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Dear Wyoming Wild Sheep Foundation

Respiratory disease has afflicted populations of bighorn sheep for the past century and, despite substantial research on the topic, pneumonia continues to be one of the most poorly understood diseases that afflict wildlife in North America. Although we have learned much in recent years, most research has been myopically focused on identifying the primary infectious agent associated with pneumonia. Nevertheless, evidence continues to support multiple primary and perhaps secondary infectious agents, and in most instances, we now manage herds that are chronically infected as opposed to those subject to new exposure. Moreover, fundamental components underlying any large ungulate population including, habitat quality and quantity, and predation remain operational and yet, are often neglected when considering disease dynamics. Indeed, performance of bighorn sheep in northwest WY is mostly asynchronous, despite 3 herds possessing a similar suite of pathogens. Of great concern in particular, is the abysmal lamb recruitment in what historically was one of the largest and most robust population of bighorn sheep in the West: the Whiskey Mountain bighorn sheep herd. Following an all-age pneumonia dieoff in 1991, the herd has exhibited consistently low lamb recruitment, and more recently in the past 3 years has been near or below 10 lambs per 100 ewes. Finally, in the past year the presence of wolves on their winter range and the apparent redistribution of some animals has highlighted the question associated with the potential interactive role of predation on this highly cherished bighorn sheep herd.

Since March 2015, we have employed a longitudinal design to data collection across the Jackson, Dubois, and Cody sheep herds in northwestern Wyoming to connect seasonal changes in nutritional condition, reproduction, survival, recruitment of young, presence of respiratory pathogens, and immunocompetence. Although efforts are still underway to analyze and process current data, a few meaningful and yet, intriguing patterns have emerged. Although the winter range appears robust, summer range of Dubois sheep is clearly nutritionally limiting as evidence by lower nutritional condition and greater costs of lactation of female sheep compared with animals from the other 2 herds. Although nutrition has clearly played a role, nutrition cannot fully explain the chronically low recruitment of lambs in Dubois during the past 2 summers. Therefore, possibly disease, predation, or micronutrients may be hampering recruitment of this world-renowned herd that has yet to overcome from an epizootic dieoff that occurred >20 years ago.

Given what we've learned in the past few years, our efforts now will shift to focus on understanding factors that are contributing to summer nutrition and address the chronically low lamb recruitment in the Dubois herd. Our aim is to take a multi-pronged approach to address multiple causal factors contributing to population dynamics of bighorn sheep in northwest Wyoming, and how that broadly will aid in future management of chronically infected sheep herds.

Specifically, we will quantify the relative contributions of nutrition, disease, and predation on population performance, and assess the current state of forage on summer ranges. Our approach is to continue our longitudinal monitoring of adult females from each of the 3 herds, which will yield valuable information on nutritional status and reproduction as female's transition from one season to the next. We will link data on nutrition and reproduction to patterns of pathogen presence and immune function over time. With this next phase of the work however, we apply increased efforts to understand contributions of summer nutrition, predation, and disease to lamb survival by monitoring summer diet, forage quality, and survival and cause-specific mortality of lambs in the Dubois and Jackson herds.

Broadly, our work seeks to understand how we can more effectively manage chronically infected populations of bighorn sheep, and in so doing, seek ways to mitigate epizootic dieoffs and bolster performance of chronically suppressed herds. Please accept my humble thanks for your consideration in providing what would be critical support as we seek to provide the necessary information to advance habitat and population management of bighorn sheep that has been stymied in recent decades by a lack of understanding of population dynamics in the presence of disease.

Attached with this letter please find our proposal, supplemental information, and a project update. Please don't hesitate to contact me with any questions, and again, thank you for your time and consideration.

Respectfully,



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