

Welcome to the Great Plains Bioassessment Symposium



AGENDA 10 August 2011

9:00 – 10:00

Registration *Presenters: please upload your talks!*

10:00 – 10:20

Welcome

10:20 – 10:40

Role of Bioassessments in Clean Water Act Programs. *Bruce Perkins, U.S. EPA Region 7, Kansas City, KS*

10:40 – 11:00

The Kansas Water Office. *Debra Baker, Environmental Scientist, Kansas Water Office, Topeka, Kansas*

11:00 – 11:20

Introduction to the Central Plains Center for Bioassessment. *Debra Baker, Central Plains Center for Bioassessment, Kansas Biological Survey*

11:20 – 1:00

LUNCH BREAK

1:00 – 1:20

Evaluation of relations between stream biological conditions and environmental variables in urbanizing watersheds of northeastern Kansas. *T.J. Rasmussen, B.C. Poulton, and J.L. Graham, U.S. Geological Survey, Kansas Water Science Center, Lawrence, Kansas and U.S. Geological Survey, Columbia Environmental Research Center, Columbia, Missouri*

1:20 – 1:40

A multi-tiered approach for biological assessment of urban streams. *Donald H. Wilkison, U.S. Geological Survey, Missouri Water Science Center-Kansas City Office*

1:40 – 2:00

Development of multi-metric regression models for predicting macroinvertebrate response to changes in stream quality in the Blue River, Kansas and Missouri, USA. *Poulton, B.C., Graham, J.L., and Rasmussen, T.J.; U.S. Geological Survey, Columbia Environmental Research Center, and U.S. Geological Survey, Kansas Water Science Center*

2:00 – 2:40

BREAK

2:40 – 3:00

Cyanobacterial blooms: toxins, tastes, and odors. *Jennifer L. Graham, Keith A. Loftin, Craig D. Adams, and Stephen J. Randtke; U.S. Geological Survey, Kansas Water Science Center and University of Kansas, School of Engineering*

3:00 – 3:20

Assessing variability among hydrogeomorphic riverine wetland subclasses. *Daniel Dvoretz, Joseph Bidwell, Craig Davis and Chris DuBois; Department of Natural Resource Ecology and Management, Oklahoma State University, School of Environmental and Life Sciences, University of Newcastle, Australia, and Oklahoma Conservation Commission*

3:20 – 3:40

Effects of land use on aquatic invertebrate communities in depressional wetlands of north central Oklahoma. *Micah D. Meyer and Craig A. Davis, Natural Resource Ecology and Management Department, Oklahoma State University, Stillwater, Oklahoma*

3:40 – 4:00

Macroinvertebrate Bioassessment in Temporary Wetlands: Limitations and Opportunities. *D. Christopher Rogers, Kansas Biological Survey*

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10:00 – 10:20

Integrative approach for forecasting water quality within the framework of climate and land-use change in Kansas. *Lindsey Witthaus, Val Smith, Belinda Sturm; Civil, Environmental and Architectural Engineering Department, University of Kansas*

10:20 – 10:40

Zebra mussels in the Neosho River basin, Kansas: assessing dispersal, colonization, and reproductive chronology. *Benjamin R. Smith, Skyler E. Delmott, Jason M. Goeckler, David R. Edds; Department of Biological Sciences, Emporia State University, and Kansas Department of Wildlife, Parks & Tourism*

10:40 – 11:00

New and interesting taxonomic and ecological findings in aquatic Lepidoptera (Pyrallidae). *Don Huggins, Central Plains Center for Bioassessment, Kansas Biological Survey*

11:00 – 11:20

Diversity of Chironomidae (Diptera) in Nebraska. *Barbara Hayford, Department of Life Sciences, Wayne State College, Nebraska*

11:20 – 11:40

Historical changes in the occurrence and distribution of freshwater mussels in Kansas. *RT Angelo, MS Cringan, E Hays, CA Goodrich, EJ Miller, MA VanScoyoc, and BR Simmons, Kansas Department of Health and Environment, Kansas Department of Wildlife, Parks and Tourism*

