

**Black Hills Area Botany & Ecology Workshop
(BHABEW XIII)
March 12, 2015**

8:00 – 8:30 Coffee's On!

Session 1

- 8:30 Symstad – **Welcome**
- 8:35 Barnhardt and Gillam – **The distribution and habitat use of North Dakota bats**
- 9:00 Whippo et al. – **Survey of 'fringe' mammals in western North Dakota**
- 9:20 Chowanski and Gates – **Identifying relationships between recent grazing practices and resource condition in the central Black Hills**

9:40 – 9:50 Break

Session 2

- 9:50 Freeman – **Three faces of forest conservation in the Black Hills**
- 10:10 Cook – **What happens after the beetles? Post-kill land management**
- 10:30 Krueger – **Incorporating climate change in natural resource management**

10:50 – 11:05 Break/World Café Setup

Session 3: World Café

- 11:05 Paintner-Green – **World Café goals and logistics**
- 11:15 Café session 1
- 11:40 Café session 2
- 12:05 Café session 3
- 12:25 Café wrap-up

12:30 – 1:40 Lunch (on your own)

Session 4

- 1:40 Gable et al. – **Harding County: A century of botany in South Dakota**
- 2:00 Blodgett et al. – **Aspen health and damage agents on the Black Hills National Forest (BHNF)**
- 2:25 Symstad et al. – **What is the critical load for nitrogen deposition in northern Great Plains grasslands?**

2:45 – 2:55 Break

Session 5

- 2:55 Steinmetz – **The extent and control of Hoary Cress in western South Dakota**
- 3:15 Bolka – **Invasives to watch for**

Poster Session (3:30 – 4:30)

- Marlow and Kunza – **Examination of resource availability for benthic macroinvertebrates in Rapid Creek, South Dakota, during elevated discharge events**
- Drozda et al. – **Black Hills National Forest Botanical Resources Update**
- Ott et al. – **Temperature, clipping, and drought effects on belowground bud outgrowth of the invasive *Bromus inermis* and the native *Pascopyrum smithii***
- Turner et al. – **An evaluation of ranch management strategies for coping with impacts of watershed-scale externalities**
- (tentative) Rolfsmeier – **Globally rare mosses found in the Nebraska Pine Ridge region**
- World Café table hosts – **Notes from world café tables**

Abstracts

(Alphabetical by first author's last name)

Paul Barnhart and Erin Gillam (North Dakota State University, Fargo, ND) – **The Distribution and Habitat Use of North Dakota Bats.** Understanding the biotic and abiotic factors that drive the distribution of species, especially among peripheral populations, is of fundamental importance for many conservation issues. Novel environments near the edge of a species distribution are often different and more challenging than those at the center of the distribution (Brown 1984). Peripheral populations are of great importance, as selection pressures may have shaped these populations differently from other central areas of the continuous distribution. Contemporary range maps are often too simplistic and lack information for species outside their continuous distribution. We conducted a survey of bats throughout North Dakota to assess the current distributions and habitat characteristics associated with presence locations. We found 11 bat species residing in North Dakota including documenting two species that were significantly outside their known distribution limits. We used maximum entropy modeling to build new distribution models which are far superior to simple polygons typically used in management scenarios. These maps provide insight into the exact ecological factors that drive species distribution in North Dakota.

Blodgett, J.T., Ambourn, A.K., and Allen, K.K. (USDA Forest Service, Rocky Mountain Region, Forest Health Protection, Rapid City, SD) – **Aspen health and damage agents on the Black Hills National Forest (BHNF).** Several diseases and insects are associated with aspen decline and mortality. In this study, damage agents and site variables were measured to determine factors contributing to aspen mortality. The objectives of the study were to: 1) evaluate tree and regeneration health, 2) quantify frequencies of damage agents, and 3) analyze tree mortality and regeneration stocking in relation to site, tree, climate, and damage agents. Permanent plots were selected in 2008 in the BHNF, were reexamined in 2012, with plans to reexamine in 2015. Most of the stands were healthy in 2008/12. Five of 49 damage agents were significantly correlated with mortality, suggesting they are contributing to the mortality observed in the Forest.

