

# Nebraska Cooperative Fish and Wildlife Research Unit—USGS

## REPORT OF ACTIVITIES September 2012 – September 2013



### Cooperating Agencies

Nebraska Game and Parks Commission  
The Wildlife Management Institute  
University of Nebraska—Lincoln  
U.S. Fish and Wildlife Service  
U.S. Geological Survey (USGS) – Ecosystems Division



**USGS**  
*science for a changing world*

U.S. Fish &  
Wildlife Service

UNIVERSITY OF  
**Nebraska**  
Lincoln<sup>®</sup>



# Report of Activities September 2012 – September 2013



## **Nebraska Cooperative Fish and Wildlife Research Unit—USGS**

University of Nebraska—Lincoln  
School of Natural Resources  
422 Hardin Hall, 3310 Holdrege Street  
Lincoln, Nebraska 68583-0984  
Phone (402) 472-0449  
Fax (402) 472-2722



# TABLE OF CONTENTS

TABLE OF CONTENTS.....	v
INTRODUCTION .....	1
PERSONNEL AND COOPERATORS .....	2
Unit Personnel .....	2
Coordinating Committee Members.....	4
Cooperators.....	5
MILESTONES AND HIGHLIGHTS .....	8
THESES AND DISSERTATIONS.....	9
ALUMNI: WHERE ARE THEY NOW? .....	10
AWARDS AND RECOGNITIONS.....	10
OUTREACH ACTIVITIES .....	11
RESEARCH PROJECTS .....	13
Adaptive Management for the Nebraska Natural Legacy Plan.....	14
Amphibian Occupancy, Functional Connectivity, and Resilience of Rainwater Basin Wetlands .....	15
Angler Behavior in Response to Management Actions on Nebraska Reservoirs .....	16
Aquatic Invasive Species (AIS) Prevention Program .....	18
Bat Movements Across Transforming Landscapes .....	19
Better Soil For Birds .....	20
Bioenergetics and Habitat Suitability Models for the Chinese Mystery Snail ( <i>Bellamya chinensis</i> ) .....	21
Canid Distribution and the Potential Impacts of Energy Development in Nebraska .....	22
Chinese Mystery Snail ( <i>Bellamya chinensis</i> ) Ecology and Impacts.....	23
Dynamics of Resilience in Complex Adaptive Systems .....	24
Ecological Models and Biodiversity Conservation in Nebraska Landscapes .....	25
Evaluating the Benefits of Higher Diversity CRP Plantings for At-risk Species .....	26
Evaluating the Value and Efficacy of Agricultural Conservation Programs for Landowners and Conservation Practitioners .....	27
Fremont State Lakes Renovation Study: Effects of Alum Application and Fishery Renovation on Water Quality...	28
Generation of Novelty in Complex Systems .....	29
Impacts of Wind Energy Development and Operation on Soil Invertebrates.....	30
Implications of Hunter Harvest and Wildlife-Friendly Agricultural Practices on Pheasant Behavior and Population Dynamics .....	31
Influence of Trout Stocking on Tier I/II Fishes .....	32
Integrating Adaptive Management, Resilience Thinking, and Optimization.....	33
Local and Landscape Constraints on Habitat Management for Upland Birds.....	34
Making Adaptive Management Meaningful: Translating Science Learning into Policy Decision-Making.....	35
Management Induced Shifts in Pheasant Reproductive Strategies.....	36
Missouri River Mitigation: Implementation of Amphibian Monitoring and Adaptive Management for Wetland Restoration Evaluation .....	37
Monitoring, Mapping, Risk Assessment, and Management of Invasive Species in Nebraska .....	38
Platte River Basin TimeLapse.....	39
Pollinator Assemblages in Southeast Prairies and Sandstone Prairies Biologically Unique Landscapes.....	40
Population Assessments of Temperate Basses in Nebraska Reservoirs .....	41
Predicting Variation In Springtime Wetland Occurrence and Flooded Area in Nebraska’s Rainwater Basin .....	42
Recruitment of Walleye and White Bass in Irrigation Reservoirs .....	43
The Relationship Between Diversity and Ecological Functions.....	44
Stopover Decisions of Migratory Shorebirds: An Assessment of Habitat, Food, Behavior and Phenology .....	45

Testing for the Presence of the Chytrid Fungus ( <i>Batrachochytrium dendrobatidis</i> ) in Amphibian Populations across Nebraska.....	46
Understanding and Managing for Resilience in the Face of Global Change .....	47
Wetland Condition Assessment.....	48
Wind and Wildlife Project.....	49
<b>PROFESSIONAL ACTIVITIES .....</b>	<b>50</b>
Teaching .....	50
Graduate Committee Service.....	50
Professional and Faculty Service.....	51
Other Professional Service.....	51
Training Assistance, Workshops and Outreach Activities .....	52
Peer-Reviewed Publications .....	54
Presentations.....	56

## INTRODUCTION

The U.S. Geological Survey (USGS) Cooperative Research Units Program has been in existence for over 70 years as a partnership among USGS, state natural resource agencies, host universities, the Wildlife Management Institute, and the U.S. Fish and Wildlife Service. The first unit was founded at Iowa State University in Ames, Iowa. The program currently has 40 units in 38 states.

In 1960, the U.S. Congress gave statutory recognition to the program when they enacted Public Law 86-686, the Cooperative Research Units Act. The intent of the act was to “facilitate cooperation among the Federal Government, colleges, and universities, the States, and private organizations for . . . research and education relating to fish and wildlife, and for other purposes [by developing] coordinated, cooperative research and training programs for fish and wildlife resources. . . .”

The three-part mission of the Cooperative Research Units Program is focused on education, research and technical assistance.

- *Education.* Unit scientists teach graduate-level university courses and provide graduate students academic guidance, linking the research mission with student training.
- *Research.* Unit scientists conduct research that supports the needs of local cooperators and partners. Research can be of local, regional or national interests.
- *Technical Assistance.* Units provide technical assistance and training to state and federal natural resource managers, and to other natural resource managers as needed. Cooperators benefit from the expertise of unit scientists, cooperating university faculty, and biologists at state natural resource agencies.

In 2004, the Nebraska Cooperative Fish and Wildlife Research Unit became the newest state Cooperative Research Unit through a Cooperative Agreement signed by the U.S. Geological Survey, the University of Nebraska–Lincoln, the Nebraska Game and Parks Commission, the U.S. Fish and Wildlife Service and the Wildlife Management Institute.

## PERSONNEL AND COOPERATORS

---

### UNIT PERSONNEL

---

#### STAFF – U.S. GEOLOGICAL SURVEY, COOPERATIVE RESEARCH UNITS PROGRAM

---

Craig R. Allen, Unit Leader  
Joseph J. Fontaine, Assistant Unit Leader – Ecology  
Kevin L. Pope, Assistant Unit Leader – Fisheries

#### STAFF – UNIVERSITY OF NEBRASKA–LINCOLN

---

Caryl Cashmere, Staff Assistant  
Christopher Chizinski, Research Assistant Professor and Coordinator, Angler Survey Project  
Valerie Egger, Administrative Assistant  
Caroline Jezierski, Coordinator, Nebraska Wind Energy and Wildlife Project  
Christopher Jorgensen, Science Coordinator, Rainwater Basin Joint Venture  
TBA, Coordinator, Nebraska Invasive Species Project

#### RESEARCH TECHNICIANS

---

Adela Annis	Amber Kubes
Chris Dietrich	Lucas Kowalewski
Lawrence (Dan) Drimmel	Alyx Lingenfelter
Tricia Dudley	Ryan Lovell
Holly Evans	Michael Ritchie
Amber Fandrich	Elise Rodriguez
Scott Fox	Danielle Rush
Ashleigh Green	John Sanley
Alisa Halpin	Cameron Sonnenfeld
Amy Jirsa	Nicole Staton
Vitas Jokubauskas	Stephen Wurfel
Sarah Jordan	

#### STATEWIDE CREEL CLERKS

---

Don Bohnenkamp	Natalie Luben
Sean Farrier	Gerald Ryschon
Joe A. Fontaine	Phil Stollberg
Jake Koenig	Jon Yates

#### STUDENT WORKERS

---

Daniel Brundrett	Anna Hicks	Isaac Mertens	Benjamin Ritter
Tanner Doescher	Chelsey Hookham	Mary Miller	Zach Schafer
Jacob Drozda	Zachary Horstman	Patrick Nepp	Margaret Schuh
Alex Engel	Elise Jarrett	Nathaniel Ptak	Chris Shank
Michael Godin	Anthony Jenniges	Carolyn Reiland-Smith	Victoria Simonsen
Garrett Hanquist	Jamie Kindschuh		

#### UNL UCARE STUDENTS

---

Josiah Dallmann	Victoria Simonsen	Alec Wong
Lukas Mullins	Sarah Spier	

## CURRENT GRADUATE DEGREE CANDIDATES – UNIVERSITY OF NEBRASKA–LINCOLN

---

### *Master of Science*

Emma Brinley Buckley, School of Natural Resources, November 2012 – present

Jason DeBoer, School of Natural Resources, January 2009 – present

Caitlyn Gillespie, School of Natural Resources, August 2012 – present

Brian Hammond, School of Natural Resources, May 2012 – present

Robert Kill, School of Natural Resources, UNL, January 2011 – present

Lucas Kowalewski, School of Natural Resources, March 2010 – present

Jessica Laskowski, School of Natural Resources, August 2011 – present

Lindsey Messinger, School of Natural Resources, January 2012 – present

William Smith, School of Natural Resources, August 2013 – present

Nathan Stewart, School of Natural Resources, January 2013 – present

Kelly Turek, School of Natural Resources, January 2012 – present

Ashley VanderHam, School of Natural Resources, June 2011 – present

### *Ph.D.*

Hannah Birgé, School of Natural Resources, January 2013 – present

Lucía Corral, School of Natural Resources, June 2012 – present

Kent Fricke, School of Natural Resources, June 2011 – present

Danielle Haak, School of Natural Resources, August 2011 – present

Noelle (Chaine) Hart, School of Natural Resources, August 2011 – present

Michelle Hellman, School of Natural Resources, May 2013 – present

Dustin Martin, School of Natural Resources, January 2009 – present

Donald Pan, School of Biological Sciences, January 2010 – present

Nicholas Smeenk, School of Natural Resources, August 2010 – present

Chad Smith, School of Natural Resources, August 2007 – present

Shana Sundstrom, School of Natural Resources, August 2011 – present

Bethany Teeters, School of Natural Resources, August 2012 – present

Daniel Uden, School of Natural Resources, August 2012 – present

## GRADUATES, 2012–13

---

Michelle Hellman, M.S., School of Natural Resources, UNL, May 2013

Christopher Jorgensen, M.S., School of Natural Resources, UNL, December 2012

Kristine Nemec, Ph.D., School of Natural Resources, UNL, December 2012

Peter Spirk, M.S., School of Natural Resources, UNL, December 2012

Ryan Stutzman, M.S., School of Natural Resources, UNL, December 2012

Chris Wiley, M.S., School of Natural Resources, UNL, August 2013

---

## COORDINATING COMMITTEE MEMBERS

---

### U.S. GEOLOGICAL SURVEY

Joseph Margraf, Regional Supervisor  
Cooperative Research Units Program  
Denver Federal Center  
Box 25046, MS 406  
Denver, CO 80225-0046  
(303) 236-1454

### UNIVERSITY OF NEBRASKA—LINCOLN

Ronnie Green, NU Vice President, IANR Harlan Vice Chancellor  
Institute of Agriculture and Natural Resources  
202 Agriculture Hall  
Lincoln, NE 68583-0708  
(402) 472-2871

### NEBRASKA GAME AND PARKS COMMISSION

Jim Douglas, Director  
2200 N. 33rd Street  
Lincoln, NE 68503-0370  
(402) 471-0641

### THE WILDLIFE MANAGEMENT INSTITUTE

Pat Ruble, Midwest Field Representative  
93 Central Station Place  
Johnstown, OH 43031-8400  
(740) 966-0496

### U.S. FISH AND WILDLIFE SERVICE

Stephen Torbit, Assistant Regional Director for Science Applications  
Region 6, Mountain-Prairie Region  
134 Union Blvd, PO Box 25486  
Denver, CO 80225  
(303) 236-4602

---

## COOPERATORS

---

### ORGANIZATIONS

---

Bard College, New York	University of Nebraska Omaha (UNO)
Benedictine College, Kansas	University of New Mexico
BOKU, the University of Natural Resources and Life Sciences, Austria	U.S. Army Corps of Engineers
Bureau of Indian Affairs	U.S. Environmental Protection Agency (EPA) Cincinnati, OH
Centre for Systems Solutions, Poland	Omaha, NE
Central Nebraska Public Power and Irrigation District	U.S. National Park Service (USNPS) Great Plains Cooperative Ecosystems Studies Unit
Chadron State College, Nebraska	U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)
Emory University, Georgia	Forest Service, Nebraska National Forest
Headwaters Corporation	National Resource Conservation Service (NRCS)
Kansas Department of Wildlife and Parks	U.S. Fish and Wildlife Service (USFWS) Ecological Services, Nebraska Field Office
Michael Forsberg Photography	Fort Niobrara–Valentine National Wildlife Refuge
International Crane Foundation	Habitat and Population Evaluation Team
International Institute for Applied Systems Analysis, Austria	Playa Lakes Joint Venture
National Socio-Environmental Synthesis Center (SESYNC)	Prairie Pothole Joint Venture
The Nature Conservancy	Rainwater Basin Joint Venture
Nebraska Association of Resource Districts	Region 6
Nebraska Bird Partnership	U.S. Geological Survey (USGS) Cooperative Research Units Program
Nebraska Department of Agriculture	Cryospheric Studies
Nebraska Department of Environmental Quality	Fort Collins Science Center
Nebraska Educational Television	John Wesley Powell Center for Analysis and Synthesis
Nebraska Farm Bureau	Northern Prairie Wildlife Research Center
Nebraska Forest Service	Sonoran Desert Research Station
Nebraska Game and Parks Commission (NGPC)	South Dakota Water Science Center
Nebraska Natural Resources Districts	Nebraska Water Science Center
Nebraska Public Power District	Wyoming Game and Fish
Nebraska Weed Control Association	
Pheasants Forever	
University of Florida	
University of Idaho	
University of Nebraska Kearney (UNK)	
University of Nebraska Center for Public Policy	
University of Nebraska–Lincoln (UNL) Department of Agricultural Economics	
Department of Computer Science / Engineering	
Department of Earth and Atmospheric Sciences	
Department of Plant Pathology	
College of Law	
School of Biological Sciences	
School of Natural Resources	

## PEOPLE

---

Jeff Abegglen, USDA Forest Service	Sherilynn Fritz, Department of Earth and Atmospheric Sciences, UNL
Mark Anderson, USGS South Dakota Water Science Center	Mike Fritz, Wildlife Division, NGPC
David Angeler, Swedish University of Agricultural Sciences, Sweden	Don Gabelhouse, Jr., Fisheries Division, NGPC
Tala Awada, School of Natural Resources, UNL	Lenny Gannes, Department of Biology, Cornell College
Anthony Barada, Fisheries Division, NGPC	Ahjonid Garmestani, U.S. EPA–Cincinnati
Anne Bartuszevige, USFWS Playa Lakes Joint Venture	Keith Geluso, Department of Biology, UNK
Daryl Bauer, Fisheries Division, NGPC	Robert Gleason, USGS Northern Prairie Wildlife Research Center
Ken Bazata, Nebraska Department of Environmental Quality	Jim Gleim, Fisheries Division, NGPC
Melinda Harm Benson, University of New Mexico	Tim Grabowski, USGS Texas Cooperative Fish and Wildlife Research Unit, Texas Tech University
Andy Bishop, USFWS, Rainwater Basin Joint Venture	Joanne Grady, USFWS Region 6
Zac Brashears, Fisheries Division, NGPC	Diane Granfors, USFWS Habitat and Population Evaluation Team
Lesley Brotkowski, TRC	Lance Gunderson, Department of Environmental Studies, Emory University
Mary Brown, School of Natural Resources, UNL	Justin Haahr, Wildlife Division, NGPC
Mark Burbach, School of Natural Resources, UNL	Mace Hack, The Nature Conservancy
Amy Burgin, School of Natural Resources, UNL	Al Hanson, Fisheries Division, NGPC
Phillip Chvala, Fisheries Division, NGPC	Alicia Hardin, Wildlife Division, NGPC
Gary Clow, USGS Cryospheric Studies	Chris Helzer, The Nature Conservancy
Mitch Coffin, Noxious Weed Program, Nebraska Department of Agriculture	Caroline Hinkelman, Wildlife Division, NGPC
Barbara Cosens, University of Idaho	Kyle Hoagland, School of Natural Resources, UNL
Nichole Cudworth, Wyoming Game and Fish	Jeff Hoffman, Wildlife Division, NGPC
Melanie Culver, USGS Arizona Cooperative Fish and Wildlife Research Unit, Univ. of Arizona	Richard Holland, Fisheries Division, NGPC
Graeme Cumming, University of Cape Town, South Africa	C. S. Holling, Department of Zoology, University of Florida
Karie Decker, Wildlife Division, NGPC	Jake Holt, Wildlife Division, NGPC
Carrick Detweiler, Department of Computer Science and Engineering, UNL	Caleb Huber, Fisheries Division, NGPC
Phillip Dobesh, USDA Forest Service	Keith Hurley, Fisheries Division, NGPC
T. Doug Beard, USGS	Scott Hygnstrom, School of Natural Resources, UNL
Jim Douglas, Director, NGPC	Jeff Jackson, Fisheries Division, NGPC
Darrol Eichner, Fisheries Division, NGPC	Joel Jorgensen, Wildlife Division, NGPC
Sebastian Elbaum, Department of Computer Science and Engineering, UNL	Scott Josiah, Nebraska Forest Service
Mike Farrell, Nebraska Educational Television	Doug Kapke, Fisheries Division, NGPC
Teresa Fink, Chadron State College	Jordan Katt, Fisheries Division, NGPC
Rob Fletcher, Department of Wildlife Ecology and Conservation, University of Florida	Adam Kester, Wildlife Division, NGPC
Valery Forbes, School of Biological Sciences, UNL	Justin King, Nebraska Public Power District
Michael Forsberg, Michael Forsberg Photography	Michelle Koch, Environmental Services Division, NGPC
Patricia Freeman, School of Natural Resources, UNL	Alan Kolok, Department of Biology, UNO
Todd Frerichs, USFWS Fort Niobrara–Valentine National Wildlife Refuge	Keith Koupal, Fisheries Division, NGPC
Jonathan Friedman, USGS Fort Collins Science Center	Ted LaGrange, Wildlife Division, NGPC
	John Laux, Wildlife Division, NGPC
	David Levy, Barid Holm LLP
	Mark Lindvall, USFWS, Fort Niobrara–Valentine National Wildlife Refuge

