Managing Invasive Annual Grasses

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Presenter's Company/Employer: Bayer
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Co-Presenter's Name: Corey Ransom
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Co-Presenter's Title: Associate Professor, Weed Science
Topic: Invasive species management - new and effective approaches
Proposal Type: Individual Presentation

Abstract:
Invasive winter annual grasses, including downy brome, medusahead, and ventenata are causing economic and environmental damage in Utah. These invasive grasses, reduce available forage, impact native and desirable vegetation, and appear to facilitate invasions by other species. Wildfires due to invasive annual grasses consume tens to hundreds of thousands of acres each year costing millions of dollars in losses and management costs. Research conducted at Utah State University the past 20 years has sought to identify strategies for managing invasive annual grasses and protecting desirable plant communities. Studies have evaluated fire, mowing, reseeding, and herbicides. In many instances, a given site has been managed effectively for 1 or 2 years. In the few instances where desirable species plantings have been successful, invasive annual grass resurgence has been delayed even longer. With herbicides alone invasive annual grass control can be improved through proper timing and with different chemical combinations. However, even when properly applied none of the previously investigated treatments could prevent invasive annual grass from becoming dominant again within a few years. More recent research with a newly developed herbicide has shown long term suppression of invasive annual grasses. In these trials, long-term suppression of the annual grasses has allowed native and desirable species to increase in cover and biomass. Some treatments are showing invasive annual grass control almost 5 years after treatment. All of the different herbicides and their unique properties will allow development of effective management and restoration plans for invasive annual grass invaded landscapes.

Can mastication and prescribed burning be applied to simultaneously reduce fuels and control invasive plants?

Presenter's Name: Ryan Tompkins
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Presenter's Title: Forestry & Natural Resources Advisor
Co-Presenter's Name: Michelle Coppoletta
Co-Presenter's Company/Employer: USDA Forest Service Region 5 Ecology Program
Co-Presenter's Title: Ecologist
Topic: Invasive species management - new and effective approaches
Proposal Type: Individual Presentation

Abstract:
Over the past 20 years, managers of public lands in the western United States have witnessed an explosive spread of the highly invasive annual grass medusahead (Elymus caput-medusae). Traditional control methods (e.g. manual removal, herbicide application, prescribed burning) developed for rangeland applications may differ when applied to dry mixed conifer forests where land managers must balance fuel reduction goals with invasive plant control objectives. We implemented a small-scale, replicated field trial to investigate the effect of high intensity prescribed fire and treatment timing on medusahead abundance. We then applied these findings to a larger spatial scale, by designing an experimental fuel reduction treatment that had the dual purpose of lowering fuel loads and reducing medusahead abundance. The specific purpose was to investigate how some of the methods commonly used in landscape-scale fuel management, specifically mastication and prescribed fire, influence the frequency and cover of medusahead over both short (1-year) and long (10-year) time periods. The application of high intensity fire, regardless of timing, reduced the percent cover of medusahead at small scales. At larger scales, mastication and prescribed fire treatments significantly reduced the frequency of medusahead in the first year following treatment. However, in the absence of follow-up treatments medusahead increased over time, and ultimately had higher abundance than prior to treatment. These findings suggest that while some treatments may be effective at small spatial scales and over short timeframes, the variable effects often seen in prescribed fire treatments applied at larger scales can facilitate dispersal of medusahead into newly treated areas over the long term. (Authors include: Ryan Tompkins, UC Cooperative Extension; Michelle Coppoletta, USDA Forest Service Region 5 Ecology Program; Jim Belsher-Howe, USDA Forest Service, Plumas National Forest)

Phenology-based UAV remote sensing for classifying invasive annual grasses to the species level

Presenter's Name: Alice Ready
Presenter's Company/Employer: University of Nevada, Reno
Presenter's Title: Master's Student
Topic: Invasive species management - new and effective approaches
Proposal Type: Poster Presentation

Abstract:
The spread of invasive plant species severely alters wildfire regimes, degrades critical habitat for native species, and has detrimental impacts upon ecosystem function, rangeland productivity, and dynamics of long-term carbon storage. Remote sensing technology has greatly improved our understanding of invasive plant ecology, and hence our ability to manage invasive species. Imagery obtained from airborne or space-borne platforms can provide spatially explicit estimates of plant population size, extent, and spread. However, it has proved quite challenging to remotely detect and monitor weed invasions at the species level, as detailed satellite imagery is commonly greater than one to four meters in resolution and is too coarse to identify isolated individuals or small patches of invasion. Species-specific weed mapping is essential for early detection of new invasions. Controlling emerging and individual infestations is critical for slowing the rate of invasion and promoting rangeland biodiversity in regions that are potentially at risk. By capitalizing on species-specific differences in plant phenology and using high resolution Unmanned Aerial Vehicle (UAV) imagery we are able to collect detailed data emphasizing the spectral differences between invasive plants at the species level, even where different species co-occur in a fine-grained mosaic. UAVs can produce images at the centimeter scale, avoiding the 'mixed-pixel problem' where larger pixels encompass multiple cover types and plant species, confounding classification efforts. This study refines a novel methodology to separate invasive annual grasses based on plant phenology, increasing the utility of remote sensing data in invasive species management. Because areas of invasion vary spatially according to cultural features and environmental influences, predictive species distribution models can improve monitoring by incorporating habitat suitability. By relating occurrence data and likely modes of species dispersal to landscape-explicit data, we can develop predictions of plant invasion over space and time. Using predictive models to explain, approximate, and predict environmental conditions under which invasive species establish and spread will focus monitoring on the most vulnerable locations. This research will use fine-scale UAV imagery to develop a predictive landscape model of future invasion risk. Thus, development of new remote sensing approaches for early detection of medusahead invasions will be timely and advantageous for allowing range managers to control its further spread.

