

Oral Presentations

Session 1: Aquatic Species (Room 1)

Influence of Hydrologic Alteration and Riverscape Fragmentation on Distribution and Abundance of Plains Minnow (*Hybognathus placitu*).

Joshuah S. Perkin* and Keith B. Gido. Division of Biology, Kansas State University, 232 Ackert Hall, Manhattan, KS. JPerkin@ksu.edu.

Decline in abundance and distribution of riverine fishes occurs worldwide, and is notable for obligate riverine species. Among obligate riverine fishes that broadcast pelagic eggs, the plains minnow is declining throughout a large geographic range. Stream fragmentation and changes in flow regime are two factors associated with declining populations of plains minnow, but the relationship between these factors remains unresolved. The purpose of this study was to characterize associations of fragmentation and flow regime with status of plains minnow across river systems. Data from published literature, U. S. Geological Survey stream gauges, and direct measurement of stream fragment lengths was ordinated to summarize characteristics of river systems with stable, declining, and extirpated plains minnow populations. Stable populations were characterized by dynamic flow regimes and greater fragment length, whereas extirpated populations were characterized by rapid fall rates in discharge and shorter fragment lengths. Rivers with declining populations had intermediate levels of flow regime alteration and riverscape fragmentation. Mechanisms driving extirpation of plains minnow in fragmented streams with homogenized flow regimes are likely related to reduced reproductive success and truncated habitat availability. Attenuating fragmentation and managing flow regimes to mimic naturally dynamic flow patterns are potentially useful conservation strategies for plains minnow and other ecologically similar species.

Student Scholarship Participation: Yes

Pallid Sturgeon Monitoring in the Kansas and Missouri Rivers.

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The Missouri Department of Conservation is 100% funded by the U.S. Army Corps of Engineers to conduct a portion of the Pallid Sturgeon Population Assessment Program (PSPAP) on the Kansas and Missouri Rivers. PSPAP is a basin wide project that is comprised of multiple state and federal agencies directing efforts to monitor the endangered pallid sturgeon and other native species. The Missouri River Field Station (MORFS) was established in 2005 and began monitoring the lower Kansas River (RM 52 – 0) and the middle section of the lower Missouri River (RM 540 – 250). A variety of gears are deployed including gill nets, trammel nets, benthic trawls, mini-fyke nets and trotlines. In 2007, MORFS captured the first pallid sturgeon recorded in the lower Kansas River since 1952. Four additional pallid sturgeon have been captured as well as many additional native species.

Student Wildlife Contest: No

Spatial and Temporal Variation in Fish Community Structure in the Upper Gila River Basin, NM.

James E. Whitney* and Keith B. Gido. Kansas State University, Division of Biology, 116 Ackert Hall, Manhattan, KS. jwhit@ksu.edu.

Arid-land streams are highly imperiled ecosystems worldwide. Successful preservation of these systems will require knowledge of baseline variation in communities under natural abiotic conditions. The Upper Gila River Basin of southwestern New Mexico lacks many of the anthropogenic modifications, other than species introductions, which plague other desert streams. Thus, this system provides an opportunity to study community structure under near pristine conditions. Spatial and temporal structure of the fish communities of the Upper Gila were quantitatively sampled at six sites during spring, summer and fall of 2008 and 2009. Principal components analysis (PCA) revealed strong spatial variability in community structure, whereas temporal variability was less evident. Differences in the abundance of native and nonnative species appear to be the source of this spatial signal. Abundances of native speckled dace tended to be greatest at upstream sites, while loach minnow were more abundant downstream. Nonnative yellow bullhead abundances were greatest upstream, while channel and flathead catfish abundances increased downstream. Studies which quantify drivers of these spatial differences would be useful in explaining coexistence between native and nonnative fishes in the Upper Gila.

Student Wildlife Contest: Yes

Nighttime Sampling of Larval and Juvenile Fishes in Mud Lake, Pool 11, of the Upper Mississippi River.

Alan R. Butler*, Matthew V. O'Brien, Kimberly M. Parsons, Andrew S. Satterlee, Garrett J. Sheldon, Daniel J. Call, and Gerald L. Zuercher. Department of Natural and Applied Sciences, University of Dubuque, Dubuque, IA 52001. abutler4@emporia.edu.

Mud Lake, a backwater of Mississippi River Pool 11, underwent extensive restoration from 2002 to 2006 to improve habitat for the fish community. Modifications included the development of channels dredged to a depth of 1.8-2.4 meters and construction of deflection embankments that isolated the backwater area from upstream river flow except for cuts in the embankments that allow the volume and rate of water to fluctuate based on seasonal conditions. We conducted this study to provide information on larval and juvenile fish utilization of restored modified backwaters as nursery habitat. We sampled Mud Lake 25 times from May through October in 2007 and 2008, using a larval/juvenile light-trapping technique. A total of 522 fish were captured, representing 14 species and 10 families (Lepisosteidae, Clupeidae, Cyprinidae, Catostomidae, Ictaluridae, Atherinidae, Poeciliidae, Moronidae, Centrarchidae, and Percidae). The five most commonly captured species were brook silverside (35%), bullhead minnow (25%), emerald shiner (24%), gizzard shad (5%), and white bass (4%). Additional sampling using several different methods is necessary to determine if additional species utilize the modified Mud Lake backwater as a nursery area.

Student Wildlife Contest: Yes

The Long and Short of it: Density-Dependent Growth of Juvenile Central Stoneroller (*Campostoma anomalum*) Within and Among Cohorts.

Erika C. Martin* and Keith B. Gido. Division of Biology, Kansas State University, 232 Ackert Hall, Manhattan, KS. erikam86@ksu.edu.

Changes in population density often result from interactions between abiotic and biotic factors. Stream drying decreases inhabitable area and exacerbates density-dependent factors (e.g., competition); flooding can have the opposite effect. Characterizing density-dependent growth can help distinguish population dynamics in non-equilibrium systems. The main objective of this study was to evaluate density-dependent growth of juvenile stoneroller (*Campostoma anomalum*). Specifically, how do changes in density of juvenile and adult stonerollers affect growth in juvenile stonerollers? We used 22

experimental streams located on the Konza Prairie Biological Station. Juvenile central stonerollers were stocked in experimental streams at densities of 5.9, 17.7 and 35.5 fish/m². Adult central stonerollers were stocked at densities of 0, 5.9 and 14.8 fish/m². Low and medium juvenile density were crossed with all adult densities, and high juvenile density was crossed only with low and high adult density. Single factor Analysis of Variance (ANOVA) was used to test for treatment differences in juvenile length at the end of the experiment. In the absence of adults, increasing densities of juvenile stonerollers was associated with shorter mean lengths. However, increasing adult density appeared to increase mean length of juvenile stonerollers. Future analyses will evaluate changes in survivorship and condition of these fish.

Student Wildlife Contest: Yes

Ecological Variables of *Macrohybopsis Storeriana* in the Arkansas River in Wichita, KS.

Becky Stanfield*. Friends University, 6101 W. Juno Wichita, KS. ibstanfield80@gmail.com.