Jared Lorensen, Fisheries Division, NGPC  
Jeff Lusk, Wildlife Division, NGPC  
Gary Lynne, Department of Agricultural Economics,  
UNL  
Piotr Magnuszewski, Centre for Systems Solutions  
Pablo Marquet, Departamento de Ecología,  
Universidad Católica de Chile, Santiago, Chile  
John McCarty, Department of Biology, UNO  
Jason McCauley, Bureau of Indian Affairs  
Tim McCoy, Deputy Director, NGPC  
Kathy McPeak, USFWS Fort Niobrara–Valentine  
National Wildlife Refuge  
Jim Merchant, School of Natural Resources, UNL  
Gerald Mestl, Fisheries Division, NGPC  
Constance Miller, USDA NRCS  
Rob Mitchell, USDA-ARS Grassland Management  
Kirk Nelson, Western Regional Parks, NGPC  
Brad Newcomb, Fisheries Division, NGPC  
Neal Niemuth, USFWS Habitat and Population  
Evaluation Team  
Parker Norton, USGS South Dakota Water Science  
Center  
Larry Pape, Fisheries Division, NGPC  
Reynaldo Patiño, USGS Texas Cooperative Fish and  
Wildlife Research Unit, Texas Tech University  
Mark Pegg, School of Natural Resources, UNL  
Andrew Pierson, Wildlife Division, NGPC  
Rocky Plettner, Nebraska Public Power District  
Mark Porath, Fisheries Division, NGPC  
Larkin Powell, School of Natural Resources, UNL  
Tom Powers, Department of Plant Pathology, UNL  
Brenda Pracheil, School of Natural Resources, UNL  
John Quinn, Furman University, South Carolina  
Steve Riley, Pheasants Forever  
Bruce Robertson, Bard College  
Dean Rosenthal, Fisheries Division, NGPC  
Jeff Runge, USFWS Nebraska Field Office  
Ashok Samal, Department of Computer Science and  
Engineering, UNL  
Steve Schainost, Wildlife Division, NGPC  
Rick Schneider, Wildlife Division, NGPC  
Casey Schoenebeck, Department of Biology, UNK  
Jeff Schuckman, Fisheries Division, NGPC  
Rob Schultz, Nebraska Weed Control Association  
Jan Sendzimir, International Institute for Applied  
Systems Analysis, Austria  
Martin Simon, Benedictine College  
Rachel Simpson, Wildlife Division, NGPC

Susan Skagen, USGS Fort Collins Science Center  
Dan Snow, Nebraska Water Center, UNL  
John Stamm, USGS South Dakota Water Science  
Center  
Matt Steffl, Wildlife Division, NGPC  
Shelley Steffl, Wildlife Division, NGPC  
Gerry Steinauer, Wildlife Division, NGPC  
Casey Stemler, USFWS Prairie Pothole Joint  
Venture  
Kristal Stoner, Wildlife Division, NGPC  
Robert Swanson, USGS Water Science Center,  
Lincoln  
Martha Tacha, USFWS Mountain-Prairie Region  
Ecological Services  
Brian Tangen, USGS Northern Prairie Wildlife  
Research Center  
Chad Taylor, Wildlife Division, NGPC  
Scott Taylor, Wildlife Division, NGPC  
Steve Thomas, School of Natural Resources, UNL  
Alan Tomkins, Center for Public Policy, University  
of Nebraska  
Bruce Trindle, Wildlife Division, NGPC  
Dave Tunink, Fisheries Division, NGPC  
Andrew Tyre, School of Natural Resources, UNL  
Charles van Riper, USGS Sonoran Desert Research  
Station  
Mark Vrtiska, Wildlife Division, NGPC  
M. Can Vuran, Department of Computer Science  
and Engineering, UNL  
T. J. Walker, Wildlife Division, NGPC  
Luke Wallace, U.S. Army Corps of Engineers  
Lisa Webb, USGS Missouri Cooperative Fish and  
Wildlife Research Unit, University of Missouri  
Karrie Weber, School of Biological Sciences, UNL  
Dave Wedin, School of Natural Resources, UNL  
Gene Wilde, Department of Biology, Texas Tech  
University  
Byron K. Williams, The Wildlife Society  
Erin Williams, USFWS Nebraska Field Office  
Sam Wilson, Wildlife Division, NGPC  
Vicki Wohlers, USDA APHIS–PPQ  
L. LaReesa Wolfenbarger, Department of Biology,  
UNO  
Eric Zach, Wildlife Division, NGPC  
Sandra Zellmer, College of Law, UNL  
Gene Zuerlein, Environmental Sciences Division,  
NGPC

## MILESTONES and HIGHLIGHTS

### GRADUATES

---

From October 2012–August 2013, six graduate students in the Nebraska Coop Unit received their degrees from the University of Nebraska–Lincoln: Michelle Hellman, Chris Jorgensen, Kristine Nemec, Peter Spirk, Ryan Stutzman and Chris Wiley—the most graduations in a single year since the Unit was started in 2004.

A number of our current and past undergraduate technicians graduated in May and August 2013 with bachelor's degrees in Fisheries and Wildlife from UNL: Nicholas Arneson, Kailee Brown, Hannah Hummel, Isaac Mertens, John-Paul Montes, John Sanley, Christopher Shank, Shelby Sidel, and Alec Wong. Chris Shank and John Sanley continued working for the Unit during the summer for the invasive species project and EPA wetlands assessment project, respectively.

### RESEARCH GRANTS

---

In April 2013, Unit faculty and staff were awarded two new grants from the Nebraska Environmental Trust, each funded for three years. *Bat Movements and Landscapes* will use ultrasonic acoustic detectors throughout eastern Nebraska to identify bat migration and movement patterns. This information is needed to guide recommendations that can minimize negative impacts of wind energy development. *Nebraska Invasive Species Project: Developing a Network for Outreach and Monitoring* will build on the Nebraska's current Invasive Species Project by increasing support for public outreach and education through workshops, educational tools, surveys, etc.

Hannah Birgé was awarded a \$10,000 grant by the Graduate Student Grant Program of the North Central Region Sustainable Agriculture Research and Education (NCR-SARE) Program. *Incorporating Soil Ecological Knowledge into Management of CRP Lands* will evaluate the perceptions and values of landowners and conservation practitioners to understand perceived values, limitations, and alternative strategies of the Conservation Reserve Program (CRP).

### PROMOTION

---

Chris Chizinski, coordinator for the Nebraska Creel Project, was promoted from post doc to research assistant professor, School of Natural Resources, University of Nebraska–Lincoln.

### CREEL SUMMIT

---

The Coop Unit hosted the Nebraska Creel Summit on August 6–7, 2013 at the Lied Lodge and Conference Center in Nebraska City. The Summit focused on the results angler survey data collected from the past five years of the Angler Survey Project, and was intended to be an intellectual exchange of information and ideas in a relaxed atmosphere. Fifty-five attendees comprised of personnel from the Nebraska Game and Parks Commission and the University of Nebraska–Lincoln enjoyed a variety of presentation formats including seminars, posters and Angler Feud. By all accounts, the Summit was a great success.



Creel Summit presentation by Kevin Pope (standing) at the Lied Lodge Conference room  
Photo: Lindsey Messinger

## STAFFING CHANGES

---

Chris Jorgensen, Rainwater Basin Joint Venture Science Coordinator, left the Unit on June 28, 2013. We wish him the best in his new endeavors.

## AUSTRIA

---

Hannah Birgé, Danielle Haak, Noelle (Chaine) Hart and Michelle Hellman are spending September 6 – November 4, 2013 in Vienna, Austria. They are being hosted by the International Institute for Applied Systems Analysis in Laxenburg, Austria as part of the NSF Integrative Graduate Education and Research Traineeship (IGERT) program. With seven other IGERT students, they will study river restoration and management in Austria.

## THESES and DISSERTATIONS

### MICHELLE HELLMAN, M.S. MAY 2013

---

*Amphibian Occupancy and Functional Connectivity of Restored Wetlands in the Missouri River Floodplain*  
University of Nebraska–Lincoln. Advisor, Craig Allen.

### CHRISTOPHER JORGENSEN, M.S. DECEMBER 2012

---

*Assessing Local and Landscape Constraints on Habitat Management for Grassland and Upland Birds*  
University of Nebraska–Lincoln. Advisor, Joseph J. Fontaine.

### KRISTINE NEMEC, PH.D. DECEMBER 2012

---

*The Relationship Between Diversity, Seeding Density, and Ecological Functions in Tallgrass Prairie Restorations*  
University of Nebraska–Lincoln. Advisor, Craig R. Allen.

### PETER SPIRK, M.S. DECEMBER 2012

---

*Effects of Length Limits on Sexually Size Dimorphic Fishes*  
University of Nebraska–Lincoln. Advisor, Kevin L. Pope.

### RYAN STUTZMAN, M.S. DECEMBER 2012

---

*Stopover Decisions of Migratory Shorebirds: An Assessment of Habitat Use, Food Availability, Behavior and Phenology*  
University of Nebraska–Lincoln. Advisor, Joseph J. Fontaine.

### CHRIS WILEY, M.S. AUGUST 2013

---

*Exploitation of Channel Catfish in Nebraska Flood-control Reservoirs*  
University of Nebraska–Lincoln. Advisor, Kevin L. Pope.

## ALUMNI: WHERE ARE THEY NOW?

### KODY UNSTAD (M.S., 2012)

---

After graduating with a master's degree from UNL in August 2012, Kody spent several months working for the Nebraska Game and Parks Commission as the Natural Heritage data technician. In May 2013, Kody accepted a position with Felsburg Holt & Ullevig Inc., a transportation and environmental consulting firm, and is working out of their Omaha, Nebraska office as an environmental scientist. His primary responsibilities involve threatened and endangered species reviews and wetland delineations for road construction projects.

### DON WARDWELL (M.S., 2006)

---

Don has the unique distinction of being the NE Coop Unit's first graduate student. He has worked for the environmental consulting firm Ecology and Environment in Portland, Oregon since 2008. His primary responsibilities involve the evaluation of wildlife populations (most commonly threatened and endangered species and migratory birds) for proposed energy and military developments projects. He works with several energy sectors, including wind, solar, natural gas, and transmission across the United States and Canada. On a more personal note, we congratulate Don on his wedding this past July.

## AWARDS and RECOGNITIONS

### OUTSTANDING POSTDOC AWARD

---

November 2012, Chris Chizinski received the University of Nebraska–Lincoln's 2012 Outstanding Postdoc Award. This award honors "exceptional comprehensive achievement in research, teaching, mentoring, innovation, and service." Chris also had a manuscript selected as one of the ten Editors Choice manuscripts in the 2010 volume of *Fisheries Management and Ecology*, "A modeling approach to evaluate potential management actions designed to increase growth of white perch in a high-density population." Most recently, Chris was promoted to research assistant professor at UNL.



Christopher Chizinski

### TRAVEL GRANTS

---

The Max McGraw Wildlife Foundation awarded Caitlyn Gillespie and Lucía Corral Conservation Leaders for Tomorrow Scholarships to attend a four-day professional development workshop at the Ringneck Ranch in Kansas.

Jessica Laskowski received a \$350 travel grant to attend the joint Cooper and American Ornithological Societies joint annual meeting, August 14–17 in Chicago, IL.

Dustin Martin received a \$100 scholarship to help cover costs for attending the International Symposium on Society & Resource Management, June 4–8 in Estes Park, CO.

The UNL David H. and Anne E. Larrick Memorial Travel Fund awarded \$500 travel grants to Jason DeBoer, Chris Jorgensen, and Jessica Laskowski.

### OTHER AWARDS AND RECOGNITIONS

---

Jessica Laskowski and Lindsey Messinger (and advisor TJ Fontaine) were part of a multi-agency team awarded the *Outstanding Wildlife Conservationist of the Year* award presented at the Nebraska Pheasants Forever State Habitat annual meeting in February. This award was presented to Jessica and Lindsey by Nebraska Game and Parks Commission, Pheasants Forever, and Quail Forever honoring the group's efforts to expand pheasant populations and habitats around southwestern Nebraska.

At the annual Nebraska Chapter of the American Fisheries Society meeting, Craig Allen and Kelly Turek received presentation awards: Best Professional Paper, Craig Allen for *Solving mysteries of the snails*; and Best Professional Poster, Kelly Turek for *Evaluation of visible implant alpha tags in four fish species*. Caitlyn Gillespie and Kent Fricke were recognized for their presentations at the annual Nebraska Chapter of the Wildlife Society Meeting. Nick Smeenk was awarded the Best Student Talk at the 2013 Annual Dakota Amphibian and Reptile Network Meeting. Nick was the co-author on a poster awarded the Best Student Poster Award at the Society of Wetland Scientists meeting.

Kent Fricke was accepted into the Graduate Fellows Program at the UNL Center for Great Plains Studies. The two-year program provides space for selected graduate students to work, meet, obtain support, learn from fellow students, engage with the Center faculty and staff, and benefit from the Center's resources as they progress towards their degrees. Kent also received the 2013 Alumni Award, presented by the UNL Wildlife Club and School of Natural Resources.

In the last two years, Ryan Stutzman (2012) and Jessica Laskowski (2013) were each awarded the Meritorious Graduate Student Award from the UNL School of Natural Resources. The award "honors, the best SNR students and recognizes their academic achievements, research, teaching contributions, leadership accomplishments, service and personal qualifications."

UNL undergraduates Vicki Simonsen and Sarah Spier were each awarded Undergraduate Creative Activities & Research Experiences (UCARE) Fellowships for 2013–14. UCARE student Josiah Dallmann was recognized by the Gamma Sigma Delta Honor Society with the Outstanding Undergraduate Student Award of Merit. Alec Wong, UCARE student from 2010 to 2013, received his bachelor's degree in Natural Resources in May 2013 from UNL. Lukas Mullins also was awarded a UCARE fellowship for 2013–14.

Two of three feature articles in the October 2012 edition of *Fisheries* were from researchers at the University of Nebraska–Lincoln. Authors of one of those feature articles, *Using the Internet to Understand Angler Behavior in the Information Age* include Kevin Pope as well as Dustin Martin and Jason DeBoer—both advised by Kevin.

## OUTREACH ACTIVITIES

Below is a *sample* of the many outreach activities that Unit staff and students participated in during the past year.

### ENVIRONMENTORS

---

Kent Fricke and Dan Uden continue to participate in the UNL Chapter of Upward Bound EnvironMentors program. They are serving as mentors for a high school student and assist the student with conducting a science project. Their project is titled "Keystone XL pipeline in Nebraska—Effects of tar sands on plant growth."

### ELEMENTARY OUTREACH, SCHOOL OF NATURAL RESOURCES GRADUATE STUDENT ASSOCIATION

---

Hannah Birgé is the elementary outreach coordinator for the School of Natural Resources Graduate Student Association. Hannah organizes and leads outreach to local McPhee Elementary School which serves some of Lincoln's lowest-income and most diverse neighborhoods. The Association hopes to introduce low-income, first generation students to the exciting world of science and critical thinking. Specific activities included:

- The Five Senses: Kristine Nemeč, Noelle Hart and Hannah Birgé led small, interactive groups exploring the Five Senses with two kindergarten classes. Trainees encouraged students to make observations with different senses, explaining their findings using descriptive language.
- Sink, Float and Dissolve: Kristine Nemeč, Noelle Hart and Hannah Birgé led small interactive groups exploring why solids sink, float, or dissolve. Trainees engaged with students, encouraging them to ask smart initial and follow up questions, to make hypotheses and to make observations.
- McPhee Science Fair: Noelle Hart and Hannah Birgé assisted parent-student teams to create a meaningful research question, conduct relevant background information, conduct an experiment (where necessary) and present findings on a poster to be presented at the 3<sup>rd</sup> and 4<sup>th</sup> grade science fairs.

## INTEGRATED MONITORING FOR PRAIRIE GROUSE WORKING GROUP

---

In February, Christopher Jorgensen was involved in a collaborative effort among various partnering agencies and personnel to establish the Integrated Monitoring for Prairie Grouse Working Group. The working group will help facilitate coordination and implementation of a landscape-level prairie grouse monitoring approach across multiple public land management agencies and private ownerships throughout Nebraska. In addition, the group designed a consistent and effective listening survey protocol that detects changes in the number of display sites, also known as leks, at a survey location over time and can easily be implemented by partnering agencies throughout the state.

## MEDIA – BILLBOARDS, TELEVISION, AND MORE

---

The Nebraska Invasive Species Project continued to have *Stop Aquatic Hitchhikers* billboards placed in Omaha and near Lake McConaughy to raise awareness of invasive species in Nebraska. Project coordinator Rodney Verhoeff was interviewed by KPTM–42 Omaha News for a segment on Asian carp in the Missouri River. He participated in the QUESTNebraska program developed by Nebraska Educational Television (NET) using blogs and interviews to raise awareness of sustainability issues. Seven technicians stationed at various lakes in Nebraska contacted boaters and handed out information on the *Clean-Drain-Dry* campaign to raise awareness of aquatic invasive species.

## SERVICE LEARNING

---

In October 2012, eleven NE Coop Unit students assisted the Nebraska Game and Parks Commission with stuffing 8,000 (of their 10,000) surveys. The NGPC sends out a mail survey approximately every ten years to assess changes in attitudes and desires of anglers. This is an outstanding illustration of service education—a service was provided to NGPC and, at the same time, students were exposed to the often overlooked logistics of research.



**Stuffing Surveys in UNL's Hardin Hall**  
Photo: Kevin Pope

## NATUREPALOOZA

---

Coop Unit students and staff participated in NaturePalooza hosted by the Nebraska State Museum and UNL's School of Natural Resources in November 2012. Caroline Jezierski had an education station about the wind and wildlife project as well as a bird migration game which educated attendees about the various bird species that migrate through Nebraska and the challenges they face during migration. Alex Engel and Isaac Mertens worked the invasive species booth which increased awareness of invasive species. Robert Kill participated at the Cornhusker Student Subunit of the American Fisheries Society booth, which presented commonly found fish in Nebraska.

## WIND AND WILDLIFE

---

Caroline Jezierski (Nebraska Wind Energy and Wildlife Project) was a guest lecturer for several courses taught at UNL as well as seminars and courses at Iowa State University and Creighton University in Nebraska.



Photos: Jessica Laskowski

## WILDLIFE WORKSHOP FOR YOUTH

---

Five graduate students led a November wildlife workshop at Lighthouse, a non-profit after-school program for under-privileged middle and high school students in Lincoln, NE. Jessica Laskowski and Joseph Fontaine developed curriculum to teach concepts of wildlife ecology through outdoor, hands-on activities in an urban setting. Lucia Corral, Kent Fricke, Caitlyn Gillespie, Amy Oden, and Jessica Laskowski taught students about habitat preference through an outdoor telemetry activity, indoor games and discussion.



## RESEARCH PROJECTS



---

## ADAPTIVE MANAGEMENT FOR THE NEBRASKA NATURAL LEGACY PLAN

Principal Investigator(s): Craig R. Allen, Joseph J. Fontaine

Graduate Student(s): Kent Fricke, Ph.D.

Project Duration: June 2010 – July 2014

Funding: Nebraska Game and Parks Commission, U.S. Fish and Wildlife Service

Project Location: Niobrara River, Nebraska

---

The Nebraska Natural Legacy Plan (NNLP) is a conservation strategy that identifies conservation targets and management approaches to decrease threats to Nebraska's biodiversity. In cooperation with the Nebraska Game and Parks Commission, an adaptive management framework will be developed for the NNLP to:

1. Evaluate the effects of conservation activities;
2. Prioritize research and monitoring activities;
3. Develop innovative programs to improve the ability to inventory and monitor at-risk species;
4. Develop theoretical and empirical techniques that facilitate the integration of research and monitoring into the management programs of at-risk, non-game species, including consideration of the complex trade-offs between social, economic, and biological factors that may facilitate and constrain effective wildlife management.