A Comprehensive Method for Detecting and Controlling Angiopteris evecta in Inaccessible Terrain on O'ahu, Hawaii.

Presenter's Name: Christine Flauta
Presenter's Company/Employer: Hawaii Department of Land and Natural Resources
Presenter's Title: Forestry and Wildlife Technician
Co-Presenter's Name: Jenna Masters
Co-Presenter's Company/Employer: Hawaii Department of Land and Natural Resources
Topic: Invasive species management - new and effective approaches
Proposal Type: Individual Presentation

Abstract:
Angiopteris evecta is an invasive tropical fern that has negatively impacted O‘ahu’s ecosystems by displacing and outcompeting native species. Many of O‘ahu’s intact wet forests are located in remote areas with steep terrain that is often inaccessible to humans. They are diversity rich and being overrun by A. evecta. The State of Hawaii Division of Forestry and Wildlife Native Ecosystem Protection and Management Section (DOFAW-NEPM) is tasked with protecting many of the ecological resources in these areas. In collaboration with public and private partnerships new approaches including aerial imagery, precision helicopter herbicide application, and GIS mapping and analytics are being used to combat this highly invasive species. These new approaches have increased safety for ground crews and the efficiency of surveying large inaccessible tracts of land. Precision helicopter spraying has enabled us to control remote and dense patches that act as a reservoir for newly emerging plants. With the continued collaborative effort of our partners, DOFAW-NEPM hopes to bring populations of A. evecta to a manageable threshold and ultimately remove it from areas with high conservation potential.

Understanding army cutworms can help restore cheatgrass-invaded areas in the U.S. Intermountain West

Presenter's Name: Cindy Salo
Presenter's Company/Employer: Sage Ecosystem Science Corp.
Topic: Invasive species management - new and effective approaches
Proposal Type: Poster Presentation

Abstract:
Cheatgrass (Bromus tectorum) has invaded many low, dry areas in the U.S. Intermountain West. This exotic annual grass forms near-monocultures across large areas and often dominates sagebrush and salt desert scrub understories. Cheatgrass competes vigorously with species seeded and planted for restoration. Starting in 2003, widespread cheatgrass die-offs have occurred in some of the lowest, driest areas of the West. Native army cutworm (Euxoa auxiliaris) outbreaks can consume cheatgrass and exotic mustards (Brassicaceae) to produce die-offs. The larvae can also defoliate native shrubs (Artemisia and Atriplex). Army cutworm eruptions seem to occur when: 1) a year of dry weather ends with heavy late summer rain, 2) numerous adult moths, called miller moths, return from high elevations in fall to lay eggs, and 3) dry weather resumes through winter. Army cutworms overwinter as larvae, feeding at night and resting under objects or in the soil during the day. Larvae pupate in late spring and emerge as miller moths. The moths follow the blooms of flowering plants to high elevations for the summer. Miller moths travel long distances. Those emerging in the Great Plains fly through Colorado's Front Range on their way to high peaks in the northern Rocky Mountains. Grizzly bears feast on the fat-filled moths. Miller moths emerging in the Intermountain West apparently spend summers in nearby mountain ranges. Large aggregations were found in Great Basin National Park after outbreaks and die-offs in 2014, and black bears were seen feeding on miller moths in the Jemez Mountains of northern New Mexico in the summer of 2003. I have studied cheatgrass die-offs and army cutworms since 2003 and am developing a network of observers to monitor fall miller moth populations and watch for winter army cutworm outbreaks and cheatgrass die-offs. Understanding Euxoa auxiliaris outbreaks and migrations in the Intermountain West will let us better predict cheatgrass die-offs. Predicting these events will let us take advantage of these times of reduced competition from cheatgrass to seed and plant desirable species in cheatgrass-invaded areas.

Nevada Department of Wildlife's Approach to Prevention and Containment of Dreissenid Mussels

Presenter's Name: Laura Megill
Presenter's Company/Employer: Nevada Department of Wildlife
Presenter's Title: Aquatic Invasive Species Coordinator
Topic: Invasive species management - new and effective approaches
Proposal Type: Individual Presentation

Abstract:
Nevada has been affected by a number of significant invasive species in recent decades, but none more devastating than the quagga mussel (Dreissena rostriformis bugensis). The 2007 discovery of quagga mussels in Lake Mead catapulted the west and Nevada into action. Watercraft inspection programs have been the primary focus in containing regional mussel populations on the lower Colorado River system and preventing their expansion throughout the State of Nevada. With no viable eradication measures available, containment and prevention are our only options. A brief overview of the watercraft inspection program will show case NDOW's efforts to combat this prolific invader.