Nevada Society for Range Management Suggested Reading: April 2015

Abstracts of Recent Papers on Range Management in the West

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NV-SRM Suggested Reading 4/7/2015

Mapping and Monitoring Cheatgrass Dieoff in Rangelands of the Northern Great Basin, USA. Stephen P. Boyte, Bruce K. Wylie, Donald J. Major, Mapping and Monitoring Cheatgrass Dieoff in Rangelands of the Northern Great Basin, USA, Rangeland Ecology & Management, Volume 68, Issue 1, January 2015, Pages 18-28, ISSN 1550-7424, http://dx.doi.org/10.1016/j.rama.2014.12.005. (http://www.sciencedirect.com/science/article/pii/S1550742414000062)

Abstract

Understanding cheatgrass (Bromus tectorum) dynamics in the Northern Great Basin rangelands, USA, is necessary to effectively manage the region's lands. This study's goal was to map and monitor cheatgrass performance to identify where and when cheatgrass dieoff occurred in the Northern Great Basin and to discover how this phenomenon was affected by climatic, topographic, and edaphic variables. We also examined how fire affected cheatgrass performance. Land managers and scientists are concerned by cheatgrass dieoff because it can increase land degradation, and its causes and effects are not fully known. To better understand the scope of cheatgrass dieoff,we developed multiple ecological models that integrated remote sensing data with geophysical and biophysical data. The models' R2 ranged from0.71 to 0.88, and their root mean squared errors (RMSEs) ranged from3.07 to 6.95. Validation of dieoff data showed that 41% of pixels within independently developed dieoff polygons were accurately classified as dieoff, whereas 2% of pixels outside of dieoff polygons were classified as dieoff. Site potential, a long-term spatial average of cheatgrass cover, dominated the development of the cheatgrass performance model. Fire negatively affected cheatgrass performance 1 year postfire, but by the second year postfire performance exceeded prefire levels. The landscape-scale monitoring study presented in this paper helps increase knowledge about recent rangeland dynamics, including where cheatgrass dieoffs occurred and how cheatgrass responded to fire. This knowledge can help direct further investigation and/or guide land management activities that can capitalize on, or mitigate the effects of, cheatgrass dieoff.

Aboveground Vegetation and Perennial Grass Seed Bank in Arid Rangelands Disturbed by Grazing. 2015. Mónica Beatriz Bertiller , Analía Lorena Carrera. Rangeland Ecology & Management 68(1):71-78.

http://www.sciencedirect.com/science/article/pii/S1550742414000098

Abstract

Recruitment by seeds can be an important mechanism for recovery of plant communities following disturbance. Our objective was to assess the density and spatial patterning of

perennial grass (highly preferred by herbivores) seeds in litter patches at locations with different aboveground vegetation structure in sites with different grazing history characteristic of the Patagonian Monte (Argentina).We asked whether structural differences in aboveground vegetation are reflected in the density and spatial patterning of perennial grass seeds in litter patches. We selected two study sites characteristic of the Patagonian Monte and within them three locations representing different vegetation states, resulting from different combinations of grazing and/or release from grazing history. At each location, we assessed the density of perennial grass seeds in litter patches at microsites beneath plant patches (canopy) and in interpatch areas without or with scattered vegetation (bare soil) at three dates during the reproductive and seed dispersal periods. The density of perennial grass seeds in litter patches was greater at canopy than at bare soil microsites, and the number of litter patches without seeds increased with decreasing total plant cover at both microsites. The density of perennial grass seeds in litter patches did not vary with differences in total plant cover or litter patch attributes at canopy microsites, while it was reduced with decreasing total plant cover at bare soil microsites. We concluded that differences in aboveground plant cover differentially affected the density of perennial grass seeds in litter patches at contrasting soil microsites. Thus potential microsites for perennial grass recruitment by seeds would increase from litter patches at bare soil microsites to litter patches at canopy microsites at locations with high and low aboveground plant cover, respectively. These issues should be considered for the sustainable management of these rangelands.

Effects of Aminocyclopyrachlor Herbicide on Downy Brome (*Bromus tectorum*) Seed Production under Field Conditions. Daniel A. Ball (*2014*Invasive Plant Science and Management: October-December 2014, Vol. 7, No. 4, pp. 561-564.