The project will investigate aspects of invasive woody plant management in the Niobrara River Valley in northern Nebraska. Species of interest include eastern red cedar, Russian olive, and common buckthorn. The current status of these species in the valley will be quantified and models reconstructing their invasion and establishment within the valley will be developed to identify vectors and barriers to invasion. Landowner perceptions of woody plant invasions and attitudes toward management techniques will be surveyed to determine the effectiveness of landscape management options. The effects of woody plant removal on vegetation and soil hydrology will be quantified to determine the effectiveness of removal techniques to improve ecosystem health and function. Finally, the results of this study will be used to develop an adaptive plan for management of invasive woody plants in the Niobrara River Valley. Fieldwork began in spring 2012 and will continue through fall 2014.



**Niobrara Valley**  
Photo: Craig Allen

---

## AMPHIBIAN OCCUPANCY, FUNCTIONAL CONNECTIVITY, AND RESILIENCE OF RAINWATER BASIN WETLANDS

Principal Investigator(s): Craig R. Allen

Graduate Student(s): Michelle Hellman, Ph.D.

Project Duration: April 2013 – May 2017

Funding: National Science Foundation IGERT Program, Grant 0903469

Project Location: Rainwater Basin, Nebraska

---

Both the quantity and overall quality of wetlands have severely declined globally. Many remaining wetlands exist in landscapes dominated by agricultural production. The Rainwater Basin is a region of Nebraska characterized by shallow wetlands located in an agricultural matrix. Following European settlement in the mid-to-late 19th century more than 90% of historic wetlands were filled or farmed through. The remaining wetlands exist in an area of intensive agriculture that has further isolated wetlands and may affect their function, and reduce the resilience of the Rainwater Basin.

Resilience of a system is the amount or magnitude of disturbance a system can absorb before it is pushed into a new stable state. Resilience can be eroded over time by small perturbations leaving the system more vulnerable to a catastrophic change.

For the Rainwater Basin, we are interested in the resilience of the functional connectivity among wetlands, for amphibian species. Amphibians are an important taxonomic group that provide services by controlling insects, serving as food for migratory birds and other species, and integrating terrestrial and aquatic systems. Amphibians are sensitive to environmental contaminants and can be used as an indicator of water quality, system health, and resilience. Occupancy of amphibians, functional connectivity of remaining wetlands, and acute and chronic effects to amphibians from commonly applied agrichemicals will be investigated. This project seeks to assess how agricultural land-use may affect resilience of a large wetland complex.



is restricted. Our second unique situation occurred in the upper basin of the Niobrara River. Box Butte Reservoir was evaluated during 2010–2011 to quantify the participation patterns by spear fishermen following a change in the spear-fishing season and to identify changes in harvest of northern pike following a change in the size limit. Our third unique situation occurred in spring 2012 with the grand opening of Wanahoo Reservoir in Wahoo, NE—rarely do brand new reservoirs open up. We are interviewing anglers during 2012–2013 to quantify the impact of this new reservoir on the regional fishery, the spatial use of the reservoir by bank anglers, and how catch rates change when targeted fish become less naïve to angling.

2. *Regional Angler Survey*: An intensive year-round survey was completed on 20 reservoirs in the Salt Valley region of southeast Nebraska during 2009–2012. This survey will provide baseline data necessary to develop a model predicting temporal and spatial participation by anglers. This model will be especially useful for understanding changes in fishing pressure at specific reservoirs as influenced by conditions at nearby reservoirs. Additional modeling will bridge the gap between social and ecological sciences by using social network analysis to look at angler participation patterns across the Salt Valley region and the influence of a new reservoir, Lake Wanahoo, on the regional fishery. Preliminary results indicate that the number of anglers harvesting fish is small across the region, whereas effort is great in most reservoirs, especially those within Lincoln.

An intensive sampling effort was also conducted during October 2011 following the rainbow trout stocking in Holmes reservoir. These data are being used to assess angler participation and catch rates on a daily time scale. Preliminary results indicate that these events increase angler effort for a period of 3–5 days and increase catch rates of rainbow trout for 1–2 days.

3. *Angler Effects on Sexually-Dimorphic Fish Species*: Differences in harvest between male and female fish can alter sex-specific rates of recruitment, growth, and mortality, and hence, the overall health of a fish population. Detailed information (species, length, total weight, age, sex, liver weight, and gonad weight) on harvested walleye, white bass, and white crappie was collected from Sherman and Calamus Reservoirs during spring 2009 and 2010. Sex-selective harvest (female-biased) was evident for white bass and white crappie, but not for walleye.
4. *Estimates of Fish Population Size—An Important Link to Understanding Fish Harvest*: Fishery biologists routinely monitor relative abundance of fish populations by assessing catch-per-unit-effort in standardized gears; they also routinely monitor harvest by estimating total number of fish kept by anglers within a year. Unfortunately, it is difficult to understand the effect of harvesting 20,000 walleye from a reservoir when only six walleye were captured in a gillnet set overnight during standard sampling. As such, we are working to obtain population size estimates for channel catfish in 10 Salt Valley reservoirs. In addition, we are investigating the applicability of techniques commonly used by wildlife biologists to estimate bird and mammal abundance, for estimating abundance of fish. Ultimately, information on fish population sizes will be linked with information on angler use and harvest.



**Chris Wiley and Jean-Paul Montes  
pulling up a hoop net at Wildwood Lake**  
Photo: Mike Dedinsky

---

## AQUATIC INVASIVE SPECIES (AIS) PREVENTION PROGRAM

Principal Investigator(s): Craig R. Allen

Project Coordinator(s): Karie Decker (7/2009 – 11/2012)  
Rodney Verhoeff (4/2013 – 7/2013)

Project Duration: April 2011 – June 2015

Funding: Nebraska Environmental Trust, USFWS Aquatic Nuisance Species Taskforce,  
Central Nebraska Public Power and Irrigation District

Project Location: Statewide Nebraska

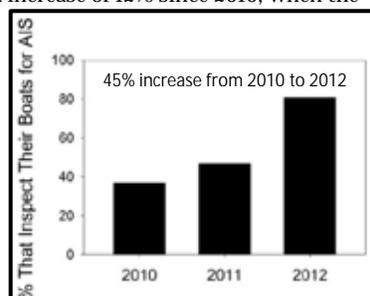
---

The Nebraska Invasive Species Project continues to administer a multi-institutional Aquatic Invasive Species (AIS) Prevention Program funded through grants from the Nebraska Environmental Trust and the USFWS Aquatic Nuisance Species Taskforce. Goals are to:

1. *Decrease* the risk of aquatic invasive species introduction into Nebraska by implementing a boat inspection and decontamination program,
2. *Increase* public awareness of aquatic invasive species through an integrated outreach/education program,
3. *Continue* aquatic invasive species monitoring efforts to help focus prevention efforts, and
4. *Increase* local and regional collaboration in the prevention of aquatic invasive species.

In 2012, seven technicians conducted boat inspections and surveyed boaters at high-risk water bodies in order to gauge public awareness of invasive species, track where boaters are coming from and going to, and to educate boaters on aquatic invasive species prevention. Technicians conducted more than 2,600 boater surveys, inspected approximately 2,000 boats, and made contact with more than 25,000 people. Sixty-five percent of boaters at these waters are Nebraska residents, but this percentage decreases seasonally as more non-residents tend to travel to Nebraska from July through October. Of those surveyed, 94% said they have heard of AIS, which represents an increase of 12% since 2010, when the program formally began. Overall in 2012, nearly 81% of boaters coming to Nebraska are from Colorado, 5% from Wyoming, 4% from Kansas, 3% from Iowa, and 2% from South Dakota. The remainder (<1%) are from 34 other states, 26 of which have known zebra or quagga mussel populations.

There were no boat/trailer decontaminations required in 2012, which is indicative of highly responsible behavior of boaters to clean, drain, and dry their watercraft before coming to Nebraska waters. In fact, from 2010 to 2012, there was a 45% increase in boaters who inspect their watercraft for AIS.



During 2012, two project technicians and several Nebraska Game and Parks Commission technicians visited 46 lakes and bodies of water throughout Nebraska and took water samples, which were then analyzed for the presence of zebra/quagga mussel larvae (veligers). More than 200 samples were collected and analyzed with all results negative for veligers, including samples from Zorinsky Lake where adult zebra mussels were found in 2010 and eradicated.



**Taking veliger samples and inspecting rocks for adult zebra and quagga mussels**  
Photo: Rodney Verhoeff

In 2013, seven invasive species technicians continued with the aquatic invasive species prevention program. Variable weather, including cooler temperatures and strong winds early in the season, led to sporadic boater activity which increased in July as temperatures warmed. Although 2013 data has not been analyzed, a cursory review shows a continued high level of AIS awareness and an upward trend in boater behavior to clean, drain, and dry watercraft. Preliminary results show that nearly 2,500 boaters were surveyed, 1,500 boats inspected, and 15,000 people contacted. Nearly 50 bodies of water were sampled in 2013 and to date no water sample has tested positive for veligers.

---

## BAT MOVEMENTS ACROSS TRANSFORMING LANDSCAPES

Principal Investigator(s): Craig R. Allen, Caroline Jezierski

Graduate Student(s): TBD

Project Duration: May 1, 2013 – April 30, 2016

Funding: Nebraska Environmental Trust

Project Location: Platte River, Nebraska

Website: <http://snr.unl.edu/renewableenergy/wind/research.asp#bat>

---

Nebraska has a diverse mix of resident and migratory bat species. Because of the diversity of habitats found throughout Nebraska, there is no place in the state where all 13 bats species occur together. The Nebraska Natural Legacy Project State Wildlife Action Plan lists five bat species as either Tier I or Tier II at-risk Species. At the national level, northern long-eared myotis (*Myotis septentrionalis*) is currently being considered as a candidate species under the Endangered Species Act. Bats provide critical ecosystem services in the form of insect consumption, pollination, and seed dispersal. The economic importance of bats was estimated in 2011 to be about \$22.9 billion to the agricultural industry or on average \$74 per acre. In a state dominated by agriculture, such as Nebraska, the loss of bats could result in increased money spent for pesticides and other insect control measures.

The potential synergistic impacts of wind energy development and white-nose syndrome on bats could have unanticipated consequences in Nebraska and around the nation. The discovery of dead bats under wind turbines was unanticipated by scientists and wind energy companies. The seven most common bat species found dead near wind turbines are all either resident or migratory bats found in Nebraska. White-nose syndrome (WNS) is a deadly fungus that affects hibernating bats. Four of the eleven bat species affected are found in Nebraska.

Potential negative impacts of wind energy development on bats can be avoided or minimized through siting and operation that take into consideration bat presence and activity. We need more knowledge of bat migration patterns and habitat use in Nebraska to help protect bats and their habitats from the potential impacts of wind energy development, and to help utility companies, wind energy developers, and facility owners to manage and mitigate the effects of new and existing wind energy facilities. Through the deployment of over 20 ultrasonic acoustic detectors for two years, we plan to identify when and where bats are moving in eastern Nebraska during spring and fall migration and summer residence. Information gathered from this project will be shared in a variety of formats and used to further promote sound resource management practices in regards to wind energy development. Partners on this project include the Nebraska Wind Energy and Wildlife Project, the U.S. Fish and Wildlife Service, the Nebraska Game and Parks Commission, and the University of Nebraska–Lincoln.



**Big Brown Bat (*Eptesicus fuscus*)**  
Photo: Don Pfitzer, USFWS

---

## BETTER SOIL FOR BIRDS

Principal Investigator(s): Craig R. Allen

Graduate Student(s): Hannah Birgé, Ph.D.

Project Duration: June 2013 – May 2016

Funding: National Science Foundation IGERT Program, Grant 0903469  
Nebraska Game and Parks Commission

Project Location: North Central Nebraska

---

The primary outcome objective is to provide landowners enrolled in the Conservation Reserve Program (CRP) in Nebraska's Niobrara Valley with a better understanding of how four, major mid-contract management activities impact key attributes of soil health.

As landowners and managers are faced with the arduous task of weighing the various economic and ecological tradeoffs of different mid-contract management strategies, soil health is often overlooked with potentially detrimental consequences for the long-term value and resilience of their land. This is especially important as landowners are faced with the option to re-enroll in CRP, with uncertain climatic and economic futures looming on the horizon. We believe that our work will render CRP lands more valuable and resilient over the long-term for private landowners by incorporating soil ecological knowledge into more recent management objectives that often focus exclusively on promoting short-term upland bird habitat.

More specifically, our research objectives include:

1. Tracking and establishing a set of measurable soil health attributes as identified by private landowners, and how they are differentially impacted by the four major mid-contract management strategies; and
2. Providing applicable, relevant information to private landowners, land managers and USDA NRCS personnel in an effort to promote smarter, adaptive management decisions that balance short- and long-term objectives to meet CRP contract requirements and landowner-desired outcomes alike.



**Nebraska landscape in the Lynch area**  
Photo: Hannah Birgé

---

## BIOENERGETICS AND HABITAT SUITABILITY MODELS FOR THE CHINESE MYSTERY SNAIL (*BELLAMYA CHINENSIS*)

Principal Investigator(s): Kevin L. Pope, Valery Forbes

Graduate Student(s): Danielle Haak, Ph.D.

Project Duration: August 2011 –

Funding: National Science Foundation IGERT Program, Grant 0903469  
Nebraska Game and Parks Commission

Project Location: Southeast Nebraska

---

Aquatic invasive species continue to spread throughout the USA at an alarming rate, and Nebraska is no exception. Maintaining ecosystem functions is a key component to preserving system resilience, but more information on how these functions are altered by specific invasive species is necessary.

The Chinese mystery snail (*Bellamya chinensis*) is an invasive freshwater snail already established in Nebraska, yet little is known about this species life-history traits and ecology or how it influences the native benthic community. Similar to other mollusk species, Chinese mystery snail populations commonly reach high densities shortly after establishment. Formulating an energy budget and examining how the Chinese mystery snail allocates energy to increase individual biomass and population density will provide an understanding of how this species directly (competing for habitat) and indirectly (eliminating benthic prey species preferred by fish) alters native biota. Additionally, this bioenergetics information can be combined with abiotic variables to develop a habitat suitability model that can be used to identify water bodies most susceptible to future invasions.



Photo: Danielle Haak

---

## CANID DISTRIBUTION AND THE POTENTIAL IMPACTS OF ENERGY DEVELOPMENT IN NEBRASKA

Principal Investigator(s): Joseph J. Fontaine, Larkin Powell

Graduate Student(s): Lucía Corral, Ph.D.

Project Duration: January 2013 – January 2018

Funding: Nebraska Game and Parks Commission

Project Location: Western Nebraska

---

Increasing conversion of grasslands throughout the Great Plains has led to significant declines in the distribution and abundance of a variety of grassland obligate species and associated increases in habitat generalists. For example, the distribution and likely densities of generalist carnivores, including coyote (*Canis latrans*) and red fox (*Vulpes vulpes*) have increased throughout much of North America, while the closely related grassland obligate, swift fox (*V. velox*) has and continues to undergo significant declines. In Nebraska, swift fox currently occupy only 21% of their historical range, while coyote has increased both in numbers and range throughout the state. Clearly generalists such as coyotes are capable of thriving in highly altered human landscapes, so it is not surprising that their distribution has increased. What is less clear is why swift fox fail to occupy the 42% of Nebraska that continues to contain seemingly high quality swift fox habitat.

As the largest canid in Nebraska, coyotes are dominate to swift fox and often cited as an important source of mortality for swift fox populations. As such increases in the abundance and distribution of coyote following the development of the Great Plains may have inadvertently restricted the range of swift fox despite the availability of suitable habitats. With increasing interest in developing infrastructure in the shortgrass prairie for gas, oil and wind energy resources there is a clear need to identify the mechanism limiting the distribution of grassland obligate species such as swift fox, and how anthropogenic change is likely to alter these limiting factors.

Over the next five years, we will work to identify the ecological mechanisms shaping the distribution of canid communities across Nebraska by developing and testing a series of species distribution models based on the habitat requirements and intraguild interactions between coyote and swift fox. The goal of this project is to understand how habitat structure, landscape attributes, and behavioral intraguild interactions, across multiple spatial and temporal scales, affect habitat use and geographic distribution of the canids species in Nebraska and how energy development may alter these relationships.



**Lucia Corral setting a camera trap**  
Photo: Lucia Corral



**Nebraska swift fox taking a self portrait**  
Photo: Lucia Corral

---

## CHINESE MYSTERY SNAIL (*BELLAMYA CHINENSIS*) ECOLOGY AND IMPACTS

Principal Investigator(s): Craig R. Allen, Kevin L. Pope

Graduate Student(s): Emma Brinley Buckley, M.S.  
Kent Fricke, Ph.D.  
Danielle Haak Ph.D.  
Noelle (Chaine) Hart, Ph.D.  
Michelle Hellman, Ph.D.  
Robert Kill, M.S.  
Kristine Nemec, Ph.D. (2012)  
Nicholas Smeenck, Ph.D.  
Bruce Stephen, Ph.D.  
Daniel Uden, Ph.D.  
Kody Unstad, M.S. (2012)  
Ashley VanderHam, M.S.

Undergraduate Student: Alec Wong (2013)

Project Duration: Summer 2011 –

Funding: Nebraska Cooperative Fish and Wildlife Research Unit

Project Location: Southeast Nebraska

Website: <http://snr.unl.edu/invasives/mysterysnails.html>

---

Chinese mystery snails (*Bellamya chinensis*) are an invasive aquatic species in North America, and populations have been found in southeast Nebraska reservoirs. Little is known about this species, but high densities suggest that there is the potential for considerable impacts on freshwater aquatic ecosystems. A group of researchers from the Nebraska Cooperative Fish and Wildlife Research Unit and the UNL School of Natural Resources are collaborating to expand the understanding of Chinese mystery snails. Research includes both field and lab components, with fieldwork focused on southeast Nebraska reservoirs.

The goal of this project is to address research questions related to the invasive Chinese mystery snail. Aspects of the project include studies of life-history traits, habitat preferences, population size, movement capabilities, desiccation tolerance, feeding methods, possible predators, shell strength, mark retention, and distribution. Additionally, this project offers students an opportunity to conduct scientific investigation in a large team setting.

Thus far, we have produced some interesting results. Following a mark-recapture study at Wild Plum Lake, Lancaster County, in September 2011, we estimated that there were approximately 664 adult snails within a 127 m<sup>2</sup> transect (5.2 snails/m<sup>2</sup>), corresponding to an adult population size of approximately 250,000 snails in the littoral zone (<3 m in depth) and wet biomass of approximately 3,100 kg (643 kg/ha). A fecundity study assessment of 29 females yielded an average of 25 young per female with a maximum of 133 young in a given female. A mark retention study in the lab demonstrated that Chinese mystery snails marked with enamel paint did not completely lose a mark during the 181 day period. This result was further corroborated by finding marked snails 293 days after release at Wild Plum Lake. After the drought of 2012, a mortality event occurred at Wild Plum, and approximately 20% of the adult population died. Finally, temperature thresholds and limitations were identified, and adult snails survived acute freezing events (5 hours) and had upper survival limits around 45°C.



Collecting snails at Wild Plum Lake  
Photo: Michelle Hellman

---

## DYNAMICS OF RESILIENCE IN COMPLEX ADAPTIVE SYSTEMS

Principal Investigator(s): Craig R. Allen

Graduate Student(s): Shana Sundstrom, Ph.D.

