The llama community has confronted recurrent ban attempts for the last 25 years and it has become apparent wild sheep hunting interests in British Columbia (BC) are driving the initiatives. The first ban initiative was in the U.S. in 1995 in Canyonlands National Park based on llamas potentially transmitting Johnes Disease to Bighorn sheep. The veterinary research community was heavily involved in compiling research over a four year period and documenting Johnes disease as related to llamas. They concluded the infection was atypical and terminal and llamas posed no significant threat regarding Johnes. Additionally, their comprehensive research found no endemic diseases in the llama population. The ban, based on disease, was rescinded, avoiding pending litigation by the llama industry.

DECEPTIVE SURVEY

In 2001, the ban initiative resurfaced in British Columbia without cause or shift in llama disease dynamics. The Canadian Llama and Alpaca Association agreed in good faith to participate in a survey of their herds in cooperation with Dr. Helen Schwantje, provincial wildlife veterinarian with British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) in the interest of finding out if their llamas carried any pathogens that posed a threat of disease transmission to wildlife. Owners submitted blood and fecal samples at their own expense and the association even provided some funding along with BC Outfitters and Guides and some NGO's.

RA'S BASED ON HYPOTHETICAL DISEASE TRANSMISSION

In 2003, Dr Schwantje published a Risk Assessment (RA): *Communicable Diseases Risks to Wildlife from Camelids in British Columbia.* The RA recommended banning llamas from BC sheep ranges, but contained this qualifying statement*: "Risks from camelids to wildlife in British Columbia remain hypothetical after this risk assessment, as no direct evidence was found to implicate camelids as sources of significant diseases in wildlife in BC or elsewhere."* This was the first communication llama owners received after participating in the survey two years earlier. There was never any indication Dr. Schwantje found any disease and it was confirmed by the qualifying statement she used to preface the RA. BC llama owners were unhappy with the lack of communication and the unsupported and irresponsible recommendation to ban llamas from wild sheep ranges after the support and cooperation they offered Schwantjes/FLNRO.

In 2005, Dr. Schwantje & Dr. Elena Garde coauthored another RA: *Examining the Risk of Disease Transmission between Wild Dall Sheep and Mountain Goats and Introduced Domestic Sheep, Goats, and Llamas in the Northwest Territories.* The assessment documents the occurrence of pathogens in domestic sheep and goats that may threaten wild sheep and goats and recommends separating the domestic species from the wild species. With no documentation of these pathogens in llamas, Schwantje/Garde arbitrarily recommended separating llamas as well. This initiated Dr. Schwantjes'

strategy of circular documentation in the 2005 RA when she refers to the original hypothetical 2003 RA as documented support for the 2005 RA's recommendation.

This statement on page 2 qualified the second RA. *"Conversely, contact between llamas and wild Dall's sheep or goats may result in disease in wild species, but there is insufficient data available to clearly assess the role of camelids as a source of disease at this time (for additional information see Communicable Diseases Risks to Wildlife from Camelids in British Columbia)."* It became apparent to BC llama owners they had been used by Dr. Schwantje.

The Garde/Schwantje 2005 RA was the reference document for the RISK ASSESSMENT ON THE USE OF SOUTH AMERICAN CAMELIDS FOR BACK COUNTRY TREKKING IN BRITISH COLUMBIA prepared by the Centre for Coastal Health (CCH RA-2017) in a continuation of the circular documentation strategy. The CCH document was based on the same diseases as the 2005 document and billed as an update. As noted by the Alaska Department of Fish and Game (ADF&G) in a letter to the Greater Appalachian Llama and Alpaca Association from ADF&G Director, Bruce Dale*; "As you know, there is no significant new information presented in the RA. After discussing the document internally and with other biologists from several jurisdictions (including the Western Association of Fish and Wildlife Agency Wild Sheep Work Group - WSWG). We will continue to focus and enhance our evaluation of disease risk from species other than llamas or related camelids."*

RA'S DISMISSED BY NOTED REAEARCHERS

Noted llama research veterinarians, Dr Murray Fowler and Dr. LaRue Johnson, took exception to the assessments as seriously flawed because they violated a foundational principle of phylogenetic separation. Sheep and goats are from the suborder, Ruminantia/ family, Bovidae, while llamas are from the suborder, Tylopoda/family, Camelidae. This precludes the assumption of shared endemic disease susceptibility and the principle was borne out by the fact none of the diseases were documented as significant or recurrent in llamas. The same criticism was voiced by Dr. Gregg Adams, Professor, Veterinary Biomedical Sciences Western College of Veterinary Medicine, Saskatchewan, Canada.

