Symposium Summary: Grassland Trophic Dynamics in a Changing World

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Changing climatic norms, altered timing and intensity of droughts and fire, and the reduction or intensification of top-down trophic processes such as herbivory and predation all threaten grasslands and we know little about how these factors influence the integrity of ecosystems. Grasslands provide livelihood and economic resources to humans but they are often highly damaged, disturbed, and destroyed by human activities and require restoration. Our symposium sought to highlight key grassland conservation and restoration issues, identify gaps in our scientific knowledge and understanding of these ecosystems, and discover paths forward to restore the trophic structure of damaged, degraded, or destroyed grasslands using evidence-based approaches, and collaboration between industrial and academic sectors.

Currently, restoration efforts are often slow or incomplete, but there are good examples where there has been success at repairing the negative effects humans have on the services ecosystems provide. Long-term, controlled scientific experiments are essential if we are to make sense of complex ecological systems, and ideally these experiments will be combined with restoration efforts and occur over long (50-100 year) time periods (Krebs). Progress in understanding food webs, requires a better understanding of how diversity and primary productivity switch between control by abiotic and biotic factors. Specifically, when are systems more or less top-down controlled and what is this control dependent on (Schmitz)? More controlled restoration trials are necessary in which potential primary productivity and physical heterogeneity of disturbed sites are manipulated, and the re-establishment of biodiversity, trophic structure, and their links to surrounding food webs are monitored. By promoting food web structure in restoration, a multitude of reticulate interactions can establish, and these highly omnivorous food webs can increase stability (resilience and resistance), biodiversity, and function; all goals of restoration and currently the focus of one long-term grassland study (Harrower).

In British Columbia, the mining industry is required to restore the areas in which they operate (Moody), and progressive mines are seeking to improve their social license to operate by developing improved restoration techniques (Holdstock). They are using novel techniques such as DNA Bar-coding (Hebert) to identify and quantify the organisms they impact, and eventually these approaches may help them assess their progress. The novel ecosystems that develop on these sites can hold important values, and provide some of the same functions or even provide improved function compared to the ecosystems that previously occupied these areas (Starzomski). With careful consideration we can improve the biodiversity values of landscapes even at mines and during mine operations by promoting wildlife habitat and being sensitive to existing ecosystems (Howie). Often these activities must be planned and implemented during the early stages of industrial operations (Sullivan). We can also use established restoration techniques to do this, by mimicking local landscapes and disturbance regimes, promoting a diversity of plant and animal species, and working within local and surrounding landscapes (Polster) to promote ecosystem health within and beyond the boundaries of a restoration project. Re-establishing an appropriate trophic structure in ecosystems negatively influenced by human land use must be an integral goal of future restoration projects and we must use experiments and data to test our ideas and move ecosystem restoration up the food chain (Sinclair).

Participants (in order of appearance):

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