11:40 – 1:00

LUNCH

1:00 – 1:20

Relocated unionid survival, 15 years later, Wolf River, Wisconsin. *Heidi L. Dunn, Ecological Specialists, Inc. and Lisie Kitchel, Wisconsin Department of Natural Resources*

1:20 – 4:00

Standard Taxonomic Effort Working Group

An introduction to SAFIT; the Southwest Association of Freshwater Invertebrate Taxonomists. *D. Christopher Rogers, Kansas Biological Survey*

POSTERS

Habitat Preference for a Nebraskan Endemic Species of Fairy Shrimp (Crustacea: Anostraca). *William Mausbach, Wayne State College, Nebraska*

Sediment quantity in pristine prairie streams: do burning and bison have an effect? *Danelle M. Russell, Walter K. Dodds, Bartosz Grudzinski, Melinda D. Daniels, Kansas State University, Manhattan, KS 66506*

Developing macroinvertebrate community metrics for water quality assessment in wetlands: an example from the impounded wetlands bordering the Great Salt Lake, Utah. *Lawrence J. Gray, Dept. of Biology, Utah Valley University*

ABSTRACTS

Role of Bioassessments in Clean Water Act Programs. *Bruce Perkins, U.S. EPA Region 7, Kansas City, KS*
The results of bioassessment studies are used by many states during the preparation of their Clean Water Act Section 303(d) impaired waters list. Regulatory background and methodologies are used by states to address narrative water quality standards for aquatic life uses in their classified waters. These narrative standards are used by states in addition to numeric criteria to protect aquatic life. Translations of these narrative criteria are developed to assess the level of biological attainment in a specific water body or water body segment. After being listed as impaired using these biological assessments, states prepare Total Maximum Daily Load plans using stressor identification procedures, such as EPA's CADDIS or others, to address the loading of pollutants causing the impairment.

The Kansas Water Office. *Debra Baker, Environmental Scientist, Kansas Water Office, Topeka, Kansas*
Responsibility for water management in Kansas is distributed across seven state agencies and federal and local agencies also play a significant role in technical assistance and implementation of policy and programs. The Kansas Water Office (KWO) coordinates the Kansas water planning process in concert with the Kansas Water Authority. The Authority's 24 members include representatives from diverse water use interest groups and leaders of the state's natural resource agencies. Advice on policy development comes from Basin Advisory Committees in each of the state's 12 river basins and other local stakeholders. The Authority, in turn, advises the Governor and Legislature on water issues to be considered for policy enactment. This session will provide a description of the operations, structure and activities of the KWO, including development of the Kansas Water Plan. An overview of current initiatives within the three main units of the Office will be presented. More detailed descriptions of several ongoing projects will be discussed including streambank restoration projects and efforts to identify potential wetlands for restoration and protection. The emphasis of these projects is to restore proper watershed function, with priority in watersheds above federal drinking water supply reservoirs. These projects demonstrate the coordinated efforts needed to address water management issues in the state.

Introduction to the Central Plains Center for Bioassessment. *Debra Baker, Central Plains Center for Bioassessment, Kansas Biological Survey*
The Central Plains Center for Bioassessment (CPCB) is a non-regulatory and non-management aquatic research organization nested within the Kansas Biological Survey (KBS) at the University of Kansas. We work closely with state, tribal, federal, and academic scientists, and other public entities in USEPA Region 7 (Iowa, Kansas, Missouri, and Nebraska), to collaborate on and research issues of aquatic ecology and water quality. The benefits of having a Center to facilitate these regional efforts are: The presence of a non-regulatory scientific entity capable of responding to technical needs of the region; Increased exchange of information among the four states via workshops and a web site; Availability of technical assistance; Standardization of methods within and between regional agencies; Increased networking among agencies with similar goals and responsibilities; Symposia to encourage open exchange of information and ideas; and Assistance in the coordination of regional-based aquatic criteria within USEPA Region 7.

