

Biennial Report

January 2010 - August 2012



Kansas Cooperative
Fish and Wildlife Research Unit

Biennial Report

Kansas Cooperative Fish and Wildlife Research Unit

January 2010 - August 2012

United States Geological Survey
205 Leasure Hall
Division of Biology
Kansas State University
Manhattan, Kansas 66506-3501
Telephone (785) 532-6070
Fax (785) 532-7159
Email kscfwru@ksu.edu
<http://www.k-state.edu/kscfwru/>

Unit Cooperators
U.S. Geological Survey
Kansas Department of Wildlife, Parks, and Tourism
Kansas State University
Wildlife Management Institute
U.S. Fish and Wildlife Service

TABLE OF CONTENTS

Preface	4
Mission Statement.....	8
Personnel and Cooperators	9
Graduate Students Supported by Unit Projects.....	14
Fisheries Projects	16
Ongoing Fisheries Projects	17
Assessing Distribution and Movement of Blue Catfish in Kansas Reservoirs	18
Developing and Testing a Spatially-Explicit, Science-Based, Decision-Support Tool for Making Riverscape-Scale Management Decisions: How Dams Affect Fish Communities, a Threatened Native Stream Fish (the Neosho Madtom), and Select Tributary Fish Species	19
Plum IslandEcosystems LTER	21
Modeling the Effects of Climate Change on Fish Populations in Large Rivers	22
Can a Mobile Consumer affect Ecosystem Function in Streams at the Konza Prairie: Exploring Crayfish Movements using PIT Tags and Mobile and Stationary Antennas	23
Recruitment of Fishes in the Kansas River	24
Long-Term Monitoring of Kansas River Fishes	26
Completed Fisheries Projects	27
Effects of Zebra Mussels on Reservoir Aquatic Communities.....	28
Sand Dredging Effects on Fishes and Fish Habitat in the Kansas River	29
Wildlife Projects	31
Ongoing Wildlife Projects	32
Development of Conservation and Climate Adaptation Strategies for Wetlands in the Great Plains LCC Region	33
Movements, Habitat Use, Survival, and potential implications of Climate Change on Mottled Ducks (<i>Anas fulvigula</i>) in the Texas Chenier Plain Region.....	34
Vegetation Use of Moist-Soil Management for Waterfowl on the Texas Coast	35
American Woodcock Habitat Occupancy and Migratory Origins in East Texas	36
Assessment Lead Exposure, Habitat Use, and Nesting Ecology of Black-necked Stilts (<i>Himantopus mexicanus</i>) on the Upper Texas Coast	37
Potential Exposure to Environmental Lead in Mottled Ducks (<i>Anas fulvigula</i>) on the Texas Chenier Plains National Wildlife Refuge Complex	38
Risk Assessment of Exposure to Lead for Mottled Ducks on National Wildlife Refuge of the Texas Gulf Coast.....	39
Parasitemia, Health, and Reproduction in Lesser Scaup at Red Rock Lakes National Wildlife Refuge.....	40
Estimating Inundation Frequency of Playa Wetlands Using 1970s LandSat MSS Data: Did Irrigation Practices Artificially Increase Frequency and Longevity of Landscape Wetness? ..	41
Occurrence and Prediction of Avian Disease Outbreaks in Kansas	42
Lesser Prairie-Chicken Habitat Use, Survival, and Recruitment in Kansas	43
Effects of USDA Conservation Practices on Lesser Prairie-Chickens in Kansas and Colorado... ..	45
Lesser Prairie-Chicken Response to USDA Conservation Practices In Kansas and Colorado	46

Completed Wildlife Projects	48
Status and Distribution of Black-tailed Prairie Dogs on Small Cultural National Parks in the Western Great Plains	49
Small Mammal Populations in Prairie Ecosystems: Scale Dependent Responses to Disturbance	52
Community Response to Use of Prescribed Grazing and Tebuthiuron Herbicide for Restoration of Sand Shinnery Oak Communities	54
Occurrence, Function, and Conservation of Playa Wetlands: The Key to Biodiversity of the Southern Great Plains	56
Deer Density, Movement Patterns, and Group Dynamics on Quivira National Wildlife Refuge: Assessing Potential Risk for Disease Transmission	58
Technical Assistance	59
Black-tailed Prairie Dog Colony Mapping at the Kiowa and Rita Blanca National Grasslands ...	60
List of Scientific, Peer Reviewed Publications	61
List of Technical Publications	65
Theses and Dissertations	66
Professional Papers Presented.....	67
Committees and Other Professional Assignments	73
Awards and Recognition	75
Courses Taught by Unit Faculty	76
Degrees Completed 1996-2012.....	77

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, Parks, and Tourism, Kansas State University, U.S. Fish and Wildlife Service, 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.

In May 2010, Dr. Paukert assumed the Unit Leader position at the Missouri Cooperative Fish and Wildlife Research Unit. Dr. Jack Cully was appointed Acting Unit Leader. Dr. Martha Mather joined the Kansas Unit in October 2010 as Assistant Leader-Fisheries. Dr. David Haukos was hired as Unit Leader in February 2011. In September 2012, Dr. Jack Cully will retire from the Kansas Unit.

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 18 new projects were initiated and 7 were completed. Six students finished Master's degrees and two finished Ph.D. degrees.

New Projects:

Assessing Distribution and Movement of Blue Catfish in Kansas Reservoirs

Developing and Testing a Spatially-Explicit, Science-Based, Decision-Support Tool for Making Riverscape-Scale Management Decisions: How Dams Affect Fish Communities, a Threatened Native Stream Fish (the Neosho Madtom), and Select Tributary Fish Species

Plum Island Ecosystems LTER

Modeling the Effects of Climate Change on Fish Populations In Large Rivers

Can a Mobile Consumer affect Ecosystem Function in Streams at the Konza Prairie: Exploring Crayfish Movements using PIT Tags and Mobile and Stationary Antennas

Development of Conservation and Climate Adaptation Strategies for Wetlands in the Great Plains LCC Region

Movements, Habitat Use, Survival, and potential implications of Climate Change on Mottled Ducks (*Anas fulvigula*) in the Texas Chenier Plain Region

Use of Moist-Soil Management for Waterfowl on the Texas Coast

American Woodcock Habitat Occupancy and Migratory Origins in East Texas

Lead Exposure, Habitat Use, and Nesting Ecology of Black-necked Stilts (*Himantopus mexicanus*) on the Upper Texas Coast

Potential Exposure to Environmental Lead in Mottled Ducks (*Anas fulvigula*) on the Texas Chenier Plains National Wildlife Refuge Complex

Risk Assessment of Exposure to Lead for Mottled Ducks on National Wildlife Refuge of the Texas Gulf Coast

Parasitemia, Health, and Reproduction in Lesser Scaup at Red Rock Lakes National Wildlife Refuge

Estimating Inundation Frequency of Playa Wetlands Using 1970s Landsat MSS Data: Did Irrigation Practices Artificially Increase Frequency and Longevity of Landscape Wetness?

Occurrence and Prediction of Avian Disease Outbreaks in Kansas

Lesser Prairie-Chicken Habitat Use, Survival, and Recruitment in Kansas

Effects of USDA Conservation Practices on Lesser Prairie-Chickens In Kansas and Colorado

Lesser Prairie-Chicken Response to USDA Conservation Practices In Kansas and Colorado

Completed Projects:

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

Effects of Zebra Mussels on Reservoir Aquatic Communities

Status and Distribution of Black-tailed Prairie Dogs on Small Cultural National Parks in the Western Great Plains

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

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

Community Response to Use of Prescribed Grazing and Tebuthiuron Herbicide For Restoration of Sand Shinnery Oak Communities

Occurrence, Function, and Conservation of Playa Wetlands: The Key to Biodiversity of the Southern Great Plains

Master's Theses Completed:

Zavaleta, Jennifer. (M.S. 2012; advisor Haukos). Effects of grazing and herbicide treatments to restore degraded sand shinnery oak grasslands. Texas Tech University.

Fischer, Jason (M.S. 2012; advisor Paukert). Fish community response to habitat alteration: impacts of sand dredging in the Kansas River. Kansas State University

Burak, Matt (M.S. 2011; advisor Mather). Developing the technology for an inexpensive, video system to count anadromous herring. University of Massachusetts.

Goldberg, Amanda (M.S. 2011; advisor Cully). Apparent survival, dispersal, and abundance of black-tailed prairie dogs. Thesis, Kansas State University.

Moon, Derek (M.S. 2011; advisor Cully). Small mammals in disturbed tallgrass prairie landscapes. Thesis, Kansas State University.

Severson, Andrea (M.S. 2010; advisor Paukert). Effects of zebra mussel (*Dreossena polymorpha*) invasion ion the aquatic community of a Great Plains reservoir. Kansas State University.

Ph.D. Dissertations Completed:

Johnson, Lacreia (Ph.D 2011: advisor Haukos). Current status and function of playa wetlands on the Southern Great Plains. Texas Tech University.

Smith, Joseph (Ph.D. 2011; advisor Mather). Examining fish community distribution and coalescence in coastal streams and estuaries using network theory. University of Massachusetts, Amherst, MA.

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
370 South Lowe Avenue
Suite A-218
Cookeville, TN 38501

Wildlife Management Institute

Patrick Ruble
12748 West Bank Dr.
Millersport, OH 43046

Kansas Department of Wildlife, Parks, and Tourism

Secretary Robin Jennison
Office of the Secretary
1020 S. Kansas, Rm 200
Topeka, KS 66612-1327

Kansas State University

Dr. Brian Spooner
Director
Division of Biology Ackert Hall, KSU
Manhattan, KS 66506

U.S. Fish and Wildlife Service

Dr. Steve Torbit
Assistant Regional Director
Region 6, U.S. Fish and Wildlife Service
134 Union Blvd
Lakewood, CO 80228

Cooperative Unit Staff

David A. Haukos, Ph.D.

Unit Leader, Wildlife and Adjunct Associate Professor, Division of Biology

Jack F. Cully, Ph.D.

Assistant Unit Leader, Wildlife and Adjunct Associate Professor, Division of Biology

Martha Mather, Ph.D.

Assistant Unit Leader, Fisheries and Adjunct Associate Professor, Division of Biology

Gene Albanese, Ph.D

Research Associate – Wildlife, Division of Biology

Joe Smith, Ph.D

Research Associate – Fisheries, Division of Biology

Faculty Cooperators at Kansas State University

Division of Biology

Dr. Walter Dodds

Dr. Keith Gido

Dr. Tony Joern

Dr. Jessie Nippert

Dr. Brett Sandercock

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

Additional Universities

Michigan State University
Dr. Dana Infante

Ohio State University
Dr. Elizabeth Marschall

Oklahoma State University
Dr. Craig Davis
Dr. Dwayne Elmore
Dr. David Engle
Dr. Ryan Limb
Dr. Scott McMurry
Dr. Loren Smith

Pennsylvania State University
Dr. Paola Ferreri
Dr. Tyler Wagner

Stephen F. Austin State University
Dr. Warren Conway
Dr. Chris Comer
Dr. Monty Whiting

Texas Tech University
Dr. Philip Gipson
Dr. Blake Grishom
Dr. Mark Wallace

University of Colorado
Sharon Collinge
Andrew Martin
Chris Ray

University of Minnesota-Duluth
Dr. Lucinda Johnson

University of Missouri
Dr. David Galat
Dr. Josh Millsbaugh

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**

Matt Bain
Tom Bidrowski
Dr. David Dahlgren
Dr. Lloyd Fox
Jason Goeckler
Shane Hesting
Eric Johnson
Joe Kramer
Jason Lugenbill

Ron Marteney
Mike Mitchener
Doug Nygren
Matt Peek
Jim Pitman
John Reinke
Mark Van Scoyoc
Keith Sexson
Ely Sprenkle

Kansas Department of Transportation

Jeff Horton
Scott Vogel

Federal Government

U.S. Fish and Wildlife Service, Kansas

Susan Blackford
Mike Disney
Greg Kramos
Rachel Lauban
Mike LaValley
Dan Mulhern
Vernon Tabor

U.S. Fish and Wildlife Service, Texas

Bill Johnson
Duane Lucia
Jena Moon
Jude Smith
Patrick Walther
Heather Whitlaw

U.S. Fish and Wildlife Service, Montana

Dr. Tom Roffe
Jeff Warren

U.S. Fish and Wildlife Service, New Mexico

James Broska
Dr. Matthew Butler
Dr. Dan Collins
Dr. Grant Harris
Dr. Steve Sesnie
John Vhrenburg

U.S. Fish and Wildlife Service, South Dakota

Dr. Pete Gober

U.S. Fish and Wildlife Service, Wyoming

Mike Lockhart

U.S. Geological Survey

Dr. Jane Austin
Dr. Doug Beard
Dr. Dean Biggins
Dr. Clint Boal
Dr. Dave Hamilton
Dr. Steve Hostetle
Dr. Jeff Kershner
Andrea Ostroff
Dr. Donna Parrish
Dr. Susan Skagen
Dr. Elizabeth Webb

U.S. Department of Agriculture, Agricultural Research Service

Dr. David Augustine

U.S. Department of Agriculture, Natural Resources Conservation Service

Dr. Christian Hagen

U.S. Bureau of Land Management, Arizona

Heidi Blasius

Centers for Disease Control and Prevention

Dr. Ying Bai
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

Shawn Stratton
Dr. Philip Woodford

U.S. Army Corps of Engineers Research Laboratory

Alan Anderson
Heidi Howard

State Agencies

Colorado Wildlife and Parks

Brian Dreher
 Dr. Jim Gammonly
 Dr. David Klute
 Dr. Mindy Rice
 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

Texas Parks and Wildlife Department

Sean Kyle

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

Graslans Charitable Trust

Charles Dixon
 Willard Heck
 Jim Weaver

The Nature Conservancy

Patricia McDaniel
 Robert Martin

Ogallala Commons

Dr. Darryl Birkenfeld
 Julie Hodges

Graduate Students Supported by Unit Projects, 2010-present

Student and Degree Sought	Thesis Project	Previous Education	Advisor
Jane Fencl, M.S.	Developing and Testing a Spatially-Explicit, Science-Based, Decision-Support Tool for Making Riverscape-Scale Management Decisions: How Dams Affect Fish Communities, a Threatened Native Stream Fish (the Neosho Madtom), and Select Tributary Fish Species	B.S., University of New Mexico	Dr. Mather
*Jason Fischer, M.S.	Fish Community Response to Habitat Alteration: Impacts of Sand Dredging in the Kansas River.	B.S., Michigan State University	Dr. Paukert
Kayla Gerber, M.S.	Assessing Distribution and Movement of Blue Catfish in Kansas Reservoirs	B.S., Winona State University	Dr. Mather
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
Sean Hitchman, Ph.D.	Developing and Testing a Spatially-Explicit, Science-Based, Decision-Support Tool for Making Riverscape-Scale Management Decisions: How Dams Affect Fish Communities, a Threatened Native Stream Fish (the Neosho Madtom), and Select Tributary Fish Species	B.S., Univ. of South Carolina M.S., Univ. of San Diego	Dr. Mather
Brian Kerns, Ph.D	Risk Assessment of Exposure to Lead for Mottled Ducks on National Wildlife Refuge of the Texas Gulf Coast	B.S., Whitman College M.S., Univ. of Southern California	Dr. Haukos
*Derek Moon, M.S.	Small Mammal Populations in Prairie Ecosystems: Scale Dependent Responses to Disturbance	B.S., Kansas State University	Dr. Cully
Zach Peterson, M.S.	Assessing Distribution and Movement of Blue Catfish in Kansas Reservoirs	B.S., Texas A&M University	Dr. Mather

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
*Andrea Severson, M.S.	Effects of Zebra Mussel (<i>Dreossena polymorpha</i>) Invasion on the Aquatic Community of a Great Plains Reservoir	B.S., Utah State University	Dr. Paukert
Andrew Stetter, M.S.	Parasitemia, Health, and Reproduction in Lesser Scaup at Red Rock Lakes National Wildlife Refuge	B.S., Univ. of Wisconsin, Stevens Point	Dr. Haukos
Brandon Weihs, Ph.D.	Estimating Inundation Frequency of Playa Wetlands Using 1970s LandSat MSS Data: Did Irrigation Practices Artificially Increase Frequency and Longevity of Landscape Wetness?	B.S., Univ. of Nebraska - Omaha M.S., Univ. of Nebraska - Omaha	Dr. Haukos

*Student received degree during reporting period

Fisheries Projects



The Kansas River near St. George, Kansas

Ongoing Fisheries Projects



Team Blue Catfish, 2012

**Front row: KCFWRU including Martha Mather, Kayla Gerber, Zach Peterson, Joe Smith
Jake Danner, Sean Hitchman, Jane Fencl. Back row: KDWPT including Ely Sprenkle,
Jason Goeckler, Ron Marteney, John Reinke**

Assessing Distribution and Movement of Blue Catfish in Kansas Reservoirs

Investigators

Kayla Gerber, M.S. Student
 Zach Peterson, M.S. Student
 Dr. Martha Mather
 Jason Goeckler, KDWPT
 John Reinke, KDWPT

Project Supervisor

Dr. Martha Mather

Funding

Kansas Department of Wildlife,
 Parks, and Tourism

Cooperators

Kansas Department of Wildlife,
 Parks, and Tourism

Kansas State University

Objectives

Determine distribution and seasonal movements of the blue catfish in a large reservoir.

