased very much in the Sundre EMZ from 2022 to 2023 and, in fact, are much lower than the minimal count by AFAP of 1015 horses in 2017.

In 2024, another HAWS/Zoocheck independent survey, including the larger 2023 AFAP survey area, tallied 612 wild horses, a decline from the past two years. The 2024 AFAP wild horse count for the Sundre EMZ in January-February found 839 horses (Feral horse management Alberta.ca), also reflecting a decline from their 2023 results. However, the large discrepancy of 227 horses between the 2024 NGOs independent count and the AFAP results again indicates a wide margin of error in the survey methods that is not being factored into AFAP's use of population counts to determine thresholds for culls. Despite these obvious limitations and questions about the AFAP survey methods, they still used

the 2024 counts to categorize the Clearwater and Elbow EMZs in the "red zone", meaning culls are being considered.

Foothills EMZ horse counts from 2017-2022

Overall, minimal counts of all of the EMZs more or less followed the dramatic oscillations as the Sundre EMZ. From 2017-2018, horse numbers increased by 53% from 1,202 to 1,712 horses (+510 horses), then decreased from 2018-2019 by 3% from 1,712 to 1,679 horses (=-33 horses) and then underwent a larger decrease of 22% from 2019-2021 (1,679 to 1,314 = -365 horses), decreasing again the next year by 19% from 2021-2022 (1,314 to 1,178 = 136 horses). In 2024, counts of only the Elbow, Ghost, Sundre, and Clearwater EMZs tallied 1,478 horses (Feral horse management Alberta.ca).

Although undergoing the typical quite dramatic population oscillations since 2017, horse numbers in the EMZs over the past five years appear relatively stable. I would also agree with the Chief Scientist's analysis of Foothills EMZ minimum count data from 2013-2021 that, due to survey methodology, no trend analysis is possible (p. 4 Alberta Office of the Chief Scientist, 2023c). In fact, in the past, the AFAP had predicted that the number of wild horses would go up exponentially if culling stopped, yet even though there has been no culling since 2015, there has been little increase and no hard evidence that horses are "outstripping the ecosystem" as AFAP had predicted.

These high population oscillations of the Foothills free-roaming horses, known to characterize wild horse population dynamics compared to other wild ungulates, raise the question of the accuracy and usefulness of using annual horse minimal counts to determine if population control measures are necessary or not, since rises and declines occur naturally (see Figure 10 on next page).

3.4 2023 AFHMF: Does The Framework Adequately Consider Ecosystem Contributing Natural Horse Population Controls Such As Predation And Severe Winters?

The AFHMF (p. 11) raises a concern that, although the Foothills free-ranging horse population has the potential to disrupt natural predator-prey relationships is not fully understood, horse-large carnivore relationships may have "unintended consequences on ungulate populations, such as elk and deer." The Chief Scientist (2023a) points out the same concern; i. e., that free-roaming horses can lead to an increase in wolf numbers, for example, which **c**ould increase the "spillover" predation risk to other ungulates. The Chief Scientist points out that free-ranging horses in some parts of the Foothills now comprise an ungulate biomass (kg per km^2) capable of supporting 10 wolves/1,000 km^2 citing Boyce and McLoughlin (2021). Similar concerns are raised by Boyce and McLoughlin (2021), who also point out that more research is needed on the topic.

Given that in some wild horse ranges in the US, mountain lions are known to control the horse population (Turner et al. 1992), it is surprising that the AFHMF and Chief Scientist barely mention predation and mostly in the negative context of how predation on horses might have "consequences on…deer and elk." In other words, their general lack of

investigating the possibility of large carnivores contributing as vectors of some population control of the Foothills horses presents a somewhat one-sided viewpoint lacking a balanced, evidential context.

Fortunately, Alberta has the rare status of having had previous studies of both radio-collared wolf and cougar predation on free-ranging horses and wild ungulates. My review of these studies found that, although cougar and wolf winter predation mortality on free-roaming horses was generally low compared to wild ungulates, the role these large predators contribute to top down population regulation should not be undervalued, including their potential for inflicting high foal mortality in some years.

The following discussion draws largely from my previous report on Foothills horse management (McCrory 2015, 2016).

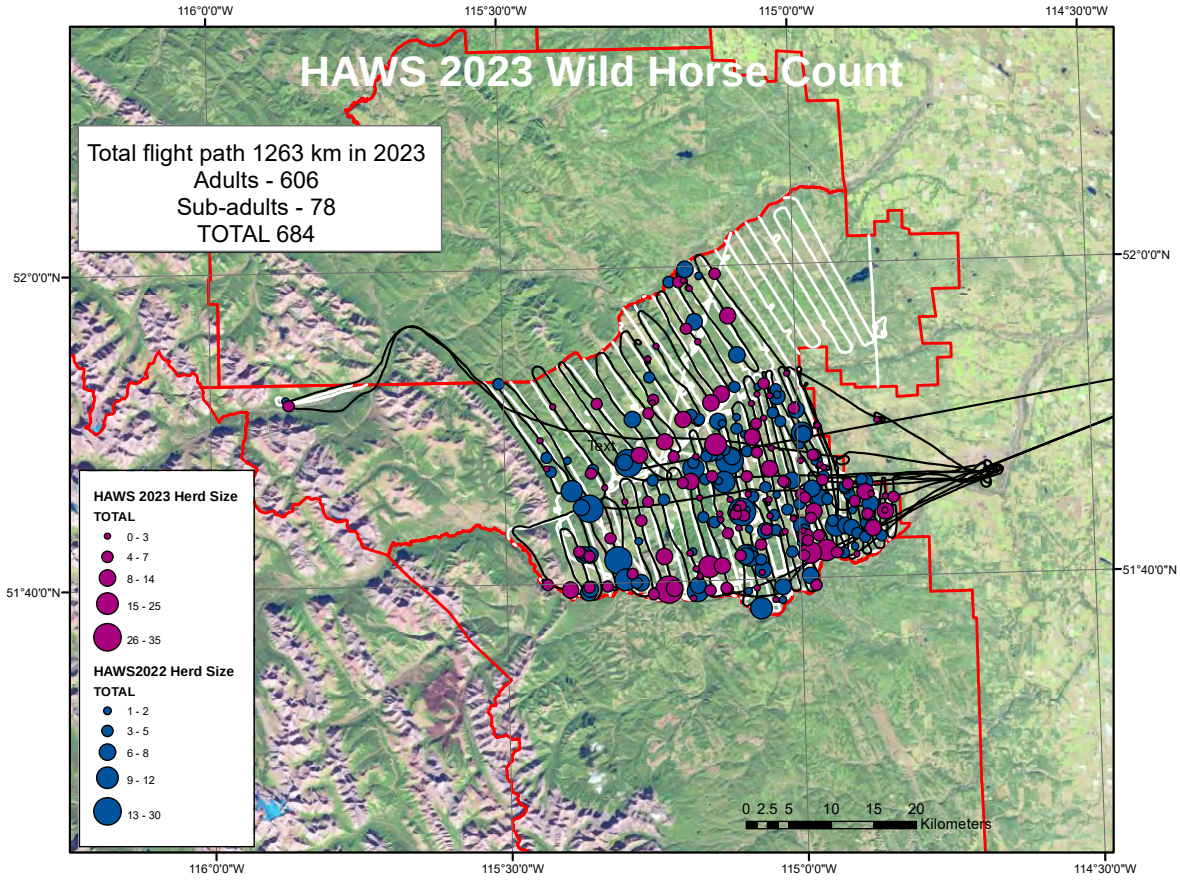

Figure 10. Help Alberta Wildies Society (HAWS)/Zoocheck 2023 helicopter flight paths in Sundre EMZ that had a minimal count of 684 horses, including 78 subadults.

3.4.1 Grey Wolf predation

According to a world-wide review of wolves and free-ranging horses (Freitas et al. 2021), wolf predation on wild horses reduces attacks on economically valuable livestock, such as cattle. In an ecological context, wolf-horse interactions have essential roles in trophic webs and ecosystem functioning. Wolf predation controls horse abundance, promoting habitat heterogeneity and preserving plant and animal diversity, as documented for other carnivore-prey systems (Ripple et al. 2014).

Although the grey wolf, considered a keystone predator, is among the more prolifically studied large carnivores, only recently have researchers been able to provide high quality descriptions of year-round predation patterns thanks largely to radio-telemetry combined with GPS technology (Sand et al. 2008). For North America, only in western Canada do wolves still cohabit free-ranging horse ecosystems where their predation on horses has been documented (Alberta Foothills: Webb 2009; BC West Chilcotin: Parr 2018, Parr and McCrory 2022).

In the West Chilcotin, a wolf diet study (Parr and McCrory 2022) found that horses were the most frequently consumed prey food and that wolves, as a keystone species, may be contributing as a top-down vector on wild horse population size. In addition, cattle utilization appeared very limited (Parr 2018). The low incidence of cattle in the diet of West Chilcotin wolves versus the much higher incidence of wild horse consumption verified the above-mentioned Freitas et. al (2021) conclusion that wolves preying on wild horses reduces attacks on livestock.

