PRELIMINARY TECHNICAL REVIEW OF

MANAGEMENT of FREE-ROAMING ("FERAL") HORSES in ALBERTA'S SIX FOOTHILLS EQUINE ZONES

Photo by Duane Starr Photography

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Report for:

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DISCLAIMER

The scientific comments, notes and findings expressed herein are entirely my own and have not been subject to outside peer review. I take full professional responsibility for any errors, omissions or errors in my interpretation of data from the scientific literature, Alberta Environment and Parks (E & P) (formerly Alberta Environment and Sustainable Resource Development, ESRD) and other sources. I take no responsibility for any errors within the data and references that I used from outside sources such as Alberta E & P. Where possible I identify where I have relied on my own professional judgment and opinion.

While the best efforts have been made to ensure the validity of this review, no liability is assumed with respect to the use or application of the information contained herein.

Although free-ranging horse populations can increase dramatically in many of the countries and regions indicated, indications of horses threatening ecosystems, habitats, and species derive from grey literature, unpublished data and observations from land managers and conservation organizations, rather than from peer-reviewed literature (Cabi. 2015).

1.0 **EXECUTIVE SUMMARY**

My study is as yet only a partial review because repeated formal information requests starting last May, 2015 to the Alberta Environment and Parks (E & P), [formerly Alberta Environment and Sustainable Resource Development- ESRD] have only been met on a very limited basis. I waited until October 23, 2015 to learn that E & P (ESRD) was refusing my requests for additional critical information.

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After a preliminary literature review and on-line search, in early July 2015 I submitted a formal list of questions to Helen Newsham, P. Ag., head of E & P (ESRD)'s policy department, in order to ascertain what evidence-based science the department was using to validate the information on their website on free-roaming horses and their history, numbers and management - including the recent controversial culls. E & P (ESRD) only provided a partial response to my request for information but did promise the rest. As of the date of this report, E & P (ESRD) has not responded to my repeated requests for additional information including all detailed horse count surveys that include detailed reports and maps.

For this preliminary review I also used other background data including partial data in E & P (ESRD)-sponsored range management plans, rancher self-evaluations and range health surveys of the 33 District Units (DUs) in the six designated foothills equine zones. This partial information was obtained by a separate third party Freedom of Information and Protection of Privacy (FOIPP) request and passed on to me. The bulk of the horse count data I used also came from the FOIPP third party application. I also reviewed relevant scientific literature I had *In File* and what I could locate online.

A scientific background analysis was then done of the various major information components that were found to the form the framework of the E & P (ESRD) "feral" horse management policy and public information system.

From the existing database I reached the following conclusions:

1. E & P (ESRD) free-roaming horse management policies and strategies generally lack scientific rigour and objectivity.

Unfortunately, in some instances, their scientific credibility is seriously undermined as a result. This impression is suggestive of a general lack of a fair and objective science-based management strategy with instead a strong institutional bias against free-roaming horses in favour of cattle allotments.

2. In some instances information provided by E & P (ESRD) is false, misleading or not well researched and thought out and does not accurately reflect the scientific studies they cite to support some of their management policies and positions.

E & P (ESRD) also makes a number of "factual" claims that are contradicted by mainstream scholastic and academic studies published in peer-reviewed scientific journals.

3. E & P (ESRD) lacks transparency in terms of maintaining and openly making available to the public, media and independent scientific community their existing database on management of foothills free-roaming horses.

Horse count data requested was not forthcoming and partial information was only obtained by a third party FOIPP. E & P (ESRD) also does not make readily available other studies such as cited on their web site. This hinders meaningful and informed public and scientific involvement regarding their free-roaming horse policies on crown range.

Overall, the end result of the lack of comprehensive science-based information in E & P (ESRD) free-roaming horse management policies is to contribute to the increased public polarization on the Alberta foothills free-roaming horse control issue; such as one finds evident on the debates on E & P (ESRD)'s "refereed" recent horse count blog site.

Following is a summary of the results of my scientific review of E & P (ESRD)'s information database to date, keeping in mind, again, that this review is incomplete due to a lack of provision of key information requested from E & P (ESRD):

4. E & P (ESRD)'s claim that the horse is not native to North America is questionable and one-sided

E & P (ESRD) avoided answering my request for evidence pertaining to their statement that horses are not native to North America, even though it was one of the written questions they asked me to submit. From my own review I found that E & P's (ESRD) claim is supported by one peer-reviewed study. This study acknowledges that the current species of the modern horse of today, *Equus caballus* is native to North America according to a detailed DNA analysis but, while admitting the evidence is mixed, the authors of the paper point out that a majority of scientists still consider them non-native. However, I found a number of other studies that document that the horse of today came from a long evolutionary history in North America and that many scientists believe the horse to be native to North America. E & P (ESRD) could have presented a more informed and balanced perspective.

5. E & P (ESRD)'s claim that foothills horses are only "feral" - derived from domestic horses from mining and logging operations in the early twentieth century ignores strong historic evidence that horses were present pre-contact, around 1730 or so

When E & P (ESRD) was asked for literature references to support their claim that foothills horses originated from mining and logging operations early in the twentieth century, I was only provided with a repeat of anecdotal information used by E & P (ESRD) in the past. I would not disagree with escapees and domestic horses periodically turned loose into the wild herds (in fact, this appears to be a current largely unenforced problem. See item 6). This has happened in much of N. A. wherever there are free-roaming horses that came from much earlier foundational stock; but the E & P (ESRD) information provided to the public clearly infers that the foundational stock for free-ranging horses in all of the foothills zone comes only from escape of released domestic stock going back to the early twentieth century.

Photo by Duane Starr Photography

Credible historical documents prove that horses likely were acquired by First Nations in southwest Alberta in the early 1700s, pre-contact, and these formed the foundational stocks of today's foothills free-ranging horse some 170 years or so prior to what E & P (ESRD) claims. Should E & P (ESRD) have done an objective review they would have been able to provide a more accurate historic account. As to E & P (ESRD)'s combined claims that not only are the current "feral" horses not native to North America and only come from domestic stock in the last 100 years, the following comment by Kirkpatrick and Fazio. (2010) provides useful insight as to this agency bias:

The non-native, feral, and exotic designations given by agencies are not merely reflections of their failure to understand modern science but also a reflection of their desire to preserve old ways of thinking to keep alive the conflict between a species (wild horses), with no economic value anymore (by law), and the economic value of commercial livestock.

The key element in describing an animal as a native species is (1) where it originated; and (2) whether or not it co-evolved with its habitat. ***Clearly, E. caballus did both, here in North American.*** *There might be arguments about "breeds," but there are no scientific grounds for arguments about "species (bold face added).*

This map shows the spread of the Spanish horse in North America including (top left) when they were thought to have arrived in what is now Alberta around 1715-1730. (Map compliments of Mike Cowdrey, and Ned and Jody Martin, *Horses and Bridles of the American Indians.* Hawkhill Press, Nicasio, Cal., 2012. (www.hawkhillpress.com).

6. **E & P (ESRD) does not appear to be concerned about the lack of management of recent domestic horses (halter-broke, branded) illegally turned loose or escaped in the foothills**

A review of some anecdotal information and range health surveys (obtained by FOIPP) indicates what appears to be a serious but unquantified problem of recent domestic "trespass" horses being turned loose or escaping in the foothills and not being picked up off the range - representing an artificial population increment. "Trespass cattle" are also mentioned in a few allotment reports.

E & P (ESRD) was questioned as to whether they have any control mechanisms in place that address the issue of recent "illegal" domestic horses instead of targeting with culls what appear to be long-standing free-roaming herds. E & P (ESRD) claimed it would be too difficult to deal with. While there is no evidence the foothills free-ranging horses are

causing quantifiable damage to the rangeland, domesticated horses that are released are not likely to have the survival skills of the wild horses who have lived in Alberta for hundreds of years, therefore releasing domesticated horses is likely to cause these animals undue suffering. For this reason, it is irresponsible for E & P (ESRD) not to be enforcing laws which prohibit domesticated horses from being illegally released onto range allotments.

7. E & P (ESRD)'s claim that the postglacial vegetation of the foothills rangelands are not adapted to repeated spring grazing is only partly true and leaves out key ecological perspectives. When questioned, E & P (ESRD) admitted that they cannot point to any sites where free-roaming horses had damaged the range.

The use of "repeated" spring grazing is confusing terminology since most grazing-oriented mammals present on the range in the spring repeatedly graze some of the same habitats. So far E & P (ESRD) has failed to provide any credible evidence that repeated grazing by free-roaming horses has caused significant damage to the rangeland as they have implied.

E & P (ESRD)'s confusing terminology is also misleading since historically, prior to European influence, the foothills fescue grasslands were the home of wild herds of bison, elk and mule deer, which would clearly infer these species made repeated spring use of the postglacial vegetation. With the advent of cattle ranching, bison were all extirpated, even from the adjacent national parks; and elk were also nearly extirpated with only reintroductions bringing back the herds. Free-roaming horses that belonged to First Nations likely began using these same rangelands in the early 1700s and now represent about 2 ½ centuries of re-adaptation. It is important to note that Parks Canada considers bison an integral part of the fescue grasslands and is working on a bison re-introduction plan for Banff National Park.

Alaska Wildlife Conservation Centre

E & P (ESRD) did provide me with references to a number of background documents that do indicate the fescue grasslands, which have evolved for millions of years in which multiple grazers were present including ancestors of today's horse, have some vulnerability to over-grazing in the spring. However, E & P (ESRD)'s comment was found to be misrepresentative since one of the studies they referenced actually indicated fescue grassland vulnerability was not just in the spring but also in the summer (when today high numbers of cattle are present in the grazing allotments). Another study referred to me indicated the fescue grasslands are vulnerable in the spring, summer and fall. However, E & P (ESRD) does not tell the whole picture since one of the key documents they also referred me to points out ***these natural grasslands are hardy, drought resistant, and evolved as highly adapted to the climate for the past 50 million years. Forage quality is high for livestock and wildlife grazing***.

By using the partial legitimate claim of spring grazing vulnerability in the same context as "feral" horses, the reader can be led to believe that since free-roaming horses are out on the range in the spring when cattle are not, the horses are causing a problem. This leaves out that elk and mule deer are also using some of the same spring ranges as horses. However, when questioned as to where we could find these sites over-grazed by the horses, an E & P (ESRD) spokesperson **said they could point to no damaged sites. This was followed by a later response from an E & P (ESRD) spokesperson to a request for more evidence of horse overpopulation and range damage that all rangeland users were contributing to the outcome of "activities…causing a decline in overall rangeland health."**

E & P (ESRD) could professionally have provided a more balanced, informative and broader-based perspective on the fescue grasslands from the literature references provided to me.

8. The E & P (ESRD) claim *that the horses have few natural predators and therefore the population needs to be controlled* is not fully true, lacks scientific rigour, and also fails to represent an ecosystem-based perspective of natural population control.

No effort has been made by E & P (ESRD) to integrate all natural control factors into the free-roaming horse management regime that would have included a more comprehensive mortality analysis involving all large predators; as well as the well-known density dependence control of wild equids and the impacts of severe winters and starvation in the Foothills Fescue Ecoregion.

Photo by Duane Starr Photography

As a test case regarding E & P (ESRD)'s claim that predation is not a factor as a viable natural population check of foothills free-roaming horse numbers, I analyzed detailed horse mortality data from a collared wolf study that included the Clearwater equine zone area. I also analyzed E & P (ESRD) minimal horse count data for the same study period and average

numbers to 2014. Using the same database available to E & P (ESRD), I was able to infer, but not prove, that wolf predation on free-roaming horses in the Clearwater equine zone is likely playing a key role in population control - contrary to E & P (ESRD)'s superficial interpretation of the same wolf study. Although more scrutiny is needed of my interpretation, I extrapolated that wolves would have killed upwards of 53 horses/annum that were free-roaming during the two year study period when a minimal count of only 30 horses was obtained. Although I made a number of assumptions that need to be tested, I am confident that a more rigorous review of the same database and my preliminary interpretation will provide strong evidence that predation by wolves is a strong population regulator where viable packs overlap with foothills free-roaming horse numbers.

With respect to cougars, a foothills study showed that a low amount of cougar predation occurred on free-roaming horses. No black bear dietary studies appear to have been done within the equine zones but the species is a well known ungulate predator. A grizzly diet study that included part or all of the northern equine zones showed no evidence of feeding on horses. However, since both bear species kill domestic livestock and are well known for preying on ungulates I am not convinced that both grizzly and black bears are not viable predation factors with respect to the foothills subpopulations of Alberta's free-roaming horses. This requires further study. Additionally, E & P (ESRD) appears to have made no attempt to include the ecological concept of "density dependent" controls of free-roaming equids resulting from increased competition for forage at higher population densities. This is considered by the U.S. National Research Council of the National Academies (2013) as the primary way that equid populations self-limit. In this context, I also found that in the past large die-offs of free-roaming horses from winter starvation in hard winters has been reported anecdotally in the Alberta foothills. Density dependent population control by nature in horses (and grazing wild ungulates) would be increased by the fact that permit cattle are allowed to deplete 50% of the available forage capacity and also the fescue grasslands are susceptible to periodic droughts such as occurred from 1999-2002.

Photo by Duane Starr Photography

E & P (ESRD) could have provided a much more balanced and scientifically credible perspective if they had included natural horse control vectors in their assessment and management policies.

9. E & P (ESRD)'s claim that *foothills free-ranging horses "are growing quickly and will outstrip the available forage"* is not supported by rigorous scientific data or other evidence. In fact two BC and two Alberta range use studies involving free-roaming horses showed no evidence that horses were out-stripping the range, although some localized vegetation damage might be occurring.

E & P (ESRD) has not provided me with their detailed survey reports and maps therefore, my evaluation of the horse count information is not yet finished. Also, some of the equine zones have not been counted in past years making it difficult to fully analyze possible population changes. However, having reviewed the data that was available, the difference in horse numbers in each zone are difficult to understand. In any event, the population of horses can only be considered to be too high if there is evidence of significant rangeland damage. Additionally, the number of horses may be considered to be too low if there are not enough animals to ensure a genetically healthy population (See section 13 regarding genetic health).

I visited the Sundre foothills region in May and late September, 2015 in search of both free-roaming horses and rangeland damage from over-grazing. In September, most of the horses I observed were grazing in clear-cut areas or along ridges away from where cattle commonly graze. Nearly all areas appeared to have healthy grazing habitat, even where range exclosure plots have been installed to assess the grassland health.

This photo was taken at one of these exclosures on September 15, 2015 along the forest trunk road between Sundre and Cochrane (N 51 45.710 W. 115 19.690)- at the end of the grazing season for cattle when it would be expected there would be the most damage - yet the grass is nearly as robust outside of the fence as it is on the inside.

In the same area, the photo below shows the only area that I observed where the grass had been over-grazed in combination with camping activities; while there was significant evidence of cows using the grazing area (about 50 excrement piles) there was no sign of horses.

Again, when E & P (ESRD) was questioned about horses outstripping available forage, they could only state that: ***These conditions may occur at any location and the locations can vary from year to year so it is not possible to point out certain sites where there is a problem.*** In a later response, E & P (ESRD) claimed that all users of the rangeland were contributing to a decline in rangeland health-even though the previous spokesperson could not point us to any damaged areas. That is not to say that free-roaming horses may not have caused some localized range degradation, as have cattle and wild ungulates. Despite this, the fact that the head of E & P (ESRD)'s range policy department could not direct us to sites damaged by horses clearly suggests the agency has greatly over-stated their case.

This was not in the least surprising since NONE of the four published range studies I reviewed involving free-roaming horses in western Canada, two in the BC Chilcotin plateau and two in the Alberta foothills, reported back that free-roaming horses "outstripped the available forage"; but rather several identified some localized over-grazing by horses and expressed concern related to this. Cattle grazing was also a concern raised in several of the studies.

One Alberta foothills study (Salter 1978) was done in what is now called the Sundre equine zone and at the time there were in the study area 200 free-ranging horses, about 50 elk (80-85 observed in winter) and 375 cattle (June 15-Oct. 15). The study concluded that ***range use was not excessive prior to cattle being turned out. There was little overlap of horses and cattle in summer even though they fed on similar plants.*** While changes have occurred in the Sundre ecosystem since the original Salter study such as grassland in-growth by conifers, wildfires, extensive roading and clearcut logging, oil and gas

development and a greatly increased recreational use including off-road vehicle use, I consider the findings still relevant today. The other Alberta foothills study used four radio-collared horses in four different bands in the Elbow equine zone (Girard 2012). It was done in an area with 131 free-roaming horses and 1,600 cattle (June 15-Oct. 15). Wild ungulates were also present. No research was done in the winter. Again the study did not conclude that the horses had outstripped the range. 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.*** There was a concern that horses and cattle in summer were near maximum acceptable levels of forage biomass removal but certainly I could see no documentation that lends credence to E & P (ESRD)'s claims of horses "outstripping the range".

The two Chilcotin studies (Bhattacharyya 2012**;** Preston 1984) were both done in similar areas of the Chilcotin plateau, one with only free-roaming horses and no cattle and the other with about 65 free-roaming (and some domestics) and high numbers of cattle that were considered the dominant grazer (89%).

The Bhattacharyya study found grazing by horses was patchy and heterogenous with no significant difference in plant community composition and heights between sites that were grazed and those that were not. My independent analysis of aerial horse counts since 2001 also suggested horse numbers, while fluctuating, remained relatively stable and never reached a state where they were eating themselves off the range.

Although Preston's study was not intended to look at range condition and causative factors of possible over-grazing between different grazing species, she did identify that both dry and wet meadows were severely overgrazed and trampled by cattle by the end of the summer (p. 84); but made no mention of horses. Similarly Preston found that *because horses depend heavily on rush-sedges in the winter, and cattle utilized them in the summer,* ***there is a possibility that cattle summer-use could adversely effect horses (p. 79)….. By the same token, horses may undermine the value of spring range to cattle. However, based on use-difference between the two herbivores already known to occur, there would seem to be little probability of this.***

Although my partial literature review showed that cattle use can be highly damaging to riparian areas in summer and fall and a number of range health surveys such as in the Sundre area allotments showed trespass cattle and **heavy-moderate range damage from cattle,** E & P (ESRD) does not discuss this issue on their web site concerning foothills "feral" horses; nor is there any evidence that E & P (ESRD) was taking remedial actions to correct cattle damage.

This is a significant anomaly and oversight I noted throughout E & P (ESRD)'s range management program for foothills free-ranging horses and cattle, that is highly suggestive of institutional bias and lack of objectivity.

10. E & P (ESRD)'s claims that free-roaming horses cause seedling damage in cutblock reforestation areas has not been substantiated

This is another rationale used by E & P (ESRD) to justify culls to control horse populations. Although the one study referred to me by E & P (ESRD) as "evidence" did identify some conifer seedling damage in reforested cutblocks from *incidental trampling*, it did not identify species of animal involved. Thus I could find no direct study where horse damage to conifer seedlings had been quantified and compared to damage by cattle and wild ungulates such as moose and elk; or that such damage was causing a proven loss of timber productivity to industry. **E & P (ESRD)'s lack of objectivity was found to be disconcerting in this regards**.

Lower Williams Creek - 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 causes some localized range degradation.

11. E & P (ESRD) horse count data and claims of over-population

To repeat, my horse count analysis is incomplete since E & P (ESRD) in an October 23, 2015 e-mail decided not to provide the information requested a number of times previously, including detailed horse count aerial survey reports and maps. This data would be very important since it would show clusters, herd sizes, distribution, survey limitations and biases and other factors.

<u>Horse counts 1978-2015 database</u>

I made the following review using earlier horse count data (to 1978) I already had *In file* from Alberta biologist Robert A. Ruttan, the 1992/2001-2015 equine zone horse counts that were obtained by a third party through FOIPP (Alberta Environment and Sustainable Resource Development (E & P (ESRD)) 2014b), and recent horse count summary data obtained from the E & P (ESRD) website.

E & P (ESRD) population size, trend estimates and cull programs are lacking in scientific rigour. Obviously, more E & P (ESRD) information is needed for me to be able to complete a final analysis of the horse counts and apparent increasing trend numbers in the Sundre and Ghost River equine zones. **However as stated earlier, since E & P (ESRD) has been unable to point to any substantive damage caused by the horses and**

instead blames so-called range health damage on "all users", they have no proven scientific justification for the assertion that the wild horses are over-populated. Additionally, E & P (ESRD), while claiming they intend to maintain free-roaming foothills horse populations, has failed to provide any assurance or studies to show that there is a large enough population of animals to sustain genetic health over the long term.

