

September 22 @ 12 – Agricultural Wildfire Preparedness in Rangelands

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I developed an Agricultural Wildfire workshop and educational materials to educate dryland crop producers and ranchers on the new Oregon OSHA guidelines for fighting farmland and rangeland wildfires. Oregon OSHA produced a new publication in 2019 with valuable input from the Oregon Wheat League that requires employers to have an emergency action plan for their farm, along with a firefighting action plan and fire prevention plan. In addition, employees must be educated in basic wildland firefighting covering fire control, fire behavior, and fireline safety. I developed templates with producer feedback for the required plans and covered pertinent aspects of fire behavior in dryland cropping, along with creating defensible space on the farm. I covered what is required and best practices to cover in the farm emergency action plan, firefighting action plan, fire prevention plan, and PPE Hazard Analysis to determine what types of PPE are necessary with agricultural wildfire. I included knowledge I have gained from 5 years of wildland fire experience, along with my M.S. degree from the University of Montana where I conducted fire research and was a teaching assistant for a fire management course. My workshop allowed attendees to document completion of an annual fire refresher as required by OSHA. I believe it is important that all producers and OSU Extension Faculty who work in fire prone areas of the state understand how to be prepared for wildfires. Over 60 farmers and ranchers in Wasco and Sherman Counties attended the workshop that was held February 10, 2020 and are now starting to develop the required emergency action plans. Many producers are also now considering going to additional wildfire training. It is still too early to see what actions will be taken as a result of this training. The workshop materials and templates are pertinent for any agricultural operation where there is the potential for wildfire. It is also important for other agricultural extension agents to understand what these new requirements are for their local producers and how to assist their communities to be prepared for wildfires.

September 29 @ 7 - Ecologically Based Weed management in Rangelands

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Centurea maculosa (Spotted knapweed) spreads rapidly and displaces the native plants that are crucial to British Columbia grasslands. Traditional weed management focuses on killing the weeds rather than addressing the ecological process that allowed the invasive to establish. Our objective was to restore desirable perennial grasses to a knapweed invaded rangeland by investigating soil chemical properties after adding a wood ash amendment, herbicide effects and three different seed mixes. The research took place at the Laurie Guichon Memorial Grasslands Interpretive Site outside of Merritt, BC. The majority of the site is covered in 50% or greater of spotted knapweed. A split-plot experimental design was used to test different combinations of herbicide, wood ash concentration (0, 1 and 10 Mg ha⁻¹) and seed treatments (Bluebunch wheatgrass/Sandberg's bluegrass, crested wheatgrass and intermediate wheatgrass). An ANOVA test with Tukey post hoc determined herbicide significantly lowered knapweed cover ($p < 0.001$) while ash had no significant effect on knapweed cover. There were no significant results within seed treatments in the first year of the study; the second year had significant establishment in the native mix and intermediate wheatgrass. The ash amendment decreased the supply of NO₃⁻ by at least half however this did not translate to a decrease in knapweed abundance as hypothesized. Where herbicide decreased knapweed cover to almost 0, it facilitated a 55 (±26)% percent increase of *Bromus tectorum* (cheatgrass). These results play an important role to help land managers make decisions on invaded western rangelands.

October 6 @ 12: Wildfire Risk Reduction Pilot Project

Amanda Miller

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The British Columbia Cattlemen's Association has partnered with the Province of British Columbia to develop a pilot program with the intent to reduce wildfire risk in BC's wildland/urban interface by managing fuel with targeted grazing, while maintaining ecological and multiple use values.

During the 2017 and 2018 fire seasons the value of agricultural practices, notably grazing, was evident in changing fire behaviour by helping slow, turn, or stop fires from moving across the landscape. In this pilot program, targeted cattle grazing will be used to reduce fine fuel loads and subsequently wildfire risk and intensities adjacent to communities, utilities, and transportation corridors.

Most fuel management projects target the removal of trees, decreasing the number of trees per hectare, changing species, and/or pruning/removing understory. A by-product of these treatments is increased herbaceous material, representing a volatile and easily ignited fuel type.

The project includes several monitoring components to assess the impact of grazing on fine fuel load, plant communities, and ecological function.

Short-term monitoring is composed of two main components **intensive** and **extensive** monitoring. **Intensive** monitoring is quantitative monitoring that occurs on small randomly selected areas and provides data at a level that can be used for statistical inferences and with enough power to detect differences due to targeted grazing. Intensive monitoring occurs after grazing is completed for the season. Sites will be stratified, and intensive sampling will occur in a subset of the area. Seventeen primary variables have been identified as most relevant to the targeted grazing pilots currently under investigation. These variables will be discussed and presented

Extensive monitoring is intended to have broader coverage of the pilot site and is completed more frequently than intensive monitoring. Extensive monitoring can provide alerts to unanticipated benefits and problems and so is conducted every two weeks while grazing is occurring. The key monitoring element is level of grazing use assessed by stubble height. Results of extensive monitoring are communicated to project managers every two weeks so that the information can be used for highly responsive adaptive management purposes.

Four sites were established in 2020, two between Peachland and Summerland, and two in Cranbrook. Additional sites will be added in future years in Merritt, Williams Lake, and the Peace region.

Preliminary data comparing grazed and non-grazed controls shows a lack of difference in total biomass, but significant differences in forb biomass. Grass heights show up to 15.2% use of grass species in grazed vs. non-grazed controls. Cattle manure and ungulate pellet group analysis reflects wildlife vs. livestock use on these study sites, and data related to ungulate grazing use was obtained on one intensively monitored site that did not receive livestock grazing pressure in 2020.