The silver chub (*Macrohybopsis storeriana*), is currently listed in Kansas as endangered and is disappearing from other locations in the United States. Research was done to study the ecological variables of the silver chub in the Arkansas River in order to develop a recovery plan. One possible benefit of this research could be to the Kansas water system. If they are able to eat zebra mussels, an invasive freshwater mussel recently found in the local watershed, work can be done to increase the silver chub population in order to help control their overpopulation in regional lakes. Data on the fish community and physical habitat containing silver chub within the Arkansas River from 1999 - 2008 was analyzed to look for any trends and associations. Results showed silver chub were mainly found in sites containing glides and high percentages of fine gravel substrate. The calculated Index of Biotic Integrity (IBI) score of most sites containing chub was from good to excellent. Over 2 years, 22 individuals were collected to identify a trend in sexual maturity, community structure, and habitat. These individuals were collected in an average depth of 1.5 feet and an average water flow of 1.4 cubic feet per second.

Request for Scholarship: Yes Student Wildlife Contest: Yes

Fish Recruitment in the Kansas River: The Role of Flow, Habitat, and Urbanization.

Joe Gerken* and Craig Paukert. Kansas Cooperative Fish and Wildlife Research Unit, Division of Biology, 205 Leasure Hall, Kansas State University, Manhattan, Kansas. Gerkenje@ksu.edu.

We used residuals of weighted catch curves to identify patterns in recruitment of river carpsucker, freshwater drum, and flathead catfish among three reaches of the Kansas River with varying degrees of urbanization. Fishes were collected using electrofishing and benthic trawls in the summer of 2008 and 2009 and all fish were aged using otoliths or pectoral spines. We found that age explained 22-67% of variation in abundance for flathead catfish, 62-87% for freshwater drum, and 30-67% for river carpsucker. Recruitment was variable among species but was most consistent among river reaches for freshwater drum (r^2 : 0.62-0.87) and most variable for flathead catfish (r^2 : 0.22-0.67). Recruitment also varied with respect to the urbanization gradient with the most consistent recruitment at our most downstream and most urbanized site near Kansas City, Kansas (r^2 : 0.56-0.87, depending on species) and the most variable recruitment at our most upstream and least urbanized site near Manhattan, Kansas (r^2 : 0.22-0.61, depending on species). Adding mean spring discharge values to our analyses only explained an additional 2-13% of year class variation. In contrast to adult fishes, juvenile fishes were generally more abundant in our most upstream and most undisturbed reach indicating that downstream populations may rely on immigration of juveniles from upstream nursery habitats. Our results indicate that many environmental variables may impact the recruitment of these species. As such, conservation

and management efforts should consider protecting a diverse array of spawning and nursery habitats for large river obligate species.

Student Wildlife Contest: No Student Scholarship: Yes

Fish and Fish Habitat in the Kansas River: What Have We Learned?

Craig Paukert*, Joseph Gerken, Jeff Eitzmann, and Andrew Makinster. Kansas Cooperative Fish and Wildlife Research Unit, 205 Leasure Hall, Division of Biology, Kansas State University, Manhattan, KS. cpaukert@ksu.edu.

The Kansas River fish community has been studied since 2004 to determine the ecology of native fishes and how instream and riparian habitat alteration has affected fishes. Flathead catfish had the slowest growth in the urbanized reaches, but exploitation was not high enough to warrant restrictive harvest regulations. Blue suckers and other native fishes were more abundant in the upper, less disturbed reaches. Barriers such as the Johnson County Weir near Kansas City and Bowersock Dam near Lawrence serve as reset points and alter the fish community and fish habitat. Food web analysis indicated fishes derive their energy from a variety of high and low velocity habitats in upriver reaches with braided channels, whereas energy was derived from only one source in the urbanized reaches. In 2004, 36 electrofishing stations were established from Kansas City to Manhattan and have been sampled 5 times per year. Future work will focus on how flow variability affects recruitment of Kansas River fishes, and how instream disturbances (dams, sand dredging) effects fish communities. Continued research and monitoring on this relatively undisturbed river is needed to assess future effect of habitat alteration and possibly contribute to recovery of the endangered pallid sturgeon.

Student Wildlife Contest: No

Zooplankton Community Characteristics in El Dorado Reservoir: Response to Zebra Mussel Invasion.

Andrea M. Severson* and Craig P. Paukert. Kansas Cooperative Fish and Wildlife Research Unit, Division of Biology, Kansas State University, Leasure Hall 205, Manhattan, KS. severson@ksu.edu.

We sought to determine whether zebra mussels affect the abundance and diversity of zooplankton in El Dorado Reservoir. Zooplankton were sampled from El Dorado (invaded reservoir) and Melvern (control reservoir) reservoirs during July and August pre- (2001, 2002) and post-invasion (2004, 2008, 2009). A nested analysis of variance with interactions was used to determine whether zooplankton abundance and diversity differed by reservoir and year. Similar trends in total zooplankton and microzooplankton abundance existed in both July and August across reservoirs and years ($P_s > 0.16$). Mean macrozooplankton abundance trends were similar in both reservoirs for July ($P = 0.25$), but showed a slight difference in August ($P = 0.04$). Mean Simpson's Diversity trends were similar between reservoirs across years ($P_s > 0.17$). Though these results do not indicate a strong zebra mussel effect on zooplankton abundance or diversity in El Dorado Reservoir, other factors merit consideration. Zebra mussel veliger densities were low in El Dorado throughout the study period, and additional work in years with higher veliger densities, along with consideration of environmental variation and fish population dynamics, is needed to fully understand the impacts of zebra mussels on aquatic communities.

Student Wildlife Contest: No

Cooperating to Control Hydrilla in Kansas.

Jeffrey W. Vogel*. Kansas Department of Agriculture, Topeka, KS. jeff.vogel@kda.ks.gov.

Hydrilla is a federal noxious weed and considered one of the worst invasive aquatic weeds in the United States. Currently, the Kansas Department of Agriculture (KDA) quarantines hydrilla and the Kansas

Department of Wildlife (KDWP) and Parks classifies it as an Aquatic Nuisance Species. During the summer of 2008, KDWP employees reported a wild infestation of hydrilla in an Olathe Park Pond that was later confirmed by the KDA and the United States Department of Agriculture. Realizing that hydrilla was not required to be controlled by state law and considering the risk of this population spreading, a meeting was called between the City of Olathe, KDWP, and KDA to discuss a possible management plan. Produced from the meeting was a management plan that outlined a plan to monitor and control the established population with integrated methods, and to survey for new infestations downstream. Floridone was applied to the pond at the beginning of June and monitored throughout the summer. Floridone proved to be effective on all submersed weeds with no recreational, irrigation, or drinking water restrictions except the treatment was considerably expensive. To offset the City's expense, KDA provided the funds to purchase the herbicide through the Emergency Pest Fund. In addition, no hydrilla was detected downstream in 2009 and surveys will continue three years past the last known occurrence of hydrilla.

Student Wildlife Contest: No

ArcMap Geospatial Applications for Defining Conservation Opportunity Areas as Part of the Kansas Comprehensive Wildlife Conservation Plan. Ken Brunson, Wildlife Diversity Coordinator, Kansas Department of Wildlife and Parks. kenb@wp.state.ks.us.

