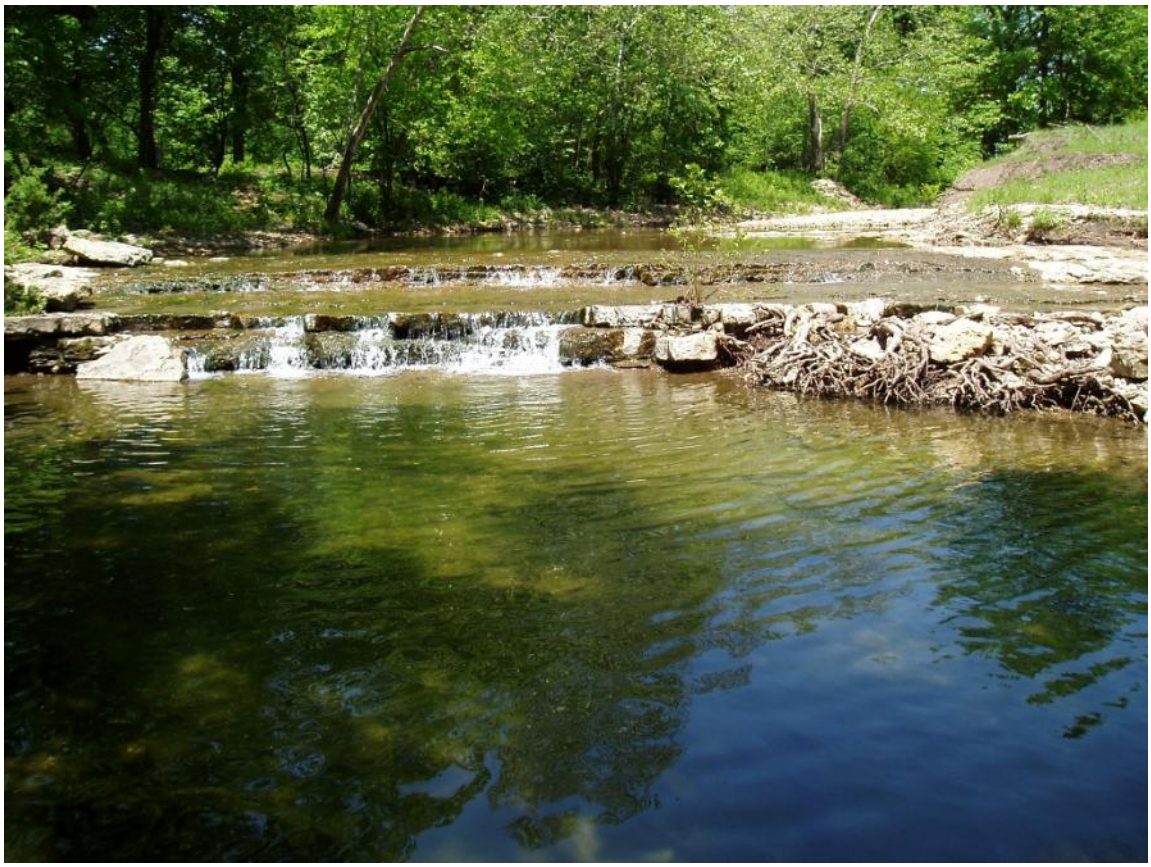
Biennial Report

1 January 2008 - 10 March 2010



Kansas Cooperative
Fish and Wildlife Research Unit

Biennial Report

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Fish and Wildlife Research Unit

1 January 2008 - 10 March 2010

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Unit Cooperators

U.S. Geological Survey
Kansas Department of Wildlife and Parks
Kansas State University
Wildlife Management Institute

TABLE OF CONTENTS

Preface

The Kansas Cooperative Fish and Wildlife Research Unit is jointly sponsored and financed by the U.S. Geological Survey-Biological Resources Division, Kansas Department of Wildlife and Parks, Kansas State University, and the Wildlife Management Institute.

In 1960, Congress gave statutory recognition to the Cooperative Research Unit program by enactment of Public Law 86-686. The act reads:

> "To facilitate cooperation between the Federal Government, colleges and universities, the States, and private organizations for cooperative unit programs of research and education relating to fish and wildlife, and for other purposes. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the purpose of developing adequate, coordinated, cooperative research and training programs for fish and wildlife resources, the Secretary of the Interior is authorized to continue to enter into cooperative agreements with colleges and universities, with game and fish departments of the several States, and with nonprofit organizations relating to cooperative research units: Provided, That Federal participation in the conduct of such cooperative unit programs shall be limited to the assignment of the Department of the Interior technical personnel by the Secretary to serve at the respective units, to supply for the use of the particular unit's operations such equipment as may be available to the Secretary for such purposes, and the payment of incidental expenses of Federal personnel and employees of cooperating agencies assigned to the units. There is authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act."

The Kansas Unit opened in October 1991 at Kansas State University in Manhattan. Dr. Timothy R. Modde was appointed as the first Unit Leader. Ms. Joyce Brite was hired as support staff. In May 1992, Dr. Modde left the Unit to take a position with the Colorado River Fisheries Project, U.S. Fish and Wildlife Service, in Vernal, Utah. Dr. Michael R. Vaughan of the Virginia Cooperative Fish and Wildlife Research Unit was assigned to the Kansas Unit as Acting Unit Leader for a six-week period.

Dr. Philip S. Gipson was selected as the Unit Leader in May 1993. In 1994, Dr. Christopher S. Guy was hired as Assistant Leader-Fisheries and Dr. Jack F. Cully, Jr. was hired as Assistant Leader-Wildlife.

Dr. Guy left in August 2002 to become Assistant Leader-Fisheries at the Montana Cooperative Fishery Research Unit in Bozeman. In November 2003, Dr. Craig P. Paukert joined the Kansas Unit as Assistant Leader-Fisheries.

In May 2008, Dr. Philip S. Gipson retired from the Kansas Unit. He accepted a position as department head at Texas Tech University in Lubbock. Dr. Craig P. Paukert was appointed as Acting Unit Leader.

The Unit Leader and the Assistant Unit Leaders are faculty members in the Division of Biology at Kansas State University. Graduate students associated with the Unit are part of the Division of Biology and graduate degrees are awarded through the Division. Unit staff and students often work on partnership projects that involve specialists from the University and other cooperating groups.

During the reporting period five new projects were initiated and six were completed. Five students finished Master's degrees, one finished a Ph.D. degree, and a posthumous Ph.D. was granted.

New Projects:

Conservation Planning For Fishes in the Upper Colorado River Basin

Development and Validation of Models to Assess the Threat to Freshwater Fishes From Environmental Change and Invasive Species

Managing the Nations Fish Habitat at Multiple Spatial Scales in a Rapidly Changing Climate

Sand Dredging Effects on Fishes and Fish Habitat in the Kansas River

Fish Assemblages and Habitat Near Bowersock Dam: Implications for Fish Passage

Completed Projects:

Effects of Anthropogenic Disturbance of Fish Community and Food Web Structure in a Great Plains River

Impacts of Road Crossings on Prairie Stream Fishes

Evaluation of Sampling Methods and Habitat Use of Missouri River Fishes

Vegetation and Small Mammal Community Response to Military Track Vehicle Disturbance at Smoky Hills Air National Guard Bombing Range, Kansas

Occupancy and Interspecies Relationships of River Otters in Eastern Kansas

Assessment of Elk Habitat Use, Population Dynamics, and Genetic Variability at Fort Riley Military Reservation, Kansas

Master's Theses Completed:

Wesley W. Bouska (M.S., 2008; Advisor: Paukert) Road crossing designs and their impact on fish assemblages and geomorphology of Great Plains streams.

Jeffrey L. Eitzmann. (M.S., 2008; Advisor: Paukert) Effects of anthropogenic disturbance on the fish assemblage and food web structure in a Great Plains river.

Kristen Pitts (M.S., 2008; Advisor: Paukert) Assessing threats to native fishes of the Lower Colorado River Basin.

Joshua Schloesser (M.S., 2008; Advisor: Paukert) Large river fish community sampling strategies and fish associations to engineered and natural river channel structures.

Mackenzie R. Shardlow (M.S., 2009; Advisor: Paukert) Factors affecting the detectability and distribution of the North American river otter.

Ph.D. Dissertations Completed:

Jonathan M. Conard (Ph.D., 2009; Advisor: Gipson) Genetic variability, demography, and habitat selection in a reintroduced elk (*Cervus elaphus*) population.

Ron E. VanNimwegen (Ph.D. (Posthumous), 2009; Advisor: Cully) Behavioral Ecology of Grasshopper Mice and Deer Mice.

KANSAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

Mission Statement

The agreement establishing the Kansas Cooperative Fish and Wildlife Research Unit in 1991 stated that the purpose was to... "provide for active cooperation in the advancement, organization, and conduct of fish and wildlife research, graduate education, in- service training, technical assistance, public relations, and demonstration programs" (Cooperative Agreement, Section II, Purpose). Unit research contributes to understanding ecological systems within the Great Plains. Unit staff, collaborators, and graduate students conduct research with both natural and altered systems, particularly those impacted by agriculture. Unit projects investigate ways to maintain a rich diversity of endemic wild animals and habitats while meeting the needs of people.

The Unit focuses on projects that involve graduate students, and the research needs of cooperators are given priority. Unit professionals function as faculty in the Division of Biology at Kansas State University. Unit professionals work with state and federal agencies, private industry, nongovernmental organizations, and interest groups to develop and conduct projects. Partnership projects are common where graduate and undergraduate students, and Unit staff work with multidisciplinary teams, often including other university faculty members and specialists from collaborating groups.

Personnel and Cooperators

Coordinating Committee Members

U.S. Geological Survey
Dr. W. James Fleming
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U.S. Fish and Wildlife Service
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Secretary Mike Hayden
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Interim Director
Division of Biology AckertHall, KSU
Manhattan, KS 66506

Cooperative Unit Staff

Craig P. Paukert, Ph.D.
Acting Unit-Leader, Fisheries and Adjunct Associate Professor, Division of Biology
Jack F. Cully, Ph.D.
Assistant Unit-Leader, Wildlife and Adjunct Associate Professor, Division of Biology
Joanna Whittier, Ph.D.
Research Assistant Professor, Division of Biology

Faculty Cooperators at Kansas State University

Division of Biology
Dr. Walter Dodds
Dr. Keith Gido
Dr. Brett Sandercock
Dr. Samantha Wisely

Department of Biological and Agricultural Engineering
Dr. Stacy Hutchinson

Department of Geography
Dr. Melinda Daniels
Dr. Shawn Hutchinson

Department of Horticulture, Forestry and Recreation Resources
Dr. Ted T. Cable

Department of Landscape Architecture
Dr. Tim Keane

Additional Universities

Iowa State University
Dr. Michael C. Quist

Michigan State University
Dr. Dana Infante

Oklahoma State University
Dr. David Engle
Dr. Ryan Limb

Pennsylvania State University
Dr. Paola Ferreri
Dr. Tyler Wagner

Purdue University
Dr. Bryan Pijanowski

Texas Tech University
Dr. Philip Gipson

University of Colorado
Sharon Collinge
Andrew Martin
Chris Ray

University of Minnesota-Duluth
Dr. Lucinda Johnson

University of Missouri
Dr. David Galat
Dr. Josh Millspaugh

University of Nebraska
Dr. Mark Pegg

University of Washington
Dr. Julian Olden
Dr. Angela Strecker

University of Wisconsin-Stevens Point
Dr. Dan Isermann

State of Kansas

Kansas Department of Wildlife and Parks

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Jason Goeckler
Joe Kramer
Ron Marteney
Mike Mitchener
Tom Mosher
Tom Mosher
Matt Peek
Jim Pitman
Keith Sexson
John Reincke
Mark Van Scoyoc

Kansas Department of Transportation
Jeff Horton
Scott Vogel

Federal Government

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Mike LeValley
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Vernon Tabor

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U.S. Fish and Wildlife Service, Missouri
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U.S. Fish and Wildlife Service, South Dakota
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U.S. Fish and Wildlife Service, Wyoming
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U.S. Geological Survey
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Dr. Doug Beard
Dean Biggins
Dr. Scott Bonar
Andrea Ostroff
Dr. Jeff Kershner
Dr. Steve Hostetler

U.S. Department of Agriculture, Agricultural Research Service
Dr. David Augustine

U.S. Bureau of Land Management, Arizona
Heidi Blasius

U.S. Bureau of Land Management, Colorado
Russ Japuntich

Centers for Disease Control and Prevention
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Dr. Ken Gage
Dr. Michael Kosoy

National Park Service
Pamela Benjamin
Kristen Hase
Brian Healy
Ron Hiebert
Robert Manasek
Kevin McMurray
Steve Meitz
Fran Pannebaker
Gary Willson
Ross Timmons
Karl Zimmerman

U.S. Army, Fort Riley
Philip Woodford

U.S. Army Corps of Engineers Research Laboratory
Alan Anderson
Heidi Howard

State Agencies

Arizona Game and Fish Department
Nicole Brown
Chris Cantrell
Joyce Francis
Sabra Schwartz
Ross Timmons
David Weedman
Kirk Young

Iowa Department of Natural Resources
Kirk Hansen
George Scholten

Michigan Department of Natural Resources
Dr. Lizhu Wang
Gary Whelan

Minnesota Department of Natural Resources
Pete Jacobson
Dr. Don Pereira

Missouri Department of Conservation
Dr. Vince Travnichek

Nebraska Game and Parks Commission
Gerald Mestl

Wyoming Game and Fish Department
Dirk Miller

Utah Division of Wildlife Resources
Brian Hobbs
Jon Sjoberg

Private Organizations and NGOs

National Wildlife Federation
Sterling Miller

The Watershed Institute
Phil Balch
Brock Emmert
Chris Mammoliti

Graduate Students Supported by Unit Projects, 2008-present

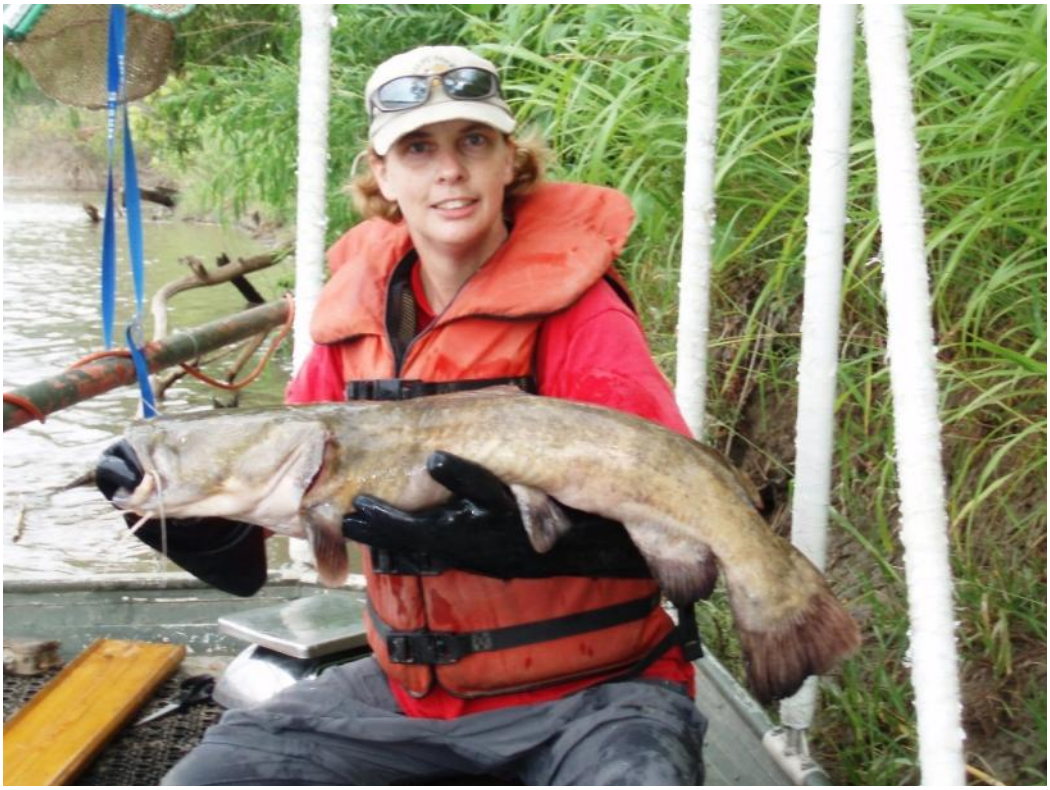
Student and Degree Sought	Thesis Project	Previous Education	Advisor
*Wes Bouska, M.S.	Impacts of road crossings on prairie stream fishes	B.S., South Dakota State University	Dr. Paukert
*Jonathan Conard, Ph.D.	Elk population dynamics in the tallgrass prairie	B.S., Southwestern College M.S., Kansas State University	Dr. Gipson
*Jeff Eitzmann, M.S.	Effects of disturbance on fishes and food web structure in a Great Plains River	B.S., Kansas State University	Dr. Paukert
Jason Fischer, M.S.	Sand Dredging Effects on Fishes and Fish Habitat in the Kansas River	B.S., Michigan State University	Dr. Paukert
Joe Gerken, Ph.D.	Recruitment of fishes in the Kansas River	B.S., Miami University (Ohio) M.S., Univ. of Central Arkansas	Dr. Paukert
Amanda Goldberg, M.S.	Demography and dispersal of black-tailed prairie dogs in four small cultural parks	B.S., University of Massachusetts	Dr. Cully
Derek Moon, M.S.	Small Mammal Populations in Prairie Ecosystems: Scale Dependant Responses to Disturbance	B.S., Kansas State University	Dr. Cully
Rachel Pigg, Ph.D.	A multiscale investigation of movement patterns to infer the metapopulation dynamics of a grassland mammal	B.S., Rhodes College (Tennessee)	Dr. Cully
*Kristen Pitts, M.S.	Assessing threats to Lower Colorado River Basin native fishes	B.S., University of Wisconsin-LaCrosse	Dr. Paukert
*Josh Schloesser, M.S.	Evaluation of sampling methods and habitat use of Missouri River fishes	B.S., University of Wisconsin-Stevens Point	Dr. Paukert
Andrea Severson, M.S.	Effects of zebra mussels on reservoir aquatic communities	B.S., Utah State University	Dr. Paukert
*Mackenzie Shardlow, M.S.	Status of river otters in eastern Kansas	B.S., University of Idaho	Dr. Paukert
*Ron VanNimwegen, Ph.D.	Movement and habitat selection of *Onychomy leucogaster* and *Peromyscus maniculatus*	B.S., Iowa State University M.S., Iowa State University	Dr. Cully

*Student received degree during reporting period

Fisheries Projects

The Kansas River near St. George, Kansas

Completed Fisheries Projects



Dr. Joanna Whittier with a flathead catfish from the Kansas River

Effects of Anthropogenic Disturbance of Fish Community and Food Web Structure in a Great Plains River

Investigators
Jeff Eitzmann, M.S.
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Objectives
Determine the fish community structure within the Kansas River and how the structure relates to anthropogenic disturbance.