Evaluation of relations between stream biological conditions and environmental variables in urbanizing watersheds of northeastern Kansas. *T.J. Rasmussen, B.C. Poulton, and J.L. Graham, U.S. Geological Survey, Kansas Water Science Center, Lawrence, Kansas and U.S. Geological Survey, Columbia Environmental Research Center, Columbia, Missouri*
Relations between stream biological conditions and environmental variables were evaluated in urbanizing watersheds of northeastern Kansas. Macroinvertebrate and algal periphyton data were used

in conjunction with water chemistry, streambed-sediment chemistry, streamflow, habitat, and land use data. Statistical analyses indicated that the primary factor explaining biological quality was the amount of urbanization upstream in the watershed. In addition, specific conductance of stream water was strongly negatively correlated with biological stream quality. Specific conductance generally depends on the amount of groundwater contributing to streamflow in these watersheds, the amount of urbanization, and discharges from wastewater and industrial sites. Concentration of polycyclic aromatic hydrocarbons (PAHs) in streambed sediment also was negatively correlated with biological stream quality. Individual habitat variables that most commonly were positively correlated with biological indicators included stream sinuosity, buffer length, and substrate cover diversity. Riffle substrate embeddedness and sediment deposition commonly were negatively correlated with favorable metric scores. This evaluation is useful for understanding factors that affect stream quality and for monitoring and managing water-quality programs.

A multi-tiered approach for biological assessment of urban streams. *Donald H. Wilkison, U.S. Geological Survey, Missouri Water Science Center-Kansas City Office* A multi-tiered approach to assess the biological health of urban stream sites in the Blue River Basin, metropolitan Kansas City, was utilized from 1998 through 2010. The approach included health and diversity measures of aquatic macroinvertebrate and periphyton communities, land-use characterization, stream reach habitat assessments, analysis of water column and bottom sediment samples for more than 100 anthropogenic compounds, and tiered-toxicity screenings of water and bottom sediments. Stream sites in the basin, as determined by Missouri Aquatic Life Use Scores, were only partially-supportive, or non-supportive of aquatic life. Decreases in macroinvertebrate community health and diversity were associated with increased urbanization; increased anthropogenic inputs of nutrients, pharmaceuticals, and organic wastewater compounds; and decreased in-stream and riparian habitat quality. Periphyton community health—as determined by an index that included measures of species diversity, richness, and motility; nutrient, dissolved oxygen, and chloride concentrations; organic enrichment, pollution tolerance, and nuisance algae—declined in response to increased urbanization. Nutrient tolerant species were most abundant downstream of wastewater treatment plants and organic enrichment tolerant species more abundant downstream of combined sewer overflows. Toxicity screenings performed using tiered tests that included primary producers (*Pseudokirchnerella subcapitata*), consumers (*Daphnia magna*), and decomposers (*Vibrio fishceri*) indicated that although water and sediments in the basin typically were neither chronically nor acutely toxic to biota, occasionally some runoff events contained water that was toxic to decomposers. Urban areas, where multiple environmental stressors may act in concert with one another, may be especially suited for the use of multi-tiered approaches for biological assessments.

Development of multi-metric regression models for predicting macroinvertebrate response to changes in stream quality in the Blue River, Kansas and Missouri, USA. *Poulton, B.C., Graham, J.L., and Rasmussen, T.J.; U.S. Geological Survey, Columbia Environmental Research Center, and U.S. Geological Survey, Kansas Water Science Center* The Blue River watershed (725 square km) is shared by Kansas and Missouri, and drains about one third of the Kansas City metropolitan area. Land use is rural in headwaters and extensively urbanized in lower reaches. Previous biological and water quality assessments documented a longitudinal decline in stream quality corresponding with increased urbanization and nutrients. Along a 10-km reach that includes a wastewater discharge, we examined responses of 34 macroinvertebrate metrics to determine the best suite of indicators for discriminating differences in stream quality among sites, and to develop multi-metric models for predicting changes in biological condition. We utilized the multi-habitat macroinvertebrate sampling protocol developed for evaluating Kansas streams, at three replicated sites during two time periods in 2008. Multiple regressions identified several significant three-, four-, and five- metric models for spring (range in r-square = 0.92 - 0.99) and late summer (range in r-square = 0.89 - 0.99). We selected significant models that included a collection of metrics with low redundancy and those representing the maximum number of metric categories. The best model for spring (r-square = 0.92) included Kansas biotic index (KBI), EPT richness, Shannon diversity index (SDI), and scraper/filtering collector ratio (ScFcr). Similarly, the best model for late summer (r-square = 0.92) included KBI, SDI, ScFcr, and clinger richness. Other metrics frequently included in statistically significant models were macroinvertebrate biotic index, Diptera richness, percent (%) filterers, percent (%) Plecoptera, percent (%) intolerant taxa, and percent (%) Trichoptera.