Project Duration: August 2012 – December 2015

Funding: U.S. Geological Survey, Powell Center for Analysis and Synthesis (RWO 16)

Project Location: Northwest United States and British Columbia, Canada

---

Ecosystems are a type of complex system, and as such share general rules of behavior with other types of complex adaptive systems. Research across a wide variety of disciplines has uncovered rules of system dynamics that address features of self-organization and emergence. Work in the field of ecology has proposed that resilience may be an emergent phenomenon of complex adaptive systems, and in particular, social-ecological systems. Resilience is the amount of disturbance a system can absorb or buffer while staying organized around the same key structures, processes, and functions. As our understanding of non-linear dynamics and complex systems has grown in recent years, the concept of resilience has exploded, and a great deal of work has been done to understand how resilience emerges and what system components and interactions comprise resilience.

One of the key findings is summarized in the cross-scale resilience model, which proposes that the distribution of species and the functions they represent within and across the scales of an ecosystem plays a key role in system resilience. While most previous work has been explicitly focused on social-ecological systems, there is some tantalizing evidence to suggest that resilience and the cross-scale model may also be applicable to other types of complex adaptive systems, such as economies.

In a more applied exploration of these ideas, the role of species abundance, coupled with their distribution of function, is an element of the cross-scale model that remains unexplored.

This project has two objectives.

1. Explore the cross-scale model in greater detail at both ends of the research spectrum, building the theoretical foundations of the cross-scale model and thus its applicability to other complex adaptive systems, in order to expand understanding of the cross-scale model to incorporate species' abundances and potentially use it as a tool for resource managers to use for identifying impending regime shifts.
2. Focus on improving our understanding of the relationship between cross-scale distributions, species abundance, and regime shifts at a system level by using a comparison of a highly disturbed river basin system (the Lower Columbia River Basin, USA) against a less disturbed basin (the Fraser River Basin, Canada).

---

## ECOLOGICAL MODELS AND BIODIVERSITY CONSERVATION IN NEBRASKA LANDSCAPES

---

Principal Investigator(s): Craig R. Allen

Graduate Student(s): Daniel Uden, Ph.D.

Project Duration: August 2012 –

Funding: Nebraska Game and Parks Commission, U.S. Fish and Wildlife Service

Project Location: Nebraska

---

Biodiversity is increasingly threatened worldwide by an array of anthropogenic stressors, including increased human population density, habitat loss and fragmentation, overhunting and overfishing, biological invasions, and climate change. In the North American Great Plains, agricultural practices have converted grasslands and wetlands into cropland, increasing food and energy production, but decreasing wildlife habitat. As global food and bioenergy demands continue to rise, agricultural conversion and intensification continue.

The Nebraska Natural Legacy Project is a state wildlife action plan that aims at accomplishing the following objectives:

1. Reverse declines of at-risk species;
2. Recover species currently listed as state or federally threatened or endangered;
3. Keep common species common, and conserve natural communities.

The plan identifies 39 Biologically Unique Landscape(s) (BUL) within Nebraska where conservation actions will be specifically targeted. A coarse filter/fine filter approach to conservation has been adopted in the plan, with the goal of benefiting the majority of species by managing at the community (coarse filter) level. Threatened species not encompassed by community-level management are then addressed specifically (fine filter). This project will develop distribution models for species and/or communities identified as conservation targets within Nebraska BULs, with the goal of integrating modeling into an adaptive management conservation framework for BUL-scale management.

Expected products for BULs include habitat suitability ranks, assessments of functional connectivity for suitable habitat patches, baseline community area and species abundance estimates, identification of locations for focusing additional sampling and monitoring efforts, predicted community distributions and species abundances under an array of plausible management-based scenarios, evaluation of progress toward accomplishing established conservation objectives, and identification of suitable locations for the reintroduction of extirpated target species. Modeling techniques will be utilized according to data availability and their propriety for addressing specific research questions. Within an iterative framework, conservation objectives, management actions, and modeling techniques may be altered as additional information supporting adjustments is obtained.

---

## EVALUATING THE BENEFITS OF HIGHER DIVERSITY CRP PLANTINGS FOR AT-RISK SPECIES

---

Principal Investigator(s): Craig R. Allen

Graduate Student(s): Hannah Birgé , Ph. D.  
Bethany Teeters, Ph.D.

Project Duration: April 2011 – December 2013

Funding: National Science Foundation IGERT Program, Grant 0903469  
Nebraska Game and Parks Commission

Project Location: Statewide Nebraska

---

Land enrolled in the USDA Conservation Reserve Program (CRP) covers more than a million acres in Nebraska. However, little attention has been given to the potential of CRP as a resource in the conservation of at-risk species. For policy and planning purposes, it is important to quantify the species composition of CRP plantings and the relative impacts of different grass and forb planting mixes on local diversity. For example, several designated at-risk butterfly species require specific plant species for successful reproduction. Additionally, forbs are needed as nectar sources for most adult species of butterflies. Landowners are not currently required to include any specific species in their CRP seeding mix, and forb diversity plantings vary. The project objective is to evaluate potential habitat benefits of a variety of CRP planting mixes for at-risk species, including birds, butterflies, bees and fish.

During the summer 2013 field season, a large portion of time was spent setting up control plots and sampling areas, installing pitfall traps, learning auditory and visual cues to identify birds, and learning local vegetation. Two technicians assisted with all activities. The following tasks have been completed on the Smith's CRP site in Holt County, NE:

1. *Ground dwelling invertebrate sampling.* Pitfall trapping to sample ground dwelling insects palatable to upland bird chicks across the control (standard CRP seed mix plantings) and pollinator (high forb, high diversity CRP seed mix plantings) plots. Three samplings occurred thus far: one in early June, one in early July and one in late July/Early August.
2. *Pollinator sampling.* Blue Vane traps were set up to sample pollinator assemblages across the control and pollinator plots in the site. This will provide us with baseline data to compare with future years, once the pollinator plots are established. Sampling occurred during summer 2013. Additionally, sweep net sampling (to capture, record and release butterfly species) occurred in late summer 2013.
3. *Bird sampling.* Point count surveys were conducted across the pollinator and control plots to establish both baseline habitat usage and a running list of bird species that visit and inhabit the entire site. Five point counts were conducted between mid-June and mid-July. The first sampling was delayed until mid-June due to the time required to learn bird calls, and to train the technicians.
4. *Vegetation surveys.* Vegetation surveys are continuously conducted across the pollinator and control plots using a cover/frequency protocol to track changes in diversity and grass to forb ratios. A total of 15 square meters is measured within every of the larger 18 control and pollinator plots.
5. *Mapping.* Extensive GPS survey of the field is continuous and will provide us with the ability to revisit sampling areas in future field seasons and the capacity to create user-friendly ways of disseminating our data to broad audiences.



**CRP Grassland**  
Photo: Joseph J Fontaine

---

## EVALUATING THE VALUE AND EFFICACY OF AGRICULTURAL CONSERVATION PROGRAMS FOR LANDOWNERS AND CONSERVATION PRACTITIONERS

---

Principal Investigator(s): Joseph J. Fontaine  
Post-Doctoral Fellow: TBD  
Project Duration: July 2013 – June 2015  
Funding: Nebraska Environmental Trust  
Nebraska Game and Parks Commission  
Project Location: Nebraska

---

In Nebraska, Conservation Reserve Program (CRP) enrollment peaked in 2007 at 1.3 million acres and by 2012 had declined by roughly 30% to 900,000 acres. At the current rate of loss, CRP could disappear from the Nebraska landscape by 2025. Although the complete loss of CRP is unlikely, dramatic reductions in the availability of CRP and changes in the distribution and land types covered in CRP are likely to have corresponding implications for the soil, water, and wildlife resources of Nebraska. While much of the decline in CRP enrollment is attributed to higher commodity prices, as corn acres over the same time period increased from 9.4 million to 9.9 million acres, the complexity of the CRP program and the associated changes in farm demographics and agricultural practices brings into question whether factors beyond economics may drive conservation attitudes in Nebraska's farmers.

Moreover, while conservation efforts have largely focused on reducing impacts through habitat restoration, it is becoming increasingly apparent that protectionist efforts are insufficient to ensure long-term socio-ecological resilience. Conservation approaches which are inclusive of human demands on ecosystem services and consider the potential for human dominated landscapes to provide for and maintain biodiversity while simultaneously providing for the food and fiber needs of society may provide an opportunity to strike a balance between socio-economic needs and socio-ecological impacts. However, this shift in paradigm necessitates innovative approaches that move beyond traditional conservation strategies. In either case, whether we are attempting to ensure the future of CRP or develop novel agricultural conservation programs, it is imperative that we understand the perceptions and values of the stakeholders involved.

This project will work with conservation practitioners and landowners throughout the state of Nebraska to evaluate the perceptions and values of landowners, specifically:

1. What are the perceptions and perceived values of the CRP program?
2. What are the perceptions and perceived values of the alternative CRP practices and the associated management requirements and approaches?
3. What are the limitations to participation in CRP by landowners?
4. What are the limitations in the ability of conservation practitioners and natural resource agencies to promote CRP?
5. What are alternative conservation strategies to CRP and the perceptions and perceived values surrounding the implementation of these alternatives?

---

## FREMONT STATE LAKES RENOVATION STUDY: EFFECTS OF ALUM APPLICATION AND FISHERY RENOVATION ON WATER QUALITY

Principal Investigator(s): Amy Burgin, Steve Thomas, Mark Pegg, Kevin L. Pope

Graduate Student(s): Brian Hammond, M.S.  
Meg Trowbridge, M.S.  
Christa Webber, M.S.

Project Duration: April 2012 – June 2014

Funding: Nebraska Department of Environmental Quality

Project Location: Fremont State Recreation Area, Douglas County, Nebraska

---

The Fremont State Lake System (FLS) is made up of 20 sandpit lakes adjacent to the Platte River near Fremont, Nebraska and is used by 800,000 visitors annually. These lakes were created as early as the 1940s and many are now experiencing water quality problems related to eutrophication. High nutrient concentrations in the water column are driven primarily by internal loading from nutrient-rich sediments accumulated through deposition of leaves fallen from trees, shoreline vegetation, fish excrement, and decaying remains of fish and aquatic vegetation. Eight of the lakes in the Fremont State Lakes are on Nebraska's 2012 section 303(d) list of impaired waters with 30 different impairments. Recent renovations to Fremont Lake #20 and Carter Lake, through the application of aluminum sulfate (alum), produced an immediate and dramatic improvement to the water quality.

The goal of this study is to understand how physical drivers (e.g., lake-basin structure and groundwater flow) and biological drivers (e.g., fish community composition) interact to affect the longevity and effectiveness of alum additions for improving water quality. This will be addressed through three major tasks:

1. *Monitoring* physical and chemical water quality;
2. *Analyzing* the internal and external phosphorous (P) budgets, and
3. *Discerning* how altered fish communities indirectly affect water-quality dynamics.

Fish community composition and structure data were collected using a boat electrofisher and sediment traps, and will be used to discern how alteration of the fish community affects rates of sedimentation and subsequent water quality. Several lakes had fish removed in addition to alum treatments, while others received no fish treatments. Using these methods will help determine which set of treatments will work best on these types of impaired lakes. Data were collected from 16 lakes in 2012 prior to any fish removal or alum treatments, and were sampled again in 2013, after treatments, to determine how the treatments affected the fish communities and water quality. The information collected during this project will be useful in designing future lake renovation projects and developing long-term management plans for renovated lakes.



Private contractor applying alum treatment to Fremont Lakes  
Photo: Brian Hammond

---

## GENERATION OF NOVELTY IN COMPLEX SYSTEMS

Principal Investigator(s): Craig R. Allen  
Graduate Student(s): none  
Project Duration: January 2013 – December 2014  
Funding: James S. McDonnell Foundation  
Project Location: Global

---

Novelty and innovation are essential attributes for the continued success of ecological, social and other complex systems, both natural and anthropogenic. Without them, dynamic, adaptive change in response to disturbance is not possible. Novelty and innovation are required to keep existing complex systems resilient and adaptable, and to create new structures and interactions following catastrophic ecological or social failures. The importance of novelty is recognized in the management and business world, but is less explicitly recognized and appreciated in the scientific world.

Novelty refers to new “products,” things or ideas which are generated through innovation, the process whereby novelty is created. Novelty and innovation are characteristic of dynamic systems—systems that are “alive” and changing—and are generated at multiple levels. For example, in biological systems, novelty is generated at the genetic level through random processes of mutation, at the species level through evolution and natural selection, at the community level as a result of regrouping of species combinations, and at the ecosystem level as a result of changes in key processes and interactions. Novelty is being constantly created—and extinguished. By generating potential solutions in advance of need, solutions may be readily available when problems arise.

Novelty can be either local or global. Locally novel additions are unique to that particular system, but may exist and originate from elsewhere. For example, when a species invades an ecosystem, novelty is added to that system. The invasive species is new to that system, but the species itself is not a novel or new life-form. On the other hand, globally novel additions had no prior existence. They are new not only to the particular system within which they are generated or added, but are globally unique. Speciation in an ecological system represents the addition of global novelty.

Without innovation and novelty, systems may become stagnant. Having a constant source of innovation and novelty is clearly important for systems, both following transformations and during their normal dynamics. However, novelty may be a destructive force as well. Invasive species, for example, can alter basic process and structure in ecosystems and be a source for decline or collapse. Cellular mutations can have obviously destructive consequences upon individuals and lineages—cancer is a prime example. Thus, innovation and novelty can be a double-edged sword. In ecosystems, for example, novelty in the form of new species has been a cause of major extinctions, but is also the prime source for recovery.

To explore the causes and consequences of the generation of novelty and innovation for humans, for social systems and for ecological systems, we will convene a small diverse group of researchers from diverse disciplines, with a variety of approaches and backgrounds, where we believe a deliberate focus on the concept of novelty could be fruitful. Our overall intent is to identify commonalities across disciplines. What attributes of a system are necessary if novelty is to arise? What might be the consequences, both positive and negative, of systems structured to permit novelty and innovation?

---

## IMPACTS OF WIND ENERGY DEVELOPMENT AND OPERATION ON SOIL INVERTEBRATES

---

Principal Investigator(s): Craig Allen, Caroline Jezierski

Undergraduate Student: Lukas Mullins (UCARE Student)

Project Duration: September 2013 – April 2014

Funding: Undergraduate Creative Activities and Research Fellowship; Pepsi

Project Location: Nebraska

---

The potential impacts of wind energy generation on wildlife and their habitats are not fully understood and vary greatly depending on the location of the wind facility. Wind energy development and operation can have direct and indirect impacts on wildlife. Direct impacts include deaths resulting from collisions and habitat loss from construction of roads, wind turbine pads, and other structures. Indirect impacts can include wildlife being displaced from preferred habitat through fragmentation or avoidance of the wind turbines, temporarily disturbed from an area, or forced to alter migration and/or movement patterns.

Studies to evaluate the potential impacts of wind energy development on wildlife have been conducted for several years. Yet, there is still much more for researchers to learn. To date, most wind-wildlife studies have focused on the direct impacts to volant or flying animals such as birds and bats. More recent studies are looking at the indirect impacts on birds and large mammals. Very little research has gone into the potential impacts of wind energy development on soil invertebrates and insects.

Soil invertebrates, such as the endangered American burying beetle, may be negatively impacted by wind energy development and operation. Through this UCARE project, we intend to investigate how and if soil invertebrates may be impacted by wind energy development through literature searches, and lab and field studies.

---

## IMPLICATIONS OF HUNTER HARVEST AND WILDLIFE-FRIENDLY AGRICULTURAL PRACTICES ON PHEASANT BEHAVIOR AND POPULATION DYNAMICS

Principal Investigator(s): Joseph J. Fontaine, Larkin Powell

Graduate Student(s): Lindsey Messinger, M.S.

Project Duration: January 2012 – May 2015

Funding: Nebraska Game and Parks Commission

Project Location: Southwestern Nebraska

---

Ring-necked pheasants (*Phasianus colchicus*) are a culturally and economically important game species in Nebraska. Unfortunately populations have been declining since the 1950s due to habitat loss and land use change. Managers are interested in developing programs that will continue to support and increase existing pheasant populations. While lands enrolled in the Conservation Reserve Program (CRP) are vital in supporting pheasant populations, participation in the program is expected to decline. Land managers in Nebraska are offering incentives to private landowners for employing wildlife friendly agricultural practices (e.g., grazing deferment, tall stubble height, and prescribed burning) and access to private lands through public access signup programs.

Our goal is to provide a better understanding of how pheasants use agriculturally-dominated landscapes and to identify the impacts of recreational hunting on pheasant behavior and population dynamics as well as evaluate the effectiveness and potential benefits of wildlife friendly agricultural practices within the Southwest Focus on Pheasants area in southwestern Nebraska. In the first year of this study, we successfully radio collared and tracked nearly 100 pheasants and interviewed numerous hunters to assess their perception of the incentive programs. Over the next two years, we will continue to use radio-telemetry to track the movements and evaluate the behavior of pheasants during the hunting season as well as identify optimal and limiting conditions for pheasant survival during the fall and winter (hunting season).



**Pheasant hunting, southwest Nebraska**  
Photo: Jessica Laskowski



**Radio collared hen pheasant**  
Photo: Lindsey Messinger

---

## INFLUENCE OF TROUT STOCKING ON TIER I/II FISHES

Principal Investigator(s): Kevin L. Pope, Mark Pegg

Graduate Student(s): Kelly Turek, M.S.

Project Duration: May 2011 – April 2014

Funding: Nebraska Game and Parks Commission

Project Location: Statewide Nebraska

---

The Nebraska Game and Parks Commission (NGPC) continually receives political pressure to stock native and non-native fish throughout the state. In many instances, stocking fish enhances recreational opportunities for anglers. However, in some instances, stocking fish mars the integrity and stability of biotic communities.

Currently, the NGPC discourages stocking trout in streams that are home to tier I/II fishes because of concern for these fish communities. Tier I/II fishes, or species of concern, are species for which conservation actions are considered vital for survival. Specifically, there is concern that introduced trout will consume or outcompete tier I/II individuals. Thus, introduced trout could potentially harm tier I/II fishes.

The goal of this project is to gain a better understanding of the interactions between non-native trout and species of concern in Nebraska headwater streams to better predict the outcomes of future trout stockings. One objective of this project was to develop an in situ, controlled experiment designed to provide information necessary to make such a prediction. In 2012, a series of 24 in-stream enclosures stocked with varying densities of non-native rainbow trout and native longnose dace were used to determine the effectiveness of enclosures. Thirty days post stocking, fish abundances from all treatments were well below stocked abundances and there was no difference in mortality between covered and uncovered enclosures, or between fish density treatments. Therefore, enclosures, as designed in 2012, were determined to be ineffective and were re-designed for 2013.



**Jamie Kindschuh shocking for longnose dace**  
Photo: Kelly Turek



**Kelly Turek with trout for stocking in the enclosures**  
Photo: Jamie Kindschuh

---

## INTEGRATING ADAPTIVE MANAGEMENT, RESILIENCE THINKING, AND OPTIMIZATION

---

Principal Investigator(s): Craig R. Allen, Melinda Harm Benson (University of New Mexico)

Graduate Student(s): Noelle (Chaine) Hart, Ph.D.