The Kansas comprehensive wildlife conservation plan, A Future for Kansas Wildlife (FKW), was accepted by the U.S. Fish and Wildlife Service in October, 2005. This document fulfilled federal requirements which enabled Kansas Department of Wildlife and Parks to continue to receive State Wildlife Grant annual apportionments. To date, about 9 million dollars have been applied since 2000 for projects addressing plan priorities. Besides the initial intent for revision of FKW within a 5-7 year period, additional updating is desirable related to expected climate change impacts and legislation. A key element in this revision will be the identification of Conservation Priority Areas (COAs.) COAs will help focus projects and funding towards priority habitats and species in FKW. This presentation puts forth a technique for identifying COAs through application of HUC10 geospatial scale. ArcMap software, the main component of ESRI's ArcGIS suite of geospatial processing programs, was applied in layering of priority species information and other landscape attributes and priorities. While efforts to date have focused primarily on terrestrial habitats and species, similar treatments are being conducted for aquatic habitats. Continued refinements of this process will allow more efficient use of funding and management activities towards those conservation objectives in most pressing need.

Session 2: Forestry and Riparian Areas (Room 2)

A Statewide Forest Resource Assessment and Strategy for Kansas.

Robert Daniels*, Robert Atchison, Elias Martinson, and Shawn Hutchinson. Operations Manager, GIS and Spatial Analysis Lab (GISSAL), Department of Geography, Kansas State University, 118 Seaton Hall, Manhattan, KS. danielsr@k-state.edu.

The 2008 Farm Bill required each State to complete a statewide forest resource assessment and strategy to identify, describe, and spatially define the forest landscape areas where the State's forestry programs will be emphasized. This presentation has two objectives: (1) to describe the GIS methodology for the statewide resource assessment, including the delineation of priority areas and; (2) to provide an introduction to the resource strategies for investing state, federal, and other resources to manage priority landscapes in Kansas, focusing where federal investment can most effectively stimulate or leverage desired action and engage multiple partners. The GIS analysis involved a multi-layer weighted raster analysis guided by three National Themes: Conserve working forest lands; Protect forests from harm; Enhance public benefits from trees and forests. A long-term comprehensive resource strategy or plan is currently being written based on the assessment. The strategy will identify issues across program areas, suggest how the Kansas Forest Service, partners and stakeholders will invest federal funding, how outcomes will be monitored and identify proposed activities that will accomplish themes and objectives and respond to criteria and indicators. The strategy will also explain how to incorporate existing plans like the Comprehensive Wildlife Conservation Plan into the framework.

Student Wildlife Contest: No

Identification and Assessment of Windbreaks in Seven Counties of Kansas Using Remote Sensing and GIS Techniques.

Kabita Ghimire*, Michael Dulin, Robert Atchison, Robert Daniels, and Shawn Hutchinson. Graduate Research Assistant, GIS and Spatial Analysis Lab (GISSAL), Department of Geography, Kansas State University, 118 Seaton Hall, Manhattan, KS. kabita@ksu.edu.

Windbreaks are a valuable resource in conserving soils and providing crop protection in western Kansas and other Great Plains states. Currently, Kansas does not have an up-to-date inventory of windbreak locations or an assessment of their condition. The objective of this study is to develop remote sensing and geographic information system methods that identify and assess the condition of windbreaks. Seven counties in South Western Kansas serve as a pilot study area for method development with the intent of transferring those methods to other counties/regions in Kansas and the Great Plains. A remote sensing technique known as object-based classification was used to classify windbreaks using color aerial photography acquired through the 2008 National Agricultural Imagery Program. Using this technique, approximately 1800 windbreaks, with area covering about 2695 acres (1091 hectares) were identified in the study area. A manual classification method placed windbreaks into three condition categories (good, fair, and poor) based on the mean textural and spectral values combined with ground truth information. Analysis showed the area of windbreaks in good condition to be approximately 400 hectares, with about 600 hectares of windbreaks falling in the fair and remaining 70 hectares in poor classes.

Student Wildlife Contest: Yes ? Student Scholarship: Yes

Documenting the Historical Spatial Extent and Character of Riparian Forests In Kansas Using General Land Office Survey Records.

Eric Banner, Melinda Daniels*, and Lisa Hook. Environmental Scientist, Kansas Department of Health & Environment, Watershed Planning Section, 1000 SW Jackson St., Topeka, KS. ebanner@kdheks.gov.

Understanding the historical spatial extent and nature of riparian forest resources in Kansas can help inform current riparian management practices as well as help us understand the impacts of human activity on riparian landscapes. Using the General Land Office (GLO) survey records of Kansas, we conducted a stratified random sample of 198 townships equally distributed throughout the state. Within each sampled township, all stream crossings were digitized and the surveyor's written descriptions of stream and riparian conditions were mined for quantitative measures of stream and riparian characteristics which were then entered into a geodatabase in ArcGIS. The presence/absence of riparian forests and associated characteristics of riparian forests were spatially analyzed to determine any correlations between riparian condition and geographical location (lat/long) or contributing watershed characteristics (e.g. area, surficial geology). Results confirm the expected influence of geographical location on forest extent, but reveal a complexity not usually acknowledged in the simple assumption of increasing forest extent towards the East. The potential uses of these results for comparative analysis with modern riparian forest extent are discussed.

Student Wildlife Contest: No

Spatial Extent, Timing, and Causes of Channel Incision, Black Vermillion Watershed, Northeastern Kansas.

Richard Marston*, Benjamin Meade, and Mark Gossard. Department of Geography, Kansas State University, Manhattan, KS. Rmarston@ksu.edu.

The Black Vermillion River (watershed area = 1310 square kilometers) contributes runoff and sediment into Tuttle Creek Lake, a large federal reservoir (volume = 327 million cubic meters) northeast of Manhattan, Kansas. Tuttle Creek Lake, completed in 1962, is about 40 percent full of sediment and is predicted to fill by 2023. Debate rages over the relative contribution of sediment from upland sources (largely croplands and pasture) versus channel incision. Our study determined the sediment production in the Black Vermillion River from channel incision. The spatial extent, timing, and causes of channel incision had not been investigated previously. We conducted a watershed-wide survey of channel cross-sections repeated at sites that were surveyed 45 years ago by the Soil Conservation Service. Channel depth 1963-2008 increased by a mean of 1.6 meters (maximum = 5.2 meters). Most channels are actively incising, or incising and widening. Channelization has reduced channel length by a significant portion and is a leading cause of incision. Rates of incision were also related to land cover, riparian vegetation, channel bed material, and geology (loess). Our study is part of a larger effort that will compare sediment contributions from upland and channel sources in the watershed.

Student Wildlife Contest: No

The Analytical Reference Reach Method for Natural Channel Design and Restoration.

John Shelley*. Department of Civil, Environmental, and Architectural Engineering, University of Kansas. 1401 E 24th St #C-5, Lawrence, KS. johnnyjazzman@gmail.com.