Cyanobacterial blooms: toxins, tastes, and odors. *Jennifer L. Graham, Keith A. Loftin, Craig D. Adams, and Stephen J. Randtke; U.S. Geological Survey, Kansas Water Science Center and University of Kansas, School of Engineering* Cyanobacteria cause a multitude of water-quality concerns, including potential production of taste-and-odor compounds and toxins. Taste-and-odor compounds cause malodorous or unpalatable drinking water and fish,

resulting in increased treatment costs and loss of aquacultural and recreational revenue. Cyanobacteria produce a diverse group of toxins, including hepatotoxins, neurotoxins, and dermatotoxins, that have been implicated in human and animal illness and death in at least 35 U.S. States. Acute human toxicoses associated with cyanotoxins have most commonly occurred after exposure through recreational activities; however, many toxins are potent tumor promoters and chronic exposure to low levels in drinking water also may pose health risks. Because of potential human-health risks several states have recently added cyanobacteria, or the easily measured toxin microcystin, to routine beach monitoring programs and cyanotoxins currently are on the U.S. Environmental Protection Agency drinking water contaminant candidate list. Despite known human health risks, few studies have assessed the distribution, co-occurrence and concentration of cyanotoxins in the U.S or evaluated the efficacy of commonly used drinking-water treatment processes. Federal and state agencies, drinking-water treatment-facility operators, and resource managers increasingly are faced with decisions about managing cyanobacterial blooms that affect local economies and public awareness, exposure, and health; therefore, representative scientific data are needed to guide management and public health decisions about cyanotoxins and taste-and-odor compounds.

Assessing variability among hydrogeomorphic riverine wetland subclasses. *Daniel Dvoretz, Joseph Bidwell, Craig Davis and Chris DuBois; Department of Natural Resource Ecology and Management, Oklahoma State University, School of Environmental and Life Sciences, University of Newcastle, Australia, and Oklahoma Conservation Commission* The hydrogeomorphic approach (HGM) to wetland classification and functional assessment has been applied regionally throughout the United States, but the ability of HGM assessment models to accurately predict anthropogenic impairment of function has limited verification. Our objectives were to assess how well a recently developed subclassification scheme for central Oklahoma reduced natural variability and to assess potential relationships between landscape alteration and site metrics utilized in HGM assessment models. We collected data for 21 site metrics including vegetation physiognomy, water chemistry, and soil structure variables at wetlands of two HGM riverine subclasses (oxbow and riparian) in May and June, 2010. Using redundancy analysis, we determined that subclass accounted for 14.2% of the variance for the selected metrics, suggesting subclass can aid in reducing natural variability among wetlands. However, there were limited relationships between landscape disturbance metrics and assessment variables. Percent human-altered land within 100 m of the wetland was only significantly associated with soil texture in riparian sites and soil organic matter among oxbows. The high degree of natural variability from climatic and hydrologic factors within both subclasses may be masking the impact of landscape disturbance on the other measured site metrics, which suggests these factors should be used to further refine subclasses. Precipitation had significant effects on site metrics within subclasses indicating that the defined reference domain may need to be subdivided to reduce natural variability. This study provides quantitative methods for evaluating the effectiveness of HGM subclasses in reducing natural variability and calibrating assessment variables to disturbance.