A detailed study in the Alberta Foothills that used wolves from eleven packs fitted with GPS collars to radio-locate ungulate kill sites also documented some predation by wolves on wild horses (Webb 2009). The large 22,994 km^2 Foothills study area west of Rocky Mountain House included a number of EMZs. The researcher estimated winter populations of 9,300 deer, 4,274 elk, 4,715 moose, and 749 free-ranging horses. A total of 192 sites were examined where ungulates had been killed by members of the different packs in 2003-2006. Of these sites, 7% were horses (i.e., 14 horses). The other kills were wild ungulates (53% deer, 24% moose, and 17% elk). When converted to biomass (amount of meat/animal) the importance of horses in the diet of wolves increased: deer represented 22%, elk 23%, moose 43%, **and free-ranging horses 12%** of the total prey biomass killed by wolves over the three study winters (in terms of biomass, the horse rates as the largest prey species).

Extrapolating the horse kill rate to the 32 packs (minimum population estimate of 286 wolves and average density of 12.42 wolves/1000 km^2) that the researchers estimated were in their study area, wolves would have killed a total of 42 horses over the three winters. Assuming the kill rate in the spring-summer-fall period (including foaling) was the same, wolves would have killed about 84 horses over three full years, or 28 horses/year. This accounted for about 3.7% of the estimated Foothills wild horse population of 749 individuals in the study area.

It is obvious from this data that, while wild ungulates (deer, elk, and moose) constitute the bulk (88%) of the large mammal biomass consumed by wolves in winter in a multi-prey species-wolf ecosystem compared to the horse, the role of wolf predation as a top down vector of horse population control, when combined with other top down mortality factors (cougar and bear predation, starvation winters, etc.), cannot be ignored. In addition, wolf (and cougar) predation on foals could be significant, although that has never been quantified in the Foothills EMZ.

Unfortunately, Alberta has an aggressive wolf control program involving a bounty system of upwards of $500 per wolf. In February 2015, the program came under criticism by the International Union for the Conservation of Nature (IUCN) (http://globalnews.ca/news/1142366/scientists-criticize-alberta-wolf-bounties/). The province is also one of the few left in Canada that allows strychnine to be used, which also impacts a significant number of other species. Combined wolf mortality from all causes in Alberta is very high (Sadie Parr pers. comm.).

3.4.2 Cougar predation

Although mountain lion (aka cougar) predation on foals was shown to effectively regulate a free-roaming horse population in the Montgomery Pass Wild Horse Territory on the central California-Nevada border during 1986-1991, a period characterized by low to no human hunting of mountain lions in the region (Turner et al. 1992), a study in the Alberta Foothills north of the Bow River found only limited predation and feeding on free-roaming horses by mountain lions (Knopff et al. 2010). The study area (16,900 km^2) covered a number of EMZs from the Bow River north to Rocky Mountain House, overlapping somewhat with Webb's 2003-2006 wolf radio-telemetry study area. Alberta had a bounty system on cougars from 1933-1964. Today, cougars appear fairly heavily hunted and trapped in the equine zones.

The Alberta study used data from 24 radio-collared cougars (15 adult females, 5 adult males, 3 subadult females, and 1 subadult male) captured during the winters of 2005-2007. The cougars were monitored closely between 1 December 2005 and 18 August 2007 using a combination of ground and aerial telemetry for as long as each collar remained active. The study found that of the 637 kills >8 kg found at GPS location clusters, 468 (73.3%) were deer, 47 (7.4%) moose, 38 (6.0%) elk, 21 (3.3%) feral horses, and 63 (9.9%) other prey (primarily non-ungulate). Wild ungulates made up most prey in both relative frequency (84%) and biomass (96%). As with wolves, deer were the most prevalent ungulate (frequency = 64%, biomass = 51%). Of the cases where the researcher could distinguish deer species (n = 541) white-tailed deer dominated (68%). Most ungulate prey were either young of the year (43%) or adults (45%), with yearlings making up the remainder. Cougars tended to kill younger animals, especially when preying on the two largest ungulate prey species, horses and moose. Nearly all predation on these species (86%) involved animals less than 2 years old.

The study also found that female horses were the primary prey before, during, and after the foaling period, whereas male horses were the main prey during the fall (September to November) The cougar predation on young mares weakens recruitment of fertile females to the population thereby acting as a vector of population control.

The data translates to 21 free-roaming horses known to have been winter-killed over 2.6 years between December 2005 and 18 August 2007 by 24 radio-collared mountain lions, with some of the lions only radio-collared in 2006-2007. What is not known is how many horses were killed in the same study area by the unstudied component of the cougar population that were not radio-collared, making it difficult to ascertain what the overall cougar predation rate might have been on the resident wild horse population.

The study concluded that:

> *…although cougars are capable of killing prey as large as adult moose and feral horses, prey of this size were rarely taken (<2% of prey weighed >400 kg). Most moose and feral horses killed by cougars (74%) were juveniles, and all cougar age-sex classes killed a higher proportion of large ungulate species (i.e., adults >200 kg) in summer when smaller juveniles were available ... feral horses, which were killed only by male cougars during winter, preference increased with cougar body size.*

The author also concluded that:

> *…kill rate estimates indicate that adult cougars are highly effective predators, killing at rates at the upper end of those recorded for wolves in both frequency and biomass (Peterson and Ciucci 2003, Sand et al. 2008, Webb 2009).*

The Alberta cougar management plan (E & P (ESRD) 2012) notes that studies have revealed that individual cougars may also specialize on a particular prey species, including some in west central Alberta that specialized on free-roaming horses. That being said, although the Alberta cougar study showed, as with wolves, a low rate of predation on free-ranging horses compared to wild ungulates, the contributing role of these two apex predators to horse population regulation should not be undervalued, including their known potential in some years to prey heavily on foals (Turner et al. 1992). In addition, herd monitoring in the US Pryor Mountains Wild Horse refuge showed that mountain lions (or/and black bears) killed 24 of 28 foals known to be born in 2004 (The Associated Press 2004). A radio-telemetry study of cougar predation 7-8 years later showed no cougar predation on wild horses (Blake et al. 2016), indicating that cougar predation on foals and wild horses can vary considerably from year to year.

3.4.3 Black bears and Grizzly bears

Various studies indicate that both grizzly and black bears are well known for being opportunistically predaceous on ungulates. In some regions they are known to seek out ungulate birthing areas in spring and prey on newborns. While both bear species have been recorded feeding on wild horse carcasses in the Foothills, their horse predatory role is not

well understood. There have been several instances documented of grizzly bears chasing wild horses west of Sundre.

Black bears

Radiotelemetry studies show that black bears exert a strong influence on the recruitment rate of some ungulate populations (Horstman and Gunson 1982). Between 1974-79, compensation was paid on 541 approved black bear-livestock compensation claims in Alberta, in which cattle accounted for 81%. Most of the cattle killed were calves (71%). Twenty-five percent of all claims occurred on grazing leases on public lands in the forested part of the province (Horstman and Gunson 1982). This would have included some of the now designated equine management zone areas.

I was unable to locate any black bear diet studies in the Foothills equine zones. However, knowing the efficiency of this species as a predator, they likely play a role in causing some mortality to free-roaming horse populations in the Foothills.

Grizzly bears

All Alberta Rocky Mountain and Foothills grizzly bear studies have shown that ungulates are consistently eaten by grizzly bears, primarily in spring (Kansas 2002). In our Brittany Triangle study area in the BC Chilcotin, there have been a number of observations of grizzly bears feeding on dead wild horses, although it was not ascertained if the bears killed the horses first or if they were scavenging on animals that had died from other causes.

Although I was unable to find any data regarding Foothills grizzly bears eating horses, knowing the efficiency of this species as an ungulate predator, I am not convinced that they don't play a role in causing some mortality to free-roaming horse populations in the Foothills equine zones, given that grizzly bear predation on elk calves has increased in recent years thereby reducing elk recruitment (Griffin et al. 2011).This warrants further review.

3.4.4 Density-dependent factors—Starvation winters and droughts

According to a review of free-roaming horse management by the BLM in the US by the National Research Council of the National Academies (2013):

> *The primary way that equid populations self-limit is through increased competition for forage at higher densities, which results in smaller quantities of forage available per animal, poorer body condition, and decreased natality and survival.*

Climate in the Foothills is severe in winter punctuated by short warming Chinook periods that are followed by freeze-up of melted snow leading to periods of difficulty for wild horses and grazing wild ungulates to crater for iced-over graminoids and sedges, their main winter forage. As noted by Salter and Hudson (1979), nutritionally stressed free-roaming horses can be predisposed to starvation under deep snow and severe weather conditions. The authors also noted that *large die-offs have been documented along the Alberta Foothills and in interior British Columbia by Forest Service Personnel*. The authors also noted that in the absence of long-term data in their Alberta Foothills study area, the

importance of nutritional stress in regulating population levels could not be determined and recommended more research was needed. I would agree.

According to Bailey (et al. 2010), a severe but short-term drought in Alberta from 1999 to 2002 caused a significant reduction in forage and pasture production in the Parkland Fescue ecoregion (Aspen Parkland). I could find no reference in AFAP information and other documents as to what effect this drought might have had on free-roaming horse population survival in the Foothills Fescue grassland ecosystem.

