(organized chronologically by conference agenda)

INFLUENCE OF NON-NATIVE TROUT ON NATIVE NON-GAME FISH IN NEBRASKA HEADWATER STREAMS

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ABSTRACT.—Introduced, non-native trout may have detrimental competitive or predatory interactions with native fishes. However, few studies have experimentally examined interactions between introduced trout and native non-game species. The objectives of this study were to determine 1) if non-native rainbow trout *Oncorhynchus mykiss* influence survival, behavior, movement, or distribution of native longnose dace *Rhinichthys cataractae* under laboratory conditions, 2) if non-native rainbow trout influence survival of native longnose dace under *in-situ* conditions using in-stream enclosures, and 3) if non-native brown trout *Salmo trutta* or rainbow trout influence native populations or communities under natural conditions. Rainbow trout preyed on longnose dace at low rates in both laboratory and in-stream enclosure experiments suggesting that if rainbow trout and longnose dace overlap in microhabitat use, some predation is likely to occur. Additionally, greater non-native trout abundances were associated with greater distinction in native community structure between sites with trout compared to sites without trout suggesting there may be increased risk to native communities in sites with high abundances of trout. Therefore, it is not recommended that non-native trout be stocked in streams containing native at-risk non-game species, and caution should be taken in stocking non-native trout even in streams with common and abundant native species.

BRINGING BACK THE POLLINATORS

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Bees and other pollinators are a fundamental part of our environment. Their work is something that touches us all through the food we eat, the clothes we wear, the landscapes we enjoy and the health of ecosystems. Yet the future of pollinators is clouded by habitat loss, pesticide use, and introduced diseases. Join Jennifer Hopwood of the Xerces Society to learn more about the fascinating lives of these insects and actions we can take to protect pollinators and provide them with habitat.

ECOSYSTEM STEWARDSHIP APPROACH TO RESTORING RIPARIAN COTTONWOOD COMMUNITIES: RESTORING COTTONWOOD DYNAMICS WITH FIRE

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Although natural resource management has theoretically moved toward an ecosystem management paradigm with a focus on multiple potential equilibria and emphasis on ecosystem services, in practice much resource management is still heavily grounded in steady state ecosystem concepts. Conventional resource management has been defined by a focus on optimal sustained yield of a single resource, limiting uncertainty by reducing the magnitude and frequency of disturbance to the resource of interest. Ecosystem stewardship has emerged as an alternative management paradigm to traditional steady state natural resource management. Ecosystem stewardship focuses on reducing vulnerability to disturbances and changing environmental conditions, thus increasing ecosystem resilience through restoring the historical range of variability in disturbance regimes. Riparian cottonwood forests are currently managed under a conventional steady state approach, which seeks to limit exposure to disturbance in order to maintain adult cottonwood trees. Despite a mounting body of evidence to the contrary, fire has been viewed as devastating to cottonwood communities and management strives to limit cottonwood exposure to it, especially to high-intensity crown-damaging fire. We took advantage of a large wildfire that burned through portions of a riparian cottonwood forest in the Cimarron National Grassland to design an experiment to examine the differences in the trajectory of cottonwood communities under an ecosystem stewardship approach as opposed to the current

approach of steady-state resource management. We establish fourteen 100x50m plots along the riparian corridor. Half of the plots were randomly located in the area burned during the wildfire and the other in the riparian area directly east and west of burned area. Data from unburned plots, which represent conditions of the forest under traditional steady-state management, show that steady-state management of riparian cottonwood communities could increase population vulnerability to local extinction as successful recruitment capable of offsetting adult cottonwood loss to drought mortality and natural die-off is limited. Recruitment frequency was low in plots not burned by the wildfire, averaging 6 recruits per plot while burned plots averaged 97 recruits per plot. The resulting size distribution is bimodal with few individuals in small size classes and almost no individuals in intermediate size classes. An ecosystem stewardship approach incorporates disturbances of varied scales and intensities that leave diverse legacies and embraces unpredictable shifts in community dynamics. For cottonwood, this would necessitate the inclusion of high-intensity wildfire-type prescribed burns to restore a cottonwood community with patches experiencing different severities. In this regard, the result of an ecosystem stewardship management approach is approximated by a combination of data from the burned and unburned plots. Burned plots are characterized by high density of resprouts and a highly left-skewed age distribution, while unburned plots have a bimodally-distributed age structure. Combining these across a landscape results in an overall more even age-structure, although age classes are patchily distributed across the landscape. This provides a mosaic of asynchronously dynamic cottonwood patches. Such asynchrony in population structure has been shown to foster system resilience and reduce vulnerability to perturbations such as drought and invasion, both of which are becoming major issues for the maintenance of riparian cottonwood communities. Our experiment highlights the importance of ecosystem stewardship, which fosters resilience to the entire range of potential disturbances faced by a community, for maintaining communities capable of withstanding high levels and novel types of disturbance potentially faced by ecosystems in the future.