Though the Schwantje/WSF documents are represented as risk assessments, none of the three meet the criteria for a valid risk assessment. CCH '17 is presented as an update and builds from the hypothetical base of the first two. It ultimately identifies the futility of the entire effort to establish a threat of disease transmission from llamas to wild sheep.

-CCH '17 cannot identify documented llama disease(s) occurrence to base the assessment on, thus making it impossible to assess the risk of something happening that has not previously occurred. Assigning risk to the possibility of transmission of those same undocumented disease(s) in llamas to wild sheep is an even greater exercise in futility. A risk assessment is clearly not an appropriate tool to employ to

accomplish Schwantjes' goal of establishing llamas as a risk of communicating disease to wild sheep.
-CCH '17 recognizes this problem and subtly converts the assessment process to a survey to identify disease in llamas as well as "emerging diseases" that have not occurred. Failing to find any disease of significance in their poorly structured survey, they default to the conjecture of the earlier two RA's, repeating the erroneous assignment of domestic sheep diseases to llamas.
-None of the RA's engage any of the many stakeholders who will be impacted other than the wild sheep industry. It is notable that llama owners, veterinarians, and researchers with the most knowledge of llamas and any associated disease(s) are not consulted. The RA's go well beyond ignoring the most obvious and significant stakeholders impacted by the assessment and pointedly discount the llama user group's significance, history, and significant contribution to managing today's wilderness lands. Llama owners are treated merely as an obstacle to step over. Identifying and engaging stakeholders is foundational to an effective risk assessment process. The calculated effort of all 3 RA's to avoid engaging the stakeholders is the reason the resulting assessments are prejudiced and hold no valid information.
-Without disease occurrence, probabilities cannot be determined. Risks of high, medium, and low are assigned based on the impacts of a disease should it infect wild sheep. This is done while acknowledging the disease(s) are not documented in llamas, but rating the impacts if llamas did hypothetically have it and could hypothetically transmit it.
-The assessments are hypothetical and accordingly have no real value, yet they violate another criteria for risk assessments by making a recommendation to ban llamas from sheep ranges. Risk assessments are supposed to be a tool to be employed by policy makers who use the information presented to make their decisions. Since hypothetical information provides no basis for banning, the recommendation to ban needs to be made to advance that agenda and salvage the intent of the RA.

CCH '17 lacks the expertise to create a valid risk assessment and to recognize they have no basis to do a risk assessment. CCH '17 failed to consult or submit their work for review by the greater research veterinary community. This allows the hillbilly prejudice and supporting science it has created to dictate and advance the flawed premise. They certainly lack the standing and expertise to make a recommendation of this magnitude based on the fiction they have created.

The RA's were subsequently picked up online by wildlife and land management agencies and used as documentation for ban proposals. The statements regarding their hypothetical status were missed or ignored. A timeline of ban initiatives and recommendations since 2001 has been compiled and concludes this writing. These hypothetical opinion pieces, labeled as risk assessments, are the sole reference document for all the proposals.

BC Llama Ban

A llama ban was put in effect in 2016 for northern BC thinhorn ranges (the most sought after and lucrative hunts). The ban affects only the use of llamas for hunting which effectively removes disease as the basis of the ban. The BC llama owners contested the legislation implicating disease as the reason for the ban and presented documented, well-reasoned rebuttals to the disease allegations. As evidenced by the final legislation, BC legislators were willing to openly benefit the OG lobby over all other interests, but unwilling to try and defend the disease issue.

