



## Rapport with Research

August 2009

### Facilitation of Native and Exotic Plant Spread

#### WHAT ROLES DO CATTLE, ELK AND DEER PLAY?



Seeds, collected from ungulate feces, are grown in a greenhouse to determine density and species richness. Photo credit: E. Lehnhoff

Bryan Endress, from the Department of Forestry Ecosystems and Society at Oregon State University, received a grant from the Center for Invasive Plant Management in 2005 to study the effects of ungulate grazing on the spread of exotic and native plants. He collaborated with Anne Bartuszevige of the Eastern Oregon Agricultural Research Center and Department of Fisheries and Wildlife at Oregon State University, and conducted research in the Zumwalt Prairie Preserve (The Nature Conservancy) and the Starkey Experimental Forest and Range in northeastern Oregon. The work resulted in a publication in the *Journal of Arid Environments* (72: 904-913, 2008). A summary of the publication, *Do ungulates facilitate native and exotic plant spread? Seed dispersal by cattle, elk and deer in northeastern Oregon*, is provided below.

#### The Potential for Spreading Seeds May Differ Among Cattle, Deer and Elk

It has been hypothesized that seeds of many plant species used as forage by ungulates may be adapted for dispersal via the guts of ungulate herbivores. This mechanism of dispersal may be especially important for the spread of invasive species in areas utilized by native ungulates as well as domestic cattle. The purpose of this research was to examine differences in the potential seed dispersal of native and exotic plants through deer, elk and cattle.

#### Setting Up and Conducting the Experiment

The researchers collected fecal samples from deer, elk and cattle during the summer of 2005. Fecal pellets of deer and elk, and portions of the cattle fecal samples, were placed in plastic pots filled with commercially available potting soil. The pots were then placed in a greenhouse maintained at ambient light and humidity and at early summer temperatures, and the pots were watered as necessary. As seedlings emerged, they were identified and then removed from the pots. Plant species were divided into the classes of grass, forb or shrub and also native or exotic.



The Zumwalt Prairie Preserve study area (pictured above) is dominated by bunchgrasses with a high diversity of forbs, where as the Starkey Experimental Forest and Range study area is covered in 70% coniferous forest and 30% bunchgrasses. Photo credit: B. Endress, Oregon State University

#### ABOUT THE SCIENTISTS

Anne Bartuszevige is currently the Conservation Science Director for the Playa Lakes Joint Venture: <http://www.pljv.org/cms/staff-profiles>

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## Seed Germination Rates and Potential for Spreading Seeds Vary Among Ungulates

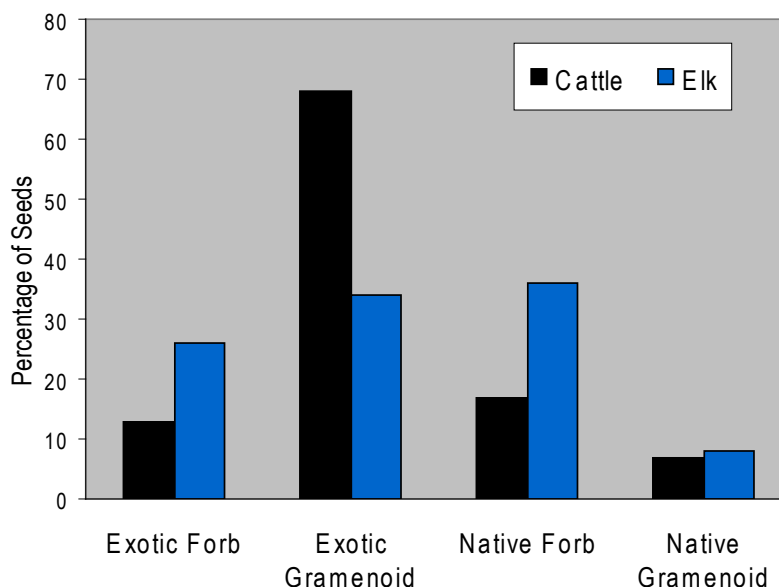
Numbers of germinating seeds in each plant class per 100 cm<sup>3</sup> of feces were compared for the different types of ungulates. These data, and the density of deer (2.0/km<sup>2</sup>), elk (1.5/km<sup>2</sup>) and cattle (3.1/km<sup>2</sup>) estimated to be in the local Wallowa-Whitman National Forest, were used to estimate the number of germinable seeds potentially dispersed through a summer grazing season.

A total of 878 seeds and 52 different plant species germinated in the samples with 42, 27 and 11 species found in cattle, elk and deer feces, respectively. The mean density of germinating seeds per 100 cm<sup>3</sup> of fecal material did not differ among elk and cattle. However, there were differences in the types of seeds that germinated (see graph on right).

Elk feces contained over twice as many native seeds as did cattle feces (41% vs. 20%). The majority (70%) of the germinable seeds in cattle feces were exotic grasses, including Canada bluegrass (*Poa compressa*), Kentucky bluegrass (*P. pratensis*) and smooth brome (*Bromus inermis*) and five others, whereas exotic grasses represented just 34% of the germinating seeds in elk feces. Many of these same species were found in elk feces, but in lower numbers. Exotic forb species, including sticky chickweed (*Cerastium glomeratum*), common sheep sorrel (*Rumex acetosella*) and corn speedwell (*Veronica arvensis*) were also found in cattle feces. The dominant exotic forb found in elk feces was common chickweed (*Stellaria media*). Few germinable seeds of any species were found in deer feces.

Based on the numbers of germinable seeds found, and the density of the different ungulates across the landscape, the researchers predicted that cattle can disperse more germinable seeds than native ungulates. It was projected that cattle can disperse 1.78 million seeds/km<sup>2</sup> in the Wallowa-Whitman National Forest. It was noted, however, that seed dispersal by cattle was restricted by grazing allotment fences, and long-distance dispersal is thus dependent on rotation of cattle between pastures. In contrast, seed dispersal by elk and deer is not limited by these fences, and therefore may contribute significantly to long-distance dispersal.

Cattle Feces Contain Significantly More Exotic Grass Seeds and Fewer Native Forb and Grass Seeds than Elk Feces



This graph shows the percentage of seeds, by life form, that germinated in cattle and elk feces. No differences in germination rates were found between the two study areas so the data were pooled. Graph adapted from Bartuszevige A and Endress B. 2008. A summary of the publication, *Do ungulates facilitate native and exotic plant spread? Seed dispersal by cattle, elk and deer in northeastern Oregon*. Journal of Arid Environments 72: 904-913.