Assess correlates of this distribution.

Location

Milford Reservoir

Completion

December 2015

Status

On-going

Progress and Results

In the first year of this project, both graduate students have written proposals for their research that meet the standards of the KSU Division of Biology, Biology 863, a course required of all incoming graduate students. We have met and discussed the project with KDWPT on a number of occasions. The graduate students have completed first aid and MOCC training. We have developed and tested tagging protocols for hatchery blue catfish. In this test, we inserted dummy acoustic tags in 12 blue catfish and held them with 12 untagged controls for 7 days in raceways at Milford Hatchery, KS. All fish (tagged and controls) survived for the study duration. The insertion site for the tagged fish healed well and tags remained within the coelomic cavity. In June, 2012, we tagged 48 blue catfish in Milford Lake. Biologists from KDWPT captured wild blue catfish using boat electrofishing. KCFWRU personnel inserted VEMCO V9 acoustic tags. To detect these tags, 20 stationary receivers were deployed throughout Milford Lake. Throughout the summer of 2012, we will collect movement data on blue catfish using stationary receivers and active tracking. These data will be combined with a spatially explicit map of temperature, bathymetry, current velocity, and prey (fish and invertebrate).

Developing and Testing a Spatially-Explicit, Science-Based, Decision-Support Tool for Making Riverscape-Scale Management Decisions: How Dams Affect Fish Communities, a Threatened Native Stream Fish (the Neosho Madtom), and Select Tributary Fish Species

Investigators

Jane Fencil, M.S. Student
Sean Hitchman, Ph.D.
Student
Dr. Joe Smith
Dr. Martha Mather
Eric Johnson, KDWPT

Project Supervisor

Dr. Martha Mather

Funding

Kansas Department of
Wildlife, Parks, and
Tourism

Cooperators

Kansas Department of
Wildlife, Parks, and
Tourism

Kansas State University

Objectives

Develop and test a
spatially-explicit, decision-
support tool for managing
human impacts in stream
and river networks

Quantify how dams and
scale affect fish
communities in and
threatened / endangered
fish species

Assist in developing
protocols for assessing
dam removals

Collect pre and post-
removal data for Correll
Dam

Location

Neosho River, Kansas

Completion

December 2015

Status

On-going

Progress and Results

Managers need science-based tools to assess how human activities impact resources. Useful tools need to be based on rigorous, current science, yet they also need to address specific problems relevant to environmental managers. Consequently, an effective decision-support tool should (i) translate existing scientific insights into the spatial-temporal scales, specificity, and precision needed to address real-world management problems, (ii) identify future information needs, and (iii) help management agencies efficiently allocate their time, manpower, and funding resources. Stream fish distribution is influenced by many factors other than dams. Although fragmentation by dams is a reasonable focus for developing a lotic decision-support tool, a broad range of other ecological conditions (such as habitat, temperature, discharge, and the biotic community) must also be included. This research will advance riverscape scale understanding of the structure and function of aquatic ecosystems. In addition, managers will be able to place their management actions in a synthetic, landscape-scale, multiple-stressor context. Both graduate students have written proposals for their research that meet the standards of the KSU Division of Biology BIO 863, a course required of all incoming graduate students. We have met with KDWPT and other regional experts to discuss the fish community of the Neosho River. The graduate students have completed first aid, MOCC training, and attended an NSF- sponsored aquatic GIS course at St. Louis University. We are in the process of evaluating (a) which sampling gear will be most effective, (b) the most effective scale for sampling and (c) size of the dam footprint. We have hosted researchers from Missouri who demonstrated the mini-Missouri trawl and determined that this gear is suitable for comparing fish communities above and below dams.



KCFWRU, MDC, KDWPT fish biologists and fish colleagues test the mini-Missouri trawl below the Cottonwood Falls dam, July 2012

Plum Island Ecosystems LTER

Investigators

TBD Ph.D student
Dr. Martha Mather
12 other Principal Investigators
from multiple universities

Project Supervisor

Dr. Anne Giblin, MBL, Woods
Hole

Funding

NSF

Cooperators

Kansas State University

Objectives

Evaluate ecological drivers for
the spatial arrangements and
connectivity between ecological
habitat patches in the coastal
zone

Determine the spatial
arrangement and the connectivity
between ecological habitat
patches in coastal watersheds
and the estuarine seascape
including their influence
ecological processes

Continue studies of movement
on fish predators

Location

Plum Island Estuary

Completion

September 2016

Status

Initiation Fall 2012

Progress and Results

The Plum Island Ecosystems (PIE) LTER has, since its inception in 1998, been working towards a predictive understanding of the long-term response of coupled land-water ecosystems. The Plum Island Estuary-LTER includes the coupled Parker, Rowley, and Ipswich River watersheds. Over the next four years we will build upon the progress we have made in understanding the importance of spatial patterns and connections across the land-margin ecosystem. Higher trophic levels, such as fish, rely on seascape configurations that create 'hot spots' of energy transfer up the food web. At larger scales, striped bass, a top predator, develops two distinct feeding groups—one specializing in feeding on marsh-dependent species and one specializing in pelagic fish in the open bay. This specialized behavior may allow them to become more efficient predators, potentially increasing their top-down control on prey.

Understanding the role of striped bass requires that we understand the regional scale dynamics of highly migratory striped bass. My involvement in this project focuses on how movements of top fish predators affect ecosystem structure and function. Specifically, using acoustic tags in conjunction with acoustic receivers, we have discovered that 65% of PIE striped bass (ages 4-6) winter in Delaware Bay and over 60% return to PIE the following year.

The scientific questions and methods used are very similar to those proposed for the blue catfish movement project described above. I will continue these investigations with a Ph.D. student funded through KSU. This research should complement ongoing fish movement work in Kansas.

Modeling the Effects of Climate Change on Fish Populations In Large Rivers

Investigators

Dr. Martha Mather
Dr. Donna Parrish
Dr. Elizabeth Marschall

Project Supervisors

Dr. Donna Parrish

Funding

NMFS

Cooperators

Kansas State University

Objective

Model the effects of climate change on fish survival in rivers during periods of heavy movement

Location

Large US Rivers associated with NE US Climate Center (includes tallgrass prairie, KS)

Expected Completion

April 2017

Status

On-going

Progress and Results

Mobile organisms including fish predators and anadromous fish may be affected by climate change through several mechanisms. These include increased water temperature and altered discharge patterns. Anthropogenic impacts, especially fragmentation by dams, can exacerbate these effects by preventing or delaying movements. In this project, we use an individual based model to understand the relationships among water temperature, discharge, dams, movement patterns, and fish survival. Although previously this research has focused on anadromous fish in large NE US rivers, the methods and insights have relevance to motile organisms in other systems where temperature and discharge are changing with climate, especially in river systems fragmented by dams. In previous work, we modeled survival of Atlantic salmon smolts in the Connecticut River using three pieces of data: 1) spring river temperature (March – May) as triggers for the initiation of migration from tributaries into the main stem, 2) spring river discharge (March- May) as the determinant of how fast salmon smolts move from the tributaries to the estuary, and 3) spring river temperatures (March-May) in the main stem as the ultimate determinate of whether smolts will survive outmigration (2 - 20 °C fish survive, otherwise they die). For this we used real river temperatures and real discharge collected throughout the Connecticut River watershed for a 10 year period. We will continue to take a modeling approach using fish life history and existing temperature and discharge data sets. Results should be applicable to mobile fish in large and small Great Plains rivers.

Can a Mobile Consumer Affect Ecosystem Function in Streams at the Konza Prairie: Exploring Crayfish Movements using PIT Tags and Mobile and Stationary Antennas

<p>Investigators Dr. Martha Mather Judith Patterson Joe Gerken Dr. Joe Smith Joe Reznick</p> <p>Project Supervisors Dr. Martha Mather</p> <p>Funding REU - NSF</p> <p>Cooperators National Science Foundation Kansas State University</p> <p>Objective Test if animal movement can change the outcome of ecological interactions in a grassland ecosystem Refine PIT tag methodologies for use in other systems.</p> <p>Location Kings Creek, Konza Prairie, KS</p> <p>Expected Completion December 2014</p>	<p>Status On-going</p> <p>Progress and Results Streams matter to a grasslands ecosystem. Ecosystem function and functioning ecosystems within these streams also matter. Multicellular animals, especially motile organisms, affect ecosystem function and functioning ecosystems. Specifically, motile organisms (a) can affect productivity as vectors for nutrient and energy transport, (b) provide unique pathway for upstream (multidirectional) flux of nutrients and energy, (c) their biodiversity can add stability to ecosystems. In particular, crayfish may play an important role in stream ecosystem function because they play a central role in aquatic and riparian food webs and act as an energy and nutrient transport vehicles in several food webs. Specifically, they connect autotrophic (algae, macrophytes) and heterotrophic (detrital) production with higher terrestrial (raccoon, birds) and aquatic (fish, otters) trophic levels. They are also very abundant and occur throughout a stream ecosystem. In the summer of 2012, we externally PIT tagged 181 crayfish. In one pool, four stationary PIT tag antenna were sited. Across multiple pools, we conducted a mobile pit tag survey. 137 of 181 tagged crayfish were detected at least once in 5 weekly backpack surveys. About 75% of these were detected by stationary antenna. By examining distribution patterns and relating them to environmental correlates, we are using these data to test how movement defines interactions, the role of abiotic escape, the impact of biogeochemical hotspots and how niche partitioning affects crayfish distributional patterns. These methods and results have generality to a wide range of fish and ecosystems including fish in Great Plains streams and rivers.</p>
---	--

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, Parks and
Tourism

Cooperators

Kansas Department of
Wildlife, Parks, and
Tourism

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

The exchange of nutrients between inundated terrestrial habitats and the main channel is thought to be a vital component of nutrient flow and food web assemblages in large rivers. Inundated terrestrial habitats may increase nutrient availability to fishes both directly (e.g. movement into flooded habitats) and indirectly (e.g. nutrients flushed into main channel) during periods of high flow. Allochthonous inputs during high flows may also provide fishes and invertebrates with necessary nutrients and energy after floods recede and return to base flow.

Despite the perceived importance of high flows for fishes and their invertebrate prey base, few studies have quantitatively examined how fish and invertebrate communities respond to flooding and floodplain inundation. We sampled fishes and benthic and drifting invertebrates in inundated habitats and adjacent main channel and downstream reaches of the Kansas River from 2009 – 2011. Samples were collected from each reach before, during, and after floods to quantify how nutrient flow is impacted by floodplain inundation. Drifting invertebrate densities were highest during high flows ($x \pm = 1.07$ invertebrates/m³) and lowest post flooding (0.39 invertebrates/m³) ($p < 0.001$). During high flows, invertebrate density was significantly higher in flooded habitats ($x \pm = 1.03$ invertebrates/m³) than in the main channel ($x \pm = 0.73$ invertebrates/m³) and downstream reaches ($x \pm = 0.64$ invertebrates/m³) ($p < 0.001$) indicating that prey may be more readily available to fishes that move into these habitats. Stable isotope analyses used to examine nutrient use by fishes in the main channel and inundated habitats found that carbon (¹³C) and nitrogen (¹⁵N) isotope signatures were similar between fishes in flooded habitats and main channel reaches indicating that both groups of fishes are utilizing similar nutrient sources.

Preliminary results of this study indicate that large bodied fishes utilized flooded habitats when available, and that the inundation of terrestrial habitats during the flood pulse provides invertebrates to the main channel that may be consumed by main channel fishes. Data analysis is ongoing and is expected to be completed by Dec. 2012.

Products since 2010

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.

- White, K., J. Gerken, C. Paukert, and A. Makinster. 2010. Fish community structure in natural and engineered habitats in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Gerken, J., and C. Paukert. 2010. Testing the flood pulse concept: The importance of floodplain inundation on fish and invertebrates of a Great Plains river. American Fisheries Society Annual Meeting, Pittsburgh, PA
- Gerken, J., and C. Paukert. 2010. Floods and fishes: examining the role of high flows on fish and invertebrates in a large Great Plains River. Midwest Fish and Wildlife Conference, St. Paul, MN.
- Paukert, C. and J. Gerken. 2010. The Importance of secondary channels to mainchannel fishes in the Kansas River. Big River Confab, Jefferson City, MO.
- Gerken, J., and C. Paukert. 2011. The importance of high flows and floodplain inundation for fish and invertebrates of the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Gerken, J., and C. Paukert. 2011. Age-specific demography of silver carp: implications for management and control. American Fisheries Society Annual Meeting, Seattle, WA.
- Gerken, J., and C. Paukert. 2011. Can silver carp be controlled? Population level response to various management regimes. Midwest Fish and Wildlife Conference, Des Moines, IA.

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. 2012
 Dr. Craig Paukert
 Dr. Martha Mather

Project Supervisor

Dr. Craig Paukert 2005-2010
 Dr. Martha Mather

Funding

Kansas Cooperative Fish and
 Wildlife Research Unit

Kansas Department of
 Wildlife, Parks, and Tourism

Cooperators

Kansas Department of
 Wildlife, Parks, and Tourism
 Dr. Keith Gido

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.

Completed Fisheries Projects



**Collaboration between KCFWRU and KDWPT on blue catfish
acoustic tagging at Milford lake, June, 2012**

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

Status

Completed

Results

The zebra mussel is an invasive bivalve that was first confirmed in Kansas in 2003, and has decreased zooplankton abundance and altered the aquatic community in other areas where it has invaded. However, little is known about its effects on the aquatic communities of warm-water Great Plains reservoirs. We analyzed zooplankton, benthic macroinvertebrate, and juvenile and small-bodied fish abundance in the littoral zone of an Eastern Kansas reservoir with an established zebra mussel population (El Dorado Reservoir) and a control reservoir without zebra mussels (Melvern Reservoir) for two years pre-zebra mussel invasion (2001-2002) and two years post-invasion (2008-2009). We found no difference in littoral zooplankton abundance between reservoirs across time, but abundance of some macroinvertebrate taxa increased, and abundance of juvenile *Lepomis* spp. and red shiners decreased in the littoral zone of El Dorado Reservoir in August of the post-zebra mussel invasion period in comparison to the control reservoir. We also analyzed abundance and condition of six adult reservoir fishes in El Dorado Reservoir and three control reservoirs in Eastern Kansas for ten years pre-zebra mussel invasion (1993-2002) and five years post-invasion (2004-2008). Adult white crappie abundance remained constant in El Dorado Reservoir but decreased in the control reservoirs during the post-zebra mussel invasion period, and condition of adult bluegill, white bass, and white crappie decreased in El Dorado Reservoir in the post-zebra mussel invasion period compared to the control reservoirs. Our findings suggest that zebra mussel invasion in El Dorado Reservoir may have affected some benthic macroinvertebrates, juvenile and small-bodied fishes, and adult fishes. We did not find evidence that zebra mussels have had substantial effects on the zooplankton community of El Dorado Reservoir. However, July-August zebra mussel veliger densities in El Dorado Reservoir averaged less than 12 veligers/L in four of the six post-zebra mussel invasion years. Additional research and long-term monitoring of zooplankton, macroinvertebrates, and fishes will be necessary to determine the full effects of zebra mussels on the aquatic communities of warm-water reservoirs throughout North America.