3.5 Are AFHMF Population Thresholds of Free-Roaming Horse Numbers Leading To Culls Or Other Population Control Measures Supported By Hard Evidence Of Damage To Range Health Caused By Horses (e.g., Sundre EMZ)?

While existing concerns for rangeland health by AFAP range managers for a highly modified Foothills ecosystem are valid from not only sympatric large grazing species (cattle, free-roaming horses, and elk) but from invasive plant species, oil, gas, and forestry development, extensive road networks, and OHV use, I found the AFAP's setting of EMZ free-roaming horse population thresholds leading to control actions lacking in hard evidence that horse numbers higher than the threshold have or would cause rangeland health damage.

Equally confounding is the so-called evidence claimed in the past by government range managers that the free-roaming horse population poses a serious threat to grassland ecosystem health and has been responsible for past range degradation. Evidence is not only seriously lacking but is generally based on unfounded claims, inferences, and unquantified assumptions. In my review of the following documents, I found that Alberta Foothills free-roaming horses appear to be responsible for very little range health deterioration in three of the Foothills EMZs (de Kock 2023a, 2023b), Sundre EMZ (Salter 1978, de Kock 2023c), and the Elbow EMZ (Girard 2012, 2013a, 2013b). As noted, historic over-grazing and rangeland degradation was primarily the result of past over-stocking of domestic cattle.

Foothills Rangeland Health and Riparian Reports were not examined or used by the Office of the Chief Scientist or used in the AFHMF for reasons that are not understood, except perhaps because they were not peer-reviewed. Past attempts by my client and myself (in 2015) to obtain Rangeland Health Reports were denied until recently, when my client's long-standing FOI requests led to the release of the 2015 Range Health Reports for only three of the six Equine Horse Management Zones (EMZs). A professional assessment of these for the Clearwater, Sundre, and Ghost EMZs by agrologist Brian de Kock found minimal evidence of free-roaming horse site damage to rangeland and riparian habitats when compared to the higher incidence of damage reported from other human influences: cattle, OHV use, oil and gas development, and clearcut logging. For the Sundre EMZ, horses exclusively damaged 3.7% of the riparian areas, with reports similar to what the rangeland reports suggested. OHVs (quads, etc.) were the biggest single contributor to riparian damage, followed by cattle and OHVs together. De Kock concluded that a reduction in EMZ wild horse numbers will do little, if anything, to reverse these changes (de Kock 2023 a, b, c).

As an example of where the Alberta government, while focused on the potential rangeland health damage from free-roaming horses in their 2023 Feral Horse Management Framework document, has not included damage to rangeland health from other causes, a study by the Alberta Wilderness Association (AWA) of OHV habitat damage in the Bighorn Backcountry area of the Foothills is a case history in point. The Bighorn Backcountry encompasses the Alberta Foothills between Banff and Jasper national parks and east of the Forestry Trunk Road. For 15 years, the AWA documented extensive OHV damage in the Hummingbird Trail network area, including damage to soil and vegetation, and wetland and streamside habitats, along with large-scale erosion, which reduces water quality and destroys and damages fish habitat (Alberta Wilderness Association 2023).

3.5.1 No field-based data on past and recent range damage by free-roaming horses provided to support AFAP-claimed threats to rangeland health used to justify the wild horse threshold levels

While the AFHMF (p. 24) states that Threshold 2 was based on a combination of four key indicators, including assessment of ecological health and forage utilization, there is a large information gap in that no actual feral horse range damage evidence is presented to support their claim that the Threshold 2 and 3 level population numbers they use are levels that have historically and today could cause deterioration of rangeland health and thus trigger control measures to reduce horse herd numbers in order to *mitigate the environmental, social, and financial risks and costs associated with declining ecosystem health.* In other words, the AFHMF provides no documentation of range damage and rangeland health deterioration that can be linked directly to having been caused by free-roaming horses.

In fact, the existing science database I found reveals very little evidence that the Foothills horses are causing significant rangeland degradation other than in minor ways. My review, as in my past review (McCrory 2015, 2016), found that free-roaming horses are responsible for very little range health deterioration in the Sundre EMZ (Salter 1978, deKoch 2023c) and three of the Foothills EMZs (de Kock 2023a, 2023b). As noted elsewhere in my review, these findings are also consistent with a recent study (Baur et al. 2017) that utilized long-term grazing exclosures and fence line contrasts to evaluate the impacts of feral horses on several grassland plant communities in a variety of US Great Basin regions. The researchers found no significant effects of feral horse grazing on plant community composition, species richness, diversity, evenness, or dominance, except to reduce herbaceous biomass. No plant community shifts were detected.

For the following discussion, I examined the following documents for direct field-based evidence of proven damage to rangeland health by Foothills free-ranging horses, past and present:

- Office of the Chief Scientist: 2023 AFAP state of current knowledge of feral horse impacts on rangeland ecosystems;
- Salter (1978) and associated publications: Free-ranging horse, elk, and cattle diet and range study west of Sundre;
- Girard (2012, 2013a, 2013b) feral horse study in the Elbow EMZ;

- Use of clearcuts;
- Assessment of 2015 Rangeland and Riparian Health Reports by agrologist Brian de Kock (2023a b,c);
- AFHMF claim that Foothills free-range domestic livestock grazing mimics historic bison grazing patterns.

3.5.2 Office of the Chief Scientist: 2023 AFAP state of current knowledge of feral horse impacts on rangeland ecosystems (Alberta Office of the Chief Scientist, 2023b)

The Chief Scientist Office 5-page background report on feral horse rangeland impacts focuses primarily on real or potential negative impacts that have been documented for free-roaming horses from different grassland ecosystems globally, many of which differ greatly from the Alberta Foothills Parkland Natural Region. Therefore, the research cited may not be that applicable. It also raises the question as to why the Chief Scientist Office did not provide similar background reports on the current knowledge of the cumulative impacts on rangeland ecosystems caused by cattle, OHV use, oil and gas development, and clearcut logging for the relevant region in Alberta.

As noted previously, the review would also have benefitted significantly if the Chief Scientist had included analyses of non-peer reviewed data and evidence-based background range information, such as the Foothills Rangeland and Riparian Health Reports.

In addition, I found that while the Chief Scientist backgrounder quoted Salter and Hudson (1979) with respect to the Alberta Foothills region that the "risks of adverse effects of grazing by feral horses is likely greatest in grasslands that experience heavy use," I also found that key information and context cited in Salter and Hudson's main study (1979) was not mentioned by the Chief Scientist. This was that Salter and Hudson (1979) found very little evidence that free-roaming horses west of Sundre were causing range damage or were a threat to rangeland health. Whether this selective literature citation by the Chief Scientist was deliberate or not, or represents bias against wild horses, I cannot say.

The most glaring omission by the Chief Scientist's review of grazing impacts, in my professional opinion, is the nearly sheer absence of discussion of the impacts of other grassland grazers (elk, cattle) on the Foothills ecosystem, in particular the much greater role that non-native cattle have played historically and may still play in rangeland health degradation than free-roaming horses. (This will be further explained in the analyses of the 2015 Foothills EMZ rangeland health surveys by agrologist de Kock 2023a,b,c).

Additionally, the Chief Scientist's feral horse impact review omits available published research on positive impacts of the roles that free-roaming horses play in maintaining ecosystem health. After all, this is a species that evolved in these North American ecosystems. Positive roles include horses spreading seeds of native grasses in their droppings and their droppings improving soil health (Downer 2014). As an alternate prey for large predators that dates back to prehistoric times in North America, they also contribute considerable biomass to native predator-prey ecosystems, such as for wolves

(Parr and McCrory 2022). In winter during deep snow periods, the horses keep trails open in moose habitat creating more ease of travel for moose, which have a different non-competitive diet than horses (Storer et al. 1977).

Moderate grazing by wild horses would also contribute to increased carbon sequestration as soil organic carbon (SOC) in grassland soils (Downer 2023). Grazing is considered important for maintaining large carbon masses in Northern Temperate Grasslands (Lysong 2016). One study I found showed that moderate long-term livestock grazing may enhance carbon sequestration of soil organic carbon in the upper soil layer of grasslands (Hewins et al. 2018). Grasslands cover more than 40% of the area of our planet's terrestrial landscape and store up to an estimated 30% carbon of the global terrestrial carbon pool as SOC (Kramer et al. 2023). As noted previously, according to a world-wide review of wolves and free-ranging horses, grazing helps control plant biomass and reduces the risk of wildfires as well as providing a stable food source for large predators, which in turn reduces wolf attacks on economically valuable livestock such as cattle (Freitas et al. 2021).

Why was this key information excluded from the Chief Scientist's report? Anyone who reviews this skewed, one-sided scientific summary by the Chief Scientist would come away with the wrong conclusion that native free-roaming horses are bad for grassland ecosystems, including the Alberta Foothills Parkland Natural Region. Such a conclusion could not be further from the truth. This region is part of the area in which they evolved over the past 50 million years.