NEST SURVIVAL OF SHORTGRASS PRAIRIE BIRDS IN AN ADAPTIVE GRAZING MANAGEMENT PLAN

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ABSTRACT.—Grassland birds have declined more than any other bird group in the past 35-40 years, primarily because of habitat loss from the conversion of native grassland to croplands, with a 52% loss of shortgrass prairie since the 1920's. The McCown's Longspur (*Rhynchophanes mccownii*) is a Tier 1 at-risk species listed in the Nebraska and Colorado State Wildlife Action Plans and a shortgrass prairie obligate species.

The Central Plains Experimental Range located in northeastern Colorado has been a site for conducting research on long-term grazing for decades. Recently scientists, ranchers and land managers developed an Adaptive Grazing Management Plan to examine how science can be conducted at ranch-level scales with manager involvement to evaluate the effectiveness of using adaptive grazing management for both production and conservation goals. In particular, this study examines how grazing management can be implemented in a manner that responds to current and changing rangeland conditions, incorporates active learning, and makes decisions based on quantitative, repeatable measurements collected at multiple spatial and temporal scales. This includes nest survival and fecundity of species of conservation concern such as the McCown's Longspur and other ground-nesting grassland species.

In 2014 I collected data on nest productivity for five species. I estimated nest survival for three of those species and found a daily nest survival of ~80%. I then modeled survival based on environmental features of known or suspected importance. I compared the applicability of two non-mutually-exclusive hypotheses: 1) nest survival is strongly influenced by weather, and 2) nest survival is strongly influenced by nest-site vegetation. After identifying the most influential temporal variables—which would account for unmeasured influences to survival—I fit separate sets of weather- and vegetation-based models. Weather variables exerted equivalent moderate influence. Vegetation variables were mostly insignificant, except for bare ground and dead vegetation. A model containing both dead vegetation and bare ground best explained survival, and it was not improved by the addition of weather variables. Nest survival declined with increasing extent of bare ground and dead vegetation. These initial findings suggest that habitat manipulation, such as adaptive grazing, can be used to promote population growth in the nesting phase. This long-term study will shed light on the use of this management tool as a win-win for ranchers and land managers to achieve conservation and productivity goals.

RARE PLANT SURVEYS IN WESTERN NEBRASKA: KIMBALL GRASSLANDS AND SANDSAGE PRAIRIE CLOVER (*DALEA CYLINDRICEPS*)

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Jim Locklear, Director of Conservation at Lauritzen Gardens in Omaha, will report on recent rare plant surveys in western Nebraska. The Kimball Grasslands is recognized as a Biologically Unique Landscape by the Nebraska Natural Legacy Project. Located in the southwest part of the Panhandle, the region hosts a significant number of Nebraska plants of conservation concern, most of which are associated with rock outcrop habitat. A reconnaissance survey was conducted during the spring and summer of 2014 to gain a better understanding of the ecology of rock outcrop communities in the Kimball Grasslands and of the associated rare species. Lauritzen Gardens is also engaged in a multi-year research project to document the ecology and conservation needs of sandsage prairie-clover (*Dalea*

cylindriceps), a perennial herb that appears to be in serious decline. Sandsage prairie-clover is rare throughout its range in the western Great Plains and is ranked as a Tier I At-risk Species in Nebraska.

FIRST DOCUMENTED NESTING OF NORTHERN SAW-WHET OWLS IN NEBRASKA

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ABSTRACT.—Four years of field work have been completed in the nesting project for Northern Saw-whet Owls. After 2 disappointing years without saw-whets using a single box, one box was occupied at the Wildcat Hills Wildlife Management Area in 2014 and four young were fledged. In 2015, that box was used again, with six young fledged. Another box in the Nebraska National Forest southeast of Crawford was also used, with six young fledged. In 2015, 11 of the owlets were banded. These are the first documented nests of Northern Saw-whet Owls in the state of Nebraska.