Over the past few decades, society has become more aware of the effect of stream and river modifications on the environment. As we see the effects of previous river modifications—loss in biodiversity, accelerated sedimentation in our drinking water reservoirs, and channel incision with attendant bank failures—we are prompted to reexamine our methods. Traditional river modification methods based solely on flooding considerations are no longer acceptable. New methods must include provision for channel stability and aquatic habitat. River channel designs that mimic the function and form of stable, self-formed rivers are termed natural channel designs. This oral presentation will introduce participants to the newly developed Analytical Reference Reach Method for natural channel design. Streams designed by the Analytical Reference Reach Method achieve stability by passing the incoming bankfull flow and sediment load without eroding the stream bed and include important geomorphic features such as riffles, pools, natural meanders, floodplain connectivity, appropriate sinuosity, and a natural bankfull capacity. The research to develop this method was funded by the Kansas Department of Transportation and applies specifically to the types of streams that are typical in Kansas.

Student Travel Scholarship Desired: Yes

Student Wildlife Contest: No

Conducting a GPS-Enabled Rapid Stream Assessment.

Charles Barden*, Megan Fisher, Bridgett Chapin, and Will Boyer. Kansas State University, 2021 Throckmorton-HFRR, Manhattan, KS. cbarden@ksu.edu.

Project objectives were to identify the miles of eroding streambank on the Prairie Band Potawatomi Nation lands and build the capacity of tribal governments to assess and stabilize eroding streambanks. A walking survey of streams on the reservation was conducted in May and June 2009, with crews of Haskell and KSU students working with tribal employees. The survey was adapted from the Rapid Assessment Along Stream Length (RASCAL) system developed by the Iowa Department of Natural Resources. The key piece of equipment was a Trimble Nomad GLC, which allowed the preloading of aerial photos for the area and the field collection of GPS-tagged observations and digital photographs. The methods and initial results will be presented, as will the plans for a streambank stabilization demonstration and workshop for Kansas tribes .

Student Wildlife Contest: No

Using Digital Elevation Data for Ecological Applications Involving River Valley Identification and Floodplain Mapping.

Jude Kastens*, Kevin Dobbs, Don Huggins, Steve Egbert, Brad Williams, and Jim Thorp. Kansas Biological Survey, University of Kansas, 2101 Constant Ave., Lawrence, KS. jkastens@ku.edu.

Treating the historic floodplain (river valley) as a static map object, the FLDPLN (“floodplain”) model was initially developed for river valley identification using digital raster elevation data. Adjusting a “depth to flood” (DTF) parameter similar to river stage, the floodplain can be mapped for different floodwater depths. FLDPLN uses backfill flooding to approximate backwater effects and spillover flooding to identify new floodwater routes. The model is modular and can be applied seamlessly to any stream network segmentation, using any set of user-specified, segment-specific DTF values. Model outputs have applications for river valley morphology assessment, ecological modeling, and flood disaster response mitigation and damage assessment. DTF values provide a hydrologic reconnectedness index that relates the degree of local stream flooding to nearby floodplain locations and features (e.g. oxbow lakes, meander scars, wetlands) that generally would be expected to become inundated at specific DTF levels.

This aspect has implications for stream restoration and the potential for reconnection of the river-floodplain system. DTF values have been found to correlate with particular water quality metrics and biological attributes, suggesting that a reconnectedness index may be used to help explain some characteristics of off-channel aquatic systems.

Format: Oral

Student Wildlife Contest: No

Initial Assessment of the Biological and Water Quality of Missouri River Floodplain Wetlands.

Jason A. Koontz* and Donald G. Huggins. Central Plains Center for BioAssessment, Kansas Biological Survey, 2101 Constant Ave., Lawrence, KS. afungi4u@ku.edu.

The Missouri River floodplain has dramatically changed throughout recent history. Scientists are quantifying relationships between the river and the network of active and abandoned channels, oxbow lakes, and wetlands that are vital to the natural function and structure of the river floodplain system. In 2005 we identified a series of reference wetlands using both GIS and onsite methodologies. This work led to the development of a simple rapid assessment method to assess the amount of potential disturbance to these wetlands located in the lower portion of the Missouri River (Sioux City to St. Louis). In 2008 and 2009 a probabilistic site selection approach was undertaken to examine the quality of the general population of wetlands within the same floodplain region. Four key components comprised both studies: water chemistry, floristic quality, macroinvertebrate community, and visually interpreted disturbance assessment. One objective that will be reviewed in this presentation is the development and testing of a multiple metric macroinvertebrate index that will be calibrated with known community responses to water and floral quality. The overall goal is to provide assessment tools that can be used to evaluate the health of these wetlands based on conditions associated with the least disturbed "reference" wetlands.

Student Wildlife Contest: Yes

Stream Suspended Solids as Influenced by Stream Discharge and Land Use.

Kyle Winders*, Walter Dodds, and Eric Banner. Kansas State University, Division of Biology, Ackert Hall 116, Manhattan, KS. winders@ksu.edu.

We extracted suspended solids (TSS) data from long-term datasets based on samples collected and analyzed by Kansas Department of Health and Environment (KDHE) and Missouri Department of Natural Resources (MODNR) from 1990-2009. Stream study sites included 24 sites monitored by KDHE, 18 sites monitored by MODNR, and 2 sites monitored by both state agencies for a total of 44 stream study sites. USGS-approved mean daily discharge data associated with each study stream site were downloaded from the National Water Information System Web Interface. Mean daily discharge values from the USGS gages were analyzed to create percent exceedance values for respective discharge rates for each stream. This approach allows comparison across streams with different mean discharges. A geographical information system (GIS) was used to construct catchment areas for each stream site and summarize land use attributes within each catchment area. ANOVA and regression analysis were used to evaluate the interactions of stream discharge and land use at different spatial scales on the amount of stream suspended solids.

Student Scholarship: Yes

Assessing Ecological Differences among Hydrogeomorphically Distinct Patches within the Kansas River Watershed.

Bradley S. Williams*, James H. Thorp, Joseph E. Flotemersch, and Jude H. Kastens. University of Kansas, Kansas Biological Survey, Higuchi Hall, 2101 Constant Ave., Lawrence, KS. Bradw0051@yahoo.com , BW0051@ku.edu.

Riverine landscapes are composed of a discontinuous series of hierarchically nested patches that influence biotic communities and ecosystem function at multiple spatiotemporal scales. The emergent ecological properties of a patch at any given level within the hierarchy result from the diversity of patch types in the next lower level. Therefore, variations in ecosystem function and biotic communities at the catchment scale should reflect the diversity of lower scale patches termed functional process zones (FPZs). FPZs are large hydrogeomorphically distinct patches that exist between catchment and river reach scales. The type and distribution of FPZs within river networks emerge from objective multivariate analyses that take into account the hydrogeomorphic forces that shape riverine landscapes, thereby making them the most appropriate spatial unit for catchment scale ecological assessments and developing catchment scale river management plans. We are currently using a GIS-based hydrogeomorphic classification scheme and spatial data mining techniques to examine the differences in fish species distribution, diversity, and assemblage structure among FPZs in the Kansas River Watershed. Our goal is to use this approach on to determine the ecological significance of FPZs in a large number of catchments and use this framework to develop more effective catchment scale river management plans.