Effects of land use on aquatic invertebrate communities in depressional wetlands of north central Oklahoma. *Micah D. Meyer and Craig A. Davis, Natural Resource Ecology and Management Department, Oklahoma State University, Stillwater, Oklahoma* Wetlands in Oklahoma provide services such as groundwater filtration, flood storage, and wildlife habitat. However, the ability of a wetland to provide services may be significantly impacted by landuse. In particular, wetlands imbedded in highly modified agricultural landscapes may become severely degraded such that important services may be impaired. Because invertebrates play an important role in nutrient cycling and also serve as critical food sources for waterbirds, they can be used to assess some services and wetland health. The objectives of our study were to determine the effects of landuse, and other landscape and environmental factors on aquatic invertebrate communities in depressional wetlands of north central Oklahoma. We sampled invertebrates from 60 wetlands during the spring and summer, 2009 and 2010. The wetlands were located in the alluvial terraces north of the Salt Fork of the Arkansas and Cimarron rivers in north central Oklahoma. Wetlands sampled were located in cropland, improved pasture, or native rangeland. Wetland hydroperiod ranged from temporary to semipermanent. Preliminary results suggest landuse practices affected aquatic invertebrate communities. Overall, we have identified 170 total taxa. The number of taxa identified for the different landuses during 2009 was 118 for cropland, 120 for pasture, and 123 for rangeland. Mean wetland taxa richness for the different landuses during 2009 was 29.1 for cropland, 35.1 for pasture, and 39.3 for rangeland. We will further discuss compositional differences of invertebrate taxa between the different landuses in addition to other landscape and environmental factors.

Macroinvertebrate Bioassessment in Temporary Wetlands: Limitations and Opportunities. *D. Christopher Rogers, Kansas Biological Survey* Bioassessment using macroinvertebrate community structure and composition is a powerful and important tool for gauging overall habitat health and functionality. This tool is being used with

increasing frequency in vernal pool restoration, recovery, construction, and general habitat monitoring. However, bioassessment in these temporary habitats is constrained by the limits of our understanding of the taxonomy of temporary water invertebrates. However, even with some limitations, bioassessment is a far more powerful tool than other temporary wetland assessment methods. Bioassessment is quantitative, replicable, verifiable, and is sensitive to small perturbations in the habitats being studied.

Integrative approach for forecasting water quality within the framework of climate and land-use change in Kansas. *Lindsey Witthaus, Val Smith, Belinda Sturm; Civil, Environmental and Architectural Engineering Department, University of Kansas* The intersection of anthropogenic climate change and intensified land-use in agricultural landscapes will lead to complex water quality and quantity issues in the future. An integrative approach is needed to guide policy and to help prevent diminishing water availability and quality. Our project will examine the environmental impacts of farmers' choices to grow crops as a feedstock for renewable energy production, and will contribute to a balanced perspective of the benefits and trade-offs that are inherent in the development of biofuel feedstocks. Our approach combines climate change scenarios for the Great Plains and predictions of watershed land-use changes related to farmers' choices, to determine inputs for the Soil and Water Assessment Tool (SWAT), a modeling framework that predicts the associated impacts on reservoir water quality and water levels. Analyses of environmental impacts from farmers' land-use choices are ongoing. Initial efforts include testing of the EUTROMOD modeling framework for the prediction of water quality in 30 Kansas reservoirs, and improving model predictions by incorporating empirical water quality models developed in the Midwest and Great Plains. For example, the Canfield-Bachman (1980) phosphorus loading model was used to estimate the resulting phosphorus concentration in the reservoirs, and two empirical equations for algal biomass derived from Kansas reservoir monitoring data (Dodds *et al.*, 2005) and Missouri lake and reservoir monitoring data (Jones *et al.*, 2008) were used to estimate chlorophyll *a* concentrations in each of the 30 reservoirs. Long-term water quality monitoring datasets from the Kansas Department of Health and Environment were used to evaluate model predictions.