My initial review revealed that E & P (ESRD) horse count data used for population estimates, trend analysis and the determination of cull programs are lacking in scientific rigor and transparency.

Photo by Duane Starr Photography

To date, I have seen no evidence that more recent aerial surveys have been standardized. In addition, E & P (ESRD) has made no effort to relate minimal aerial counts with numbers actually on the ground in order to make reliable statistical estimates of total numbers - a methodology which is foundational to a reliable population inventory and sound rather than speculative management decisions based on a subjective database. For example, one study in Australia (Linklater and Cameron 2002) compared helicopter and ground counts in the same area and found that **helicopter counts overestimated real numbers by 15-32%.** Based on these factors, there is to date no reliable information which can explain why the horse counts differ significantly between the equine zones or why some zones appear to be consistently higher than the others. Many factors may be at play here including survey errors (double counting), food availability, historic range areas of the free-roaming horses, number of predators, human encroachment, etc. Further detailed in-depth investigation needs to be done to determine the carrying capacity and number of horses it can support.

A scrutiny of the limited database I had access to going back to 1977 suggests that, on average, while total horse numbers in the Alberta foothills, as indicated by "total counts per survey", have increased in some years (the highest in 1977 of 1791 horses) they have decreased in others (with the most recent indicating there are 880 horses). Despite the different counts, there may be more long-term stability related to the horse count fluctuation data than E & P (ESRD) has given consideration to. However accurate these surveys of minimal numbers might be, the historic context suggests considerable fluctuations in free-ranging horse numbers that most likely reflect differences in survey methods and visibility of the horses at the time of the surveys, natural population fluctuations such as poor winter survival and predation as well as live-capture by permit holders and unknown illegal shooting of horses.

In terms of total numbers averaged out over time it is interesting that the estimate by Evans (1993) of 630 – 850 *escaped or abandoned* horses in the "Green" or forested foothills area of Alberta in 1993 is very similar to the E & P (ESRD) estimate of 880 horses in 2014. Additionally, as noted by Evans (1993), **counts by forest districts indicated a decline**

from 1977 when 1,791 horses were estimated. In other words, an examination of horse counts and population estimates in the foothills zone within a broad time-frame of some 20-30 years suggests that, even given the vagaries and inherent errors and variations in aerial surveys, the horse subpopulations are obviously undergoing population ups and downs as with normal wild ungulate populations in the same foothills areas such as mule deer and Rocky Mountain elk. If Evans (1993) data for 1977 is at all accurate, then nearly 40 years ago free-ranging horses were nearly double the numbers suggested from E & P (ESRD)'s 2014 counts. In conclusion, in light of these previously higher horse numbers, the two published range studies in areas if the foothills equine zones have not documented long-term range degradation from free-roaming horses nor has E & P (ESRD) been able to provide information to support their claim that the current numbers of horses are "outstripping the range" and "causing unsustainable impacts on the land".

12. Horses are being blamed for range damage while the role of cattle is ignored by E & P (ESRD)

Grazing allotment data shows that during the cattle grazing period (June 15-Oct. 15) there are over eight times more cattle than free-roaming horses (8,502 versus 800-1,000) in the equine zones. This is an important context as to which species might actually be causing the "outstripping of the range" and "unsustainable damage on the land" that E & P (ESRD) claims free-roaming horses are responsible for

In blaming the horses, E & P (ESRD) overlooks evidence that cattle could be a greater problem:

- A number of the range health surveys in the foothills equine zones report on extensive damage being caused by cattle in some of the foothills allotments.

- The high negative impacts of cattle grazing on riparian areas (e.g. streamsides including fish-bearing habitats, sedge meadows, and other wetlands) has been amply documented in the scientific literature.

- Wild horses tend to be broken into small territorial, nucleus reproductive bands and bachelor bands that behaviourally helps limit their impacts on vegetation cover as compared to putting 300 cows on the same range. It is well recognized that cattle have a tendency to concentrate their numbers in one or several herds and therefore

behaviourally, unless spread out and distributed by range riders, can have a much more concentrated grazing impact on the range than free-roaming horses.

These cattle over-grazing factors are totally ignored in E & P (ESRD)'s unsubstantiated claims against the free-roaming horses and it is no wonder E & P (ESRD) could not point us to sites damaged by the horses. It is also no surprise that during my field visits to the foothills in May and September, I was only able to find one small area that could be considered as overgrazed but where only cattle sign was evident. Site damage was most obvious at cattle salt licks and was caused by cattle, horses and wild ungulates but appeared localized.

13. Genetic viability.

In a letter sent by the Minister of Alberta Environment and Parks to Zoocheck dated September 29, 2015 the minister notes "I can assure you that our government is committed to ensuring that feral horse populations remain on our lands …." Additionally, all participants on Alberta's Feral Horses Advisory Committee (meeting minutes obtained through Freedom of Information request) indicated that free-roaming horses should remain in Alberta.

If the Alberta government is committed to maintaining free-roaming horse populations in the Alberta foothills at acceptable range health levels rather than extirpate them from the foothills fescue grasslands, then I see no E & P (ESRD) provisions to manage populations in the six equine management zones to maintain healthy minimal viable populations (MVP) that engenders genetic allelic diversity and prevents in-breeding depression and birth defects.

Photo by Duane Starr Photography

One concern is that the southern subpopulation in the Elbow equine zone is totally isolated from the northern five equine zones. The five northern zones appear to be interconnected as *metapopulations,* although this needs to be verified. According to the National Academie report on using science to improve the BLM wild horse and burro program in the US (National Research Council of the National Academies. 2013) *it was originally that an*

effective population size of at least 50 was necessary to avoid short-term inbreeding depression, but empirical work suggests that if maintenance of fitness is important, effective population sizes much larger than 50 are necessary.

Given that ERSD has been unable to point to any damage caused by the current number of horses in Alberta, it would be prudent to engage in research which can inform the number of horses necessary to maintain a healthy free-roaming horse population in the province and factor that into the horse management program.

14. Comments on E & P (ESRD)'s recent free-roaming control measures

I will reserve my final professional opinion on this until I am able to analyze the detailed aerial survey reports and maps for the Sundre and Ghost River equine zones that E & P (ESRD) claims indicate dramatic increases in numbers that led to the recent E & P (ESRD) cull programs. As well, I hope to obtain other background information such as predator (wolf) control. There are many questions related to the controversial horse culls. For example, it is disturbing that the head of the province's range management unit could not point me to damaged sites in the Sundre and other equine zones where the horses were claimed to be outstripping the range; and the more recently appointed head of range management stated that the deterioration of range health was caused by "all users". I also saw no convincing evidence of this claimed deterioration in range health such that free-roaming horses had to be culled in my review of the range health surveys and rancher self-assessments in the FOIPP database for the DUs for these equine zones

Courtesy of IDA, photo credit Craig Downer

The other discrepancy, as noted, is that long term minimal count data for four of the six equine zones do not suggest the recent population increases that E & P (ESRD) indicates from their surveys have occurred for the Ghost River and Sundre equine zones; the four other equine zones, while experiencing ups and downs in minimal counts, appear to have fairly stable populations of less than 100 animals. In addition, while admitting on their website that along with high reproductive and low capture rates, *increasing numbers of escaped and illegally released horses have significantly increased the population and distribution area of feral horses*, E & P (ESRD) does not attempt to document and control recent released and escaped domestics – another influence that is not taken into account. Also for the Clearwater equine zone, I demonstrate the strong possibility from the wolf study there that horse numbers are likely being held in check by wolf predation.

It is also interesting that the scientists involved in the recent free-roaming horse range study in the Elbow equine zone (Girard et al. 2013b) concluded that while combined use by cattle and horses would be problematic should they exceed the carrying capacity of the grasslands, they did not feel that ***that sporadic horse captures will contain the growth of feral horse populations.*** It is noteworthy that the US National Academy review of wild horse and burro management by the BLM in the US (National Research Council of the National Academies. 2013) concluded that *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.*

Free-ranging horse populations are growing at high rates because their numbers are held below levels affected by food limitation and density dependence. In population ecology, density dependence refers to the influence of density on such population processes as population growth, age-specific survival, and natality. Effects of increased population density are manifested through such changes as reductions in pregnancy, fecundity, percentage of females lactating, young-to-female ratios, and survival rates. Regularly removing horses holds population levels below food-limited carrying capacity. Thus, population growth rate could be increased by removals through compensatory population growth from decreased competition for forage. As a result, the number of animals processed through holding facilities is probably increased by management.

Photo by Duane Starr Photography

Density dependence, due to food limitation, will reduce population growth rates in equids and other large herbivores through reduced fecundity and survival. Case studies show that animal responses to density dependence will include increased numbers of animals that are in poor body condition and are dying from starvation. Rangeland health is also affected by density dependence. Equids invariably affect vegetation abundance and composition. Reduced vegetation cover, shifts in species composition, and increased erosion rates often occur on rangelands occupied by equids. ***However, no case study has reported that the changed vegetation cannot persist over a long period of time or that complete loss of vegetation cover is an inevitable outcome.*** *The results are consistent with theoretical predictions that when a herbivore population is introduced, vegetation cover will initially change and productivity will often be reduced by herbivory. In some environments, however, moderate levels of herbivory have little adverse effect or even have favorable effects on plant production. Vegetation production may decline, but it may stabilize at a lower level as herbivore populations come into quasiequilibrium with the altered vegetation.* ***Whether such a system can persist over the long term is unknown.***

15. First Nations consultation

As part of my scientific review, the involvement and input of traditional ecological knowledge (TEK) of First Nations in the government's free-roaming horse management program is noticeable only by its absence. Contemporary science in western Canada, including the Federal government, now recognizes and includes First Nation TEK in various research projects including cultural keystone species. .

Three Chiefs from the Piegan Blackfeet, a tribe from Montana and Alberta. via WikiCommons

I am sure, given that First Nations in Alberta were the cultural group that first brought the foundational horses into the foothills in the early 1700s, that the free-roaming horses of today would qualify as a *cultural keystone species* and that involvement of First Nations in research and management would lend a vital perspective.

Free-roaming horses just west of Sundre, Alberta. Photo: Wayne McCrory.

RECOMMENDATIONS

I recommend the following actions be taken prior to any further decisions concerning management of Alberta's last free-roaming horse population.

1. The Minister of Environment and Parks has said that the Alberta Government intends to ensure free-roaming horse populations remain in the Alberta foothills. To accomplish this at acceptable range health levels rather than make unsubstantiated and contradictory claims as to horse overpopulation and range deterioration, all of these significant problems I have identified with their scientific database, interpretation, policies and web site public information need to be addressed and rectified. Otherwise what appears to be a very faulty management regime will only continue to be very controversial.

2. Strong consideration should be given to special legislative recognition and protection of Alberta's free-roaming horses that recognizes their unique origins, cultural/heritage values including First Nations, and ancestral evolutionary role in ecosystem functioning of the ancient fescue grasslands of Alberta. They should be managed under this special legislation separate from being managed as stray livestock under the narrow and prejudicial definition of "feral" animals. Such management needs to be fully transparent to the public.

3. Domestic horses illegally released or that escape into the wilds need to be controlled as separate from the established long-term foundational wild herds.

4. Conduct long-term field research of a viable sample of different herds in each of the six equine zones to determine reproductive rates, survival and increments or losses to herds, including all mortality causes including predation factors.

5. Conduct independent and objective long-term baseline research in each equine zone of range conditions and health that looks at grazing use and effects of all large species on the range: free-roaming horses, cattle and wild ungulates as well as overall effects of logging, wildfire and off road vehicle use (ORV). This should involve a cumulative effects (CE) analysis.

6. Standardize aerial horse count methods. All aerial counts must also be followed up by ground counts to ensure accuracy. Counts must be done in all equine zones annually and all reports and maps be fully available to scrutiny by the public.

7. E & P should stop relying on self-assessment of rangeland health by the ranching industry and instead have government hired consultants at arms-length from the ranching industry collect data for rangeland health inventories and those inventory reports should be made available to the public.

8. Consult with Alberta First Nations to include traditional knowledge regarding the history and heritage interest around the free-roaming horses.

2.0 INTRODUCTION & APPROACH

This report is a preliminary independent scientific review for Zoocheck of the management policies and practices of the Alberta Environment and Sustainable Resource Development (E & P (ESRD)) for free-roaming horses in the six Foothills Equine Zones: with particular emphasis on the E & P (ESRD) database and rationale to periodically cull some horse subpopulations.

This is by no means a complete and comprehensive review due to a variety of factors, not the least of which was the poor quality of initial background information provided by E & P (ESRD) and their ultimate refusal to provide more detailed evidence. Nonetheless I considered my professional review adequate to provide Zoocheck with a reliable overview of the value and limitations of E & P (ESRD)'s free-roaming horse policies and current management regime.

The following approach was used to make my assessment:

- On-line research of E & P (ESRD) free-roaming horse management in the Alberta foothills.

- On-line research and review of background documents used by E & P (ESRD) in their free-roaming horse and range program for the foothills.

- Review of other E & P (ESRD) (2014) documents on the management of free-roaming horses obtained by a third party through the Alberta Freedom of Information and Protection of Privacy (FOIPP). These are references as E & P (ESRD) (2014).

- Review of other studies and information that would pertain to the E & P (ESRD) program. Particular use and emphasis in my review was made of the peer-reviewed on-line Invasive Species Compendium on *Equus caballus by* CAB International (Cabi 2015), the independent findings of the National Academie report on using science to improve the BLM wild horse and burro program in the US (National Research Council of the National Academies. 2013) and the U.S. BLM Strategic Research Plan – Wild Horse and Burro Management (Bureau of Land Management (BLM). 2003 - revised 2005).

- Personal knowledge and research experience from 11 years of studying free-roaming horses in the BC Chilcotin (McCrory 2002, Cothran and McCrory 2014 and others) and including design of a wild horse management/tourism plan for the Xeni Gwet'in First Nation and input and peer-review of two university graduate-level research projects and an on-going wolf diet study related to wild horses, wild ungulates and cattle.

- Limited field surveys including an overview trip in mid May on the forest trunk road from west of Sundre to Cochrane with short spot checks of habitat and horse sign

and a 3-day survey of wild horses and range conditions in the Sundre-Williams Creek area and Sundre-Cochrane road corridor from Sept. 28-30. I also have extensive familiarity with foothills habitat types & grassland/riparian ecology based on three years of previous grizzly bear habitat assessment in Kananaskis Country (Herrero et al. 1983).

- Data obtained from written information queries to Helen Newsham, P. Ag. Head, Rangeland Integration Section Policy Division of E & P (ESRD) and comments made in subsequent response refusing to provide evidence and information by her successor, Rob Kesseler.

- Review of natural control factors for free-roaming horse populations, including density dependent factors and predation. I searched the scientific literature for references to periodic horse die-offs in the foothills as well as studies on various large predators (wolves, cougars, grizzly bears and black bears). As well I examined the degree of mortality of "control" and hunt programs on known natural predators, wolves and mountain lions of free-roaming horses including the predator bounty system.

- I used my review of predation studies to test the following claim by E & P (ESRD): *The research we've done shows feral horses don't really have any natural predators – they're sometimes killed by wolves and cougars, but not often. With no natural check on their population…* For my test case, I analyzed detailed horse mortality data from a collared wolf study that included the Clearwater equine zone area, along with E & P (ESRD) minimal horse count data.

My preliminary report for Zoocheck is loosely structured in a format pertaining to various categories of information used by E & P (ESRD) to support their cull program. In May 2015 I was going to be in Edmonton and requested in advance an interview with Helen Newsham, P. Ag. Head, Rangeland Integration Section, Policy Division. E & P (ESRD). This was turned down due to her being busy and she requested that it would work better if I submitted a written list of questions. This I did on July 7 after doing a background review. I received only a partial response on July 28 and submitted another letter on July 29 asking for the remaining missing data and for clarification of some of the information E & P (ESRD) provided on July 28 that I considered vague or not adequate or simply requiring just a yes or no answer. When I did not hear back I sent a follow up request to her successor, Rob Kesseler. On October 23 I received a response refusing to provide me with any more information.

I have taken the liberty of providing these questions and E & P (ESRD) answers along with my comments in the different relevant sections of this report.

Any professional opinions and conclusions expressed herein are entirely my own. I have attempted to identify where some of my data analysis infers certain preliminary conclusions but is not rigorous enough at this point to have a high degree of confidence.

3.0 REVIEW & COMMENTS

3.1 COMMENTS ON E & P (ESRD) DATABASE AND PUBLIC INFORMATION PROGRAM RE- FREE-ROAMING HORSE MANAGEMENT

In general, E & P (ESRD) tends to run a more or less "closed shop" in terms of making only limited summary information available on their website, very little of it scientifically backed up with background reports and other evidence. In addition, the generalized questions and answer section for the public on their web site is lacking in scientific documentation and credibility. Only limited data on horse counts used to justify recent wild horse culls has been made available on the web site and reports and maps are generally lacking as verified by Helen Newsham, head of the E & P (ESRD) Rangeland Integration Section: *We do not routinely develop reports or maps for public distribution other than the material on the website* (Helen Newsham, P. Ag. Head, Rangeland Integration Section. Policy Division. Alberta E & P (ESRD). (June 15, 2015 e-mail to Julie Woodyer, Campaigns Director, Zoocheck).

A written attempt to obtain background information and scientific evidence from E & P (ESRD) used to support their web and media statements was met with evasiveness and limited scientific referencing that was often confusing and not well thought out or explained. In the end, the request for evidence was refused.

Range health surveys and management plans by ranchers used by E & P (ESRD) to make management decisions including wild horse culls are considered internal documents and have to be obtained through the Freedom of Information and Protection of Privacy (FOIPP) request process.

3.1.1 E & P (ESRD) general web site

E & P (ESRD) maintains a web site with limited information on free-roaming horses in the Alberta Foothills. This includes about how their horse counts are conducted, and maps for the count results for the last three years based on Equine Management Zones and a list of questions and answers for the public (http://E & P (ESRD).alberta.ca/lands-forests/land-management/feral-horses/feral-horse-faqs.aspx).

Another associated web site has considerable technical information on range types and range management approaches Alberta but this does not address free-roaming horse management (Principles of rangeland management and range health methodologies) http://aep.alberta.ca/lands-forests/grazing-range-management/default.aspx).

The E & P (ESRD) web site was disappointing in that for such a controversial issue it was not comprehensive such that scientific references and documents backing up their public information was generally lacking. Summaries are provided on recent horse counts but technical reports and maps were generally lacking and not available.

3.1.2 E & P (ESRD) web site/blog on 2013 and 2014 horse counts

The web site presents the results of the E & P (ESRD) horse counts with some analysis and justification for at least the 2013 and 2014 counts and associated horse removal programs. It includes a blog open to the public with a mediator. One finds on the blog many controversial posts, both pro and con, regarding the polarized debate regarding the horse cull. Often the debate surrounds inadequately explained or misleading claims by E & P (ESRD). The mediator sometimes steps in but tends to only promote the E & P (ESRD) position and rationale at times, which only continues to polarize, not inform, the debate. While some information is available on E & P (ESRD) blog related to recent horse counts, the actual survey maps, reports and interpretive analysis by the surveyors are not made available for public scrutiny. Critical information that could inform intelligent review and discussion thus appears to be deliberately withheld by E & P (ESRD).

3.1.3 E & P (ESRD) lack of transparency

My review of the existing, available E & P (ESRD) free-ranging horse database and my professional experience in attempting to conduct a professional review of E & P (ESRD) management of free-ranging horse management in the Alberta Foothills is that, overall, the E & P (ESRD) Rangeland Integration Section lacks transparency and scientific credibility in terms of both professional and public access to their management database, reports and other information. Again, to repeat: According to Helen Newsham, head of the E & P (ESRD) Rangeland Integration Section: *We do not routinely develop reports or maps for public distribution other than the material on the website* (Helen Newsham, P. Ag. Head, Rangeland Integration Section. Policy Division. Alberta E & P (ESRD). (June 15 2015 e-mail to Julie Woodyer, Zoocheck). Yet such information if provided would allow closer scrutiny and understanding of the horse counts and claimed population trends.