Student Wildlife Contest: No

Student Scholarship: Yes

The Applied Science and Technology for Reservoir Assessment (ASTRA) Program of the Kansas Biological Survey: Addressing Research and Management Information Needs of Kansas Reservoirs.

Mark Jakubauskas*, Jerry deNoyelles, Edward Martinko, Donald Huggins, Paul Liechti, Scott Campbell, and Ryan Callihan. ASTRA Program, Kansas Biological Survey, 2101 Constant Ave., University of Kansas, Lawrence, KS. mjakub@ku.edu.

In Kansas, reservoirs are vital resources that present a particular challenge to state and local agencies charged with their management. Constructed an average of 30 years ago, thousands of reservoirs in Kansas and many other states are gradually filling with sediment washed down from their watersheds. Little is known about the current state of siltation in these reservoirs, yet many citizens depend on these reservoirs for water, recreation, flood control, and irrigation. Recognizing this critical need for information on reservoir sedimentation and conditions, the Kansas Biological Survey created the Applied Science and Technology for Reservoir Assessment (ASTRA) Program. ASTRA has acquired sophisticated acoustic echosounding technology for bathymetric mapping, sediment thickness estimation, bottom sediment type classification, fish surveys, and submerged aquatic vegetation surveys. Additionally, ASTRA has a dedicated sediment coring pontoon boat with vibracorer for taking sediment cores in reservoirs for measuring sediment thickness and sampling sediment characteristics. Major investments in field equipment have been backstopped by additional investments in water quality laboratory capabilities and high-speed data processing and 3-D visualization technology.

Student Wildlife Contest: No

Session 3: Water Conservation and Urbanization (Room 3)

Collaborating Agencies and Other Entities to Implement Conservation.

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Budget cuts, limited resources, and heavy workloads are realities that face every agency, units of government, entities and organizations. Yet the need to address the resource concerns of Kansas remains a vital issue to sustain the prosperity and health of our waters, wildlife, soil, air, plants and human existence. Cooperation is not new to the conservation of our natural resources however; time has dulled the emphasis of working together to focus on our own goals and responsibilities. We slump into a rut of working with the same people, on the same issues with the same approach. The successful outcomes of collaborating together provides the opportunity to concentrate on all of our natural resource needs by utilizing talents of all partners to accomplish conservation objectives. In addition, it allows the ability to expand outreach efforts to touch those who are not traditional customers. Small Scale Farmer workshops are one example of bringing together multiple agencies to a single location allowing producers easy access to their information. Working together we ensure the integrity of our message to the target audience, no matter who is presenting the information. Combing the limited resources of each partner we can accomplish more of our goals in a shorter amount of time. Community Gardens are growing in popularity out of necessity. This is a good illustration where collaborating conservation partners can provide needed resources and assistance to socioeconomically challenged growers. Partner cooperation demonstrates a positive message to the public by viewing multiple levels of government and organizations working together for their benefit. This is a win-win situation for Natural Resources.

Baseline Tetracycline and Tetracycline Resistance Levels in Perennial, Wadeable Streams of Kansas and Nebraska.

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Antibiotics and antibiotic resistance are emerging contaminants. Tetracyclines are common antibiotics with a well-known mode of action and multiple resistance determinants. Water column samples were collected from 22 streams in Kansas and Nebraska in conjunction with a USEPA probability-based study of perennial, wadeable streams. Tetracyclines were analyzed by enzyme-linked immunosorbent assay (ELISA), while polymerase chain reactions (PCR) were used to enumerate 16S-rRNA, *tetW*, *tetQ*, and *tetO*. *TetW*, *tetQ*, and *tetO* were highly correlated ($r^2 > 0.80$, $p < 0.001$). Observed values of genes and tetracyclines were consistent with moderately impacted areas and were generally no different among states, reference conditions, and ecoregions. However, *tetW* levels were significantly different between Kansas and Nebraska. Based on probability, approximately 20% of Kansas and Nebraska streams are predicted to have observable levels of tetracyclines, *tetW*, *tetQ*, and *tetO*. Findings suggest an ambient reservoir of tetracycline resistance genes and favorable conditions for resistance selection.

Student Wildlife Contest: No

Kansas Healthy Yards and Communities: Reducing Nonpoint Source Pollution Through Consumer Education.

Jennifer Smith* and Holly Dickman. K-State Research and Extension – Douglas County, 2110 Harper St, Lawrence KS. smithjen@ksu.edu.

Only 41 percent of Americans have any idea what the term watershed means and just 22 percent are aware that storm water runoff is the most common source of pollution of streams, rivers, and oceans (Roper survey, EPA). Kansans need education about best management practices, conservation of natural resources, waste management, integrated pest management, and identification and selection of proper plant materials for healthy people, plants, and the environment. Kansas Healthy Yards and Communities (KHYC), a new environmental initiative of Kansas State University, targets homeowners, municipalities, and the horticulture industry to reduce stormwater runoff through awareness of best management practices. KHYC uses a variety of methods to educate consumers including an interactive website, lawn and landscape assessments, and educational sessions.

Student Wildlife Contest: No

Urbanization - Construction Sites and Conservation.

Dennis J. Brinkman*. Supervisory District Conservationist, USDA, Natural Resources Conservation Service, 3231 SW Van Buren, Topeka, KS. dennis.brinkman@ks.usda.gov.

You think a bare cropland field can put a significant amount of sediment into a stream? Acre per acre, that is nothing compared to an unprotected construction site. The good news, just as in agricultural areas, there are conservation practices that are effective in managing storm water, soil erosion and sediment from construction sites. This presentation looks at the effects of urbanization on streams and other water bodies from changes in storm water runoff as well as from sediment from construction sites. Included are BMP's that could be used to address these issues.

Student Wildlife Contest: No

Seasonal Free Water in Some Eastern Kansas Soils.

Don Gastineau*. Resource Soil Scientist, Natural Resources Conservation Service, 871 S Country Club Rd, Chanute, KS. donald.gastineau@ks.usda.gov.

Excess water in soil affects nutrient movement, effectiveness of septic systems, efficiency of fertilizer use and plant growth. The depth of a saturated soil layer and the time of year in which it occurs are important. This is true because biological activity leads to things such as the loss of nitrogen fertilizer into the atmosphere and the processing of effluent from septic tanks. The population densities of organisms which contribute to these outcomes are affected by the properties of individual soil layers. A long-term study to estimate the depths of saturated soil layers during any given month for four claypan soils in Southeast Kansas began in 2005. The findings of this study will be used to improve the usefulness of soil survey reports such as Water Features, Sewage Disposal and Dwellings and Small Commercial Buildings. Piezometers and wells are installed at several depths in each soil. Sensors equipped with data loggers are being used to record the presence of free water. Precipitation at the study sites is being estimated using NOAA daily data located within 3 miles of each site. In addition, 5 of the sites are located on a 160 acre farm which has a recording rain gauge. Precipitation data is compared with soil water data to see if the two can be correlated. Preliminary findings indicate free water is present in some layer of all of these soils during some months of most years.

Student Wildlife Contest: No

Constructed Wetlands Serving as Protection to Ground and Surface Water Quality.

Dan Curtis*. USDA/NRCS RC&D Project Coordinator – Great Bend, KS. dan.curtis@ks.usda.gov.