Determine if trophic structure differs by anthropogenic disturbances (e.g. land use and instream habitat) or fish density within a large river.

Location
Kansas River in eastern Kansas

Completion
October 2009

Status
Completed

Progress and Results
We investigated the spatial variation in the Kansas River fish community and food web structure to determine the status of the fishes in the Kansas River and how that changes with habitat alteration. Riparian land use was dominated by agriculture in the upper river reaches and tended to increase in urban land use in the lower reaches. Instream habitat complexity also decreased with increased urban area. Species that prefer high-velocity flows and sandy substrate (blue sucker and shovelnose sturgeon) were associated with the upper river reaches. Fishes and macroinvertebrates from the less urbanized reach had higher variability in delta^{13}C than the intermediate and urbanized reaches, suggesting fish from these reaches utilized a variety of carbon sources. Seines had higher abundance and species richness and captured more unique species than other gears. Gill nets and electrofishing had the most similar catch. One threatened species, the shoal chub (n=21) and two SINC species, the blue sucker (n=171) and Johnny darter (n=18) were collected in the Kansas River through sampling the fish community in 2006 and 2007, and other opportunistic sampling through July 2009. When conducting fish community assessments, multiple gears are needed to effectively sample all species present. Conservation of fishes and habitat in the Kansas River may need to focus on protecting upriver reaches or restoring downriver reaches near the urban centers.

Products 2008-present
Eitzmann, J. L., and C. P. Paukert. In press. Urbanization in a Great Plains river: effects on fishes and food webs. River Research and Applications.

Eitzmann, J. L., and C. P. Paukert. 2010. Longitudinal differences in habitat complexity and fish assemblage structure of a Great Plains River. American Midland Naturalist 163:14-32.

Eitzmann, J. L. 2008. Effects of anthropogenic disturbance on the fish assemblage and food web structure in a Great Plains river. M.S. thesis, Kansas State University.

Paukert, C. P., and J. Eitzmann. 2008. Food web dynamics of a Great Plains river: effects of habitat alteration. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Eitzmann, J. L., and C. P. Paukert. 2008. Effects of anthropogenic changes on food web dynamics in a Great Plains river. Kansas Natural Resources Conference, Wichita, KS.

Impacts of Road Crossings on Prairie Stream Fishes

Investigators
Wes Bouska, M.S. 2008
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Department of Transportation

Cooperators
Kansas Department of Wildlife and Parks

United States Fish and Wildlife Service

Kansas Department of Transportation

The Watershed Institute, Inc.

Objectives
Quantify fish passage among different road-stream crossing designs both in the Kansas Flint Hills and in controlled experimental streams.

Determine which crossing design is best for fish passage.

Location
Flint Hills streams in Northeast Kansas

Completion
September 2009

Status
Completed

Progress and Results
A mark-recapture and geomorphological study was conducted to evaluate fish passage and stream morphology at three types of vehicle crossings in the Flint Hills streams of Northeast Kansas. We investigated five concrete box culverts, five low-water crossings (concrete slabs vented by one or multiple culverts), and two single corrugated culverts. A total of 6,433 fish were marked April to May 2007 and 709 were recaptured June to August 2007. Fish passage occurred at all crossing types, but upstream movement of recaptured fish was higher at controls (41.1%) than at crossing reaches (19.1%) for low-water crossings. A comparison of channel and road crossing dimensions showed that box culverts and corrugated culverts would be more effective than low-water crossings at transporting water, sediments, and debris during bankfull flows, and fish passage at base flows. Upstream passage of Topeka shiner, green sunfish, red shiner, and Southern redbelly dace was tested through three simulated crossing designs (box culverts, round corrugated culverts, and natural rock) across 11 different water velocities (0.1 m/s to 1.1 m/s) in an experimental stream. Upstream movement did not differ among designs, except natural rock crossings had lower movement than box or corrugated culverts for red shiners. These results suggest that crossing type affects fish passage and the morphology of the stream, although water velocity in different crossing designs alone may not be a determining factor in fish passage. Low-water crossings had the greatest impact on fish community and movement, but barriers to fish movement are likely caused by other variables (e.g. perching).

Products since 2008
Bouska, W. W., and C. P. Paukert. In press. Effects of visible implant elastomer mark color on the predation of red shiners by largemouth bass. Fisheries Management and Ecology.

Bouska, W. W., and C. P. Paukert. 2010. Road crossing designs and their impact on fish assemblages of Great Plains streams. Transactions of the American Fisheries Society 139:214-222.

Pullen, R. R., W. W, Bouska, S. Campbell, and C. P. Paukert. 2009. Intestinal helminths of *Cyprinella lutrensis* in Deep Creek, Kansas; prevalence and spatial distribution estimates for *Bothriocephalus acheilognathi* (the Asian fish tapeworm) and *Rhabdochona Canadensis*. Journal of Parasitology 95(5):1224-1226.

Bouska, W. W., C. P. Paukert, and T. Keane. 2009. Inventory and assessment of road-stream crossings for aquatic organism passage, with recommendations for culvert design. Final report, Kansas Department of Transportation, KTRANS Program, Project Number KSU 07-6, Topeka.

Bouska, W. W. 2008. Road crossings design and their impacts on fish assemblages and geomorphology of Great Plains streams. M.S. thesis, Kansas State University.

Mammoliti, K., W. Bouska, and C. Paukert. Seasonal stockpiling of prairie stream fishes below road crossings in the flinthills of Kansas. Kansas Natural Resources Conference, Wichita, KS.

Bouska, W. W. and C. P. Paukert. 2008. Effects of road crossing design on movement and species composition of Great Plains stream fishes. Kansas Natural Resources Conference, Wichita, KS

Bouska, W. W. and C. P. Paukert. 2007. Impacts of Road Crossings on Prairie Stream Fishes. Midwest Fish and Wildlife Conference, Madison, WI.

A sampling site for Topeka shiners in the Mill Creek watershed

Evaluation of Sampling Methods and Habitat Use of Missouri River Fishes

Investigators
Joshua Schloesser, M.S. 2008
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
US Geological Survey, SSP Program

Cooperators
US Army Corps of Engineers

US Fish & Wildlife Service

Missouri Department of Conservation

Nebraska Game and Parks Commission

Objectives
Determine the most appropriate gears, mesh sizes, and deployment strategy to sample 25 species of Missouri River fishes with the goal of detecting trends in abundance.

Determine if Missouri River fishes associate with specific habitats and how these change along a latitudinal gradient.

Location
Missouri River, lower 1,207 km in Missouri and Nebraska

Completion
September 2008

Status
Completed

Progress and Results
We evaluated sampling strategies and the effects of dike structure modifications in the lower Missouri River to better develop sampling and mitigation strategies to protect and enhance native river fishes. We compared probabilities of detection (*p*), variability (coefficient of variation; CV) in catch per unit effort, and lengths for 25 species over a 3 year period with multiple sampling gears. Over 80% of adult large-bodied fishes were collected in gill nets during coldwater. Trammel nets never had the highest *p* during coldwater, but had the highest or equally high *p* for 85% of adult large-bodied fishes during warmwater. Mean CV was lowest with gill nets for adult large-bodied fishes; chub spp. had the lowest CV in otter trawls. We also compared fish community composition and the probability an un-notched and notched dike structure and channel sand bar (referred to as channel structures) was occupied by various fish species. Few differences in species richness and diversity were evident among channel structures. Notching a dike structure had no effect on proportional abundance for any habitat guild. Occupancy at notched dikes increased for blue catfish and decreased for blue sucker, but did not differ for 17 (81%) other species. No distinct increase in occupancy at natural channel sand bars compared to engineered dike structures was evident. Our results suggest dike structures may provide necessary habitats for many fluvial species when compared to channel sand bars, but notching did not increase abundance or occupancy of most native Missouri River fishes.

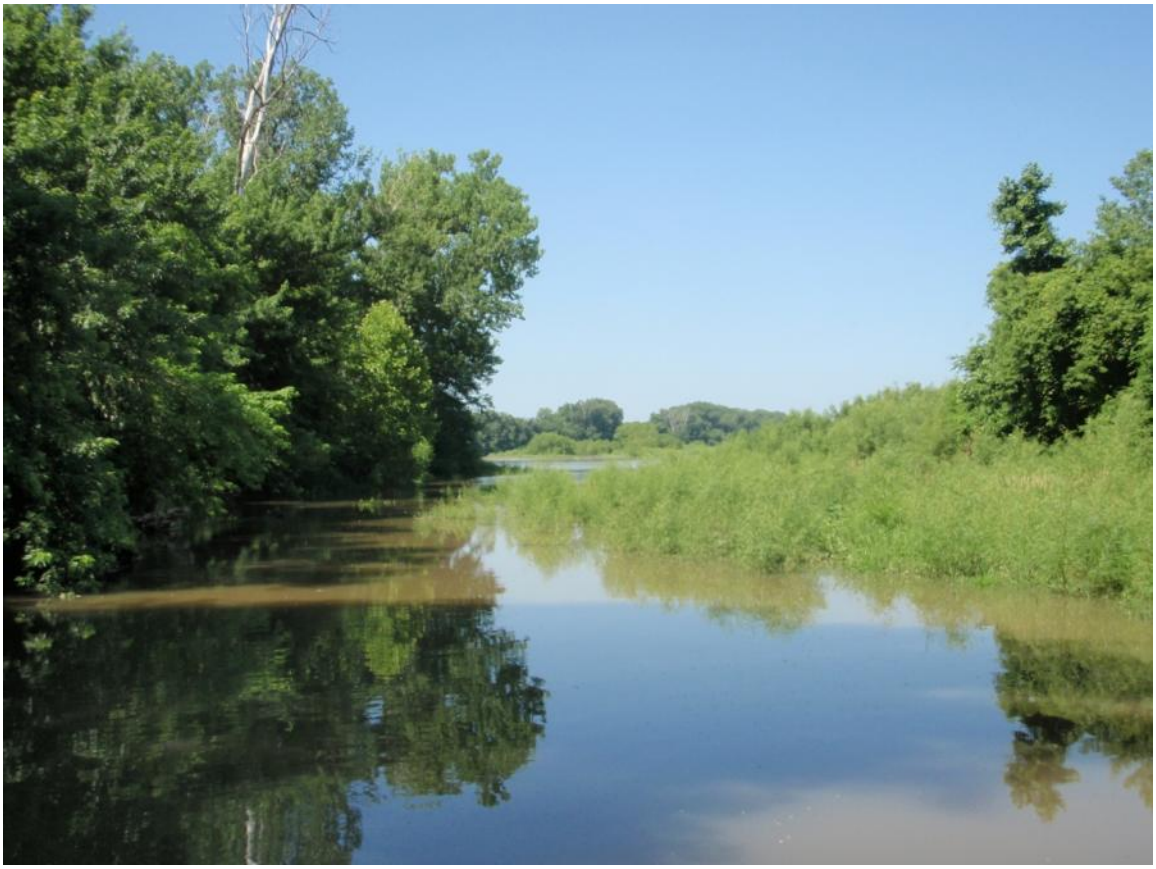
Products 2008-present
Schloesser, J. T., C. P. Paukert, W. J. Doyle, T. D. Hill, K. D. Steffensen, and V. Travnichek. In review. Heterogeneous detection probabilities for Missouri River fishes: implications for large river monitoring programs. North American Journal of Fisheries Management.

Schloesser, J. T. 2008. Large river fish community sampling strategies and fish associations to engineered and natural river channel structures. M.S. thesis, Kansas State University.

Schloesser, J. T., and C. P. Paukert. 2008. The use of occupancy modeling to aid the Missouri River pallid sturgeon monitoring program. Missouri River Natural Resources Conference, Nebraska City, NE.

Schloesser, J. T., C. Paukert, W. Doyle, T. Hill, G. Mestl, and V. Travnichek. 2008. Comparison of sampling gear detection probabilities and variability for Missouri River fishes. Kansas Natural Resources Conference, Wichita, KS.

Ongoing Fisheries Projects



A Kansas River secondary channel during flooding

Developing Conservation Priorities to Protect Fish Biodiversity in the Lower Colorado River Basin

Investigators
Kristen Pitts, M.S. 2008
Dr. Craig Paukert
Dr. Joanna Whittier
Dr. Julian Olden, Univ. of Washington
Thomas Pool, Ph.D. student, Univ. of Washington

Project Supervisors
Dr. Craig Paukert
Dr. Joanna Whittier

Funding
USGS

Cooperators
Over 12 partners from various agencies in the Southwest

Objectives
Identify landscape-level habitat metrics associated with native fish presence in the Lower Colorado River Basin (LCRB).

Develop a classification hierarchy for aquatic habitats for determining conservation areas.

Create an ecological risk index based on anthropogenic stressors; and maintain an online database on unpublished documents related to the LCRB.

Location
Lower Colorado River Basin, AZ, NM, UT, CA

Expected Completion
July 2010

Status
Data analysis is nearing completion; final report is being developed.

Progress and Results
Non-native introductions and habitat alteration have substantially changed the native fish fauna in the Lower Colorado River Basin. Identifying the areas that have the highest loss of native fish diversity (or highest increase in non-native fish diversity) can help identify areas that resource managers may focus on for conservation. Although anthropogenic activities often influence ecosystem processes and biotic communities, rarely are they integrated into conservation planning due to the difficulty in quantifying threats to biotic integrity. Over 1.5 million fish records have been collected and complied into a database. Various landscape-level habitat metrics and anthropogenic stressors have also been calculated. To date, all stressor and landscape level metrics have been summarized by catchment and upstream watershed. Stressor data are currently being related to fish metrics. The boundaries for the classification hierarchy have been completed and are under review by regional biologists. Ultimately, these data will be synthesized to allow land managers to set conservation priorities. This project is part of the national Aquatic Gap Analysis Program.

Products

Kristen Pitts, M.S. 2008. Assessing threats to native fishes in the Lower Colorado River Basin. M.S. thesis, Kansas State University.

Pool, T., J. Olden, J. Whittier, and C. Paukert. 2009. Riverscape patterns and environmental drivers of functional diversity and composition of fish communities in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM..

Whittier, J., C. Paukert, and J. Olden. 2009. Modeling local and watershed drivers of native and non-native fishes in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM.

Paukert, C. P., and J. Whittier. 2008. Effects of invasive species in freshwater fisheries. 5th World Fisheries Congress, Yokohama, Japan.

Whittier, J. B., C. P. Paukert, and J. D Olden. 2008. Spatial patterns in the distribution and conservation of imperiled fishes in the Lower Colorado River Basin. American Fisheries Society Annual Meeting, Ottawa, Canada.

Pitts, K. L., C. P. Paukert, and J. B. Whittier. 2008. Assessing anthropogenic threats to fishes in the Lower Colorado River Basin. American Fisheries Society Annual Meeting, Ottawa, Canada.

Whittier, J., C. Paukert, K. Pitts, and J. Olden. 2008. Development and classification of watershed boundaries to aid conservation efforts in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Evaluation of an ecological risk index in quantifying threats to fishes. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Whittier, J., C. Paukert, K. Pitts, and J. Olden. 2008. Spatial patterns in the distribution and conservation of imperiled fishes in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Utility of an ecological risk index to assess threats to native fishes: insights from the Verde River Basin, Arizona. First Annual Midwest Student Fisheries Colloquium, Lincoln, NE.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Utility of an ecological risk index to assess threats to native fishes: insights from the Verde River Basin, Arizona. Kansas Natural Resources Conference, Wichita, KS.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Alteration of flow regime and its influence on fish assemblages within the Lower Colorado River Basin. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Evaluation of an ecological risk index in quantifying threats to fishes. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Whittier, J. B., C. P. Paukert, K. L. Pitts, and J. Olden. 2008. Building a classification hierarchy for the Lower Colorado River Basin to provide an ecological basis for selecting conservation areas. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

The Little Colorado River, Arizona

Conservation Planning For the Upper Colorado River Basin

Investigators
Dr. Craig Paukert
Dr. Joanna Whittier
Dr. Julian Olden, Univ. of Washington

Project Supervisors
Dr. Craig Paukert
Dr. Joanna Whittier

Funding
US Geological Survey

Cooperators
Over 8 partners from state and federal agencies, NGO's and universities in the Southwest

Objectives
Identify landscape-level habitat metrics associated with native fish presence in the Upper Colorado River Basin.

Develop a classification hierarchy for aquatic habitats for determining conservation areas.

Classify landscape-level threats to aquatic biota in the UCRB.

Location
Upper Colorado River Basin, NM, UT, WY, CO

Expected Completion
September 2013

Status
Began fall 2009

Progress and Results
The Upper Colorado River Basin (UCRB) has one of the most threatened fish faunas in the United States. There are only 14 native fish species in the UCRB and most have declined in their range and abundance in the last 100 years. Identifying the areas that have the greatest declines in diversity of native fishes (or greatest non-native fish increases) can assist resource managers focus limited resources for conservation efforts. In addition, spatially-explicit models for non-native fishes can help resource managers predict areas that have a high likelihood of future colonization. Riverine ecosystems are hierarchically organized where physical habitat at smaller scales are a function of processes operating at higher levels. Defining the correct scale at which to define habitat classes and protect biodiversity is necessary so resource managers can make more informed science-based conservation decisions. This project will link to ongoing projects in the Lower Colorado River Basin (LCRB) to develop conservation priorities for 642,000 km^2 of area which is about 8% of the entire U.S. Linking the methods, data collection, analysis, and products from the Lower Colorado Aquatic Gap Analysis Project (GAP) to the Upper Colorado GAP will create a seamless integration of both the lower and upper basin to provide a uniform analysis for the entire Colorado River watershed. This project will not only provide information on the factors that influence fish distributions within the UCRB, but also provide guidance to other resource organizations and recommendations on conservation priorities within the basin. The project began in fall 2009 with initial data collection and organization. Graduate students, post doctoral research associates, and other staff will be hired in 2010 to aid in the completion of the project.