3.5.3 Salter's (1978) free-ranging horse, cattle, and elk diet and range study west of Sundre

I agree with Preston (1984) that past management decisions in the US and Canada involving, in some cases, the complete removal of feral equids, have been made on the assumption of competition between feral horses and other forms of wildlife and livestock without adequate knowledge of the habitats, behaviours, and diets of feral equids. [Preston's study in the BC Chilcotin, in fact, did just such a study that found that range cattle, not Chilcotin wild horses, were mostly responsible for the range damage she documented].

In my opinion, I agree that accurate information of the seasonal diets of grazing species is critical to interpreting their habitat use patterns and trends and competition with other species. Just because two grazing species spend considerable time in the same habitat types does not necessarily mean they are in competition if they are concentrating part or all of the time on different grasses, forbs, shrubs, and sedge species.

Salter's 1978 range study and associated publications (Salter and Hudson 1978, 1978a, 1978b, 1979, 1980) provide the key information on the diet of Foothills free-ranging horses. Although, since there have been many changes on the landscape, I still consider the Salter diet/habitat study applicable to any interpretation of range conditions today because it is the only detailed academic research study on the diet of free-roaming horses and cattle

in the Alberta Foothills available to help interpret diet overlap and habitat use. Elk diet, also studied by others, is included.

These published Salter works are also significant because the study area of 200 km^2 was located approximately 30 km west of Sundre—within the most controversial Sundre EMZ. The researchers noted that during the study period there were 200 free-ranging horses, about 50 elk (80-85 observed in winter), and 1,500 AUM of permitted cattle use between June 15-Oct. 15 (i.e., about 375 cattle).

The diets of horses, cattle, and elk in this study area were dominated by grasses and sedges. As noted earlier, while the potential for competition and range degradation from free-roaming horses exists, the Salter research found very little evidence that this was happening. The diet of horses was comprised of 43 plant categories. Although hairy wild rye (*Elymus innovatus*) was considered unpalatable at all seasons, it was widely available and formed 25% of the monthly horse diet with a decrease from May to July. *Fescue* spp. were also widespread and comprised 20% of the diet. Sedge (*Carex* spp.) use was high but varied from 18% in September to 56% in May. It was also considered widespread (Salter and Hudson 1979).

The diet of horses, cattle, and elk was quite similar in that their main food species were hairy wild rye, *Fescue* spp., and sedge. Seasonally, for the three main ungulate grazing species, there was considerable overlap of diet between horses and elk in the winter (Jan–March), when cattle were off the range, and considerable overlap between horses and cattle in summer-early fall (June–Oct.), when elk were absent (in spring they migrated back to summer in Banff National Park).

Comparing late winter diet for horse and elk: Horse and elk winter diets were quite similar, although horses grazed more on sedge. Hairy wild rye was 28% of the later winter diet (Jan–March) of free-roaming horses and 14% for elk. Rough Fescue was 25% for free-roaming horses and 23% for elk. Sedge was 35% for free-roaming horses and 9% for elk. A previous study in the Ya Ha Tinda area showed that rough Fescue made up over 69% of the elk winter diet (Morgantini and Russell 1983). It is also relevant that rough Fescue, a densely tufted bunchgrass, is ideal for winter grazing by these species as it evolved to be less palatable until fall and winter (Bailey et al. 2010).

Comparing late spring-summer-fall diet for horses and cattle: Hairy wild rye was 26% for free-roaming horses and 7% for cattle. Fescue was 26% for free-roaming horses and 41% for cattle. Sedge was 34% for free-roaming horses, and 27% for cattle (Salter and Hudson 1980).

Comparing three main grazing species for horses, elk, and cattle: Hairy wild rye was 28% of the later winter diets (Jan–March) of free-roaming horses and 14% for elk. It was 26% of the summer diet (June–Oct) for free-roaming horses, and 7% for cattle.

Rough Fescue (*Fescue* spp.) was 25% of the later winter diets (Jan–March) of free-roaming horses and 23% for elk. It was 26% of the summer diets (June–Oct) for free-roaming horses, and 41% for cattle.

Sedge (*Carex* spp.) was 35% of the later winter diet (Jan–March) of free-roaming horses and 9% for elk. It was 34% of the summer diet (June–Oct) for free-roaming horses and 27% for cattle.

A basic conclusion of Salter and Hudson (1980) was that during spring, although horses used some areas that were later preferred by cattle, range use was not excessive prior to cattle being turned out. Even though the two species fed on similar plants, intensive examination of an important winter–spring wild horse and elk range (and cattle summer range) showed that utilization of new growth by horses and elk was nil to very light over 95% of the 70 ha intensive study area just prior to the cattle turn-out date.

Concentration of foraging activity in other areas resulted in localized grazing and trampling damage (primarily in wet habitats) during spring, but evidence of spring grazing was found on less than 5% of total meadow habitat. Elk and horses (and to a lesser extent mule deer, white-tailed deer, and moose) utilized succulent green herbage during April-May, but the low incidence of grazing in non-forested habitats indicated that food was being produced more rapidly than it was consumed.

Similarly, spring grazing by wild horses did not deplete ranges preferred later in the season by cattle, but certain common use areas (primarily dry grasslands and dwarf birch thickets) were overgrazed by autumn. The study also found that combined grazing by horses and cattle caused localized damage along stream courses and around both natural and artificial salt licks. There was little overlap of horses and cattle in summer despite diet similarities (Salter and Hudson 1980).

But what about today? Based on data in Salter (1978), in 1976, his 200 km^2 study area west of Sundre had 200 free-ranging horses. This equates to a density of 1 horse/km^2. Boyce's (2022) study area west of Sundre showed a density that ranged from 0.5-0.6 horse/km^2 from 2017-2019, indicating that there is likely a lower density of horses today west of Sundre than in 1976, when Salter's range study found very little evidence of damage that could be attributed only to horses.

3.5.4 Girard (2012, 2013a, 2013b) study in Elbow EMZ did not document any range degradation caused by free-ranging horses

The Girard study used four radio-collared horses in four different bands in the Elbow Equine Zone (Girard 2012). It was done in an area with twelve times as many cattle as horses (131 free-roaming horses and 1,600 cattle, June 15–Oct 15). Wild ungulates, including elk, were also present. No research was done in the winter. The study found that during summer, horse presence and abundance were closely related to cattle presence, suggesting that both utilise the same habitats. Estimated forage biomass removal (44%) by mid-July were near maximum acceptable levels. Published papers (Girard et al. 2013a, 2013b) concluded that:

> ***Although depletion of forage could arise at this time of year given that cattle are using similar vegetation types as horses (Girard et al. 2013), and have similar***

diets to horses (McInnis and Vavra 1987), interspecific competition is unlikely during this time given the rapid growth and biomass increases observed.

Certainly I could find no documentation in the Girard research that horses were causing important range damage and degradation in the summer, especially in a rangeland that had 12 times more cattle than horses on the range.

3.5.5 Use of clearcuts

According to AFAP biologist Rob Simieritsch, landscape changes, such as logging or fire, can create short term sources of forage during the early stages of forest regeneration, i.e., initial 7−10 years (Oct 27/23 email to Darrell Glover).

While Boyce (2022) did not assess rangeland and riparian health and damage in his recent study in the Sundre EMZ, by using GPS telemetry data of five radio-collared free-ranging mares and camera trap data for horses, cattle, and elk, Boyce found that horses selected forestry clearcuts in summer and avoided native rangelands, except for one horse, whereas cattle occupied clearcuts less. His findings that horses may avoid cattle areas during the summer growing season are similar to that reported in the Sundre EMZ over 40 years ago (Salter and Hudson 1980). In other words, damage to native grasslands by free-ranging horses today may be limited by their preferred use of clearcuts during the summer growing season. As will be seen in the following section, the 2015 Rangeland and Riparian Health reports for the Sundre EMZ confirm very limited site damage was caused by free-ranging horses.

However, the preferred use of clearcuts during the growing season appears not to be consistent in all EMZs. Using four radio-collared horses in four different bands in the Elbow EMZ, Gerard (2012, 2013a, 2013b) found a relatively high overlap of free-ranging horses and cattle during the spring-summer growing season and a tendency for horses to select clearcuts only in winter. With twelve times as many cattle as free-ranging horses in her study area, she recorded rangeland biomass removal at maximum during the growing season. However, I could find no evidence in her published research of range degradation that could be attributed only to the horses.

The missing AFAP information gap here is the lack of a GIS map analysis of the amount of early seral clearcuts in the EMZs to ascertain how much of this new horse habitat is being created annually by logging companies, and how much is undergoing attrition and becoming less valuable for grazing as the new forests take over. There is also no information in the AFMF about wildfires or controlled burns in the EMZs and the shift by horses to using regenerated grazing habitats in those areas as a result of wildfire nutrient recycling, as was documented in the Chilcotin (McCrory 2023). A study of BC guide-outfitters free-ranging horses (under permit) in northern BC found that horses preferentially selected recently burned areas and areas that burned more frequently when these were available (Leverkus et al. 2018).