My experience in researching the science used by E & P (ESRD) is that the information provided on their website is very limited. For example, I could find no information available that uses available government foothills horse counts going back 30 or more years.

3.2 BACKGROUND: THE FOOTHILLS EQUINE MANAGEMENT AREAS

The Alberta foothills are broken down into six equine zones. From north to south these area: Brazeau, Nordegg, Clearwater, Sundre, Ghost River and Elbow River. The Elbow River zone, which includes a portion of Kananasksis Country, is the only one that is isolated from the others (Figure 1). Each of these zones is broken into District Units for purposes of range allotments, range health assessments and management plans.

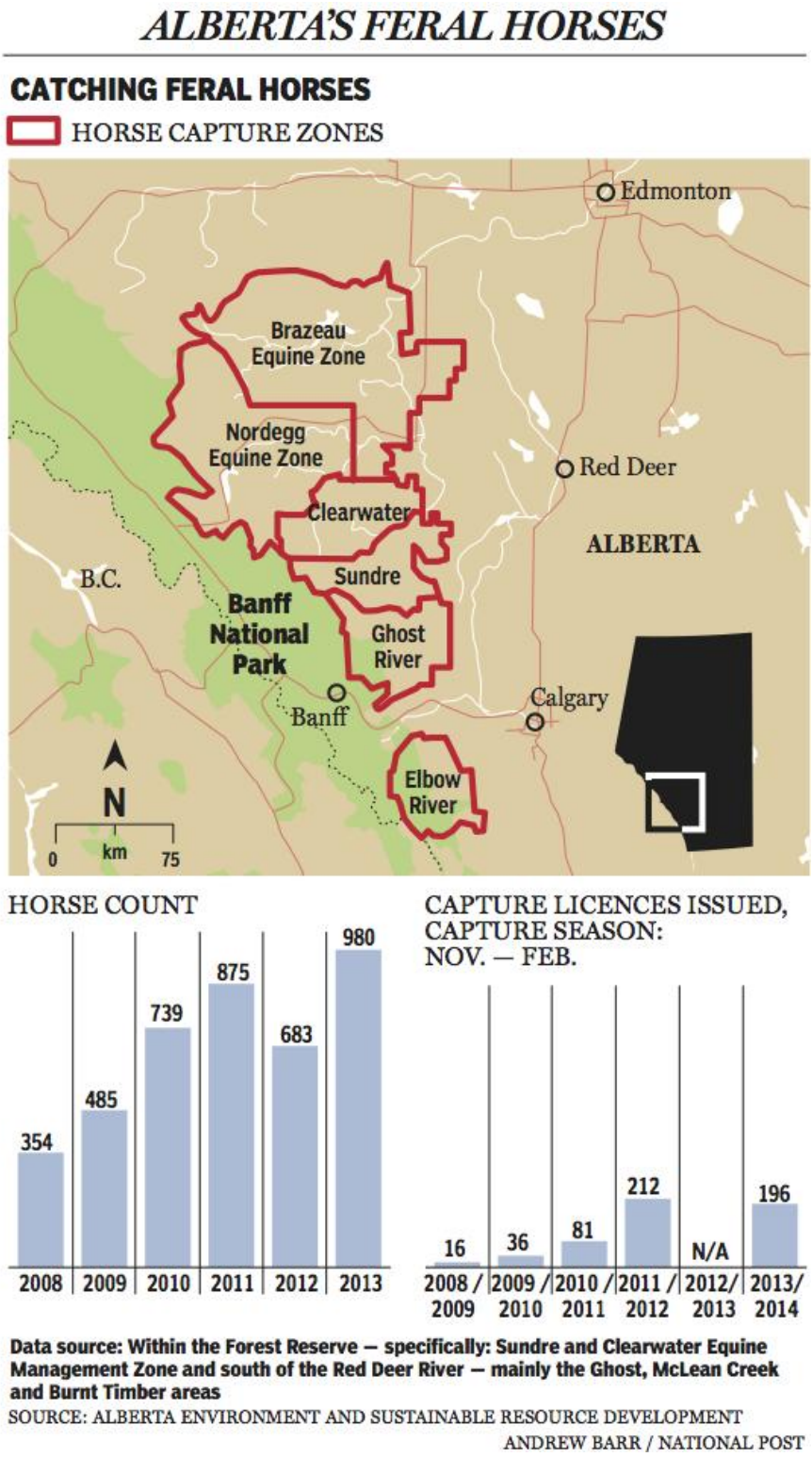

Figure 1. Alberta Foothills Equine Management Zone. National Post (2014). http://news.nationalpost.com/news/canada/clash-between-activists-and-ranchers-over-albertas-wild-horse-cull-heats-up

3.3. EVALUATION OF E & P (ESRD)'S INFORMATION ON ORIGINS OF HORSES IN NORTH AMERICA AND ALBERTA FOOTHILLS

Following is a partial evaluation of the accuracy of information and scientific database used by E & P (ESRD) related to Alberta's free-roaming horses and their management.

3.3.1 E & P (ESRD)'s claim that horses are not native to North America

Historic context: E & P (ESRD) public information on origin of horses in North America and origin of current free-roaming horses in foothills equine zones

In order to provide some historic context for the public and media, E & P (ESRD) has provided on their website a somewhat questionable claim as to the origin of horses in North America as well as the origin of horses in the Alberta foothills zone. In response to my recent written query for supporting evidence to horses not being native to North America, the answers provided were neither scientifically credible, not supported by back up evidence with relevant documentation other than to repeat a few anecdotal statements and avoid providing evidence.

Question to E & P (ESRD) 1.1 FIRST ITEM.

> "*I have to repeat that horses are NOT native to North America"....*Helen Newsham, P. Ag. Head, Rangeland Integration Section. Policy Division. Alberta E & P (ESRD). (March 19, 2015 e-mail to <briandekock@platinum.ca>, then forwarded by the recipient to Julie Woodyer, Zoocheck).

July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), Item 1.1:

> What evidence does E & P (ESRD) have to support the following claims. Please provide references from the scientific literature, [Please Note: There is substantive published archeological, DNA and other information on this very topic published in the scientific literature. I would be very interested in what specific documents you are using to support your claim]: *I have to repeat that horses are NOT native to North America...*

This question directed to H. Newsham was not answered in her response just before her retirement from E & P (ESRD). Since she made this statement it is interesting that, although given the opportunity, the question was ignored although she responded to other questions or sent them out to other staff members for more information.

Following are my comments that support an opposite and scientifically documented historic context – that being that North America was the evolutionary birthplace for millions of years for the horse as we know it today.

July 29, 2015 McCrory Wildlife Services response sent by e-mail to both H. Newsham and cc'd to her replacement Rob Kessler

> The July 28 response avoids addressing the claim by Helen Newsham that horses are not native to North America, which contradicts a substantive amount of accepted historical, archeological, DNA and other science-based information on this very topic that is published in the scientific literature.
>
> Again, could you please provide the evidence for your claim including scientific references.

On October 2 I sent a reminder to Mr. Kesseler. On October 23, **I received a response refusing to provide the information requested**.

The following peer-reviewed study (Cabi. 2015) indicates that the current species of the modern horse of today, *Equus caballus* is native to North America according to a detailed DNA analysis but, while admitting the evidence is mixed, the authors point out that a majority of scientists still consider them non-native:

> *It is sometimes argued that E. caballus should be considered as a native species in North America, despite its absence between the Pleistocene and the arrival of European people a few hundred years ago, on the grounds of studies such as that by Weinstock et al. (2005). This study used analyses of a segment of 349-716 base pairs in mitochondrial DNA of fossil equid remains from 53,000 years ago to historical times to produce a phylogenetic tree that the authors interpret as suggesting that domestic E. caballus are conspecific with most or all of the equids in North America from the late Pleistocene. While there remains mixed evidence of whether contemporary E. caballus should be considered native to North America or not, a majority of mammalogists and phylogeneticists in practice consider them non-native, given that the preponderance of existing evidence is consistent with such a designation.*

Kirkpatrick and Fazio (2010) provide an excellent synopsis that supports the concept that horses are native to north America related to similar non-native positions as E & P (ESRD) taken by U.S. government agencies and their controversial policies over management of free-roaming horses:

> *Wild horses (Equus ferus) were well-established inhabitants of North America until extirpated more than 8,000 years ago (Lever 1985). Following re-introduction of the domestic horse (Equus ferus callabus) by Europeans, horses expanded in geographic range and eventually formed significant populations of free-ranging horses over large areas of the western United States and portions of Canada (Lever 1985; Singer 2005).*
>
> *The key element in describing an animal as a native species is (1) where it originated; and (2) whether or not it co-evolved with its habitat. Clearly, E. caballus did both, here in North America. There might be arguments about "breeds," but there are no scientific grounds for arguments about "species".*

As a scientist I agree with their conclusion. I also believe the following statement made by the Kirkpatrick and Fazio (2010) is directly applicable to E & P (ESRD)'s claims that horses are non-native and feral:

> *The non-native, feral, and exotic designations given by agencies are not merely reflections of their failure to understand modern science but also a reflection of their desire to preserve old ways of thinking to keep alive the conflict between a species (wild horses), with no economic value anymore (by law), and the economic value of commercial livestock.*

Rather than spend a considerable amount of time for Zoocheck synthesizing the other studies on evolutionary history of the horse in North America I have simply added the following scholastic information for further context on the subject of wild horses of today being native versus non-native to North America:

a). According to a paper in the American Journal of Life Sciences, Downer (2014) concludes the horse and burro as positively contributing returned natives in North America:

> *Since the Wild Free-Roaming Horses and Burros Act of 1971, debate has raged over whether horses and burros are restored North American natives. Fossil, genetic and archeological evidence supports these species as native. Also, objective evaluations of their respective ecological niches and the mutual symbioses of post-gastric digesting, semi-nomadic equids support wild horses and burros as restorers of certain extensive North American ecosystems. A Reserve Design strategy is proposed to establish naturally self-stabilizing equine populations that are allowed to harmoniously adapt over generations within their bounded and complete habitats. These populations should meet rigid standards for viability based on IUCN SSC assessments (2,500 individuals). Basic requirements are described for successful Reserve Design including viable habitat as well as specific regions of North America where this could be implemented.*

b). In part of her response to my question re-grazing impacts Newsham quotes a federal government report by Bailey et al. (2010) titled *Management of Canadian Prairie Rangeland*. This is a very comprehensive and well-researched background report. Noteworthy is that, although the authors do not make any inferences to the horse being native to North America, the same report makes the following references to horses being present in early times in the same "ancient" fescue grasslands that still exist today and inferentially where the wild *Equus caballus* now reside today in the Alberta foothills:

> *Canadian prairie rangelands or grasslands are composed mostly of ancient natural grasslands, some forest ecosystems, as well as introduced, semi-permanent grasslands developed by ranching and farming interests. The 50 to 80 million-year-old natural grasslands are widely distributed. …The ancient natural grasslands of the Canadian prairies have adapted and evolved for about 50 to 100 million years as the Rocky Mountains arose....The natural grasslands of both uplands and riparian (wetland)*

areas were the traditional habitat for grazing herds of wild ungulates, including bison, horses, and wild camels.

p. 2. *Over thousands of years, grass-eating animals and their predators evolved with the prairie plants. They included various species of bison, elk, deer, antelope, horses, camels, big horn sheep, small mammals, insects, and birds. The array of predators included wolves, grizzly bears, aboriginal peoples, and more recently, eastern Canadian, European, and American settlers.*

p. 18. For millions of years, grazing, drought, and fire influenced the grasslands of the prairies. Drought and fire both strongly influenced the formation of ancient natural grasslands. Grazing has always been a part of the Great Plains grasslands. During the ice age, there were horses, camels, and mammoths, but bison were the dominant grazer in the Canadian plains grassland ecosystem (http://esask.uregina.ca/entry/prehistory_southern_saskatchewan.html). Overgrazing occurred when the populations of grazing animals exploded, when there was drought, and when too many fires removed too much of the forage resource. These factors would have also reduced rangeland ecological health. Subsequently, many grazers would have died due to starvation, lack of water, or disease. Afterwards, for a period of years, the rangelands would gradually have recovered to a healthier state because of the reduced grazing pressure.

c). **Haemig (2012) also provides a comprehensive paleontological and ecological summary in Ecology.Info 33 (www.ecology.info/horses.htm**):

The first horses appeared in the early Eocene of North America, 50 to 56 million years ago…. The Pleistocene epoch occurred 1.8 million to 10,000 years ago….. By the beginning of the Pleistocene, there was only one genus of horses, Equus, still remaining in North America. Although horse generic diversity was low, horses were still very abundant animals and continued to numerically dominate ungulate communities in North America (Guthrie 2003). .....Fossil deposits from the mid- and late-Pleistocene of North America usually contain remains of two horses: a caballine horse and a stilt-legged equine. Both forms belonged to the genus Equus, but were from genetically distinct lineages (Weinstock et al. 2005). A recent study of caballine fossils in the northern hemisphere reveals that those of late Pleistocene times belonged to two clades: (1) an endemic North American group, and (2) a Holarctic group found in both North America and Eurasia (Vilá et al. 2001). The familiar domestic horse of today comes from the second clade (see below).

Extinction of Horses in North America

After over 55 million years of evolution and residence in North America, horses became extinct there. This extinction occurred either in the late Pleistocene or early Holocene. (The Holocene is the period of time we live in now. It began after the Wisconsonian glaciers melted, roughly 10,000 years ago.). The extinction of North America's horses occurred during a time period when many other large mammals throughout the world

also became extinct. It is hard to find agreement in the literature about terminal dates. Kurtén and Anderson (1980) reported a dating of 8,000 years ago for horse fossils from Alberta, Canada, but MacFadden (2005) writes that North American horses became extinct roughly 10,000 years ago.

Should North America's modern wild horses be considered invasive, non-native species? Here again the answer is not clear because we don't know exactly what caused the extinction of horses in North America thousands of years ago. If humans did extirpate these earlier horses, then the presence of wild horses in modern-day North America could be seen as a wholesome restoration of one endemic element that was lost long ago by human carelessness.

Whichever way we decide to view North America's modern wild horses, it is essential that they be managed in an ecological way.

d). **Another excellent synopsis of the history of the horse in North America is provided in the BLM Strategic Research Plan – Wild Horse and Burro Management (2003):**

The wild horses that roam the west are feral descendents of domestic stock brought to North America by European colonists. No native wild horses existed in the Americas at that time, even though the horse evolved in North America and spread to Eurasia approximately 2.5- 3.0 million years ago. The North American fossil record suggests that progenitors of all extant horses, asses, and zebras once lived in North America. The last remaining native wild horses persisted in North America until as recently as 8,000-10,000 years ago when they mysteriously became extinct. Recent paleontological finds from Alberta indicate that these last remaining small native wild horses were killed and eaten by Native Americans about 10,000 years ago. Perhaps over-exploitation by Native Americans in this pre-domestication period played a role in the horse's demise in North America. Climate change and changes in vegetation have likely also played a role (Hulbert 1993, Martin and Klein 1984, Sharp and Cerling 1998, McFadden 1992).

The disappearance of the native form of such an adaptable and widespread species as the wild horse from North America several thousand years ago remains an enigma. The progenitor of the domestic horse (Equus caballus) which was domesticated roughly 6,000 years ago, is suspected to have been a tarpan-like animal—a short, stocky, mousy or yellowish gray (possibly dun or grulla) animal about the size of a large pony. The tarpan persisted into the early to mid 1800s in western Europe and the Ukraine where the last animal was shot in 1879. The tarpan also did not survive in captivity, the last one died in 1918, although the closely related Mongolian or Przewalski wild horse (Equus-caballus przewalskii) did survive in captivity. The Przewalski horse has a different chromosome number and thus, is not the progenitor of the domestic horse (Bennett and Hoffman 1999).

e). **Bhattacharyya (2012) in her doctoral dissertation on Free-Roaming Horses in the Culture and Ecology of the Brittany Triangle and Nemiah Valley in British Columbia provides the following summary**:

> *Free-ranging horses (Equus ferus caballus L.) in North America, and around the globe, are the same species as domestic horses though they represent a similarly diverse range of breeds. Evolutionary ancestors of the modern horse, as well as some other equids, existed in North America and throughout Eurasia. The early North American equine species apparently became extinct during the same period as many other large mammals died off on this continent during the Pleistocene period between 10,000 and 7,500 years ago (Clutton-Brock, 1994; Kavar and Dovc, 2008). Horses continued to range throughout Eurasia, undergoing morphological changes in response to localized environmental conditions, and are believed to have been tamed then domesticated by humans between 5,000 and 2,000 years ago (Berger, 1986). From that time forward, horses became inextricably interwoven with human history in Europe and Asia, an essential partner to human transportation, culture, warfare, agriculture, social hierarchy and political power……. While it is generally acknowledged that horses were brought to North America (specifically, the region that is now Mexico) by Spanish explorers during the early sixteenth century (Wagner, 1983), there is some debate over whether this action represented the introduction of an exotic species into North America or the re-introduction of a long absent native species (Beever and Brussard, 2000a; Kirkpatrick and Fazio, 2010). This debate influences whether free-ranging horses should be considered a native species, an invasive species, or something else. A more appropriate distinction might be made according to the ecological impacts of various sub-populations, rather than attempting to classify all populations of horses according to a nomenclature that does not entirely fit, and automatically suggests a certain set of value judgments (Wismer, personal communication 2011).*

f). **Associate professor Dr. Claudia Notzke from the University of Lethbridge provides the following review (Notzke 2012):**

> *Many government agencies -including the Government of Alberta- consider wild horses as domesticated escapees and an invasive species with no dollar value attached to them as either livestock or huntable wildlife. As "alien" species they must be doing what all alien species do: compete with "native wildlife" and damage "native ecosystems."*
>
> *In contrast to the seemingly entrenched government attitude many scientists (paleoecologists, mammologists, range scientists) view the wild horse in North America as returned wildlife (Martin 2005:194; Flannery 2001:295; Morin 2006:303; see also Burckhardt 1996). The horse coevolved with American ecosystems over 4 million years before becoming extinct 11,000 years ago1, due to a combination of human overhunting and climate change. It was reintroduced by the Spanish ca 500 years ago and spread throughout the Americas, in many cases reoccupying its ancient ecological niche. Despite "domestication" the modern horse Equus caballus is genetically equivalent to Equus lambei, a horse, according to fossil records, that*

represented the most recent Equus subspecies in North America prior to extinction. While ecosystems may have changed, no one can deny that historic niches remain unfilled today and that the North American fauna is impoverished (Berger 2008:158).

Footnote 1. *A brief explanatory note: Modern horses originated in North America approximately 4 million years ago. The genus Equus (which includes modern horses, zebras and donkeys) dispersed from North America to Eurasia approximately 2-3 million years ago. Several extinctions occurred in North America, along with further migrations to Asia (presumably across the Bering Land Bridge) and return migrations to North America over time. The last extinction occurred in North America approximately 11 000 years ago. In 1493 things came full circle: on Columbus' second voyage to the Americas, Spanish horses, representing Equus caballus, returned to North America, first to the Virgin Islands, and in 1519 to the continent, in modern-day Mexico. After escape from their owners, they dispersed onto the American Great Plains.*

I am presenting the generally accepted version of the horse's history in North America. Increasing evidence (purposefully repressed?) is coming to light indicating that a continuous lineage of horses survived in small remnants up until the reintroduction of European horses. This evidence includes fossils, petroglyphs, geoglyphs and aboriginal oral history (Alison 2008; Downer 2011; Henderson 1991; Ryden 1999:49f.; telephone interview with Patricia M. Fazio 01/09/2006).

3.3.2 E & P (ESRD)'s claim that foothills horses are only derived from domestic horses from mining and logging operations in the early twentieth century

Question to E & P (ESRD) 1.1 SECOND ITEM.

What evidence does E & P (ESRD) have to support the following claims. Please provide references from the scientific literature, as well as any historic documentation that you might have such as to support the inference on the E & P (ESRD) web site that the foothills horses are only derived from domestic horses turned loose from former logging and mining operations :

- *Our research says that these are escaped domestic stock. That makes them feral, not wild.* (Dave Ealey. E & P (ESRD). Quoted in Explore magazine article (Powter 2000).