Products since 2010

Severson, Andrea. Effects of zebra mussel (*Dreosena polymorpha*) invasion on the aquatic community of a Great Plains reservoir. M.S. Thesis, Kansas State University.

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

Severson, A. and C. Paukert. 2010. Zooplankton community response to zebra mussel invasion in a Kansas reservoir. Midwest Fisheries Student Colloquium, Manhattan, KS.

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

Investigators

Jason Fischer, M.S. 2012
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

February 2012

Status

Completed

Results

In-stream dredging is a common practice in rivers worldwide that can affect fish and fish habitat. We investigated the magnitude of these alterations and their influence on the fish community of the Kansas River, a large sand bed river. Fishes were collected monthly from June 2010 to June 2011 in Edwardsville and Lawrence, KS from 12, 1-km reaches (three actively dredged, two historically dredged that have not been dredged in at least one month, and seven control reaches) with bottom trawls, seines, and electrofishing. Water depths and velocities were measured with an acoustic doppler current profiler and interpolated in ArcGIS at all 12 reaches. Actively dredged reaches had proportionally more deep water habitat (> 3 m) and lower velocity (< 0.15 m/s) near the river bed than control reaches ($P < 0.01$ and $P = 0.04$, respectively). However, the mean proportion of shallow water habitat (< 0.5 m), high velocities near the river bed (> 0.30 m/s), low velocity habitat (< 0.25 m/s), and high velocity habitat (> 0.75 m/s) were similar among all reach types (P s > 0.05). A canonical correspondence analysis was used to characterize relationships among habitat variables, reach types (actively dredged, historically dredged, and control), and catch per unit effort (CPUE) of fishes in the Kansas River. Mean velocity and depth explained a significant amount of variation in species CPUE; however, reach type was not a significant factor for any of the gear types for any season. Our results show that dredging in Great Plains Rivers can increase depths, but alterations to fish community structure was not evident, likely because many of these fishes are adapted to a range of habitat conditions and are highly mobile.

Products since 2010

Fischer, J.C. 2012. Fish community response to habitat alteration: impacts of sand dredging in the Kansas river. M.S. Thesis, Kansas State University

Fischer, J., C. Paukert, and M. Daniels. 2012. Influence of in-stream and watershed alterations on sandbars and islands in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Fischer, J., J. Gerken, C. Paukert, and M. Daniels. 2011. Habitat and fish community response to sand dredging in a large Great Plains river. Midwest Fish and Wildlife Conference, Des Moines, IA.

Fischer, J. J. Gerken, C. Paukert, and M. Daniels. Habitat and Fish Community Response to Sand Dredging in a Large Great Plains River. American Fisheries Society Annual Meeting, Seattle, WA.

Fischer, J., C. Paukert, J. Gerken, and M. Daniels. 2011. Influence of sand dredging on fish communities in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

Daniels, M. K., J. Fischer, K. Costigan, J. Gerken, and C. Paukert 2011. Making sense of an intensively modified sediment regime: measuring the relative impact of in-channel dredging amidst reservoir trapping and network-scale incision in the Kansas River basin. International Symposium on the Interactions between Sediment and Water. Dartington, England

Fischer, J., C. Paukert, J. Gerken, and M. Daniels. 2010. Fish community response to habitat alteration: impacts of sand dredging in the Kansas River. Midwest Fish and Wildlife Conference, St. Paul, MN.

Wildlife Projects



Ongoing Wildlife Projects



Development of Conservation and Climate Adaptation Strategies for Wetlands in the Great Plains LCC Region

Investigators

Dr. Gene Albanese, Post-
Doctoral Research Associate

Project Supervisors

Dr. David Haukos
Dr. Susan Skagen

Collaborators

Dr. Mindy Rice
Dr. David Hamilton

Funding

U.S. Geological Survey

Objectives

Conduct a network analysis of
playa wetlands

Determine the effect of playa
loss on delivery of ecosystem
goods and services

Location

Texas, New Mexico,
Oklahoma, Kansas, and
Colorado

Expected Completion

Sept 2015

Status On-going

Progress

The project was initiated in September 2011. A network analysis of wetland systems in the GPLCC will be conducted. This will primarily focus on playa wetlands but include saline lakes in the final product. The results of this research will identify clusters of playas and individual wetlands critical to the connectivity of playa clusters. In addition, isolation of playas and other wetlands and the effect on endemic and wetland-dependent species will be assessed. There will be determination of the scope and value of ecological goods and services provided by playas and other wetlands in the GPLCC. Included will be valuation of ecological services historically provided, currently provided in light of recent assessment of wetland loss, and future provisions under current rates of wetland loss and degradation. Further, relationships among current landscape management and conservation strategies on delivery of ecological services provided by GPLCC wetland systems will be addressed. This includes effects of agricultural and water conservation strategies, habitat management practices and prescriptions, playa restoration approaches, Conservation Reserve Program (CRP) and wetland buffer strip plant propagation; establishment, sustainability, ecology, and effectiveness of filtering sediments; wildlife habitat enhancement and connectivity; and climate change and adaptation on wildlife habitat quality and playa wetland function (including groundwater recharge and water quality improvement). Development of information for initiation of adaptive resource management plans and landscape scale models concerning management prescription effectiveness and impacts of climate change on vegetation responses, habitat quality for various species of terrestrial or aquatic wildlife, and playa wetland and saline lake ecological and hydrological functions. This will include extensive literature reviews of the ecology of playa wetlands and saline lakes.

Movements, Habitat Use, Survival, and potential implications of Climate Change on Mottled Ducks (*Anas fulvigula*) in the Texas Chenier Plain Region

Investigators

Jena Moon, Ph.D. Student
Stephen F. Austin State
University

Status

On-going

Project Supervisor

Dr. David Haukos
Dr. Warren Conway

Progress and Results

The mottled duck is a species of waterfowl that is increasingly less common along the Gulf Coast. Population levels of this species are currently below goal numbers established by the Gulf Coast Joint Venture. As a focal species for Strategic Habitat Conservation, the mottled duck has been established as an indicator species to coastal marsh health and function. Currently, biologists have a relatively poor understanding of mottled duck habitat use, regional movements, response to habitat management, and movements between Refuge lands, State Wildlife Management Areas, and private lands. Habitat quality/quantity and disturbance maybe important factors dictating mottled duck movements both spatially and temporally. We have attached 18-gram solar PTT radios (satellite radios) to 15 mottled duck hens in the summer of 2009, and 30 in 2010, and 45 in 2011. The PTT radios are needed to document movements, in particular when hens depart Federal property along the Texas Gulf Coast. Other objectives of the monitoring effort will include documenting coarse and fine scale habitat use (i.e., aerial classified into habitat coverage's using ERDAS), documenting seasonal movements of mottled ducks, and examining variability of responses in relation to climatic events, landscape habitat conditions (i.e., wetland availability assessed by utilizing Landsat data), and disturbance. We will also be examining potential impacts of climate change, though assessing home range level habitat changes from current conditions to projected conditions in 2050 and 2100 by the Sea Level Affecting Marshes Model (SLAMM). This information is important to resource managers along the upper Texas Coast and across the mottled duck range. It is needed to refine and improve habitat management practices (e.g., burning, grazing, hydrology manipulation, herbicide applications, mechanical treatments, etc.) to allow for adaptive management across the mottled duck's range.

Funding

U.S. Fish and Wildlife
Service

Cooperators

Patrick Walther
Dr. Dan Collins

Objectives

Determine movements of adult female mottled ducks during all major life stages, climatic events, high disturbance periods, and landscape habitat changes

Document course and fine scale habitat use during all major life stages

Model survival rates in relation to breeding periods, hunt periods, molting periods, and climatic events

Determine home range size for adult female mottled ducks

Location

Chenier Plain of the upper Texas and western Louisiana Gulf Coast

Products since 2010

Moon, J., D. Haukos, W. Conway, and P. Walther. 2011. Habitat use and movements of adult mottled ducks on the Texas Chenier Plain. Annual Meeting of The Texas Chapter of The Wildlife Society, San Antonio, Texas.

Moon, J.A., D.A. Haukos, and W. Conway. 2012. Potential climate change impacts to mottled ducks on the Chenier Plain Region of Texas. Texas Chapter of The Wildlife Society, Fort Worth, Texas.

Completion

May 2013

Use of Moist-Soil Management for Waterfowl on the Texas Coast

Investigators

Mike Whitson, M.S.
Student
Stephen F. Austin State
University

Project Supervisor

Dr. Warren Conway
Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey
Stephen F. Austin State
University

Cooperators

Texas Chenier Plain NWR
Complex
Dr. Dan Collins
Patrick Walther

Objectives

Assess biomass production
in response to moist-soil
management treatments

Determine species
response to moist-soil
management treatments

Measure waterfowl
response to moist-soil
management on the upper
Texas Gulf Coast.

Location:

Anahuac NWR

Completion: August 2013

Status

On-going

Progress and Results

The overriding goal for this research is to quantify variation in vegetation species response, biomass production, invertebrate availability and waterfowl use as related to early, mid and late flooding dates in moist soil managed fallow rice fields on the upper Texas coast. This research will provide federal, state, private land managers and conservation agencies with viable wetland management techniques to enhance habit conditions, wetland mitigation, and assist in reducing migratory waterfowl and residential mottled duck populations to exposure of areas with high lead contamination. Specific objectives include estimate existing seed bank composition and variation in biomass production, seed production, above ground plant community composition in areas under varying temporal implementation regimes and treatment conditions. We will also determine, compare and characterize bird use and behavior among treatments to estimate moist soil management practices that drive waterfowl habitat selection and use.

American Woodcock Habitat Occupancy and Migratory Origins in East Texas

Investigators

Dan Sullins, M.S. Student
Stephen F. Austin State
University

Project Supervisor

Dr. Warren Conway
Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey
Stephen F. Austin State
University

Cooperators

Texas Chenier Plain NWR
Complex
Dr. Dan Collins
Patrick Walther

Objectives

Measure patch occupancy
of wintering American
woodcock

Using band recovery and
isotope data, determine
harvest derivation for
southern wintering
grounds.

Location:

North America

Completion: May 2013

Status

On-going

Progress and Results

I am examining landscape scale American woodcock habitat use and availability during winter in East Texas. Specifically, I am quantifying and estimating occupancy and presence of American woodcock on 24 unique survey plots on public and private forest lands, using a trained pointing dog on GPS-tracked surveys. From these data, I will estimate survey area, detection rates, occupancy, and woodcock density as related to habitat quality and quantity as estimated using a revised habitat suitability index for wintering woodcock in the region. Finally, in an attempt to characterize migratory origins and connectivity, I am using stable isotopes from nationally harvested subadult woodcock, to delineate migration corridors and connections between natal and wintering grounds. Combined, these data will be important in updating and validating winter habitat models and migratory corridors for American woodcock.

Products since 2010

Sullins, D.A., W. Conway, and D. Haukos. 2012. American woodcock (*Scolopax minor*) habitat suitability and occupancy in eastern Texas. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

Lead Exposure, Habitat Use, and Nesting Ecology of Black-necked Stilts (*Himantopus mexicanus*) on the Upper Texas Coast

Investigators

Thomas Riecke, M.S.
Student
Stephen F. Austin State
University

Project Supervisor

Dr. Warren Conway
Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey
Stephen F. Austin State
University

Cooperators

Texas Chenier Plain NWR
Complex
Dr. Dan Collins
Patrick Walther

Objectives

Measure lead exposure in
black-necked stilts

Model the population
effect of lead exposure on
black-necked stilts

Determine effect of coastal
marsh management
practices on population
demography of black-
necked stilts.

Location:

Anahuac NWR

Completion: May 2013

Status

On-going

Progress and Results

The black-necked stilt has been studied extensively in the western United States, but its habitat requirements and breeding ecology are poorly delineated elsewhere. In western North America, black-necked stilts exist in dense populations, often clustered around salt evaporation ponds and managed wetlands, while black-necked stilts in the Southeast are putatively more broadly distributed in coastal marsh habitats. These regional habitat differences may promote variation in metapopulation structure, nest-site selection, reproductive success, and habitat and space use, none of which are well described in coastal Texas. Moreover, historic waterfowl harvest sites along the Texas coast have extensive lead deposition from spent shot.

Although lead shot ingestion has been documented in black-necked stilts no data exist on blood lead concentrations or potential effects on survival, nest success, and other vital. This research has been designed to quantify black-necked stilt blood lead levels, habitat use, nest-site selection, and nest success on the upper Texas coast.

Products since 2010

Riecke, T.V., W. Conway, and D.A. Haukos. 2012. Nest success and nest site selection of black-necked stilts on the Texas Chenier Plain National Wildlife Refuge Complex. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

Potential Exposure to Environmental Lead in Mottled Ducks (*Anas fulvigula*) on the Texas Chenier Plains National Wildlife Refuge Complex

Investigators

Stephen McDowell, M.S.
Student
Stephen F. Austin State
University

Project Supervisor

Dr. Warren Conway
Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey
Stephen F. Austin State
University

Cooperators

Texas Chenier Plain NWR
Complex
Dr. Dan Collins
Patrick Walther

Objectives

Determine the availability
of lead on the upper Texas
Gulf Coast

Estimate the exposure of
lead by mottled ducks

Evaluate pathways of lead
exposure for waterbirds of
the upper Texas Gulf
Coast

Location:

Anahuac NWR

Completion: December
2012

Status

On-going

Progress and Results

The mottled duck is a non-migratory waterfowl species that depends on the marshes along the Gulf of Mexico. Since the mid-1980s the Texas breeding pair populations have declined, where current population estimates hover around 17,000 individuals. Though use of lead shot was banned nationwide for migratory waterfowl hunting in 1991, recent studies show mottled ducks continue to have elevated wing bone lead concentrations. Such data indicate that mottled ducks continue to be exposed to lead somewhere during the annual cycle. I am estimating blood lead concentrations within local, hatch-year, and adult mottled ducks to isolate when mottled ducks are initially exposed to lead. I am also estimating spent lead shot availability and distribution, as well as soil lead concentrations on the Complex to determine potential pathways by which mottled ducks obtain lead. Such research is important to evaluate long term effects on mottled duck populations and as possible influences on important vital rates, such as survival and fecundity.

Products since 2010

McDowell, S.K., W. Conway, and D. Haukos. 2012. Potential exposure to environmental lead in mottled ducks (*Anas fulvigula*) on the Texas Chenier Plains National Wildlife Refuge Complex. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

Risk Assessment of Exposure to Lead for Mottled Ducks on National Wildlife Refuge of the Texas Gulf Coast

Investigators

Brian Kearns, Ph.D
Student

Project Supervisor

Dr. David Haukos
Dr. Warren Conway

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey

Cooperators

Texas Chenier Plain NWR
Complex
Stephen F. Austin State
University
Dr. Dan Collins
Patrick Walther

Objectives

Within the context of a formal risk assessment, evaluate the risk of environmental lead for mottled ducks and other waterbirds.

Model the impacts of lead availability on survival and reproductive of mottled ducks.

Evaluate the effect of lead on the body condition of mottled ducks

Use ratio of lead isotopes to determine potential sources of lead in addition to spent lead shot

Location:

Anahuac NWR

Completion: August 2015

Status

Starting fall 2012

Progress and Results

Currently, ongoing studies on the Texas Chenier Plain and Midcoast NWR Complexes are quantifying spatial availability of lead pellets and lead concentrations in the soil, birds, and plants. In addition, that study is also relating environmental lead concentrations with concentrations in blood of mottled ducks and other species. Therefore, the proposed study will combine all of those data and conduct a formal risk assessment of lead for mottled ducks. To determine potential source of lead (i.e., natural or anthropogenic) in these samples, ratios of stable lead isotopes following the methods of Saint-Laurent et al. (2010) will be evaluated. We will use kriging techniques in ArcGIS along with general estimating equations to produce maps for all NWRs that predict probability density functions of lead availability in all sampled habitats across the range of mottled ducks. Using the model being developed for predicting the influence of environmental lead on population demography of mottled ducks on the Texas Chenier Plain NWR, we will estimate the effects of available lead on mottled duck survival and recruitment on the coast of Texas. Recent efforts using population matrix models will be used to assess the effects of lead exposure on reproduction and survival of mottled ducks. Finally, these data will be used to conduct a risk assessment is the determination of the quantitative or value of risk related to a concrete situation and a recognized threat (also called hazard). Risk assessment consists in an objective evaluation of risk in which assumptions and uncertainties are clearly considered and presented. Part of the difficulty of risk management is that measurement of both of the quantities in which risk assessment is concerned - potential loss and probability of occurrence. The collected data will provide these quantities. We will follow the EPA framework for ecological risk assessment, including the following three general phases: (1) problem formulation, (2) analysis, and (3) risk characterization.