Development and Validation of Models to Assess the Threat to Freshwater Fishes From Environmental Change and Invasive Species

Investigators
Dr. Craig Paukert
Dr. Joanna Whittier
Dr. Julian Olden, Univ. of Washington
Dr. Angela Strecker (post doctoral research associate)

Project Supervisors
Dr. Craig Paukert
Dr. Joanna Whittier

Funding
USGS

Cooperators
National Fish Habitat Initiative

Desert Fish Habitat Partnership

Objectives
What are the primary threats to freshwater ecosystems in the Lower Colorado River Basin, and how do they vary across spatial scales?

Which fishes are at greatest risk to anthropogenic and biotic threats?

What is the association between fish communities and specific threats indices different spatial scales?

Location
Lower Colorado River Basin

Expected Completion
September 2011

Status
Began summer 2009. A post doctoral research associate was hired in fall 2009 and data analysis is ongoing.

Progress and Results
Freshwater ecosystems of the western US deserts are among the most threatened in North America. Our project will develop and validate a suite of threat indicators for desert fishes using the Lower Colorado River Basin (LCRB) as a model system for future regional threat assessments. The analytical framework developed will be readily applicable to other regions and Fish Habitat Partnerships. We will conduct a multi-scaled investigation of the anthropogenic and biological factors threatening desert fishes within the LCRB to identify species, functional groups, and fish assemblages at most risk to imperilment, and provide a management tool to guide conservation strategies. Our project will partition the threat scores into different facets of anthropogenic and biological threats (e.g., hydrologic alteration, land use change, water quality, invasive species) to quantify the magnitude and variability of threats from different sources, and to identify the appropriate spatial scale and watersheds in most need of immediate management actions. This project will provide an adaptive framework to conduct regional risk assessments that could be utilized by other National Fish Habitat Partnerships through initial development of the threat assessment with stakeholder involvement, and continued refinement of the risk assessment as new information is collected.

Managing the Nations Fish Habitat at Multiple Spatial Scales in a Rapidly Changing Climate

Investigators
Dr. Craig Paukert
Dr. Joanna Whittier
Dr. Jeff Kershner, USGS
Dr. Dana Infante, Michigan St. U.
Dr. Steve Hostetler, USGS
Dr. Lucinda Johnson, U. of MN-Duluth
Dr. Ty Wagner, Penn St. U.
Dr. Paola Ferreri, Penn St. U.
Dr. Lizhu Wang, Michigan DNR
Dr. Julian Olden, U. of Washington
Dr. Don Pereria, Minnesota DNR
Pete Jacobson, Minnesota DNR
Gary Whelan, Michigan DNR
Dr. Bryan Pijanowksi, Purdue U.

Project Supervisor
Dr. Craig Paukert

Funding
USGS National Wildlife Climate Change Science Center

Cooperators
National Fish Habitat Initiative

Objectives
Where are the aquatic habitats in need of conservation as climate changes and causes unanticipated changes in the environment?

What are the nationwide aquatic habitat alterations from projected climate and land-use changes?

What are the commonalities in the effects of climate and land-use changes across regions and scales?

Location
Nationwide

Expected Completion
September 2011

Status
Began fall 2009

Progress and Results
Successful conservation and management of aquatic habitat and fisheries will require forecasts of future environmental change to ecosystems as a result of changing climate. To date, climate change impacts have been predicted using Atmosphere-Ocean General Circulation Models (AOGCMs) at large spatial scales; however, management of fish and aquatic habitats mainly occurs at regional and local spatial scales. We propose to downscale the AOGCM models to identify how climate and land-use change will impact the vulnerability of fish habitat at national, regional, and local scales, and to determine the biological responses of fishes to these changes. We will use on-going work of the partnership-driven National Fish Habitat Action Plan, to incorporate global climate change models and predicted land-use change to the Nation's aquatic systems. Integration of future climate change scenarios will offer decision makers a refined understanding of future vulnerability (and uncertainties) of aquatic systems. We will also determine changes in fish habitat from the downscaled climate models at regional and local scales that represent varying climate and land-use patterns, and different aquatic systems. Further, we will model population-level effects resulting from climate change such as increased water temperature for selected species. Our research will use empirically-driven models with downscaled AOGCM models to predict aquatic habitat and biological responses to climate change at multiple scales to help resource managers understand the potential effects of various climate change scenarios on fish and habitat. We will provide resource managers with GIS-based maps at national and regional scales of how habitat will change with climate and land-use change, and information on how those changes affect fish populations.

Recruitment of Fishes in the Kansas River

Investigators
Joe Gerken, Ph.D. student
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas State University

Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Objectives
Identify the biological and environmental factors that influence recruitment in the Kansas River.

Determine if year class strength of selected fishes is related to river flows, and if year class strength is consistent throughout the Kansas River.

Make recommendations of the conditions (flows) suitable for recruitment of large river fish.

Location
Kansas River in eastern Kansas

Expected Completion
December 2012

Status
In progress

Progress and Results
Recruitment may be a bottleneck for large river fishes because anthropogenic influences can limit recruitment by destroying or modifying spawning and juvenile rearing habitat, or block fish migrations. Therefore, research to determine factors that influence recruitment of riverine fishes would aid managers in determining the critical factors that limit recruitment to possible mitigation or conservation efforts (e.g., habitat enhancements, minimum flow requirements, modifications of reservoir operations) that would help native river fishes. We collected age structures in numerous fish species to determine if age structure differs among reaches and if strong or weak year classes are consistent throughout the river. The 2005 year class was weak for river carpsucker and freshwater drum, but was only weak for the upriver reach for flathead catfish. From 1999 to 2005, year class strength was consistent (strong or weak) among the three river reaches for 4 years (57%) for river carpsucker, 2 (29%) for flathead catfish, and 1 (14%) for freshwater drum, suggesting that year class strength among river reaches differed even within a species. The lowermost reach near Kansas City, Kansas always had the most consistent recruitment (r^2=0.56-0.93, depending on species) where the uppermost, most unaltered reach near Manhattan, Kansas had the least consistent recruitment (r^2=0.20-0.44 depending on species). Field work in 2009 focused on sampling backwaters and secondary channels before, during, and after flooding to determine species composition, diets, and energy flow and recruitment patters between the main channel and backwater and how that is related to water level.

Products
Mammoliti, K., J. Gerken, and C. Paukert. 2010. Population characteristics of channel catfish in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J. E., and C. P. Paukert. 2010. Fish recruitment in the Kansas River: the role of flow, habitat, and urbanization. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J. E., and C. P. Paukert. 2009. Effects of urbanization on recruitment of Riverine fishes. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Gerken, J., and C. Paukert. 2009. Spatial variation in the recruitment patterns of three riverine fishes in the Kansas River. American Fisheries Society Annual Meeting, Nashville, TN.

Gerken, J., and C. Paukert. 2009. Spatial variation in the recruitment patterns of three riverine fishes in the Kansas River. KSU Biology Student Research Forum, Manhattan, KS.

Effects of Zebra Mussels on Reservoir Aquatic Communities

Investigators
Andrea Severson, M.S. student
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas State University

Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Objectives
Determine if zooplankton abundance differed before and after zebra mussel establishment, and if these trends were similar to reservoirs without zebra mussels.

Determine if age-0 largemouth bass growth differed before and after zebra mussel establishment, and if these trends were similar to reservoirs without zebra mussels.

Location
El Dorado and Melvern, reservoirs in eastern Kansas

Expected Completion
May 2010

Status
In progress

Progress and Results
Zebra mussels have been shown to impact fishes throughout the northern United States. Zebra mussel presence was confirmed in El Dorado Reservoir, Kansas, in 2003. We analyzed mean catch per unit effort (CPUE; number of fish per gill or trap net night) and mean relative weight (*Wr*) for several common reservoir fishes from 1993 to 2008 using standardized fish sampling conducted by Kansas Department of Wildlife and Parks. A before-after control-impact experimental design was used to compare bluegill, gizzard shad, walleye, white bass, and white crappie CPUE and *Wr* for El Dorado Reservoir (impact system) and Milford Reservoir (control system) in the pre-invasion and post-invasion periods. Abundance and condition of fishes before and after zebra mussel invasion were highly variable among years and reservoirs. Zooplankton were sampled from El Dorado and Melvern (control reservoir) reservoirs during July and August pre- (2001, 2002) and post-invasion (2008, 2009). Similar trends in microzooplankton abundance existed in both July and August across reservoirs and years. Simpson's Diversity trends were similar between reservoirs. Although these results do not indicate a strong zebra mussel effect on zooplankton abundance or diversity in El Dorado Reservoir, veliger densities were low in El Dorado in 2008 and 2009, and additional work in years with higher veliger densities may be needed to fully understand the impacts of zebra mussels on aquatic communities.

Products 2008-present
Paukert, C. and A. Severson. 2010. Zooplankton community characteristics in El Dorado Reservoir: response to zebra mussel invasion. Kansas Natural Resources Conference, Wichita, KS.

Paukert, C. P., and A. M. Severson. 2009. Using long-term data to determine the effects of zebra mussels on reservoir sport fishes. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Severson, A. and C. Paukert. 2009. Zebra mussel invasion and zooplankton in a Great Plains Reservoir: Cause for concern? American Water Resources Association Annual Water Resources Conference, Seattle, WA.

Severson, A., and C. Paukert. 2009. Does zebra mussel presence affect abundance and condition of reservoir fishes in a Kansas reservoir? American Fisheries Society Annual Meeting, Nashville, TN. finalist, best student poster

Severson, A., and C. Paukert. 2009. Effects of zebra mussel invasion on fish abundance and condition in a Kansas reservoir. KSU Biology Student Research Forum, Manhattan, KS.

Severson, A., and C. P. Paukert. 2009. Impacts of zebra mussels on fishes in El Dorado Reservoir. Kansas Natural Resources Conference, Wichita, KS.

Long-Term Monitoring of Kansas River Fishes

Investigators
Andy Makinster, M.S. 2006
Jeff Eitzmann, M.S. 2008
Joe Gerken, Ph.D. student
Jason Fischer, M.S. student
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Cooperative Fish and Wildlife Research Unit

Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Objectives
Develop long-term monitoring program for fishes in the Kansas River.

Location
Kansas River in eastern Kansas

Completion
Ongoing

Status
Ongoing

Progress and Results
Developing long-term monitoring of fish and wildlife populations is essential to determine future effects of disturbance, climate change, or other effects that may impact biodiversity. We began a long term monitoring program of fishes in the Kansas River beginning March 2005. Since March 2005, we have electrofished 36 stations 5 times per year within 6 reaches of the Kansas River. These six reaches consist of sample sites near Kansas City, Lawrence below Bowersock Dam, Lawrence above Bowersock Dam, Topeka, Wamego, and Manhattan, Kansas. All species of fish are weighed and measured at each site, and individually numbered t-bar tags are attached to selected species (blue suckers, shovelnose sturgeon, flathead catfish, channel catfish, and other large bodied fishes). To date over 3,398 fish have been collected in this program. Data from this program have been used by the US Fish and Wildlife Service, Kansas Department of Wildlife and Parks, and in several research projects at Kansas State University.

Products since 2008

White, K., J. Gerken, C. Paukert, and A. Makinster. In press. Fish community structure in natural and engineered habitats in the Kansas River. River Research and Applications.

Paukert, C. Fish and fish habitat in the Kansas River: what have we learned? Kansas Natural Resources Conference, Wichita, KS.

White, K., J. Gerken, C. Paukert, and A. Makinster. Fish community structure in natural and engineered habitats in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J. E., and C. P. Paukert. 2009. Impacts of a low-head dam on fish communities in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J. E., and C. P. Paukert. 2009. Impacts of a low-head dam on a Great Plains River Fish Community. American Fisheries Society Midwest Student Colloquium, Annual Meeting, Ames, IA.

Gerken, J., and C. Paukert. 2008. Fish community changes associated with a low-head dam in a large Great Plains river. Midwest Fish and Wildlife Conference, Columbus, OH.

Gerken, J., and C. Paukert. 2008. Effects of a low-head dam on the fish community of a large Great Plains River. American Fisheries Society Annual Meeting, Ottawa, Canada.

Gerken, J., and C. P. Paukert. 2008. Effects of a low-head dam on the fish community of a large Great Plains river. Southwestern Association of Naturalists, Memphis, TN.

Sand Dredging Effects on Fishes and Fish Habitat in the Kansas River

Investigators
Jason Fischer, M.S. student
Dr. Melinda Daniels
Dr. Craig Paukert

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Kansas State University, Department of Geography

Objectives
Identify if Species in Greatest Conservation Need are located at sand dredge reaches in the Kansas River.

Determine if fish communities differ at dredge and reference reaches in the Kansas River.

Identify if habitat is altered in sand dredge reaches compared to reference reaches.

Measure the extent, if any, of fragmentation of habitat of sand dredging in the Kansas River.

Location
Kansas River in eastern Kansas

Completion
December 2011

Status
Began January 2010

Progress and Results
Sand and gravel are essential materials for construction, and high-quality material is often found in rivers and streams. However, instream dredging may have adverse physical effects by altering the instream habitat and fragmenting the natural river. These alterations include head cutting, streambed degradation, and channel widening. Not only can dredging alter physical habitat needed by native fishes, but can create a behavioral barrier for migrating fish by creation of deepwater, low velocity areas may inhibit upstream migrations of native fishes. In the Kansas River, sand dredging has resulted in bank erosion, riverbed degradation, and channel widening. Currently the US Army Corps has issued nine dredging permits through 2012 from near Topeka to Kansas City. In addition, dredging on the Missouri River from Rulo, NE to St Louis will not continue after 2009 unless an Environmental Impact Statement is developed. The scientific evidence on the ecological effects of instream mining are limited (Meador and Layer 1998), and therefore agencies evaluating these effects have little information on which to base their decisions. Of the 21 Tier I and II fish species in the Aquatic Eastern Large Rivers priority area, 19 have been historically collected in the Kansas River and six (32%) have been collected in reaches below Lawrence by KSU since 2006. At least three species in greatest conservation need have been located from limited sampling near dredging operations and additional sampling (more sites and seasons with additional sampling gears) may collect other Tier I and II species in these reaches. Our study will help identify the habitat needs for Tier 1 and II species that are collected in the Kansas River at reference reaches and sites altered by dredging. This information can be used to assure the key large river habitats are preserved and more complete data on the population status and distribution of Tier I sand II species are more complete.

Products since 2008
Paukert, C. P., J. Schloesser, J. Eitzmann, J. Fischer, K. Pitts, and D. Thornbrugh. 2008. Effect of instream sand dredging on fish communities in the Kansas River USA: current and historical perspectives. Journal of Freshwater Ecology 23:623-633.

Fish Assemblages and Habitat Near Bowersock Dam: Implications for Fish Passage

Investigators
Dr. Melinda Daniels
Dr. Craig Paukert
Dr. Keith Gido
Joe Gerken, PhD student
Josh Perkin, PhD student

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Kansas State University, Department of Geography

Objectives
Determine the seasonal distribution, abundance, and habitat use of the Species of Greatest Conservation Need near Bowersock Dam on the Kansas River.

Evaluate physical and hydrologic factors that affect distribution of fish above and below Bowersock Dam.