- *Free roaming horses on public land are descendants of domestic stock, which E & P (ESRD) considers to be feral animals.* (Strategic Relations Inc. 2013. Report for E & P (ESRD)).

- *Alberta's free-ranging horses are descended from domestic animals – not wildlife. That's why we call them 'feral'. In the early twentieth century, lots of horses were used in logging and mining operations – and when those operations stopped, all the horses were turned loose. The offspring of these horses have become feral horses that live in areas close to the initial logging and mining operations. When*

> *other domestic horses are turned loose or escape from ranches, they join this population*. http://E & P (ESRD).alberta.ca/lands-forests/land-management/feral-horses/feral-horse-faqs.aspx

July 28, 2015 E & P (ESRD) response (Newsham):

> *There have been numerous instances of horses straying from Indian Reserves and adjacent private property in the vicinity of the designated capture area. Horses have also been intentionally released or may have escaped from guides, outfitters or recreational horse users. We also had one instance where an individual was releasing mares to breed with the feral stallions and later collecting the foals. We have heard from locals that it is also common knowledge that in the past horses were released from mining and logging camps when many of those operations ceased. We have also had reports of situations such as individuals taking a horse into the back country for hunting many years ago. Since they may not have had room to truck the animal back, in some cases the horse was left to fend for itself in the back country.*

July 29, 2015 McCrory Wildlife Services response sent by e-mail to both H. Newsom and cc'd to her replacement Rob Kessler:

> I would not disagree with escapees and domestic horses periodically turned loose into the wild herds, this appears to happen in much of N. A. wherever there are free-roaming horses that came from earlier foundational stock, but the E & P (ESRD) information provided to the public clearly infers that the foundational stock for free-ranging horses in all of the foothills zone comes ONLY from domestic stock going back to the early twentieth century. Other historical sources and researchers and my information base on this strongly contradicts your claims such as that I obtained from extensive interviews with early pioneer ranchers and very old native Stony elders and a review of early fur trade journals and other historic documents for our report on the history of the grizzly bear in Kananaskis Country (foothills zone). (McCrory and Herrero. 1985).
>
> How does E & P (ESRD) square this up with the substantive historical documentation and First Nations oral history that horses in Alberta including the foothills were present pre-contact, pre-cattle ranching, including those that were free-roaming and the strong evidence that foundational stock for the horses in the foothills came much earlier from First Nations horses in the pre-contact era? Is E & P (ESRD) still claiming that foundational stock in the current Equine zones are only from domestic breeds since the early twentieth century and thus that that the stronger evidence for earlier foundational stock is invalid or not significant? Yes or No?

On October 2 I sent a reminder to Mr. Kesseler. On October 23, I received an e-mail response from Mr. Kesseler refusing to provide the information requested. Mr. Kesseler

indicated that: *the foundational stock for the free roaming horses is not critical considering the overall need for an holistic management approach to ensuring the sustainability of the available natural resources in the area. As such we will not be providing any additional follow up information as requested in your recent letter.*

What Mr. Kesseler failed to address is the misleading portrayal by E & P (ESRD) that free roaming horses in the foothills only originated from domestic stock early in the twentieth century. Such a claim is contradicted by the following evidence that free roaming horses were present in Alberta long before the 1900s:

- According to Notzke (2012): *Wild horses in the Rocky Mountains and their vicinity were recorded by David Thompson for the early 19th century, and in the adjoining prairies by Anthony Hendry (or Henday) for 1754. First Nations in this region have owned horses at least since the 1730s (Thompson 1916; Ewers 2001).*

- Explorer David Thompson recorded horses in the Sundre area in 1808. Blackfoot raiders introduced the mustangs to Alberta in the 1700s (Edmonton Journal. February 11, 2007).

- Aboriginal folklore says Alberta's first horses were brought in by the Blackfoot Indians around 1630. After that explorer and Reverend John McDougal described in his journals of 1865 wolves preying on wild horses and buffalo (Vancouver Sun. Nov. 18, 2002).

- Enns (2013) in her book *Wild horses, wild wolves. Legends at risk at the foot of the Canadian Rockies* also provides an early historic backdrop, including First Nations oral history on origins of horses in what is now Alberta (pp. 58-62).

- Cowdrey et al. (2012) in their book *Horses and Bridles of the American Indians* (pp. 20-21) provide, in my professional opinion, the best, comprehensive historical documentation that First Nations first brought horses to what is now Alberta (around 1715). A copy of this map (Figure 3) is on on page ?? of this report.

In any event, the bloodlines of the first horses is largely irrelevant to the discussion, since they represent in a wild state the *Equus caballus* species that researchers claim to have evolved in both North America and Europe and they serve the same purpose in the ecosystem as their ancestors. In my opinion their complex herding type of behaviour is still much more adapted to living in the wilds than in barnyards.

3.3.3 E & P (ESRD)'s management of recent domestic horses (halter-broke, branded) illegally turned loose in the foothills

Question to E & P (ESRD) 1.2. July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), Item 1.2:

> Related to item 1.1 (above) does E & P (ESRD) have any control mechanisms in place to address recent domestic horses (halter-broke, branded) turned loose or escaped from domestic operations. i.e. Instead of targeting what appear to be long-standing free-roaming herds, does E & P (ESRD) address the illegal release, etc. of domestic horses into the wilds that people can no longer keep?

July 28, 2015 E & P (ESRD) response (Newsham):

> *Unfortunately many of the horses that have been intentionally released are not branded and it difficult to distinguish a feral horse from a more recent stray. When it is possible to identify ownership of the horse, the owner would be contacted and asked to remove the horse. If the horse is not removed the department can use the provisions of the Stray Animals Act to have the animals captured and impounded.*

It would appear from Newsham's comments and the following comments in range reports that E & P (ESRD) has direct knowledge of illegally released/abandoned/escaped horses:

> P. 64. CLEARWATER. Range Inventory, 2013 (Pers. comm.) - *In the Seven Mile and Cutoff DUs, **there is a lot of domestic horse use and it is difficult to distinguish from feral horse use**.*
>
> P. 66. Range Management Plan. 1989.
> *McKillop DU, Pashko DU and Logan DU Plans RMP have separate plans*
> *3.6 Escaped/Abandoned horses (same section in all plans)-*
> ***Escaped/Abandoned horses have been found throughout the Distribution Unit** and compete for forage between cattle and wildlife. Unless Escaped/Abandoned horsesare controlled, range conditions may decline.*
>
> P. 73-74. GREASE CREEK. Self Inspection Forms:
>
> - *2006: Along the main road & pipelines **branded horses are still there** and trespass cattle are and have been a concern.*
> - *Oct. 2008. **Trespass horses are still a problem** as well as cattle from Upper Fallentimber. The trespass cattle were better than in the past however they along with the horses graze along the main road.*

- *Nov. 2009. Along the road (579) over-utilization in early spring (**many with brands**) you allowed to graze in my allotments and adjoining allotments. The action needed is the removal of these domestic horses as the herd is increasing yearly. And Remove the domestic horses that are not permitted to be there (The entire herd must go as they are all descendents of the branded horses).*

There was no indication that charges have been laid when horses are illegally released, nor is there any indication that E & P (ESRD) it taking action to ensure that these horses are humanely branded to ensure that they are not confused with the free-roaming horses. Instead the department allows horses to be rounded up without knowing their origin or whether or not free-roaming horse populations, which have existed in Alberta for 250 years, are being impacted.

3.3.4 E & P (ESRD)'s claim that the postglacial vegetation of the foothills rangelands are not adapted to repeated spring grazing

Question to E & P (ESRD) 1.3: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), Item 1.3:

> What evidence do you have to support your statement that the postglacial vegetation of the Alberta Foothills Equine Zone is not adapted to repeated spring grazing as per your statement in terms of known post-glacial and recent historic distribution and abundance of wild herbivores in the foothills region (e.g. as say for elk and bison as noted in *Mammals of Alberta*. Soper. 1964)?
>
> When I go to the range management website you referred my client to I found the following statement: *Rangeland ecosystems have evolved over thousands of years, adapting to the soils, climate and natural disturbance factors of the Northern Great Plains, especially the influence of wild grazers like bison.* http://aep.alberta.ca/lands-forests/grazing-range-management/default.aspx.
>
> **Are you actually claiming that historically - pre-recent horse and pre-domestic cattle - these rangelands never had repeated spring grazing from multiple species of wild herbivores that have existed there for a long time including bison?**

In an email from Helen Newsham to briandekock@platinum.ca (then forwarded to Zoocheck) Newsham stated:

> *I have to repeat that horses are NOT native to North America…. and this postglacial vegetation is not adapted to repeated spring grazing, regardless of how many people say the animals have a "right" to be here. These principles are well established in North American and world science.*

July 28, 2015 E & P (ESRD) response (Newsham):

There have been numerous studies done on the effects of repeated grazing of fescue grasslands. A couple of examples include:

Willms, W.D. 1991. Cutting frequency and cutting height effects on rough fescue and Parry oat grass yields. Journal of Range Management 44:82-86.

Willms, W.D., S. Smoliak, and J.F. Dormaar. 1985. Effects of stocking rate on rough fescue grassland vegetation. Journal of Range Management 38:220-225.

Also, in a Master's thesis by Tanya Marie Thrift (from Montana State University) on the "Effects of long term winter-spring grazing on foothills rangeland" she indicates that "Rough fescue evolved with long-term heavy winter bison grazing, which brought forth the misconception that rough fescue was tolerant to heavy grazing in other seasons (Johnston and MacDonald 1967). However, research has shown that rough fescue is not tolerant to heavy grazing in spring, summer, and early fall (Johnston et al. 1971; McLean and Wikeem 1985b; Willms et al. 1985; Willms et al. 1988; Willms 1991).

In another document on "Management of Canadian Prairie Rangeland" by Arthur W. Bailey, Ph.D., P.Ag. Duane McCartney, M.Sc. and Michael P. Schellenberg, Ph.D., P.Ag., CPRM it states that "Frequent grazing, or grazing for long periods, in spring-summer does not provide effective rest periods. Over many years, this practice will kill the most productive native forage plants."

For context I have typed in the following from the Bailey et al. (1985) paper that defines what is meant by "fescue prairie" or "fescue grasslands":

The fescue prairie is one of the most productive grasslands on the Northern Great Plains. It represents an ecozone between the forest to the north and the Mixed Prairie to the south. In southwest Alberta, the fescue prairie covers the foothills of the Rocky Mountains (Pavlick and Looman 1984) at elevations between 1,000 and 1,700 m above sea level. The dominant species is rough fescue (Festuca campestris Rydb.) but Parry oat grass (Danthonia parryi Scribn.) may dominate on drier sites…..Rough fescue is extremely susceptible to grazing during the growing season. Increasing grazing pressure will result in a shift of the grassland composition from one dominated by rough fescue to one consisting of a less productive species including Poa spp., Carex spp. Taraxacum offinale Weber, and Lappula echinata Gilib. Heavy grazing pressure produces more beef per unit area (Willms et al. 1985) but introduces production instability.

Keeping in mind that Newsham could not point to any sites in the equid zones where over-grazing by free-roaming horses was evident and that I was unable to find any during my own visits to the foothills, the following, references would help explain why there is no evidence of the horses causing the significant damage to the grasslands that is inferred:

A comprehensive federal government report by Bailey et al. (2010) entitled *Management of Canadian Prairie Rangeland* reports the following:

> *Canadian prairie rangelands or grasslands are composed mostly of ancient natural grasslands, some forest ecosystems, as well as introduced, semi-permanent grasslands developed by ranching and farming interests. The 50 to 80 million-year-old natural grasslands are widely distributed. …The ancient natural grasslands of the Canadian prairies have adapted and evolved for about 50 to 100 million years as the Rocky Mountains arose....The natural grasslands of both uplands and riparian (wetland) areas were the traditional habitat for grazing herds of wild ungulates, including bison, **horses**, and wild camels….. For millions of years, grazing, drought, and fire influenced the grasslands of the prairies. Drought and fire both strongly influenced the formation of ancient natural grasslands. Grazing has always been a part of the Great Plains grasslands. During the ice age, there were **horses**, camels, and mammoths, but bison were the dominant grazer in the Canadian plains grassland ecosystem (http://esask.uregina.ca/entry/ prehistory_southern_saskatchewan.html). Overgrazing occurred when the populations of grazing animals exploded, when there was drought, and when too many fires removed too much of the forage resource. These factors would have also reduced rangeland ecological health. Subsequently, many grazers would have died due to starvation, lack of water, or disease. Afterwards, for a period of years, the rangelands would gradually have recovered to a healthier state because of the reduced grazing pressure.*

After reviewing the materials on this subject, I would tentatively agree that the fescue grasslands may be vulnerable to over-grazing, but it is important to note that "repeated" spring grazing does not necessarily result in over-grazing. Given that E & P (ESRD) has been unable to provide evidence or point to any areas that have been over-grazed, I am skeptical that there is any substantive damage that is attributable to free-roaming horses.

Historically and today, wild ungulates in the same area, particularly mule deer and Rocky Mountain elk that share some of the range and cattle District Units with wild horses, are known to "repeatedly" graze the same habitats during the spring. They don't just use it once and then abandon it. In any event, as stated above, this does not necessarily mean that the area is over-grazed. I could find no mention in E & P (ESRD)'s records of elk, mule deer and white-tailed deer spending a lot of time on spring ranges, particularly when it has been a prolonged winter and late spring; or the fact in some years when there is a very late spring, some cattle may also be released to graze the same spring range as horses and other ungulates as per their permit time (usually June 15); and they would also "repeatedly" graze on what is considered spring range during the early stages of green-up. I have observed this repeatedly in the B.C. Chilcotin.

Noteworthy absent in E & P (ESRD) concerns about over-grazing is that some range degradation from cattle is documented in the range management plans and range health surveys for various DUs and various years in the FOIPP material (E & P (ESRD) 2014). Even

then, the authors of these documents always come back to blaming the horses without evidence.

The following statement from the North Sheep Draft Range Management Plan (2013, p. 39, obtained through FOIPPP) outlines the point that other wild animals are not being properly considered in E & P (ESRD)'s assessments*:*

> *During the 2009 range health audit, care was taken that the Muskeg DU sites were assessed before the cattle had entered: by doing this, an idea of the forage utilization of the feral horses could be obtained. Seven grassland sites were assessed during the audit, the utilization ranged from 20-70%, with an average of 40%. As disposition holders are expected to leave 50% carryover for wildlife consumption, overutilization of these primary grazing sites seems unavoidable, even with extensive cattle management. All of the primary sites that were assessed were in the healthy with problems category…..This non ideal range health is probably the result of utilization of these areas at non advantageous times of the year i.e. continuous grazing and overutilization during the growing season…*
>
> *The latest feral horse count flight took place in March 2012, when 23 horses were observed in the Muskeg DU….in all areas of the North Sheep allotment, the highest population of feral horses in found in this DU.*

Firstly, 23 is not a large number of wild horses and secondly, although the range health surveys looked at forage utilization by horses in the spring, no account is made for the degree of use of the same range assessment sites by wild ungulates such as mule deer and elk. And no attempt is made to include the previous grazing history by cattle. E & P (ESRD) has also not provided any idea of the number of cattle sharing the same range. I raise this point because the same plan (p. 29) refers to three of the unhealthy grassland sites in the same DU being degraded by *long term moderate to heavy cattle utilization*; with no effort to factor in similar cattle use the previous season into the range condition of the sites studied that infer horses are causing the damage.

3.3.5 E & P (ESRD)'s claim that horses eat the same grasses as other species and that they tend to graze heavily in the spring

Question to E & P (ESRD) 1.4: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), 1.4:

> Please provide evidence and literature citations of studies that support the following E & P (ESRD) claim that the horses eat the same grasses as other species and that they tend to graze heavily in the spring:
>
> *Alberta's feral horse population eats the same grasses as other species do, and they tend to graze heavily in the spring. To prevent overgrazing, we need to keep their population manageable.* http://E & P (ESRD).alberta.ca/lands-forests/land-management/feral-horses/feral-horse-faqs.aspx

July 28, 2015 E & P (ESRD) response (Newsham), 1.4:

> *A Master's thesis completed by R.E. Salter entitled "Ecology of Feral Horses in Western Alberta" provides a basis for the claim that there is a high degree of habitat overlap with deer, moose and elk. There is also a Ph.D Thesis completed by B.D. Irving in 2001 on "The impacts of grazing on conifer regeneration in west central Alberta" and a MSc Thesis completed by T. Girard in 2012 on "Habitat selection by feral horses in the Alberta foothills" that provide insight into horse dietary preferences and foraging behaviour.*

A review of the background studies (Salter and Hudson 1978, 1979, 1980) and work by Girard (2012) do indicate that free-roaming horses eat the same grasses as some other grazing species; however several of these studies also indicate significant dietary and habitat selection differences that are relevant to the discussion at hand but not addressed at all by E & P (ESRD). For example, moose that use the same ecosystems as the foothills horses are not a species that eats the same grasses as horses and cattle do.

a). **Salter, R.E. 1978. Ecology of Feral Horses in Western Alberta. Master's thesis, Department of Animal Science, University of Alberta, February 1978. 239 pp.**

Although the study was done in 1976, nearly 40 years ago, I still consider it applicable to the situation today because, besides the Alberta foothills research by Girard (2012), it is still the only detailed piece of academic research we have available that quantified and compared the forage and dietary preferences of overlapping free-roaming horses, cattle and ungulates in the Alberta foothills. This interesting range ecology study led to three publications in various peer-reviewed journals (Salter and Hudson. 1978; Salter and Hudson. 1979; and Salter and Hudson. 1980) as well as one published paper on free-roaming horse social organization (Salter and Hudson. 1980).

These published works are also significant in that although the field work was done in 1976, the study area of 200 km^2 was located approximately 30 km west of Sundre in what today is the most controversial E & P (ESRD) equine zone. The researchers noted that during the study period there were 200 free-ranging horses, about 50 elk (80-85 observed in winter) and 1500 AUM of permitted cattle use between June 15-Oct. 15 (i.e. 375 cows). The published papers stemming from the Salter thesis provided invaluable information and grazing insights - much of which appears to be ignored today in E & P (ESRD)'s management policies for free-roaming horses.

While obvious changes have occurred in the Sundre ecosystem since the original Salter study such as grassland in-growth by conifers, wildfires, extensive roading and clearcut logging and a greatly increased recreational use including off-road vehicle use, their findings should still be applicable.

Their basic conclusion (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. There was little overlap of horses and cattle in summer even though they fed on similar plants.

Relevant key findings (see Appendix B) include:

- Salter and Hudson (1979): Major forages in the Alberta foothills are highest in crude protein and lowest in fibre in the spring, but reach a low quality during winter…..Horses selected new growth on previously grazed areas in spring – to so some extent during the growing season – **and may thus have effectively prolonged the period of availability of high quality forage.**

- Salter and Hudson (1980) concluded:

  - **During spring, horses used some areas later preferred by cattle but range use was not excessive prior to cattle being turned out.** There was little overlap of horses and cattle in summer even though they fed on similar plants. Keep in mind in the study area there were a number of wild ungulates, 200 horses and 375 cattle sharing the area.

  - **During spring horses occupied some areas later preferred by cattle but range use was not excessive prior to the turn-out of cattle. Intensive examination of an important winter-spring range (and cattle summer range) showed that utilization of new growth was nil to very light over 95% of the 70 ha are 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 nonforested habitats indicated that food was being produced more rapidly than it was consumed.**

  - **Similarly, spring grazing by 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**.

  - **There was little contemporaneous spatial overlap of horses and cattle even though their summer diets showed 66% overlap**. Over 90% of sites utilized by cattle in summer had received prior use by horses. In about 40% of these there was little overlap during the time when cattle were actually present.

- In terms of combined use, by late summer 75% of nonforested habitat was used at a safe or lower level, most of the remaining 25% receiving heavy utilization, with the pattern varying with the habitat type.

- Combined grazing by horses and cattle caused localized damage along stream courses and around both natural and artificial salt licks.

- Potential for competition appeared highest between horses and cattle but grazing relationships were complex.

- The lack of behavioural interactions and dietary differences suggested ecological separation of horses from deer and moose. Mule deer were more prevalent in the study area than white-tailed deer. Dietary overlap of horses and mule deer was not determined.