Parasitemia, Health, and Reproduction in Lesser Scaup at Red Rock Lakes National Wildlife Refuge

Investigators

Andrew Stetter, M.S.
Student

Project Supervisor

Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service
U.S. Geological Survey
Kansas State University

Cooperators

Red Rocks Lake NWR
Jeff Warren, USFWS
Jane Austin, USGS

Objectives

Provide baseline
information on scaup
health and parasitemia.

Relate parasitemia
prevalence and indices of
health to body condition
and breeding status.

Location:

Red Rocks Lake NWR

Completion: August 2014

Status

On-going

Progress and Results

The role of disease, and perhaps parasites in particular, have been largely overlooked as drivers of avian life history evolution and population dynamics with few exceptions (e.g., botulism, cholera, HPAI). Haemoproteus parasitemia is common in North American waterfowl, with prevalence of this blood parasite positively correlated with mortality rates in waterfowl. Haemoproteus parasitemia, *per se*, does not lead to mortality, but instead reduces an individual's health, which may ultimately lead to lower fitness. We are conducting a study to explore relationships among parasitemia, health, and reproduction in lesser scaup (*Aythya affinis*). Objectives of the current study are to 1) provide baseline information on scaup health and parasitemia, and 2) relate parasitemia prevalence and indices of health to body condition and breeding status. The study was conducted on Lower Red Rock Lake, a high elevation montane wetland complex in southwest Montana. Adult lesser scaup are captured during the breeding season via spotlighting. Morphological measurements and a blood sample are taken from each individual. A size-adjusted relative body condition was calculated for each individual (BCIndex). Reproductive status of each female was determined by palpating the oviduct for the presence of an egg. The health of each individual was estimated using the heterophile:lymphocyte ratio (H-LRatio). Of the fifty birds captured, 10% were found to have blood parasites, all of which were male. Relationships between scaup relative body condition and H-LRatio were inconsistent between sexes. A strong negative relationship between H-LRatio and BCIndex for male scaup was found, indicating individuals in poor body condition were also in poor health. We did not find a similar relationship for female scaup. Breeding status of females was not related to health. There was also no relationship between presence of blood parasites in males and health.

Estimating Inundation Frequency of Playa Wetlands Using 1970s Landsat MSS Data: Did Irrigation Practices Artificially Increase Frequency and Longevity of Landscape Wetness?

Investigators

Brandon Weihs, Ph.D.
Student, Geography

Project Supervisor

Dr. David Haukos

Funding

U.S. Fish and Wildlife
Service

Cooperators

Bill Johnson, USFWS
Dr. Steve Sensie, USFWS
Dr. Grant Harris, USFWS

Objectives

Development of an accurate spatial remote sensing model to document hydrological condition of playas in the Texas High Plains.

Assess accuracy of results from Landsat analyses.

Construct trends of hydrological conditions of playas and saline lakes since the 1970s.

Test competing models containing available landscape level data to determine if differences between the 1970s and 2000s are due to changes climatic conditions, watershed conditions, or perhaps due to other factors (e.g., irrigation).

Location:

Southern High Plains,
Texas and New Mexico

Completion: December
2013

Status

On-going

Progress and Results

A primary objective of the North American Waterfowl Management Plan is to maintain (and restore) continental waterfowl populations at 1970s numbers. Playas are the dominant wetland feature in the Texas High Plains. Historical U.S. Department of Agriculture soil survey maps suggest there are more than 20,500 playas in this region.

Although playas average only 6.3 ha in size and account for only 2% of the Texas High Plains landscape, they provide ecological functions critical to the persistence of nearly all flora and fauna in the region.

Timing and duration of playa hydroperiods drive both plant and invertebrate production. Playas are vital migratory stop-over and wintering sites for migratory birds.

Although current playa conditions, in terms of availability during midwinter due to natural flooding events, are increasingly understood, little is known about playa conditions during the 1970s through 1990s. Historically, playas were actually incorporated into many furrow irrigation systems, either as catchment basins or as tailwater recovery basins.

Thus, the landscape during the 1970s may have been artificially wet due to irrigation. If average annual habitat availability, in terms of the percent of inundated playas, was enhanced due to irrigation runoff, then using waterfowl numbers during this decade may result in habitat objectives that are simply not reasonable under natural and current conditions.

In 1972 Landsat 1 was the first orbiting satellite to begin collecting data with the expressed intent to monitor the Earth's surface, an effort that continues today through Landsat VII. Playa sample sites required for remote sensing modeling procedures will be selected using both existing NWI GIS data and digitized historical soil survey data. For the 1970s, Landsat data from this period is limited to information acquired using the multispectral scanner system (MSS) sensor. MSS data were acquired with a revisit time of 18 days at a nominal ground sample distance (GSD) of 60 m².

Sample results will support modeling efforts run in ERDAS Imagine. Model out-puts will be incorporated into a GIS to measure the spatial and temporal extent of wet and dry playa basins across the study area for the time period assessed. These results should provide reasonable estimates of the annual availability and duration of inundated playas for this period and better inform regional waterfowl population goals.

Occurrence and Prediction of Avian Disease Outbreaks in Kansas

Investigators

TBD Research Associate

Project Supervisor

Dr. David Haukos

Funding

Kansas Department of
Wildlife, Parks, and
Tourism

U.S. Fish and Wildlife
Service

Cooperators

Shane Hesting
Dr. Tom Roffe

Objectives

Compile all known records
of avian disease outbreaks
in Kansas.

Associate each record with
available environmental
data (e.g., precipitation
index, temperature) and, if
possible, estimated
population at risk during
each outbreak.

Create a historical data
base and a web-based
reporting form for avian
disease outbreaks in
Kansas.

Construct predictive
models for environmental
conditions that may
support a disease outbreak

Location:

Throughout Kansas

Completion: December
2013

Status

Initiation Fall 2012

Progress and Results

There are a wide variety of diseases that affect birds. These diseases can be bacterial, viral, fungal, parasitic, and toxic (i.e., environmental contaminant). Of the diseases that affect migratory, wild birds, those of primary concern are avian cholera, avian botulism, duck plague, aspergillosis, West Nile, Newcastle disease, and avian influenza. Avian cholera and avian botulism are bacterial diseases, *Pasteurella multocida* and *Clostridium botulinum*, respectively, that typically affect waterfowl and shorebird species. Occurrence, causes, and impacts of disease in wild bird populations are rarely studied beyond documentation of large outbreaks in terms of date, duration, species affected, and estimated number of individuals affected. These records are stored throughout many different venues. For many avian diseases, certain environmental conditions are hypothesized to be necessary prior to the occurrence of epizootic events. By location in the middle of the Central Flyway, Kansas provides critical habitat for breeding, migrating, and wintering migratory birds. In addition, several areas (e.g., Cheyenne Bottoms, Quivira, Jamestown, and McPherson wetland habitats) support large populations of migratory waterfowl and other waterbirds that would result in a major mortality event should a disease outbreak occur. Further, survey evidence f indicate that migratory birds are staging for longer periods in Kansas compared to historical duration, increasing the likelihood of increased impacts of disease outbreaks in the state. All records of disease outbreaks will be compiled through a comprehensive search of all potential locations that may house any such reports. Once all possible records are compiled, a data base will be generated that includes all potential information related to disease outbreaks (e.g., date, location, duration, species involved, number of dead birds counted). Upon completion of the historical data base, a web-based reporting process will be developed for use by anyone in the state of Kansas. We will use one of the suite of available models and software (e.g., MaxEnt, Environmental-Niche Factor Analysis, Genetic Algorithm for Rule-Set Prediction) used to develop predictive models based on known occurrence of a disease outbreak and the environmental conditions associated with the outbreak.

Lesser Prairie-Chicken Habitat Use, Survival, and Recruitment in Kansas

Investigators

TBD – 2 M.S. and 1 Ph.D
Student

Project Supervisor

Dr. David Haukos
Jim Pitman
Dr. David Dahlgren

Funding

Kansas Department of
Wildlife, Parks, and
Tourism

Cooperators

Kansas Department of
Wildlife, Parks, and
Tourism

U.S. Fish and Wildlife
Service

Great Plains LCC

USDA Forest Service

Objectives

Identify lesser prairie-chicken (LPCH) population demography including survival, nest success, and recruitment for populations in a variety of habitats

Identify LPCH seasonal habitat selection with emphasis on nesting and brood site selection in each habitat type

Identify adult LPCH weekly, monthly, and seasonal movements and home ranges in each habitat

Evaluate the impacts of energy development and

Status

Initiation Fall 2012

Progress and Results

Lesser prairie-chickens (*Tympanuchus pallidicinctus*; hereafter LPC) currently exist in scattered populations in Kansas, Oklahoma, Colorado, Texas, and New Mexico. Each population is associated with unique habitat types and patch sizes; experiencing different population trajectories from severe decline to relatively stable or, rarely, increasing. There are a number of potentially interacting factors impacting LPC populations including reduction of habitat and connectivity due to grassland and shrubland conversion to row-crop agriculture; energy development including oil/natural gas drilling, wind farms, ethanol and other biofuels, and potentially solar fields; infrastructure related to energy development including transmission lines, substations, roads, meteorological towers, and disturbance due to frequent human presence; unmanaged grazing; suppression of natural fire; increasing intensity and duration of drought; extensive use of herbicides and insecticides; high-density livestock fencing; and invasive vegetation. Because of the fragmentation of the LPC range and subsequent isolation of populations, it is necessary to study each population to generate inference regarding population demography (e.g., survival, nest success, recruitment), habitat selection, and seasonal movements as well as evaluate relative influence of potential limiting factors. We propose to conduct a telemetry study to evaluate LPC habitat selection, seasonal movements, population demography, and response to energy development in three populations in Kansas. The populations represent different habitats and trajectories. In southwest Kansas (Morton and Stanton counties), LPC have been in a severe population decline with isolated areas of relatively stable populations. This area is represented by short-grass prairie and sand sagebrush (*Artemisia filifolia*) habitats that are grazed by livestock. Pastures are large with relatively low fence density. Much of the occupied portion of this area is on U.S. Forest Service National Grasslands (Cimarron NG). Oil and gas exploration is ongoing in many locations. The environment is semi-arid and currently experiencing an extreme drought. The population of south-central Kansas (Barber, Comanche, Kiowa, Clark, and Meade counties) is relatively stable. Habitats in the area are predominantly mid-grass, with shrub and woody cover in the absence of natural or prescribed fire. Landuse is primarily livestock grazing with a relatively high fence density. Patch burning is becoming a common land management technique in the area. Oil and gas development also is present. The area has high potential for wind farm development and transmission line installation. The population of north-west Kansas (Sherman, Thomas, Logan, and Gove counties) is expanding both in terms of range and numbers. The region is predominantly row-crop agriculture and lands enrolled in the Conservation Reserve Program

other anthropogenic activities on LPCH habitat use, movements, and survival

Compare vital rates among populations residing within each habitat type

Model those demographic data to predict future population trajectories.

Identify the effect of grassland patch size, habitat fragmentation, and level of connectivity on vital rates of LPCH populations.

Conduct a risk assessment to evaluate the relative effects of potential limiting factors for populations residing within each habitat type

Evaluate potential radio-mark handicap between 2 radio transmitter types.

Identify daily survival of lesser prairie-chicken chicks within mixed grass prairie and/or grassland mosaic habitats consisting of short-grass prairie and conservation reserve program grasslands.

Location:

Throughout Kansas

Completion: May 2017

(CRP) of the U.S. Department of Agriculture. Livestock grazing occurs primarily on winter wheat. Fence density is intermediate between the previously described study sites but is primarily temporary electric rather than the permanent 4-5 strand barbed wire. The CRP locations are dominated by native species planted to provide permanent cover on highly erodible soils. In addition, many CRP fields have wildlife waterers installed (guzzlers) as a conservation practice. We propose to capture, track, and maintain a sample size of a minimum of 30-40 satellite radio tagged hens per year for 4 years in each study population. We anticipate having a sample size of approximately 150 hen LPCs during the course of the study, with each hen providing data for an average of 18 months. Relevant vegetation measures will be taken at each nest and brood site as well as locations during the remainder of each throughout the study to evaluate habitat selection as it relates to survival. Home ranges will be calculated for each LPC during each season. Resource selection functions will be used to evaluate habitat use relative to availability. Vital rates will be used in matrix models to determine the relative influence of these rates on population rate of change.

Effects of USDA Conservation Practices on Lesser Prairie-Chickens In Kansas and Colorado

Investigators

TBD: Ph.D, M.S. student

Project Supervisor

Dr. David Haukos
Dr. Christian Hagen

Funding

USDA NRCS
Great Plains LCC

Cooperators

Kansas Department of
Wildlife, Parks, and
Tourism
Kansas State University

Objectives

Document the spatial relationships between lesser prairie-chickens and USDA conservation programs throughout the annual cycle (e.g., leks, nest sites, brood use, winter flocks).

Measure the vegetation structure and composition of CRP fields used and not used by lesser prairie-chickens.

Quantify the effects of other conservation practices (i.e., water development, fencing) on lesser prairie-chickens.

Compare the response of lesser prairie-chickens among management strategies of CRP.

Location:

Throughout Kansas,
eastern Colorado

Completion: December
2016

Status

Initiation Fall 2012

Progress and Results

Lesser prairie-chicken (*Tympanuchus pallidicinctus*) occurs primarily on the High Plains of the Southern Great Plains. Population numbers and range have declined >80% since European settlement.

Populations of northwest Kansas and eastern Colorado are associated with former croplands that have been enrolled in a U.S. Department of Agriculture conservation programs/practices, principally the Conservation Reserve Program (CRP) and Environmental Quality Incentive Program (EQIP). Trends in these populations are relatively stable to increasing based on the appearance of leks, count data, and anecdotal information. Conservation practices with CRP fields that may be affecting these populations include vegetation species composition, development of supplemental water areas, mid-term management practices, and emergency haying/grazing declarations. Use of CRP may also be related to juxtaposition of CRP, cropland, and other land uses. Practices associated with EQIP that may affect lesser prairie-chickens include grazing management (e.g., fencing and water development), irrigation strategies, and invasive species control. However, features of CRP and EQIP that positively benefit lesser prairie-chicken populations have not been comprehensively tested. Therefore, there is a need to assess the effects of USDA conservation practices on lesser prairie-chickens to develop guidelines and recommendation for the establishment and management of conservation practices for landowners interested in managing for lesser prairie-chickens. In addition, the overall population response by lesser prairie-chickens to conservation programs needs to be assessed in regard to demography of the population to model future population trends.

Lesser Prairie-Chicken Response to USDA Conservation Practices In Kansas and Colorado

Investigators

TBD Research Associate
and M.S. Student

Project Supervisor

Dr. David Haukos

Funding

USDA Farm Services
Agency

Cooperators

Dr. Christian Hagen
Jim Pitman
Dr. David Dahlgren
Kansas Department of
Wildlife, Parks, and
Tourism

Objectives

Quantify landscape connectivity created by CRP fields throughout the LEPC range and identify thresholds important to maintaining LEPC population persistence.

Document the spatial relationships between lesser prairie-chickens and USDA conservation practices throughout the annual cycle (e.g., leks, nest sites, brood use, winter flocks).

Using occupancy (PRESENCE) and species occurrence (e.g., MAXENT) models: quantify the spatial extent, juxtaposition, and habitat composition/structure of CRP grasslands and native prairie habitat that yield high likelihood of LEPC occurrence.