3.5.6 Assessment of 2015 Rangeland and Riparian Health Reports by agrologist Brian de Kock (2023a, b, c)

Alberta Rangeland Health Reports in Foothills cattle grazing allotments include assessments done by the Rocky Mountain Forest Grazers Association, as well as riparian reports conducted by the Alberta Riparian Habitat Management Society, also known as "Cows and Fish", a non-profit society dedicated to understanding and improving livestock grazing of Foothills grasslands and riparian areas. The Rangeland Health Reports are funded and managed on a yearly basis by the grazing participants of the Rocky Mountain Forest Grazers Association. Rangeland Health Reports are carried out in the field according to a quite rigorous field procedural manual (Adams 2016).

It is to be noted that although these reports do not provide an overall assessment of the rangeland health of the many different grazing habitat types, they do provide evidence of what are the main causes of rangeland health site degradation.

Up until this year, the Rangeland Health reports have never been made public, despite eight years of efforts by my client, Zoocheck, through Freedom of Information (FOI) applications. These were finally released in 2023 after a long inquiry by the Alberta Office of the Information Commissioner, which resulted in an order to the government to release the records to Zoochek. My own efforts in 2015 to obtain the Range Health reports directly from the office of the Grazer's Association were blocked by their office. In 2023, only the 2015 reports for the Ghost, Sundre, and Clearwater equine zones were released.

Independent professional agrologist Brian de Kock reviewed 3875 pages in five different 2015 Rangeland Health Assessment reports for the FOIed Ghost, Sundre, and Clearwater equine zones. Of these, 2194 pages were various types of assessments, including Site Description Forms, Vegetative Inventory Forms, and the Site Assessment Score Sheets. He did not extensively review the remainder of the report contents that included photos, handwritten notes, and data (de Kock 2023a,b,c). De Kock also reviewed the Rangeland Health Reports for just the Sundre EMZ (de Kock 2023c).

De Kock found only minimal evidence of free-roaming horse site damage to rangeland and riparian areas compared to the higher incidence of damage from cattle grazing, OHV use, oil and gas development, and clearcut logging. This included the Sundre EMZ (de Kock 2023c), where Salter's 1978-1988 range research also found limited evidence of range damage caused by horses.

De Kock's conclusions also help explain why my and my client's 2015 formal requests to Helen Newsham, P.Ag., head of E & P's (ESRD) policy department for specific site information to verify E & P's claims of free-roaming horse range damage led her to reply that "it is not possible to point out certain sites where there is a problem" (McCrory 2015). There were no such sites, or very few.

Rangeland: Ghost, Sundre, and Clearwater Equine Management Zones:

The de Kock (2023) review of 2015 Rangeland Health Reports of three EMZs concluded that very little range damage could be attributed to free-ranging horses:

- *There is cause for concern when it comes to the health of the rangeland in the eastern slopes as identified in the Rangeland Health Reports. There are complex reasons for the declines in rangeland health that are occurring, and many of the challenges created by this may be difficult and costly to resolve if they are to be resolved at all. Wild horses are not the cause of the vast majority of the problems; they have simply adapted to the changes in the landscape being driven by recreation and industrial activities on the eastern slopes. A continued reduction in wild horse numbers will do little if anything to reverse these changes.*
- *Based on review of all the comments, observations and ratings included in the Rangeland Health Reports, damage to the rangeland could be assigned specifically and exclusively to wild horses in only 24 sites out of a total of 483 sites, which is approximately 4.96%. While there was other mention of horses impacting rangeland health in other sites, these sites were also impacted by activities such as cutblocks/logging, recreational vehicles (OHV, QUADS, ATVs), well sites/pipelines, invasive species, compaction, and more. In all of these cases, horses were NOT the exclusive, nor the primary cause of damage. Note that damage to the rangeland assigned exclusively to cattle was 54 times out of the 485 sites, which is approximately 11%. This is likely due to the higher number of cattle on the landscape as compared to the number of horses.*

Riparian: Ghost, Sundre, and Clearwater Equine Management Zones:

- *Horses exclusively damaged 3.7% of the riparian areas with reports similar to what the rangeland reports suggested. OHV (quads, etc.) were the biggest single contributor to riparian damage, followed by cattle and OHV together* (de Kock 2023 b).

Rangeland – Sundre Equine Management Zone:

- *Based on review of all the comments, observations, and ratings included in the Sundre Equine Zone Rangeland Health Reports, damage to the rangeland could be assigned specifically and exclusively to wild horses in only 9 sites out of a total of 164 sites, which is approximately 5.5%. This includes mentions of heavy grazing which may or may not be considered as damaging the landscape. While there were multiple mentions of horses impacting rangeland health in other sites, many of these sites were also impacted by activities such as cutblocks/logging, recreational vehicles (OHV, QUADS, ATVs), wellsites/ pipelines, invasive species, compaction, and more. In all of these cases, horses were NOT the exclusive, nor the primary cause of damage.*

- *Note that damage to the rangeland assigned exclusively to other factors is as follows:*
  - *Cattle: 15 times out of the 164 sites which is approximately 9.1%.*
  - *Recreational vehicles: 24 out of 164 sites which is approximately 14.6%*
  - *Logging: 28 out of 164 sites which is approximately 17%.*
- *The most significant activity that impacted the health of these sites was cutblocks and logging followed by recreational vehicles (OHV, quad, ATV and Truck). Cattle were mentioned a number of times with 7 specific references to damage by cattle, mostly by heavy or over grazing, compaction, or trailing. While feral horses were mentioned a number of times, including some instances of multiple mentions on the same site reports, only 4 of the sites identified horses specifically and exclusively causing damage, mostly due to heavy winter or spring grazing. The remainder of the feral horse mentions were linked to cutblocks, pipelines, joint damage with cattle, and recreational activities.*
- *There is cause for concern when it comes to the health of the rangeland in the Sundre Equine Zone as identified in the Rangeland Health Reports. As per the entire 2015 Rangeland Health Reports, there are complex reasons for the declines in rangeland health that are occurring, and many of the challenges created by this may be difficult and costly to resolve if they are to be resolved at all. Wild horses are not the cause of the vast majority of the problems, in fact they are responsible for only 5.5% of the problems on the landscape. Wild horses have simply adapted to the changes in the landscape being driven by recreation, industrial, and commercial activities on the eastern slopes. A reduction in wild horse numbers will do little if anything to reverse these changes* (de Kock 2023c).

3.5.7 AFHMF claim that Foothills free-range domestic livestock grazing mimics historic bison grazing patterns

The AFHMF document is in error by claiming that domestic livestock grazing mimics a disturbance regime similar to historic bison grazing (p.11) when it also states that historic use of the foothills was seasonal, with bison migrating from the Foothills winter ranges to the prairies during the spring, summer, and early fall before returning back to the Foothills (p. 13). That plains bison historically wintered in the Foothills is confirmed in the government's 2017 bison status report (Nishi 2017). However, the AFHMF's claim to mimic the historic bison grazing pattern is misleading since cattle are not turned out until June 15, when historically most of the bison had moved to summer range in the prairies. The cattle do not use the Foothills allotments in winter when the bison were, historically, once the most concentrated.

3.6 AFHMF Concerns Re- Potential Impact of Feral-Horse Grazing On Plant Communities and Plant Species-At-Risk

The AFHMF refers to the high level of plant and plant community biodiversity in the EMZs, including 237 species and/or plant communities (p.13). The government Framework also focuses on specific concerns regarding the impact of year-round horse grazing on native plant communities as differing from the feeding strategies of native wildlife (e.g., "elk migrate to graze, while moose are predominately browsers"). The AFHMF maintains, in the context of free-roaming horse year-round grazing, that *Native plant communities and soils cannot tolerate this type of repeated/sustained grazing and will degrade, eventually undergoing irreversible changes* without providing any hard scientific field evidence of horses causing this phenomenon in an ecosystem in which the ancestors of the horse originally evolved.

The AFHMF also goes one step further to infer that non-native plant communities that replace native plant communities are less resilient and raise winter forage quality concerns for elk. In other words, taken in this context, the reader might easily conclude that Foothills free-roaming horses are causing damage to and degrading native plant communities, including plant species-at-risk, which then has a negative impact on wintering elk.

While these are, of course, legitimate concerns, not producing any hard evidence regarding any negative effects on native plant communities and plant species-at-risk by free-roaming horse-grazing while ignoring historic evidence which shows that past over-grazing by cattle has been a major influence on native plant communities is misleading.

As well, the above-mentioned claim in the AFHMF is highly exaggerated, given that horses evolved in the Fescue grasslands that were sustained by grazing by herbivores. As well, many other rangeland regions with native plant communities have sustained wild herbivores for millennia.

Have the Foothills horses then been responsible for damaging native plant communities? We don't know since no study has been done, but possibly not if a recent study (Baur et al. 2017) that utilized contrasts of long-term grazing exclosures and fence lines to evaluate the impacts of feral horses on several grassland plant communities in a variety of US Great Basin regions is any indication. The researchers found no evidence of a significant effect of feral horse grazing on plant community composition, species richness, diversity, evenness, or dominance, except to reduce herbaceous biomass. Also, no plant community shifts were detected.