October 13 @ 7: Rangeland plant responses to arbuscular mycorrhizal fungi, options for ecological restoration.

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Arbuscular mycorrhizal fungi (AMF) are an important component of plant communities as they provide multiple benefits to mycorrhizal plants. Some of those benefits include stress relief, moisture absorption, nutrient acquisition, and pathogen protection. All those benefits may be critical for new plant establishment, especially in rangelands. However, remains unclear how those mechanisms work in multiple plant species, and recent work has provided ambiguous results. Here, we developed an experimental framework to better understand how several rangeland plant species respond to arbuscular mycorrhizal fungi. We wanted to understand 1) how *Artemisia* species respond to commercial inoculum and early seral native AMF, 2) do *Artemisia* species become more competitive against invasive species when colonized by AMF, and 3) does a late seral AMF source benefit more a late seral plant while an early seral AMF source benefits more an early seral plant? Results from our first research question indicate that colonized *Artemisia* species grown on early seral soils showed a negative mycorrhizal growth response when compared to autoclaved controls. Preliminary results to our second research question indicate that competitive ability of *Artemisia* species may not be increased immediately after seedling emergence, thus may be a long-term response. Results are important for ecological restoration because in many cases, AMF is applied without complete understanding of its effect on individual plant species.

Oct 20 @ 12: Reworking the Range: Applying historical sources, data, and methods to rangeland management

Dr. Tim Paulson

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Range scientists, range managers, and others often set goals for animal and plant communities on working and formerly-grazed rangelands based on a historical understanding of what was and ought to be there, but there is usually very little detailed, site-specific evidence to support these baselines. How can we use historical records and historical research methods to support land management and planning? My research seeks to use diverse archival collections, privately-owned collections, oral history interviews, and other historical sources to track change in environmental and social indicators on rangelands from about 1800 to the present. I tabulate, narrate, and visualize these complex, inconsistent datasets to present longitudinal understanding of historical change at multiple scales. My coauthors and I have completed a pilot study in California that applied the method to assess specific models of ecological change and I am currently working towards a second phase in British Columbia.

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Oct 27 @ 7: Evaluating Existing Control Methods for *Ventenata dubia* and their Effectiveness

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In British Columbia less than 1% of our native ecosystems are grasslands and despite their relative size they play an important role on our landscape, hosting more than 30% of at BC's risk species, sequestering carbon, pollinating agricultural crop, and as intrinsic cultural significance for First Nations people (WSP 2010). These ecosystems are under constant pressure and risk from a multitude of invasive species, among these invaders is an emerging threat to BC's grasslands known as *Ventenata dubia*. *Ventenata dubia* is a winter annual grass that has been invading sagebrush steppe ecosystems along with ponderosa pine ecosystems in the United states pacific northwest (Fryer 2015). The objectives for this meta-analysis are to research current control methods that are used for *Ventenata dubia* and rate their efficacy, and to set-up recommendations for management of *Ventenata dubia*. To fulfill the objectives of the meta-analysis in January of 2020 papers were gathered and reviewed using an integrated pest management lens and from them control methods were found. These control methods were then ranked from not effective, poor, effective, and very effective. When the physical/mechanical, biological, and cultural controls were ranked the only effective treatment that occurred was the addition of fertilizer to a site, with hand pulling and seeding both ranking as poor. Chemical control was shown to be far more effective overall with only glyphosate and picloram being not effective and imazapic rated as poor. The short-term herbicides of rimsulfuron, sulfosulfuron, and fluenacet plus mertibuzin all were ranked as very effective. For long-term herbicides indaziflam, indaziflam with glyphosate and indaziflam with rimsulfuron, were all rated very effective while propoxycarbazone-sodium was ranked only as effective. Based on these results I suggest herbicide treatment with indaziflam (by itself or with another herbicide) or a short-term herbicide that rated very effective in conjunction with a fertilization treatment. As well I recommend not only being reactionary but also being proactive and look to find ways to prevent establishment in the first place through actions such as cleaning equipment and making sure the shoulders of the roads are seeded. Based on this meta-analysis future research into both palatability of *Ventenata dubia* in other ungulate species (not just cattle) as well as the effects of prescribed fire used in successive seasons on *Ventena dubia* would both be beneficial to better understanding and controlling *Ventenata dubia*.

Nov 3 @ 12: The bird and the herd: sage-grouse and the ranch-level economics of prescribed grazing on rangelands in the West

Dr. Anna T. Maher (Presenter)

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Authors: Anna T. Maher, Nicolas Quintana Ashwell, John A. Tanaka, John P. Ritten, Kristie A. Maczko, Holly Dyer, Holly Kirkpatrick, Kendall Roberts, and Thomas Hilken

With half of the remaining sage-grouse habitat understood to be on private land, government programs that incentivize rotational grazing and resting on rangelands have become increasingly popular over the last decade. Yet, little is known about the effect of these programs on the rancher's bottom line. This study used information from rancher focus groups and ecological site descriptions to parameterize profit-maximizing models of cow-calf ranching enterprises. Impacts were quantified by comparing models with and without these prescribed grazing practices. Results showed positive returns in specific cases given government financial support, but financial outcomes can be negative. Results vary according to geographic location, herd size, possible changes in harvest efficiency, and the size of privately owned rangeland.