Status

Initiation Fall 2012

Progress and Results

Significant numbers of lesser prairie-chickens of Kansas and Colorado are associated with former croplands that have been enrolled in a U.S. Department of Agriculture conservation programs/practices, principally the Conservation Reserve Program (CRP) and Environmental Quality Incentive Program (EQIP). Trends in these populations are relatively stable to increasing based on the appearance of leks, count data, and anecdotal information. At a broad-scale CRP has reduced habitat fragmentation and assisted in connecting extant and expanding populations. Additionally, conservation practices with CRP fields that may be affecting these populations include vegetation species composition, development of supplemental water areas, mid-term management practices, and emergency haying/grazing declarations. Use of CRP may also be related to juxtaposition of CRP, cropland, and other land uses. Practices associated with EQIP that may affect lesser prairie-chickens include grazing management (e.g., fencing and water development), irrigation strategies, and invasive species control. There is a need to assess the effects of USDA conservation practices on lesser prairie-chickens to develop guidelines and recommendation for the establishment and management of conservation practices for landowners interested in managing for lesser prairie-chickens. In addition, the overall population response by lesser prairie-chickens to conservation programs needs to be assessed in regard to demography of the population to model future population trends. A land cover map (PLJV, CLU, or Regional GAP with assessment adjustments) will be imported into a Geographic Information System (GIS). Current CRP enrollments will be added as a GIS layer. In addition, a layer of LEPC lek locations based on historical data and annual changes in lek locations during the past decade from historical surveys will be created. Finally, lek locations from the 2012 range-wide survey will be added as an additional layer. Patch occupancy will be evaluated using programs PRESENCE and MAXENT at a variety of spatial scales. Occupancy will be determined by the presence of leks and results from telemetry data (see below). Beta values of a suite of independent variables (e.g., patch size, distance to other patches, patch composition, etc.) will be used to judge relative influence of each variable on occupancy. Using satellite and VHF telemetry, LEPC use of CRP fields will be documented. Vital rates (nest success, survival relative to other habitat types) will be determined for each patch type and used to rank patch quality. Resource selection functions will be used to determine habitat use relative to availability. Home range estimates in CRP will be compared to other habitat types. Dispersal and movements within

Link occupancy of the “best” landscapes to fitness parameters for populations.

Examine occupancy and fitness and finer scale measures to quantify the relative values of various management strategies for CRP and other USDA conservation programs.

Location:

Throughout Kansas and eastern Colorado

Completion: December 2013

and among CRP habitat patches will be measured. All measurements and comparisons will be in context of available USDA NRCS conservation practices. Habitat measurements of occupied and unoccupied CRP fields will be recorded. Differences in habitat of occupied and unoccupied CRP will be determined using multivariate statistics and ordination. Population demography will be linked to a variety of USDA conservation practices. Fitness parameters (e.g., survival, recruitment) will be measured in CRP relative to other habitat types. The influence of CRP on LEPC populations will be determined by scaling results up to landscape levels. A variety of landscape metrics (e.g., edge, patch size, patch configuration, interpatch relationships) will be calculated using FRAGSTATS at a variety of different scales. Landscape and structural connectivity will be evaluated at several different biologically relevant dispersal distances using network/graph theory with programs CONFORE and PAYJACK to determine distances at which the network is complete or collapses. Geospatial simulations (e.g., sensitivity analyses) will be used to evaluate the ability of the network to support LEPC population persistence. We will evaluate structural and functional connectivity using spatially explicit simulation models and network analysis. Functional connectivity will be assessed using immigration/emigration rates among patches and home range size. These data will result in an estimate the likelihood of movement and occurrence among patches, patch importance to network connectivity and possibility even persistence rates within patches with estimates of survivorship included.

Completed 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, MS
2011

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 2011

Status: Completed

Progress and Results:

Black-tailed prairie dogs (*Cynomys ludovicianus*) are a species of management and conservation concern. Prairie dogs have lost both habitat and occupied area due to plague, which is caused by the bacterium *Yersinia pestis*, pest control, and habitat conversion to agricultural land. Our goals were to estimate survival rates and dispersal rates, and to compare methods for estimating abundance of black-tailed prairie dogs for both management and conservation. We trapped black-tailed prairie dogs at four small National Parks from April 2009 through August 2011. Prairie dogs were trapped and marked for two trapping sessions per year in order to estimate seasonal rates of apparent survival. Apparent survival rates were estimated using the package RMark in R to construct models for program MARK. We found estimates to vary according to field site, sex, year, and season (summer or winter). Possible reasons for the differences in survivorship among sites could be presence of disease, quality of forage, predation, or frequency of dispersal. Visual counts were also conducted each trapping session beginning in April of 2010 to estimate abundance. Mark-recapture, mark-resight, and visual counts were compared to determine which method would be the most effective for estimating abundance of prairie dogs. We found mark-resight to produce the most precise estimates of abundance. While it costs more money to conduct a mark-resight estimate than visual counts because of repeated sessions, they produced significantly different results from one another 75% of the time, which was especially apparent on sites that had some form of visual barriers such as tall vegetation and uneven ground. However, if further information is needed in terms of sex ratios, age ratios, or the exact number of prairie dogs, then mark-recapture is the only method that can be used. Land managers need to address the level of accuracy needed, topography, and vegetation height before choosing which sampling method is best for the prairie dog towns in question. Finally, we looked at rates of intercolony and intracolony dispersal by placing 149 VHF collars and 6 GPS collars on prairie dogs at three colonies. Intracolony dispersal was also monitored through visual observation and trapping records over the three years of the study. We found 23 intracolony and eight intercolony dispersal events. Combined, these three studies offer insight not only into monitoring of prairie dog populations but also potential influence by plague both within and among colonies of prairie dogs.

Products since 2010

Goldberg, A. 2011. Apparent survival, dispersal, and abundance of black-tailed prairie dogs. Thesis, Kansas State University.

- Pigg, R., T. Johnson, and J. F. Cully. The influence of landscape features on the disease ecology of sylvatic plague. Fifth Biennial Meeting of the International Biogeographical Society, 7-11 January 2011. Crete.
- Goldberg, A., and J. F. Cully. Estimated Apparent Survival of Black-tailed Prairie Dogs at Four Small National Parks Using the Robust Design in Program MARK. American Society of Mammalogists Annual Meeting, Portland Oregon, June 24-28, 2011.
- Goldberg, A., J. F. Cully. Apparent Survival of Black-tailed Prairie Dogs at Four Small National Parks Using the Robust Design in Program MARK. 72nd Midwest Fish and Wildlife Conference, Des Moines, Iowa, 4-7 December 4-7, 2011.
- Pigg, R., T. Johnson, and J. F. Cully. The influence of landscape features on the disease ecology of sylvatic plague. 72nd Midwest Fish and Wildlife Conference, Des Moines, Iowa, 4-7 December 4-7, 2011.
- Cully, J., R. Pigg, and A. Goldberg. 2010. Sustainability of black-tailed prairie dogs at small culture parks of the western Great Plains. 22nd North American Prairie Conference, Cedar Falls, Iowa.
- 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.



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 Dependent Responses to Disturbance

Investigators

Dr. Jack Cully

Status

Completed

Student

Derek A. Moon,
M.S. 2011

Results

Disturbance is defined as any discrete event that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment. Habitat use by an organism is based on its perception of where to maximize its own fitness, and can be altered in response to disturbance-induced changes in resources, substrate, or physical features modified by disturbance. Disturbance-induced changes to vegetation structure reshape a small mammal's surrounding physical environment and/or resources, and may influence its utilization of an area. Effective wildlife and resource management is dependent on a thorough understanding of how individual species and communities utilize their surroundings and how disturbance affects a species' response to changes in its surroundings. We investigated seasonal habitat associations of three small mammal species and for overall species diversity across a gradient of military combat-vehicle disturbance intensities at the Fort Riley Military Reservation, Kansas. Deer mouse (*Peromyscus maniculatus*) abundance did not vary across a categorical gradient of disturbance created by military-combat vehicles, regardless of season. Western harvest mouse (*Reithrodontomys megalotis*) abundance was associated with more highly disturbed areas irrespective of season. Prairie vole (*Microtus ochrogaster*) abundance was associated with habitat that was less disturbed in the spring but more highly disturbed in the fall. Shannon diversity of the small mammal community was higher in the more highly disturbed areas regardless of season. This research shows that small mammals respond to disturbances created by military training with combat vehicles in a species-specific manner, and indicates that there may be differences in the effects of military training versus natural or agricultural disturbances on the abundance and diversity of small mammals. This is an important consideration given that the Department of Defense manages more than 12 million ha of land in the United States, and is charged under the Sikes Act with conserving natural resources on these lands, including biological diversity. Thus, the findings of other ecological research on the effects of disturbance on small mammals may not be directly applicable to the types of disturbances that occur on military lands, which underscores the need for further research on the specific effects of military-training activities on species' responses.

Project Supervisor

Dr. Jack Cully

Funding

Department of Defense,
Fort Riley

Objective

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

Location

Fort Riley Military
Installation

Products since 2010

Moon, D. 2011. Small mammals in disturbed tallgrass prairie landscapes. Thesis, Kansas State University

Moon, D., and J. F. Cully. 2010. Small mammals in prairie ecosystems: scale dependent responses to disturbance. Annual meeting of the American Society of Mammalogists, Laramie, Wyoming.



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

Community Response to Use of Prescribed Grazing and Tebuthiuron Herbicide For Restoration of Sand Shinnery Oak Communities

Investigators

Jennifer Zavaleta, M.S.
2012
Texas Tech University

Project Supervisor

Dr. David Haukos
Dr. Clint Boal

Funding

Grasslands Charitable
Trust
Weaver Ranch
Texas Tech University

Cooperators

Charles Dixon
Willard Heck
Jim Weaver

Objectives

Determine the community response to tebuthiuron and grazing treatments used to restore sand shinnery oak grasslands

Assess the temporal response of the community to the treatment combinations over a 12-year period

Compare resulting vegetation composition to historical standards.

Location

New Mexico

Completion

March 2012

Status: Completed

Results:

The sand shinnery oak (*Quercus havardii*) mixed-grass community is an isolated, relict habitat located within short-grass prairie of the Southern High Plains. With the introduction of center-pivot agriculture, unmanaged grazing, oil and gas exploration and suppression of the natural fire regime, the vegetation composition of the shinnery oak community has changed during the past century. Land managers have used herbicides (e.g., tebuthiuron) and a variety of grazing systems as tools to manage shinnery oak. Results show that at relatively low levels of tebuthiuron (0.60 kg/ha) and subsequent moderate grazing system, sand shinnery oak can be reduced and maintained at near historical levels without reapplying tebuthiuron because the tested management approach allowed grasses to remain competitive in the system. There was 91% less shinnery oak in untreated areas. The removal of shinnery oak made environmental soil moisture more available for grasses and forbs to germinate and grow. Grasses increased by 149% and forbs increased by 257% in treated areas as compared to untreated areas throughout the study period. In terms of visual obstruction, there was both an herbicide and grazing effect in April such that visual obstruction increased by 30% in treated areas as compared to untreated and decreased by 6.5% in grazed areas as compared to non-grazed areas. There was no significant herbicide effect of overall abundance of small mammals. However, there was a significant grazing effect such that there was 23% more abundance of small mammals in grazed areas as compared to non-grazed areas, which was likely driven by kangaroo rats. Areas that were treated with tebuthiuron and had moderate grazing statistically reached historical standards only during one year, but showed trends that were comparable to historical standards throughout the study compared to other treatment combinations. The largest difference between treated areas and historical standards was that treated areas had more forbs. The change from a shrub monoculture to a mixed-grass prairie changes the plant composition and structure and provides more niches for invertebrates, mammals and herptiles to fill.

Products since 2010:

Zavaleta, J. 2012 Effects of grazing and herbicide treatments to restore degraded sand shinnery oak grasslands. Thesis, Texas Tech University.

Zavaleta, J., D. Haukos, and C. Boal. 2012. Community response to use of prescribed grazing and herbicide for restoration of sand shinnery oak grasslands. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.



Example of a restored sand shinnery oak grassland in eastern New Mexico

Occurrence, Function, and Conservation of Playa Wetlands: The Key to Biodiversity of the Southern Great Plains

Investigators

Lacrecia Johnson, Ph.D
2011
Texas Tech University

Project Supervisor

Dr. David Haukos

Funding

EPA
Texas Tech University
U.S. Fish and Wildlife
Service

Cooperators

Dr. Loren Smith
Dr. Scott McMurry

Objectives

Evaluate physical loss and modifications of playas as a function of anthropogenic impacts.

Develop the framework of a functional assessment for Great Plains playa wetlands

Estimate the effect of the USDA soil eclassification and subsequent emapping of upland and depressional soils in the SHP of Texas

Quantify the effectiveness and impact of vegetative buffers of different widths and vegetation structure around playa wetlands on concentrations of metals, nutrients, and sediment in precipitation runoff and total volume of water entering playas.

Location

Texas, New Mexico, and Oklahoma

Status: Completed

Results:

Playas form the primary wetland system in the High Plains portion of the Southern Great Plains (SGP) and provide valuable ecosystem services and functions including being key sites for biodiversity. Current estimates of the number of playas within the SGP (Texas, New Mexico, Oklahoma, southwestern Kansas, southeastern Colorado) from historical soil surveys (pre-1970s), topographic maps, and field checks exceed 25,000. This number often gives the potentially mistaken impression that there are numerous, adequately functioning playas in the region that continue to meet ecological and societal needs. In addition, these historical estimates are used to generate samples of playas for a variety of natural resource survey and research efforts, which depend on the occurrence of functional playas to generate sound inferential results. During the time period of 1970-2008 an estimated 17% of playas have been physically lost from the SGP landscape. Through the application of the function matrix, none of the sampled playas were estimated to function at full functional capacity in the SGP. Seventy-three (47%) of playas were estimated to be partially functional and restorable. Partially functional and non-restorable due to cost playas were estimated at 12.9% or 20 playas, and 61 (39.4%) playas were partially functional and non-restorable because effective restoration techniques do not exist. The effect of buffers surrounding playa wetlands on water quality was evaluated as functions of buffer width and vegetation cover. TDS and TSS reached a combined maximum removal at 50 m, 49% and 72% respectively. Nitrate and phosphorus reached a combined maximum removal at a distance of 20 m, 49% and 33% respectively. Maximum removal of metals occurred at 40 m. Estimated percent reduction in runoff reaching the playas due to the presence of a buffer was greatest for the native CRP cover type (-5.8%). A minimum buffer width of 40-50 m is necessary to maximize contaminant removal from runoff entering playa wetlands

Products since 2010:

Johnson, L. 2011. Current status and function of playa wetlands on the Southern Great Plains. Dissertation, Texas Tech University.

Johnson, L.A., D.A. Haukos, L.M. Smith, and S.T. McMurry. 2011. Jurisdictional loss of playa wetlands caused by reclassification of hydric soils on the Southern High Plains. *Wetlands* 31:483-492.

Johnson, L.A., D.A. Haukos, L.M. Smith, and S.T. McMurry. 2012. Loss and modification of Southern Great Plains playas. *Journal of Environmental Management* *In Press*

Completion

March 2011

Johnson, L., D.A. Haukos, L.M. Smith, and S. McMurry. 2011. Current status and function of Southern Great Plains playas wetlands and evaluation of buffer effectiveness: Implications for future conservation efforts. Final Report U.S. Environmental Protection Agency Cooperative Agreement CD-966441-01-0, Playa Lakes Joint Venture Project #445, U.S. Fish and Wildlife Service/U.S. Geological Survey Cooperative Agreement # 1434-HQ-07-RM-0068; TCRWFU RWO 67

Johnson, L., D. Haukos, L. Smith, and S. McMurry. 2010. Effectiveness of wetland buffers as a conservation tool for playas. 46th Annual Meeting of the Texas Chapter of The Wildlife Society, Galveston, Texas.



Lacrecia Johnson and technician searching for sampling locations in a playa wetland.