Project Duration: August 2011 –

Funding: National Science Foundation IGERT Program, Grant 0903469

Project Location: Statewide Nebraska

---

The natural resources management paradigm has been shifting from traditional command-and-control to a focus on complex social-ecological systems and explicit recognition of uncertainty. Adaptive management is an approach combining management actions and scientific investigation to increase understanding of environmental systems. It is a structured, “learning by doing” method to management that embraces uncertainty and change. Resilience thinking acknowledges the presence of multiple stable states in nature and considers the extent to which a given system can absorb perturbation before shifting into a different organization of functions and processes. Central to resilience theory is the awareness of the ubiquity of surprise in social-ecological systems. Optimization is a conservation tool used to make transparent management decisions based on explicit values and objectives. Adaptive management, resilience thinking, and optimization have all been suggested as appropriate ways to implement the emerging social-ecological management paradigm, but translation into practice remains a challenge.

Structured decision making is a process for making smarter decisions that involves the clear elucidation of problems, objective, alternatives, consequences, and tradeoffs. This research project seeks to explore how structured decision making can link resilience, adaptive management, and optimization in order to generate a cohesive method of implementing the emerging social-ecological paradigm. Research conducted as part of this project will involve:

1. Translating resilience theory into natural resource management practices using structured decision making;
2. Investigating how optimization can be used to address resilience objectives;
3. Exploring the potential for adaptive management under State Wildlife Grants, focusing on the Nebraska Natural Legacy Project;
4. Creating frameworks for operationalizing future natural resources management projects that engage adaptive management, resilience thinking, and optimization.

---

## LOCAL AND LANDSCAPE CONSTRAINTS ON HABITAT MANAGEMENT FOR UPLAND BIRDS

Principal Investigator(s): Joseph J. Fontaine, Larkin Powell

Graduate Student(s): Christopher F. Jorgensen, M.S. (2012)

Undergraduate Student: Victoria Simonsen (UCARE Student)

Project Duration: January 2010 – December 2013

Funding: Nebraska Game and Parks Commission

Project Location: Statewide Nebraska

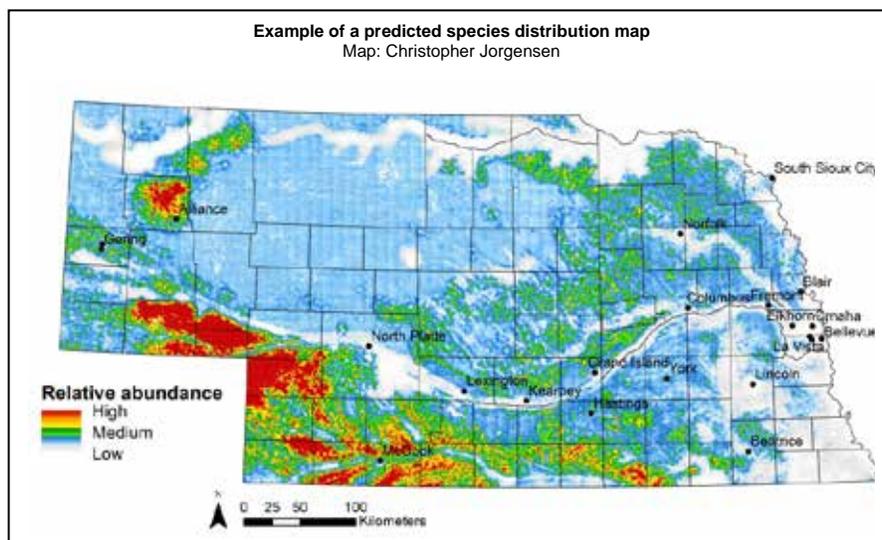
---

Throughout the Great Plains, changing land-use practices are resulting in large scale biodiversity loss and an ever increasing dependence on effective conservation and restoration efforts provided by private, state, and federal agencies. Yet, far too often local management efforts fail to demonstrate the desired outcome for wildlife populations. Understanding why management actions are unsuccessful is paramount, but past studies often fail to consider the importance of ecological mechanisms that act across multiple spatial and temporal scales. By exploring how grassland bird communities select habitat based on local vegetative composition as well as landscape attributes, we can gain perspective on why populations and communities fail to react to apparently suitable habitat improvements.

Using geographic information system spatial analysis tools, we are analyzing data from avian point count surveys and local vegetation assessments within a larger land cover layer of Nebraska. The resulting outputs are being employed to create species specific spatial models for Nebraska which identify key focus areas to implement management efforts with the goal of maximizing management benefits to grassland bird communities.

Over the 2010, 2011, and 2012 field seasons, roughly 3000 avian point count surveys were conducted on State Wildlife Management Areas, private properties enrolled in the Open Fields and Waters program, road transects and other private properties enrolled in CRP throughout much of Nebraska. In order to validate our spatially explicit species distribution models, this past field season we added 10 transects located in the panhandle, north-central, and north-eastern portions of the state. Analysis of habitat factors influencing upland species and other obligate grassland birds indicates that the surrounding landscape strongly affects local habitat suitability. Thus, the success or failure of conservation efforts on the ground may be determined by the landscape context.

Although the bulk of this project was completed in December of 2012 when Chris Jorgensen received his master's degree, the project is continuing until December 2013 with one of our undergraduate UCARE students working to test one of the mechanisms that may explain how landscapes influence pheasant populations.



---

## MAKING ADAPTIVE MANAGEMENT MEANINGFUL: TRANSLATING SCIENCE LEARNING INTO POLICY DECISION-MAKING

Principal Investigator(s): Craig R. Allen, Kyle Hoagland

Graduate Student(s): Chad Smith, Ph.D.

Project Duration: July 2008 –

Funding: No external funding

Project Location: Platte River in Nebraska, Colorado, Wyoming

---

Chad Smith continues his research into the gap between science and decision-making in adaptive management programs and tools to successfully bridge that gap.

The working title of his dissertation is “Making Adaptive Management Meaningful: Translating Science Learning into Policy Decision-Making.” Adaptive management has been and continues to be implemented around the country and world, yet few examples exist of programs successfully implementing all six steps (Assess → Design → Implement → Monitor → Evaluate → Adjust) of adaptive management. A key break point in this process seems to be synthesizing collected data and using that synthesis to tell a story about what data say in regard to key questions and hypotheses in a way that is useful to decision-makers and results in positive changes in management or policy.

Research will:

1. Explore the science and policy interface in a comparative study of several adaptive management programs,
2. Provide specific background on this issue as it relates to the Platte River Recovery Implementation Program,
3. Showcase decision analysis other tools that can be used as decision support in the Platte River and other adaptive management programs, and
4. Discuss opportunities for and challenges to bridging the science/policy gap.

Smith is applying learning from his research in the real world, serving as Adaptive Management Plan implementation coordinator for the Platte River Recovery Implementation Program. He is also co-lead of a small team writing an Adaptive Management Plan for the Middle Rio Grande Endangered Species Collaborative Program.

---

## MANAGEMENT INDUCED SHIFTS IN PHEASANT REPRODUCTIVE STRATEGIES

Principal Investigator(s): Joseph J. Fontaine

Graduate Student(s): Jessica Laskowski, M.S.

Project Duration: September 2011 – August 2014

Funding: Nebraska Game and Parks Commission

Project Location: Southwestern Nebraska

---

The native grasslands of the Great Plains serve as habitat for numerous wildlife species, but the intensification of agricultural practices and the subsequent alteration of the landscape has drastically reduced and fragmented remaining grasslands. The Conservation Reserve Program (CRP) has helped to mitigate habitat loss and slow the rate of population decline of grassland dependent species, but funding for, and subsequent enrollment in, CRP is declining. Pheasants are an economically important species that responds well to CRP, but as acres of CRP decline, it is becoming increasingly important to develop new approaches to improve and stabilize pheasant populations.

Because pheasants are relatively short-lived, successful reproduction is paramount to population growth. The goal of this project is to better understand how management actions (e.g., habitat enhancement programs, harvest management) influence pheasant reproduction and subsequently pheasant population growth. We will employ an individualistic approach that considers behavioral and life history responses to management actions as a means of understanding pheasant population dynamics.

Radio-telemetry will be used to track breeding hen pheasants from 2012 to 2014 within Nebraska's Southwestern Focus on Pheasant Area, a site intensely managed to boost pheasant populations. Hen nesting site preferences and reproductive strategy (e.g., clutch size, egg size, incubation patterns) will be assessed in response to variable land-cover, hunting regimes and habitat enhancement. In 2012, we tracked 30 hen pheasants across 8 study sites (private lands enrolled in CRP and one Wildlife Management Area) and in 2013 we added another 40 hens and two more sites to our sampling effort. This project is ongoing with an expectation that it will be completed early next summer.



**Jessica Laskowski sampling nest vegetation**  
Photo: Lindsey Messinger



**Jessica Laskowski measuring pheasant eggs**  
Photo: Lindsey Messinger

---

## MISSOURI RIVER MITIGATION: IMPLEMENTATION OF AMPHIBIAN MONITORING AND ADAPTIVE MANAGEMENT FOR WETLAND RESTORATION EVALUATION

Principal Investigator(s): Craig R. Allen, Martin Simon (Benedictine College)

Graduate Student(s): Ashley VanderHam, M.S.  
Michelle Hellman, M.S. (2013)

Project Duration: July 1, 2009 – March 2014

Funding: U.S. Geological Survey (RWO 11)  
U.S. Army Corps of Engineers

Project Location: Missouri River Corridor of Iowa, Kansas, Missouri and Nebraska

---

Data are being collected to determine what constitutes a successful wetland restoration, given the desired goals of the U.S. Army Corps of Engineers. Herpetofauna—primarily amphibians—are being used as indicators of wetland success. This will be accomplished by quantifying the occurrence and recruitment of amphibians at existing mitigation sites and formulating models of quality wetland restorations. These models will be used by managers in future restorations and for adaptive management approaches to the design of new wetland restorations. The study area is the Missouri River corridor of Iowa, Kansas, Missouri and Nebraska.

This project is a multi-institutional monitoring program that focuses on tightly linking monitoring with hypothesis testing in an adaptive framework. The design consists of frog call surveys to determine occupancy rates for a large number of wetlands on numerous restoration properties, coupled with intensive sampling of frogs, turtles and salamanders to assess abundance and recruitment on eight restored wetland complexes in four states. The focus areas for the Nebraska Coop Unit are three Missouri River wetland complexes located from Falls City to Omaha, Nebraska. Project collaborators at Benedictine College in Kansas are focusing on the Benedictine Wetlands in Kansas.

The final season of the Wetland Herpetofaunal Survey has been completed. Breeding anuran call surveys were conducted as well as tadpole dip-netting over three seasons in April, May and June 2013. In July 2013, turtle trapping was implemented to obtain species richness and abundance estimates.

A final report will be developed which will include results from all four participating states: Iowa, Kansas, Missouri and Nebraska.



**Snapping Turtle**  
Photo: Jessica Umberger



Credit: USGS

---

## MONITORING, MAPPING, RISK ASSESSMENT, AND MANAGEMENT OF INVASIVE SPECIES IN NEBRASKA

Principal Investigator(s): Craig R. Allen

Coordinators: Karie Decker (7/2009 – 11/2012)  
Rodney Verhoeff (4/2013 – 7/2013)

Project Duration: January 1, 2010 – December 31, 2014

Funding: Nebraska Game and Parks Commission

Project Location: Statewide Nebraska

Website: <http://snr.unl.edu/invasives/>

---

Funding was provided through a federal-aid grant from the Nebraska Game and Parks Commission to:

- Provide outreach to and facilitate communication among stakeholders regarding biological invasions, coordinate the Nebraska Invasive Species Council, and assist with any additional legislation regarding invasive species as needed.
- Develop management tools including an invasive species adaptive management plan, a risk analysis for high-risk invasive species in Nebraska, a multi-agency prevention protocol for preventing the spread of invasive species (terrestrial and aquatic), and identification of invasive species introduction pathways.

The Nebraska Invasive Species Project continued to coordinate monthly meetings for the Nebraska Invasive Species Council, which was formalized as a state council through legislation in April of 2012. This thirteen-member advisory council discusses topical invasive species issues, develops management plans and Early Detection-Rapid Response (EDRR) plans, builds collaborative partnerships to address priority issues, and informs the Nebraska Legislature of the status of invasive species in the state.

The project participated in a variety of outreach events in order to provide information regarding identification, prevention, and management of invasive species. This included presentations at the Nebraska Lakes Association spring conference, the annual meeting of the Nebraska Game and Parks Commission Fisheries Management Division, and the Nebraska Attorney General's "Mind Over Mussels" conference. An estimated 15,000 people have received invasive species information during the past year or have been directly contacted by one of our technicians at various lakes throughout Nebraska.

The project website (<http://snr.unl.edu/invasives/>) serves as a hub for invasive species information, events, management plans, species biology, research, and links to useful, online mapping tools. Additionally, the website allows for onsite reporting of invasive species sightings. The project site receives an average of over 200 visitors each week. Along with the website, the project distributes the latest news and a newsletter via a listserv system to several hundred subscribers. This past year, four newsletters were distributed to over 700 organizations, agencies, and other interested parties.



**Project technician interacting with an angler as part of invasive species outreach efforts**

Photo: Rodney Verhoeff

In early 2013, the project coordinator was interviewed by KPTM-42, a television station out of Omaha, on Asian carp in the Missouri River. A segment aired on June 6, 2013 and continues to be posted on the station website. The Project participated in QUESTNebraska, which is a new multi-media program focusing on sustainability that uses media such as blogs, video, and interviews to engage viewers. An NETV representative accompanied two technicians in the field to videotape and observe invasive species monitoring and outreach efforts. Additionally, the Project coordinator was interviewed and tape-recorded on a variety of invasive species issues. The Project segment is scheduled to be aired this fall on the NETV QUESTNebraska website found at: <http://quest.netnebraska.org/p/about.html>.

---

## PLATTE RIVER BASIN TIMELAPSE

Principal Investigator(s): Craig Allen, Michael Farrell, Michael Forsberg

Graduate Student(s): Emma Brinley Buckley, M.S.

Project Duration: January 2013 – June 2015

Funding: Institute for Agriculture and Natural Resources, UNL

Project Location: Central Platte River Basin

---

Integrating photography with science is a dynamic approach for communicating research, and is an innovative method for extracting data. Conservation photography has been implemented and recognized as a communication tool for science and an influential means of sustaining and managing natural resources. Time-lapse photography is part of this emerging field and capable of conveying visual information of what is occurring within a system.

Water scarcity is a global issue, with a leading example happening and developing in the Great Plains of Nebraska. The central Platte River basin hosts a convergence of uses, including irrigation for agriculture, power production, public municipality supplies, and critical habitat for numerous species.

In collaboration with Michael Forsberg and Michael Farrell's Platte Basin Timelapse project, this study aims to explore innovative approaches in the realm of science communication by combining time-lapse photography with remotely sensed ecological and phenological data.

Water quality measurements and bioacoustics of bats, frogs, and birds will be integrated with time-lapse series to visually identify temporal and spatial variability patterns. Features will be extracted from the images to see if photographic attributes are correlated with water quality or call phenology.



**Trail camera for capturing time-lapse changes in the state of the Platte River**  
Photo: Emma Brinley Buckley



**A multiparameter sonde suspended in the Platte River near Lowell to monitor water quality**  
Photo: Emma Brinley Buckley

---

## POLLINATOR ASSEMBLAGES IN SOUTHEAST PRAIRIES AND SANDSTONE PRAIRIES BIOLOGICALLY UNIQUE LANDSCAPES

Principal Investigator(s): Craig R. Allen, Chris Helzer (The Nature Conservancy)

Graduate Student(s): Bethany Teeters, Ph.D.  
Christopher Wood, M.S. (UNO)

Project Duration: June 2009 – June 2015

Funding: Nebraska Game and Parks Commission  
National Science Foundation IGERT Program, Grant 0903469

Project Location: Southeast Nebraska, Pawnee County

---

The Southeast Prairies Biologically Unique Landscape (BUL) is part of the Southeast Nebraska Flagship Initiative, a partnership that includes The Nature Conservancy, Northern Prairies Land Trust, Spring Creek Prairie Audubon Center and the Nebraska Game and Parks Commission. The implementation of Flagship Initiatives—including that in the Southeast Prairies BUL—follows from the Nebraska Legacy Plan to implement a proactive approach to conserving non-game wildlife and biological diversity in an adaptive management framework. The overall goal is to determine how to most effectively and efficiently manage prairies while maintaining critical plant-insect relationships indicative of system functioning.

This project aims to evaluate the current and potential viability of ecological systems within priority landscapes. It began as a pilot study in 2011 conducted by Bethany Teeters in which the bee assemblages were compared between extremely isolated prairie fragments and large, well-connected fragments. This was a continuation of Chris Wood's work in which habitat factors that influence the structure of the pollinator community in the southeast prairies were examined. His goal was to determine which factors have the greatest impact on abundance and species richness in tallgrass prairie fragments. As most remnant prairie fragments are privately owned, this knowledge will be useful when approaching landowners about management techniques that benefit both agriculture and prairie conservation. After all, the majority of angiosperms are dependent upon pollinators for reproduction, including prairie forbs. Understanding population viability for various pollinator taxa and how that status differs across the landscape will help improve land management strategies that support conservation efforts.

Research currently focuses on bees as a key insect group that provides an important ecosystem service: pollination. In 2012, comparisons of bee species richness, diversity, and abundances were made between the dominant grassland types in the southeast: remnant prairie or haymeadow, properties enrolled in the Conservation Reserve Program (CRP) and grazed pastures. These grasslands were evaluated as potential bee habitats based on floral resource availability. Nearly 6,000 individuals were collected over the season which were identified and sorted into functional groups. Future research will focus on questions of habitat connectivity in this landscape and other habitat factors that may help explain the assemblages and distribution of species.



American bumble bee (*Bombus pensylvanicus*), dusted with pollen, on thistle in a grazed pasture in Southeast Prairies BUL

Photo: Bethany Teeters

Chris and Bethany are currently combining species lists from the past few years of collection to identify and document new records for the area and the State of Nebraska. Such documentation is important for monitoring species distributions and determining changes in those distributions over time, especially if they correspond to changes in local or regional climate. The overall goal of all the work in this area is to evaluate the functioning of ecosystem services and identify important factors that influence the pollinator community in this landscape. Such information will be valuable for making appropriate land management and conservation recommendations.

---

## POPULATION ASSESSMENTS OF TEMPERATE BASSES IN NEBRASKA RESERVOIRS

Principal Investigator(s): Kevin L. Pope, Christopher J. Chizinski

Graduate Student(s): Lucas Kowalewski, M.S.  
Nathan Stewart, M.S.

Project Duration: July 2012 – June 2015

Funding: Nebraska Game and Parks Commission

Project Location: Southeastern Nebraska

---

Branched Oak Lake and Pawnee Reservoir are flood-control reservoirs located in the Salt Valley of eastern Nebraska, and are popular sites for water recreation. Angler use at these reservoirs has declined in recent years and the Nebraska Game and Parks Commission is interested in restoring angler use to past levels. Declines in angler use are associated with shifts and declines in the sportfish communities. Habitat degradation associated with reservoir aging (sedimentation and loss of near-shore habitat) has contributed to a shift from fish communities dominated by near-shore species to fish communities dominated by off-shore species.

White perch have been unintentionally introduced into both reservoirs, and now comprise a majority of the fish biomasses. To improve the sportfish communities in Branched Oak Lake and Pawnee Reservoir, the white perch population sizes need to be reduced and maintained at low levels. Previous attempts to reduce white perch population sizes by stocking predatory fish have not been successful. The presence of gizzard shad in these reservoirs complicates attempts to control white perch through predation by providing the predatory fish with an alternative prey. Physical reductions (removal of large portions of the populations) in both white perch and gizzard shad populations are needed for predators to have any chance of controlling and maintaining white perch populations at low levels.