- **While these conclusions are valid for the patterns of resource use documented during the study, the complex and labile nature of range relationships needs to be emphasized.**

b). **Girard, T.L. 2012. Habitat selection by feral horses in the Alberta foothills. MSc Thesis. Dept. of Agricultural, Food and Nutritional Science. 148 pp.**

This is a very interesting master's study involving the radio-collaring of four individual mares from four different bands. Much of the study area has been clearcut (13%) and experiences high outdoor recreational use. The study area was a 202 km2 area west of Bragg Creek, Alberta, in and around the McLean Creek Forest Land Use Zone. It is also within the Elbow equine zone, isolated in the south from the five other zones in the north. **During the study there were 131 free-roaming horses in 11 different bands, and from June 15-Sept.15 /Oct. 15, 1600 cattle.**

In my opinion, this is clearly demonstrative of a lack of scientific rigour, I was disappointed that the author quoted the Alberta government's misclaims that horses are feral and have only been free-roaming in the Alberta foothills since the early 1900s. The scholastic credibility of this otherwise informative study suffers from the lack of a more balanced historical context. Additionally the author failed to mention the possible side effects of the drug used to tranquilize four pregnant mares during winter helicopter operations. If it was anything comparable to the standard Telazol used by grizzly bear researchers in the Alberta foothills, the capture drug can cause capture myopathy that affects physiology as well as behavioural changes for the first 100 days after capture (Cattett et al. 2008).

Overall, the study found that horses have select home ranges with little overlap with home ranges of other bands. Horses appear to show a good deal of home range fidelity from year to year. **In my opinion, this social behaviour of near exclusivity of home ranges of different bands has implications for natural distribution across the landscape and, unlike cattle and bison, a built-in mechanism to avoid over-crowding and possible over-grazing of home ranges that needs to be further studied.**

The study and two associate published papers had some interesting findings but was inconclusive and ambivalent as to the extent of range damage the Elbow equines were causing. **Where damage was observed from range health surveys this was inferred from combined summer long grazing by cattle and horses.** Relevant findings include:

- *The identity of selected habitats changed slightly throughout the seasons (i.e. increased selection of cutblocks in winter). Increased selection of cutblocks in winter could be problematic and lead to heightened land use conflicts between forestry and feral horses.* ***It is unknown whether increased horse use of regenerating cutblocks could increase damage to tree seedlings.***

- *It should be noted that forage utilization assessments in this study were very conservative, averaging 44% by the time of sampling in late July after only 2-3 months of summer grazing****. Although un-quantified in the present investigation, continued grazing by feral horses and cattle into late summer would have increased forage utilization levels substantially on primary ranges (grasslands and shrublands),*** *and also account for the observed lack of litter and standing dead carryover within these habitats during sampling.* ***With grazing capacity in grasslands likely exceeded by summer long grazing from cattle and horses, this likely accounts for observations that the range health of many grasslands in the region is being compromised, as reflected by low range health scores*** *(Michalsky 2010). Moreover, the lack of standing dead litter under heavy use is problematic, as litter is an important indicator of range health, and also helps limit the use of late seral native grasses such as rough fescue (Festuca campestris) (Moisey et al. 2006)….*

The study led to two published papers in peer-reviewed journals (Girard et al. 2013a, 2013b):

The Girard (2013a) study concluded that horses selected for grasslands at all seasons with an increase in selection of shrublands in the spring and summer. Clearcuts were selected by horses only during the winter but degree of damage to seedlings was not determined. The study concluded that horses selected for habitats covering 14% of the study area while avoiding 42% of habitats. The study concluded for summer that (p. 435):

- *Concentration of horse use within sparse vegetation types (grassland and shrubland), particularly during one or more times of the year, help identify critical horse habitat including areas where multiple, overlapping land uses interact on public land.*

- ***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….*** Also (p. 436): ***Ruggedness was not a factor in habitat selection suggesting topography (i.e. elevation, slope and aspect) does not pose the same limitation for horses as it does for cattle (Kauffman 2011).***

The Girard (2013b) study provided additional insights:

- *Horse presence and abundance were closely related to cattle presence during summer, suggesting that both herbivores utilise the same habitats.* ***Estimates of forage biomass removal (44 %) by mid-July were near maximum acceptable levels****. In contrast to horse-cattle associations, horses were negatively associated with wild ungulate abundance, although the mechanism behind this remains unclear and warrants further investigation.* ***Our results indicate that feral horses in SW Alberta exhibit complex habitat selection patterns during spring and summer, including overlap in use with livestock. This finding highlights the need to assess and manage herbivore populations consistent with rangeland carrying capacity and the maintenance of range health.***

c). **Relevant range studies in BC Chilcotin**

There have been three range studies related to free-roaming horses in the BC Chilcotin plateau where current population levels are estimated to be about 1,000 animals. It must be kept in mind that while there are ecological similarities between this area and Alberta in that both are in montane foothills regions, both have the same guild of top predators (grey wolf, wolverine, cougar, grizzly bear and black bear) and that free-roaming horses have been present since the early-mid 1700s, there are forage plant differences one of the main being that in the Chilcotin, pine grass is one of the most significant horse diet plants whereas it is not found in the Alberta foothills -where hairy wildrye is a dominant horse food.

Although I have reviewed all three of the BC studies I will reference here only two (Bhattacharyya 2012**;** Preston 1984) since the other one (Storer et al. 1977) looked only at the relationship between wild horses and moose and found no negative impact of horses on moose.

The Bhattacharyya (2012) study was done within Nunsti Provincial Park in the Brittany Triangle and the Elegesi Qiyus Wild Horse Preserve. Here there are no institutional horse controls and no cattle grazing. Aerial counts since 2001 suggest the population has not over-grown the range, generally averaging around 100 animals per annual count. Perambulations of aerial counts noted as in Alberta may reflect different survey conditions and not necessarily population trends.

What is important to note is that generally left alone under policy of the Xeni Gwet'in First Nation and the Ministry of Forests Range management division, the horses have not over-populated the range or shown noticeable increases in numbers as reflected by the counts of minimal numbers. Hand in hand with this is that Bhattacharyya's range studies concluded that there was no statistical evidence of overall degradation; but only localized damage was being caused to the range by the study area horse, as follows:

Results demonstrate that the free-roaming horses are part of a social-ecological complex, one of many disturbance factors in a system with multiple drivers of ecological and social change. Grazing and disturbance of vegetation by horses are patchy and heterogeneous in distribution, but no statistically significant difference was found in plant community composition or heights between sample sites.

Similar results were obtained by Preston (1984) in the same plateau ecosystem but on east side of the Taseko River just to the east of the Brittany Triangle. Here, however, there appeared to be a high number of range cattle For the 200 sq km study area, range cattle were estimated to be the dominant grazer (89.7%) from June to October (p.ii) and that there were "so many cattle" that were "literally everywhere" (p. 69). The cattle (mostly Herefords) were from three range allotments. A fluctuating number of domestic horses shared the study area with 65 free-roaming horses that comprised 7.4% of the herbivore population, with moose 2.9%.

Key findings include:

- In the dry summer of 1978 when more sedge meadows than usual were available to cattle, by the end of August both dry and wet meadows used by cattle were severely grazed and had sustained heavy trampling damage (p. 84). No mention is made of similar damage caused by the horses.

- In numerous instances, horses were heavily concentrated in areas that cattle used very slightly, and vice versa. Horses and cattle were distributed differently over the study area (p. 92).

- Horse groups were observed to use not only the same meadows repeatedly, but also the same portions of the particular meadows. Some open areas that appeared to have good forage were not touched by cattle all summer, while similar areas were repeatedly grazed (p.66).

- *While horses and cattle were both on the study site from June to September, the differences in habitat-use, distribution and diet choice appeared to ameliorate the potential for interference between the two species (p. 79). However, because horses depend heavily on rush-sedges in the winter, and cattle utilized them in the summer,* ***there is a possibility that cattle summer-use could adversely effect horses*** *(p. 79)…..* ***By the same token, horses may undermine the value of spring range to cattle. However, based on use-difference between the two herbivores already known to occur, there would seem to be little probability of this.*** **The author then notes that in Alberta the Salter (1978) study estimated that only 5 percent of non-forested habitat on the study site showed evidence of spring (June) grazing by horses.**

Although the author draws no conclusions concerning over-grazing and range damage (this was not a study objective), the inference I draw from this study is that in semi-forested regions where both free-ranging horses and range cattle seasonally share the same areas

during the spring-fall range allotment period, there is little "competition" between the two species and where cattle are numerous, some of the range damage may be attributed more to them than to horses.

3.3.6 E & P (ESRD)'s claim that free-ranging foothills horses really don't have any natural predators and with no natural check on their population, wild horse populations can quickly grow too fast for the landscape to support

Question to E & P (ESRD) 1.5: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), 1.5 :

> Again the report you mention and other evidence with appropriate citations would be appreciated for the following statement re- predators:
>
> > *The research we've done shows feral horses don't really have any natural predators – they're sometimes killed by wolves and cougars, but not often. With no natural check on their population, wild horse populations can quickly grow too big for the landscape to support. .* http://E & P (ESRD).alberta.ca/lands-forests/land-management/feral-horses/feral-horse-faqs.aspx

July 28, 2015 E & P (ESRD) response (Newsham), 1.5:

> *There have been two noteworthy studies completed on cougar and wolf predation in west central Alberta. One is a Ph.D Thesis by Kyle Knopff on cougars on "Cougar Predation in a Multi-Prey System in West-Central Alberta" in 2010 and the other is a management study completed by Nathan Webb, Evelyn Merrill and James Allen on "Density, Demography, and Functional Response of a Harvested Wolf Population in West-Central Alberta" from 2009. In the wolf study only 7% of the ungulate kills from 11 packs were feral horses.*

Alberta has an aggressive wolf control program involving a bounty system of upwards of $500 per wolf. In February the program came under criticism by the International Union for the Conservation of Nature (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 that also impacts other species. Combined wolf mortality from all causes in Alberta is very high (Sadie Parr pers. comm.).

As will be discussed further my analysis of E & P (ESRD) horse count data going back to 2001 and before in some instances indicates that over the long term, with some minor spikes in horse counts up and down, the minimal count data suggests that four of the equine zones (Elbow, Clearwater, Nordegg and Brazeau) generally have annual counts under 100 animals and the persistence of these low counts in these units suggests the wild horse populations are not as E & P (ESRD) claims in the state where they *can quickly grow too big for the landscape to support.* Unfortunately, E & P (ESRD) so far has not provided me with the requested detailed horse count reports and associated maps that would have

enabled me to scrutinize the claims about increasing horse numbers and upward trends in the other two equine units.

The following review also indicates that E & P (ESRD) has used the wolf study data out of overall context. By using the same dataset, I demonstrate the possibility that the overall horse kill from **all** of the wolf packs for each of the entire years (2003-2006) could have been upwards to 160 horses. This merely underscores E & P (ESRD)'s lack of scientific rigour and over-generalizations to suit their management agenda for "feral" horses, which I find very disconcerting and counter-productive to developing a much more credible and ecologically sound management approach that is, in my professional opinion, needed for the foothills free-roaming horses.

Wolves

Although wolves are among the most 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). Where wolves occur with free-ranging horses they are known predators. A detailed wolf study (Webb et al. 2009) has been done in the Alberta foothills using these high technology methods combined with site visits to kills sites. The study area was the Clearwater area (22,994 km2), similar to the Clearwater Equine zone (although I was unable to compare the size and extent of the two study areas).

Upon close examination of the Webb at al. study, I found E & P (ESRD)'s statement that *only 7% of the ungulate kills from 11 packs were feral horses* accurate from what is in the report but overall misleading in terms of the inference that wolves were killing few free-ranging horses. Upon closer scrutiny I concluded, using some unverified assumptions, that overall wolf kills of Clearwater area wild horses was likely significant. Although the study did conclude that 7% of a total 192 wolf-killed ungulates in winter from 11 different wolf packs in 2003-2006 involved free-ranging horses, when converted to biomass (amount of meat/animal) the importance of horses in the diet goes up: deer represented 22%, elk 23%, moose 43%, **and free-ranging horses 12%** of the total prey biomass killed by wolves over three winters (In terms of biomass the horse rates as the largest prey species).

More importantly E & P (ESRD) overlooked two other factors. First, the wolf biologists studied only 11 packs of a confirmed minimum of 32 packs within the study area (with a minimum population estimate of 286 wolves an average density of 12.42 wolves/1000 km2). Secondly, the study was done only in winter and thus horse kills for the other six months of each year were not estimated or included in the analysis.

When the database on horse kills is extrapolated to full year kills and to all of the 32 packs, this crude extrapolation indicates that the number of free-roaming horses killed by wolves over three years would be much higher and likely significant as a partial population controlling vector than E & P (ESRD) concluded. First I have no idea how the Clearwater wolf study area compares with the Clearwater equine zone but I am assuming for purposes of discussion that the wolf study area and equine zone are approximately analogous. I am

also assuming that the wolf kill rate of horses is approximately the same for the non-winter seasons as it was for the winter study season, including during the spring when foals are born.

The kill rate of horses by the 11 packs amounts to a known mortality of 27 horses over the three winter periods. Although the study acknowledges that prey selection varied from pack to pack and thus it was difficult to generalize, what E & P (ESRD) did not consider is that if the kill rate was extrapolated from the 11 radio-collared packs to the overall 32 packs, the total estimated number of winter horse kills for the same three-year period would triple to approximately 80. Assuming the kill rate was the same during the non-winter seasons (say for ½ of the year), an estimated 160 horses could have been killed by wolves or approximately 53 per annum. Although this is a very crude extrapolation, it does suggest that the role of wolf predation on free-ranging horses in the foothills is far more important than E & P (ESRD) claims.

In terms of horse counts, nine years (2005-2014) of surveys by E & P (ESRD) in the Clearwater Equine Zone (Table 1) showed an average minimal count of 54 horses/year with a range of variation of 30-89. The different counts between years could just as easily be reflective of different survey conditions and methods as annual fluctuations in real (actual) horse numbers on the ground. As noted there were 27 horses known to be killed by collared wolves between during the winters from 2003 and 2006; and an overall crude estimate of all 53 horses killed annually during the same period from all 32 wolf packs. The only minimal count during this period was 2005 when 32 horses were counted.

Overall, the consistently low horse counts suggest a fairly stable and low population. What this dataset infers, but does not prove, is that wolves are likely playing a significant role in the natural regulation of the Clearwater free-ranging horse population. I did not examine other free-roaming horse mortality or removal data that might be available for the same period such as random shootings and removals under the Alberta government permit system. Nonetheless the powerful inference that wolves may be controlling horses in this equine zone merits closer scrutiny and study.

Cougars

Although mountain lion predation on foals has been 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 km2) covered a number of the southern Equine management zones in the foothills from the Bow river north to Rocky Mountain house.

The study (Knopff 2010) used data from 24 cougars (15 ad. F., 5 ad. M, 3 subad. F, and 1 subad. M) captured during the winters of 2005-2006 and 2006-2007. 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%). Deer were the most prevalent ungulate (frequency = 64%, biomass = 51%), and 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 free-roaming horses and moose (the largest prey available in west-central Alberta) and nearly all predation on these species (86%) involved animals <2 years old.

The data translates to 21 free-roaming horses known to have been killed over 2.6 years, between December 2005 and 18 August 2007 by 24 radio-collared mountain lions. What is not known is how many horses were killed in the same study area by the other component of the cougar population that was not radio-collared.

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.

From 1933-1964 there used to be a bounty system. Today cougars appear fairly heavily hunted and trapped, including in the equine zones.

Grizzly bear predation

Various studies indicate that both grizzly and black bears are well known for being opportunistically predaceous on ungulates. In some areas they are known to deliberately seek out birthing grounds for ungulates, such as moose in Alaska, to hunt for newborn young. All Alberta Rocky Mountain and foothills grizzly bear studies have shown that ungulates are consistently eaten by grizzly bears, primarily in the 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 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. This warrants further review.

Black bears

Radiotelemetric 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 an ungulate predator they likely play a role in causing some mortality to free-roaming horse populations in the foothills.

Density dependent factors – drought conditions and starvation winters

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.* As noted by the Salter and Hudson (1979) Aberta foothills study, 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.

It appears that E & P (ESRD) has not considered this aspect in their management regime. Nor could I find where E & P (ESRD) has made an attempt to determine horse herd reproductive and survival rates; which most biologists consider critical data in management of any wild animal population. What would be really important is to conduct long-term field research of a viable sample of different herds in each of the six equine zones to determine reproductive rates, survival and increments or losses to herds, including all mortality causes.

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 E & P (ESRD) information

and other documents as to what effect the drought might have had on free-roaming horse populations in the foothills fescue grasslands.

What should be noted as a major factor in terms of winter horse survival and density dependent natural population control is that cattle on the foothills range allotments are allowed to remove up to 50% of the grazing carrying capacity each year into the fall months (October 15). This would likely have a strong influence in reducing winter survival for free-ranging horses and wild ungulates depending on a number of variables including periodic drought conditions, numbers of recently released domestic (branded and halter-broke horses), number of wild horses, number of wild ungulates and severity of winter conditions that would limit access to all available winter forage. One has to wonder why E & P (ESRD) has not considered this aspect.

McCrory Wildlife Services conclusions re- overall natural control factors in free-roaming horse management:

Little, if any, effort appears to have been made by E & P (ESRD) to integrate all natural control factors into their horse management regime in the Foothills Fescue Ecoregion that would include a more comprehensive review of natural mortality from all large predators along with the impacts of droughts, severe winters and starvation on free-roaming horse numbers.

3.3.7 E & P (ESRD)'s claim that foothills free-ranging horses are growing quickly and have already outstripped the available forage from parts of the capture area and are having unsustainable impacts on the land.

Question to E & P (ESRD) 1.6: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), 1.6 :

> Again, evidence please to support claims of over-grazing and range damage by free-roaming horses:
>
> *Ecosystem health and protection of the resource from the feral horse overgrazing is a key factor in driving the need to manage populations. Even if all domestic cattle were removed from the Forest Reserve, the horse population is growing quickly and will outstrip the available forage – it has already done so in some parts of the capture area. http://ESRD.alberta.ca/lands-forests/land-management/feral-horses/feral-horse-faqs.aspx*
>
> If free-roaming horses have already outstripped the available forage in some parts of the capture area, there must be some evidence, including studies and Range Health surveys to support this statement. In June my client e-mailed you asking which allotments had damage. How do you reconcile the previously-cited ERSD statement with your recent response to my client: *Over the years we have considered capture licenses in those Equine Management Zones where horse populations show an*

> *upward trend and where equine use of forage is high relative to available forage. These conditions may occur at any location and the locations can vary from year* ***so it is not possible to point out certain sites where there is a problem****.* (Emphasis added by me). (Helen Newsham, P. Ag. Head, Rangeland Integration Section. Policy Division. Alberta E & P (ESRD). June 15, 2015 e-mail to Julie Woodyer, Zoocheck)

July 28, 2015 E & P (ESRD) response (Newsham), 1.6:

> *Information to address this question has already been provided to your client.*

No explanation, other than the comment about not being able to point out damaged sites has been received by myself or Zoocheck.

Following are some other points to consider regarding grazing of horses:

- It is possible that in drought years that grazing by wild animals including the free-roaming horses may periodically, cause some areas to be over-utilized, however since E & P (ESRD) is unable to point to any damaged sights and has failed to factor in grazing by other wild animals, there is currently no reliable evidence that this is happening. Additionally, it is also important to note that there is extensive evidence in the published literature that indicates cattle can over-utilize and damage to a high degree in the summer and fall.