As previously noted, a recent "state of the prairie" inventory of the Parkland Natural Region in which the six Alberta EMZs occur showed that only 20% of the native vegetation/features remain. Since 1990-2010, another 2% has declined (Prairie Conservation Forum 2019). Given the historic over-stocking of cattle and that today there are about six times more cattle (8,544) than wild horses (1,428) during the active growing season in the six EMZs, it is clear that detailed field study will be required by Alberta range managers to substantiate or not substantiate their claims that free-ranging Foothills wild horses are causing degradation of native plant communities and plant species-at-risk.

3.7 AFHMF Ignores Cumulative Effects On Rangeland and Ecosystem Health and Targets Only Horse Control

Instead of a close examination of the potential and real range health damage and cumulative effects to the Foothills grassland communities caused by the multiplicity of human influences on the landscape from a wholistic, ecosystem, and cumulative effects perspective, the 2023 Alberta Feral Horse Management Framework and the Feral Horse Advisory Committee (FHAC) have chosen only to focus on the wild horse population levels as a possible source of existing or threatened range health deterioration and as the primary target species for control measures.

However, mitigation of threats or existing damage to rangeland health in the Foothills ecosystem cannot be achieved without due consideration of and addressing all causative factors and cumulative effects. The AFHMF provided no data, maps, or cumulative effects analysis that quantifies other known damages to rangeland and ecosystem health that need to be considered besides the potential danger from free-ranging horses (i.e., seasonal cattle grazing, invasive plant species [both accidentally and intentionally introduced for reclamation of disturbed areas], OHV use, clearcut logging, oil and gas development, and the extensive road network related to these industrial-scale activities) despite the yearly Rangeland Health Reports providing crude measures of the impacts of these.

Just focussing on wild horse numbers and controlling horse numbers without defensible evidence that population thresholds are triggering rangeland health deterioration, and without addressing all of the other existing and potential cumulative grazing impacts on the Foothills ecosystem, including cattle grazing within the context of grassland and rangeland health, is not going to protect or restore rangelands that are already damaged and under threat from multiple influences.

3.7.1 Example of cumulative effects: Off-Highway Vehicle (OHV) riparian habitat damage (Alberta Wilderness Association 2023)

As an example of where the Alberta government has focussed on the potential rangeland damage from free-roaming horses in their 2023 Feral Horse Management Framework document while not including damage to rangeland health from other causes, a study by the Alberta Wilderness Association (AWA) of habitat damage caused by fifteen years of OHV use in the Bighorn Backcountry area of the Foothills is a case history in point. The Bighorn Backcountry encompasses the Alberta Foothills between Banff and Jasper national parks and east of the Forestry Trunk Road. For 15 years, the AWA documented extensive OHV damage in the Hummingbird trail network area, including damage to soil and vegetation in wetland and streamside habitats along with large-scale erosion that reduces water quality and destroys and damages fish habitat (Alberta Wilderness Association 2023). OHV damage has also been documented extensively in the Alberta rangeland health reports (de Kock 2023 a,b,c).

3.8 Do the AFHMF and Chief Scientist Feral Horse Reports Include Information On Cattle Numbers and Their Grazing Impacts?

As noted, the Fescue grasslands of Alberta, including the Foothills, represent some of the most ecologically diverse areas of the province. Downer's 2015 surveys documented an extensive species list. Cattle and their historic and potential impacts on the rangeland health of Foothills Fescue grasslands and other grassland plant communities are generally omitted in the AFHMP and Chief Scientists' background feral horse reviews. The Chief Scientist Office never bothered to prepare a similar "state of current knowledge of cattle impacts on rangeland ecosystems" for the Alberta Feral Horse Advisory Committee, which in my professional opinion and from a wholistic grassland ecosystem point of view, is a glaring omission.

This omission is very surprising given that an Alberta government Fescue grassland range review (Willoughby 2001) pointed out that historically, the Fescue plant community was the most desired to maximize beef production. Historic over-grazing by cattle, as the author carefully pointed out, led to a decline in condition of many of these grassland communities. In other words, past cattle over-use, not free-roaming horses and other wild ungulates, were largely responsible for the historic decline of the Foothills grassland ecosystems, even though, as discussed, all three grazing species have some overlap of grass and sedge diets and habitat uses.

Cattle are well noted in the scientific literature for causing range degradation. As noted in Williams et al. (1985), in rough Fescue grassland in southwestern Alberta, light grazing (1.2 Animal Unit Months per hectare) was found to have little effect on the plant community, while moderate grazing (1.6 AUM/ha) led to a reduction in Fescue cover, and heavy grazing (2.4 AUM/ha and 4.8 AUM/ha) had a substantial effect. Belsky et al. (1999) found in a review of 136 US studies of riparian areas that in every case, the effects of cattle on the riparian ecosystems were detrimental and that cattle spend 5 to 30 times more time in riparian areas than elsewhere in their pastures. Similar results were found in an Alberta Foothills study where cattle spent a disproportionate amount of their feeding time in the riparian zone during late summer and early fall when compared to upland areas. This was because, as upland forage matures and becomes less palatable, cattle concentrate feeding activities in the richer riparian zone. Even though the riparian zone may make up a small proportion of the pasture's total available forage, it may supply the bulk of cattle forage consumption during late August and September. The authors point out that such impacts could be limited by basing stocking rates for this period only on forage available in the riparian zone (Marlow and Pogacnik 1986).

In Idaho, researchers found that grazing by free-ranging horses may have a greater impact on riparian areas than grazing by only cattle and wildlife and thus need to be carefully managed, especially where horses, cattle, and wildlife overlap. Although the study documented streambank disturbance, reductions in stubble height and herbaceous biomass in a riparian area where there were more cattle than wild horses, they did not claim that the shared use by both these species was cumulatively causing riparian and rangeland health degradation, although the potential existed and was dependent on numbers (Kaweck et al. 2018).

In order to understand the approximate number of cattle on the Foothills allotments in proportion to the number of wild horses, I requested information on the number of cattle from AFAP and only received information on number of Animal Units Month (AUM) for the six Foothills EMZs (Appendix 1).

An Animal Unit Month (AUM) is the amount of dry forage that one animal unit (AU) consumes in a month. The total AUMs of an Alberta cattle lease AUM is determined from carrying capacity, which is the stocking rate for a specific area of land in AUMs and also accounts for such variables as livestock distribution and range health. In general, one average-sized cattle AUM is one head per month (AESRD 2008). Although there are many variables involved in using AUMs per grazing allotment to ascertain number of cattle, I used a straight ratio of one AUM = one average-sized head of cattle, and assumed a four-month period each head was out on the open range. As pointed out, given that AUMs are derived from quantity and duration of grazing, the exact length of the grazing period within and between range allotments is expected to vary annually. Permit holders do not necessarily utilize the full AUM allocation for a given range allotment every grazing season (Kelsey Cartwright email Jan. 18, 2024).

Given that 34,170 AUMs are permitted on the 36 range allotments in the six EMZs (Appendix 1) for an approximate four month period, the total number of cattle would amount to about 8,544 cattle annually out on the range, with approximately 1500 wild horses. In other words, during the active spring-fall growing season there are on average about six times more cattle than wild horses out on the open range.

3.9 Are AFHMF and Chief Scientist's Concerns Over Impacts of Foothills Free-Roaming Horses On Foothills Elk Populations Valid?

Both the 2023 AFHMF (p. 11) and the Office of the Chief Scientist raised concerns about the potential effects of free-roaming horses on native wildlife, including elk. The concerns are two-fold: one, the potential for competition for forage, and two, horse predator-prey relationships leading to an increase in numbers of predators that then prey more on elk. The Chief Scientist has provided the Feral Horse Advisory Committee with a background study on the relationship of feral horses and coexisting ungulates. The Chief Scientist document points out the potential for an impact on elk numbers from food competition between feral horses and native ungulates, such as if habitat range is limited, foraging conditions are poor, or if herbivore density increases citing Salter and Hudson (1980) (Alberta Office of the Chief Scientist 2023a).

As noted previously, in their Sundre study area, Salter and Hudson (1980) found that both elk and free-roaming horse diets in late winter (Jan-March) were similar, preferring Fescue, hairy wild rye, and sedge, with horses consuming far more sedge than elk. A previous study in the Ya Ha Tinda area, a large private ranch owned by Parks Canada west of Sundre, showed that rough Fescue made up over 69% of the elk winter diet (Morgantini and Russell 1983). An estimated 1,000 elk from Banff National Park winter at Ya Ha Tinda. Others winter in other areas of the Foothills and then seasonally migrate back to Banff for summer. However, more are remaining to become year-round residents in the Alberta Foothills.

Although this could lead to competition, no evidence of Foothills elk winter die-offs from competition with horses is provided by the Chief Scientist and the AFHMF. Salter and Hudson (1980) point out that "although horses and elk both used dry grasslands during winter and spring, competition for forage was minimal due to low number of elk present." This was not included or considered in the Chief Scientist's review.

The AFHMF (p. 11) raises a concern that, although the Foothills free-ranging horse population has the potential to disrupt natural predator-prey relationships is not fully understood, feral horse-large carnivore relationships may have "unintended consequences on ungulate populations, such as elk and deer." For example, the Chief Scientist points out that free-roaming horses can lead to an increase in wolf numbers that would increase the "spillover" predation risk to other ungulates. They point out that free-ranging horses in some parts of the Foothills now comprise an ungulate biomass (kg per km^2) capable of supporting 10 wolves/ 1000 km^2, citing Boyce and McLoughlin (2021). Similar concerns are raised by Boyce and McLoughlin (2021), who point out that more research is needed on the topic.