Baseline information on the abundances and spatial distributions of white perch and gizzard shad is needed to inform management on the best strategies to target and remove large abundances of these species. The goal of this project is to provide this baseline information with two specific objectives:

1. Quantify white perch and gizzard shad abundance;
2. Describe the seasonal and daily spatial distributions of white perch and gizzard shad.

Spatially explicit population density estimates will be calculated throughout each reservoir over three seasons and two years. White perch and gizzard shad densities are being assessed with a combination of gears including sonar, gillnet, boat electrofisher, and beach seine. Sampling has begun and will continue until late November 2013; sampling will resume in March 2014 and continue until November 2014.



Luke with a gillnet of white perch  
Photo: Nathan Stewart

---

## PREDICTING VARIATION IN SPRINGTIME WETLAND OCCURRENCE AND FLOODED AREA IN NEBRASKA'S RAINWATER BASIN

Principal Investigator(s): Craig R. Allen, Scott Taylor (NGPC), Andy Bishop (Rainwater Basin Joint Venture Partnership)

Graduate Student(s): Daniel Uden, Ph.D.

Project Duration: August 2010 – January 2013

Funding: Nebraska Game and Parks Commission  
USGS Great Plains Landscape Conservation Cooperative

Project Location: Rainwater Basin, Nebraska

---

Migratory waterbirds rely on stopover habitat along migration routes to replenish energy reserves and improve body condition. Shallow, closed-basin playa wetlands in the Rainwater Basin region of south-central Nebraska provide critical stopover habitat for migratory waterbirds in the Central Flyway. The ephemeral nature of these wetlands and localization of precipitation events influences the distribution and degree of springtime wetland ponding and causes avian stopover habitat to vary among locations and years. Ponding is hypothesized to be driven by weather events, individual wetland characteristics, and surrounding landuse; but it is unclear which variables, or combinations of them, are most important.

We used generalized linear mixed models and linear mixed models in a multi-model inference framework to compare alternative hypotheses explaining wetland inundation (presence/absence of water) and ponded area in 2004 and 2006 – 2009. Candidate variables included local weather events, surrounding landuse, and wetland characteristics. In general, surrounding rowcrop agriculture, greater hydric footprint shape complexity, and warmer and drier weather patterns negatively influence wetland inundation and ponded area. The degree of ponding in Rainwater Basin wetlands was greater in 2007 than 2006, presumably because 2006 was relatively dry and 2007 was relatively wet. Differences between these and other years are reflected in inundation model predictions for individual years.

Validations of predictive models were conducted with a subset of regional wetlands not used for model training, and validation results show the inundation model to be a better predictor of wetland inundation than the ponded area model is of wetland ponded area. Models may be used to inform the managers of publicly owned wetlands regarding the use of groundwater pumping to provide additional stopover habitat, and identify and prioritize wetland and watershed restoration actions in this highly altered agricultural landscape.

---

## RECRUITMENT OF WALLEYE AND WHITE BASS IN IRRIGATION RESERVOIRS

Principal Investigator(s): Kevin L. Pope

Graduate Student(s): Jason DeBoer, M.S.  
Robert Kill, M.S.  
Ryan Lueckenhoff, M.S. (2011)  
Dustin Martin, M.S. (2008)

Project Duration: September 2006 – August 2013

Funding: Nebraska Game and Parks Commission

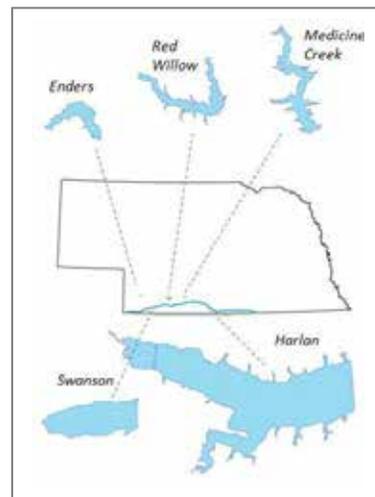
Project Location: Enders Reservoir, Medicine Creek Reservoir, Red Willow Reservoir, and Swanson Reservoir, Nebraska

---

The five reservoirs within Nebraska's Republican River watershed (Swanson Reservoir, Enders Reservoir, Red Willow Reservoir [also referred to as Hugh Butler Lake], Medicine Creek Reservoir [also referred to as Harry Strunk Lake], and Harlan County Lake) were built primarily for flood control and irrigation, resulting in large in-reservoir water-level fluctuations within and among years. These reservoirs also provide important fisheries for anglers in southwest Nebraska, with walleye and white bass being of particular importance. Continued annual stockings of walleye have been necessary to maintain populations because natural production is limited. In contrast, white bass populations are self-sustaining, although recruitment is erratic (i.e., weak or missing year-classes are common) in all but Harlan County Reservoir.

The purpose of this project was to gain an understanding of the factors affecting recruitment of walleye and white bass in irrigation reservoirs. The primary foci were to document the relative importance of spawning habitats, and the timing of recruitment bottlenecks for walleye and white bass in southwest Nebraska irrigation reservoirs. A secondary focus was development of a general walleye population model that incorporated uncertainty in frequency of missing year classes.

We are assessing temporal and spatial trends in abundance of larval walleye and white bass from 2008 to 2011, and comparing with trends in abundance of zooplankton—the primary prey of the larval fishes—to understand annual variability in fish production within these systems. We are also building a mathematical model to understand population responses to missing year classes. Information gained from this project will further our understanding of the ecology of reservoirs in semi-arid regions.



---

## THE RELATIONSHIP BETWEEN DIVERSITY AND ECOLOGICAL FUNCTIONS

Principal Investigator(s): Craig R. Allen, Chris Helzer (The Nature Conservancy), LaReesa Wolfenbarger (UNO)

Graduate Student(s): Kristine Nemeč, Ph.D. (2012)

Project Duration: July 1, 2005 – December, 2012

Funding: James S. McDonnell Foundation  
Nebraska Game and Parks Commission  
The Nature Conservancy  
The National Science Foundation IGERT Program, Grant 0903469

Project Location: Central Platte River Valley, Nebraska

---

In recent decades, agricultural producers and conservation organizations have converted thousands of hectares of cropland to grassland in the Great Plains. This project investigated the relationship between species diversity in prairie restorations and ecological functions utilizing restoration plots along the Platte River in south central Nebraska. Both high diversity and low diversity seed mixes were used in the restoration plots. Although high diversity seed mixes can cost up to five to ten times as much as low diversity seed mixes, little information is available on the ecological functions that may result from the added diversity. Restorations that maintain critical ecological functions and services may help maintain functional and resilient working landscapes. This study is among the first to compare the ecological functions provided by grassland seed mixes commonly used by practitioners.

Increasing plant community diversity was found to be more important than increasing seeding density for enhancing resistance to invasion by unsown perennial forbs and legumes and in reducing inflorescence production by *Bromus inermis*. There was a significant positive relationship between plant community diversity and the abundance of coccinellid beetles, but the abundance of ants, carabid beetles, and spiders showed no significant response to diversity or seeding density. Seeding density had a positive effect on carabid beetle and spider species richness and Shannon-Weaver diversity. Year was the main significant effect for explaining levels of herbivory damage in *Ratibida columnifera* and *Solidago Canadensis*. Herbivory levels of each did not differ significantly among the treatments in 2010 and 2011. There was a significant negative relationship between diversity and levels of soil nitrate with low diversity plots containing higher amounts of nitrate and ammonium than the high diversity plots.

Overall, results indicate increasing diversity may be more important than increasing seeding density for provision of the ecological functions studied.

Kristine Nemeč received her Ph.D. in December 2012.



Photo: Kristine Nemeč

---

## STOPOVER DECISIONS OF MIGRATORY SHOREBIRDS: AN ASSESSMENT OF HABITAT, FOOD, BEHAVIOR AND PHENOLOGY

Principal Investigator(s): Joseph J. Fontaine, Susan Skagen (USGS Fort Collins Science Center), Ted LaGrange (NGPC), Lisa Webb (Missouri Cooperative Fish and Wildlife Unit), Andy Bishop (Rainwater Basin Joint Venture)

Graduate Student(s): Ryan Stutzman, M.S. (2012)  
Caitlyn Gillespie, M.S.

Project Duration: January 2010 - September 2015

Funding: U.S. Geological Survey National Climate Change and Wildlife Science Center (RWO 12)

Rainwater Basin Joint Venture

Great Plains Landscape Cooperative

Project Location: Nebraska, North Dakota, South Dakota

---

The wetlands of the Great Plains are increasingly altered by anthropogenic change, but remain important stopover habitats for a variety of migratory birds, including 37 species of shorebirds. Although shorebirds use highly altered wetlands, the extent to which these habitat decisions represent true preference and are adaptive remains unclear. To identify the influence of anthropogenic change on avian habitat preferences, surveys were conducted for migrating shorebirds from April to June of 2010 and 2011 in north-central South Dakota. Our results show that shorebirds prefer highly-altered, agricultural wetlands, which have lower invertebrate (food) abundance than do grassland wetlands. However, by examining migrant behavior, we were able to determine that individuals have a higher foraging rate and search effort at preferred habitats, indicating that foraging efficiency, rather than food availability, is the limiting factor in this system.

We also examined the influence of local phenology on shorebird migration to identify the potential sensitivity of migratory timing to climate change. We found that shorebird migration coincides with invertebrate food resources, indicating that migrants may be sensitive to climate-driven changes in food resource phenology.

Based on the findings from this initial study, which concluded with Ryan Stutzman receiving his M.S. in December of 2012, we have now begun to assess how larger landscape attributes affect stopover decision processes and the corresponding physiological implications. In the spring of 2013, Caitlyn Gillespie began monitoring shorebird migratory patterns through the Rainwater Basin of south-central Nebraska as well as the southern Prairie Pothole Region of South Dakota, a study that will continue over the next two years.



**Shore birds**  
Photo: Joseph Fontaine

---

## TESTING FOR THE PRESENCE OF THE CHYTRID FUNGUS (*BATRACHOCHYTRIUM DENDROBATIDIS*) IN AMPHIBIAN POPULATIONS ACROSS NEBRASKA

Principal Investigator(s): Craig R. Allen, Ted LaGrange (NGPC)  
Graduate Student(s): Nick Smeenck, Ph.D.  
Project Duration: August 2010 – May 2014  
Funding: Nebraska Game and Parks Commission  
U.S. Environmental Protection Agency (EPA)  
Project Location: Statewide Nebraska

---

Many worldwide amphibian population declines and mass mortality events have been attributed a fungal infection chytridiomycosis (chytrid) caused by the fungal zoospore *Batrachochytrium dendrobatidis* (*Bd*). Although the exact mechanism by which mass mortalities occur from chytrid is unknown, it is hypothesized that the chytrid fungus infects keratinized epidermal cells of postmetamorphic frogs with death caused by: 1) disruption of osmoregulation; 2) the absorption of a fungal toxin; 3) or a combination of these factors. Concern over the potential ecological consequences of such rapid and drastic extinctions has led to an increase in effort studying the potential effects of emerging infectious disease on amphibian populations. Furthermore, scientific and technological advances in non-invasive techniques to detect the chytrid fungus have changed the ability of researchers and managers to track the distribution of and measure the population fluctuations and declines caused by infectious disease such as chytrid.

The chytrid fungus is known to occur in Nebraska and has been found in amphibian populations located in eastern Nebraska as well as along the Central Platte River. Although sporadic testing for the chytrid fungus in populations of native amphibians has occurred in Nebraska, a statewide survey has never been conducted. This lack of knowledge pertaining to the current distribution of chytrid the state must be rectified. Doing so will not only allow researchers to know where chytrid is currently found in the state, but also aid in the development of predictive models and help in the understanding of factors that may help or mitigate the further spread of chytrid.

The primary goal of this study to determine the current extent of chytrid in Nebraska by swabbing larval amphibian populations statewide. Using PCR, the samples will be tested for the presence of *Bd* zoospores. The presence/absence of chytrid in amphibian populations will be used to model the distribution of chytrid based on environmental covariates associated with wetland condition and amphibian call surveys. The results of these models will be used to develop predictive maps of the potential spread of chytrid based on important environmental and anthropogenic variables.

During the spring and summer of 2011 and 2012, researchers visited wetlands in eastern and central Nebraska. During site visits, tadpoles were captured using dip nets. At those sites where tadpoles were captured, each individual was swabbed using a sterile swab. In 2011 and 2012, 168 swabs were collected from 5 frog species at 21 sites. Preliminary PCR results detected chytrid in 62% of the sites. Additionally, chytrid was detected in at least one swab from each species. The detection rate (*d*) was highest in bullfrogs (*n* = 9; *d* = 1.00) and lowest in plains leopard frogs (*n* = 78; *d* = 0.10). The detection rate did not appear to vary between months (May – *n* = 56, *d* = 0.125; June – *n* = 112 *d* = 0.17). An additional 10 samples were collected during 2013. Sampling will continue during the spring and early summer of 2014.

---

## UNDERSTANDING AND MANAGING FOR RESILIENCE IN THE FACE OF GLOBAL CHANGE

Principal Investigator(s):	Craig R. Allen, Shana Sundstrom, Kirsty Nash (James Cook University, Australia)
Graduate Student(s):	Kirsty Nash, Ph.D. Shana Sundstrom, Ph.D.
Project Duration:	August 2012 – December 2015
Funding:	U.S. Geological Survey, Powell Center for Analysis and Synthesis (RWO 16)
Project Location:	Global

---

Resilience science provides a conceptual framework and methodology for quantitatively assessing the ability of a system to remain in a particular state. Probable non-linear ecological responses to global change, including climate change, require a clear framework for understanding and managing resilience. However, much of the resilience research to date has been qualitative in nature, and frameworks developed for the implementation of resilience science have been either vague or focused on the social component of social-ecological systems. Attempts to quantify resilience and operationalize the concept include the cross-scale resilience model, discontinuity theory and the early detection of leading indicators of regime shifts. More work is needed to support the effective use of resilience theory for managing ecological systems. We propose to address gaps in the science of ecological resilience in order to develop a usable framework for the implementation of resilience science by natural resource managers. We will do this by accomplishing a series of related but discrete tasks.

1. *Synthesize* the current state of discontinuity research, the language barriers to communicating complex systems science and discontinuities, and the key criticisms of discontinuity theory in order to present a defined direction for how these criticisms could be addressed and/or tested.
2. *Determine* whether changes in species abundance can be a leading indicator of system-level regime shifts and an indication of the location of scale breaks within the scales of a system, and test the hypothesis that the location of species with the highest variance in abundance will be non-random.
3. *Develop* a new conceptual model of the relationship between biodiversity, scale and resilience that accounts for abundance and functional response diversity.
4. *Develop* a resilience framework for managers from a synthesis of our discussions and basic research.

To accomplish these goals we will convene a working group of international team of scientists working in a broad range of social-ecological systems. Working group meetings will be arranged to collaboratively address these tasks.

We have successfully completed two of the three working group meetings in Fort Collins, CO, at the USGS John Wesley Powell Center for Analysis and Synthesis. Numerous publications are being developed as a result of the analytical, data-driven focus of our first two meetings. An upcoming third and final meeting will focus on translating our work into a land-use management plan framework, which incorporates key elements of resilience theory and the cross-scale resilience model.

---

## WETLAND CONDITION ASSESSMENT

Principal Investigator(s): Craig R. Allen, Ted LaGrange (NGPC)  
Graduate Student(s): Nick Smeenck, Ph.D.  
Project Duration: August 2010 – May 2014  
Funding: Nebraska Game and Parks Commission  
U.S. Environmental Protection Agency (EPA)  
Project Location: Statewide Nebraska

---

Since 1867, Nebraska has lost nearly 35% of its wetland resources, which equates to a loss of over one million acres of wetlands across the state. As of 2005, only 3% of remaining wetlands in Nebraska were owned by state, federal, or other conservation and management organizations. Although the quantity of these wetlands is known, the quality of the remaining, privately owned wetlands is less well understood.

As an extension of the U.S. Environmental Protection Agency's (EPA) National Wetland Condition Assessment (NWCA), eleven wetland complexes will be visited, many in recognized Biologically Unique Landscapes, and wetland conditions will be measured in ten individual wetlands in each complex. One wetland in each complex will be what is considered the "reference standard" in terms of condition for wetlands in each complex, which provides a reference point to which other wetlands in that complex are compared. The data collection methods conform to those developed by the EPA, in which three levels of assessment are used to quantify wetland condition including landscape assessment, intensive on-site assessment focusing on vegetative, soil, and hydrologic characteristics and amphibian presence, and a rapid assessment method (USA-RAM) developed by the EPA.

The primary goal of this wetland condition assessment project is to quantify the condition of important wetland resources in Nebraska and aid in the development of wetland-specific, rapid assessment methods and state-wide wetland management strategies. The knowledge gained will be increasingly important as many federal and state easements protecting privately owned wetlands come to an end, allowing federal and state agencies to target areas of wetlands for protection where the most gains can be recognized.

Data collection began in April 2011. In the spring of 2011 and 2012, anuran call surveys were conducted to determine amphibian presence in 50 wetlands located in six wetland complexes (Eastern saline, Missouri River, Central Platte River, Cherry County, Elkhorn headwaters, and Rainwater Basins). During the summer of 2011, researchers conducted assessments at 12 wetland sites associated with the EPA's National Wetland Condition Assessment. In addition, during the summers of 2011–2013 researchers conducted wetland condition assessments at 109 wetland sites located across Nebraska.



**Walking to a remote sampling site**  
Photo: Craig Allen



**Establishing survey plots in the Sandhills**  
Photo: Craig Allen

---

## WIND AND WILDLIFE PROJECT

---

Principal Investigator(s): Craig R. Allen, Joseph J. Fontaine  
Coordinator: Caroline Jezierski  
Project Duration: March 2011 – February 2014  
Funding: Nebraska Game and Parks Commission  
Project Location: Statewide Nebraska  
Website: <http://snr.unl.edu/renewableenergy/wind/>

---

This project helps to mitigate negative impacts of wind energy development and operation on local flora and fauna by facilitating communication among stakeholders regarding wind power development, identifying and implementing priority research and monitoring efforts, and developing management tools and outreach and educational materials.

Eight questions related to wind energy development and wildlife resources were submitted to the 2012 Nebraska Annual Social Indicators Survey (NASIS) to learn more about Nebraskan's knowledge and perceptions of wind energy development and its potential impacts on wildlife resources. A total of 948 Nebraskans responded to the wind energy and wildlife questions. Results and reports are available on the Project website. Building off of the responses from the 2012 NASIS, the Project submitted five questions to the 2013 NASIS. The 2013 questions are more focused on individual species and landscapes of concern, wind energy regulations protecting wildlife in Nebraska, and mitigation for wind energy development and operation impacts on wildlife. Results from this survey will be available in the fall 2013.

A number of research projects related to wind energy and wildlife are currently being developed. The Nebraska Environmental Trust awarded a grant to study bat movements and migrations in eastern Nebraska (see the *Bat Movements across Transforming Landscapes* project page). Grant proposals for additional bat studies are being developed; other relevant research topics are being considered. Undergraduate student, Lukas Mullins, was awarded an Undergraduate Creative Activities and Research fellowship to study the potential impacts of wind energy developments on soil invertebrates. More information is available on the *Impacts of Wind Energy Development and Operation on Soil Invertebrates* project page.