Location
Kansas River in eastern Kansas

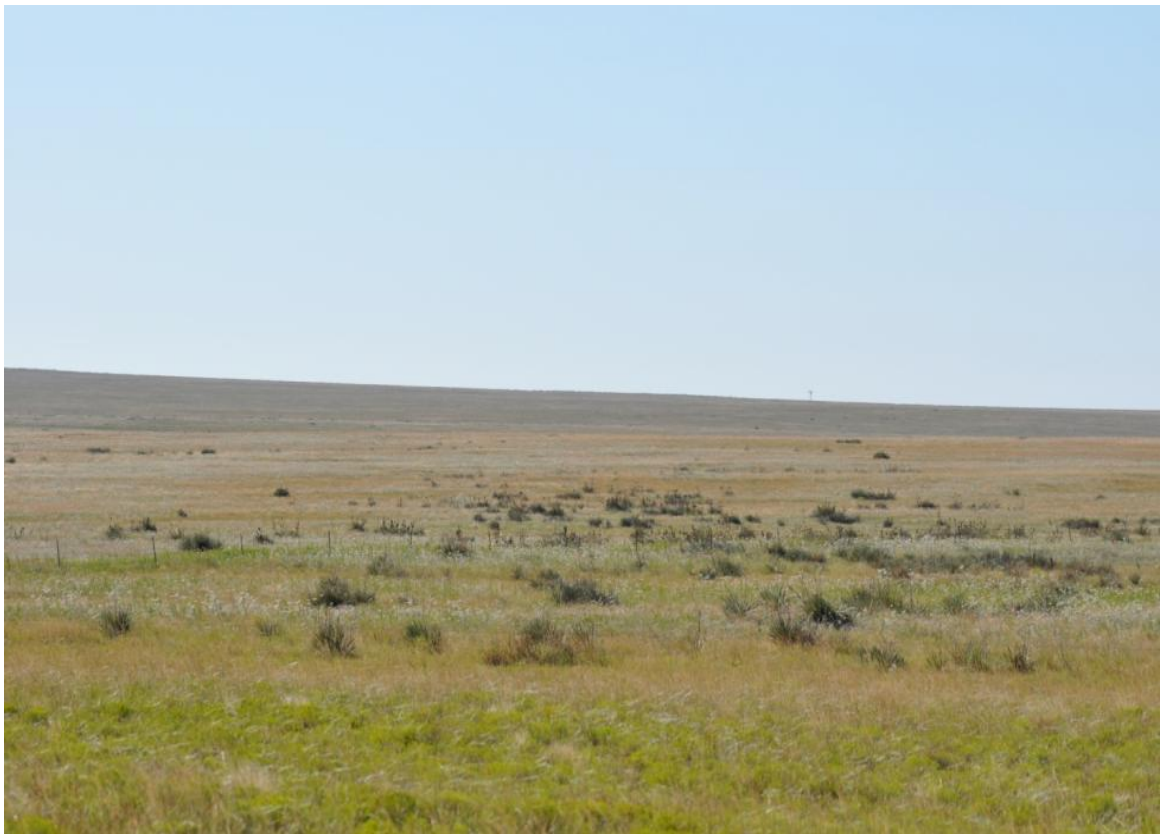
Completion
December 2011

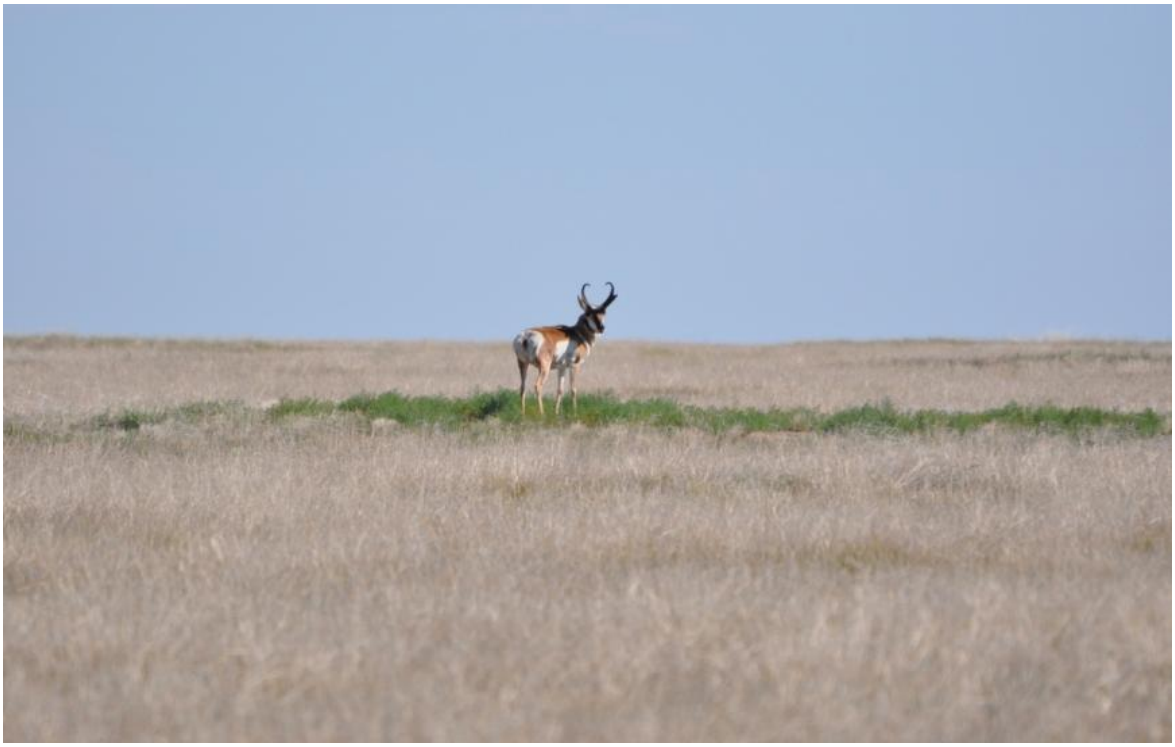
Status
Began January 2010

Progress and Results
Fish declines are linked to the altered habitat and hydrology created by dams, introduction or establishment of non-native fishes in reservoirs and tailwaters below dams, and the blockage of migratory routes to spawning habitats or other areas large river fishes need to complete their life cycle. Bowersock Dam at river km 83 on the Kansas River is the only dam on the mainstem Kansas River, and has blocked aquatic organism passage for many native fish (e.g., shovelnose sturgeon, blue sucker) in the Kansas River. In addition, historical records indicate the federally-endangered pallid sturgeon were located below Bowersock Dam. The invasive Asian carp (Bighead carp and silver carp) have been reported in the Lower Kansas River and its tributaries, and bighead carp have been collected by KSU researchers within 5 km below Bowersock Dam since 2004. Therefore, identifying the seasonal distribution of both native and invasive species below Bowersock Dam will aid in considerations to mitigate fish passage at the dam (e.g., fish ladder). Our study will help identify the impacts of instream obstructions (Bowersock Dam) on the habitat needs for Tier 1 and II species in the Kansas River. This information can be used to assure that key large river habitats are preserved and more complete data on the population status and distribution of rare Tier I sand II species (that have been collected below Bowersock Dam) are more complete.

Wildlife Projects

Completed Wildlife Projects





Landscape genetics of deer and the potential spread of CWD in Kansas: A pilot study to examine deer density and hunting pressure as factors.

Investigators
Dr. Samantha Wisely

Project Supervisor
Dr. Samantha Wisely

Funding
US Geological Survey

Cooperators
Lloyd Fox
Dr. Jack Cully

Objectives
Identify risk factors for the spread of CWD. Document the roles of population density and hunting pressure on genetic population structure.

Location Kansas

Completion
September 30, 2008

Status: Completed

Progress and Results
Chronic wasting disease (CWD) is a prion caused wasting disease of cervids that is expanding its range in the U.S. There is an established focus in Colorado, Wyoming, and Nebraska, and in 2005 the first, and so far only, case was documented in northwestern Kansas. There is no documented disease risk to humans, but because of the potential of another prion disease, bovine spongiform encephalopathy (mad cow disease) to cause new variant Creutzfeldt-Jakob disease in humans, there is uncertainty of the safety of venison from infected deer. CWD also has the potential to reduce the value of the high quality trophy deer herd in Kansas, which could have negative impacts on an important tourist recreational activity.
We identified two factors that may be correlated with transmission risk, density of groups (motivated by evidence that density of prairie dog colonies rather than density of prairie dogs per se is important for the transmission dynamics of plague), and hunting pressure, which cause deer to aggregate in large numbers in refugia where they are protected from hunting. Because disease transmission is often density dependent, the increased density in refugia may increase transmission rates. This is a pilot study to identify indices of genetic connectivity of white-tailed deer at nine study sites that vary in deer group density and hunting pressure. The study is in progress.

Products: Completion Report

Statham, M., S.M. Wisely, A. Mattox, L. Fox, J. Cully. 2008. Landscape Genetics of Genetic Susceptibility of White-Tailed Deer to Chronic Wasting Disease: Implications for CWD Emergence Across Kansas. International Conference on Emerging Infectious Diseases..

Biogeography and Molecular Epidemiology of the PRNP Gene in Kansas

Investigators
Dr. Samantha Wisely

Project Supervisor
Dr. Jack Cully

Funding
USGS

Cooperators
Lloyd Fox

Objectives
Identify risk factors for the spread of CWD.

Identify the spatial extent and frequency of the PRNP gene in Kansas White-tailed deer.

Location Kansas

Completion
September 2008

Status: Completed

Progress and Results
This is an add-on to the CWD study above, and is in progress. The cervid PRNP gene has been identified as a genetic marker for increased risk of infection by CWD. This study will use the same samples to quantify the prevalence and spatial distribution of the PRNP gene in white-tailed deer in Kansas prior to CWD becoming established in the state. My role will be to incorporate the results of genetic analyses into the GIS.

Products: Completion Report.

Wisely, S., M. Statham, A. Mattox, L. Fox, and J. Cully. 2008. Prevalence and biogeography of genetic susceptibility to Chronic Wasting Disease in white-tailed deer from Kansas. The Wildlife Society.

Vegetation and Small Mammal Community Response to Military Track Vehicle Disturbance at Smoky Hills Air National Guard Bombing Range, Kansas

Investigators
Dr. Philip S. Gipson
Dr. David Engle (Oklahoma State)
Mr. Ryan Limb (Ph.D. Student, Oklahoma State)

Project Supervisors
Dr. Philip S. Gipson
Dr. David Engle

Collaborators
Galen Wiens, Smoky Hill Air National Guard Natural Resources Department

Funding
U.S. Army Corps of Engineers, Construction Engineering Research Lab (CERL)

Objectives
Does grazing by livestock have a positive, negative, or neutral effect on the capacity of land to sustain military training?

Does haying have a positive, negative, or neutral effect on the capacity of the land to sustain military training? If the effect is not neutral, what is the size of the difference?

Location
Smoky Hills Air National Guard Range, Kansas

Completion
December 2008

Status
Completed

Progress and Results
Historic natural disturbance regimes in grasslands are now largely replaced by anthropogenic activities, many of which at least partially mimic natural disturbance to plants and soil. However, it is unclear how plant communities respond when multiple disturbances are combined. Therefore, we used tracked vehicles as focal soil disturbance agents in a mesic mixed prairie to assess the relative influence of intense, focal soil disturbance on plant species composition and bareground within a matrix of either undisturbed prairie or prairie disturbed by grazing or hay harvest. Plant communities were resistant to both defoliation disturbances, but were less resistant to focal soil disturbance. Grazed and hayed communities followed similar successional trajectories following focal disturbance and recovered within two growing seasons. Plant species richness and bareground increased ($P < 0.05$) following focal soil disturbance in both grazed and hayed communities, but the combination of focal soil disturbance and extensive defoliation disturbance did not have a greater effect ($P > 0.05$) than focal soil disturbance alone. Also, the effect was short lived with recovery after two growing seasons. Small mammal communities responded differently to disturbances by grazing and tracked-vehicles but not substantially different until 1 year post treatments. It appears cattle grazing by itself or in combination with another disturbance is likely to reduce or limit small mammal community species richness and numbers of individual animals. Our results suggest that anthropogenic disturbances can serve as proxies for natural disturbance.

Products since 2008
Limb, R. 2008. The effects of disturbance on grassland plant communities. Ph.D. Dissertation, Oklahoma State University.

Althoff, K. Blecha, P. Gipson, R. Limb, T. Bidwell, and D. Engle. 2009. Changes in vegetation, small mammal communities, and soil compaction associated with military training at the Smokey Hill Air National Guard Range, Kansas. Final Report to US Army Corps of Engineers, ERDC-CERL.

Occupancy and Interspecies Relationships of River Otters in Eastern Kansas

Investigators
Dr. Craig Paukert
Dr. Philip Gipson
Kevin Blecha
Mackenzie Shardlow, M.S.

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Department of Wildlife and Parks

Cooperators
Kansas Department of Wildlife and Parks

Objectives
Estimate occupancy and detection probabilities of river otters in the eastern third of Kansas.

Compare fur-harvester questionnaires regarding river otter occurrence with estimates achieved through sign surveys.

Examine factors influencing occupancy of river otter at multiple spatial scales.

Location
Eastern Kansas

Completion
October 2009

Status
Completed

Progress and Results
We conducted sign surveys for river otters from January to April 2008 and 2009 in eastern Kansas to assess how local- and landscape-scale habitat affects river otter occupancy and how survey methods and habitat affect the detectability of river otter sign. Multiple observers surveyed 3-9 400-m stretches of stream and reservoir shorelines for 110 randomly-selected sites and measured local-scale (within a 100 m buffer of site) habitat variables (e.g., stream order, sinuosity, proportion of land cover types) and landscape-scale habitat variables. The overall probability of occupancy accounting for detection probability was 0.33. River otter occupancy increased with the proportion of woodland cover and decreased with the proportion of cropland and grassland cover at the local scale. The best-fitting model also indicated occupancy increased with decreased shoreline diversity, waterbody density, and stream density at the landscape scale, possibly because of the influence of large reservoirs in the watershed. Occupancy was not affected by land cover or human disturbance at the landscape scale. Detection probability for 400-m surveys was highest in mud substrates (p = 0.60) and lowest in snow (p = 0.18) and litter substrates (p = 0.27). Detection probability for scat was more than double that for tracks, and detection probabilities were 17-64% lower for novice observers than experienced observers. Sign surveys are a useful technique for monitoring many species, including river otters, and accounting for detection probability will improve estimation of occupancy. Furthermore, understanding the ecological factors and the scale important to river otter occurrence will be useful in identifying areas for restoration and management efforts.

Products
Shardlow, M. R., C. P. Paukert, B. Sandercock, and P. S. Gipson. In revision. Factors affecting detectability of river otters during noninvasive sign surveys. Journal of Wildlife Management.

Shardlow, M. R., and C. P. Paukert. 2009. Distribution and population status of river otters in eastern Kansas. Final Report, Kansas Department of Wildlife and Parks, Pratt.

Shardlow, M. R. 2009. Factors affecting detectability and distribution of the North American river otter. M.S. thesis, Kansas State University.

Shardlow, M., P. S. Gipson, K. A. Blecha, and M. Peek. 2008. River otter distribution and population status in eastern Kansas. Information Brochure, Kansas Department of Wildlife and Parks.

Shardlow, M. and C. Paukert. 2009. Seeing what was missed: evaluating detection probabilities from river otter sign surveys. The Wildlife Society Annual Meeting, Monterey, CA.

Shardlow, M. and C. Paukert. 2009. Factors affecting the detectability and occupancy of river otters in eastern Kansas. KSU Biology Student Research Forum, Manhattan, KS.

Shardlow, M., C. Paukert, and T. Cable. 2009. Furharvester sighting reports and opinions regarding river otters in Kansas. Kansas Natural Resources Conference, Wichita, KS.

Shardlow, M., and C. Paukert. 2008. Sign survey techniques for river otters: looking back and moving forward. Midwest Fish and Wildlife Conference, Columbus, OH.

Shardlow, M., C. Paukert, and P. Gipson. 2008. Factors affecting the distribution and detectability of river otters in Eastern Kansas. Midwest Furbearer Workshop. Olathe, KS.

Assessment of Elk Habitat Use, Population Dynamics, and Genetic Variability at Fort Riley Military Reservation, Kansas

Investigators
Jonathan Conard, Ph.D.
Dr. Philip Gipson

Project Supervisor
Dr. Philip Gipson

Funding
Rocky Mountain Elk Foundation

Fort Riley Conservation Division

U.S. Army Construction Engineering Research Laboratory

Safari Club International

Cooperators
Kansas Department of Wildlife and Parks, New Mexico Cooperative Fish and Wildlife Research Unit, Fort Riley Conservation Division

Objectives
Assess elk resource selection in tallgrass prairie

Estimate survival rates and mortality causes

Compare genetic variability to other reintroduced elk herds

Location:
Fort Riley Military Reservation

Completion: 2009

Status
Completed

Progress and Results
We examined factors influencing microsatellite variability, demographic vital rates, and habitat use for a reintroduced elk population at Fort Riley, Kansas based on data collected from 2003 – 2007. Levels of allelic richness, observed heterozygosity, and expected heterozygosity for the Fort Riley population were intermediate to other North American elk populations. Genetic variability in restored North American elk populations was not well explained by founding population size, number of founding populations, or number of years since the last translocation. Survival for prime-age adult elk had the highest stage-specific elasticity value, but life-stage simulation analysis indicated that variation in calf survival had the highest correlation with variation in population growth rate. These results suggest that calf survival varies temporally and is the vital rate most directly related to variation in population growth rate for this population. We assessed the relative influence of risk-related and resource-related factors on elk habitat selection by comparing predictor variables included in top resource selection function models at the landscape and home range scales. All predictor variables, with the exception of fall and spring prescribed burns, were included in top models across seasons at both spatial scales. Elk selected low elevation areas, gentle slopes, edge habitat, and areas close to streams at both spatial scales. At the landscape scale, elk generally avoided roads and preferred areas on or near Fort Riley. These findings do not support the idea that risk-related factors are the primary determinant of elk habitat use at the landscape scale as has been found for ungulates in areas with natural predators.

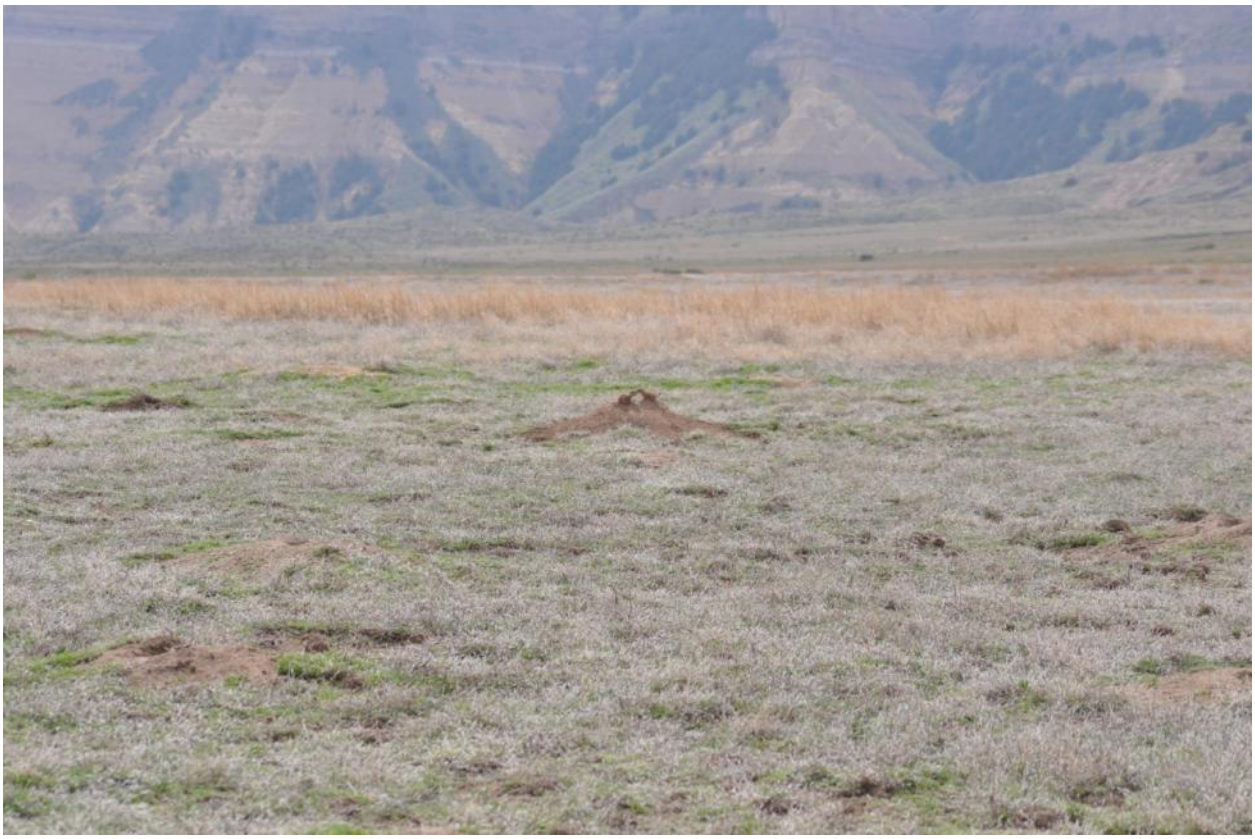
Products since 2008

Conard, J. M. Genetic variability, demography, and habitat selection in a reintroduced elk (*Cervus elaphus*) population. Ph.D. Dissertation, Kansas State University.