Kurt Chowanski and Roger Gates (South Dakota State University, Department of Natural Resource Management, West River Agricultural Center, Rapid City, South Dakota) – **Identifying relationships between recent grazing practices and resource condition in the central Black Hills.** Understanding relationships among livestock grazing practices, timber and forage production, and plant community composition is critical to reduce uncertainty and optimize management for sustainable and efficient provisioning of ecosystem goods and services. To investigate these relationships, we surveyed grazed meadows and forests in the Black Hills across gradients of duration

and intensity of cattle use. We found negative correlation between: 1) plant species richness and intensity of use, and 2) forage production and cattle stocking rate. This work suggests that intensity of use can be used to identify stocking rates which balance livestock production and plant community composition.

Blaine Cook (USDA Forest Service, Black Hills National Forest, Custer, SD) – **What happens after the beetles? Post-kill land management.** Black Hills National Forest...the changing forest. What are management options for treatment ?

Nick Drozda, Cheryl Mayer, Chelsea Monks, Rylan Sprague, and Kelly Warnke (USDA Forest Service, Black Hills National Forest, various locations) – **Black Hills National Forest botanical resources update.** The 2014 field season was a busy one for the Black Hills National Forest botany cadre! We confirmed a population of the federally listed plant species Leedy's roseroot (*Rhodiola integrifolia* spp. *leedyi*), undertook an extensive common buckthorn (*Rhamnus cathartica*) removal project in Dugout Gulch Botanical Area, and continued to document lichen species found on the Forest.

John F. Freeman (independent historian, Laramie, WY) – **Three faces of forest conservation in the Black Hills.** The activities of three individuals engaged in conservation during the early, middle, and recent periods of BHNH history illustrate stages in the transformation of forestry; from producing "outputs" to restoring and maintaining the conditions that made those "outputs" possible. All that occurred within the broader context of a commercialized forest, changes in the public's view of forest values, advances in science, and catastrophic wildfires and beetle epidemics, which have provided forest managers with a chance to realign their efforts to create and maintain a biologically diverse forest that can resist natural and human disturbances.

M. Gabel (Black Hills State University, Spearfish, SD), B.E. Nelson (University of Wyoming, Laramie, WY), D. Mergen (Mergen Ecological Delineations), K. Hansen (USDA Forest Service, Sioux Ranger District), G. Kostel (Black Hills State University) – **Harding County: A century of botany in South Dakota.** We report the current knowledge of the vascular plant flora of Harding County, South Dakota which includes 724 species. Introduced species have increased from five percent of the flora to 13% over the last century. Relatively small changes have occurred in plant species duration, species habit or major groups over 100 years. Coefficients of conservatism varied from 4.3 to 6.2 in eight areas across the county, with the lowest values in riparian areas and highest values in pine-dominated buttes.

Jerry Krueger (Black Hills National Forest) – **Incorporating climate change in natural resource management.** Natural resource managers are faced with a multitude of challenges that include finding a way to incorporate the large amount of climate change science in their planning efforts. I will introduce case study examples and initiatives underway in the US Forest Service that are helping on the ground efforts to make the best use of regional and sub-regional science in managing the nations National Forests and Grasslands.

R.Marlow and L.A. Kunza (Department of Atmospheric and Environmental Science, South Dakota School of Mines and Technology) -- **Examination of resource availability for benthic macroinvertebrate in Rapid Creek, South Dakota during elevated discharge events.** Benthic macroinvertebrates (BMI) play a key role in food web dynamics in fluvial ecosystems. Their communities are structured to process the resources present and will alter their foraging strategies to minimize energy lost. Flushing flows are known to alter resource composition and availability for the BMI community. We examined the question of how BMI composition and resource availability shift in relation to discharge. Our objectives were to document the quantity and availability of algal, benthic

organic matter and seston resources from five locations in Rapid Creek, SD through April 2014 – April 2015. Environmental variables of river channel morphology, habitat characteristics and discharge data were collected for the same time period. Flow exceedances of 90% throughout the summer months lead to noticeable decrease in BMI populations and excessive scouring of both microbial resources and periphyton mats from the substrate.

