
MODELING PROACTIVE DECISIONS TO MANAGE PNEUMONIA EPIZOOTICS IN BIGHORN SHEEP

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Pneumonia epizootics in bighorn sheep (*Ovis canadensis*) are a major challenge for wildlife agencies due to the complexity of the disease, long-term impacts, and lack of tools to manage risk. We developed a decision model to facilitate proactive management of pneumonia epizootics in bighorn sheep in Montana. Our decision model integrates a risk model to predict probability of pneumonia epizootics based on identified risk factors. It uses a structured decision making (SDM) approach to analyze potential decisions based on predictions from the risk model, herd-specific management objectives, and predicted consequences and trade-offs. We demonstrated our model's use with an analysis of representative herds and analyzed the recommended decisions to understand them clearly. We learned that proactive management for each herd was expected to outperform in meeting multiple, competing management objectives compared to ongoing status quo management. Based on sensitivity analyses, we also learned that the recommended decisions were relatively robust with limited sensitivity to variations in model inputs and uncertainties; we expect this to be the case in future analyses as well. Our decision model addressed the challenges of uncertainty, risk tolerance, and the multi-objective nature of management of bighorn sheep while providing a consistent, transparent, and deliberative approach for making decisions for each herd. It is a unique tool for managing pneumonia epizootics using an accessible framework for biologists and managers. Our work also provides a case study for developing similar SDM-based decision models, particularly for other wildlife diseases, to address challenges of making complex decisions.