Conard, J.M., M.A. Statham, P.S. Gipson, and S.M. Wisely. *In press*. The influence of translocation strategy and management practices on the genetic variability of a re-established elk (*Cervus elaphus*) population. Restoration Ecology

Conard, J.M., and P. S. Gipson. 2009. Demographic vital rates and population growth: rethinking the relationship in a harvested elk population. Ecological Society of America Annual Meeting, Albuquerque, NM.

Ongoing Wildlife Projects



Black-tailed prairie dogs at Scott's Bluff National Monument, Nebraska

Status and distribution of black-tailed prairie dogs on small cultural National Parks in the western Great Plains.

Investigators
Dr. Jack Cully

Students
Rachel Pigg
Amanda Goldberg

Project Supervisor
Dr. Jack Cully

Funding
US Geological Survey.

Cooperators
Gary Willson

Objectives
Identify status of black-tailed prairie dogs at 4 culture parks in western Great Plains.

Document rate of migration
Document population trends.

Identify damage by prairie dogs to park resources.

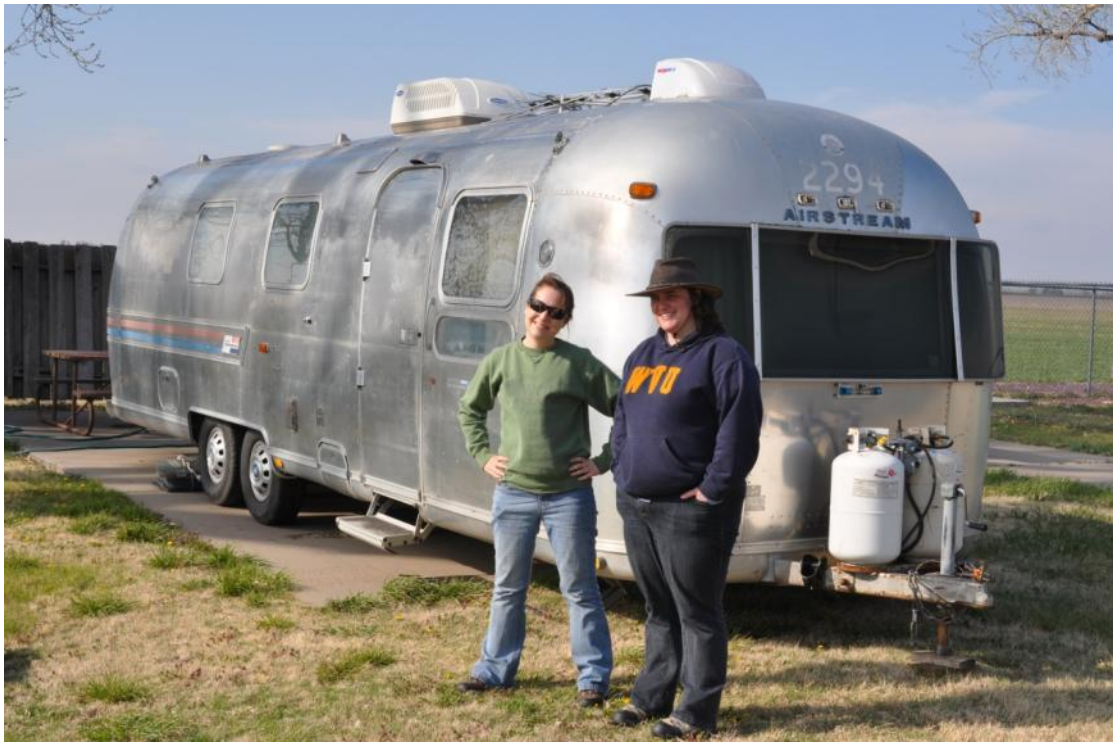
Location Kansas, Colorado, Nebraska.

Completion
December 31, 2011

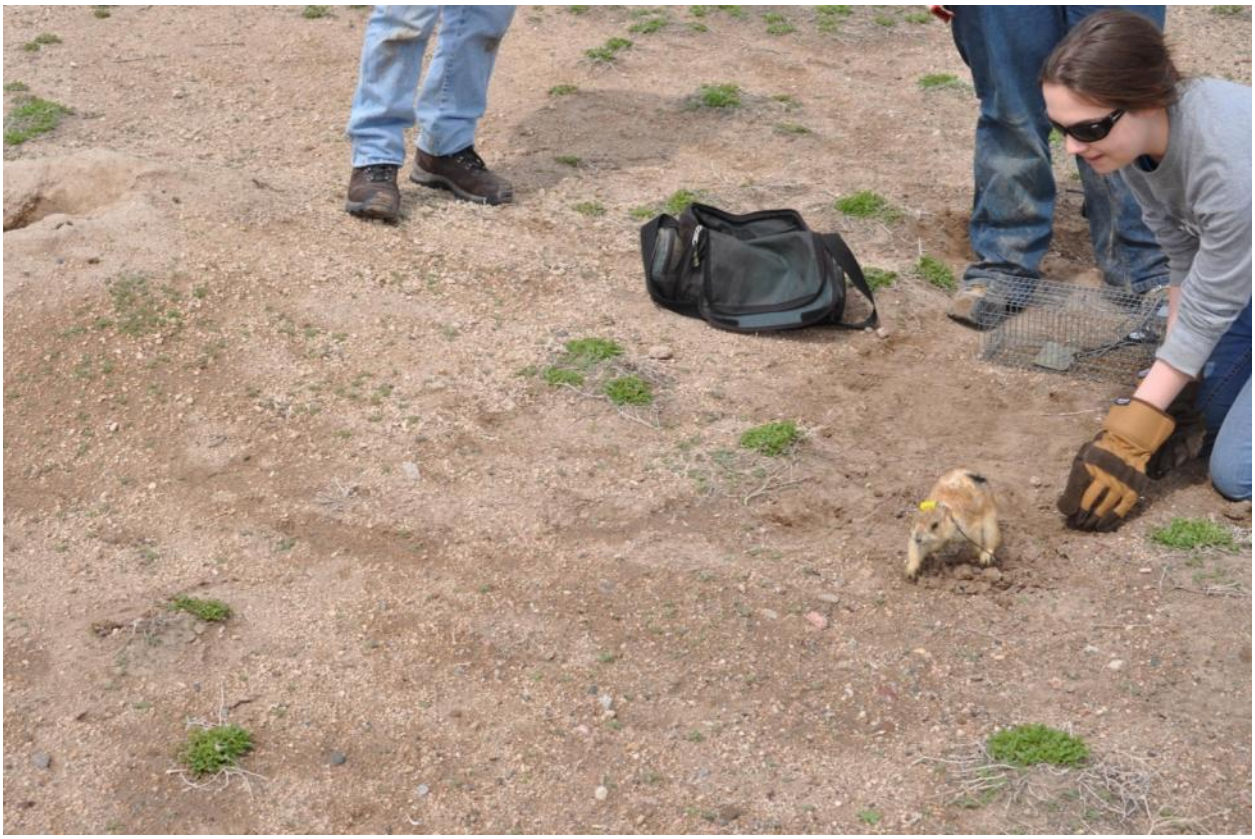
Status: Ongoing

Study sites selected and set up at four parks in the western Great Plains, Fort Larned National Historic Site, Kansas, Bent's Old Fort, Colorado, Sand Creek Massacre National Historic Site, Colorado, and Scott's Bluff National Monument, Nebraska. We trapped prairie dogs during one 5-day session and conducted visual counts for three days at the end of the trapping session at each park during summer 2008. We again trapped prairie dogs and conducted visual counts in 2009 during two sessions at each parks. In addition, during 2009, we placed radio transmitters on 16 prairie dogs at each park (only 14 at Sand Creek) to monitor animal movements.

Progress and Results:
Black-tailed prairie dogs pose a management dilemma for land managers because the species is considered an agricultural pest by many farmers and ranchers at the same time it is identified as a keystone species and ecological engineer that benefits many grassland plant and animal species. On Park Service lands, prairie dogs may also degrade cultural resources by digging burrows into cultural remains that the Parks are mandated to protect. This project addresses four issues at the four parks: 1. What is the status of prairie dogs on four small prairie culture parks? 2. Are current population assessment methods adequate? 3. What is the extent of prairie dog movement from National Park lands to adjacent farm or ranch lands? 4. What is the extent of prairie dog damage to the parks' cultural resources?



Rachel Pigg and Rebecca Rhodes at the little house on the prairie, Fort Larned National Historic Site, Kansas.



Rachel Pigg is releasing a newly radio-collared prairie dog at Scott's Bluff National Monument, Nebraska.

Small Mammal Populations in Prairie Ecosystems: Scale Dependant Responses to Disturbance

Investigators
Dr. Jack Cully

Student
Derek A. Moon,
M.S. student

Project Supervisor
Dr. Jack Cully

Funding
Department of Defense, Fort Riley

Objectives
Assess small mammal habitat selection in relation to disturbance and vegetation in tallgrass prairie at Fort Riley.

Location
Fort Riley Military Installation

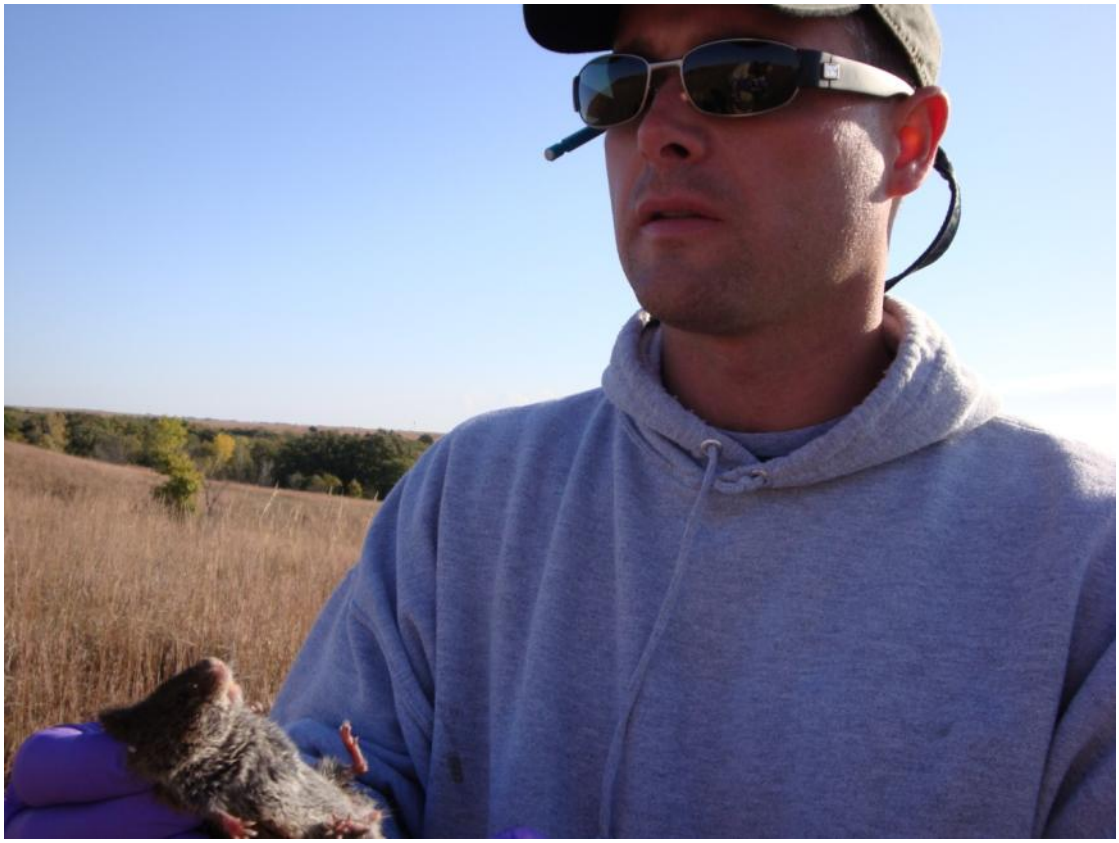
Status
Ongoing

Status
Field work is complete, data analysis is complete, and write-up is in progress.

Progress and Results
Small mammals and vegetation characteristics were sampled on 33 one-hectare plots of varying degrees of disturbance across the Fort Riley landscape during the spring and fall of 2008. Data were analyzed at three spatial scales; trap station, 0.25 ha, and 1 ha, for three small mammal species; deer mice, western harvest mice, and prairie voles. Pearson's correlation coefficients were calculated for the three species in relation to vegetation and disturbance measurements at each spatial scale during each season. Multiple linear regression was used to analyze which habitat variables best explained variation in each small mammal species relative density during each season at each spatial scale. Redundancy analysis was used to ordinate small mammal species in relation to measured habitat variables. Permutational manova was used to test for non-random habitat selection as well as for interactions between species at each spatial scale and season.

Spring track index and vegetation density were the most important variables for explaining variation in relative density for all species across both seasons and spatial scales. Fall tracking was the next most important habitat variable. At the full plot scale across all species three habitat variables were found to be significant in explaining small mammal relative density; however, at the 0.25 plot scale six variables were found to be significant.

At the full plot scale, only deer mice were found to select habitat non-randomly. At the 0.25 plot scale deer mice selected habitat non-randomly during the spring and fall, western harvest mice selected habitat non-randomly in the fall, and prairie voles selected habitat non-randomly in the spring.



Derek Moon with a prairie vole at one of his study sites at Fort Riley, Kansas.

Range and Training Lands Assessment on Fort Riley (RTLA) on Fort Riley Military Installation, Kansas

Investigators
Dr. Stacy Hutchinson, Department of Biological and Agricultural Engineering

Dr. Shawn Hutchinson, Department of Geography

Project Supervisor
Dr. Stacy Hutchinson

Funding
U.S. Department of Defense, Ft. Riley ITAM Program

Objectives
Assess the impacts of repeated military vehicle disturbances on plant, animal, and soil communities to determine sustainability and develop ecological models at the local ecosystem level.

Develop statistical models of impacts by military disturbance and verify those models with monitoring data.

Assess the use of low-level aerial photography to evaluate bare ground conditions.

Explore other potential methods to rapidly assess small mammal communities with the goal of reducing monitoring costs and health risk to field researchers.

Location
Fort Riley Military Reservation, Kansas

Expected Completion
September 2011

Status
In progress

Progress and Results
We are currently rewriting the Fort Riley RTLA assessment plan to focus on Training Land Vegetation Condition, Training Area Stability, LRAM Project Assessment, Training Land Safety and Mobility, and Stream Channel Stability. These assessments will integrate grassland ecology, hydrologic sciences and soil sciences within a geospatial data structure to provide a more comprehensive, timely report of the military training land condition. To date, we have developed remote sensing techniques to estimate and monitor biomass production and bare soil, which are used as indicators of vegetation condition and to detect large scale changes and impacts from training. We are in the process of establishing an instrumentation network to provide real-time weather and stream discharge measurements for assisting with training land management.

Products since 2008
Bussen, P. 2009. Analysis of a Rapid Soil Erosion Assessment Tool. MS Thesis, Kansas State University.

Hutchinson, S.L. and J.M.S. Hutchinson. 2009. Validating the Kinematic Wave Approach for Rapid Soil Erosion Assessment: nLS Model Overview and Sensitivity Analysis Results. December 2009. SERDP and ESTCP Partners in Environmental Technology Technical Symposium & Workshop; Washington, DC.

Hutchinson, S.L., J.M.S. Hutchinson, and T.J. Vought, Jr. 2009. Validating the Kinematic Wave Approach for Rapid Soil Erosion Assessment and Improved BMP Site Selection (SI-2017). December 2007. Watershed Process and Management Side Meeting, SERDP and ESTCP Partners in Environmental Technology Technical Symposium & Workshop; Washington, DC.

Burkitt, J., K. Franke, J.M.S. Hutchinson, and S.L. Hutchinson. 2009. GIS-enabled Kinematic Wave Approach for Rapid Soil Erosion Assessment and Improved BMP Site Selection. Capitol Research Summit, Topeka, KS.

Burkitt, J., K. Franke, J.M.S. Hutchinson, and S.L. Hutchinson. 2009. GIS-enabled Kinematic Wave Approach for Rapid Soil Erosion Assessment and Improved BMP Site Selection. Kansas State University Graduate Research Forum; Manhattan, KS.

Deer Density, Movement Patterns, and Group Dynamics on Quivira National Wildlife Refuge: Assessing Potential Risk for Disease Transmission

Investigators
Kevin Blecha
Dr. Jonathan Conard

Project Supervisor
Dr. Jonathan Conard

Funding
US Fish and Wildlife Service
Kansas Department of Wildlife and Parks
U.S. Army Corps of Engineers Environmental Research Laboratory

Cooperators
Quivira National Wildlife Refuge

Kansas Department of Wildlife and Parks
Sterling College

Objectives
Identify factors contributing to direct and indirect contact rates among deer.