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

<p>Investigators Kevin Blecha Dr. Jonathan Conard</p>	<p>Status Completed</p>
<p>Project Supervisor Dr. Jonathan Conard</p>	<p>Progress and Results In our study, small grains (winter wheat / rye) are the most common crop within the predominantly agricultural landscape surrounding Quivira National Wildlife Refuge. This type of crop was used most frequently by deer, and was preferred by deer in winter time periods during some years of our study. In addition to winter wheat, deer used a variety of other crop types including corn, alfalfa, and fallow fields. Use of corn by white-tailed deer peaked during the summer which is consistent with observations that deer will consume corn during the summer (Nixon et al. 1991) and that home ranges may shift closer to corn fields during the tasseling-silking developmental stage. Fallow fields were used by deer most frequently during the summer (May-August) and were not avoided by deer during any season. The use of fallow fields by deer during the summer months was unexpected and to our knowledge has not been documented in other agricultural systems. Since deer used habitat selectively with respect to agricultural crops, it may be possible to use existing crop fields on Quivira National Wildlife Refuge as a means of managing distributions and movement patterns of deer. However, our results suggest that male deer often completely avoided burned areas for several weeks following burning and used burned areas of mixed-grass prairie less than expected in the 4 month time period following prescribed burning during the spring and late summer. Deer did not strongly avoid burned areas between 4-16 months following spring burning and did not exhibit a consistent pattern of avoidance or preference for burned areas during this time period. Our results suggest that fire in mixed-grass prairie may strongly influence patterns of habitat selection up to 4 months following a prescribed burn that occurs during the spring or summer.</p>
<p>Funding US Fish and Wildlife Service Kansas Department of Wildlife, Parks, and Tourism U.S. Army Corps of Engineers</p>	<p>Products since 2010 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.</p>
<p>Cooperators Quivira NWR Sterling College Kansas State University</p>	<p>Conard, J.M. and R. Lauben. 2012. Patterns of habitat selection and densities of white-tailed deer at Quivira National Wildlife Refuge. Final Report</p>
<p>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</p>	
<p>Location Quivira National Wildlife Refuge</p>	
<p>Completion July 2012</p>	

Technical Assistance



Participation by fisheries biologists from Kansas Department of Wildlife, Parks and Tourism, Kansas Cooperative Fish and Wildlife Research Unit, and Missouri Department of Conservation in a demonstration of the mini-Missouri trawl, July 2012.

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: 2010-present

Books and Book Chapters

- Smith, L.M., D.A. Haukos, and S. McMurry. 2012. High Plains Playas. Pages 299-311 *In: Wetland Habitats of North America: Ecology and Conservation Concerns*, D. Batzer and A. Baldwin (editors). University of California Press, Berkeley, CA.
- Haukos, D.A. 2011. Use of tebuthiuron to restore sand shinnery oak grasslands of the Southern High Plains. *Pages 103-124 In Mohammed Naguib and Abd El-Ghany Hasaneen (Ed.), Herbicides – mechanisms and mode of action*. ISBN: 978-953-307-744-4, InTech, Available from: <http://www.intechopen.com/articles/show/title/use-of-tebuthiuron-to-restore-sand-shinnery-oak-grasslands-of-the-southern-high-plains>

Peer Reviewed Journal Articles

- Albanese, G., Davis, C. A. *In Press*. Broad-scale relationships between migratory shorebirds and landscapes in the southern Great Plains. *Auk*.
- Albanese, G., Davis, C. A., Compton, B. *In Press*. Spatiotemporal scaling of N. American continental interior wetlands: Implications for shorebird conservation. *Landscape Ecology*.
- Antolin, M.F., D.E. Biggins, C.J. Brand, J. F. Cully, L.E. Ellison, K.L. Gage, and T.E. Rocke. 2010. *Eds. Special Issue: Symposium on the Ecology of Plague and its Effects On Wildlife. Vector-borne and Zoonotic Diseases* 10:1-103
- Behney, A.C., B.A. Grisham, C.W. Boal, H.A. Whitlaw, and D.A. Haukos. 2012. Sexual selection and mating chronology of lesser prairie-chickens. *Wilson Journal of Ornithology* 124:96-105.
- Beldon, J., B. Hanson, L. Smith, S. McMurry, and D. Haukos. 2012. Assessment of the effects of farming and conservation programs on pesticide deposition in High Plains Wetlands. *Environmental Science and Technology* 46:3424-3432.
- Bishop, M.P., Shroder, J.F., Ali, G., Bush, A.G.B, Haritashya, U., Roohi, R., Sarikaya, M.A, Weihs, B.J., 2012. Southwest Asian Regional Center: Afghanistan and Pakistan. New York: Springer-Verlag, In Press
- Bouska, W. W., and C. P. Paukert. 2010. Effects of visible implant elastomer mark color on the predation of red shiners by largemouth bass. *Fisheries Management and Ecology* 17:294-296.
- 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., T. Keane, and C. P. Paukert. 2010. The effects of road crossing design on geomorphology and classification of prairie streams. *Journal of Freshwater Ecology* 25:499-506.
- Cully, J. F., Jr., S. K. Collinge, R. E. VanNimwegen, C. Ray, W. C. Johnson, B. Thiagarajan, D. B. Conlin, and B. E. Holmes. 2010. Spatial variation in keystone effects: Small mammal diversity associated with black-tailed prairie dog colonies. *Ecography* 33:667-677.
- Cully, J. F., Jr., T. L. Johnson, S. K. Collinge, and C. Ray. 2010. Disease limits populations: Plague in black-tailed prairie dogs. *Vector Borne and Zoonotic Diseases* 10:7-15.
- Cully, J. F., S. K. Collinge, R. E. VanNimwegen, C. Ray, W. C. Johnson, B. Thiagarajan, D. B. Conlin, and B. E. Holmes. 2010. Spatial variation in keystone effects: small mammal diversity associated with black-tailed prairie dog colonies. *Ecography* 33:1-11.

- Cully, J. F., T. L. Johnson, S. K. Collinge, and C. Ray. In press. Disease limits populations: Plague and black-tailed prairie dogs. *Vector-Borne and Zoonotic Diseases*.
- Dinehart, S.K., L.M. Smith, S.T. McMurry, T.A. Anderson, P.N. Smith, and D.A. Haukos. 2010. Acute and chronic toxicity of Roundup Weathermax® and Ignite®280 SL to larval *Spea multiplicata* and *S. bombifrons* from the Southern High Plains, USA. *Environmental Pollution* 158:2610-2617.
- 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. 2010. Urbanization in a Great Plains river: effects on fishes and food webs. *River Research and Applications* 26:948-959.
- Ferry, K. H., and M. E. Mather. 2012. Spatial and temporal diet patterns of young adult and subadult striped bass feeding in Massachusetts estuaries: trends across scales. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 4:30–45
- Fischer, J., C. Paukert, and M. Daniels. Accepted. Fish Community Response to Habitat Alteration: Impacts of Sand Dredging in the Kansas River. *Transactions of the American Fisheries Society*.
- Frank, H. F., M. E. Mather, J. M. Smith, R. M. Muth, J. T. Finn. 2011. Role of origin and release location in pre-spawning movements of anadromous alewives. *Fisheries Management and Ecology* 18(1):12–24.
- Haukos, D.A. 2012. Wetland Ecosystems (Book Review). *Ecology* 93:215-216.
- Haukos, D.A., S. Martinez, and J. Hetzel. 2010. Characteristics of pair ponds used by mottled ducks on the Chenier Plain of coastal Texas. *Journal of Fish and Wildlife Management* 1:93-101.
- Hitchman, S.M., N.B. Reynolds, and A.R. Thompson. In Press. Larvae define spawning habitat of bocaccio rockfish, *Sebastes paucispinis*, within and around a large southern California marine reserve. *Marine Ecology Progress Series*.
- Hoogland, J. L., J. F. Cully, L. S. Rayor, and J. P. Fitzgerald. 2012 (August). Conflicting research on the demography, ecology, and social behavior of Gunnison's prairie dogs (*Cynomys gunnisoni*). *Journal of Mammalogy*.
- Jeffress, M., R., C. P. Paukert, J. B. Whittier, B. K. Sandercock, and P. S. Gipson. 2011. Scale-dependent factors affecting North American river otter distribution in the Midwest. *American Midland Naturalist* 166:177-193.
- Jeffress, M.R., C.P. Paukert, B. K. Sandercock, and P. Gipson. 2011. Factors affecting the detectability of river otters during sign surveys. *Journal of Wildlife Management* 75:144-150.
- Johnson, L.A., D.A. Haukos, L.M. Smith, and S.T. McMurry. 2011. Jurisdictional loss of playa wetlands caused by reclassification of hydric soils on the Southern High Plains. *Wetlands* 31:483-492
- Johnson, L.A., D.A. Haukos, L.M. Smith, and S.T. McMurry. 2012. Loss and modification of Southern Great Plains playas. *Journal of Environmental Management* *In Press*
- Johnson, T.L., J. F. Cully, Jr., S. K. Collinge, C. Ray, C. M. Frey, and B. K. Sandercock. 2011. Spread of plague among black-tailed prairie dogs is associated with colony spatial characteristics. *Journal of Wildlife Management* 75:357-368.
- Johnson, W.P., M.B. Rice, D.A. Haukos, and P. Thorpe. 2011. Factors influencing the occurrence of inundated playa wetlands during winter on the Texas High Plains. *Wetlands* 31:1287-1296.
- Marschall, E. A., M. E. Mather, D. L. Parrish, G. W. Allison, J. McMenemy. 2011. Migration delays caused by anthropogenic barriers: dams, temperature, and success of migrating salmon smolts. *Ecological Applications*, 21: 3014–3031

- Mather, M. E., J. T. Finn, S. M. Pautzke, D. Fox, T. Savoy, H. M. Brundage III, L. A. Deegan, R. M. Muth. 2010. Destinations, routes, and timing of adult striped bass on their southward fall migration: implications for coastal movements. *Journal of Fish Biology* 77: 2326–2337.
- Mather, M. E., D. L. Parrish, J. M. Dettmers. Now that you have great results, where should you submit your manuscript? Accepted - Writing for Natural Resources Professions (Bruce Vondracek, Cecil Jennings, editors), American Fisheries Society, Bethesda, MD
- Mather, M.E., H. J. Frank, J. M. Smith, R. D. Cormier, R. M. Muth, and J. T. Finn. 2012. Assessing freshwater habitat of adult anadromous alewives at multiple scales: a common challenge for fish and watershed restoration. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, 4:1, 188-200
- Mattson, B.J, M.C. Runge, J.H. Devries, G.S. Boomer, J.M. Eadie, D.A. Haukos, J. P. Fleskes, D.N. Koons, W.E. Thogmartin, and R. J. Clark. 2012. A prototypical modeling framework for integrated harvest and habitat management of North American waterfowl: case-study of northern pintail metapopulation dynamics. *Ecological Modeling* 225:146-158.
- McRoberts, J.T., M.J. Butler, W.B. Ballard, H.A. Whitlaw, D.A. Haukos, and M.C. Wallace. 2011. Detectability of lesser prairie-chicken leks: a comparison of surveys from aircraft. *Journal of Wildlife Management* 75:771-778
- McRoberts, J.T., M.J. Butler, W.B. Ballard, M.C. Wallace, H.A. Whitlaw, and D.A. Haukos. 2011. Response of lesser prairie-chickens on leks to aerial surveys. *Wildlife Society Bulletin* 35:27-31.
- O'Connell, J., L. Johnson, L. Smith, S. McMurry, and D. Haukos. 2012. Land-use and conservation programs on wetland plant communities of the semi-arid United States Great Plains. *Biological Conservation* 146:108-115.
- Paukert, C. P., K. L. Pitts, J. B. Whittier, and J. D. Olden. 2011. Development and assessment of a landscape-level ecological threat index of the Lower Colorado River Basin. *Ecological Indicators* 11:304-310.
- Pautzke, S. M., M. E. Mather, J. T. Finn, L. A. Deegan, R. M. Muth. 2010. Seasonal use of a New England estuary by foraging contingents of migratory striped bass. *Transactions of the American Fisheries Society* 139: 257–269.
- Pool, T. K., J. D. Olden, J. B. Whittier, and C. P. Paukert. 2010. Environmental drivers of fish functional diversity and composition in the Lower Colorado River Basin. *Canadian Journal of Fisheries and Aquatic Sciences* 67:1791-1807.
- Rice, M., D. Haukos, J. Dubvosky, and M. Runge. 2010. Survival and recovery band-recovery models for northern pintails of North America. *Journal of Wildlife Management* 74:778-787.
- Rigby, E., and D. Haukos. 2012. Breeding season survival and breeding incidence of female mottled ducks on the upper Texas Gulf Coast. *Waterbirds In Press*
- Saalfeld, S.T, W.C. Conway, D.A. Haukos, and W.P. Johnson. 2011. Nest success of Snowy Plovers (*Charadrius alexandrinus*) in the Southern High Plains of Texas. *Waterbirds* 34:389-399.
- Saalfeld, S.T, W.C. Conway, D.A. Haukos, and W.P. Johnson. 2012. Selection and spacing patterns of snowy plover nests in the Southern High Plains of Texas. *Journal of Wildlife Management In Press*
- Saalfeld, S.T, W.C. Conway, D.A. Haukos, and W.P. Johnson. 2012. Alleviation of nest thermal extremes by incubating snowy plovers in the Southern High Plains of Texas. *Wader Study Group Bulletin*. 119 *In Press*

- Saalfeld, S.T., W.C. Conway, D.A. Haukos, and W.P. Johnson. 2012. Recent declines in apparent survival and survey counts of snowy plover breeding in the Southern High Plains of Texas. *Wilson Journal of Ornithology In Press*.
- Saalfeld, S.T., W.C. Conway, D.A. Haukos, M.B. Rice, S.L. Jones, and S.D. Fellows. 2010. Multiscale habitat selection by long-billed curlews (*Numenius americanus*) breeding in the United States. *Waterbirds* 33:148-161.
- Schloesser, J. T., C. P. Paukert, W. J. Doyle, T. D. Hill, K. D. Steffensen, and V. H. Travnichek. In press. Fish assemblages at engineered and natural channel structures in the Lower Missouri River: implications for modified dike structures. *River Research and Applications*.
- Schloesser, J. T., C. P. Paukert, W. J. Doyle, T. D. Hill, K. D. Steffensen, and V. H. Travnichek. 2012. Heterogeneous detection probabilities for imperiled Missouri River fishes: implications for large river monitoring programs. *Endangered Species Research* 16:211-224.
- Shroder, J.F., Jr., and Weihs, B.J., 2010. Geomorphology of the Lake Shewa landslide dam, Badakhshan, Afghanistan using remote sensing data. *Geografiska Annaler*, 92:469-483.
- Shroder, J.F., Jr., and Weihs, B.J., 2012. Mass Movement. *Encyclopedia of Geoarchaeology*, New York: Springer-Verlag, In Press
- Shroder, J.F., Jr., Jensen-Schettler, M., and Weihs, B.J., 2012. Loess failure in northeast Afghanistan. *J. Phys. Chem. Earth*, In Press
- Shroder, J.F., Jr., Weihs, B.J., and Jensen-Schettler, M., 2011. Mass movement in northeast Afghanistan. *J. Phys. Chem. Earth*, 36:1267-1286.
- Sidele, J. G., D. J. Augustine, D. H. Johnson, S. D. Miller, J. F. Cully, Jr. and R. P. Reading. 2012. Aerial surveys adjusted by ground surveys to estimate area occupied by black-tailed prairie dog colonies. *Wildlife Society Bulletin* 36:248-256.
- Smith, J. S., and M. E. Mather. 2011. Using assemblage data in ecological indicators: a comparison and evaluation of commonly available statistical tools. *Ecological Indicators* 13: 253-262
- Smith, L.M., D.A. Haukos, S.T. McMurry, T. LaGrange, and D. Willis. 2011. Influence of ecosystem services provided by playa wetlands in the High Plains: potential influences of USDA conservation programs and practices. *Ecological Applications* 21:582-592.
- Smith, L.M., N.H. Eules, Jr., and D.A. Haukos. 2011. Are isolated wetlands isolated? *National Wetlands Newsletter* 33(5) 26-27.
- Smythe, L., and D.A. Haukos. 2010. Density of grassland birds in sand shinnery oak communities treated with tebuthiuron and grazing in eastern New Mexico. *Restoration Ecology* 18:215-223.
- Strecker, A., J. Olden, J. Whittier, and C. Paukert. 2011. Defining conservation priorities for freshwater fishes according to taxonomic, functional, and phylogenetic diversity. *Ecological Applications* 21(8):3002-3013.
- Tsai, J.S., L.S. Venne, L.M. Smith, S.T. McMurry, and D.A. Haukos. 2012. Influence of local and landscape characteristics on avian richness and density in wet playas of the Southern Great Plains, USA. *Wetlands* 32:605-618.
- Weihs, B.J., and Shroder, J.F., Jr., 2011. Mega-terraces and related ungulate activities in Loess Hills, Iowa, USA. *Zeitschrift für Geomorphologie*, 55:45-61.
- 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*.