Jacqueline P. Ott (South Dakota State University and US Forest Service-RMRS, Rapid City, SD), Jack L. Butler (US Forest Service-RMRS, Rapid City, SD), Yuping Rong (China Agriculture University, Beijing, China), and Lan Xu (South Dakota State University, Brookings, SD) – **Temperature, clipping, and drought effects on belowground bud outgrowth of the invasive *Bromus inermis* and the native *Pascopyrum smithii*.** Population persistence of perennial grasses depends on stem recruitment from the belowground bud bank. Bud outgrowth responses of native and invasive perennial grasses to grazing and environmental conditions could strongly impact grassland resiliency to climate change and were tested in a growth chamber study. Under short-term drought and a range of temperatures, *Bromus inermis* (smooth brome) maintained a greater number of live buds per stem and initiated a greater proportion of those buds to tiller than *Pascopyrum smithii* (western wheatgrass). Temperature, drought, and clipping tended to affect the size of new tillers rather than the amount of tiller initiation.

Amy Symstad (USGS Northern Prairie Wildlife Research Center, Hot Springs, SD), Anine Smith (Graduate Degree Program in Ecology, Colorado State University), Wesley Newton (USGS Northern Prairie Wildlife Research Center, Jamestown, ND), and Alan Knapp (Department of Biology, Colorado State University) – **What is the critical load for nitrogen deposition in northern Great Plains grasslands?** Nitrogen fertilization experiments often show increased primary production and decreased biodiversity when this nutrient is added to grasslands. Consequently, the National Park Service is concerned that increasing atmospheric nitrogen deposition caused by fossil fuel combustion could adversely affect the ecosystems in its trust. A 4-year field experiment in three vegetation types of northern Great Plains national parks suggests that plant diversity may decrease with increasing nitrogen in more productive communities, but only at nitrogen addition levels much greater than those expected from atmospheric deposition. Communities with low productivity may be more sensitive. Productivity of badlands sparse vegetation significantly increased with an addition of 10 kg N/ha/yr, a level commensurate with deposition levels anticipated in this region. Inconsistent responses among increasing nitrogen addition levels and years suggest that atmospheric nitrogen deposition effects on many plant communities in this region will be difficult to discern from natural spatial and temporal variability.

B.L. Turner, R. Gates, G. Hoogenstraat, A. Smart (South Dakota State University) – **An evaluation of ranch management strategies for coping with impacts of watershed-scale externalities.** Land use change in the Swan Creek watershed (Walworth, Edmunds, and Potter counties South Dakota) has contributed to increased stream discharge, leading to flooding of Rock Hills Ranch (RHR) property. Although land conversion has brought positive economic benefits to those directly involved, it has rendered two hundred grassland acres of RHR almost useless. In order to provide guidance to RHR about an appropriate course of action, we modeled stream discharge from similar, single storm events in 2006 and 2012 using the Hydrologic Engineering Center's-Hydrologic Modeling System (HEC-HMS) to quantify the hydrologic effect of the land use conversion. From 2006 to 2012, we estimated an increase in cultivated crop area of over 21,000 acres (or 27%) which contributed to peak discharge increases of over 4.5% (or 110 thousand gallons per second at peak-flow). A simple strategic management procedure, combined with Net Present Value and Modified Internal Rate of Return (MIRR) estimation, was then used to identify ranch strategies to cope with this change. Each strategy

was ranked on how well it mitigated the externality effects, and what financial impacts to RHR would be, in order to determine an appropriate response. We suggested an Easement strategy which provided an adequate financial return (MIRR=21%) while creating a vegetative buffer to protect downstream properties in the watershed.

Craig Whippo (Dickinson State University, Dickinson, ND), Samantha Pounds (Fort Hayes State University, Fort Hayes KS), Morgan Petersen (Dickinson State University, Dickinson, ND), Michael Shaughnessy (Northeastern State University, Tahlequah, OK) – **Survey of ‘fringe’ mammals in western North Dakota.** The status of 22 western North Dakota mammal species is presently unknown or incomplete. A number of ‘fringe’ mammals are thought to be associated with specific plants. This study aims to: establish baseline survey data, determine current status and range limits, identify vegetation associations and habitat parameters, and produce updated range distribution maps of ‘fringe’ mammals in western North Dakota. With little known about the distributions of these mammals, it is necessary to document their occurrences in order to understand the ecology of the region and make good management decisions. Preliminary data from the 2014 summer field season will be presented.