- Also, some of the apparent localized over-use range issues may in fact be related to the practice throughout the Equine zones of the ranching community putting out salt blocks for cattle and then free-roaming horses and wild ungulates also using them. Such concentrated site use by various hoofed grazing species is likely to cause some localized habitat degradation. The range health and other reports in the FOIPP document (E & P (ESRD) 2014) do make some reference to this. For example on page 66 of this document under Stewardship self-assessment forms for 2006: *Wild horses on cutoff at winters flat. Someone was salting them and drawing them in. flat was grazed off! Approx. -33 head. Usually there is only 5-6 head there. This was going on long before we put our cattle in. we were out there at least a month before and there was salt there.* While I would agree that cattle, wild ungulates including the free-roaming horses may cause some localized over-utilization, to date, I have not seen any concrete evidence that the free-roaming horses are responsible for overall range degradation as claimed and inferred throughout many of the E & P (ESRD) documents; which would explain why Helen Newsham recently admitted that "*it is not possible to point out certain sites where there is a problem".*

- One of the more interesting FOIPP documents was the report **Free ranging horse resource impact evaluation** by Alta Rangeland Services (2007), prepared for the E & P (ESRD) Alberta Rangeland Management Branch at Pincher Creek. Despite what Newsham admits, the study claims in the introduction that *increases in horse use is leading to severe range degradation* and other negative effects; there is no mention

of the impacts of cattle and wild ungulates in the same area playing a contributing role in the inferred bad condition of the grasslands. The method was to carry out visual dung and pellet count through a 100 m long by 10 m wide transect in conjunction with a range health assessment of each site for *horse, cattle and game.* I thought this was a good approach since it did not just focus on only horse use of the range. However, despite a 76-page report including extensive study results with site photos and data spreadsheets there were no conclusions provided since "*An interpretation of the results was not a requirement of the project".* Doing this kind of study and then not interpreting the results is unprofessional and raises the serious question as to why E & P (ESRD) did not interpret the results.

- The second section of the range health material on the different District Units (DUs), pp. 54-106, from the FOIPP E & P (ESRD) documents repeatedly identifies a multiplicity of range health issues from infringement by conifers, clearcut logging, off-road vehicle (ORV) use, However, I have not seen any evidence that these other factors that are significantly impacting the rangeland health are being managed to reduce the damage they are causing.

- The other aspect I found curious was that although range degradation attributed to cattle is identified in some of the range health surveys of the DUs, I found no place where this was studied further by E & P (ESRD) or where strong remedial measures were recommended and undertaken (E & P (ESRD) 2014). 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 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. Another study in the foothills found that cattle spend a disproportionate amount of their feeding time in the riparian zone during late summer and early fall when compared to upland areas. 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).

The following summary (Beever 2003) provides what I consider to be an astute and apt commentary on the complexities of determining grazing competition and range degradation by free-roaming horses and other hooved ruminants related to controversial claims of over-grazing patterns and damage on native rangeland by free-ranging horses in North America:

> *Compared to other ungulates of North America, free-roaming horses (Equus caballus) possess a unique evolutionary history that has given rise to a distinct suite of behavioral, morphological, and physiological traits. Because of their unique combination of cecal digestion, an elongate head with flexible lips, and non-uniform*

> *use of the landscape, horses represent a unique disturbance agent in semi-arid ecosystems of the western United States. Consequently, it is inappropriate to assume that influences of horses on the structure, composition, function, and pattern of arid and semi-arid ecosystems will mirror influences of cattle or other artiodactyls. Although management areas for free-roaming horses occupy 18.6 million ha of land across western North America, we know relatively little about how western ecosystems and their components have responded to this uniquely managed ungulate. I draw on my research of horse habitats in the western Great Basin (U.S.A.) to examine predictions of horses' unique influence, and advocate for continued research to refine our understanding of synecological relationships amonghorses and diverse ecosystem components in arid and semi-arid regions.*

Similarly, in her M. Sc. thesis on the grazing ecology of free-roaming horses, cattle and moose in the BC Chilcotin, Karen Preston (1984, p. 4) points out that:

> *Management decisions, including complete removal of feral equids in localized areas, have been made in the past, both in the United states…and Canada….on the assumption that competition exists between feral horses and burros and with other forms of wildlife and with livestock. However, as obvious as it may seem it must be emphasized that realistic management decisions can only be made with adequate knowledge, and knowledge of habit and diets of feral equids in the various niches that they occupy is very scarce, particularly on forested ranges.*

It would appear that E & P (ESRD) fits the same uninformed agency management mold she is referring to.

As part of the range impact analysis I reviewed a number of academic-based ranged studies/published papers from the Alberta foothills and the BC Chilcotin on the diets and effects of free-roaming horses on rangeland ecology to obtain some measure as the seriousness of E & P (ESRD)'s concerns and claims about free-roaming foothills horse over-grazing and causing range degradation and resulting competition with cattle and wild ungulates. What these studies highlight to me is that the E & P (ESRD)'s case against free-roaming horses is highly overstated.

3.3.8 E & P (ESRD)'s concerns and claims that free-roaming horses cause seedling damage in cutblock reforestation areas

This concern is included by E & P (ESRD) (2014) in some of the stakeholder comments and concerns such as from Spray Lakes sawmills. I could find no direct study where horse damage to conifer seedlings had been quantified and compared to cattle and wild ungulate damage such as moose and elk. Although Girard et al. (2013b) identified that horses use of cutblocks during winter (not summer) in the Elbow equine zone: ***It is unknown whether increased horse use of regenerating cutblocks could increase damage to tree seedlings.***

Korpela and Karpyshyn (2003) found that coniferous seedling damage on grazed areas in cutblocks in the Alberta foothills was primarily due to incidental trampling rather than livestock browsing. However, damage that might have been caused by free-roaming horses was not quantified and differentiated from ungulates. Coniferous cutblocks produce on average three times the forage produced by the mature conifer forest. However, in both coniferous and decidous cutblocks forage production reaches its maximum approximately three years post harvest (E & P (ESRD) 2004). According to Burkinshaw and Bork (2009): *Horses also have an affinity for cattle habitats, leading to high range use and increased risk of degradation. Increased use of cut blocks may lead to increased risk of damage to forest regeneration, and the combined effects of horses and cattle on wildlife habitat availability remain unclear.*

3.3.9 E & P (ESRD) horse count data and claims of over-population

Unfortunately, because E & P (ESRD) refused to provide the survey reports and maps as requested, I was unable to complete my review of the horse count information. This data would be very important since it would show clusters, herd sizes, distribution and other factors. In addition it should be scrutinized in terms of accuracy. One study in Australia (Linklater and Cameron 2002) comparing helicopter and ground counts found that helicopter counts overestimated numbers by 15-32%.

Question to E & P (ESRD) 1.7: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), Item 1.7 : Horse count information available on the E & P (ESRD) web site.

> Can you please provide the horse count reports, methods and maps for each year that indicate an upward trend in the Sundre Equine Zone since 2003. There is now no quantified information available to support this on your website other than the maps. Additionally, how do you or your researchers explain the apparent significant increase in the Sundre Equine Zone compared to more stable appearing and much lower numbers in the other Equine zones?
>
> (Feral Horse 2013 Count Summary– Feb 2014 (1 page, 12MB)
> (Feral Horse 2014 Count Summary– Apr 2014 (1 page, 2MB)
> (Feral Horse 2015 Count Summary– Jun 2015 (1 page, <1MB)

July 28, 2015 E-mail response from H. Newsham:

> *We are not entirely sure why there has been a significant increase in the Sundre zone compared to the other equine zones. The apparent increase may in part be a result of the some of the disturbance from fire and logging that has created additional temporary grazing opportunities. Research conducted by Tisa Gerard (Bevan) studying radio collared horses suggests that cutblocks are a preferred habitat in some seasons.*

It is unclear why the horse counts in the Sundre equine zone appear to be consistently higher than the other equine management zones. However, we need more information on the methods used to count the horses and related data.

If they are using aircraft to count horses, they may be overestimating the numbers of horses. In Linklater et al. (200) *Escape behaviour of feral horses during a helicopter count*, they report that:

> *Animal escape behaviour in response to aircraft could influence the accuracy and precision of aerial estimates of population size but is rarely investigated. Using independent observers on the ground and in the air, we recorded the behaviour of 17 groups, including 136 individually marked horses (Equus caballus), during a helicopter count in New Zealand's Kaimanawa Mountains and compared the helicopter count with a ground-based mark-resight estimate in the same area (20.5 km^2). The helicopter induced running and changes in group size and composition in all horse groups that travelled from 0.1 up to 2.75 km before leaving the ground-observer's view. One-tenth of marked horses were not counted and a quarter counted twice. The possible double-counting of a further 23 (17%) could not be confirmed because only two of the three observers' records concurred. Thus,* ***the helicopter count over-estimated the marked sub-population by at least 15% and possibly by up to 32%****. The helicopter count (228 horses) was 16.9% larger than the mark-resight estimate (195, 95% CI = 157-234). We identify the characteristics of the helicopter count that stimulated horse escape* behaviour and discuss how it should be considered in the design of aerial population-estimate methods.

Given this, it may be prudent for E & P (ESRD) to conduct ground counts using photo identification of the horses to get an accurate count in all equine zones.

See comments in item 1.8 for more on this aspect.

Question to E & P (ESRD) 1.8: July 7, 2015 McCrory Wildlife Services letter to E & P (ESRD), Item1.8 : Horse counts

> I have an *In File* reference to Foothills horse counts going back to 1977 (Evans 1993). Evans estimated 630 – 850 *escaped or abandoned* horses in the "Green" or forested foothills area of Alberta in 1993. His work reported that counts by forest districts indicated a decline from 1977 when 1791 horses were estimated. Has E & P (ESRD) used this previous earlier horse count data in their overall longer-term population estimates and longer-term trend analysis?
>
> In the E & P (ESRD) concerns for "over population", has the 1977 estimate of 1,791 horses been taken into your analysis as evidence of higher past numbers and population fluctuations before formal control measures were implemented by government? If so, I would appreciate a copy of this and any other report and analyses related to horse population numbers and long-term trends.

> Additionally, I have information that AB. F & W biologist, Eldon Bruns, of Rocky Mountain House, conducted annual counts of free-roaming horses for quite a number of years, if not a decade or more. Can you please provide this data?

July 28, 2015 E-mail response from H. Newsham:

> *We have not used any earlier count data as we are unsure of the methods of collection. In addition, this data would have likely included all sighting of feral or stray horses in many parts of the province's provincial Green Area. Our focus now is only on the designated capture area west of Sundre. Eldon Bruns did not complete annual counts of feral horses. However, when they were completing wildlife surveys they had noted horses that would have been seen anecdotally. These numbers would have been considered for areas where a formal horse count would not have been done. If the horses were sighted in an area that we were planning to count we would not have used the numbers from any wildlife surveys.*

July 29 McCrory Wildlife Services comments sent by e-mail to E & P (ESRD) :

> Thank you for your July 28 response. I would still very much appreciate the detailed horse count reports, methods and maps as requested. Also any earlier count data you may have in your files, despite your more or less discounting these.

In actual fact, despite their claiming they have not used the earlier count data, I have confimed that E & P (ESRD), through the FOIPP data Zoocheck recently provided to me from a third party source, has prepared tables for the foothills equine units showing horse counts from 2001-2014. The FOIPP data indicates that these were prepared by E & P (ESRD) in February 2014. A table was also included that includes horse counts for the Sundre area for 1992-2009. It is therefore difficult to accept the recent statement from E & P (ESRD) that they have not used any of the earlier count data as they are unsure of the methods. It would be a simple matter for E & P (ESRD) to actually obtain the survey notes and associated maps and check the methods – some of which, going back as far as they do, likely involve fixed wing surveys and count data from Eldon Bruns of AB Fish and Wildlife. It is therefore puzzling to me why E & P (ESRD) denies using the past survey data and why they are not more transparent in terms of making this earlier data they assembled available for scientific and public scrutiny on their web site.

Until I receive the original detailed reports and maps from E & P (ESRD) on the horse counts completed under their jurisdiction I am not able to complete this section of my review. However, I have made the following reference notes using earlier horse count data I already have *In File* from biologist Robert A. Ruttan, the 1992/2001 – 2015 equine zone horse counts that were obtained by an FOIPP by a third party (Alberta Environment and Sustainable Resource Development (E & P (ESRD)) 2014b), and recent horse count summary data obtained from the E & P (ESRD) website.

Partial review of Alberta's horse counts and free-roaming horse management: 1974-2001

The following review indicates that government counts of free-roaming horses in the Alberta foothills has been on-going, off and on, since 1977 or for 38 years.

In 2001, at the time of completing my report of free-ranging horses in the Brittany Triangle area of the BC Chilcotin, I included for relevant context a summary of wild horse research and management in North America, including Alberta (McCrory 2002). At this time I hired Alberta wildlife biologist Robert Ruttan to research population estimates and management of free-ranging horses in the Alberta foothills. Mr. Ruttan had some long-term familiarity of free-ranging horse ecology issues in Alberta and Saskatchewan. He worked in Alberta for the Canadian Wildlife Service and in Saskatchewan for the Fish and Game.

Following is a synopsis of Mr. Ruttan's 2001 up-date for free-ranging horse management in Alberta (exclusive of the Suffield issue):

> *Evans (1993) estimated 630 – 850 escaped or abandoned horses in the "Green" or forested foothills area of Alberta. Counts by forest districts indicated a decline from 1977 when 1791 horses were estimated. In 2000, an aerial survey of wild horses by Don Livingstone (Forest and Land Use Officer at Rocky Mountain House, pers. comm. to Ruttan) counted 187 horses west of Sundre and 100 near Nordegg. Smaller numbers were observed on the Clearwater.*
>
> *By 2001 the Alberta government had implemented a permit system for live-capture of free-ranging horses from certain foothill areas. The wild horse permit area included the Sundre, Nordegg and Clearwater horse populations. Permittees were allowed to capture only by corral traps, and to take a ratio of one female/three males of any age, with no limit as to numbers. Permittees at the time were estimated to live-capture an estimated 30 - 40 free-ranging horses per year. Outside of the permit area there were no regulations re: number, sex, age or capture method.*
>
> *According to a 2001 synopsis by Robert Ruttan (pers. comm.), the Alberta free-ranging horse capture permit system and associated rules appeared to be a compromise between public pressure for full protection of the species, including campaigns to stop snaring, running down or shooting horses on the one side, and, on the other side, to satisfy cattle ranchers who wanted no protection of wild horses.*
>
> *According to notes by Robert Ruttan (pers. comm.), aerial surveys of free-ranging horses in the Alberta foothill zone prior to 2001 were on-going for some time; including those by Eldon Bruns, Fish and Wildlife biologist from Rocky Mountain House.*

More recent E & P (ESRD) recent horse counts

According to a E & P (ESRD) summary (2014) of annual free-ranging horse counts, some 880 horses were counted in the foothills zone during 5 days of helicopter surveys in March, 2014 - approximately 100 fewer than a similar survey in 2013. The report notes, and I agree, that the numbers are those that were observed, meaning that the actual population size, taking into account horses that were not visible, may be higher. However, considering the study done by Linklater (2002) revealed that aerial counts result in over-estimating horse counts by 15-32%, therefore it is also possible that the number of horses in the Alberta equines zones may be much lower than is currently being reported. Given this, the only way to get an accurate count would be to do photograph aerial counts followed up by ground counts also using photographs to confirm the actual number of horses.

Until such time as I have done a further review, such as obtaining information requested from E & P (ESRD) related to grazing capability, number of cows and detailed horse count & methods for each of the equine zones, it is extremely difficult to understand why there is such a discrepancy in the number of horses in the Sundre zone compared to other larger unit, **and in particular the adjacent Clearwater equine zone just to the north that shows relatively stable numbers going back to 2001. In any event, without evidence of damage caused by the horses, there is no reason to believe that there are more than the carrying capacity can support.**

The 2013 map (National Post 2014) includes a graph that suggests counts in the Sundre zone from between about 180 animals in 2003, about 80 in 2004 to over 500 in 2013. These estimates were used to justify the 2013 cull in the Sundre unit without any analysis of survey methods and differences in survey intensity and conditions. Given there is no damage the government can point to, the suggestion that that horse populations are sky-rocketing out of control is, in my opinion, an exaggeration.

The E & P (ESRD) suggestion that this apparent increase may be the result of increased "temporary grazing opportunities" from logging and wildfire is speculative at best. The answer provided by E & P (ESRD) on July 28 was insufficient, as not even a hypothetical maximum exponential population increase of 20% could explain such a numbers discrepancy.

However accurate these surveys of minimal numbers might be, the historic context suggests considerable fluctuations in free-ranging horse numbers that most likely reflect differences in survey methods and visibility of the horses at the time of the surveys, natural population fluctuations such as poor winter survival and predation as well as live-capture by permit holders and unknown illegal shooting of horses.

In terms of total numbers averaging out over time, it is interesting that the estimate by Evans (1993) of 630 – 850 *escaped or abandoned* horses in the "Green" or forested foothills area of Alberta in 1993 is very similar to the 2014 E & P (ESRD) estimate of 880 horses. Additionally, as noted by Evans (1993), **counts by forest districts indicated a decline from 1977 when 1791 horses were estimated.**

In other words, an examination of horse count/estimate trends in the foothills zone within a broad time-frame of some 20-30 years suggests that, even given the vagaries and inherent errors and variations in aerial surveys, the horse subpopulations are obviously undergoing population ups and downs as with normal wild ungulate populations in the same foothills areas such as mule deer and Rocky Mountain elk. If Evans (1993) data for 1977 is at all accurate, then nearly 40 years ago free-ranging horses were nearly double the numbers estimated today.

E & P (ESRD) horse counts in the equine zones based on minimum number aerial surveys from 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

An analysis of minimal aerial counts from 2001-2015 of four of the Equine zones: Elbow (Zone 1), Clearwater (Zone 4), and Nordegg (Zone 5) and Brazeau (Zone 6) showed all had average horse counts of less than 100. Although the range of low-high counts varies considerably in some instances, the consistency of the low minimal counts suggests these four zones have relatively small, stable populations that remain more or less constant without the dramatic shifts detected in the Sundre and Ghost annual counts. The one anamolous exception was in the Elbow where a minimal aerial count of 168 in 2008 was followed by an aerial count of 90 in 2010 – with a much more accurate ground estimate of 113 animals; suggesting a population crash rather than a significant error between surveys.

This apparent stability and relative constant of numbers over a fairly long period of time in the majority area of the foothills equine habitat is suggestive that natural control of numbers is occurring, such as the wolf predation control of numbers that the data shows for the Clearwater.

This makes it all the more difficult to comprehend why the Ghost and Sundre equine zones have undergone such dramatic ups and downs in numbers, with an apparent recent trend of increasing numbers to the point that in 2013 the Sundre equine zone accounted for half of the overall foothills wild equid numbers.

Elbow equine zone (Zone 1):

Data was not available for earlier years. From 2008-2015, horse counts averaged 88 horses with a low high of 50-168 horses. This is the only zone where what appear to be a fairly reliable ground count from an intensive radio-telemetry study by Girard (2012) could be evaluated against aerial counts. Aerial minimal number counts between 2009 and 2011 found 112, 90 and 97 horses respectively. What was interesting was that in 2010, 90 horses (minimal numbers) were detected by air counts but what appear to be a fairly accurate ground by researchers yielded 131 horses. Compared to the high aerial minimal count of 168 in 2008, the more accurate 2010 ground count would suggest a significant fall in numbers from either artificial removals and/or natural mortality exceeding increments to the population.

Table 1. E & P (ESRD) horse counts in the Elbow equine zone (Zone 1): 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

Year	Source	Total count	Comment
2001	E & P (ESRD) (2014 b)	No data available	
2002	E & P (ESRD) (2014 b)	No data available	
2003	E & P (ESRD) (2014 b)	No data available	
2004	E & P (ESRD) (2014 b)	No data available	
2005	E & P (ESRD) (2014 b)	No data available	
2006	E & P (ESRD) (2014 b)	No data available	
2007	E & P (ESRD) (2014 b)	No data available	
2008	E & P (ESRD) (2014 b)	168	
2009	E & P (ESRD) (2014 b)	112	
2010	E & P (ESRD) (2014 b)	90	Girard (2012) est. 131 horses
2011	E & P (ESRD) (2014 b)	97	
2012	E & P (ESRD) (2014 b)	58	
2013	E & P (ESRD) (2014 b)	66	
2014	E & P (ESRD) (2014 b)	50	
2015	E & P (ESRD) (2014 b)	64	

Ghost river equine zone (zone 2):

Table 2. E & P (ESRD) horse counts in the Ghost river equine zone (Zone 2): 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

Year	Source	Total count	Comment
2001	E & P (ESRD) (2014 b)	No data available	
2002	E & P (ESRD) (2014 b)	No data available	
2003	E & P (ESRD) (2014 b)	No data available	
2004	E & P (ESRD) (2014 b)	No data available	
2005	E & P (ESRD) (2014 b)	No data available	
2006	E & P (ESRD) (2014 b)	No data available	
2007	E & P (ESRD) (2014 b)	No data available	
2008	E & P (ESRD) (2014 b)	98	
2009	E & P (ESRD) (2014 b)	104	
2010	E & P (ESRD) (2014 b)	212	
2011	E & P (ESRD) (2014 b)	261	
2012	E & P (ESRD) (2014 b)	195	
2013	E & P (ESRD) (2014 b)	173	
2014	E & P (ESRD) (2014 b)	242	
2015	E & P (ESRD) (2014 b)	171	

Sundre equine zone (zone 3)

The FOIPP horse tables from E & P (ESRD) contained two separate tables on horse counts. When collated into the following composite table there were inconsistencies in some years.