Tools have been developed to educate stakeholders about wind energy and wildlife issues. The Nebraska Wind Energy and Wildlife Project website was developed and is frequently updated. More than 80 individuals from a diverse array of stakeholders are subscribed to the listserv developed to disseminate Nebraska wind energy and wildlife information. Emails sent out via the listserv approximately every two weeks contain Nebraska-specific information (including legislative bill updates) and nation-wide wind and wildlife news. Several informational handouts were developed including *Wind Energy Development and Wildlife in Nebraska*, *Bats of Nebraska*, *Navigating the Wildlife Consultation Process: Wind Energy in Nebraska*, *Nebraska Wind Conference: Wind – Wildlife Session Presenters 2012*, and *2012 Wind Energy and Wildlife Survey Results* for each Public Power District. An informational packet containing several Project fact sheets was sent to planning and zoning officials or clerks of the 93 counties and the 34 Rural Electric Associations of Nebraska. Outreach/education booths were set-up at several events intended for families and professionals. The coordinator was a guest lecturer for a number of university courses in Nebraska and Iowa. Links to the archived listserv messages, the electronic newsletter, the informational handout, and other project materials are on the Project website.

A number of guidance documents have been or are currently being updated and/or developed. The *Guidelines for Wind Energy and Wildlife Resource Management in Nebraska* were updated in early 2013. *Bat Assessment Guidance for Wind Energy Facilities in Nebraska* was developed and reviewed by a number of local and national bat and wind experts. Environmental language for a Request for Proposals for wind energy developments was modified and provided to public power districts. A template for Whooping Crane Contingency Plans was developed for use by wind energy companies interested in developing within the migratory corridor. A sub-group of the Nebraska Wind and Wildlife Working Group is developing mitigation recommendations for forthcoming wind energy developments. All of these documents have been developed with input from a variety of stakeholders.

## PROFESSIONAL ACTIVITIES

---

### TEACHING

---

#### CRAIG ALLEN

##### Spring 2013: Foundations of Ecological Resilience

This course introduced students to the concept of resilience, especially ecological resilience. Students explored both theoretical and applied aspects of ecological resilience, and the development of resilience theory. To further explore these concepts, students developed and completed a project focusing on resilience; the exact nature of the project varies according to the student cohort. By the conclusion of the course students were familiar with a number of prominent issues in resilience theory, its development and application.

#### JOSEPH FONTAINE

##### Spring 2013: Adaptive Natural Resource Management

This course introduced students to the concepts of structured decision making and adaptive management, but in doing so the course explored the history of natural resource management and the various management paradigms that have and continue to dominate resource management. At the completion of this course students were able to have an understanding of the theory and practice of adaptive management as well as an understanding of why we continue to move toward a more transparent and scientific methodology of natural resource management.

#### KEVIN POPE

##### Spring 2013: Managed Aquatic Systems

This course, team-taught with Mark Pegg (UNL SNR), was designed to increase students' understanding of ecological processes that occur in regulated river basins and associated problems or opportunities that arise with fishery management. The focus was primarily on fishes and understanding how structure, process and function of aquatic systems are influenced by human activities. A unique aspect of this course is the presence of both professors in the classroom; that is, this course is truly team-taught, providing students the formal opportunity to interact with two faculty members that have differing experiences and sometimes differing opinions.

#### NICHOLAS SMEENK

##### Fall 2012: Introduction to Agricultural and Natural Resource Systems

Teaching assistant for a NRES 103 recitation section. The course explores the interrelationship and the impact of increased human involvement on agricultural and natural resource systems.

---

### GRADUATE COMMITTEE SERVICE

---

#### CRAIG ALLEN

- Didier Baho (Ph.D., Aquatic Sciences and Assessment, Swedish University of Agricultural Sciences, Uppsala)
- Christina Hoffman (Ph.D., School of Natural Resources, UNL) (Graduated May 2013)
- Wayne Ohnesorg (Ph.D., Entomology, UNL)
- Katilyn Price (M.S., School of Natural Resources, UNL)
- P. Shrestha (Ph.D., Agricultural Economics, UNL)
- Trisha Spanbauer (Ph.D., Earth and Atmospheric Sciences, UNL)
- Bruce Stephen (Ph.D., School of Natural Resources, UNL)
- Chris Wood (MS, Biology, University of Nebraska Omaha)

#### JOSEPH FONTAINE

- Jason DeBoer (M.S., School of Natural Resources, UNL)
- Robert Kill (M.S., School of Natural Resources, UNL)
- Irina Skinner (M.S., Wildlife Ecology and Conservation, University of Florida)

#### KEVIN POPE

- Martin Hamel (Ph.D., School of Natural Resources, UNL)
- Jeremy Hammen (Ph.D., School of Natural Resources, UNL)
- Matthew Haugen (M.S., School of Natural Resources, UNL)
- Nicholas Hogberg (M.S., School of Natural Resources, UNL)
- Lindsey Messinger (M.S., School of Natural Resources, UNL)
- Mathew Rugg (M.S., School of Natural Resources, UNL)
- Shana Sundstrom (Ph.D., School of Natural Resources, UNL)
- Kirk Steffensen (M.S., School of Natural Resources, UNL) (Graduated December 2012)

---

#### PROFESSIONAL AND FACULTY SERVICE

---

#### CRAIG ALLEN

- Core Team, National Socio-Environmental Synthesis Center, “Social-Ecological System Resilience, Climate Change and Adaptive Water Governance” [The Resilience and Law Project]
- Invited Policy Forum paper, *Science*
- Invited Feature paper (Ph.D. student D. Uden, first author), *Journal of Soil and Water Conservation*. 2013
- Program Committee, 2013 Global Water for Food Conference: Too Hot, Too Wet, Too Dry: Building Resilient Agroecosystems
- Guest Editor, *Ecological Applications*. Contribution of reserves to regional resilience
- Appointed, Core Advisory Group, Collaborative Adaptive Management Network (2012–present)
- Nominated and Awarded, The August T. Larsson Guest Researcher Programme—2012 and 2013, Swedish University of Agricultural Sciences, Uppsala, Sweden
- Co-organizer, special feature for the *Journal Ecology and Society* “Law and social-ecological resilience,” published 2013
- Program Committee, Soil and Water Conservation Society—Adaptive Management Technical Lead. 2011–2013
- Associate editor, *Ecology and Society*

#### KEVIN POPE

- Associate Editor, *Transactions of the American Fisheries Society*
- Book Editorial Advisory Board, American Fisheries Society
- Graduate Committee, UNL School of Natural Resources

#### JOSEPH FONTAINE

- Awards Committee, American Ornithological Union
- Assistant Secretary, Cooper Ornithological Society
- Book Review Editor, *Condor*
- Student Presentation Awards Committee, Cooper Ornithological Society
- Scientific Committee, Nebraska Partnership for All-Bird Conservation
- Scientific Committee, Nebraska Natural Legacy Plan
- Adaptive Management Plan Creative Team, Nebraska Natural Legacy Plan
- Technical Committee, Rainwater Basin Joint Venture

---

#### OTHER PROFESSIONAL SERVICE

---

#### HANNAH BIRGÉ

- Elementary Outreach Coordinator for the School of Natural Resources’ Graduate Student Association
- Team leader, video and poster presentation for the 2013 NSF IGERT online poster competition

CHRIS CHIZINSKI

- Vice-chair, Postdoc Advisory Council in the spring 2013
- Chair, Postdoc Advisory Council in the fall 2013

KENT FRICKE

- At-Large Board Member, Nebraska Chapter of The Wildlife Society, 2013–2015
- Student Liaison, The Wildlife Society Council
- Chair, Student Development Working Group, The Wildlife Society
- Chair, Participant Agenda Subcommittee, Leadership Institute Committee, The Wildlife Society

KARIE DECKER

- Working group member, Zorinsky Lake Zebra Mussel Task Force
- Expert witness, Nebraska Legislative Session

VALERIE EGGER

- Graduate Student Handbook Committee, UNL School of Natural Resources
- Editor, USGS *Coop Catch-up* newsletter

CAROLINE JEZIERSKI

- Planning Committee, National Wind Coordinating Collaborative Wind Wildlife Research Meeting IX
- Nomination Committee, Renewable Energy Working Group, The Wildlife Society
- Planning assistance, Nebraska Wind Conference 2012
- Planning Committee, Renewable Energy Working Group Symposium, The Wildlife Society 2013 Annual Meeting
- Peer-review for scientific publications

RODNEY VERHOEFF

- Nebraska Representative Alternate, Mississippi River Basin Panel on Aquatic Nuisance Species
- Nebraska Representative Alternate, Western Regional Panel on Aquatic Nuisance Species
- Board Member, Nebraska Weed Management Area Coalition
- Monthly Meeting Facilitator/Organizer, Nebraska Invasive Species Council

---

## TRAINING ASSISTANCE, WORKSHOPS AND OUTREACH ACTIVITIES

---

CARYL CASHMERE

- Presenter. UNL Forms and Processes. Statewide Creel Clerk Workshop, March 2013. Lincoln, NE.

CHRISTOPHER CHIZINSKI

- Planning coordinator. Statewide Creel Clerk Workshop, March 2013. Lincoln, NE.
- Co-Instructor. Motorboat Operators Certification Course (MOCC), April 2013. Lincoln, NE
- Co-Instructor. Over-the-water training course, April 2013. Lincoln, NE.
- Co-Instructor. Over-the-water training course, March 2013. Lincoln, NE
- Co-Instructor. Over-the-water training course, November 2012. Lincoln, NE.

VALERIE EGGER

- Presenter. UNL Forms and Processes. Nebraska Invasive Species Project Technician Workshop and Inspection Training, May 2013. Lincoln, NE.

JOSEPH (TJ) FONTAINE

- Co-Instructor. Over-the-water training course, April 2013. Lincoln, NE.

KENT FRICKE

- Co-chair, “Behind the Scenes of Scientific Publication and Critical Review” Workshop at The Wildlife Society’s 2012 Annual Conference in Portland, Oregon.

- EnvironMentors/Upward Bound Co-Mentor. University of Nebraska–Lincoln, 2011–2013.
- Opportunities for Student Involvement in The Wildlife Society.
- Opportunities for Student Involvement in The Wildlife Society. Student-Professional Workshop. Nebraska Chapter of The Wildlife Society Annual Meeting. Chadron, NE.
- Student opportunities in The Wildlife Society. University of Nebraska–Lincoln Student Chapter of The Wildlife Society. Lincoln, NE.

#### NOELLE (CHAINE) HART

- Education/Outreach. Teaching the 5 senses, McPhee Elementary School, November 2012. Lincoln, NE.
- Mentor. Fulbright Canada-RBC Eco-Leadership Program Project: Land in Focus-connecting community to the land through nature photography and inter-generational storytelling, June 2013. Lincoln, NE.

#### CAROLINE JEZIERSKI

- Guest Lecturer. Wind Energy Development & Wildlife – Striving for Co-existence. Creighton University Environmental Science Senior Seminar, September 2012. Omaha, NE.
- Outreach/Education Booth . Nebraska Wind Energy and Wildlife Project, Annual Nebraska Cooperative Fish and Wildlife Research Unit Coordinating Meeting, September 2012. Lincoln, NE.
- Guest Lecturer. Wind Energy Development & Wildlife – Striving for Co-existence. Iowa State University Wind Energy Science, Engineering, and Policy (WESEP) IGERT class (EE 594 W). October 2012. Lincoln, NE (taught remotely to Ames, IA).Presentation – The Nebraska Game and Parks Legacy Program Meeting, October 2012. North Platte, NE.
- Outreach/Education Booth. The Nebraska Natural Legacy Project Meeting, October 2012. North Platte, NE.
- Outreach/Education Booth. Climate Change and Clean Energy Solutions Forum, October 2012. Lincoln, NE.
- Moderator, Session Planner, Outreach/Education Booth. The Nebraska Wind Conference, October 2012. Lincoln, NE.
- Guest Lecturer. Wind Energy Development & Wildlife—Striving for Co-existence. University of Nebraska – Lincoln Environmental Planning and Policy class (CRPL 470/870), November 2012. Lincoln, NE.
- Guest Lecturer. Wind Energy Development & Wildlife—Striving for Co-existence. University of Nebraska – Lincoln Wind Energy Systems class (ELEC 430), November 2012. Lincoln, NE.
- Outreach/Education Event. NaturePalooza, November 2012. Lincoln, NE.
- Poster. Nebraska Wind Energy and Wildlife Project: 2012 Public Survey Results. Midwest Fish & Wildlife Conference, December 2012. Wichita, KS.
- Outreach/Education Booth. The Rainwater Basin Joint Venture Annual Informational Seminar, February 2013. Hastings, NE.
- Outreach/Education Booth. Earth Wellness Festival, March 2013. Lincoln, NE.
- Outreach/Education Booth. Rivers and Wildlife Celebration, March 2013. Grand Island, NE.
- Poster. Nebraska Chapter of the Wildlife Society Annual Meeting, March 2013. Chadron, NE.
- Co-Instructor. Over Over-the-water training course, Kayak skills, March 2013. Lincoln, NE.
- Outreach/Education Booth. Lincoln Earth Day, April 2013. Lincoln, NE.
- Co-Instructor. Over Over-the-water training course, Kayak skills, April 2013. Lincoln, NE.
- Outreach/Education Event. 8th Grade Class Visit, May 2013. Lincoln, NE.
- Outreach/Education Booth. Green Revolution, Fontenelle Forest, Fall 2013. Bellevue, NE.
- Invited Presenter. The Nature Conservancy, Nebraska All-Staff Meeting, August 2013. Omaha, NE.
- Invited Presenter. The UNL Geography Seminar, September 2013. Lincoln, NE.

#### JESSICA LASKOWSKI

- Co-instructor. Lighthouse Youth Wildlife Workshop, November 2012. Lincoln, NE.

#### LINDSEY MESSINGER

- Co-instructor. Lighthouse Youth Wildlife Workshop, November 2012. Lincoln, NE.

#### KEVIN POPE

- Lead-Instructor. Motorboat Operators Certification Course (MOCC), April 2013. Lincoln, NE.
- Lead-Instructor. Over-the-water training course, May 2013. Lincoln, NE.
- Lead-Instructor. Over-the-water training course, April 2013. Lincoln, NE.
- Lead-Instructor. Over-the-water training course, March 2013. Lincoln, NE.
- Lead-Instructor. Over-the-water training course, November 2012. Lincoln, NE.

#### NICHOLAS SMEENK

- Association of Zoos and Aquariums' FrogWatch USA Chapter Coordinator Training Workshop, Vermillion, SD
- EPA Region VII Wetland Monitoring and Assessment Workshop, Kansas City, MO

#### BETHANY TEETERS

- Pollination and Pollinators, Pollinator Workshop, June 2013. Spring Creek Prairie, Denton, NE.
- "Macrophotography of Insects" for Land in Focus program with the Boys and Girls Club, June 2013.
- Information booth at Indian Cave Outdoor Adventure Day, May 2013. Falls City, NE.
- Pollinator Assemblages in Southeast Prairies Biologically Unique Landscape and Sandstone Prairies, Nebraska Natural Legacy Conference, November 2012. North Platte, NE.
- Bee Diversity in Nebraska Grasslands, Tallgrass Prairie Seminar, September 2012. Beatrice, NE.
- Guest presenter for two-week SOAR program (Summer Orientation about Rivers) by the Prairie Plains Resource Institute. July 2013.

#### DAN UDEN

- EnvironMentors/Upward Bound Co-Mentor. University of Nebraska-Lincoln, 2011-2013.

#### RODNEY VERHOEFF

- Presenter. Nebraska Lakes Association Annual Spring Conference, April 2013. Mahoney State Park, NE.
- Shared Educational/Outreach Booth. Earth Day Celebration, April 2013. Lincoln, NE.
- Presenter. Nebraska Attorney General's "Mind Over Mussels" Conference, May 2013. Ogallala, NE.
- Educational/Outreach Booth. University of Nebraska-Lincoln "Campus Connections" Network Event, May 2013. Lincoln, NE.
- Co-Instructor. Over-The-Water Training, May 2013. Lincoln, NE.
- Instructor. Nebraska Invasive Species Project Technician Workshop and Inspection Training, May 2013. Lincoln, NE.
- Host. University of Nebraska-Lincoln/College of Agricultural Sciences and Natural Resources Student-Parent Orientation, May 2013. Lincoln, NE.
- TV Show Segment Interviewee. Asian Carp in the Missouri River. KPTM-42 TV Station, June 2013. Omaha, NE.
- Website Segment Interviewee and Field Visit Guide. Invasive Species and Sustainability. Nebraska Educational Television, June 2013. Lincoln, NE.
- Presenter. Nebraska Game and Parks Commission Fisheries Management Annual Meeting, July 2013. Alma, NE.

#### CHRIS WILEY

- American Fisheries Society, Nebraska Chapter, Cornhusker Student Subunit: Treasures, 2012 – present.
- Nebraska Game and Parks Commission: Volunteer Fishing Instructor, September 2012 and May 2013.

---

#### PEER-REVIEWED PUBLICATIONS

---

- Allen, C. R., J. Fontaine, and A. Garmestani. 2012. Adaptive Management of Ecosystems. Pages 125-147 in *Encyclopedia of Sustainability Science and Technology*. Springer, New York, NY.
- Allen, C. R., A. S. Garmestani, and S. Sundstrom. 2012. Resilience. Pages 335-339 in *Encyclopedia of Sustainability*, Volume 5, Ecosystem Management and Sustainability. Berkshire Publishing Group, Great Barrington, MA.
- Allen, C. R., K. T. Nemecek, D. A. Wardwell, J. D. Hoffman, M. Brust, K. L. Decker, D. Fogell, J. D. Hoffman, J. Hogue, A. Lotz, T. Miller, M. Pummill, L. E. Ramirez-Yañez, and D. R. Uden. 2013. Predictors of regional establishment success and spread of introduced non-indigenous vertebrates. *Global Ecology and Biogeography* 22:889-899.
- Allen, C. R., D. G. Angeler, A. S. Garmestani, L. H. Gunderson and C. S. Holling. (in press). Panarchy: theory and application. *Ecosystems*.

