

Bringing Insight into Livestock Depredation by Wolves in Southwestern Alberta, Canada

by

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Conflict between the livestock industry and wolves has been ongoing in southwestern Alberta, Canada since settlement of the area, because of wolf depredation on domestic livestock (Gunson 1992, Musiani *et al.* 2003, Musiani and Paquet 2004). Although impacts of depredation on the livestock industry in Alberta as a whole are very small, costs to individual ranchers can be high, as depredation events often re-occur in the same area. The common management practice in response to depredation, both in the past and present, is to cull wolves, affecting the viability of wolf populations in this portion of the province (Gunson 1992, Musiani *et al.* 2003, Musiani and Paquet 2004). It is in the interest of many segments of the general public, including ranchers, to reduce depredation (Gunson 1992, Kellert *et al.* 1996, Musiani *et al.* 2003, Musiani and Paquet 2004). Benefits to the rancher are obvious, with the potential for additional benefits to all concerned stakeholders, including increased tolerance for wolves in the area leading to a probable reduction of culling, resulting in more stable wolf populations in the southwest portion of Alberta.

Some studies in other parts of the world have used a spatial approach to model and predict areas of livestock depredation (Mech *et al.* 2000, Treves *et al.* 2004). In southwestern Alberta, depredations tend to re-occur in the same areas; therefore we used a similar approach, using Geographic Information Systems (GIS) to model spatial factors we thought had an impact on depredation events in southwestern Alberta. We used multivariate statistics to determine what variables could be used to predict areas of livestock depredation risk. Some of the factors we looked at included: human disturbances (e.g. buildings and roads), habitat (e.g. vegetative cover, riparian areas and terrain ruggedness) and wild prey distribution (elk density). Our goal is to provide information to ranchers in southwestern Alberta on what defines areas of livestock depredation, and thus help them better manage their livestock to reduce depredation risk when wolves are in the area.

Methods

We contacted ranchers along the foothills of southwestern Alberta to determine locations of depredation sites. We visited these depredation sites with the ranchers to record GPS locations. We established the relationship of these depredation locations to roads, buildings, vegetative cover, riparian areas, and prey density in comparison to random points on the landscape available to wolves using multivariate statistics.

Depredation Risk Factors

Some of the parameters we tested had a nominal relationship to depredation risk. These parameters indicated that depredation risk was related to cattle distribution. For example, contrary to what was expected, depredation risk was higher closer to paved roads and buildings but lower closer to remote areas and dirt roads. This is because we looked at depredation risk across a large scale. In relation to habitat available to wolves, depredation happens in areas where humans are located, as this is where cattle are located. If we examined depredation at a smaller scale (e.g. at the individual ranch) we believe depredation risk would be lower where human presence is high. However, it is also possible that human disturbance levels in southwestern Alberta are not high enough to deter wolves from attacking cattle. Regardless, these parameters had a weak relationship to depredation risk and are not the most useful for predicting areas susceptible to depredation.

Conversely, the elk density and distance to vegetative cover parameters had the greatest ability to predict depredation risk. Depredation events occurred in locations where elk density was higher and in closer proximity to vegetative cover when compared to available sites. Wolves likely use cover to avoid detection of prey (Kunkel *et al.* 1999) and cover likely decreases detection of wolves by humans, important in areas where culling of wolves is practiced. Depredation risk is higher where elk density is higher, potentially because these areas are expected to be colonized and hunted by wolves (Mech 1970, Jedrzejewski *et al.* 2000 and Carroll *et al.* 2003). When livestock are put into these areas, chance encounters with wolves are higher (Linnell *et al.* 1999) and depredation events may be more likely to occur.

Implications for Ranchers and Wildlife Managers

Proximity to vegetative cover is an important indicator of where depredation events occur in southwestern Alberta. This is a variable we believe can be managed by ranchers and wildlife managers when depredation becomes a problem on a given ranch. Movement of cattle away from forested areas will result in decreased risk of depredation to that livestock and will potentially result in fewer depredation events. Ranchers and managers should focus anti-depredation strategies to areas where vegetation cover is substantial (when livestock are located there) to deter wolves from preying on livestock.

Elk density is a factor that would be difficult for wildlife managers and ranchers to manage. However, at the very least, wildlife managers and ranchers may be able to determine the vulnerability of an area where cattle are grazed to depredation by understanding the density of wild prey in the area. Eliminating wild prey in an area will not necessarily decrease depredation risk and may in fact increase reliance of wolves on livestock (Meriggi and Lovari 1996, Meriggi *et al.* 1996) and is unlikely a management tool available to ranchers or wildlife managers. Public support for removal of big game species, such as elk, to reduce depredation risk would likely be very low if it existed at all. Improved understanding on the finer scales of the relationship of wild prey density to livestock depredation will provide further insight into what drives livestock depredation by wolves in southwestern Alberta.

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