Narrated Slide set presentation demonstrating over 100 home, small business, and communities up to 250,000 people where Constructed Wetlands functioning all over the world are cleansing water through time detention treatment and controlled release back into surface and subsurface ecosystems. Slides will accurately show nine residential and small business systems functioning in Kansas and 60 others around the United States and overseas. Will discuss wet and dry systems, functional misconceptions, and technical value of the technology. Will provide handouts that parallel technological advances in Modern Constructed Wetland design and their practical application for advanced treatment of household, animal, and manufactured wastes. Presentation will also cultivate alternatives in advanced design applications that solidify this nature based technology and clarify design and applied misconceptions.

Session 4: Water Conservation and Agriculture (Room 4)

Risk Analysis of Converting CRP Back to Cropland in Western Kansas.

Richard V. Llewelyn*, Jeffery R. Williams, Dustin L. Pendell, Alan Schlegel, and Troy Dumler. Extension Assistant, Department of Agricultural Economics, Kansas State University, 342 Waters Hall, Manhattan, KS. rvl@ksu.edu.

This study uses risk-analysis to evaluate the economics of producing a wheat-grain sorghum-fallow rotation with three different tillage strategies (conventional, reduced, and no-tillage) compared to the Conservation Reserve Program (CRP) in western Kansas. Yields, input rates, and field operations from an experimental field at Tribune, KS are used to calculate net returns for each tillage strategy and the preferred management strategies are determined for risk-neutral to risk-averse producers. The alternatives are compared using average crop prices for 2007-2008, a period of relatively high prices, as well as average prices for 2006-2008, representing historically lower crop prices. Although net returns using reduced tillage and no-tillage strategies with the higher 2007-2008 prices are larger than typical CRP payments, risk analysis indicates CRP would be the preferred strategy for more risk-averse managers. When the lower average prices for 2006-2008 are used, CRP payments are higher than returns from crop production and would be preferred by risk-neutral or risk-averse managers. Based on this analysis, only those individuals who are risk-neutral or just slightly risk-averse would prefer crop production to continued CRP enrollment, and this only if commodity prices reach and remain at the historically high levels of late 2007 and early 2008.

Student Wildlife Contest: No

Selling Conservation of Playas in Western Kansas.

Harold Klaege* and Art Gomez. Executive Director, Kansas Alliance for Wetlands and Streams (KAWS), P.O. Box 2112, Salina, KS. hklaege@kaws.org.

Playas are ephemeral, closed-basin wetlands that are important zones of recharge to the High Plains (or Ogallala) aquifer and critical habitat for birds and other wildlife in the otherwise semiarid, shortgrass prairie and agricultural landscape. Many of the Playa's in western Kansas have been protected in recent years by the Conservation Reserve Program (CRP). Approximately 1.745 million acres of CRP (west of highway 81) are scheduled to expire in years, 2009 - 2012. With the decrease in CRP acres, increased

funding from the USDA Farm Bill programs, the decrease in staff from NRCS, FSA and other wetland associated agencies, promotion of one-on-one contacts are almost nonexistent. This lack of capacity to contact landowners on wetland conservation and protection programs, KAWS has developed a partnership with NRCS and the Playa Lakes Joint Venture, promoting playa restoration and protection in the western half of Kansas. KAWS Wetland Coordinator in Scott City has been making those one-on-one contacts to gain the attention of landowners and producers in Western Kansas. The Wetland Coordinator works closely with the NRCS and FSA in the western counties of Kansas. The coordinator has made over 330 contacts with landowners in 2009.

Status of Wetland Enhancement and Restoration in Thomas County, Kansas.

Andrew Burr*. USDA Natural Resources Conservation Service – 915 E. Walnut, Colby, KS.
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The United States Department of Agriculture offers financial and technical assistance for wetland enhancement and restoration through the Wetland Reserve Program, Wildlife Habitat Incentives Program, and Conservation Reserve Program. These programs are used by agricultural producers in western Kansas to make their fields easier to farm and as a reason to avoid the trouble associated with farming through playas. Their efforts also benefit wildlife, water quality, and water quantity. This presentation will describe the opportunities available through USDA, efforts made to promote wetland improvements, and challenges and successes realized by field office staff.

Student Wildlife Contest: No

Implementation of Best Management Practices in the Little Arkansas River Watershed.

Ron Graber*, D. Devlin, P. Barnes, D. Ladd, and R. Schlender. K-State Research & Extension, 7001 W. 21st Street N., Wichita, KS. rgrab@ksu.edu.

The Little Arkansas River watershed, located in south-central Kansas, is an agricultural watershed. The most common pollutants for surface waters include fecal coliform bacteria, excess nutrients, atrazine herbicide, and total suspended solids. A watershed restoration and protection strategy was completed in November 2004 by a local stakeholders group. They determined that reducing atrazine herbicide concentrations in surface waters was their top priority for implementation. Three sub-watersheds in 2006, five in 2007 and six in 2008 were targeted for rapid implementation of atrazine herbicide best management practices (BMPs). In 2009, the program expanded to include vulnerable fields throughout the watershed. An education and demonstration program, surface water monitoring plan, and incentive program for atrazine BMP implementation were developed and delivered in the targeted watersheds. Incentive payments provided by the City of Wichita and the State Conservation Commission were based on the amount of pollutant reduction expected with practices the farmers were willing to implement. A KSU extension agronomist visited on-farm with farmers to get their commitment to implement atrazine BMPs. In four years, as a result of this program, 300 farmers implemented atrazine BMPs on more than 53,000 acres and received incentive payments totaling over \$190,000. A paired watershed study was designed to determine water quality improvements with BMP implementation. An automated surface water monitoring system was installed in the streams at the base of the watersheds targeted for BMP implementation and also at the base of adjoining watersheds. The adjoining watersheds had no special programs for BMP implementation. This allows them to serve as a check to determine water quality improvements in the targeted watersheds. Water quality monitoring of treated and untreated watersheds found significantly lower atrazine concentrations each year in streams in targeted watersheds in which best management practices had been implemented.

Student Wildlife Contest: No

Trends and Impacts of Kansas Irrigated Agriculture.

Danny H. Rogers*. Kansas State University Research and Extension, Department of Biological and Agricultural Engineering, 147 Seaton Hall, Manhattan, KS. drogers@ksu.edu.

Total irrigated acreage in Kansas remains at approximately 3 million acres, which is about 15 percent of total annual harvested cropland acres. This acreage represents over 25 percent of the total value of Kansas crop production. However, regional analysis show the impact of irrigation is much more significant and in heavily irrigated counties over 90 percent of the value of crop production may come from irrigated acres. Trends on irrigation system type, crop acreages, and water withdrawals will be presented.

Student Wildlife Contest: No

Managing Irrigation with Diminished Capacity Wells.

Alan Schlegel*. Kansas State University, Southwest Research-Extension Center-Tribune, 1474 State Highway 96, Tribune, KS. schlegel@ksu.edu.