DOI: http://dx.doi.org/10.1614/IPSM-D-13-00097.1

Abstract

Previous research has shown that pyridine growth regulator herbicides can affect seed production in annual grasses including downy brome, Japanese brome, wheat, and other cereal grain crops. Aminocyclopyrachlor is a pyridine carboxylic acid growth regulator herbicide that has recently been registered for broadleaf weed and brush control in nonagricultural areas, which may help facilitate release of native perennial grasses in native plant restoration sites. The influence of aminocyclopyrachlor on downy brome seed production was evaluated at multiple application rates and timings under controlled field conditions. The effect of aminocyclopyrachlor on seed production was compared with aminopyralid, another pyridine growth regulator herbicide. When applied to downy brome plants in the early vegetative stage (EPOST) at approximately 580 growing degree days (GDD), aminocyclopyrachlor at 320 g ae ha^{-1} reduced seed

germination by 50 to 88% in the first and second study years, respectively. Aminopyralid reduced seed germination by 94% in the first study year, but only 20% in the second year. When applied to downy brome plants in the early heading stage at approximately 1,235 GDD (LPOST), aminocyclopyrachlor at 320 g ae ha^{-1} reduced seed germination by 100% both years. Aminopyralid reduced seed germination by 95% in the first year, and 81% in the second year. Other than the observed reduction in seed germination, herbicides did not produce any visible changes in downy brome aboveground plant growth or development. Because downy brome seeds are relatively short-lived in soil, aminocyclopyrachlor and aminopyralid applications to downy brome–infested rangelands and other natural areas could result in reductions in downy brome population densities over time. No published data exist on the effect of aminocyclopyrachlor on seed production of desirable perennial grasses in natural ecosystems, thereby suggesting the need for further research.

Successes We May Not Have Had: A Retrospective Analysis of Selected Weed Biological Control Agents in the United States. Hariet L. Hinz, Mark Schwarzländer, André Gassmann, and Robert S. Bourchier (*2014*) Invasive Plant Science and Management: October-December 2014, Vol. 7, No. 4, pp. 565-579.

DOI: http://dx.doi.org/10.1614/IPSM-D-13-00095.1

Abstract

In this paper, we describe five successful classical biological weed control agents released in the United States. For each of the five arthropod species, we compared data from prerelease studies that experimentally predicted the agent's host range with data collected postrelease. In general, experimental host range data accurately predicted or overestimated risks to nontarget plants. We compare the five cases with insects recently denied for introduction in the United States and conclude that none of the discussed agents would likely be approved if they were petitioned today. Three agents would be rejected because they potentially could attack economic plants, and two because of potential attack on threatened or endangered plants. All five biocontrol agents have contributed significantly to the successful management of major weeds with no or minimal environmental risk. We believe that the United States may miss opportunities for sustainable and environmentally benign management of weeds using biological control if the regulatory framework only considers the *risks* of agents as potential plant pests and treats any host-range data regarding economic or threatened and endangered species as a binary decision (i.e., mandates rejection if there is any chance of feeding or development). As a way forward we propose the following: (1) the addition of risk and benefit analyses at the habitat level with a clear ranking of decision-

making criteria as part of the U.S. Department of Agriculture Animal and Plant Health Inspection Service Technical Advisory Group's evaluation process of biocontrol agents; (2) recognition of the primacy of realized host range data for potential agents that considers the insect's host selection behavior instead of emphasizing fundamental host range data during release evaluations, and (3) development of formalized postrelease monitoring of target and nontarget species as part of the release permit. These recommendations may initially be advanced through reassessment of current policies but may in the longer term require the implementation of dedicated biocontrol legislation.

Economic Savings from Invasive Plant Prevention. Roger L. Sheley, Jordan L. Sheley, and Brenda S. Smith (*2015*). Weed Science: January-March 2015, Vol. 63, No. 1, pp. 296-301.