Table 3. E & P (ESRD) horse counts in the Sundre (Zone 3): 1982-2009 and 2001-2015 from E & P (ESRD) (FOIPP, July 27,2015). 1976 count from Salter and Hudson (1979)

Year				
1976	Over 200	Reported by Salter and Hudson (1979) in 200 sq km study area west by south west of Sundre		
E & P (ESRD) (FOIPP 2015 data)	**Total count: 1982-2009 table**	**Comment**	**Total count: 2001-2015 table**	**Comment**
1982-04-19	174 horses, 33 colts	Is this 207 total?		
1983-03-15	170 horses			
1984-03-22	208 horses			
1985-04-16	99 horses, 2 colts			
1986-04-16	103	Very few colts noted		
1987	no count			
1988-03-09	138 horses			
1989-03-08	130 horses			
1990-03-16	78 horses			
1991-01-09	176 horses			
1992-02-06	80 horses, 2 colts			
1993-02-18	14 horses	no a/c. survey by truck		
1994	134 horses			
1995	247 horses			
1996	161 horses			
1997	263 horses			
1998-2000		Note that the table had no entries		
2001-02-27	157 horses		2001	151
2002		Year not included	2002	Not counted
2003	203 horses			184
2004	85 horses			85
2005	306 horses			222
2006	193 horses			198
2007	125 horses			129
2008	269 horses			269
2009	437 horses	Includes cutoff and area up to N. Ram River		367
2010				243
2011				420
2012				357
2013				541
2014				448
2015				474

Clearwater equine zone (Zone 4)

Nine years (2005-2014) of surveys by E & P (ESRD) in the Clearwater equine zone showed an average minimal count of 54 horses/year with a range of variation of 30-89, which could just as easily reflect different survey conditions and methods as annual fluctuations in real (actual) horse numbers on the ground. Overall, the consistently low horse counts suggest a fairly stable and low population.

Table 4. E & P (ESRD) horse counts in the Clearwater equine zone (Zone 4): 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

Year	Source	Total count	Comment
2001		Not counted	Not fully surveyed (9 horses)
2002	E & P (ESRD) (2014 b)	Not counted	
2003	E & P (ESRD) (2014 b)	Not counted	Not fully surveyed (7 horses)
2004	E & P (ESRD) (2014 b)	Not counted	
2005	E & P (ESRD) (2014 b)	32	
2006	E & P (ESRD) (2014 b)	Not counted	
2007	E & P (ESRD) (2014 b)	30	
2008	E & P (ESRD) (2014 b)	41	
2009	E & P (ESRD) (2014 b)	51	
2010	E & P (ESRD) (2014 b)	78	
2011	E & P (ESRD) (2014 b)	89	
2012	E & P (ESRD) (2014 b)	42	
2013	E & P (ESRD) (2014 b)	69	
2014	E & P (ESRD) (2014 b)	51	
2015		Not surveyed	

Nordegg equine zone (Zone 5)

The Nordegg minimal counts suggested a fairly stable subpopulation as the counts had limited numerical variation from year to year between 2001 (81 horses) and 2013-2014 (83 and 80 horses). Seven years of counts provided an average of 78 horses with a low-high range of 49-116). The fact that improved aerial counts with a helicopter in recent years is close to the overall average is evidence that the horse population has remained relatively constant.

Table 5. E & P (ESRD) horse counts in the Nordegg equine zone (Zone 5): 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

Year	Source	Total count	Comment
2001	E & P (ESRD) (2014 b)	81	
2002	E & P (ESRD) (2014 b)	Not counted	
2003	E & P (ESRD) (2014 b)	94	
2004	E & P (ESRD) (2014 b)	Not counted	
2005	E & P (ESRD) (2014 b)	49	
2006	E & P (ESRD) (2014 b)	Not counted	
2007	E & P (ESRD) (2014 b)	44	
2008	E & P (ESRD) (2014 b)	116	
2009	E & P (ESRD) (2014 b)	Not counted	
2010	E & P (ESRD) (2014 b)	Not counted	Not fully surveyed (15 horses)
2011	E & P (ESRD) (2014 b)	Not counted	Not fully surveyed (12 horses)
2012	E & P (ESRD) (2014 b)	Not counted	
2013	E & P (ESRD) (2014 b)	83	
2014	E & P (ESRD)	80	
2015		Not surveyed	

Brazeau equine zone (Zone 6)

The Brazeau, being at the northern extremity of the foothills free-ranging horse habitat, was only surveyed in three years from 2008-2014, giving a partial count of 11 in 2008, 43 in 2013 and 9 in 2014. The data suggests a small subpopulation that does not appear of management concern.

Table 6. E & P (ESRD) horse counts in the Brazeau equine zone (Zone 6): 2001-2015. Source: E & P (ESRD) (FOIPP, July 27,2015)

Year	Source	Total count	Comment
2001	E & P (ESRD) (2014 b)	Not counted	
2002	E & P (ESRD) (2014 b)	Not counted	
2003	E & P (ESRD) (2014 b)	Not counted	
2004	E & P (ESRD) (2014 b)	Not counted	
2005	E & P (ESRD) (2014 b)	Not counted	
2006	E & P (ESRD) (2014 b)	Not counted	
2007	E & P (ESRD) (2014 b)	Not counted	
2008	E & P (ESRD) (2014 b)	Not counted	Not fully surveyed (11 horses)
2009	E & P (ESRD) (2014 b)	Not counted	
2010	E & P (ESRD) (2014 b)	Not counted	
2011	E & P (ESRD) (2014 b)	Not counted	
2012	E & P (ESRD) (2014 b)	Not counted	
2013	E & P (ESRD) (2014 b)	43	
2014	E & P (ESRD)	9	
2015		Not surveyed	

3.3.10 Comments on number of cattle in grazing alloments and potential impacts of cattle on the land

The following table of AUM (animal unit months) information was provided by E & P (ESRD) head Rob Kesseler (Sept. 3/15 e-mail to Zoocheck) in the 33 grazing allotments within the "designated horse capture area". This would appear to be the same as the boundaries of the equine zones. An AUM is the grazing required for one cow for one month. In order to determine the approximate number of cows for the 33 range allotments, the total AUM has to be divided by four since it is a four month grazing season. This amounts to a total of 8,502 cattle. It is to be noted that there were no grazing permits issued for domestic horses. However, at any given time in the overall equine zones for the four month grazing period (June 15-Oct. 15) there are over eight times more cattle than horses (8,502 versus 800-1,000) which is an important context to keep in mind in terms of which species might actually be causing the outstripping of the range and unsustainable damage on the land that E & P (ESRD) claims free-roaming horses are responsible for

As noted elsewhere in my report a number of the range health surveys report on damage being caused by cattle in some of the foothills allotments and and the high negative impacts of cattle grazing on riparian areas (e.g. streamsides including fish-bearing habitats, sedge meadows, and other wetlands) has been amply documented in the scientific literature. Another factor I would like to point out is that has wild horses tend to be broken into small territorial, nucleus reproductive bands and bachelor bands that behaviourally helps limit their impacts on vegetation cover as compared to putting 300 cows on the same range. It is well recognized that cattle have a tendency to concentrate their numbers in one or several herds and therefore behaviourally, unless spread out and distributed by range riders, can have a very concentrated grazing impact on the range.

These cattle over-grazing factors are totally ignored in E & P (ESRD)'s unsubstantiated claims against the free-roaming horses and it is no wonder E & P (ESRD) could not point us to sites damaged by the horses. It is also no surprise that during my field visits to the foothills in May and September, I was only able to find one small area that could be considered as overgrazed (although the roots of the grasses were intact, so it is unlikely there was permanent damage to the grass in this area), I could find no sign of horses in the area, but there was a significant amount of cow excrement in the over-grazed area.

2015 cattle grazing data for the Foothills horse capture area.
Information from E & P.

Allotment	Regular AUMs	Temporary AUMs	Total AUMS
Aura Cache	785		785
Bearberry Creek	481		481
Bragg Creek	250		250
Bread Creek	837		837
Burnt Timber	660	30	690
Clearwater	2,052		2,052
Coalcamp Creek	1,320		1,320
Devil's Head	916		916
Elbow	990		990
Fall Creek	203		203
Fish Creek	857	69	926
Ghost River	1,000		1,000
Grease Creek	500		500
Harold Creek	807		807
Jumpingpound	2,106		2,106
Lesieur Creek	453		453
Little Red Deer	617		617
Lower Fallen Timber	997		997
Lower James	684	40	724
Lower Red Deer	260		260
McCue Creek	413		413
McLean Creek	1,261		1,261
Moose Creek	532		532
North Sheep	3,636		3,636
Prairie Creek	425		425
Ram River	616		616
Rough Creek	371	100	471
South Sheep	6,259		6,259
Upper Fallen Timber	474		474
Upper James	636	300	936
Upper Red Deer	636		636
Williams Creek	913		913
Wilson Creek	491	35	526
TOTALS	33,438	574	34,012

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APPENDIX A.

HORSE COUNTS OBTAINED FROM E & P (ESRD) THROUGH A THIRD PARTY FOIPP APPLICATION (JULY 2015)

FOOTHILLS EQUINE ZONES (2001-2015)

"SUNDRE AREA", 1982-2009

(Data converted to word documents by copying from pdf)

Feral Horse Survey and Capture Numbers.
(Data compiled: February 11, 2014 by E & P (ESRD)

Feral Horse Survey and Capture Numbers
Data Sources:

- Elbow River Equine Zone (Zone 1)
- Ghost River Equine Zone (Zone 2)
- Sundre Equine Zone (Zone 3)
- Clearwater Equine Zone (Zone 4)
- Nordegg Equine Zone (Zone 5)
- Brazeau Equine Zone (Zone 6)

Data compiled: February 11, 2014

2013

Zone	Horses Counted
Elbow River Equine Zone	66
Ghost River Equine Zone	173
Sundre Equine Zone	541
Clearwater Equine Zone	69
Nordegg Equine Zone	83
Brazeau Equine Zone	48
Total Horses	**980**

2012

Zone	Horses Counted
Elbow River Equine Zone	58
Ghost River Equine Zone	195
Sundre Equine Zone	357
Clearwater Equine Zone	42
Nordegg Equine Zone	not surveyed
Brazeau Equine Zone	not surveyed
Total Horses	**652**

2011

Zone	Horses Counted
Elbow River Equine Zone	97
Ghost River Equine Zone	261
Sundre Equine Zone	420
Clearwater Equine Zone	89
Nordegg Equine Zone	not fully surveyed (12 horses)
Brazeau Equine Zone	not surveyed
Total Horses	**879 (without Nordegg = 867)**

2010

Zone	Horses Counted
Elbow River Equine Zone	90
Ghost River Equine Zone	212
Sundre Equine Zone	243
Clearwater Equine Zone	78
Nordegg Equine Zone	not fully surveyed (15 horses)
Brazeau Equine Zone	not surveyed
Total Horses	**638 (without Nordegg = 623)**

2009

Zone	Horses Counted
Elbow River Equine Zone	112
Ghost River Equine Zone	104
Sundre Equine Zone	367
Clearwater Equine Zone	51
Nordegg Equine Zone	not surveyed
Brazeau Equine Zone	not surveyed
Total Horses	**634**

2008

Zone	Horses Counted
Elbow River Equine Zone	168
Ghost River Equine Zone	98
Sundre Equine Zone	269
Clearwater Equine Zone	41
Nordegg Equine Zone	116
Brazeau Equine Zone	not fully surveyed (11 horses)
Total Horses	**703 (without Brazeau = 692**

2007

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	129
Clearwater Equine Zone	30
Nordegg Equine Zone	44
Brazeau Equine Zone	not surveyed
Total Horses	**203**

2006

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	198
Clearwater Equine Zone	not surveyed
Nordegg Equine Zone	not surveyed
Brazeau Equine Zone	not surveyed
Total Horses	**198**

2005

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	222
Clearwater Equine Zone	32
Nordegg Equine Zone	49
Brazeau Equine Zone	not surveyed
Total Horses	**303**

2004

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	85
Clearwater Equine Zone	not surveyed
Nordegg Equine Zone	not surveyed
Brazeau Equine Zone	not surveyed
Total Horses	**85**

2003

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	184
Clearwater Equine Zone	not fully surveyed (7 horses)
Nordegg Equine Zone	94
Brazeau Equine Zone	not surveyed
Total Horses	**285 (without Clearwater = 278)**

2002

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	not surveyed
Clearwater Equine Zone	not surveyed
Nordegg Equine Zone	not surveyed
Brazeau Equine Zone	not surveyed
Total Horses	

2001

Zone	Horses Counted
Elbow River Equine Zone	no data available
Ghost River Equine Zone	no data available
Sundre Equine Zone	151
Clearwater Equine Zone	not fully surveyed (9 horses)
Nordegg Equine Zone	81
Brazeau Equine Zone	not surveyed
Total Horses	**241 (without Clearwater = 232)**

Equine Management Zone	2015 Count	2014 Count	Percent change
Zone 1 Elbow River	64	50	28%
Zone 2 Ghost River	171	242	-29%
Zone 3 Sundre	474	448	6%
Zone 4 Clearwater	not counted	51	
Zone 5 Nordegg	not counted	80	
Zone 6 Brazeau	not counted	9	
Total all zones	**709**	**880**	**-19%**

Feral Horse Count Sundre Area 1982-2009

Date	Count
1982-04-19	**174 horses, 33 colts**
1983-03-15	**170 horses**
1984-03-22	**208 horses**
1985-04-16	**99 horses, 2 colts**
1986-04-16	**103, very few colts noted**
1987	**no count**
1988-03-09	**138 horses**
1989-03-08	**130 horses**
1990-03-16	**78 horses**
1991-01-09	**176 horses**
1992-02-06	**80 horses, 2 colts**
1993-02-18	**14 horses, NOTE: no a/c available, did survey by truck**
1994-	**134 horses**
1995	**247 horses**
1996	**161 horses**
1997	**263 horses**
2001-02-27	**157 horses**
2003	**208 horses**
2004	**85 horses**
2005	**306 horses**
2006	**193 horses**
2007	**125 horses**
2008	**269 horses**
2009	**437 horses (includes cutoff and area up to N Ram River)**

APPENDIX B.

REVIEW OF SOME STUDIES in WESTERN CANADA RELATED TO GRAZING ECOLOGY BY FREE-ROAMING HORSES, CATTLE AND WILDLIFE

Despite public controversy in British Columbia and Alberta for well over a century and a half concerning free-ranging horses and their impacts on the rangeland used by domestic cattle, there have been few academic type studies in western Canada of free-roaming horse dietary ecology when compared to extensive short and long-term research on the topic carried out in the United States; i.e. completed graduate theses and published scholarly papers in Canada on free-roaming horses remain somewhat scant despite considerable academic interest and public controversy. Nonetheless I consider the combination of longer-term studies in the United States and the handful of short-term Canadian academic thesis and published studies that quantify the comparative use in one way, shape or form, of habitats by free-roaming horses, domestic cattle and other ruminants very relevant to the discussion; and I must succinctly observe, such studies and their cautionary notes go often ignored in the decision-making process on free-roaming horse management by government range managers in both provinces; Alberta's E & P (ESRD) being no exception in this regards.

1. **Salter, R.E. 1978. Ecology of Feral Horses in Western Alberta. Master's thesis, Department of Animal Science, University of Alberta, February 1978. 239 pp.**

Although the study was done nearly 40 years ago, in 1976, I still consider it applicable to the situation today since; besides the work by Girard (2012), it is still the only detailed piece of academic research that quantified and compared the forage and dietary preferences of free-roaming horses, cattle and ungulates in the Alberta foothills that we have available. This interesting range ecology study led to three publications in various peer-reviewed journals (Salter and Hudson. 1978; Salter and Hudson. 1979; and Salter and Hudson. 1980) as well as one published paper on free-roaming horse social organization (Salter and Hudson. 1980).

The published works are also significant in that although the field work was done in 1976, the study area of 200 km2 was located approximately 30 km west of Sundre in what today is the most controversial E & P (ESRD) equine zone. The researchers also noted that during the study period there were 200 free-ranging horses, about 50 elk and 1500 AUM of permitted cattle use between June 15-Oct. 15 (i.e. 375 cows). Although I was unable to access Salter's thesis on-line, the published papers provide invaluable information, much of which appears to be ignored today in E & P (ESRD)'s management policies for free-roaming horses.

Key findings:

- Salter and Hudson (1979) noted that horses made use of a variety of habitat types in order to access available forage, particularly during the winter.

- Habitat occupancy during spring was related to stage of forage growth; previously grazed meadows were the first to green-up and were heavily used for feeding. This resulted in localized damage to vegetation from close cropping and trampling. Horses also fed under forest cover during the spring.

- Major forages in the Alberta foothills are highest in crude protein and lowest in fibre in the spring, but reach a low quality during winter…..Horses selected new growth on previously grazed areas in spring – to so some extent during the growing season – and may thus have effectively prolonged the period of availability of high quality forage.

- Salter and Hudson (1980) concluded that the lack of behavioural interactions and dietary differences suggested ecological separation of horses from deer and moose. Mule deer were more prevalent in the study area than white-tailed deer. Dietary overlap of horses and mule deer was not determined.

- Although horses and elk used dry grasslands during winter and spring, competition for forage was minimal due to the low number of elk. Horses used 93% of sites used by horses, but elk utilized only 6% of sites used by horses. 85 elk were observed a number of times in February and March feeding on the same slopes as horses.

- During spring horses occupied some areas later preferred by cattle but range use was not excessive prior to the turn-out of cattle. Intensive examination of an important winter-spring range (and cattle summer range) showed that utilization of new growth was not to very light over 95% of the 70 ha are 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 nonforested habitats indicated that food was being produced more rapidly than it was consumed.**

- **Similarly, spring grazing by 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.**

- There was little contemporaneous spatial overlap of horses and cattle even though their summer diets showed 66% overlap. Over 90% of sties utilized by cattle in summer had received prior use by horses. About 40% of these there was little overlap during the time when cattle were actually present.

- In terms of combined use, by late summer 75% of nonforested habitat was used at a safe or lower level, most of the remaining 25% receiving heavy utilization, with the pattern varying with the habitat type.

- Combined grazing by horses and cattle caused localized damage along stream courses and around both natural and artificial salt licks.

- Potential for competition appeared highest between horses and cattle but grazing relationships were complex.

- There was a general ecological separation of wild horses from deer and moose. While horses shared 90% of sites used by moose over the year, this decreased to 25% during late winter. This was because wintering moose mostly browsed on shrubs while horses fed mostly on grasses and sedges. In one instance in winter, an adult moose and five horses fed within 25 m of each other in a mixed shrub meadow. The moose browsed on shrubs while the horses pawed for graminoids.

- Faecal samples were collected for dietary analysis from horses, elk and cattle, but not from moose. Hence study results are based on habitat use, but do not reflect research into dietary competition between horses and moose.

- While these conclusions are valid for the patterns of resource us documented during the study, the complex and labile nature or range relationships needs to be emphasized.

2. **Girard, T.L. 2012. Habitat selection by feral horses in the Alberta foothills. MSc Thesis. Dept. of Agricultural, Food and Nutritional Science. 148 pp.**

This is a very interesting master's study involving the radio-collaring of four individual mares from four different bands. Much of the study area has been clearcut (13%) and experiences high outdoor recreational use. The study area was a 202 km2 area west of Bragg Creek, Alberta, in and around the McLean Creek Forest Land Use Zone. It is also within the E & P (ESRD) southern most equine zone, Elbow. During the study there were 131 free-roaming horses in 11 different bands, and from June 15-Sept.15 /Oct. 15, 1600 cattle.