ARE THEY GROWING? WHERE ARE THEY GROWING? WHY ARE THEY GROWING? MONITORING AND MODELING OAK REGENERATION AND FOREST TREE COMMUNITIES IN INDIAN CAVE STATE PARK, SOUTHEAST NEBRASKA

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ABSTRACT.—During the summer of 2014, we conducted surveys of oak seedling abundance, tree community composition, and other forest characteristics in Indian Cave State Park (ICSP). ICSP is the largest protected area within the Indian Cave Bluffs Biologically Unique Landscape of extreme southeast Nebraska and is predominately characterized by mixed oak-dominated deciduous forest communities. Prescribed burning and the thinning of shade-tolerant trees that may be limiting oak regeneration are management actions currently being implemented to conserve these communities. The objectives of this ongoing monitoring project are twofold: 1) identify factors affecting oak seedling regeneration, including the effects of management actions; and 2) delineate approximate forest tree community boundaries. Here, we report preliminary findings and outline future analysis objectives.

HABITAT USE OF MOUNTAIN PLOVERS DURING NEST INCUBATION

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ABSTRACT.—The Mountain Plover (*Charadrius montanus*) is a species of conservation concern throughout its range, native to short-grass prairie habitat of the western Great Plains, and a tier-1 at-risk species listed in Nebraska's Natural Legacy Plan. Mountain Plovers prefer to nest in recently disturbed areas with bare ground, short vegetation, and little to no slope. Historically, formation of these conditions was facilitated by native grazers such as Bison (*Bison bison*) and prairie dogs (*Cynomys* spp.). Over the past 150 years, local extirpation of these native grazers and the expansion of agriculture across the prairie have greatly reduced the availability of suitable native habitat. Mountain Plovers, however, will readily nest on agricultural fields, whether fallow or with low-growing crop.

During the 2014 and 2015 breeding season, we deployed GPS-tags on nesting Mountain Plovers to estimate home-range size and habitat use during the nest incubation period. Our study site consists of private, mostly agricultural land in Kimball Co., Nebraska and Weld Co. Colorado. Do these crop fields support plover foraging needs in addition to providing nesting habitat, or do plovers nesting on cropland travel to nearby native rangeland to meet their foraging needs? We aim to better understand how plovers are using the agricultural landscape matrix that has supplanted much of their native breeding range.

BALANCING CONFLICTING VALUES OF ECOSYSTEM SERVICES: ADAPTIVE MANAGEMENT ALONG THE RANGELAND-WOODLAND INTERFACE

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ABSTRACT.—The values that humans place on ecosystem services dictate the management decisions that affect natural resources. However, different stakeholders often place different values on the services that an ecosystem can provide, resulting in the need to balance conflicting values and make decisions. In addition, values are spatially and temporally dynamic, therefore increasing the complexity of the decision-making process. Furthermore, there are often uncertainties that surround both the social and ecological impacts of those decisions. A decision-making approach that is able to adapt to dynamic social and ecological conditions and reduce uncertainties is necessary to make robust and

defensible decisions. By implementing an adaptive framework that allows decisions to be made while taking steps to reduce uncertainties, managers can more effectively understand and balance conflicting values of ecosystem services. As an example, we explore the regional problem of eastern redcedar (*Juniperus virginiana*) encroachment into grass- and wood-lands in the Great Plains, which decreases biodiversity and changes the structure of many ecosystems, but represents a commodity that can be utilized for several purposes. We discuss factors that should be considered when making decisions about how to balance trade-offs among and within categories of ecosystem services, and the implications of these trade-offs for management and policy.

INDIRECT EFFECTS OF A WIND ENERGY FACILITY ON THE BEHAVIOR OF GREATER PRAIRIE-CHICKENS (*TYMPANUCHUS CUPIDO PINNATUS*) AT LEKS IN NEBRASKA