WSF dictated CCH RA-17

Reading the WSF document (WILD SHEEP FOUNDATION-THINHORN SHEEP SUMMIT II-SYNTHESIS & SUMMARY [6/6/2017] April 11–12, 2017) it becomes apparent that WSF collaborated with Dr Schwantje/FLNRORD to create an association of llamas with disease transmission to wild sheep. This effort was ostensibly to make wild sheep and goat hunting the exclusive domain of WSF Outfitters and Guides and to build on the WSF's 2014 Thinhorn Sheep Summit Action Plan Update statement: *"No Contact in the North"* (a presentation made to BC Wild Sheep Society Conference and AGM in Kelowna BC March 13-14). It is apparent they were attempting to structure this RA to fit their narrative that llamas present a disease threat to wild sheep and goats to bolster their legislative push to eliminate competition from private citizens supporting their hunts with llamas. Their own research does not support banning llamas and certainly does not support ban regulation or legislation. It is apparent in the 2017 synthesis document, the push for the llama ban is coming from the BC/WSF contingent. The only plausible explanation is eliminating competition for limited tags and keeping exclusive access to sheep ranges for the aristocratic hunter serviced by the outfitter/guide based WSF.

Problems created by WSF ban initiative

As the WSF has moved in this direction they have created problems for others besides the llama industry. The WSF is an international organization. They are now in the process of trying to insinuate BC's political philosophy, favoring aristocratic hunting, on the sovereign interests of the US and its citizens who are strongly tied to equal access to all public lands and the wildlife it supports. If their premise of llamas presenting a disease threat to any wildlife was not fabricated, there would be a mutual interest that would make the common pursuit of some action plausible. However, it is false, manipulated, unsupported, and therefore very problematic.

Llamas are rapidly gaining popularity with American hunters and other outdoor recreation enthusiasts. Their low maintenance (10% of a horse), low wilderness impact, ease of transporting, and steady disposition all make them favorites for the sportsman/recreationalist concerned with impacts. Llamas are increasingly being employed by users other than hunters. Back country maintenance, enabling disabled outdoorsmen, family campers, photographers, and fishermen are some of the users for

which llamas make wilderness access possible. These users all traverse sheep ranges in their travels and are not going to accept llamas being banned on an arbitrary/false premise. Additionally, llama owners in general, whether they pack or not, take strong exception to their animals being referred to and treated as disease reservoirs.

Regarding disease, llamas are the safest domestic species that can be comingled in wild sheep populations. They have no endemic diseases and have a solid history of safe back country travel amongst all wild species. Additionally, because of their robust immune system and unique nano antibodies that can actually invade pathogen cells, they are being studied rather intensely for production of broad-spectrum vaccines as well as to produce palliative antibody therapy for at risk individuals that develop particularly virulent Covid 19 infections. Additionally, these nanabodies are being explored for cancer treatment and pain reduction. Llamas lack of endemic disease is likely explained by their unique immune system.

Given their natural compatibility with the mountain environment, documented lack of disease, and unique immunity dynamics, it is counterintuitive for WSF pursue a ban of llamas based on disease threat to wildlife. Ban attempts that originate in BC protectionism and sketchy science are particularly onerous to American llama owners and outdoorsmen.

Precautionary Principle

Lacking disease documentation, WSF and sympathizers defer to “precautionary principle” or “zero risk” policy, repeatedly stating a default mantra, “a lack of peer-reviewed evidence should not be considered proof that transmission has not, or could not, occur.” This may be a true statement, but it seems rather petty against a corollary statement regarding the other obvious domestic species accessing wild sheep ranges. It’s important to note that the lack of peer-reviewed evidence regarding disease in llamas is the result of a lack of disease that would spawn research that would be peer-reviewed. Horses, cattle, and humans on the other hand have an abundance of peer-reviewed evidence of disease occurrence and many of the diseases are transmissible to wild sheep. That should be regarded as evidence that disease transmission to wild species can and likely has or will occur, yet these species are not considered disease threats to wild sheep by WSF.

