Potential Health Risks to Dall's Sheep associated with Domestic Sheep and Goats in the Northwest Territories, Canada

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Abstract: In Canada's Northwest Territories (NWT), healthy populations of Dall's sheep (*Ovis dalli*), caribou (*Rangifer tarandus*), moose (*Alces alces*), and mountain goats (*Oreamnos americanus*) are important for subsistence and resident hunters in the Mackenzie and Richardson Mountains, and are the basis for a world-class non-resident outfitted hunting industry in the Mackenzies. There is also growing interest in developing the agricultural industries in the Northwest Territories (NWT), including domestic livestock production. However, expansion of the livestock industry could result in pathogen exchange among domestic and wild species, and subsequent negative consequences on the NWT economy. For example, introduction of a domestic sheep strain of the bacterium *Mannheimia haemolytica* has the potential to cause outbreaks of pneumonia in Dall's sheep populations. Introduction of domestic goats and llamas as pack animals for back-country recreation could result in pathogen transfer and negative effects on wildlife populations. We believe that agriculture, tourism, and hunting may coexist only if participants in these activities are aware of potential negative interactions and act to eliminate or minimize them.

To develop a sustainable agricultural industry in the NWT while conserving wildlife species and ecosystem health, it is critical that we understand risk of disease introduction with domestic livestock or exotic species, risk of disease transmission between wild and domestic/exotic animals, and how risks can be mitigated with minimal impact on either sector. The objectives of the current Risk Assessment were to identify the pathogens known to infect domestic sheep, domestic goats, llamas, Dall's sheep and mountain goats, and to examine the disease risks associated with the possible introduction of domestic sheep, goats, and llamas to the Mackenzie and Richardson Mountains.

We identified numerous pathogens in domestic sheep and goats that have had serious negative impacts on the health of bighorn sheep (*Ovis canadensis*). Thinhorn sheep (Dall's and Stone's sheep; *O. dalli* subspp.) may have similar disease susceptibilities, leading to detrimental impacts on wild sheep and goats in the NWT. Nine infectious agents were considered high risk: *Mycobacterium avium paratuberculosis, Mycoplasma conjunctivae* and *M. ovipneumoniae, Pasteurella* spp., *Mannheimia haemolytica*, contagious ecthyma, Parainfluenza-3, *Muellerius capillaris*, and *Oestrus ovis*. Ninteen

infectious agents were unknown risk for Dall's sheep, 10 were low risk, 128 had no apparent risk at this time, and 3 were important but not reported in Dall's sheep or mountain goats in NWT. Of the risk agents identified, 11 were potential public health concerns. Some disease agents in Dall's sheep and mountain goats may infect domestic sheep, goats, or llamas; however, current management and treatment practices of domestic livestock preclude major concern for present or future agriculture in the NWT.

The Risk Assessment indicates contact between domestic sheep or goats and wild sheep or goats would likely result in significant disease in the wild species, with substantial long-term negative effects on population dynamics and sustainability. **We strongly advise that domestic goats <u>not</u> be used as pack animals, and that domestic sheep and goats not be pastured in the vicinity of Dall's sheep or mountain goat ranges within the NWT**. This recommendation is consistent with the practical experience and recommendations of bighorn sheep managers and biologists throughout Canada and the United States. Experience gained from events in the U.S. and southern Canada clearly highlights substantial economic and social costs in mitigating the effects of diseases of domestic sheep and goats in wild sheep populations. Contact between llamas and wild sheep or goats **may** result in disease in wild species, but data are insufficient to clearly assess the role of camelids as a source of disease.

Risks change as a result of changing management practices in wild and/or domestic livestock, ecosystem balance (climate change, habitat fragmentation), and the discovery or emergence of novel diseases. Our document[2] provides a basis for pro-active guidelines and management policies to prevent negative impacts associated with the possible introduction of domestic sheep, goats, and llamas to the NWT. It also highlights the critical importance for managers and agencies with mandates for animal health to develop science-based assessments for other potential introductions or translocations of wild and domestic species in the NWT and elsewhere. Integration of these recommendations into policy will provide a positive framework for continued development of a healthy domestic livestock industry while promoting healthy wildlife populations in the NWT and sustainability of all forms of wildlife harvest and tourism.

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[2] http://wildlife1.usask.ca/Publications/NWT_Dall_Mtn_goats_Domestic_sheep_goats_RiskAssessment.pdf