Technical Publications

- Albanese, G. Davis, C. A. 2010. Monitoring distribution and habitat-use patterns of migrant shorebirds and assessing habitat quality of isolated wetlands in the mixed-grass prairie region. ODWC Final Report, 1801 N Lincoln, OKC, OK 73105. 46pp.
- Albanese, G., Burris, L. Skagen, S. K. 2010. Implications of climate change for avian conservation in Great Plains landscapes. Great Plains Landscape Conservation Cooperative, USFWS. 68pp.
- Conard, J.M. and R. Lauben. 2012. Patterns of habitat selection and densities of white-tailed deer at Quivira National Wildlife Refuge. Final Report
- 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.
- Johnson, L., D.A. Haukos, L.M. Smith, and S. McMurry. 2011. Current status and function of Southern Great Plains playas wetlands and evaluation of buffer effectiveness: Implications for future conservation efforts. Final Report U.S. Environmental Protection Agency Cooperative Agreement CD-966441-01-0, Playa Lakes Joint Venture Project #445, U.S. Fish and Wildlife Service/U.S. Geological Survey Cooperative Agreement # 1434-HQ-07-RM-0068; TCRWFU RWO 67
- Smith, L.M., S. T. McMurry, J. O'Connell, and D.A. Haukos. 2011. Influence of U. S. Department of Agriculture Programs and Conservation Practices on Ecological Services Provided by Playa Wetlands in the High Plains; CEAP Wetlands Final Report to the USDA.
- 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

- Fischer, Jason (M.S. 2012; advisor Paukert). Fish community response to habitat alteration: impacts of sand dredging in the Kansas River. Kansas State University
- Zavaleta, Jennifer (M.S. 2012; advisor Haukos). Effects of grazing and herbicide treatments to restore degraded sand shinnery oak grasslands. Texas Tech University, Lubbock, TX.
- Moon, Derek (M.S. 2011; advisor Cully). Small mammals in disturbed tallgrass prairie landscapes. Kansas State University.
- Goldberg, Amanda (M.S. 2011; advisor Cully). Apparent survival, dispersal, and abundance of black-tailed prairie dogs. Kansas State University.
- Burak, Matt (M.S. 2011; advisor Mather). Developing the technology for an inexpensive, video system to count anadromous herring. University of Massachusetts, Amherst, MA.
- Smith, Joseph (Ph.D. 2011; Mather). Examining fish community distribution and coalescence in coastal streams and estuaries using network theory. University of Massachusetts, Amherst, MA.
- Johnson, Lacreacia (Ph.D 2011; advisor Haukos). Current status and function of playa wetlands on the Southern Great Plains. Texas Tech University, Lubbock Texas.
- Severson, Andrea (M.S. 2010; advisor Paukert). Effects of zebra mussel (*Dreossena polymorpha*) invasion ion the aquatic community of a Great Plains reservoir. Kansas State University.

Research Experience for Undergraduates (REU)

2011 – Judith Patterson (Mather)

Can a mobile consumer affect ecosystem function in streams at the Konza Prairie: exploring crayfish movements using PIT tags and mobile and stationary antennas

2012 – Nervalis Medina-Echevarria (Albanese, Haukos)

Adult Regal Fritillary (*Speyeria idalia*) density among fire and grazing regimes at Konza Prairie with notes on the occurrence patterns of its host plant, Prairie Violet (*Viola pedatifida*).

List of Presentations 2010-present

- Albanese, G., and Davis, C. A. 2012. Broad-scale relationships between migratory shorebirds and landscapes in the southern Great Plains. 9th Intercol International Wetlands Conference. Orlando, FL.
- Albanese, G., and Davis, C. A. 2012. A comparative examination of within wetland and wetland context characteristics on stopover habitat use by migrant shorebirds: Is the neighborhood important? 9th Intercol International Wetlands Conference. Orlando, FL.
- Albanese, G., and Davis, C. A. 2011. Spatiotemporal scaling of continental interior wetlands: Implications for shorebird conservation. Waterbird Society 2011 annual meeting. Grand Island, NE.
- Albanese, G., Davis, C. A., and B. Compton. 2012. Spatiotemporal scaling of continental interior wetlands: Implications for shorebird conservation. International Association for Landscape Ecology 2012 annual symposium. Newport, RI.
- Boal, C., D. Haukos, and B. Grisham. 2011. Understanding the ecology, habitat use, phenology and thermal tolerance of nesting lesser prairie-chickens to predict population level influences of climate change. Great Plains Landscape Conservation Cooperative, Fort Robinson, Nebraska.
- Bouska, W. W., and C. P. Paukert. 2010. Road crossing designs, their effect on prairie stream fishes, and an update on the Topeka shiner. Dakota Chapter of the American Fisheries Society annual meeting, Spearfish, SD.
- Burak, M. K., M. E. Mather, J. T. Finn, J. B. Kim, and R. M. Muth. 2010. Identification of the timing and magnitude of anadromous alewife spawning migrations in three coastal Massachusetts rivers. Northeastern Division American Fisheries Society, Newton, MA.
- Conway, W., and D. Haukos. 2010. Distributional records of tiger beetles (Coleoptera:Cicindelidae) in saline lakes of the Southern High Plains of Texas. Bright Ideas Conference, Stephen F. Austin State University, Nacagdoches, Texas.
- Conway, W., and D. Haukos. 2010. Tiger beetles (Coleoptera:Cicindelidae) in saline lakes of the Southern High Plains of Texas. Annual Meeting Southwestern Association of Naturalists, Junction, Texas.
- Cormier, R., H. J. Frank, M. E. Mather, R. M. Muth, J. M. Smith, J. T. Finn. 2010. Relationship between movements of anadromous alewives and large- and small-scale habitat features. Northeastern Division American Fisheries Society, Newton, MA.
- Cully, J., R. Pigg, and A. Goldberg. 2010. Sustainability of black-tailed prairie dogs at small culture parks of the western Great Plains. 22nd North American Prairie Conference, Cedar Falls, Iowa.
- Daniel, D., S. McMurry, L. Smith, and D. Haukos. 2011. Effects of Conservation Reserve Program on size, sediment depth, and volume loss in playa wetlands. 36th Annual Great Plains Limnology Conference, Texhoma, Texas.
- Daniels, M. K., J. Fischer, K. Costigan, J. Gerken, and C. Paukert. 2011. Making sense of an intensively modified sediment regime: measuring the relative impact of in-channel dredging amidst reservoir trapping and network-scale incision in the Kansas River basin. International Symposium on the Interactions between Sediment and Water. Dartington, England.
- Fischer, J. J. Gerken, C. Paukert, and M. Daniels. Habitat and fish community response to sand dredging in a large Great Plains river. American Fisheries Society Annual Meeting, Seattle, WA.
- Fischer, J., C. Paukert, and M. Daniels. 2012. Influence of in-stream and watershed alterations on sandbars and islands in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.

- Fischer, J., C. Paukert, J. Gerken, and M. Daniels. 2010. Fish community response to habitat alteration: impacts of sand dredging in the Kansas River. Midwest Fish and Wildlife Conference, St. Paul, MN.
- Fischer, J., C. Paukert, J. Gerken, and M. Daniels. 2011. Influence of sand dredging on fish communities in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Fischer, J., J. Gerken, C. Paukert, and M. Daniels. 2011. Habitat and fish community response to sand dredging in a large Great Plains river. Midwest Fish and Wildlife Conference, Des Moines, IA.
- Frank, H. J. M. E. Mather, S. M. Pautzke, J. M. Smith, R. M. Muth, J. T. Finn. 2010 Encouraging stakeholder participation in restoration research: The adopt-a-herring program. Invited Presentation Restoration of American Shad and River Herring in Atlantic Coastal Waters, Annual Meeting, American Fisheries Society, Pittsburgh, PA.
- 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., and C. Paukert. 2010. Floods and fishes: examining the role of high flows on fish and invertebrates in a large Great Plains River. Midwest Fish and Wildlife Conference, St. Paul, MN.
- Gerken, J., and C. Paukert. 2010. Testing the flood pulse concept: The importance of floodplain inundation on fish and invertebrates of a Great Plains river. American Fisheries Society Annual Meeting, Pittsburgh, PA.
- Gerken, J., and C. Paukert. 2011. Age-specific demography of silver carp: implications for management and control. American Fisheries Society Annual Meeting, Seattle, WA.
- Gerken, J., and C. Paukert. 2011. Can silver carp be controlled? Population level response to various management regimes. Midwest Fish and Wildlife Conference, Des Moines, IA.
- Gerken, J., and C. Paukert. 2011. The importance of high flows and floodplain inundation for fish and invertebrates of the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Goldberg, A., and J. F. Cully. Estimated Apparent Survival of Black-tailed Prairie Dogs at Four Small National Parks Using the Robust Design in Program MARK. American Society of Mammalogists Annual Meeting, Portland Oregon, June 24-28, 2011.
- Goldberg, A., J. F. Cully. Apparent Survival of Black-tailed Prairie Dogs at Four Small National Parks Using the Robust Design in Program MARK. 72nd Midwest Fish and Wildlife Conference, Des Moines, Iowa, 4-7 December 4-7, 2011.
- Grisham, B., C. Boal, and D. Haukos. 2011. A ten year assessment of herbicide treatment and grazing on nest site selection and daily nest survival of lesser prairie-chickens in New Mexico. Prairie Grouse Technical Council, Hays, Kansas.
- Grisham, B., C. Boal, and D. Haukos. 2011. Thermal ecology of nesting lesser prairie-chickens and the potential implications of climate change. 18th Annual Meeting of The Wildlife Society, Waikoloa, Hawaii.
- Grisham, B., C. Boal, and D. Haukos. 2011. Thermal tolerances of nesting lesser prairie-chickens and the potential population level influence of climate change. Joint Meeting of the Association of Field Ornithologists, Cooper Ornithological Society, and the Wilson Ornithological Society, Kearney, Nebraska.
- Grisham, B., C. Boal, and D. Haukos. 2011. Understanding the thermal tolerance of nesting lesser prairie chickens to predict population level influence of climate change. Annual Meeting of The Texas Chapter of The Wildlife Society, San Antonio, Texas.
- Grisham, B.A., C. Boal, and D.A. Haukos. 2012. The predicted influence of climate change on lesser prairie-chicken reproductive parameters. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

- Haukos, D.A. 2010. Playa wetland ecology and management, Workshop, Kansas Wildlife and Parks, Great Bend, Kansas
- Haukos, D.A. 2010. Demographic model development for northern pintails of North America. Central Flyway Waterfowl Technical Committee, March 2010, Tulsa, Oklahoma and July 2010, Norman, Oklahoma.
- Haukos, D.A. 2010. Demographic model development for northern pintails of North America. Mississippi Flyway Waterfowl Technical Committee, Mobile, Alabama.
- Haukos, D.A. 2010. High Plains wetlands: connections, concerns, and conservation. Seminar, Department of Wildlife and Fisheries, South Dakota State University, Brookings, South Dakota.
- Haukos, D.A. 2010. Mottled duck focal species plan, Central Flyway Waterfowl Technical Committee, Norman, Oklahoma and Mississippi Flyway Waterfowl Technical Committee, Mobile, Alabama.
- Haukos, D.A. 2010. Playa ecology, management, and threats, Workshop, Kansas Alliance for Wetlands and Streams, Garden City, Kansas
- Haukos, D.A. 2010. Playa ecology: their historical value and current issues, Invited Presentation - Water, Water Everywhere, But Will There Be A Drop To Drink, A Symposium on the Use and Misuse of Water on the Llano Estacado Through Time, Historical Society of New Mexico, Hobbs, New Mexico
- Haukos, D.A. 2010. Status and research of mottled ducks on the Texas Chenier Plain NWR Complex, USFWS Biologists and Managers Meeting, Port Arthur, Texas
- Haukos, D.A. 2011. Migratory Bird Program and National Wildlife Refuges: a partnership. Texas Coastal NWR Biologists meeting, Rockport, Texas.
- Haukos, D.A. 2011. The High Plains: Connecting Ecosystems. Great Plains Landscape Conservation Cooperative Science Team Meeting, Oklahoma City, Oklahoma.
- Haukos, D.A. 2011. 2011 Water Issues Forum: Kansas In Transition. Kansas Water Board, Hays, Kansas.
- Haukos, D.A. 2011. The High Plains: making sense of a complex system. Webinar, Great Plains Landscape Conservation Cooperative, September 2011. (Invited).
- Haukos, D.A. 2011. The influence of playa wetlands on High Plains biodiversity. Ecology of Waterbird Migration and Playa Wetland Ecology Symposia, Rainwater Basin Joint Venture/Playa Lakes Joint Venture Research Symposium; Annual Meeting of The Waterbird Society, Grand Island, Nebraska.
- Haukos, D.A. 2012. Emerging issues related to diseases of migratory birds in the Great Plains. Annual meeting of the Disease Committee, Midwest Association of State Wildlife and Fisheries Agencies, Manhattan, Kansas.
- Haukos, D.A. 2012. Playas of the Llano Estacado. Southern Plains Conference, Ogallala Commons, Muleshoe, Texas
- Haukos, D.A., and E. Rigby. 2011. A matrix population model for mottled ducks on the western Gulf Coast of Texas. The West Gulf Coast Plain and Big Thicket Science Conference, Nacogdoches, Texas.
- Haukos, D.A., and P.McDaniel. 2011. Use of grazing management to restore lesser prairie-chicken habitat in eastern New Mexico. Prairie Grouse Technical Council, Hays, Kansas.
- Haukos, D.A., L.A. Johnson, L.M. Smith, and S. McMurry. 2011. Effectiveness of vegetative buffer areas surrounding playa wetlands. Ecology of Waterbird Migration and Playa Wetland Ecology Symposia, Rainwater Basin Joint Venture/Playa Lakes Joint Venture Research Symposium; Annual Meeting of The Waterbird Society, Grand Island, Nebraska.