What the Chief Scientist review omits to mention, however, is that free-ranging horses may, at times, take predator pressure off wild ungulates, such as elk and deer. And, as noted previously, a world-wide review of wolves and free-ranging horses (Freitas et al. 2021), found wolf predation on wild horses reduces attacks on economically valuable livestock.

Nonetheless, in order to investigate if the Chief Scientist's and AFHMF concerns and assumptions that free-roaming horses could hypothetically cause elk population declines from food competition and from upsetting the balance of predator-prey relationships, I carried out a reality check and found little or no evidence that this has been happening in recent times with the elk population in the Foothills EMZs. In fact, the opposite has happened according to a recent peer-reviewed Alberta elk study in relation to wolves, mountain lions, and grizzly bears (Trump et al. 2022). The researchers concluded that: "increasing large predator populations do not necessarily equate to a loss in prey populations at the provincial scale. If habitats are sufficient to support a larger prey population, then the prey population should be able to support a larger population of predators."

I fail to understand why the Chief Scientist's review of only peer-reviewed scientific literature on feral horses omitted this key Alberta elk study.

As background context, since colonialism, both elk and the three large carnivore species (grizzly bears, wolves, mountain lions) in the Foothills Equine Management Zones (EMZs) have undergone significant man-made population declines and have only recently recovered to healthy numbers (see Trump et al. 2022).

Elk were nearly extirpated from the province 100 years ago but have now recovered. Wolf populations have increased after total extirpation in southern Alberta in the 1950s, when more than 4,200 wolves were killed, mostly with toxicants, for rabies control. Wolves were absent for about 30 years but returned naturally from a few survivors to Banff National

Park in 1985 and rapidly recolonized the Rocky Mountains and adjacent Foothills. Mountain lions also strongly increased after 1970, recovering from a historic systematic persecution that reduced cougars to low levels. As a result of Alberta conservation measures, including closing the grizzly bear trophy hunt, grizzly bear numbers have also increased in recent times. Population numbers of all three top carnivores still appear to be increasing today, according to Trump et al. (2022).

The Trump et al. (2022) study examined elk hunter harvest in Alberta over 26 years (1995-2020). Although the study pointed out that large predators are believed to cause declines in hunter harvests due to direct competition for prey with hunters, the researchers found the opposite for elk populations in Alberta, including the Foothills elk population and some of the Mountain elk population that overlap with the six Feral Horse Equine Management Zones. In fact, although populations of grizzly bears, mountain lions, and wolves that prey on elk have increased in recent years, harvest of elk and elk populations also increased in the province. The exception was one area in the Mountain elk population where predation on elk calves by grizzly bears reduced elk recruitment. Numbers of grizzly bears, wolves, and cougars are also high in this area. The continued disruption of elk migration routes by roads and industrial development was also believed to have contributed to the localized elk population decline. The Foothills elk population area was one of two areas with the highest elk population harvest over 26 years. A contributing factor may be related to an increasing number of migratory elk becoming resident in the Sundre EMZ instead of migrating at the end of winter back to their historic summer range in Banff National Park (see Boyce 2022).

In conclusion, AFHMF concern regarding free-roaming horses competing with elk for limited food resources and causing elk population declines and/or predation of top predators on free-roaming horses increasing the numbers of top predators resulting in population declines of elk is not currently supported by available research. A recent Alberta study of 26 years of elk hunter harvest data that included the Foothills showed the opposite is true and that elk numbers have mostly increased along with increased populations of grizzly bears, wolves, and mountain lions. In other words, varying levels of predation on varying numbers of free-roaming horse populations on shared rangeland with elk appears to have had little or no influence on elk population and hunter harvest over a quarter of century, therefore partially dispelling AFHMF concerns that free-roaming horses are having a negative effect on elk populations. Somehow this key Alberta peer-reviewed elk study was ignored by the scientists preparing the AFHMF.

4.0 ARE ANCESTRY (GENETICS) AND TIMELINE OF ORIGINS OF FOOTHILLS WILD HORSES ACCURATELY REPRESENTED IN THE AFHMF AND CHIEF SCIENTIST'S BACKGROUND REPORT?

Regarding the origins and bloodlines of the Alberta Foothills wild horse, the AFHMF (p. 4) claims that:

> *Alberta's feral horse populations are descendants of escaped or intentionally released domestic horses, used by First Nations, farmers, ranchers, logging and mining industries, and hunters before and after the Industrial Revolution.*

The Framework (p. 21) also claims, in terms of forage allocation, that the horse is a non-native species (*i.e., cattle, horses, sheep, and goats*).

This conclusion is nearly identical and was probably derived from one of the Chief Scientist's reports (Alberta Office of The Chief Scientist 2023c), which has a review of the origins of horses in Alberta (p. 1) and their genetics (p. 2).

Although the Chief Scientist is accurate in stating that Alberta's horse populations may have originated from northward dispersal of horses with Spanish heritage initially brought in by Indigenous Peoples, their interpretation of today's Foothills breeds as mixed breeds heavily influenced by more draft horses brought in by settlers is partly in error, at least for the Sundre EMZ. The Chief Scientist's interpretation was, unfortunately, done without sufficient examination of other key scientific information available to them on ancestry and origins (Cothran 2021, Taylor et al. 2023, and McCrory 2015).

In my professional opinion, the Chief Scientist also strongly erred by relying solely on a peer-reviewed genetics study done by a graduate student (Tollett 2018) that was severely constrained by its small sample size and where the author even warned that *the data set for each subpopulation was too small to draw conclusions with authority* while ignoring a genetics study done by one of the world's equine genetics experts that used a much larger sample size (Cothran 2021).

The following careful comparison of both studies reveals that the genotyping by Dr. Gus Cothran of the hair samples of 56 Foothills wild horses (all but two from the Sundre EMZ) represented 10.4% of the estimated horse population of the Sundre EMZ, whereas Tollett's study used only 19 hair and tissue samples, of which 17 samples represented 0.1% of the combined minimal horse population of four EMZs sampled and 0.9 % of the combined minimal population estimate of the Ghost/Sundre EMZs. Therefore, Dr. Cothran's findings should be considered far more reliable. Despite Christina Tollett's covenant that her data set was too small to draw authoritative conclusions, the AFAP and the Chief Scientist Office chose to select only Tollett's limited data for reasons that are not understood except that world equine expert Cothran's report had not yet been peer-reviewed.

Christina Tollett's study used hair and tissue samples collected from 19 different horses that were captured for adoption or to be sold at market. This included 12 samples from the combined Ghost and Sundre EMZs, three from the Elbow EMZ, and two from the Brazeau EMZ. The author lumped the Ghost and Sundre EMZs into one, likely because the samples were not identified to either EMZ. Two samples came from an unknown area. In terms of sample size/EMZs minimal population estimates, overall, the 17 samples from the 1,516 horses combined minimal horse numbers for the four EMZs represents 0.1% (3 of 122 minimal population in Elbow EMZ, 12 of the 1,386 in the Ghost/Sundre EMZs and 2 of 8 in the Brazeau equine zone) and 0.9% of the Ghost/Sundre EMZs minimal population count.

Based on this extremely low sampling effort, Tottett still concluded that the Foothills horses have a history of *admixture with various breeds* with the *primary cluster centred between draft breeds and the Standardbred horse*, while other horse groups link closely with the *Morgan horse*. The results were considered by the author to be *highly indicative of mixed breed origins* and *with a strong relationship to draft breeds.* [The study also found elevated levels of inbreeding, with variation across and within equine zones.]

I agree with the author's conclusion that the data set for each subpopulation was too small to draw conclusions with authority and, in my professional opinion, are therefore unreliable to draw any inferences of bloodlines at the EMZ population level. In addition, I also suspect that her ancestry results are even more tentative and unreliable than her cautionary note infers due to the potential for a strong bias from over-sampling horses proximal to private lands and settlements where recently escaped or released mixed breed domestic horses would be more prevalent than from more remote areas where less diluted earlier core foundation bloodlines are more likely to occur. Unfortunately, the researcher provided no information as to the locales where each sample horse was captured.

On the other hand, Dr. Cothran's Texas A & M University lab genotyped hair samples from 56 different horses, 36 of which were collected from horse hair snagged on trees along horse trails or at bedding or lick sites in remote areas of the Sundre EMZ, and 20 taken from mane/tail hair of horses that were captured from culls (D. Glover pers. comm.). Samples were collected between 2015-2017. At the time, the average minimal horse count for the Sundre EMZ for the three collection years was 540 animals; thus the hair sample size (N=56) represents about 10.4% of the estimated Sundre EMZ horse population. This in my opinion, is a good sample cross section of this genetic subpopulation compared to Tollett's sample size of 12 or 0.9 % of the 1,386 estimated minimal number of horses in the Ghost/Sundre EMZs.