The CCH ‘17 lists diseases that could hypothetically infect llamas. These were Mannheimia haemolytica (M. haemolytica), Pasteurella spp., contagious ecthyma (CE, parapoxvirus), bovine viral diarrhea virus (BVDV), Mycobacterium avium paratuberculosis (Johne’s Disease), Bluetongue virus (BTV) and Mycobacterium bovis (M. bovis). In February, 2020, the American Association of Small Ruminant Practitioners (AASRP) issued a policy statement specifically listing these pathogens as not significant in llamas, precluding transmission to wild ungulates. Llama research and clinical evidence identify these pathogens as sporadically infecting only individual llamas as atypical or terminal infections that prove llamas to be dead end hosts rather than reservoirs. It is foolish to base a ban on hypothetical, undocumented disease when

the stated clinical and research evidence accumulated by +/- 1000 practicing veterinary professionals specifically disqualify the likelihood.

CCH ’17 further states, “Estimates of prevalence and disease transmission dynamics for these and other SAC pathogens in North America are very limited, due to gaps in surveillance, a lack of effective diagnostic tests, and the potential for an asymptomatic carrier state.” It is obvious that without disease occurrence, surveillance would be a continuous gap, and that effective diagnostic tests would not exist for diseases that haven’t occurred. To be an asymptomatic carrier requires the presence of a disease pathogen and active infection on a repetitive basis, neither of which have been demonstrated in llamas for any of the listed diseases. It does however, sound ominous, which is the likely intent.

While CCH ‘17 laments the lack of documented disease occurrence in llamas in the veterinary literature, they have failed to note studies that show llamas to not carry disease or transmit it to wild sheep. Pen studies since 1992 have comingled llamas with bighorn sheep, focused on determining if llamas potentially carry the pathogens causing polymicrobial pneumonias that are lethal in susceptible wild sheep populations. Not only do the pen studies demonstrate llamas do not carry those pathogens, the lack of mortality and other disease occurrence in the pen studies indicates the absence of other pathogens as well. These studies are the same ones used to document the presence of the polymicrobial pathogens in domestic sheep. It’s curious these studies eliminating llamas as a threat to wild sheep were not noted while the same studies form the backbone of research used to ban domestic sheep from wild sheep habitat. The pen studies corroborate the foundational research and documentation of the Canyonlands Summit and DOI legal settlement which is conspicuously absent in the CCH ‘17 research as well.

If the precautionary approach is applied to llamas, it will have to be applied to all species, effectively shutting down access to any controllable species (horses, cattle, canines, humans). This was just demonstrated in the Chugach National Forest (CNF) retraction of their proposed llama ban because precautionary principle unfairly targeted llamas, leaving horses and cattle present with greater disease potential. Cattle are particularly vulnerable when you consider that all the hypothetical diseases the CCH RA -17 tried to ascribe to llamas are documented as endemic in cattle and transmittable to wild sheep. These are well-documented and some have been transmitted to wild species. Horses have a lengthy list of diseases including both endemic, species-specific diseases as well as pathogens of significant impact in wild sheep populations: Pasturella multocida/ pneumonias, Streptococcus spp./strangles, Brucella mellitensis/fistulous withers, and vesicular stomatitis are a few apparent pathogens horses carry and serve as a reservoir. Mycobacterial infections (M. bovis, M avium paraTB) have a higher prevalence in humans than llamas as is the case with parapox virus (contagious ecthyma) in humans.

The absurdity of this scenario spotlights the absurdity of pursuing the precautionary approach with llamas, the least likely disease vector of all domestic species.

A Llama Ban Will Hurt All Stakeholders, Particularly WSF.

It seems unwise for WSF to continue pursuing a llama ban. Given the advantages llamas offer for the well-being of the sheep, the question arises, “Does WSF care about wild sheep as much as they do about who kills them?” This will ultimately have more repercussions for their organization than any other group. There is strong public sentiment against the elite hunting concept and the inequities of pay to play. WSF has an inordinate amount of influence in wild sheep policy and their influence, money, and presence is obvious.

They are a 501(c)(3), special interest organization and are more involved in the management of publicly owned wildlife than is appropriate. They do contribute significant money to wild sheep research, but it is noteworthy that much of that money comes from the tag auctions of exclusive hunt tags. That money is being used against the best interests of the citizenry that collectively owns the tags, the sheep, and the hunt lands, and the arrangement should come to an end. State agencies could effectively conduct their own online auctions and do their own funding with greater accountability. The citizenry should demand it.