A field study was conducted at the KSU-Southwest Research-Extension Center near Tribune, KS to evaluate preplant irrigation (0 and 3 in.), well capacities (0.1, 0.15, and 0.2 in./day capacity), and plant population (22,500, 27,500, and 32,500 plants per acre) on crop yield and water use efficiency. Corn yields were increased an average of 13 bu/a by preseason irrigation. Grain yields were 15% greater when well capacity was increased from 0.1 to 0.2 in./day. Optimum plant population varied with irrigation level. A plant population of 22,500 plants per acre was adequate with the lowest well capacity and without preseason irrigation. With a well capacity of 0.2 in./day, 32,500 plants per acre provided greater yields with or without preseason irrigation. Preseason irrigation increased available soil water at planting by about 2 in. Water use efficiency was greatest at the highest well capacity and increased with preseason irrigation. Preseason irrigation is a viable practice when in-season well capacity cannot fully meet crop needs. Plant populations should be adjusted for irrigation level, taking into account both well capacity and preseason irrigation.

Student Wildlife Contest: No

Session 5: Wildlife (Room 3)

Benthic Macroinvertebrate Response to Hydrogeomorphic Fluctuations: Sand Beds, River Complexity, and Habitat Use.

Brian O'Neill* and James H. Thorp. Kansas Biological Survey and Department of Ecology and Evolutionary Biology, Higuchi Hall, University of Kansas, 2101 Constant Ave., Lawrence, KS. boneill@ku.edu.

Thunderstorm-driven rivers of the Great Plains have flashy hydrologic cycles which have direct consequences for ecosystem structure and function. Organisms must survive flow variability, continuous bed restructuring, and channel reorganization. Past research has detailed the importance of rock substrates, woody debris, and aquatic vegetation as important invertebrate habitats. Since prairie rivers rarely have these habitats, we investigated how zoobenthos coped with hydrogeomorphic fluctuations and determined that geomorphic structures within the riverscape are important to

invertebrate dynamics. We collected over 500 zoobenthic samples over a 4-month period in summer 2007. Dominant invertebrate taxa were chironomids, ceratopogonids, and oligochaetes. Flow pulses significantly changed sandbar shape, altered substrate composition, and changed the number of channels. Invertebrate richness and community composition were tied to river channel complexity rather than hydrology. Downstream displacement of organisms was more complete in areas of high hydraulic stress (leading edge of bars), whereas areas of flow relief were more stable. Additionally, community composition of a side channel alternated between side channel and backwater assemblages when it was repeatedly cut off and reopened. Understanding roles of hydrogeomorphic fluctuations continues to be important, especially with climate models predicting increased precipitation variability in the Great Plains.

Format: Oral

Student Wildlife Contest: No

Effects of Burning and Grazing Treatments on Small Mammals in the Central Platte River Valley, Nebraska.

Justin D. Anderson*, Felipe Chavez-Ramirez, and Elmer J. Finck. Fort Hays State University, Department of Biological Sciences, 600 Park St., Hays, KS. j_anderson5@scatcat.fhsu.edu.

The Platte River Whooping Crane Maintenance Trust, Inc. (the Trust) is a non-profit organization dedicated to conserving habitat for migratory birds along the Platte River in central Nebraska. The Trust uses two alternative methods to manage their rangelands for migratory birds along the Platte River, patch burning and deferred rotation grazing systems. These management systems are being used to create and maintain structural heterogeneity and biodiversity while providing cattle access to graze a mosaic of vegetational patches, which vary in nutritional value and palatability. The objective of our study was to compare the two management systems to determine their effects on small mammals. We used transects of Sherman live traps (7.6 x 8.9 x 22.9 cm) within the treatment areas to sample the small mammal community to determine if there was a significant difference in species richness, species diversity, and relative abundance among the treatments. In 2009, trapping occurred twice during each season for spring, summer, and fall. Thus far we have recorded 347 individuals of nine species within the treatment areas. Our research will help managers better understand the effects of patch burning and deferred rotation grazing systems on small mammals.

Student Wildlife Contest: Yes

Effects of Wetland Restoration Techniques and Vegetational Attributes on Avian Communities in Small Prairie Pothole Wetlands.

Alexander L. Galt* and Elmer J. Finck. Department of Biological Sciences, Fort Hays State University, 600 Park Street, Hays, KS. algalt@scatcat.fhsu.edu.

A "hemi-marsh" is a semi-permanent wetland with an emergent vegetation to open water ratio of 50:50. Resource managers have been excavating sediment and topsoil, to promote this condition, during the wetland restoration process in the Prairie Pothole Region (PPR) for a number of years. The literature does not address the effects of excavation or the influence of vegetation on semi-permanent wetlands that are less than 1 ha, yet there are thousands of these wetlands in PPR. We conducted avian surveys and a nest success analysis on 53 small (< 0.5 ha), semi-permanent wetlands in the PPR of Minnesota to assess the influence of excavation and vegetation on avian communities. Our data showed a positive relationship between emergent vegetation and avian diversity, as well as, between emergent vegetation and avian nest success, which suggested that small, semi-permanent wetlands were functioning

differently than larger wetlands of the same type. Our data did not show a significant relationship between avian diversity and topsoil and subsoil excavations nor between nest success and topsoil and subsoil excavations. The monetary cost of managing and restoring wetlands for the hemi-marsh condition is often high; therefore, these results could have major management implications for resource managers in the PPR.

Student Wildlife Contest: Yes

Animal Communities in Fragmented Tallgrass Prairie Landscapes: Selected Vertebrate and Invertebrate Responses.

William Busby*. Kansas Biological Survey, 2101 Constant Ave., Lawrence, KS. wbusby@ku.edu.

As habitat loss and fragmentation proceeds in tallgrass prairie landscapes, wildlife is affected in diverse ways. Grassland specialist species are generally considered to be most sensitive to such habitat change, and usually respond with population declines and eventual extirpation. The manner in which different prairie taxa respond to habitat loss and degradation varies widely. The response of selected grassland bird and insect species to habitat patch size and quality was examined in remnant prairies east of the Flint Hills. While most grassland birds have minimum area requirements and do not persist in the smallest remnants, some conservative prairie insects exhibit greater tolerance to small habitat patches. Yet while prairie birds respond mostly to vegetation structure, prairie insects are more effected by plant species composition and prairie quality. The conservation implications of these varying responses to habitat size and quality by different animal taxa are discussed.

Student Wildlife Contest: No

Estimating Population Size of White Tailed Deer (*Odocoileus virginianus*) on the Konza Prairie Biological Station.

Adam C. Siders* and Samantha M. Wisely, Kansas State University Student chapter of The Wildlife Society, Putnam Hall, Manhattan, KS.

In 2004, the Kansas State University student chapter of The Wildlife Society began a long-term study to monitor white tailed deer (*Odocoileus virginianus*) on the Konza Prairie Biological Station. The data acquired through distance sampling can be used to estimate densities and to monitor population fluctuations from year-to-year. We hypothesize that because there is no hunting pressure on the white tailed deer population at the station, the population has increased since 2004. We used a line transect method of distance sampling to estimate density. The line transect method involved surveying a 19 kilometer predetermined route on the station. We recorded cluster size, radial distance from the vehicle, a compass bearing, and the UTM of the vehicle location. Program DISTANCE was used to analyze the data. DISTANCE estimated the densities as well as the probabilities of detection to determine the likelihood of seeing deer in various habitat types at particular distances from the transect. We recorded three habitat types, open, mixed, and forested and found different probabilities of detection for each. If we determine population densities have increased in the last 5 years, we believe that management of the population should be considered.