Background on density, movements, and social structure to develop testable hypothesis for future research on white-tailed deer of QNWR

Location
Quivira National Wildlife Refuge

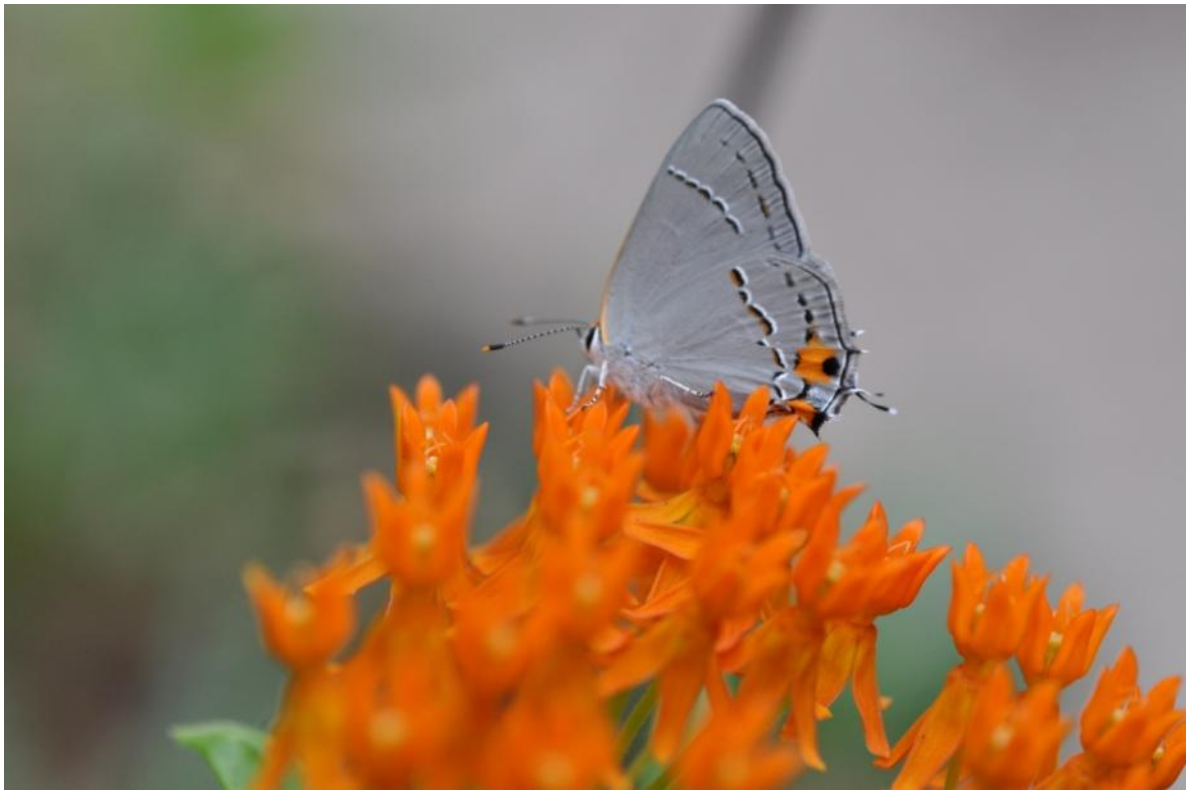
Completion
July 2010

Status
Field data collection for the project has been completed, and data analysis and preparation of publications is ongoing.

Progress and Results
Preliminary analysis of location data from 11 male deer collected from November 2007 – May 2009 indicates that patterns of habitat use by male deer are characterized by a high density of locations in a few core areas. The home range size of male deer varied seasonally, with minimum convex polygon home ranges of male deer being largest during the winter (January-April) and smallest during the summer (May-September). Home ranges of all male deer included portions of Quivira National Wildlife Refuge, although adjoining areas of private land were used frequently by male deer throughout the year. Disease transmission may depend on contact rates between deer. Our preliminary results suggest that contact between male deer was highest during winter and lowest during summer time periods. Preliminary analysis suggests that land-cover type may influence contact rates, with woodland and cultivated areas potentially being areas of high contact between deer. Additionally, we will estimate deer population density on Quivira National Wildlife Refuge using data collected from distance-sampling surveys and will use microsatellite data to determine if deer relatedness is correlated with spatial patterns of habitat use.

Products since 2008
Blecha, K.A., P. S. Gipson, J. M. Conard and J. Sellers. 2008. Deer of Quivira. Information Brochure, U.S. Fish and Wildlife Service, Quivira National Wildlife Refuge.

Technical Assistance



Zooplankton Dynamics in Marion Reservoir: Implications for Monitoring the Effects of Zebra Mussel Invasion

Investigators
Dr. Craig Paukert
Michael Proffer, undergraduate

Project Supervisor
Dr. Craig Paukert

Funding
Kansas Cooperative Fish and Wildlife Research Unit

Cooperators
Kansas Department of Wildlife and Parks

US Army Corps of Engineers

Objectives
Determine if zooplankton abundance differed among years or months in Marion Reservoir,

Determine baseline zooplankton abundance information to assess future impacts of the zebra mussel invasion.

Location
Marion Reservoir, Kansas

Completion
July 2009

Status
Completed

Progress and Results
Zebra mussels were documented in Marion Reservoir in July 2008, which was attributed to irresponsible boaters. Monitoring the changes in zooplankton before and after invasion can help determine the effects of the zebra mussel on the aquatic community. Standardized collections of zooplankton in Marion Reservoir were conducted by the U.S. Army Corps of Engineers for several years prior to zebra mussel invasion in 2008. The data obtained from these pre-zebra mussel zooplankton collections may play an important role in studying the effects of zebra mussels within a reservoir system, and can act as a baseline for future monitoring data. A total of 36 samples (3 sites, x 3 years x 4 months) were analyzed from sites 15, 2, and 5 for this report. Mean total zooplankton abundance was not consistent among years or months (year by month interaction $p=0.0002$), therefore the analysis was separated by year. Mean total zooplankton abundance did not differ by month for 2004 or 2005). However, total zooplankton was highest in May and July of 2005. Cyclopoid density did not differ among years or months, while Calanoid density was slightly higher in July ($p=0.015$). Daphnia density did not differ among years or months. The mean coefficient of variation for total zooplankton abundance ranged from 93 in May to 109 in June, but was similar among months ($p=0.936$). Power analysis revealed that to detect a 50% change in total zooplankton abundance at a power level of 0.8, you would need 35 to 63 zooplankton tows, depending on month. June sampling required the greatest number of samples (63) whereas the other months were fairly similar. However, May sampling required slightly less samples (35) than July and August (42-44 samples).

Products 2008-present
Proffer, M., and C. P. Paukert. 2009. Zooplankton dynamics in Marion Reservoir. Report Submitted to US Army Corps of Engineers, Tulsa District, and Kansas Department of Wildlife and Parks, Emporia.

Evaluation of the Success of Humpback Chub Translocations in Shinumo Creek

Investigators
Dr. Craig Paukert
Dr. Joanna Whittier

Project Supervisor
Dr. Craig Paukert

Funding
National Park Service, Grand Canyon National Park

US Bureau of Reclamation

Cooperators
National Park Service
US Bureau of Reclamation
US Fish and Wildlife Service
Grand Canyon Wildlands Council
Arizona Game and Fish Department

Objectives

Determine if translocated humpback chub remain Shinumo Creek.

Determine if translocated humpback chub movement out of Shinumo Creek is related to hydrology, water temperature, season, and year

Location
Shinumo Creek in Grand Canyon, Arizona

Completion
September 2012

Status
In progress

Progress and Results
This project will aid in the development of a comprehensive strategy to aid in the recovery of humpback chub (HBC) in Grand Canyon through completion of research needs identified by the US Fish and Wildlife Service and the Grand Canyon National Park (GCNP), and the evaluation and analysis of current translocation efforts. We will evaluate the effectiveness of ongoing humpback chub translocations in Shinumo Creek. The installation of a fixed PIT tag antenna and subsequent analyses of these data allow a more precise determination of the fate of the translocated fish. Therefore, the success of the ongoing effort at Shinumo needs to be answered before additional translocations are attempted. To better address the effectiveness of the Shinumo reintroduction, a multiple array antenna was installed near the mouth of Shinumo Creek (upstream of barrier falls) by GCNP, but the analysis of data collected from these efforts is needed to evaluate the success or failure of translocation efforts. We will use information on HBC locations gathered from the remote antennae installed in June 2009 at the mouth of Shinumo Creek. The analysis began in summer 2009 and will continue through 2012. Data from PIT tag detections will be used to examine movement patterns of individual HBC and whether the patterns are related to environmental or biological factors. The proportion of fish recorded by the remote antenna will be summarized by day, week, and/or month (depending on the objective) to determine if the proportion of tagged fish that move out of Shinumo Creek differ by season, water temperature, or water flows. These results will help identify variables associated with presumed movements out of Shinumo Creek.

Products 2008-present
Whittier, J., and C. Paukert. Analysis of Movement of Relocated Humpback Chub in Shinumo Creek. Internal Report to Grand Canyon National Park. 26 January 2010

Factors Influencing Threatened and Endangered Fishes in the Great Plains

Investigators
Dr. Craig Paukert
Mr. Joe Gerken

Project Supervisor
Dr. Craig Paukert

Funding
US Fish and Wildlife Service

Cooperators
US Fish and Wildlife Service

Kansas Department of Wildlife and Parks

Objectives
Determine the effects of land use, instream and riparian habitat, interspecific competition, predation, and urbanization and impoundment development of Topeka shiner abundance.

Attempt to determine if there are trends in Topeka shiner populations or distribution over time.

Location
Eastern Kansas streams

Completion
September 2013

Status
In progress

Progress and Results
We examined how changes to the stream environment have affected Topeka shiner populations in Kansas. Largely as a result of anthropogenic changes to its environment, the Topeka shiner's current range in Kansas has been reduced to about 10% of its original size, resulting in the species being listed as endangered under the Endangered Species Act in 1998. We used data collected by the Kansas Department of Wildlife and Parks to determine the effects of abiotic and biotic factors impacting Topeka Shiner populations. Mean catch per unit effort (CPUE) (fish/seine haul) for Topeka shiners declined among the 1995, 2003, and 2008 samples (mean CPUE = 3.11, 1.14, 0.34, respectively). This decline was likely a result of the high number of impoundments and an increase among all years in the relative abundance of predatory fishes (mean CPUE = 1.17, 2.37, and 3.43, respectively). Results from this study show that efforts to reduce the number of impoundments and predators throughout the Topeka shiner range, along with efforts to preserve the stream and riparian habitats where Topeka shiners are currently found, may be necessary to increase the present range and population size of this endangered species.

Products 2008-present

Gerken, J., and C. Paukert. 2009. Factors Influencing Threatened and Endangered Fishes in the Great Plains. Annual Performance Report to US Fish and Wildlife Service.

Gerken, J. E., and C. P. Paukert. 2009. Topeka shiners status and trends in Kansas. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Gerken, J., W. Bouska, and C. Paukert. 2009. Effects of instream habitat and fish communities on the endangered Topeka shiner in Kansas streams. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J.E., and C.P. Paukert. 2009. Factors impacting Topeka shiner distribution in Kansas. American Fisheries Society Midwest Student Colloquium, Annual Meeting, Ames, IA.

Gerken, J., W. Bouska, and C. Paukert. 2008. Factors influencing the endangered Topeka shiner in Kansas streams. Midwest Fish and Wildlife Conference, Columbus, OH.

Black-tailed prairie dog Colony Mapping at the Kiowa and Rita Blanca National Grasslands

Investigators
Dr. Jack Cully

Funding
U.S.D.A. Forest Service

Objectives
Map active Black-tailed Prairie Dog colony distribution on the Kiowa and Rita Blanca National Grasslands and compare with distributions from past years.

Attempt to identify active areas of sylvatic plague on grasslands.

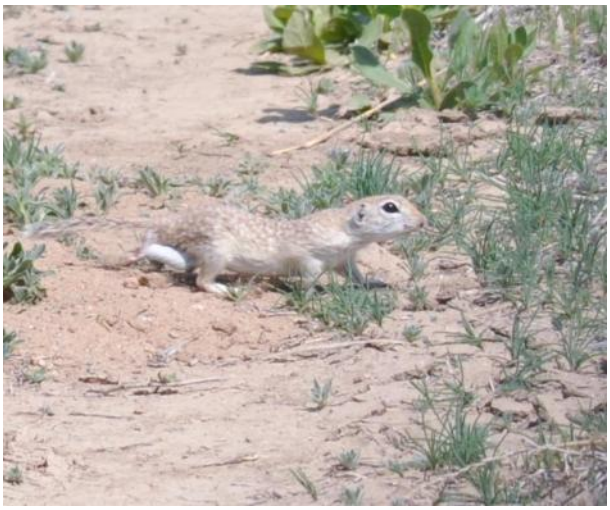
Location
Kiowa and Rita Blanca National Grasslands

Completion
December 2011

Status
In progress

Progress and Results
All known colonies were mapped on the two grasslands during fall 2009. Colonies were placed on maps in a Geographical Information System (ArcMap) and compared with the distribution of colonies mapped in 2006. The overall area of colonies on the grasslands grew slightly from 2006-2009 (671 ha to 742ha), but these figures hide significant changes in individual colony areas between the two times. At the time colonies were mapped in 2006, epizootic plague remained active, and the largest colonies on the Kiowa and Rita Blanca, colonies K59/60 (48.7 ha), K65 (45.5 ha), K 147 (54.2 ha), RB 82 (172.8 ha), RB 83 (49.2), and RB 89 (53.9 ha) had not been noticeably impacted by plague. When we mapped again in 2009, all but one of these colonies, K65, had been hit by plague and the cumulative area of the affected colonies was reduced from 384.8 ha to 9.8 ha. These five affected colonies accounted for 57% of total colony area in 2006, and were reduced by 97.5% by 2009. In addition, nine colonies that appeared to be growing well in 2006 were inactive when mapped in 2009. These data indicate that plague continues to be active on the Kiowa and Rita Blanca National Grasslands during 2009.

Products:
Annual Report for 2009.



Spotted Groundsquirrel photographed at Bent's Old Fort National Historic Site, Colorado.

List of Scientific, Peer Reviewed Publications: 2008-present

Books and book chapters

Collinge, S. K., C. Ray, and J. F. Cully, Jr. 2008. Effects of disease on keystone species, dominant species, and their communities. Pages 129-144. In: Ostfeld, Evener, and Keesing, editors. Effects of Ecosystems on Disease and of Diseases on Ecosystems. Princeton University Press.

Gerken, J., and C. Paukert. 2009. Threats to paddlefish habitats. Pages 173-184 in: C. P. Paukert and G. Scholten, editors. Paddlefish management, propagation, and conservation in the 21st century: building from 20 years of research and management. American Fisheries Society, Bethesda, Maryland.

Gerken, J. E. and G. L. Adams. 2008. Habitat use of grotto sculpin (*Cottus* carolinae) a troglomorphic fish in Perry County, Missouri. Proceedings of the National Cave and Karst Management Symposium.

Hansen, K. A., and C. P. Paukert. 2009. Current management of paddlefish sport fishes. Pages 277-290 in: C. P. Paukert and G. Scholten, editors. Paddlefish Management, Propagation, and Conservation in the 21st Century: Building from 20 years of Research and Management. American Fisheries Society, Bethesda, Maryland.

Isermann, D. and C. P. Paukert. In press. Regulating harvest. In: W. A. Hubert and M. C. Quist, editors. Inland Fisheries Management in North America, third edition. American Fisheries Society, Bethesda, Maryland.

Paukert, C. P and D. Galat. Accepted. Large warmwater rivers. In: W. A. Hubert and M. C. Quist, editors. Inland Fisheries Management in North America, third edition. American Fisheries Society, Bethesda, Maryland.

Paukert, C. P., and G. Scholten, editors. 2009. Paddlefish Management, Propagation, and Conservation in the 21st Century: Building from 20 years of Research and Management. American Fisheries Society, Bethesda, Maryland.

Peterson, J. T., and C. P. Paukert. 2009. Converting nonstandard fish sampling data to standardized data. Pages 195-214 in: S. A. Bonar, D. W. Willis, and W. A. Hubert, editors. Standardized Sampling Methods in North America. American Fisheries Society, Bethesda, Maryland.

Quinn, S. P., and C. P. Paukert. 2009. Centrarchid fisheries. Pages 312-339 in: S. J. Cooke and D. P. Phillip, editors. Centrarchid Fishes: Diversity, Biology, and Conservation. Blackwell Science, London.

Peer reviewed journal articles

Augustine, D.J.,M. R. Matchett, T. P. Toombs, J. F. Cully, Jr., T. L. Johnson, and J. D. Sidle. 2008. Spaciotemporal dynamics of black-tailed prairie dog colonies affected by plague. Landscape Ecology 23:255-267.

Bouska, W. W., and C. P. Paukert. 2010. Road crossing designs and their impact on fish assemblages of Great Plains streams. Transactions of the American Fisheries Society 139:214-222.

Bouska, W. W., and C. P. Paukert. In press. Effects of visible implant elastomer mark color on the predation of red shiners by largemouth bass. Fisheries Management and Ecology.

Brinkerhoff, R.J., C. Ray, B. Thiagarajan, S. K. Collinge, J. F. Cully, Jr., B. Holmes, and K. L. Gage. 2008. Keystone hosts: Prairie dogs affect occurrence patterns of disease vectors on small mammals. Ecography 31:654-662.

Brinkley, P., J. R. Fischer, and C. P. Paukert. 2008. Effects of fixative on total length of small bodies stream fishes. Journal of Freshwater Ecology 23:471-473.

Conard, J. M., J. A. Baumgardt, P. S. Gipson, and D. P. Althoff. In Press. The influence of trap density and duration of sampling on the detection of small mammal species richness. Acta Theriologica.

Cully, J.F., Jr., S. K. Collinge, R. E. VanNimwegen, C. Ray, W. C. Johnson, B. Thiagarajan, D. B. Conlin, and B. E. Holmes. In press. Spatial variation in keystone effects: Small mammal diversity associated with black-tailed prairie dog colonies. Ecography 33:1-11.

Cully, Jr., J. F., T. L. Johnson, S. K. Collinge, and C. Ray. 2010. Disease limits populations: Plague and black-tailed prairie dogs. Vector-Borne and Zoonotic Diseases.

Davis, N, and C. P. Paukert. 2008. Impact of gravel bar scalping on Neosho madtom populations from the Lower Neosho River, Kansas. Journal of Freshwater Ecology 23:501-511.