Zebra mussels in the Neosho River basin, Kansas: assessing dispersal, colonization, and reproductive chronology. *Benjamin R. Smith, Skyler E. Delmott, Jason M. Goeckler, David R. Edds; Department of Biological Sciences, Emporia State University, and Kansas Department of Wildlife, Parks & Tourism* The zebra mussel (*Dreissena polymorpha*) is an invasive mollusk that adversely affects native species and ecosystems, as well as industries and municipalities that utilize infested waters. Zebra mussels were documented in Marion Reservoir, Kansas (Cottonwood River) in 2008 and in Council Grove City Lake, Kansas (Neosho River) in 2010. In spring 2011, we began an assessment of the dispersal and colonization dynamics of zebra mussels in reservoirs and rivers of the upper Neosho River Basin, Kansas, including the possibility that lowhead dams may facilitate their spread. Preliminary results confirm the presence of veligers and adults downstream from these two reservoirs. Our ongoing field research also examines differential colonization on various commonly-available manmade substrates, as well as the effectiveness of fluoropolymer foul-release coating intended to inhibit zebra mussel colonization. Investigation of reproductive chronology will examine seasonal variation in gametogenesis, size at maturity, and time to maturity in Marion Reservoir. Finally, we will conduct a mail survey to evaluate economic impacts of the zebra mussel invasion throughout the Neosho River Basin.

New and interesting taxonomic and ecological findings in aquatic Lepidoptera (Pyrilidae). *Don Huggins, Central Plains Center for Bioassessment, Kansas Biological Survey* A number of recent nomenclatural changes have occurred within the Lepidoptera family of Pylalidae that affect the number of genera of pyralids that are considered aquatic since their larvae and pupae develop in aquatic environments. A number of aquatic pyralid genera found in the Nearctic remain unknown or undescribed as larva (and pupa) despite the fact that these insects are often part of the invertebrate fauna of our lakes, ponds, wetlands and streams. While the Nearctic is species poor, 17 of the 21 genera with aquatic larvae currently known in the world are found in this zoogeographical region. Over the years I have collected and reared various aquatic caterpillars from the southwest and central United States that provide insights to both their taxonomy and ecology. Both the larva of *Oxyelophila callista* (Forbes) and *Usingeriessa onyxalis* (Hampson) were collected, reared and studied allow us some knowledge of these heretofore unknown larvae. In addition the collection and study of the widespread genus *Petrophila* have lead to the discovery of several new *Petrophila* species, one of which is widespread and common in the Central and Eastern U.S. Notes on the life cycle, egg laying habitats and feeding ecology of *Petrophila* larvae will also be discussed and some key species characteristics examined.

Diversity of Chironomidae (Diptera) in Nebraska. *Barbara Hayford, Department of Life Sciences, Wayne State College, Nebraska* Non-biting midges (Diptera: Chironomidae) are one of the most diverse and common macroinvertebrate taxa in freshwater ecosystems. Over 300 species of Chironomidae have been identified from the Great Plains region of which 114 species have been identified from Nebraska. I conducted a survey of Chironomidae from select regions in Nebraska with the objective to increase the known diversity of the family in the region. The three regions of Nebraska targeted in the survey are the Pine Ridge, Sandhills, and the Verdigris and Bazile Creek watersheds. Each of these regions has been recognized as biologically unique landscapes by the Nebraska Natural Legacy Project increasing the likelihood that the regions support a diverse and possibly endemic chironomid community. Survey work primarily has taken place from 2008 to the present, during all seasons, but with most sampling taking place during late winter and early spring. Ninety-nine species have been documented by the survey, to date, which represents an increase of diversity by 78% over known diversity found in peer-reviewed publication and by 17% over known diversity found in both published and unpublished sources. Species collected during winter and early spring increased known diversity of Chironomidae by 4%. The subfamily Orthoclaadiinae is predominant in the Pine Ridge streams and the streams of the Verdigris and Bazile Creek watersheds; whereas the subfamily Chironominae is predominant in Sandhills streams and lotic habitats. Rare species have been identified by occurrence and logistic regression is used to identify environmental variables that support communities dominated by rare species.