DOI: http://dx.doi.org/10.1614/WS-D-14-00004.1

Abstract

Prevention programs are often assumed to be the most cost-effective method for managing invasive plants. However, there is very little information available about economic and biological factors that determine the forage benefits resulting from prevention programs. We developed an easy to use economic model to assess potential savings in livestock forage that might result from implementing prevention programs. The model can be used to determine potential loss in forage production caused by invasive plants and to estimate potential income savings by preventing invasive plant infestations. The model compares a prediction of populations with and without a prevention program using a logistic growth function. Animal unit month (AUM) price and interest rates are the primary economic input variables. The primary biological input variables are amount of invasive plant utilization, size of the initial infestation, and the spread rate with and without prevention. Our model suggests that as the AUM price increases and/or the interest rate decreases, the total savings increases for each AUM that was protected through a prevention program. The model also shows savings per AUM increases as the size of the initial infestation decreases, suggesting that prevention should focus on eliminating seed sources and seed production early in the program. Using our model inputs, the savings per AUM was about $9.20 for each percent reduction in spread rate over 100 yr.

Habitat and herbivore density: Response of mule deer to habitat management. Bergman, E. J., Doherty, P. F., White, G. C. and Freddy, D. J. (2015) The Journal of Wildlife Management, 79: 60–68.

DOI: http://dx.doi.org/10.1002/jwmg.801

ABSTRACT

The suite of demands competing for wildlife management funds necessitates direct assessment of management decisions, especially when these decisions have direct costs, as well as tangible opportunity costs. We conducted a mark–resight study that estimated mule deer (*Odocoileus hemionus*) density across multiple study units in southwest Colorado that had been exposed to different intensities of habitat treatments. Our treatments were comprised of common habitat management techniques including hydro-axe and roller-chopper disturbances as well chemical control of weeds and reseeding with desirable mule deer browse species. Reference study units received no habitat management treatments. Total deer densities varied between 20–84 deer/km^2 in southern study units and 4–12 deer/km^2 in northern study units. We did not observe a consistent pattern of higher deer density on advanced treatment study units despite it being the primary hypothesis of the study. We observed a wide range of variation in deer density among years. Resighting probabilities (range 0.070–0.567) were best modeled as an interactive function of study unit and year, although sampling method was also influential. We recommend that if population density is to be used as a population response variable, it be used in tandem with other, possibly more sensitive parameters such as overwinter survival or late winter body condition.

Demography, reproductive ecology, and variation in survival of greater sage-grouse in northeastern California. Davis, D. M., Reese, K. P. and Gardner, S. C. (2014), The Journal of Wildlife Management, 78: 1343–1355.

DOI: http://dx.doi.org/10.1002/jwmg.797

ABSTRACT

We examined demographic parameters and factors influencing nest survival of female greater sage-grouse (*Centrocercus urophasianus*) in northeastern California. Additionally, we used

known-fate models in program MARK to examine bi-weekly survival rates of females over an 8-month period (Mar–Oct, 2007–2009). Nest survival rate, assuming a 38-day exposure period, was 41% and was positively associated with grass height ($\hat{\beta}$ = 0.03, SE = 0.02), but the 95% confidence interval overlapped 0 (95% CI = −0.007–0.767) and the effect of grass height on nest success was likely to be small. Grass height and visual obstruction was greater at nest sites than at random locations, suggesting females selected sites with structurally more closed habitat for nesting. Females that nested under vegetation other than sagebrush (*Artemisia* spp.) had increased nest survival probabilities, suggesting sage-grouse selection of nest sites is based on vegetation structure more than plant species. Sagebrush canopy cover was considerably lower in our study area (approx. 10% on random plots) compared with sagebrush cover described across the geographic range of sage-grouse (>15%) and sage-grouse use of non-sagebrush plants in our study suggests sagebrush nesting habitat is limited. The overall 8-month survival (breeding season through autumn migration) for female sage-grouse was 49% (SE = 0.06) with most deaths occurring in spring and autumn. Mortalities during spring coincided with nest initiation, incubation, and following hatch when successfully nesting females were tending to chicks. Mortalities in September coincided with dispersal and autumn migration. The survival estimate during the breeding season was greater among known failed nesters ($\hat{S}_{\text{FAILED}}$ = 0.69) than females that nested successfully ($\hat{S}_{\text{SUCCESSFUL}}$ = 0.53), indicating female greater sage-grouse were exposed to greater mortality risk during incubation and brood-rearing periods. Greater mortality risk during the breeding season (i.e., nesting and brood-rearing) can have a major impact on greater sage-grouse demography. Conservation and management efforts should focus on enhancing female greater sage-grouse survival during the breeding and brood-rearing season.