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ABSTRACT.—Rapid expansion of the wind energy industry in North America has raised concerns about the effects of anthropogenic disturbance on prairie grouse. While efforts have been made to address the effects of wind energy facilities on individual fitness and survival, effects on breeding and non-breeding behaviors at leks near wind turbines have been largely neglected. We investigated the effects of a pre-existing (built in 2005) 36-turbine wind energy facility in Nebraska, USA on the behavior of Greater Prairie-Chickens (*Tympanuchus cupido pinnatus*) between March and May 2013 using direct behavioral observations. Wind turbine noise has the potential to disrupt acoustic communication and behavior and the potential to reduce female lek attendance. We predicted that males at lek sites close to the facility would spend more time in agonistic behaviors and less in breeding behaviors. Although we found no effect of the wind energy facility on female lek attendance, males at leks located close to the facility spent less time in non-breeding behaviors than those at leks farther from the facility. Distance to the wind facility had no effect on the amount of time males spent in booming displays, flutter-jumps, or agonistic behaviors. Given that the amount of time spent in breeding behaviors has important fitness consequences, our results have implications for the persistence of this species of conservation concern.

MIDPOINT OF A 25-YEAR IMPLEMENTATION PLAN FOR THE SALINE WETLANDS CONSERVATION PARTNERSHIP

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ABSTRACT.—The Saline Wetlands Conservation Partnership currently consists of four primary contributors (City of Lincoln, Lower Platte South Natural Resources District, Nebraska Game and Parks Commission, and The Nature Conservancy) and several other entities who participate in efforts to conserve Nebraska's eastern saline wetlands. Since 2003, the Partnership has implemented efforts to conserve and restore these wetlands. The efforts initially included land acquisition and management and through the years began to include wetland restoration. Today, efforts include research, continued restoration, and project planning for the future. I will discuss how the partnership has progressed during the first half of the Implementation Plan, what is currently taking place, and what lies ahead for 2028.

RESILIENCE OF SANDHILLS GRASSLAND TO AN EXTREME WILDFIRE AND DROUGHT EVENT

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ABSTRACT.—The Nebraska Sandhills, one of the largest contiguous grassland ecoregions remaining in North America, is characterized by sandy textured soils stabilized by fine root biomass from predominately warm-season grasses. Concern over the destabilization of the sand dunes has led to management approaches that seek to prevent disturbances, such as fire, that remove vegetation and expose bare ground. In 2012, extreme drought conditions (38% below the average for the growing season) coincided with one of the most extreme wildfire events observed in the area in recent decades. Considering that bison were not removed from the area and the drought continued for an additional six months following the wildfire, we hypothesized that the occurrence of wildfire and herbivory during this drought would result in the loss of stability in Sandhills grassland and a lack of recovery of grassland vegetation. Following the wildfire, we tracked the response of aboveground grassland productivity in burned areas compared to adjacent areas not burned. Contrary to the local concerns shaping our hypothesis, grassland vegetation recovered rapidly following this wildfire and drought event. These findings demonstrate that Sandhills grasslands are considerably more resilient than currently believed.

SPATIOTEMPORAL PRODUCTIVITY PATTERNS IN GRASSLAND LANDSCAPES DURING A CHANGING CLIMATE

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ABSTRACT.—By the end of the century, climate change models forecast an increase in frequency and intensity of growing season droughts in North American grasslands. Historically, pyric herbivory, defined as herbivory driven by fire, was a major contributor of spatiotemporal complexity in grassland landscapes. Considering the implications of coupled spatiotemporal productivity patterns for biodiversity, it is paramount to determine the whether pyric herbivory will continue to create landscape heterogeneity following extreme drought. In this study, we take advantage of an extreme drought event in 2011 to study its impact on three core expectations of pyric herbivory: (1) pyric herbivory creates a shifting mosaic, with discrete patches consisting of differing levels of plant biomass at any given time; (2) pyric herbivory drives plant biomass over time; and (3) forage quality spikes following fire and declines over time since focal fire and grazing. We conducted our study in replicate experimental landscapes managed with fire and grazing for the past 15 years. Prior to the drought in 2009, we conducted multiple studies to determine the underlying fire-grazing relationship driving spatiotemporal patterns in grass biomass. We then conducted a rigorous study following the drought to test whether the three core expectations of pyric herbivory were upheld. We show vegetation responses following a single-drought event that contrast with long-held core expectations: (1) Spatial heterogeneity of the landscape was not maintained. (2) The strength of pyric herbivory as a long-term temporal driver of plant biomass was significantly reduced. (3) Forage quality did not spike following fire and no apparent relationship was discernible over time. Our study reveals the high degree of novelty in spatiotemporal productivity patterns that will make managing for heterogeneity more challenging in an era of global change.