Historical changes in the occurrence and distribution of freshwater mussels in Kansas. *RT Angelo, MS Cringan, E Hays, CA Goodrich, EJ Miller, MA VanScoyoc, and BR Simmons, Kansas Department of Health and Environment, Kansas Department of Wildlife, Parks and Tourism* The surface waters of eastern and central Kansas once supported an impressive variety of native freshwater mussels, but a widespread decline in species richness accompanied the urban, industrial, and agricultural development of this region. Statewide mussel surveys performed by KDHE and KDWP during the past two decades have shed new light on the scope and severity of this decline. Of the 48 mussel species originally known from Kansas, six are now extirpated, one lacks reproductively viable populations (i.e., faces imminent extirpation), and 38 others have suffered evident range regressions or a widespread thinning of former populations. Soil erosion and stream siltation, other forms of water and sediment pollution, physical habitat degradation, stream flow attenuation, and declines in the native fishes serving as biological hosts for larval mussels all have contributed to these changes. Dams and other impediments to fish migration now hinder the reestablishment of mussel colonies following prolonged droughts and catastrophic water pollution events. Some mussel populations in this region display unique morphological, developmental, and genetic attributes, implying their continued attrition may lead to the eventual loss of distinctive forms or subspecies.

Relocated unionid survival, 15 years later, Wolf River, Wisconsin. *Heidi L. Dunn, Ecological Specialists, Inc. and Lisie Kitchel, Wisconsin Department of Natural Resources* Unionid relocation is often used to mitigate direct impacts of instream construction projects. However, unionids are seldom monitored for more than a few years. In 1995, over 23,000 unionids of 21 species were relocated from the STH 29 bypass bridge area in the Wolf River, Shawano County, Wisconsin. *Epioblasma triquetra*, *Alasmidonta marginata*, and *Tritogonia verrucosa* (Wisconsin threatened and endangered species) were placed in grids, and other species were distributed upstream in a 100m x 30m area. In 1997, 55.5% of the T&E species were recovered, mortality was only 4.2%. 34% of the recovered T&E species had moved, and growth was apparent. In 2010, 9472 unionids of 20 species were relocated from STH 22 bridge construction area, approximately 550m upstream of the STH 29 bypass bridge, and 100 to 200m upstream of the STH 29 bypass bridge unionid relocation area. Fourteen individuals of five species (*Actinonaias ligamentina*, *Elliptio dilatata*, *Ligumia recta*, *Lampsilis cardium*, and *Potamilus alatus*) were found marked at the STH 22 bridge site, indicating they had moved upstream at least 100m in the past 15 years from the STH 29 relocation site. Six live and one shell of male *E. triquetra* relocated in 1995 were recovered within T&E grids. Live *A. ligamentina*, *L. costata*, and *P. alatus* were also recovered in the STH 29 relocation area. Most of the construction areas under the STH 29 bypass bridge contained suitable unionid habitat, and unionids had recolonized. Approximately 8 unionids/m² were removed from the STH 29 bridge area in 1995, and density in 2010 was 5.0 unionids/m² (±2.8). Thus, at least some unionids have survived 15 years after relocation, some moved over 100m, and unionids recolonized construction areas.

An introduction to SAFIT; the Southwest Association of Freshwater Invertebrate Taxonomists. *D. Christopher Rogers, Kansas Biological Survey* SAFIT is an independent, nonprofit organization of professional invertebrate biologists whose mission is to promote standardized freshwater invertebrate taxonomy in support of aquatic ecosystem biotic assessments in the southwestern USA. SAFIT is also charged with promoting a better

understanding of macroinvertebrate taxonomy and systematics, and fostering scientific research, education, training and professional development of our membership. SAFIT is primarily a support organization for entities conducting aquatic bioassessment.