Doyle, W., C. P. Paukert, A. Starostka, and T. D. Hill. 2008. A comparison of four sampling gears used to collect shovelnose sturgeon in the Lower Missouri River. Journal of Applied Ichthyology 24:637-642.

Eitzmann, J. L., and C. P. Paukert. 2010. Longitudinal differences in habitat complexity and fish assemblage structure of a Great Plains River. American Midland Naturalist 163:14-32.

Eitzmann, J. L., and C. P. Paukert. In press. Urbanization in a Great Plains river: effects on fishes and food webs. River Research and Applications.

Fischer, J. R., and C. P. Paukert. 2008. Habitat relationships with fish assemblages in least disturbed Great Plains regions. Ecology of Freshwater Fish 17:597-609.

Fischer, J. R., and C. P. Paukert. 2008. Historical and current environmental influences of an endemic Great Plains fish. American Midland Naturalist 159:364-377.

Fischer, J.R., and C. P. Paukert. 2009. Spatial scale of stream fish assemblage and abundance estimates: effects of sampling effort, community structure, and habitat heterogeneity. Canadian Journal of Fisheries and Aquatic Sciences 66:277-290.

Makinster, A.S., and C. P. Paukert. 2008. Effects and utility of minimum length limits and mortality caps for flathead catfish in discrete reaches of a large prairie river. North American Journal of Fisheries Management 28:97-108.

Paukert, C. P., and A. S. Makinster. 2009. Longitudinal patterns in flathead catfish relative abundance and length at age within a large river: effects of an urban gradient. River Research and Applications 25:861-873.

Paukert, C. P., J. Schloesser, J. Eitzmann, J. Fischer, K. Pitts, and D. Thornbrugh. 2008. Effect of instream sand dredging on fish communities in the Kansas River USA: current and historical perspectives. Journal of Freshwater Ecology 23:623-633.

Petersen, J. H., D. L. DeAngelis, and C. P. Paukert. 2008. Developing bioenergetics and life history models for rare and endangered species. Transactions of the American Fisheries Society 137:244-253.

Pullen, R. R., W. W, Bouska, S. Campbell, and C. P. Paukert. 2009. Intestinal helminths of *Cyprinella lutrensis* in Deep Creek, Kansas; prevalence and spatial distribution estimates for *Bothriocephalus acheilognathi* (the Asian fish tapeworm) and *Rhabdochona Canadensis*. Journal of Parasitology 95(5):1224-1226.

T. Bala, Y. Bai, K. L. Gage, and J. F. Cully, Jr. 2008. Prevalence of *Yersinia pestis* in rodents and fleas associated with black-tailed prairie dogs at Thunder Basin National Grassland, Wyoming. Journal of Wildlife Diseases 44:731-736.

Thiagarajan, B., J. F. Cully, Jr., T. M. Loughin, J. C. Montenieri, and K. L. Gage. 2008. Geographic variation in rodent-flea relationships in the presence of black-tailed prairie dog colonies. Journal of Vector Ecology 33:178-190.

VanNimwegen, R. L., J. Kretzer, and J. F. Cully. 2008. Ecosystem engineering by a colonial mammal: how black-tailed prairie dogs structure rodent communities. Ecology 89:3298-3305.

White, K., J. Gerken, C. Paukert, and A. Makinster. 2In press. Fish community structure in natural and engineered habitats in the Kansas River. River Research and Applications.

Whittier, J. B., and D. M. Leslie, Jr. 2009. Survival and movement of chicks of the Least Tern (*Sterna antillarum*) on an alkaline flat. Southwestern Naturalist 54:176-181.

Technical publications

Cully, J. F., Jr. 2010. Black-tailed Prairie Dog Colony Mapping at the Kiowa and Rita Blanca National Grasslands. Project Report to the U.S.D.A., Forest Service, Cibola National Forest, Agreement Number Agreement Number 09-CS-11030300-012, Albuquerque, NM.

Paukert, C.P., J.L. Eitzmann, and J.E. Gerken. 2009. Distribution and Abundance of Fishes in the Kansas River. Final Report, Kansas Department of Wildlife and Parks, Project Number T-15-R-1, Pratt, Kansas.

Pigg, R. M., and J. F. Cully, Jr. 2009. Status and Management of Black-tailed Prairie Dogs on Small Cultural Parks of the Western Great Plains. Annual Report to U.S.G.S. N.R.P.P. Program and National Park Service.

Shardlow, M., C. Paukert, K. Blecha, and P. Gipson. 2009. Distribution and population status of river otters in eastern Kansas. Final Report to Kansas Department of Wildlife and Parks, Pratt.

Whittier, J. B., and C. P. Paukert. 2010. Analysis of Movement of Relocated Humpback Chub in Shinumo Creek. Preliminary Report. National Park Service, Grand Canyon National Park.

Theses and Dissertations

Bouska, W. W. 2008. Road crossings design and their impacts on fish assemblages and geomorphology of Great Plains streams. M.S. Thesis, Kansas State University.

Conard, J. M. 2009. Genetic variability, demography, and habitat selection in a reintroduced elk (*Cervus elaphus*) population. Ph.D. Dissertation, Kansas State University.

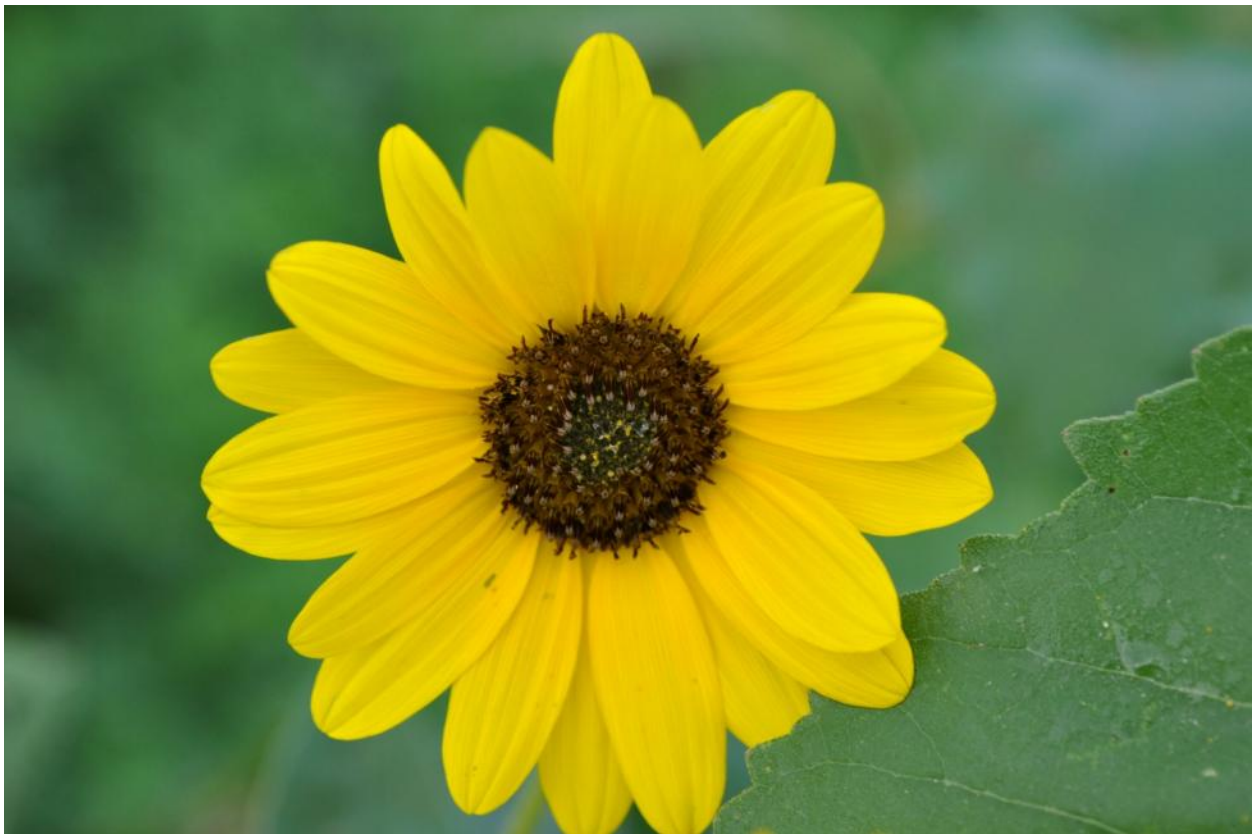
Eitzmann, J. L. 2008. Effects of anthropogenic disturbance on the fish assemblage and food web structure in a Great Plains river. M.S. Thesis, Kansas State University.

Pitts, K. L. 2008. Assessing threats to native fishes in the Lower Colorado River Basin. M.S. Thesis, Kansas State University.

Schloesser, J. T. 2008. Large river fish community sampling strategies and fish associations to engineered and natural river channel structures. M.S. Thesis, Kansas State University.

Shardlow, M. R. 2009. Factors affecting detectability and distribution of the North American river otter. M.S. Thesis, Kansas State University.

VanNimwegen, R. E. 2009. Behavioral ecology of grasshopper mice and deer mice. Ph.D. Dissertation, Kansas State University (posthumous).



List of Presentations 2008-present

Bouska, W. W. and C. Paukert. 2008. Effects of road crossing design on movement and species composition of Great Plains stream fishes. First Annual Midwest Student Fisheries Colloquium, Lincoln, NE.

Bouska, W. W., and C. P. Paukert. 2008. Effects of road crossing design on movement and species composition of Great Plains stream fishes. Kansas Natural Resources Conference, Wichita, KS.

Bouska, W., and C. Paukert. 2008. Fish on the move: effects of culvert design on the passage of Great Plains stream fish. Midwest Fish and Wildlife Conference, Columbus, OH.

Bouska, W., and C. Paukert. 2008. Road crossing designs and their impact on movement and diversity of Great Plains stream fishes. American Fisheries Society Annual Meeting, Ottawa, Canada.

Bouska, W., and C. Paukert. 2008. The effects of crossing design and water velocity on the movement of Great Plains lotic fishes. Midwest Fish and Wildlife Conference, Columbus, OH.

Bouska, W., and C. Paukert. 2009. Passage of prairie fishes through different crossing designs and water velocities in an experimental stream. Kansas Natural Resources Conference, Wichita, KS.

Cully, J. F. and T. L. Johnson. 2008. Plague regulates black-tailed prairie dog populations**.** Symposium on the Ecology of plague and its effects on wildlife, Fort Collins, CO.

Cully, J. F. 2009. Plague, Prairie Dogs and Black-footed Ferrets. Rita Blanca Ferret Introduction Workshop, U.S. Fish and Wildlife Service, U.S.D.A., Forest Service, Clayton, NM.

Davis, N., and C. P. Paukert. 2008. An assessment of Neosho madtom related to gravel harvest from the Neosho River, Kansas. Kansas Natural Resources Conference, Wichita, KS.

Eitzmann, J. L., and C. P. Paukert. 2008. Effects of anthropogenic changes on food web dynamics in a Great Plains river. Kansas Natural Resources Conference, Wichita, KS.

Fischer, J. R., and C. P. Paukert. 2008. Habitat relationships with fish assemblages in minimally disturbed Great Plains regions. Dakota and Iowa Chapter of the American Fisheries Society Joint Annual Meeting, Sioux Falls, SD.

Fischer, J., and C. Paukert. 2008. Habitat relationships with fish assemblages in minimally disturbed Great Plains regions. American Fisheries Society Annual Meeting, Ottawa, Canada.

Gerken, J. E., and C. P. Paukert. Fish recruitment in the Kansas River: the role of flow, habitat, and urbanization. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J. E., and C. P. Paukert. 2009. Effects of urbanization on recruitment of Riverine fishes. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Gerken, J. E., and C. P. Paukert. 2009. Topeka shiners status and trends in Kansas. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Gerken, J., and C. P. Paukert. 2008. Effects of a low-head dam on the fish community of a large Great Plains river. Southwestern Association of Naturalists, Memphis, TN.

Gerken, J., and C. Paukert. 2008. Effects of a low-head dam on the fish community of a large Great Plains River. American Fisheries Society Annual Meeting, Ottawa, Canada.

Gerken, J., and C. Paukert. 2008. Fish community changes associated with a low-head dam in a large Great Plains river. Midwest Fish and Wildlife Conference, Columbus, OH.

Gerken, J., and C. Paukert. 2009. Spatial variation in the recruitment patterns of three riverine fishes in the Kansas River. American Fisheries Society Annual Meeting, Nashville, TN.

Gerken, J., and C. Paukert. 2009. Spatial variation in the recruitment patterns of three riverine fishes in the Kansas River. KSU Biology Student Research Forum, Manhattan, KS.

Gerken, J., W. Bouska, and C. Paukert. 2008. Factors influencing the endangered Topeka shiner in Kansas streams. Midwest Fish and Wildlife Conference, Columbus, OH.

Gerken, J., W. Bouska, and C. Paukert. 2009. Effects of instream habitat and fish communities on the endangered Topeka shiner in Kansas streams. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J.E., and C.P. Paukert. 2009. Impacts of a low-head dam on fish communities in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Gerken, J.E., and C.P. Paukert. 2009. Factors impacting Topeka shiner distribution in Kansas. American Fisheries Society Midwest Student Colloquium, Annual Meeting, Ames, IA.

Gerken, J.E., and C.P. Paukert. 2009. Impacts of a low-head dam on a Great Plains River Fish Community. American Fisheries Society Midwest Student Colloquium, Annual Meeting, Ames, IA.

Japuntich, R., S. M. Borthwick, S. J. Hayes, and C. P. Paukert. 2008. Impacts of big game browse and drought on the mountain shrub community in Southwestern Colorado. 15th annual Wildland Shrub Symposium, Bozeman, MT.

Kretschmann, A., S. Bonar, K. Young, J. Whittier, C. Paukert, and D. Guertin. 2009. Using Geographic Information Systems to delineate native fish and sport fish management areas in the Verde River watershed, Arizona. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM.

Mammoliti, K., J. Gerken, and C. Paukert. Population characteristics of channel catfish in the Kansas River. Kansas Natural Resources Conference, Wichita, KS. poster

Mammoliti, K., W. Bouska, and C. Paukert. Seasonal stockpiling of prairie stream fishes below road crossings in the flinthills of Kansas. Kansas Natural Resources Conference, Wichita, KS. poster

Paukert, C. and A. Severson. Zooplankton community characteristics in El Dorado Reservoir: response to zebra mussel invasion. Kansas Natural Resources Conference, Wichita, KS.

Paukert, C. Fish and fish habitat in the Kansas River: what have we learned? Kansas Natural Resources Conference, Wichita, KS.

Paukert, C. P. 2008. Effects of human alteration on stream and river fishes: what we know and what are we doing about it? Kansas State University, Division of Biology Seminar Series.

Paukert, C. P. 2008. Using long-term data to assess the distribution of a rare fish: lessons from the Colorado River. Midwest Fish and Wildlife Conference, Columbus, OH.

Paukert, C. P. 2009. Alteration of stream and rivers its effects on fishes: can we reverse the trend? Department of Natural Resources Ecology and Management, Iowa State University, Ames, IA.

Paukert, C. P. 2009. Conservation of stream and river fishes: from landscape to local influences. University of Missouri, Department of Fisheries and Wildlife. Columbia, MO.

Paukert, C. P. 2009. From zebra mussels to river otters: update of the Cooperative Fish and Wildlife Research Unit. Kansas Department of Wildlife and Parks, Fish and Wildlife Division meeting, Salina, KS.

Paukert, C. P., and A. M. Severson. 2009. Using long-term data to determine the effects of zebra mussels on reservoir sport fishes. 70th Midwest Fish and Wildlife Conference, Springfield, IL.

Paukert, C. P., and J. Eitzmann. 2008. Food web dynamics of a Great Plains river: effects of habitat alteration. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Paukert, C. P., and J. Whittier. 2008. Effects of invasive species in freshwater fisheries. 5th World Fisheries Congress, Yokohama, Japan.

Paukert, C., W. Bouska, and T. Keane. 2009. Road crossing design and their impacts of fish assemblages and geomorphology of Great Plains streams. Kansas Transportation Engineering Conference, Manhattan, KS.

Peterson, J. and C. Paukert. 2009. Converting non-standard fish sampling data to standardized data. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM.

Peterson, J., and C. Paukert. 2008. Converting non-standard fish sampling data to standardized data. American Fisheries Society Annual Meeting, Ottawa, Canada.

Peterson, J., and C. Paukert. 2009. Converting non-standard fish sampling data to standardized data. American Fisheries Society Annual Meeting, Nashville, TN.

Pitts, K. L., C. P. Paukert, and J. B. Whittier. 2008. Assessing anthropogenic threats to fishes in the Lower Colorado River Basin. American Fisheries Society Annual Meeting, Ottawa, Canada.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Evaluation of an ecological risk index in quantifying threats to fishes. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Pitts, K. L., C. Paukert, and J. Whittier. 2008. Utility of an ecological risk index to assess threats to native fishes: insights from the Verde River Basin, Arizona. First Annual Midwest Student Fisheries Colloquium, Lincoln, NE.

Pitts, K., C. Paukert, and J. Whittier. 2008. Alteration of flow regime and its influence on fish assemblages within the Lower Colorado River Basin. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Pitts, K., C. Paukert, and J. Whittier. 2008. Evaluation of an ecological risk index in quantifying threats to fishes. Arizona/New Mexico Joint Annual Meeting, Prescott, AZ.

Pitts, K.L., C. Paukert, and J. Whittier. 2008. Utility of an ecological risk index to assess threats to native fishes: insights from the Verde River Basin, Arizona. Kansas Natural Resources Conference, Wichita, KS.

Pool, T., J. Olden, J. Whittier, and C. Paukert. 2009. Riverscape patterns and environmental drivers of functional diversity and composition of fish communities in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM.

Prebyl, T., T. Mosher, C. Paukert, and S. Wisely. 2009. Identifying the strain of a record largemouth bass using a DNA-sequencing approach. Kansas Natural Resources Conference, Wichita, KS.

Schloesser, J. T., and C. P. Paukert. 2008. The use of occupancy modeling to aid the Missouri River pallid sturgeon monitoring program. Missouri River Natural Resources Conference, Nebraska City, NE.