- Johnson, L., D. Haukos, L. Smith, and S. McMurry. 2010. Effectiveness of wetland buffers as a conservation tool for playas. 46th Annual Meeting of the Texas Chapter of The Wildlife Society, Galveston, Texas.
- Kennedy, C. G., M. E. Mather, J. T. Finn, L. A. Deegan, and S. M. Pautzke. 2010. Determining acoustic receiver range in a shallow northeastern estuary with complex bathymetry: the role of habitat, depth and tide. Southern New England Chapter, American Fisheries Society, Groton, CT.
- Kennedy, C. G., M. E. Mather, J. T. Finn, L. A. Deegan. 2011. The geomorphic complexity of a New England estuary and its role in shaping seasonal habitat use and site fidelity of striped bass on a foraging migration. Annual meeting of the American Fisheries Society, Seattle, WA.
- Kennedy, C. G., M. E. Mather, J. T. Finn, L. A. Deegan. 2011. The complexity of habitat complexity: how physical features of a New England estuary shape seasonal habitat use of migratory striped bass. CERF meeting, FL.
- Mammoliti, K., J. Gerken, and C. Paukert. 2010. Population characteristics of channel catfish in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Mammoliti, K., W. Bouska, and C. Paukert. 2010. Seasonal stockpiling of prairie stream fishes below road crossings in the flint hills of Kansas. Kansas Natural Resources Conference, Wichita, KS.
- Mather, M. E. 2011. Migratory fish in estuarine landscapes: can anadromous fish provide a general ecological framework for understanding distribution, habitat use, and movement? North American Benthological Society, Providence, RI.
- Mather, M. E., H. J. Frank, J. M. Smith, R. M. Muth, J. T. Finn. 2010. Understanding the role of origin and release location in behavior and habitat use of pre-spawning alewives to improve the efficiency of restoration. Invited Presentation Restoration of American Shad and River Herring in Atlantic Coastal Waters, Annual Meeting, American Fisheries Society, Pittsburgh, PA.
- Mather, M. E., M. K. Burak, J. T. Finn, R. M. Muth, J. B. Kim, K. H. Ferry. 2010. Counting anadromous fish at remote fishways in small coastal streams: a review of past uses of video monitoring with an evaluation of a new system. Northeastern Division American Fisheries Society, Newton, MA.
- Mather, M. E., R. M. Muth, and H. J. Frank. 2012. Using the Adopt-A-Fish Program to Get Stakeholders Hooked on Conservation. North American Congress for Conservation Biology, Invited Speaker, Symposium, Oakland, CA.
- Mather, M.E., E.A. Marschall*, and D.L. Parrish. Predicting interactive effects of climate change and dams on success of downstream-migrating salmon. Fish and Climate Change, The Fisheries Society of the British Isles Annual Symposium, Belfast, UK.
- Mather, M. E., J. M. Smith, J. Gerken, J. Patterson. 2011. Can animal movement change the outcome of ecological interactions in a grassland ecosystem? Grasslands in an International Context, Symposium, Kansas State University, Manhattan, KS.
- Mattson, B., M. Runge, R. Clark, J. Eadie, D. Haukos, J. Fleskes, W. Thogmartin, and K. Gynn. 2011. A modeling framework to integrate harvest and habitat management of North American waterfowl: case-study of northern pintail metapopulation dynamics. 18th Annual Meeting of The Wildlife Society, Waikoloa, Hawaii.
- McDowell, S.K., W. Conway, and D. Haukos. 2012. Potential exposure to environmental lead in mottled ducks (*Anas fulvigula*) on the Texas Chenier Plains National Wildlife Refuge Complex. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

- McMurry, S., L. Smith, and D. Haukos. 2011. Sedimentation and volume loss in cropland, grassland, and CRP playas. Ecology of Waterbird Migration and Playa Wetland Ecology Symposia, Rainwater Basin Joint Venture/Playa Lakes Joint Venture Research Symposium; Annual Meeting of The Waterbird Society, Grand Island, Nebraska.
- McRoberts, J.T., W. Ballard, H. Whitlaw, M. Butler, M. Wallace, and D. Haukos. 2012. Aerial surveys for lesser prairie-chicken leks: detectability and disturbance response. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.
- McRoberts, J.T., W. Ballard, H. Whitlaw, M. Butler, M. Wallace, and D. Haukos. 2011. Detectability of lesser prairie-chicken lets from aerial surveys. 18th Annual Meeting of The Wildlife Society, Waikoloa, Hawaii.
- Moon, Derek, and J. F. Cully. 2010. Small mammals in prairie ecosystems: scale dependent responses to disturbance. Annual meeting of the American Society of Mammalogists, Laramie, Wyoming.
- Moon, J., D. Haukos, W. Conway, and P. Walther. 2011. Habitat use and movements of adult mottled ducks on the Texas Chenier Plain. Annual Meeting of The Texas Chapter of The Wildlife Society, San Antonio, Texas.
- Moon, J.A., D.A. Haukos, and W. Conway. 2012. Potential climate change impacts to mottled ducks on the Chenier Plain Region of Texas. Texas Chapter of The Wildlife Society, Fort Worth, Texas.
- O'Connell, J., L. Smith, S. McMurry, and D. Haukos. 2010. Conservation effects of catchment land management on playa communities of playa wetlands in the short-grass prairie ecoregion. Annual Meeting of the Society of Wetland Scientists.
- O'Connell, J., L. Smith, S. McMurry, and D. Haukos. 2011. Effects of land management on plant communities of playa wetlands. Ecology of Waterbird Migration and Playa Wetland Ecology Symposia, Rainwater Basin Joint Venture/Playa Lakes Joint Venture Research Symposium; Annual Meeting of The Waterbird Society, Grand Island, Nebraska.
- Paukert, C. 2010. Fish and fish habitat in the Kansas River. Midwest Fisheries Student Colloquium, Manhattan, KS.
- Paukert, C. 2010. Fish and fish habitat in the Kansas River: what have we learned? Kansas Natural Resources Conference, Wichita, KS.
- 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. and J. Gerken. 2010. The Importance of secondary channels to mainchannel fishes in the Kansas River. Big River Confab, Jefferson City, MO.
- Pigg, R., T. Johnson, and J. F. Cully. The influence of landscape features on the disease ecology of sylvatic plague. Fifth Biennial Meeting of the International Biogeographical Society, 7-11 January 2011. Crete.
- Pigg, R., T. Johnson, and J. F. Cully. The influence of landscape features on the disease ecology of sylvatic plague. 72nd Midwest Fish and Wildlife Conference, Des Moines, Iowa, 4-7 December 4-7, 2011.
- Riecke, T.V., W. Conway, and D.A. Haukos. 2012. Nest success and nest site selection of black-necked stilts on the Texas Chenier Plain National Wildlife Refuge Complex. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.
- Saalfeld, S., W. Conway, D. Haukos, and W. Johnson. 2010. Nest success of Snowy Plovers in the Southern High Plains of Texas. Annual Meeting Wilson Ornithological Society.
- Saalfeld, S., W. Conway, D. Haukos, and W. Johnson. 2010. Nest site selection of snowy plovers in the Southern High Plains of Texas. 46th Annual Meeting of the Texas Chapter of The Wildlife Society, Galveston, Texas.

- Severson, A. and C. Paukert. 2010. Zooplankton community response to zebra mussel invasion in a Kansas reservoir. Midwest Fisheries Student Colloquium, Manhattan, KS.
- Smith, J. M., M. E. Mather, R. M. Muth and J. T. Finn. 2010. Beaver-dam alterations of fish assemblages in coastal watersheds: Implications of fragmentation on ecosystem function. National meeting, Ecological Society of America, Pittsburgh, PA.
- Smith, L., D. Haukos, and S. McMurry. 2011. Ecosystem services and playas of the U.S. Great Plains. Joint Meeting of Society of Wetland Scientists, Wetpol, and Wetland Biogeochemistry Symposium, Prague, Czech Republic.
- Smith, L., D. Haukos, and S. McMurry. 2011. Ecosystem services provided by High Plains playas; status and needs. Special Session CEAP-Wetlands, Soil and Water Conservation Society, Washington, D.C.
- Sullins, D.A., W. Conway, and D. Haukos. 2012. American woodcock (*Scolopax minor*) habitat suitability and occupancy in eastern Texas. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.
- Weihls, B.J. 2010. Lake Shewa Rock-Slide Failure and Water Impoundment, Badakhshan, Afghanistan. Great Plains/Rocky Mountains Regional Association of American Geographers Conference, Lawrence, KS
- Weihls, B.J. 2011. Terracette Genesis and Related Ungulate Activities. Binghamton Geomorphology Symposium, Mobile, AL
- Weihls, B.J. 2011. Terracette Genesis and Related Ungulate Activities, Great Plains/Rocky Mountains. Regional Association of American Geographers Conference - Poster Presentation, Denver, CO
- Weihls, B.J., and J.F. Shroder, Jr. 2010. Lake Shewa Rock-Slide Failure and Water Impoundment, Badakhshan, Afghanistan. Association of American Geographers Conference, Washington D.C.
- Weihls, B.J., W. Butler, and R. Marston. 2012. Cross-Valley Profiles and Mass Movement Hazards in Deglaciaded Canyons, Grand Teton National Park. Association of American Geographers Conference. New York, NY
- Weihls, B.J., W. Butler, and R. Marston. 2011. Cross-Valley Profiles and Mass Movement Hazards in Deglaciaded Canyons, Grand Teton National Park. Association of American Geographers Conference, Seattle, WA
- Weihls, B.J., W. Butler, and R. Marston. 2011. Mapping Slope Failure Hazards and Their Impacts on Human Structures in Grand Teton National Park, Wyoming. Binghamton Geomorphology Symposium, Mobile, AL
- Weihls, B.J., W. Butler, and R. Marston. 2011. Slope Failures and Hazards in Grand Teton National Park. Association of American Geographers Conference, Seattle, WA
- Wells, S. P., J. M. Smith, M. E. Mather, R. M. Muth, and J. T. Finn. 2010. An approach to evaluating the combination of gear that representatively samples fish assemblages in small coastal streams. Northeastern Division American Fisheries Society, Newton, MA.
- White, K., J. Gerken, C. Paukert, and A. Makinster. 2010. Fish community structure in natural and engineered habitats in the Kansas River. Kansas Natural Resources Conference, Wichita, KS.
- Zavaleta, J.C., D.A. Haukos, and C. Boal. 2012. Community response to use of prescribed grazing and herbicide for restoration of sand shinnery oak grasslands. 48th Annual Meeting, Texas Chapter of The Wildlife Society, Fort Worth, Texas.

Committees and Other Professional Assignments 2010-present

Jack Cully

- Interstate Black-tailed Prairie Dog Conservation Committee.
- Kansas Black-footed Ferret Reintroduction Advisory Panel
- Program Committee, USGS Symposium on the Ecology of Plague and its Effects on Wildlife
- Search Committee – KCFWRU Unit Leader

Jane Fencil

- Teaching Assistant, Principles of Biology (Spring 2012)

Kayla Gerber

- Teaching Assistant, Principles of Biology (Spring 2012)

Joe Gerken

- Instructor, Fisheries Management (Fall 2010)

David Haukos

- Chair, Pintail Action Group
- Member, Great Plains LCC Science Team
- Member, Playa Lakes Joint Venture Science Advisory Team
- Associate Editor, Wildlife Society Bulletin
- Subject Editor, Journal of Fish and Wildlife Management
- Search Committee, Associate Professor-Wildlife Kansas State University
- Technical Representative, Great Plains Cooperative Ecosystems Study Unit, Kansas State University
- Adjunct Professor, Texas Tech University
- Adjunct Professor, Stephen F. Austin State University
- Adjunct Professor, Oklahoma State University
- Participant, OneHealth On-Line Course, Kansas State University

Sean Hitchman

- Teaching Assistant, Organismal Biology (Spring 2012)

Martha Mather

- Subject Editor, Wetlands Ecology and Management
- Invited Participant, National Science Foundation Proposal Review Panel (Population and Community Ecology)
- Invited Participant, USGS Research Grade Evaluation Panel
- Search Committee, Associate Professor-Wildlife Kansas State University
- Student Affairs Committee Chair, KDWPT Sponsored North Central AFS meeting
- Research Grade Evaluation Panel, US Geological Survey, Minneapolis, 2010
- Sponsor – Demonstration of the Mini-Missouri Trawl, 2012

Zach Peterson

- Teaching Assistant, Principles of Biology (Spring 2012)

Rachel Pigg

- Search Committee, Associate Professor-Wildlife Kansas State University
- Search Committee, KCFWRU Unit Leader Search Kansas State University
- Biology Graduate Student Association - Secretary 2010
- Biology Graduate Student Association - Faculty Award Committee Chair 2012
- Biology Graduate Student Association T-shirt Committee Member 2008—present
- Teaching Assistant, Organismic Biology (Fall 2010)
- Teaching Assistant, Landscape Ecology (Fall 2011)
- Teaching Assistant, Principles of Biology (Spring 2012)
- Instructor, Principles of Biology (Summer 2012)

Craig Paukert

- Chair, Ecology and Evolutionary Biology Section, KSU Biology, 2009-2010
- Audio Visual Chair, AZ/NM American Fisheries Society
- Secretary/Treasurer, Education Section of the AFS, 2009-2011
- Member, AFS Board of Professional Certification, 2007-2010
- Associate Editor, *North American Journal of Fisheries Management*, 2003-2011
- Program Comm., Cooperative Research Units All Hands Meeting, New Orleans, 2010
- Research Grade Evaluation Panel, US Geological Survey, New Orleans, 2010

Brandon Weihs

- Instructor, Cartography and Thematic Mapping (Fall 2010, 2011; Spring 2011, 2012)
- Instructor, GIS applications for fisheries course, American Fisheries Society Meeting, Ottawa, Canada, Portland, OR, Nashville, TN, and Yokohama, Japan

Awards and Recognition 2010-present

Jack Cully

- USGS Performance Award in the Cooperative Research Units (2011)

Jason Fischer

- Second Place, Best Student Presentation, Midwest Fish and Wildlife Conference
- Outstanding Unit Student, Kansas Cooperative Fish and Wildlife Research Unit

Joe Gerken

- Kansas Chapter AFS Tiemeier-Cross Award
- Special Achievement Award, Kansas Cooperative Fish and Wildlife Research Unit
- Best Student Presentation, Kansas Chapter of the AFS
- Certificate of Appreciation, Education Section, American Fisheries Society

David Haukos

- USGS Performance Award in the Cooperative Research Units (2011)

Martha Mather

- USGS Performance Award in the Cooperative Research Units (2012)

Craig Paukert

- USGS STAR Award for outstanding performance, Cooperative Research Units, 2010
- USGS STAR Award, Cooperative Research Units for service, 2010
- Best Professional Presentation, Kansas Chapter of the AFS 2010

Rachel Pigg

- Berryman Institute Graduate Fellowship, \$15000
- Honorable Mention for Student Poster Award, International Biogeography Society's 5th Biennial Conference
- Conservation Leaders of Tomorrow Workshop Scholarship, \$2000

Brandon Weihs

- Kansas Chapter AFS Tiemeier-Cross Award Kansas State University Geography Department Geography Travel Grant – Fall 2011
- Kansas State University Geography Department Geography Travel Grant – Fall 2011
- Binghamton Geomorphology Symposium Travel Grant – Fall 2011
- Kansas State University Graduate Student Council Travel Grant – Spring 2011
- Kansas State University Geography Department Geography Travel Grant – Spring 2011
- Kansas State University Geography Department Geography Travel Grant – Fall 2010
- Rumsey Bissell Marston Scholarship for Fieldwork in Physical Geography– Spring 2010
- University of Wyoming National Parks Service Grant – Spring 2010
- Mel Marcus Award for Physical Geography – Spring 2009

Jennifer Zavaleta

- Fulbright Scholarship for research in Chile.
- Second Texas Tech University Annual Biological Sciences Symposium.

University Courses Taught by Unit Faculty

2010

Ornithology

Instructor:
Dr. Jack F. Cully, Jr.
Assistant Unit Leader

Biopolitics and Natural Resource Policy

Instructor:
David Haukos
Texas Tech University

Fisheries Management and Techniques

Instructor:
Dr. Craig P. Paukert
Acting Unit Leader

Advanced Fisheries Science

Instructor:
Dr. Craig P. Paukert
Acting Unit Leader

2011

Professional Skills

Co-Instructor:
Dr. Martha Mather
Assistant Unit Leader

2012

Wildlife Conservation – Terrestrial Portion

Co-Instructor:
Dr. David Haukos
Unit Leader

Advanced Spatial Modeling

Instructors:
Dr. David Haukos, Dr. Gene Albanese
Unit Leader, Research Associate

Professional Skills

Co-Instructor:
Dr. Martha Mather
Assistant Unit Leader

River Regimes

Co-Instructors:
Dr. Martha Mather
Assistant Unit Leader

Kansas State University Degrees Completed 1996 - 2012

2012

Jason Fischer (M.S. 2012; advisor Paukert). Fish community response to habitat alteration: impacts of sand dredging in the Kansas River.

2011

Derek Moon (M.S. 2011; advisor Cully). Small mammals in disturbed tallgrass prairie landscapes.

Amanda Goldberg (M.S. 2011; advisor Cully). Apparent survival, dispersal, and abundance of black-tailed prairie dogs.

2010

Andrea Severson (M.S. 2010; advisor Paukert). Effects of zebra mussel (*Dreossena polymorpha*) invasion on the aquatic community of a Great Plains reservoir.

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.

Jeffrey 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 revegetations on the abiotic and biotic components in two Kansas streams.