Habitat Preference for a Nebraskan Endemic Species of Fairy Shrimp (Crustacea: Anostraca). *William Mausbach, Wayne State College, Nebraska* Large branchiopods live in habitats ranging from ephemeral pools to permanent lakes. The Nebraska Sandhills is a large region (19,600 sq. mi) in central and western Nebraska characterized by chemically diverse lotic habitats ranging from ephemeral road side ditches and ponds to permanent lakes. The diversity of lotic environments in the Sandhills is likely to support diverse groups of large branchiopods, but despite surveys in the 1950s and 60s, little is known about large branchiopods from the Sandhills region. In an attempt to increase the known biodiversity and distributions of large branchiopods in the Nebraska Sandhills, 34 lotic sites were sampled in May 2011, from both wildlife refuges and roadside ditches in Cherry, Sheridan, and Garden counties. Eleven of the 34 sites sampled contained a single species of fairy shrimp, *Branchinecta potassa* Belk (1979). *B. potassa* is endemic in the Nebraskan Sandhills and very little information about type locality and habitat preference is known. The results of this survey extend the distribution of *B. potassa* into Garden County with the southernmost site being within the Crescent Lake National Wildlife Refuge. Elevation, latitude, longitude, total dissolved solids (TDS), pH, and salinity were measured or recorded for each site and were used to develop a model habitat to predict the presence of *B. potassa*. Preliminary results indicate that high concentrations of TDS and high percent salinity are the best predictors of whether *B. potassa* will be present at a site in the Nebraska Sandhills.

Sediment quantity in pristine prairie streams: do burning and bison have an effect? *Danelle M. Russell, Walter K. Dodds, Bartosz Grudziński, Melinda D. Daniels, Kansas State University, Manhattan, KS 66506* Total suspended solids (TSS) have direct negative effects on stream biotic integrity and are associated with heavy metals, nutrients, and pathogens. Burning and bison grazing were historically common in tallgrass prairie yet we know little about how they influence stream sediment concentrations. We analyzed two years of sediment collections in three prairie watersheds at Konza Prairie (Kansas): annually burned and no bison (Shane), 2 year interval burn and bison (N2B) and bison with a 4 year interval burn (N4D). TSS varied significantly across two of the three watersheds. N2B and Shane both had lower TSS despite N2B had bison; however, TSS was ten-fold greater in N4D and bison were more frequently observed there, telling bison impacts may be localized. Temporal trends show that TSS is correlated with discharge and perhaps from bison congregating at N4D's stream in summer when nearby streams were dry. Burning had no significant effect on observed TSS. Even the greatest TSS concentrations are roughly 1/100th of those currently found in this ecoregion, suggesting human land use and land cover effects contribute substantially more to sediment loads than the historically dominant conditions in grasslands characterized by bison activity and burning.

Developing macroinvertebrate community metrics for water quality assessment in wetlands: an example from the impounded wetlands bordering the Great Salt Lake, Utah. *Lawrence J. Gray, Dept. of Biology, Utah Valley University* The wetlands surrounding the Great Salt Lake serve as critical breeding and migration habitat for many species of waterfowl and are an important recreational and economic resource for the populace of northern Utah. Water chemistry analyses have shown that many of these wetlands are not in compliance with current water quality standards, particularly for dissolved oxygen, pH, and nutrients. Studies currently are underway to develop appropriate water quality standards that also involve biological measures, including aquatic macroinvertebrates. The current emphasis is on a class of wetlands known as the impounded wetlands, which are shallow, man-made basins, varying from several acres up to 500 acres. Water depth (ca. 1 m) is regulated to provide for waterfowl habitat, especially during the fall migration. During summer, most ponds have extensive growths of pondweed (*Stuckenia*). Except in brackish/saline ponds, the taxa of macroinvertebrates present are similar in all ponds. Like many wetlands elsewhere, the most common taxa are odonates, corixids, chironomids (mainly *Chironomus*), *Hyaella* amphipods, snails, and mayflies (*Callibaetis* and *Caenis*). Differences between ponds occur as shifts in relative abundance of common taxa in response to vegetation growth and water chemistry. Two metrics have proven to be useful in detecting this shift in composition: the proportion of "phytophilous" taxa (e.g., damselflies and mayflies) and Simpson's index. Correlations between these metrics and habitat/water chemistry variables are discussed. In addition, the precision of metric estimates relative to sampling effort is evaluated.