Student Wildlife Contest: Yes

Session 6: Rangeland (Room 4)

Comparative Studies of Two Small, Freshwater Wetlands in Ellis County, Kansas.

P. Allen Casey*. USDA-NRCS-Manhattan Plant Materials Center, 3800 S. 20th St., Manhattan, KS.
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Vegetation composition and the composition of surface water were studied during 2007 and 2008 at two small wetlands in Ellis County, Kansas. Surface water compositions were identified using deuterium isotope values in 2007 and 2008. Study site 1 had a floristic quality index of 28 and study site 2 had a floristic quality index of 20. The floristic quality index suggested that study site 1 was of a higher quality than study site 2 and is best explained by the larger area and the presence of a fen at study site 1. Both study sites were similar in species composition and forb frequency during May and June and during July and August, reflecting a change in the flora from cool season to warm season species. Groundwater contributed 50 to 100% of the water at study site 1 and delta deuterium ($\delta^2\text{H}$) values became higher as it flowed downstream during the 2007 season with $\delta^2\text{H}$ values that ranged from -19.8 to -48.2‰. Water $\delta^2\text{H}$ values at study site 2 during 2007 and 2008 was not enriched or depleted as it moved downstream with $\delta^2\text{H}$ values that ranged from -19.8 to -29.8‰.

Student Wildlife Contest: No

Decomposition Rates of Shrub Leaves Compared to Grass Clippings in a Tallgrass Prairie.

Alexander J. Lyon* and Dr. Brenda A. Koerner. Department of Biological Sciences, Campus Box 4050, Emporia State University, Emporia, KS. alyon@emporia.edu.

Fire suppression has led to an increase in density and cover of shrubs within the tallgrass prairie of the central United States. Morphological differences between shrubs and grasses alter the processes by which aboveground carbon (C) enters the soil. Tallgrass prairie soils have the potential to store large amounts of C. Detritivore type and abundance affect decomposition rates and thus the amount of C that enters the soil system. High decomposition rates are often indicative of labile C sources which have short residence times. We examined the decomposition rate of shrub leaves and native tallgrass clippings on the Ross Natural History Reservation, Americus, KS. Decomposition bags containing shrub and grass leaf biomass were placed in both shrub and grass patch types during November 2008 and removed at three month intervals. Samples were oven dried and ashed to determine mass loss. During the first year of decomposition, shrub microclimate significantly impacted decomposition rates. Using the Acid Detergent Fiber (ADF) method the chemical composition of both plant types were determined. Tallgrasses contained significantly greater amounts of cellulose and lignin than compared to shrubs, thus explaining the difference in decomposition rates.

Student Wildlife Contest: No

Student Scholarship: Yes?

Estimating Annual Net Primary Productivity of the Tallgrass Prairie Ecosystem of the Central Great Plains using AVHRR NDVI.

Nan An*, Kevin P. Price, and John M. Blair. Department of Agronomy, Kansas State University, Manhattan, KS. nanan@ksu.edu.

Aboveground Net Primary Productivity (ANPP) is indicative of an ecosystem's ability to capture solar energy and store it in the form of carbon. Annual and interannual ecosystem variation in ANPP is often

linked to climatic dynamics and anthropogenic influences. Measurements of ANPP are of critical importance to the proper management and understanding of climatic and anthropogenic influences on tallgrass prairie, yet detailed and systematic measurements of ANPP over large geographic regions of this system do not exist. For these reasons, this study was conducted to investigate the use of the Normalized Difference Vegetation Index (NDVI) to model ANPP for the tallgrass prairie. The goal of this study is to develop a robust model using the AVHRR biweekly NDVI values to predict tallgrass ANPP. This study was conducted using the Konza Prairie Biological Station as the primary study area with data also from the Rannells Flint Hills Prairie Preserve and other sites near Manhattan, Kansas. Efforts to validate the TAM results were frustrated by considerable variations among existing remote sensing based ANPP model estimates and *in-situ* clipplot measurements of peak season tallgrass production. These findings support the conclusion that ecosystem specific ANPP models are needed to improve global scale ANPP estimates.

Student Scholarship: Yes

Student Wildlife Contest: No

Effect of Woody Encroachment of Prairie on Denitrification in Riparian and Benthic Zones of Streams.

Alexander J. Reisinger* and Walter K. Dodds. Div. of Biology, Kansas State University – 104 Ackert Hall, Manhattan, KS. areisin1@ksu.edu.

Woody encroachment and its effects on nitrogen cycling in terrestrial ecosystems have been well-studied relative to the impacts on riparian and aquatic ecosystems. Riparian areas of headwater prairie streams were historically dominated by grasses, but have become increasingly covered by woody vegetation. To determine potential consequences of woody plant expansion on denitrification, three reaches were delineated from each of two branches of Kings Creek, which drains Konza Prairie Biological Station. The three reaches are of different vegetation types: grassy, woody, and woody vegetation removed. Potential and actual denitrification were measured seasonally along longitudinal transects perpendicular to the stream. Riparian denitrification was significantly different at the different branches ($p < 0.05$), with the removal reach exhibiting higher potential denitrification ($p = 0.001$). Distance from the stream was not significantly correlated with denitrification. For benthic denitrification, potential denitrification was measured for dominant stream substrata on four different dates. Substrata and sampling date were significant factors ($p < 0.001$), with grass roots and filamentous algae exhibiting greater rates than sediment or leaf packs. Woody plant removal can increase riparian denitrification and woody encroachment changes the dominant stream denitrification substrata from grass roots to mosses.

Student Wildlife Contest: No Student Scholarship: Yes?

Estimating Cover of Red Cedar and Modeling its Invasion Patterns in a Central Great Plains Tallgrass Ecosystem.

Kevin P. Price*, Matthew Ramspott, Derrick Voisey, Jude Kastens, and Loretta Johnson. Kansas State University, Agronomy, 2004 Throckmorton Plant Science Center, Manhattan, KS. kpprice@ksu.edu.

Red cedar (*Juniperus Virginiana*) is a native tree of the eastern Great Plains. Of the woody species within the tallgrass ecosystem, expanding populations of this tree may pose a greater threat because it thrives on both lowland and upland area, and being evergreen it can effectively compete for soil moisture and nutrients. Its increasing expansion is raising concerns of grassland resource managers because it degrades rangeland productivity and alters wildlife habitat quality. Furthermore, its invasion alters biogeochemical and biophysical processes, biodiversity, and consequently changes the ecosystem in

ways that are considered less desirable by many resource managers. The goal of this study was to develop cost effective remote sensing methods for mapping and monitoring red cedar tree cover. Methods used for estimating cover and a demonstration of changing tree distribution over a 15 year period will be presented. Using leaf-off satellite image periods is essential for accurately mapping red cedar. Our findings support the thesis that red cedar geographic distribution is expanding and the density of the trees is increasing at an alarming rate in our eastern Kansas study area.

Student Wildlife Contest: No