- Angeler, D. G., C. R. Allen, and R. K. Johnson. 2012. Insight on invasions and resilience derived from spatiotemporal discontinuities of biomass at local and regional scales. *Ecology and Society* 17(2): 32. <http://dx.doi.org/10.5751/ES-04928-170232>.
- Angeler, D. G., C. R. Allen, and R.K. Johnson. 2013. Measuring the relative resilience of subarctic lakes to global change: redundancies of functions within and across temporal scales. *Journal of Applied Ecology* 50:572–584.
- Angeler, D., K. L. Pope, and C. R. Allen. 2013. Saliendo del círculo vicioso: Gestiones alternativas para garantizar la sostenibilidad de la pesca. *Revista Latinoamericana de Recursos Naturales* 8(2):76–89.
- Bajer, P. B., C. J. Chizinski, J. Silbernagel, and P. W. Sorensen. 2012. Variation in micro-predator abundance explains recruitment of a mobile invasive fish, the common carp, in a naturally unstable environment. *Biological Invasions* 14:9, 1919-1929. DOI: 10.1007/s10530-012-0203-3.
- Chaine, N. M., C. R. Allen, K. A. Fricke, D. M. Haak, M. L. Hellman, R. A. Kill, K. T. Nemeck, K. L. Pope, N. A. Smeenk, B. J. Stephen, D. R. Uden, K. M. Unstad, and A. E. Vanderham. 2013. Population estimate of Chinese mystery snail (*Bellamya chinensis*) in a Nebraska reservoir. *BioInvasions Records* 1(4):283–287.
- DeBoer, J. A., K. L. Pope, and K. D. Koupal. 2013. Environmental factors regulating the recruitment of walleye *Sander vitreus* and white bass *Morone chrysops* in irrigation reservoirs. *Ecology of Freshwater Fish* 22:43–54.
- Decker, K. L., C. R. Allen, L. Acosta, M. Hellman, C. Jorgensen, S. Rolfsmeier, G. Steinauer, R. Stutzman, K. Unstad, A. Williams, and M. Yans. 2012. Landuse, landscapes, and biological invasions. *Invasive Plant Science and Management* 5:108-116.
- Garmestani, A. and C. R. Allen. (2014, in press). *Social–Ecological Resilience and Law*. University of Columbia Press, New York, NY (-460pp).
- Garmestani, A. S., and C. R. Allen. 2013. Panarchy. In A. H. El-Shaarawi and W. W. Piegorsch, editors. *Encyclopedia of Environmetrics*. John Wiley and Sons, Ltd. Chichester, UK. Online.
- Garmestani, A., C. R. Allen, A. C. Arnold and L. H. Gunderson. (in press). Resilience and law, an introduction. In *Social–Ecological Resilience and Law*, Garmestani, A. S. and C. R. Allen, editors. Columbia University Press, New York, NY.
- Garmestani, A. S., C. R. Allen, and M. H. Benson. 2013. Can law foster social-ecological resilience? *Ecology and Society* 18(2):37. <http://dx.doi.org/10.5751/ES-05927-180237>.
- Garmestani, A. S., C. R. Allen, and C. S. Holling. 2013. Cross-scale morphology. In A. H. El-Shaarawi and W. W. Piegorsch, editors. *Encyclopedia of Environmetrics*. John Wiley and Sons, Ltd. Chichester, UK. Online.
- Garmestani, A., C. R. Allen, J. B. Ruhl and C. S. Holling. (in press). Integrating resilience and law. In *Social–Ecological Resilience and Law*, Garmestani, A. S. and C. R. Allen, editors. Columbia University Press, New York, NY.
- Haak, D. M., N. M. Chaine, B. J. Stephen, A. Wong, and C. R. Allen. 2013. Mortality estimate of Chinese mystery snail (*Bellamya chinensis*) in a Nebraska reservoir. *BioInvasions Records* 2:137–139.
- Hoover-Miller, A., A. Bishop, J. Prewitt, S. Conlon, C. Jezierski, and P. Armato. 2013. Efficacy of voluntary mitigation in reducing harbor seal disturbance. *Journal of Wildlife Management* 77(4):689–700.
- Jorgensen, C. F., R. J. Stutzman, L. Anderson, S. Decker, L. A. Powell, and J. J. Fontaine. (in press). Choosing a DIVA: a comparison of emerging digital imagery vegetation analysis techniques. *Applied Vegetation Science*.
- Kessler, A. C., J. W. Merchant, S. D. Shultz, and C. R. Allen. 2013. Cost-effectiveness analysis of sandhill crane habitat management. *Journal of Wildlife Management*. DOI: 10.1002/jwmg.587
- Kolasa, J., C. R. Allen, J. Sendzimir, and C. A. Stow. 2012. Predictions and retrodictions of the hierarchical representation of habitat in heterogeneous environments. *Ecological Modelling* 245: 199–207.
- Kowalewski, L. K., A. P. Maple, M. A. Pegg, and K. L. Pope. 2012. Latitudinal influence on age estimates derived from scales and otoliths for bluegills. *North American Journal of Fisheries Management* 32:1175–1179.
- Lotz, A., and C. R. Allen. Social-ecological predictors of invasions and extinctions. (in press). *Ecology and Society*.
- Martin, D. R., B. M. Pracheil, J. A. DeBoer, G. R. Wilde, and K. L. Pope. 2012. Using the internet to understand angler behavior in the Information Age. *Fisheries* 37:10, 458–463
- Mitchell, R., K. Vogel, and D. R. Uden. 2012. The feasibility of switchgrass for biofuel production. *Biofuels* 3(1):47–59.

- Myers, P. E., and C. R. Allen. (in press). Consuming fire ants reduces northern bobwhite survival and weight gain. *Journal of Agricultural and Urban Entomology*.
- Nash, K. L., C. R. Allen, D. Angeler, C. Barichiev, A. S. Garmestani, N. A. J. Graham, D. Granholm, M. Knutson, J. Nelson, M. Nyström, S. Riley, C. A. Stow and S. M. Sundstrom. (in press). Discontinuities, cross-scale patterns and the organization of ecosystems. *Ecology*.
- Nemec, K. T., C. R. Allen, C. J. Helzer, and D. A. Wedin. 2013. Influence of richness and seeding density on invasion resistance in experimental tallgrass prairie restorations. *Ecological Restoration* 31:168-185.
- Nemec, K. T., J. Chan, J. Hamm, C. Hoffman, T. Spanbauer, L. Acosta, C. Allen, T. Hefley, D. Pan, and P. Shrestha. (in press). Assessing resilience in stressed watersheds. *Ecology and Society*.
- Robertson, B. A., R. A. Rice, T. S. Sillett, C. A. Ribic, B. A. Babcock, D. A. Landis, J. R. Herkert, R. J. Fletcher, J. J. Fontaine, P. J. Doran, and D. W. Schemske. 2012. Are agrofuels a conservation threat or opportunity for grassland birds in the United States? *Condor* 114:679-688.
- Stephen, B. J., C. R. Allen, N. M. Chaine, K. A. Fricke, D. M. Haak, M. L. Hellman, R. A. Kill, K. T. Neme, K. L., Pope, N. A. Smeenk, D. R. Uden, K. M. Unstad, A. E. VanderHam, and A. Wong. 2013. Fecundity of the Chinese mystery snail in a Nebraska Reservoir. *Journal of Freshwater Ecology* DOI:10.1080/02705060.2013.769127.
- Sundstrom, S., C. R. Allen and C. Barichiev. 2012. Species, functional groups, and thresholds in ecological resilience. *Conservation Biology* 26:305-314.
- Turek, K. C., M. A. Pegg, and K. L. Pope. 2013. Review of the negative influences of non-native salmonids on native fish species. *Great Plains Research* 23:39-49.
- Uden, D. R., C. R. Allen, R. B. Mitchell, T. D. McCoy, and Q. Guan. (in press). Scenarios of bioenergy development impacts on regional groundwater withdrawals. *Journal of Soil and Water Conservation*.
- Uden, D. R., C. R. Allen, R. B. Mitchell, Q. Guan and T. D. McCoy. (in press). Potential contributions of a perennial bioenergy feedstock to groundwater conservation under scenarios of future change: *Journal of Soil and Water Conservation*.
- Uden, D. R., R. B. Mitchell, C. R. Allen, T. D., Q. Guan and T. D. McCoy. 2013. The feasibility of producing adequate feedstock for year-round cellulosic ethanol production in an intensive agricultural fuelshed. *Bioenergy Research*. DOI 10.1007/s12155-013-9311-x.
- Unstad, K. M., D. R. Uden, C. R. Allen, N. M. Chaine, D. M. Haak, R. A. Kill, K. L. Pope, B. J. Stephen, and A. Wong. 2013. Survival and behavior of Chinese mystery snails (*Bellamya chinensis*) in response to simulated water body drawdowns and extended air exposure. *REABIC Management of Biological Invasions* 4:123-127
- van Riper, C., J. W. van Wagtenonk, and J. J. Fontaine. (in press). Great gray owls (*Strix nebulosa*) in Yosemite National Park: On the importance of food, nesting snags, and human disturbance. *Natural Areas Journal*.
- Wilde, G. R., and K. L. Pope. 2013. Worldwide trends in fishing interest indicated by internet search volume. *Fisheries Management and Ecology*.
- Wong, A., C. R. Allen, N. M. Chaine, D. M. Haak, K. L. Pope, N. A. Smeenk, B. J. Stephen, and D. R. Uden. (in press). Enamel-based mark performance for marking Chinese mystery snails *Bellamya chinensis*. *Management of Biological Invasions*.

---

## PRESENTATIONS

---

- Allen, C. R. 2013. Resilience in working agricultural landscapes. Water for Food Annual Conference, Lincoln, NE. (invited presentation and panel member)
- Allen, C. R. 2012. Discontinuities and regime shifts. John Wesley Powell Center for Analysis and Synthesis, Fort Collins, CO.
- Allen, C. R., N. M. Chaine, K. A. Fricke, D. M. Haak, M. L. Hellman, R. A. Kill, K. T. Neme, K. L. Pope, N. A. Smeenk, B. J. Stephen, D. R. Uden, K. M. Unstad, A. E. VanderHam, and A. Wong. 2013. Solving mysteries of the snails. Nebraska Chapter of the American Fisheries Society Annual Meeting, Gretna, NE. (invited and best presentation award)

- Birgé, H., M. Sliwinski, K. Nemeč, T. Spanbauer, N. Hart, J. Chan, J. A. Hamm, C. Hoffman, L. Acosta, C. R. Allen, T. Hefley, D. Pan, and P. Shrestha. 2013. Operationalizing resilience: A rapid approach to socialecological system assessment. NSF IGERT 2013 National Video & Poster Competition, online.
- Birgé, H., M. Sliwinski, K. Nemeč, T. Spanbauer, N. Hart, J. Chan, J. A. Hamm, C. Hoffman, L. Acosta, C. R. Allen, T. Hefley, D. Pan, and P. Shrestha. 2013. Operationalizing resilience: A rapid approach to socialecological system assessment. Water for Food Annual Conference, Lincoln, NE.
- Chaine, N. M., C. R. Allen, K. A. Fricke, K. Stoner, and S. Taylor. 2012. Completing the adaptive management cycle - Learning from actions and results. Nebraska Natural Legacy Project Annual Conference, North Platte, NE.
- Chizinski, C. J., C. G. Huber, D. R. Martin, and K. L. Pope. 2013. Influence of emergency drawdown on angling at Red Willow Reservoir. Nebraska Chapter of the American Fisheries Society, Gretna, NE (poster).
- Corral, L., L. A. Powell, T. J. Frink, S. Wilson, J. J. Fontaine. 2013. Canid community composition and distribution across Nebraska. Nebraska Chapter of the Wildlife Society, Chadron, NE.
- Fontaine, J. J. 2012. Changing climates and changing landscapes: A migrant bird's dilemma. Biology Department Seminar, University of South Dakota, Vermillion, SD.
- Fontaine, J. J., C. Gillespie, and R. J. Stutzman. 2013. The interplay of climate and land-use change: Implications for a long distance migrant. Rainwater Basin Joint Venture Informational Seminar, Hastings, NE.
- Fricke, K. A., C. R. Allen, J. J. Fontaine, S. Taylor, R. Schneider, and K. Stoner. 2012. Implementing adaptive management at alternative scales: Opportunities lost?. Midwest Fish and Wildlife Conference, Wichita, KS.
- Fricke, K. A., C. R. Allen, J. J. Fontaine, S. Taylor, R. Schneider, S. Wessel, T. Smydra, R. Jessen, S. D. Rasmussen, and K. Stoner. 2013. Applying adaptive management to invasive species. Nebraska Chapter of The Wildlife Society Annual Conference, Chadron, NE. (poster)
- Fricke, K. A., C. R. Allen, J. J. Fontaine, S. Taylor, R. Schneider, S. Wessel, T. Smydra, R. Jessen, S. D. Rasmussen, and K. Stoner. 2012. Applying adaptive management to invasive species. Nebraska Natural Legacy Conference, North Platte, NE. (poster).
- Gillespie, C. and J. J. Fontaine. 2013. Habitat decisions in altered landscapes: behavioral and physiological consequences for long-distance migrants. Nebraska Chapter of the Wildlife Society, Chadron, NE.
- Haak, D. M., B. J. Stephen, N. M. Chaine, K. L. Decker, D. R. Uden, C. R. Allen, V. E. Forbes, and K. L. Pope. 2013. Moving faster than a snail's pace: trends and consequences of invasive freshwater snails. 18th International Conference on Aquatic Invasive Species, Niagara Falls, Ontario, CA (poster).
- Hurley, K. L., C. J. Chizinski, D. R. Martin, and K. L. Pope. 2012. When creel limits change, size matters. Midwest Fish and Wildlife Conference, Wichita, Kansas.
- Jeziarski, C. M. 2012. Nebraska Wind Energy and Wildlife Project. Nebraska Natural Legacy Project Meeting, North Platte, NE.
- Jeziarski, C. M. 2012. Nebraska Wind Energy and Wildlife Project: 2012 Public Survey Results. Nebraska Chapter of The Wildlife Society Annual Meeting, Chadron, NE. (poster).
- Jeziarski, C., C. Allen, M. Koch, J. J. Fontaine, T. McCoy Nebraska Wind Energy and Wildlife Project. 2012. 73rd Annual Meeting, Midwest Fish and Wildlife Conference, Wichita, KS (poster).
- Jorgensen, C. F. and J. J. Fontaine. 2013. If you build it will they come? Managing pheasants in tomorrow's landscapes. Pheasants Forever State Habitat Meeting, Kearney, NE.
- Jorgensen, C. F., J. Holt, and J. J. Fontaine. 2013. Ring-necked pheasants in the Rainwater Basin: The past, present, and future prospects. Rainwater Basin Joint Venture Informational Seminar, Hastings, NE.
- Kowalewski, L. K., C. J. Chizinski, K. L. Pope, L. A. Powell, and M. A. Pegg. 2013. Influence of sampling design on accuracy and precision of point-count population estimates. Annual Meeting Nebraska Chapter of American Fisheries Society, Gretna, NE.
- Kowalewski, L. K., C. J. Chizinski, K. L. Pope, L. A. Powell, and M. A. Pegg. 2012. Influence of sampling design on accuracy and precision of point-count population estimates. 73rd Annual Meeting, Midwest Fish and Wildlife Conference, Wichita, KS (poster).
- Laskowski, J. and J. J. Fontaine. 2013. Hen pheasant reproduction in response to current management actions. Pheasants Forever State Habitat Meeting, Kearney, NE.
- Martin, D. R. and K. L. Pope. 2013. Defining a regional fishery using network theory. 19th International Symposium on Society and Resource Management, Estes Park, CO.

- Martin, D. R., L. N. Messinger, J. J. Fontaine, and K. L. Pope. 2012. Temporal trends in hunting and angling participation in the United States. Midwest Fish and Wildlife Conference, Wichita, KS.
- Martin, D. R., L. N. Messinger, J. J. Fontaine, and K. L. Pope. 2013. Temporal trends in hunting and angling participation in the United States. Nebraska Chapter of the American Fisheries Society, Gretna, NE.
- Messinger, L. and J. J. Fontaine. 2013. Pheasant behavioral responses to hunting pressure and current management actions. Pheasants Forever State Habitat Meeting, Kearney, NE.
- Messinger, L. N. and J. J. Fontaine. 2013. Pheasant Behavioral Responses to Hunting Pressure and Management Actions. Nebraska Chapter of the Wildlife Society, Chadron, NE.
- Smeenck, N. A., T. LaGrange, C. R. Allen. 2013. Wetland assessment of Eastern Saline wetlands. Nebraska's Eastern Saline Wetlands – Informational Seminar. Lincoln, NE.
- Smeenck, N. A., T. LaGrange, C. R. Allen. 2013. Nebraska intensification project: an ecological assessment of Nebraska's wetlands. Rainwater Basin Joint Venture 18th Annual Informational Seminar, Hastings, NE.
- Smeenck, N., T. LaGrange, C. Allen. 2013. Nebraska's wetland assessment intensification study as part of the EPA National Wetland Condition Assessment Project. Annual Meeting of the Society for Wetland Scientists, Duluth, MN.
- Smeenck, N. A. and W. M. Roosenburg. 2013. The Population Ecology of a headstart supplemented population of diamondback terrapins (*Malaclemys terrapin*) at the Poplar Island Environmental Restoration Project in the middle Chesapeake Bay. Annual Dakota Amphibian and Reptile Network Meeting, Vermillion, SD.
- Teeters, B. and C. R. Allen. 2012. Pollinator assemblages in southeast prairies biologically unique landscape and sandstone prairies, Nebraska Natural Legacy Conference, North Platte, NE.
- Teeters, B. S., C. R. Allen, and C. Helzer. 2013. Bee diversity and functional composition in grassland habitats of the tallgrass prairie. International Conference on Pollinator Biology, Health and Policy, State College, PA (poster).
- Uden, D. R., C. R. Allen, R. Mitchell, T. McCoy and Q. Guan. 2012. Predicted avian responses to biofuel-based landuse change in Nebraska's Rainwater Basin. Nebraska Natural Legacy Conference, North Platte, NE.
- Uden, D. R., C. R. Allen, and C. F. Jorgensen. 2012. Predicting variation in springtime playa inundation in Nebraska's Rainwater Basin. Rainwater Basin Joint Venture Brown-bag lunch session, Grand Island, NE.
- Uden, D. R., C. R. Allen, T. McCoy, R. Mitchell, and Q. Guan. 2012. Predicted avian responses to biofuel-based landuse change. Midwest Fish and Wildlife Conference, Wichita, KS.
- Uden, D. R., C. F. Jorgensen, and C. R. Allen. 2013. Predicting variation in springtime playa inundation in Nebraska's Rainwater Basin. Rainwater Basin Joint Venture Annual Informational Seminar, Hastings, NE.
- Webber, C., A. Burgin, K. Jarecke, V. Shoepfer, and N. Smeenck. 2013. Incorporating biogeochemical function and recovery time into restored wetland valuation. Society of Wetland Scientists Conference, Duluth, MN (poster).
- Wiley, C. L., C. J. Chizinski, D. R. Martin, and K. L. Pope. 2013. Does the species-sought characteristic describe catch and harvest? Nebraska Chapter of the American Fisheries Society annual meeting, Gretna, NE (poster).
- Wiley, C. L., C. J. Chizinski, D. R. Martin, and K. L. Pope. 2012. Does the species-sought characteristic describe catch and harvest? Midwest Fish and Wildlife Conference, Wichita, KS (poster).
- Wiley, C. L., D. R. Martin, C. J. Chizinski, and K. L. Pope. 2012. Species caught and harvested by species-sought angler groups. Midwest Fish and Wildlife Conference, Wichita, KS. (poster)
- Wiley, C. L., D. R. Martin, and K. L. Pope. 2013. Size structures of channel catfish caught with terminal tackle and hoop nets. Nebraska Chapter of the American Fisheries Society annual meeting, Gretna, NE (poster).
- Wiley, C. L., D. R. Martin, and K. L. Pope. 2013. Size structures of channel catfish caught with terminal tackle and hoop nets. Southern Division of the American Fisheries Society spring meeting, Nashville, TN.
- Wong, A., D. M. Haak, C. R. Allen, N. M. Chaine, K. A. Fricke, M. L. Hellman, R. A. Kill, K. L. Pope, B. J. Stephen, D. R. Uden, and K. M. Unstad. 2012. Thermal limits of the Chinese mystery snail (*Bellamya chinensis*): acute upper and chronic lower lethal limits. Midwest Fish and Wildlife Conference, Wichita, KS.

---

We extend our appreciation to the staff and students of the Nebraska Cooperative Fish and Wildlife Research Unit, University of Nebraska–Lincoln, U.S. Fish and Wildlife Service and USGS for photographs and art work.





