

Model-Based Assessment of Aspen Responses to Elk Herbivory in Rocky Mountain National Park¹

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Abstract—In Rocky Mountain National Park, aspen has been observed to decline on elk winter range for many decades. The SAVANNA ecosystem model was adapted to explore interactions between elk herbivory and aspen dynamics on the elk winter range. Several scenarios were explored that considered different levels of overall elk population; different levels of elk utilization of aspen, reflected by the length of time during which elk utilized the aspen stand; and different fencing treatments where fences were removed following a specified, variable number of years.

Simulated aspen regeneration success was much greater when elk use was less prolonged over the course of the year. Under the Heavy Use scenario (8 months of elk use), there was a threshold between four and five elk per km² where regeneration success became dramatically less. Under the Light Use scenario (3 months of elk use), aspen regeneration success was high at elk densities up to 10 elk per km², moderate at 11 elk per km², and nil at 12 elk per km². Aspen regeneration success was significantly improved by fencing aspen stands, even without stimulating additional aspen suckering through burning or mechanical disturbance. At the landscape level, the Heavy Use scenario yielded the interesting result that aspen regeneration success, represented in terms of proportion of aspen stands on the winter range to re-establish successfully over a 60-year period, was little affected by elk population level. This was because elk distribution was highly aggregated.

The results of this modeling exercise suggest that managing the overall elk population level may not be as effective for stimulating successful aspen establishment as managing local elk distributions and access to aspen stands. However, aspen may be serving as an indicator species for a system that is outside its range of historic variability due to anomalously high elk numbers. It is recommended that Rocky Mountain National Park take action to control the overall elk herd size, while simultaneously conducting intensive, site-level management activities to propagate aspen within the heavily utilized portion of the winter range.

¹Authors chose to submit abstract in the place of full report.

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