Schloesser, J. T., C. Paukert, W. Doyle, T. Hill, G. Mestl, and V. Travnichek. 2008. Comparison of sampling gear detection probabilities and variability for Missouri River fishes. Kansas Natural Resources Conference, Wichita, KS.

Schloesser, J., C. Paukert, W. Doyle, T. Hill, G. Mestl, and V. Travnichek. 2008. Detection and occupancy probabilities for monitoring Missouri River fishes. American Fisheries Society Annual Meeting, Ottawa, Canada.

Scholten, G., and C. Paukert. 2009. Life history, status, and management of paddlefish. American Fisheries Society Annual Meeting, Nashville, TN.

Severson, A. and C. Paukert. 2009. Zebra Mussel Invasion and Zooplankton in a Great Plains Reservoir: Cause for Concern? American Water Resources Association Annual Water Resources Conference, Seattle, WA.

Severson, A., and C. Paukert. 2009. Does zebra mussel presence affect abundance and condition of reservoir fishes in a Kansas reservoir? American Fisheries Society Annual Meeting, Nashville, TN.

Severson, A., and C. Paukert. 2009. Effects of zebra mussel invasion on fish abundance and condition in a Kansas reservoir. KSU Biology Student Research Forum, Manhattan, KS.

Severson, A., and C.P. Paukert. 2009. Impacts of zebra mussels on fishes in El Dorado Reservoir. Kansas Natural Resources Conference, Wichita, KS.

Severson, A., J. Schloesser, J., K. Pitts, J. Eitzmann, and C. Paukert. 2008. Abundance and size structure of fishes in main and secondary channels of the Kansas River. First Annual Midwest Student Fisheries Colloquium, Lincoln, NE.

Severson, A., J. Schloesser, K. Pitts, J. Eitzmann, and C. Paukert. 2008. Abundance and growth of fishes in main and secondary channels of the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Shardlow, M. and C. Paukert. 2009. Factors affecting the detectability and occupancy of river otters in eastern Kansas. KSU Biology Student Research Forum, Manhattan, KS.

Shardlow, M. and C. Paukert. 2009. Seeing what was missed: evaluating detection probabilities from river otter sign surveys. The Wildlife Society Annual Meeting, Monterey, CA.

Shardlow, M., and C. Paukert. 2008. Sign survey techniques for river otters: looking back and moving forward. Midwest Fish and Wildlife Conference, Columbus, OH.

Shardlow, M., C. Paukert, and P. Gipson. 2008. Factors affecting the distribution and detectability of river otters in Eastern Kansas. Midwest Furbearer Workshop. Olathe, KS.

Shardlow, M., C. Paukert, and T. Cable. 2009. Furharvester sighting reports and opinions regarding river otters in Kansas. Kansas Natural Resources Conference, Wichita, KS.

Statham, M., S.M. Wisely, A. Mattox, L. Fox, J. Cully. 2008. Landscape Genetics of Genetic Susceptibility of White-Tailed Deer to Chronic Wasting Disease: Implications for CWD Emergence Across Kansas. International Conference on Emerging Infectious Diseases.

Thiagarajan, B., J. F. Cully, Jr., and K. L. Gage. 2008. Ecology of rodents and fleas associated with black-tailed prairie dogs in areas with plague. Symposium on the Ecology of plague and its effects on wildlife, Fort Collins, CO.

White, K., J. Gerken, C. Paukert, and A. Makinster. Fish community structure in natural and engineered habitats in the Kansas River. Kansas Natural Resources Conference, Wichita, KS. poster

Whittier, J. B., C. P. Paukert, and J. D Olden. 2008. Spatial patterns in the distribution and conservation of imperiled fishes in the Lower Colorado River Basin. American Fisheries Society Annual Meeting, Ottawa, Canada.

Whittier, J., C. Paukert, and J. Olden. 2009. Modeling local and watershed drivers of native and non-native fishes in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Albuquerque, NM.

Whittier, J., C. Paukert, K. Pitts, and J. Olden. 2008. Development and classification of watershed boundaries to aid conservation efforts in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Whittier, J., C. Paukert, K. Pitts, and J. Olden. 2008. Spatial patterns in the distribution and conservation of imperiled fishes in the Lower Colorado River Basin. Western Division of the American Fisheries Society Annual Meeting, Portland, OR.

Winders, K., and C. Paukert. 2009. Reduction in the abundance and condition of native fishes after invasion of white perch. Kansas Natural Resources Conference, Wichita, KS.

Wisely, S., M. Statham, A. Mattox, L. Fox, J. Cully. 2008. Prevalence and biogeography of genetic susceptibility to Chronic Wasting Disease in white-tailed deer from Kansas. The Wildlife Society, Monterey, CA.

Committees and Other Professional Assignments
2008-present

Wes Bouska

- Fundraising Committee Chair, KS Chapter, American Fisheries Society

Jack Cully

- Interstate Black-tailed Prairie Dog Conservation Committee.
- Kansas black-footed Ferret Reintroduction Advisory Panel
- Program Committee, U.S.G.S Symposium on the Ecology of Plague and its Effects on Wildlife.

Joe Gerken

- KSU Biology Graduate Student Association, Student Government Representative
- President, KSU Student SubUnit of the American Fisheries Society
- Newsletter Editor, Education Section of the American Fisheries Society
- Secretary/Treasurer, Education Section of the American Fisheries Society
- Student Liaison, Fish Habitat Section of the American Fisheries Society
- Plenary Committee, KS Natural Resources Conference
- Program Committee Member, Kansas Natural Resources Conference
- Fundraising Committee Chair, KS Chapter, American Fisheries Society
- Co-instructor, GIS applications for fisheries course, American Fisheries Society Meeting, Nashville
- Meeting Chair, 3rd Annual Midwest Student Fisheries Colloquium

Craig Paukert

- Chair, Ecology and Evolutionary Biology Section, KSU Biology
- President, Kansas Chapter of the American Fisheries Society
- Secretary/Treasurer, Education Section of the American Fisheries Society
- Associate Editor, North American Journal of Fisheries Management
- AFS Board of Professional Certification
- Chair, Skinner Memorial Award, American Fisheries Society
- Faculty Advisor, KSU Student Subunit of the American Fisheries Society
- Steering Committee, Kansas Natural Resources Conference
- Program Committee, Kansas Natural Resources Conference
- Mark Enloe Memorial Scholarship, KSU Division of Biology
- Adjunct Professor, University of Arizona
- Courtesy Professor, University of Missouri
- Science Committee, National Fish Habitat Initiative
- Session moderator, Midwest Fish and Wildlife Conference
- Session moderator, AFS Annual Meeting, Nashville
- Research Grade Evaluation Panel, U.S. Geological Survey

Rachel Pigg

- Student Representative to the Division of Biology Graduate Affairs Committee.

Kristen Pitts

- Co-instructor, GIS applications for fisheries course, American Fisheries Society Meeting, Ottawa, Canada
- Audio Visual Chair, AZ/NM American Fisheries Society

Josh Schloesser

- President, KSU Student Subunit of the American Fisheries Society
- Audio Visual Committee, Kansas Natural Resources Conference

Andrea Severson

- Student Poster Judge, KS Natural Resources Conference
- Secretary/Treasurer, KSU American Fisheries Society

Mackenzie Shardlow

- Publicity Committee, KS Natural Resources Conference
- Webmaster, Kansas Natural Resources Conference
- The Wildlife Society, Student Professional Development Working Group

Joanna Whittier

- President-Elect**,** Fisheries Information and Technology Section, American Fisheries Society
- Instructor, GIS applications for fisheries course, American Fisheries Society Meeting, Ottawa, Canada, Portland, OR, Nashville, TN, and Yokohama, Japan
- Advertising Committee, Western Division American Fisheries Society Meeting
- Webpage Editor, AZ/NM American Fisheries Society
- Publicity Committee, Kansas Natural Resources Conference
- Webpage Editor, Kansas Chapter of the American Fisheries Society
- Listserve Manager, Kansas Chapter of the American Fisheries Society

Awards and Recognition
2008-present

Wes Bouska
- American Fisheries Society Skinner Memorial Award Honorable Mention
- Janice Lee Fenske Memorial Award finalist
- Joan Duffy Travel Grant

Joe Gerken
- American Fisheries Society Skinner Memorial Award
- Kansas Chapter AFS Tiemeier-Cross Award
- Janice Lee Fenske Memorial Award finalist
- Joan Duffy Travel Grant
- Best Student Poster (2009, 2010), Kansas Chapter of the AFS
- Best Student Presentation, Kansas Chapter of the AFS
- Invited presentation, Midwest Fish and Wildlife Conference

Craig Paukert
- USGS Performance Award in the Cooperative Research Units (2008 and 2009)
- Finalist, Outstanding Biology Graduate Faculty Award, KSU
- Certificate of Appreciation, Education Section, American Fisheries Society
- Best Professional Presentation (2008, 2010), KS Chapter of the AFS

Kristen Pitts
- American Fisheries Society Equal Opportunity Award

Josh Schloesser
- American Fisheries Society Skinner Memorial Award
- Kansas Chapter AFS Tiemeier-Cross Award

Andrea Severson
- Ackert Award for Outstanding Presentation at the Biology Graduate Student Forum
- Nominee, Watkins Award for outstanding graduate student teaching in Biology
- Second place, best student oral presentation, American Water Resources Association Annual Water Resources Conference, Seattle
- Finalist, Best Student Poster, Annual AFS Meeting, Nashville
- Best Student Presentation, Kansas Chapter of the AFS
- Kansas Chapter AFS Tiemeier-Cross Award

Mackenzie Shardlow
- Janice Lee Fenske Memorial Award Winner
- Second Place, Best Student Presentation, Midwest Fish and Wildlife Conference
- Kansas Chapter of the Wildlife Society Travel Award
- Outstanding Unit Student, Kansas Cooperative Fish and Wildlife Research Unit
- Kansas Chapter of the Wildlife Society Travel Award

University Courses Taught by Unit Faculty

2008

Evolutionary Ecology/Conceptual Issues in Evolution	Instructor: Dr. Jack F. Cully, Jr. Assistant Unit Leader
Physiological Adaptations of Animals	Instructor: Dr. Jack F. Cully, Jr. Assistant Unit Leader
Fisheries Management and Techniques	Instructor: Dr. Craig P. Paukert Acting Unit Leader
Advances Fisheries Science	Instructor: Dr. Craig P. Paukert Acting Unit Leader

2009

GIS Applications for Ecology Studies	Instructor: Dr. Joanna B. Whittier Research Assistant Professor

2010

Ornithology	Instructor: Dr. Jack F. Cully, Jr. Assistant Unit-leader

Degrees Completed 1996 - 2009

2009

Jonathan M. Conard (Ph.D., 2009; Advisor: Gipson) Genetic variability, demography, and habitat selection in a reintroduced elk (*Cervus elaphus*) population.

Mackenzie R. Shardlow (M.S., 2009; Advisor: Paukert) Factors affecting the detectability and distribution of the North American river otter.

Ron E. VanNimwegen (Ph.D. (Posthumous), 2009; Advisor: Cully) Behavioral Ecology of Grasshopper Mice and Deer Mice.

2008

Wesley W. Bouska (M.S., 2008; Advisor: Paukert) Road crossing designs and their impact on fish assemblages and geomorphology of Great Plains streams.

Jeffrey L. Eitzmann. (M.S., 2008; Advisor: Paukert) Effects of anthropogenic disturbance on the fish assemblage and food web structure in a Great Plains river.

Kristen Pitts (M.S., 2008; Advisor: Paukert) Assessing threats to native fishes of the Lower Colorado River Basin.

Joshua Schloesser (M.S., 2008; Advisor: Paukert) Large river fish community sampling strategies and fish associations to engineered and natural river channel structures.

2007

Jesse R. Fischer (M.S., 2007; Advisor: Paukert) Structural organization of Great Plains stream fish assemblages: Implications for sampling and conservation.

2006

Jeremy Baumgardt (M.S., 2006; Advisor: Gipson) The effects of trapping methods on estimation of population parameters for small mammals.

Brian E. Flock (Ph.D., 2006; Advisor: Gipson) The effects of landscape configuration on northern bobwhite in southeastern Kansas .

Tracey N. Johnson (M.S., 2006; Advisor: Brett K. Sandercock) Ecological restoration of tallgrass prairie: grazing management benefits plant and bird communities in upland and riparian habitats.

Andrew S. Makinster (M.S., 2006; Advisor: Paukert) Flathead catfish population dynamics in the Kansas River.

Timothy R. Strakosh (Ph.D., 2006; Advisor: Keith Gido) Effects of water willow establishment on littoral assemblages in Kansas reservoirs: Focus on Age-0 largemouth bass.

Bala Thiagarajan (Ph.D., 2006; Advisor: Cully) Community dynamics of rodents, fleas and plague associated with black-tailed prairie dogs.

2005

Tammi L. Johnson (M.S., 2005; Advisor: Cully) Spatial dynamics of a bacterial pathogen: Sylvatic plague in Black-tailed prairie dogs.

Lorri A. Newby (M.S., 2005; Advisor: Cully) Effects of experimental manipulation of coterie size on demography of Black-tailed prairie dogs in South Dakota.

2004

No degrees granted

2003

Christopher D. Anderson (M.S.; 2003; Advisor: Gipson) Recreational pressure at Fort Niobrara National Wildlife Refuge: Potential impacts on avian use and seasonal productivity along the Niobrara River.

Jonathan M. Conard (M.S., 2003; Advisor: Gipson) Responses of small mammals and their predators to military disturbance in tallgrass prairie.

William E. Jensen (Ph.D., 2003; Advisor: Cully) Spatial variation in Brown-headed Cowbird (*Molothrus ater*) abundance and brood parasitism in Flint Hills Tallgrass Prairie.

Mayee Wong (M.S., 2003; Advisor: Cully) High spatial homogeneity in a sex-biased mating system: The genetic population structure of greater prairie chickens (*Tympanuchus cupido pinnatus*) in Kansas, Missouri, and Nebraska.

Stanley L. Proboszcz (M.S., 2003; Advisor: Guy) Evaluation of habitat enhancement structure use by spotted bass in natural and experimental streams.

2002

Michael C. Quist (Ph.D., 2002, Advisor: Guy) Abiotic factors and species interactions that influence recruitment of walleyes in Kansas reservoirs.

2001

Troy R. Livingston (M.S., 2001; Advisor: Gipson) Coprophagy: An ecological investigation of the consumption of mammalian carnivore feces.

Amber D. Rucker (M.S., 2001; Advisor: Cully) Conversion of tall fescue pastures to tallgrass prairie in southeastern Kansas: Small mammal responses.

Gerald L. Zuercher (Ph.D., 2001; Advisor: Gipson) The ecological role of the Bush Dog, *Speothos venaticus*, as part of the mammalian predator community in the Interior Atlantic Forest of Paraguay.

2000

Patrick J. Braaten (Ph.D., 2000; Advisor: Guy) Growth of fishes in the Missouri River and Lower Yellowstone River, and factors influencing recruitment of freshwater drum in the lower channelized Missouri River.

Anne C. Cully (Ph.D., 2000; Advisors: Barkley and Knapp). The effects of size and fragmentation on tallgrass prairie plant species diversity.

Travis B. Horton (M.S., 2000; Advisor: Guy) Habitat use and movement of spotted bass in Otter Creek, Kansas.

Sally J. Schrank (M.S., 2000; Advisor: Guy) Population characteristics of bighead carp *Hypophthalmichthys nobilis* larvae and adults in the Missouri River and interspecific dynamics with paddlefish *Polyodon spathula*.

Patricia R. Snyder (M.S., 2000; Advisor: Gipson) Assessment of activity transmitters based on behavioral observations of coyotes, bobcats, and raccoons.

Jeffry A. Tripe (M.S., 2000; Advisor: Guy) Density, growth, mortality, food habits, and lipid content of age-0 largemouth bass in El Dorado Reservoir, Kansas.

1999

Justin E. Kretzer (M.S., 1999; Advisor: Cully) Herpetological and coleopteran communities of black-tailed prairie dog colonies and non-colonized areas in southwest Kansas.

Michael C. Quist (M.S., 1999; Advisor: Gipson) Structure and function of fish communities in streams on Fort Riley Military Reservation.

James W. Rivers (M.S., 1999; Advisor: Gipson) Seasonal avian use patterns of farmed wetlands and nest predation dynamics in riparian grasslands dominated by reed canary grass (*Phalaris arundinacea*).

Stephen L. Winter (M.S., 1999; Advisor: Cully) Plant and breeding bird communities of black-tailed prairie dog colonies and non-colonized areas in southwest Kansas and southeast Colorado.

1998

Jan F. Kamler (M.S., 1998; Advisor: Gipson) Ecology and interspecific relationships of mammalian predators on Fort Riley Military Reservation, Kansas.

1997

Matthew N. Burlingame (M.S., 1997; Advisor: Guy) 1995 Kansas licensed angler use and preference survey and attitudes towards angling by secondary education students.

Greg A. Hoch (M.S., 1997; Advisor: Cully) Mapping and monitoring of disturbance from military training at Fort Riley, Kansas and an investigations into the stability of grassland ecotones using satellite remote sensing.

David E. Hoover (M.S., 1997; Advisor: Gipson) Vegetation and breeding bird assemblages in grazed and ungrazed riparian habitats in southeastern Kansas.

Raymond S. Matlack (M.S., 1997; Advisor: Gipson) The swift fox in rangeland and cropland in western Kansas: Relative abundance, mortality, and body size.

Heidi L. Michaels (M.S., 1997; Advisor: Cully) Landscape and fine scale habitat of the Loggerhead Shrike and Henslow's Sparrow on Fort Riley Military Reservation, Kansas.

Jeff S. Tillma (M.S., 1997; Advisor: Guy) Characteristics of spotted bass in southeast Kansas streams.

1996

William K. Smith (M.S., 1996; Advisor: Gipson) Responses of Ring-necked Pheasants to Conservation Reserve Program fields during courtship and brood rearing in the high plains.

Jennifer R. Wiens (M.S., 1996; Advisor: Guy) Effects of tree revetments on the abiotic and biotic components in two Kansas streams.