Unfortunately and in my opinion clearly demonstrative of a lack of scientific rigour, I was disappointed that the author quoted the Alberta government's misclaims that horses are feral and have only been free-roaming in the Alberta foothills since the early 1900s. Without carrying out adequate historical research of the origins of the horses in Alberta the author thereby misses relevant scholastic and much more balanced context that the foothills horses have likely been using these same habitats as "mustang" escapees in association with First Nations having horses around 1730 (Cowdrey et al. 2012), if not before. Therefore "learned" range associations have likely been going on for many more horse generations spanning at least 1.5 centuries beyond what the government claims; along with of course the recognized more recent domestic escapees and domestics turned loose on the range.

As an aside, I also found it disturbing that although mentioning four mares were tranquilized from helicopters (three of them pregnant at the time) the study did not identify the type of drug used. If it was anything comparable to the standard Telazol used by grizzly bear researchers in the Alberta foothills, the capture drug can cause capture myopathy that affects physiology and behaviour for the first 100 days after capture (Cattett et al. 2008).

Although this is a small sample size of individuals (4 radio-collared horses from 4 bands) carried out over a short time frame (2 yrs.), as acknowledged by the researchers, (p. 436) one has to keep in mind that it is more or less a measure of the feeding of ecology of four different horse bands – still a small sample size that may not be fully representative of all of the horse bands along the foothills and may not compare well to more remote areas where the influence of motorized access and clearcut logging is less impacting on horse avoidance of potential feeding habitats near roads and trails that this study found.
Overall, the study found that horses have select home ranges with little overlap with home ranges of other bands. Horses appear to show a good deal of home range fidelity from year to year.

This social behaviour of near exclusivity of home ranges of different bands has implications for natural distribution across the landscape and is in my opinion, unlike cattle and bison, a built in mechanism to avoid over-crowding and over-grazing of home ranges that needs to be further studied.

The study had some interesting findings but was inconclusive and ambivalent as to the extent of range damage the Elbow equines were causing. **Where damage was observed from range health surveys this was inferred from combined summer long grazing by cattle and horses.** Relevant findings include:

p. 52

The identity of selected habitats changed slightly throughout the seasons (i.e. increased selection of cutblocks in winter). Increased selection of cutblocks in winter could be problematic and lead to heightened land use conflicts between forestry and feral horses. ***It is unknown whether increased horse use of regenerating cutblocks could increase damage to tree seedlings.***

p. 92-94

The presence of competing ungulates on one another based on the field plots sampled had mixed results during the study period, with wild ungulates appearing to negatively impact horses in both years, and horses negatively impacting ungulate abundance in a parallel study during 2010 (Appendix G), coincident with larger sample sizes of field plots. The observed negative response in horse use to wild ungulate presence may be explained through several mechanisms. The simplest explanation is that this relationship is a direct reflection of horses and wild ungulates preferring distinctly different habitats, specifically grasslands (or open shrublands) and woodlands, respectively. Previous work has shown that horses and wild

ungulates utilize different habitats due to differing dietary requirements (McInnis and Vavra 1987, Hubbard and Hansen 1976). Thus, a second potential explanation is that horses and wild ungulates may exhibit mutual avoidance on the landscape in an attempt to avoid competition or perhaps predators, in effect displacing native ungulates from habitats they would normally use. Moreover, the similar use of habitats by horses and cattle (see below) may result in displacement of wild ungulates by both horses and cattle. Previous work has shown that when livestock move into a region, wild ungulates (i.e. mule deer) move into less preferred areas of the landscape (Stewart et al. 2002, Kie et al. 1991, Loft et al. 1991), results that could apply following exposure to both horses and cattle in the current study. Finally, it is also possible that the observed extent of segregation in habitat use between feral horses and wild ungulates may be overestimated based on the method of using fecal counts to assess ungulate presence. For example, elk have been found to defecate where they bed rather than where they forage (Collins and Urness 1981, 1983), which would overestimate elk use of bedding sites such as forest, and underestimate use of adjacent foraging sites, presumably grasslands. ***Nevertheless, the observed segregation documented here between feral horses and wild ungulates during summer is important, with further information needed on the specific mechanisms determining this relationship.***

In contrast to wild ungulates, feral horse abundance in field plots was positively associated with cattle presence, particularly during 2010. *This is not surprising given the dependence of both these herbivores on the same habitats, specifically grasslands, during summer (see Section 4.5.1). Although it was anticipated that cattle and horses, being the predominant large herbivores within this ecosystem, may segregate their use in the landscape, little evidence was apparent to support this notion. One possibility for the strong overlap in* ***habitat use is that both these herbivores may benefit from the prompt regrowth of biomass throughout the summer growing season following frequent defoliation, which is known to attract animals to high quality forage (Belsky 1986).*** *Salter and Hudson (1980) found that the majority of ranges in their study had feral horse use prior to cattle entry, a pattern likely to occur at McLean Creek as well where cattle do not enter the area until June. Thus, spring and early summer use by horses may initially condition vegetation within lowland grasslands, which is then further reinforced throughout the year by ongoing cattle and horse use. Finally, it is worth noting that cattle do not appear to exhibit any relationship with horse presence (Appendix F), suggesting cattle are behaving independently of other herbivores.*

Cattle stocking rates in the region were around 2300 AUMs in 2010 based on approximately 1600 animals (unpublished ASRD data) grazing from June 15th until September 15th. In contrast, feral horse stocking rates were approximately 1965 to 2358 AUMS based on 131 individuals, *a 1.5 AU equivalent per head, and a 12 month year-long grazing season. A key difference evident between these herbivores is that while cattle use occurs from mid June to mid October, feral horses are using the range throughout the year. This is problematic as production values for habitats obtained in this study indicate that grasslands (primary range) provide only 3805 AUMs for the entire year. As grasslands were shown to be selected by cattle and horses in the region, aggregate use by these herbivores is likely well over this stocking level (i.e. 2300 AUM for cattle + 2000 AUM for horses). If secondary range (shrubland) is included, an assumption that appears to be supported by*

results of the current study, the total available AUMs available for sustainable grazing increases to 5607 (Figure 4.14). Although cutblocks are also clearly important for contributing to horse grazing capacity, feral horse preference for cutblocks only in winter indicates cutblocks do not reduce summer grazing pressure, but rather provide an abundance source of alternative grazing (9837 AUMs) during winter when no other forage is available. Although the greatest contributor of AUMs is from conifer forests due to their large size (Table 4.14), these areas are not selected or highly utilized by feral horses, potentially limiting their contribution to horse survival.

It should be noted that forage utilization assessments in this study were very conservative, averaging 44% by the time of sampling in late July after only 2-3 months of summer grazing. ***Although un-quantified in the present investigation, continued grazing by feral horses and cattle into late summer would have increased forage utilization levels substantially on primary ranges (grasslands and shrublands),*** *and also account for the observed lack of litter and standing dead carryover within these habitats during sampling.* ***With grazing capacity in grasslands likely exceeded by summer long grazing from cattle and horses, this likely accounts for observations that the range health of many grasslands in the region is being compromised, as reflected by low range health scores*** *(Michalsky 2010). Moreover, the lack of standing dead litter under heavy use is problematic, as litter is an important indicator of range health, and also helps limit the use of late seral native grasses such as rough fescue (Festuca campestris) (Moisey et al. 2006)….*

Girard's thesis lead to two published papers in peer-reviewed journals:

Girard, T.L., E.W. Bork, S.E. Neilsen, and M.J. Alexander. 2013a. Seasonal variation in habitat selection by free-ranging feral horses within Alberta's Forest Reserve. Rangeland Ecology & Management, 66(4):428-437 and:

Girard, T.L., E.W. Bork, S.E. Neilsen, and M.J. Alexander. 2013b. Landscape-scale factors affecting feral horse habitat use during summer within the Rocky Mountain Foothills. Environmental Management (2013) 51:435–447.

The Girard 2013a study concluded that horses selected for grasslands at all seasons with an increase in selection of shrublands in the spring and summer. Clearcuts were selected by horses only during the winter. The study concluded that horses selected for habitats covering 14% of the study area while avoiding 42% of habitats. *Concentration of horse use within sparse vegetation types (grassland and shrubland), particularly during one or more times of the year, help identify critical horse habitat including areas where multiple, overlapping land uses interact on public land.*

Another items of interest was:

p. 435. **For summer:** ***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….***

p. 435. Cattle in Alberta avoided conifer cutblocks in summer similar to the horses (Kaufmann 2011).

p. 435. Increased selection of conifer cutblocks in winter contradicts Irving (2001) who found horses in the Upper Foothills of Alberta selected disturbed areas (roadsides, etc.) over pine cutblocks.

p. 436. **Ruggedness was not a factor in habitat selection suggesting topography (i.e. elevation, slope and aspect) does not pose the same limitation for horses as it does for cattle (Kauffman 2011).**

3. **The Girard (2013b) study provided additional insights:**

Abstract

Public lands occupied by feral horses in North America are frequently managed for multiple uses with land use conflict occurring among feral horses, livestock, wildlife, and native grassland conservation. The factors affecting habitat use by horses is critical to understand where conflict may be greatest. We related horse presence and abundance to landscape attributes in a GIS to examine habitat preferences using 98 field plots sampled within a portion of the Rocky Mountain Forest Reserve of SW Alberta, Canada. Horse abundance was greatest in grassland and cut block habitats, and lowest in conifer and mixedwood forest. Resource selection probability functions and count models of faecal abundance indicated that horses preferred areas closer to water, with reduced topographic ruggedness, situated farther from forests, and located farther away from primary roads and trails frequented by recreationalists, but closer to small linear features (i.e. cut lines) that may be used as beneficial travel corridors. Horse presence and abundance were closely related to cattle presence during summer, suggesting that both herbivores utilise the same habitats. ***Estimates of forage biomass removal (44 %) by mid-July were near maximum acceptable levels****. In contrast to horse-cattle associations, horses were negatively associated with wild ungulate abundance, although the mechanism behind this remains unclear and warrants further investigation. Our results indicate that feral horses in SW Alberta exhibit complex habitat selection patterns during spring and summer, including overlap in use with livestock. This finding highlights the need to assess and manage herbivore populations consistent with rangeland carrying capacity and the maintenance of range health.*

4. **Bhattacharyya, J. 2012. Knowing Naŝlhiny (Horse), Understanding the Land: Free-Roaming Horses in the Culture and Ecology of the Brittany Triangle and Nemiah Valley. Doctoral Dissertation, School of Planning, University of Waterloo, ON.**

Preamble by Wayne McCrory

The study area was in Nunsti Provincial Park in the Brittany Triangle **where no cattle use occurs.** Elk were extirpated from the area, apparently in the early 1800s and moose did not arrive until about the 1920s as a result of a prolonged post-glacial range expansion from

refugia during the last ice age. Mule deer are common summer residents. Most migrate in the fall to the Fraser River to over-winter but a few remain in the Brittany (McCrory 2002).

The study area is in western Canada's only wild horse preserve, established by decree by the Xeni Gwet'in First Nation in 2002. The preserve is called the "Elegesi Qiyus Wild Horse Preserve," or Eagle Lake Henry Cayuse Wild Horse Preserve. As a result of a BC Supreme Court ruling, the Xeni Gwet'in established their rights to capture wild horses from the Brittany for domestic use. The Xeni Gwet'in have a hands off management policy in terms of overall population and periodically use the Brittany horses for tourism and for film documentaries.

The Brittany horses are thus not "controlled" by humans. The last wild horse bounty hunt in BC was sponsored by the BC Ministry of Forests was related to a cattle grazing tenure in Elkin Creek, immediately adjacent to the Brittany Plateau. This was not within the core Brittany core wild horse study area Other than a small number being captured by First Nations for domestic use, the population has remained unmolested by humans. I documented six horses out of one band that died after the 2003 wildfire – apparently from starvation due to dried winter forage biomass (grasses and sedges) being burned off in the fall.

Although the Ministry of Forests & Range has in the past conducted annual fixed wing horse counts, areal counts by Friends of Nemaiah Valley (FONV) and the Xeni Gwet'in First Nation in about February were considered somewhat more reliable. Prior the large 2003 wildfire in the Brittany, 90 horses were counted in August 2001(fixed wing). Just after the 2003 fire, about 80 horses were counted by helicopter in September, 2003. In December 2005, a helicopter survey counted 121, In February 2011 the helicopter count was 127 horses and in February 2013 it was 48 horses. These are considered minimal counts, as noted with the similar Alberta free-roaming horse counts. Similar perambulations of counts are also to be noted that may reflect different survey conditions and not necessarily population trends.

What is important to note is that generally left alone under policy of the Xeni Gwet'in First Nation, the horses have not over-populated or shown noticeable increases in numbers. In fact a map of free-roaming horse densities and interpolated horse distribution in the BC Chilcotin prepared by agrologist Allen Dobbs for McCrory Wildlife Services (2010) showed a low density of horses in the Brittany Triangle compared to other areas. The map was prepared applying the Kriging Algorithm and BC Ministry of Forests & Range areal counts 2007-2009 and the FONV count for Dec. 2015. Horse counts for the four years averaged 89 animals for the Brittany.

Results of Bhattacharyya's range studies

Hand in hand with this is that Bhattacharyya's range studies concluded that there was no statistical evidence of overall degradation; but only localized damage was being caused to the range by the study area horse, as follows:

Results demonstrate that the free-roaming horses are part of a social-ecological complex, one of many disturbance factors in a system with multiple drivers of ecological and social change. ***Grazing and disturbance of vegetation by horses are patchy and heterogeneous in distribution, but no statistically significant difference was found in plant community composition or heights between sample sites.***

The sample sites for this study are grass and sedge meadows within a pine-spruce forest ecosystem in the Brittany Triangle, which is a plateau. The elevation of sample sites for this study ranges between 1220-1350 metres above sea level
Little peer-reviewed research exists to elucidate the actual ecological impacts and social relationships of free-roaming horses in the particular ecological, cultural and political context of the Brittany Triangle, or to support management decisions concerning the horses.

Free-roaming horses tend to form trails when they move across the landscape, so that they have an intense but localized impact on soils and vegetation (forming trails) as opposed to cattle which tend towards dispersed travel patterns (trampling larger areas to varying degrees) (Beever and Brussard, 2003). Horse trails form an extensive network through forested areas within the Brittany Triangle, connecting meadows, watering sites and other natural habitats. These trails are used not only by horses, but by other animals as well. McCrory (2002) suggests that horse trails may serve to help other wildlife conserve energy in the winter, by easing the energy requirements of travel through snow and ice.

Horse grazing in combination with moose browsing may be one factor in maintaining meadows from shrub and forest encroachment (IN06), though this study does not provide conclusive evidence of such an effect. The plant species that occurred with the highest frequency in sample sites was Juncus balticus, and that species was also heavily grazed by horses. Field observations suggested that the species was consistently grazed by horses, particularly during the spring season. Grazing patterns within each meadow followed the growth of Juncus balticus through the stratified vegetation areas of meadows from driest to wettest strata throughout the summer, as standing water levels receded. Future research could study and seek to confirm the palatability of Juncus balticus and the Brittany Triangle horses' forage preferences. However, field research for this study found no evidence of overgrazing on an extensive scale within the study area. Some areas are intensively grazed; other areas are not. The Home Meadows generally had healthy litter….

Composite faecal samples collected in the study region during August 2007 and tested at Washington State University's Wildlife Habitat Lab for dietary analysis found that among the samples, sedges (Carex) and rushes (Juncus) together comprised 53%-76.7% of the horse's diet, and grasses (Agrostis, Alopecurus, Calamagrostis, Deschampia, Poa, and unknown species) between 21.5% and 46%. While there were not enough samples tested to yield results that can be reliably generalized to characterize the diets of horses in the Brittany Triangle, in general (see Chapter 3 for a discussion of faecal sampling in this study), these "pilot tests" do provide anecdotal indication of the summer grazing practices of horses in the study area, relative to plant community composition and species frequencies that are reported as part of this study.

5. **Preston, S. K. (1984). A habitat-use and dietary analysis of a monogastric versus a ruminant herbivore, on forested range. Master of Science, University of British Columbia, Vancouver, BC.**

This is an important study with a significant amount of good information on the comparative grazing ecology of free-roaming horses, domestic cattle and moose in overlapping and disparate habitats in the BC Chilcotin. The study area is a high elevation plateau in the Haines area on the east side of the Taseko River, with habitat types similar to the Brittany Triangle wild horse preserve just opposite on the west side of the Taseko River (McCrory 2002). Most of the area is lodgepole pine forest with intermittent wetlands, small and large open meadows and other habitat types that provide a variety forage plants for grazing animals.

As the author Karen Preston points out, pine grass (*Calamagrostis rubescens*), a forest not a meadow species, was the most important seasonal plant utilized by both range cattle and free-roaming horses in the Haines study area but in the Salter (1978) study in the Alberta foothills, hairy wildrye grass (*Elymus innovatus*) composed the most single dominant forage of free-roaming horses. Hairy wildrye is also a forested, not a meadow species. This dietary difference and others must be kept in mind when extrapolating key findings from the Preston study in terms of cattle-horse grazing interactions to the Alberta foothills situation. In fact, Preston provides an excellent literature review that cautions against simplified concepts of species range "competition" and other range management assumptions and concepts that were being applied by agencies at the time of her research 30 years ago and are still used today.

Although excellent anecdotal and quantified analyses are found within the Preston study, I found it particularly hard to follow since the abstract does not provide a sufficient summary of the relevant findings and the very lengthy summary at the end of the report does not adequately link key information outlined within the discussion. Therefore I have teased out of the document information that I considered might be relevant and hope my interpretation is accurate.

For the 200 sq km study area, range cattle were estimated to be the dominant grazer (89.7%) from June to October (p.ii) and that there were "so many cattle" that were "literally everywhere" (p.69). The cattle (mostly Herefords) were from three range allotments. A fluctuating number of domestic horses shared the study area with 65 free-roaming horses that comprised 7.4% of the herbivore population, with moose 2.9%.

The study used laboratory fecal epidermal analysis from dropping samples for horses and cattle from June through September and for horses in winter. A system of random transects was used to collect distribution and habitat use for horses, cattle and moose – primarily through counts of droppings.

Following are some of the observations and conclusions I have drawn from the report:

- Both horses and cattle used meadow habitat disproportionately more than availability, though not necessarily in the same locations.

- Pine grass (a forest not a meadow species), was the most important seasonal plant utilized by both range cattle and free-roaming horses in the Haines study area. Horses consistently utilized pine grass 1.5 to 2 times more than cattle (p.84).

- In the dry summer of 1978 when more sedge meadows than usual were available to cattle, by the end of August both dry and wet meadows used by cattle were severely grazed and had sustained heavy trampling damage (p. 84). No mention is made of similar damage caused by the horses.

- In numerous instances, horses were heavily concentrated in areas that cattle used very slightly, and vice versa. Horses and cattle were distributed differently over the study area (p. 92).

- Horse groups were observed to use not only the same meadows repeatedly, but also the same portions of the particular meadows. Some open areas that appeared to have good forage were not touched by cattle all summer, while similar areas were repeatedly grazed (p.66).

- An analysis of the proportionate use of botanical groups by horses and cattle showed a significant difference in their utilization per month of grasses, rush-sedges and 'other' (i.e. mainly forbs and browse).

- The total diets of horses and cattle represented on a fraction of the plant species comprising the plant groups found in the study area (p. 94-95).

- The author analyzes a number of variables to explain the lack of association between horses, cattle and moose (p.71).

- *While horses and cattle were both on the study site from June to September, the differences in habitat-use, distribution and diet choice appeared to ameliorate the potential for interference between the two species (p. 79). However, because horses depend heavily on rush-sedges in the winter, and cattle utilized them in the summer,* ***there is a possibility that cattle summer-use could adversely effect horses*** *(p. 79)…..* ***By the same token, horses may undermine the value of spring range to cattle. However, based on use-difference between the two herbivores already known to occur, there would seem to be little probability of this.*** **The author then notes that in Alberta the Salter (1978) study estimated that only 5 percent of non-forested habitat on the study site showed evidence of spring (June) grazing by horses.**

- Although the author draws no conclusions concerning over-grazing and range damage (this was not an objective), the inference I draw from this study in that in semi-forested regions where both free-ranging horses and range cattle seasonally share the same areas during the spring-fall range allotment period, there is little “competition” between the two species and where cattle are numerous, some of the range damage may be attributed more to them than to horses.

END

Photo by Duane Starr Photography