Dr. Cothran's conclusions were far different than Tollett's. He concluded that the main ancestry of Sundre EMZ horses were Spanish breeds,

> *…that cluster between clusters of Old World Iberian breeds from Spain and Portugal...This association could indicate origins of the Alberta horses from Native American horses that obtained the horses from other indigenous people from further south in the present United States. There is no data to determine when these*

> *horses entered into this region of Canada. If this possible origin is true then the horses may have been here for a long time.*

He also concluded that, *other breeds are included in the ancestry of these horses* [and] *that the Canadian type horse is far more likely to have contributed to the make-up of the Wildies*.

In terms of when the horses were first brought in, Cothran's discovery of Spanish foundation ancestry of the Sundre EMZ links to a more recent peer-reviewed published study on the early dispersal of the horse across the Americas, which found that wild horses initially originated mainly from Spanish Horses brought to the Americas starting in the early 1500s. Subsequently, escaped and stolen Spanish horses were spread across the Americas by Indigenous peoples. The horses reached the northern Great Plains and northern Rockies far earlier than thought, in the early-mid 1600s (Taylor et al. 2023). This would be the time period of about four centuries ago that the core foundation Spanish Iberian horses in the Sundre EMZ would likely have been first introduced by the Foothills First Nations.

Dr. Cothran's findings of dominant Spanish Iberian ancestry of the wild horse Foothills subpopulation in the Sundre EMZ is similar to his findings of the same ancestry in the main West Chilcotin wild horse subpopulation in BC (Cothran and McCrory, *In Press*). This is significant considering that only four remnant subpopulations of numerous subpopulations in the US have Spanish bloodlines (Sponenberg 1999). This includes the population of the Pryor Mountains Wild Horse Range (Cothran 2010). Genetic tests of many of the other US herds has shown mixed breeds (Cothran pers. comm.).

In conclusion, both the AFHMF and Chief Scientist associated background reports appear to be partly right about mixed breeds, but by ignoring available, credible evidence from a study done by a world-recognized equine exert that the core foundation breed of the Sundre EMZ horses is the Spanish horse first introduced from First Nations in the early-mid 1600s, this downplays the overall significance of the Spanish Iberian bloodlines that have existed west of Sundre for about four centuries.

4.1 Classification or Misclassification? Are Foothills Wild Horses Non-Native Feral Livestock or A Returned Native Wild Species?

The AFHMF (p. 33) indicates that the Feral Horse Advisory Committee has recommended that consideration be given to renaming feral horses that includes updating and clarifying legislation/regulations related to feral horse management when the *Stray Animals Act* and *Horse Capture Regulations* undergoes legislative review. However, the agency has no plans right now to change legislation (letter from Rob Simieritsch to W. McCrory, January 11, 2024).

My review found that the Office of the Chief Scientist background review ignored a body of available peer-reviewed published evidence by distinguished scientists that today's wild *Equus ferus caballus* in North America should be reclassified as a returned native mammal species rather than as a non-native alien species based on fossil, genetic, and archeological

evidence (Kirkpatrick and Fazio 2010, Downer 2014, Cabi 2015, and Donavan 2021). According to Dr. Ross MacPhee of the American Museum of Natural History:

> *The horse that lived in the Yukon 5,000 years ago is directly related to the horse species we have today,* Equus caballus*. Biologically, this makes the horse a native North American mammal and it should be treated as such* (Donavan 2021).

Consider that according to a federal government study *Management of Canadian Prairie Rangeland* (Bailey et al. 2010), the Foothills Fescue-Grassland Complex is a remnant of the 50-million-year-old Fescue ecosystem that once was the traditional habitat for *grazing herds of wild ungulates, including bison, horses, and wild camels.* Rough Fescue, a densely tufted bunchgrass, was ideal for winter grazing by these species as it evolved to be less palatable until fall and winter. In other words, the Alberta Foothills Horse Equine Zones (EMZs) of today are part of the North American birthplace of the 50-million year evolution of the horse.

In conclusion, the recent genetic evidence I have previously cited establishes that the largest core population of Foothills horses west of Sundre are genetically unique with their Spanish Iberian ancestry and, as such, have functioned as a wild population in the Foothills ecosystem with native predators for about four centuries. This hardly warrants them still being classified under the Alberta Stray Animals Act in the modern scientific age as alien stray livestock recently escaped from domestication and in the same non-native barnyard category as domestic cattle, sheep, and goats.

Ironically, the Alberta provincial government was a signatory to the International Union of the Conservation of Nature (IUCN) decades ago, which includes the 1992 IUCN Action Plan for Wild Equids (Duncan 1992). The plan acknowledges the genetic uniqueness of feral equids as representative of an important part of the planet's biodiversity and recommends careful conservation considerations be undertaken. The recent findings that the foundation herds of the Foothills horses are Spanish Iberian and are thus unique for a North American horse subpopulation only strengthens the need for the Alberta government to live up to its IUCN commitment towards a greater conservation of their wild horses rather than just treating them as stray domestic livestock that should be periodically culled.

Consider also that a University of Calgary review (Kincaid 2008) of the history and biology of the Alberta Foothills free-ranging horses, or FRH, concluded they could possibly be listed as a threatened species under Federal legislation for species-at-risk:

> *If protection and inclusion of FRH in Alberta was to be considered, this project could potentially contribute research to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which recommends species to the Species-at-Risk Act (SARA). COSEWIC deems a species 'wild' if it is native, has persisted in Canada for more than 50 years, and threatened if a 10% decline in population over 100 years occurs (COSEWIC 2007). Based on criteria outlined by COSEWIC, free roaming horses are wild and threatened* (Kincaid, 2008).

However, wild horses may not qualify as a native Wildlife Species, which according to one COSEWIC definition is a species "that has expanded its range into Canada without direct human intervention from a region where it naturally occurred." Wild horses were reintroduced back to their North American birthplace from Europe as a result of "direct human intervention."

> ***B) Native Wildlife Species***
>
> *COSEWIC would normally only consider native Wildlife Species. A native Wildlife Species is a Wildlife Species that occurs in Canada naturally, or that has expanded its range into Canada without direct human intervention from a region where it naturally occurred, has produced viable populations, and has persisted in Canada for at least 50 years.*
>
> *As stated in the Species-at-Risk Act, a Wildlife Species is, in the absence of evidence to the contrary, presumed to have been present in Canada for at least 50 years and therefore eligible for assessment.*

In conclusion, AFAP and the Alberta government are still applying the outdated domestic livestock *Stray Animals Act* law to improperly classify Foothills wild horses as non-native escaped, feral domestic barnyard livestock in the face of strong, compelling evidence that the horses are a returned native species that evolved in North America. Such misclassification in the same category as non-native domestic species raised in barnyards (cattle, goats, and sheep) as used in the 2023 Alberta Feral Horse "science-based" management plan allows the species to be managed only as livestock and not as a critical wildlife component belonging in the Foothills ecosystem.

While I agree that some of the free-roaming horses would include recently released, escaped, or stray domestic horses near settled areas, to lump the core Sundre Spanish Iberian population that evidence demonstrates as the returned native horse that has lived wild in the ecosystem for approximately four centuries with domestic non-native species raised in barnyards is inappropriate. In addition, the unique Spanish Iberian bloodlines of the Sundre EMZ wild horses is internationally significant within the context of the 1992 IUCN Wild Horse and Burro Action Plan for the conservation of the planet's free-ranging horse biodiversity.

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APPENDICES

APPENDIX 1. Number of cattle AUMs and range allotments in six Alberta Foothills Equine Management Zones

The following was provided as a result of an information request for the number of cattle in the Foothills EMZs (Rob Simieritsch email January 11, 2024).

Range allotment information related to the six Equine Management Zones:

- 34,179 Animal Unit Months (AUMs) are permitted on 36 range allotments that are covered by the 6 Equine Management Zones (EMZ).
    - Sundre EMZ – 7,285 AUMs
    - Ghost EMZ – 8,224 AUMs
    - Clearwater EMZ – 2,255 AUMs
    - Elbow EMZ – 15,428 AUMs
    - Nordegg EMZ – 987 AUMs
    - Brazeau EMZ – 0
- Sundre EMZ – 544,898 ac
    - Allotments – Bearberry, Bread Creek, Coalcamp Creek, Lower James, Lower Red Deer, Moose Creek, Upper James, Upper Red Deer, Williams Creek, Wilson Creek
- Ghost EMZ – 598,907 ac
    - Allotments – Aura Cache, Burnt Timber, Devil's Head, Ghost River, Harold Creek, Lesieur Creek, Little Red Deer, Lower Fallen Timber, McCue Creek, Upper Fallen Timber
- Clearwater EMZ – 515,911 ac
    - Allotments – Clearwater, Fall Creek, Limestone, Prairie Creek
- Elbow EMZ – 444,555 ac
    - Allotments – Bragg Creek, Elbow, Fish Creek, Jumpingpound, McLean Creek, North Sheep, South Sheep
- Nordegg EMZ – 1,648,056 ac
    - Allotments –Ram River, Rough Creek (Holbrook and Pheonix Horse – are not grazed by livestock and have not been for almost 30 years)
- Brazeau EMZ – 1,851,383 ac
    - Allotments – none

END