

ANNUAL REPORT OCT 2022 - SEPT 2023

NEBRASKA COOPERATIVE

FISH & WILDLIFE RESEARCH UNIT



We extend our appreciation to the staff and students of the
Nebraska Cooperative Fish and Wildlife Research Unit,
University of Nebraska–Lincoln for photographs and images.

Production & Layout Design: Donna Robinson

Cover: Turkey project in western Nebraska.
Photo: Justin Haag, Nebraskaland Magazine

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NEBRASKA COOPERATIVE

FISH & WILDLIFE RESEARCH UNIT



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Tyree Brown and Becca Cusick setting up camera traps for tukey in the southwest Nebraska.

Photo: Katie Hickle

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PROGRAM DIRECTION

Endorsed by the NECFWRU Executive Coordinating Committee, September 2020

The Nebraska Cooperative Fish and Wildlife Research Unit (NECFWRU) is committed to developing future natural-resource managers and researchers through graduate education, doing innovative and novel research that is interdisciplinary and cross-boundary in support of the North American Model of Wildlife Conservation, and enhancing cooperator capabilities through technical assistance on state-of-the-art science practices.

Teaching within NECFWRU includes formal classes, small groups, and one-on-one interactions, and emphasizes active-learning approaches that empower students to take responsibility for their life-long educational journey.

Research within NECFWRU addresses the expressed information needs of the citizens of Nebraska and the United States of America, especially to better understand natural systems and how socioecological processes are altered by disturbances and management actions.

Assistance within NECFWRU occurs frequently in both informal and formal settings, and is meant to provide advice and training on cooperator needs including discussions of their science questions, study-design considerations, and training.

The diversity of landscapes and subsequent diverse fish-and-wildlife resources in Nebraska requires NECFWRU to champion a broad focus for graduate education, applied research, and technical assistance. Fishery and wildlife management, landscape ecology, and social and ecological resilience will be emphasized, with intent of complementing and strengthening existing foci of land-grant universities, state and federal natural-resource agencies, and non-government organizations centered on natural resources.



Sun rising on Fort Robinson State Park.

Photo: Kevin Pope



NECFWRU and Students.
Photo: Joe Spooner

PERSONNEL & COOPERATORS



UNIT PERSONNEL

Staff – U.S. Geological Survey, Cooperative Research Units Program

Kevin Pope, Unit Leader

Sarah Sonsthagen, Assistant Unit Leader Wildlife

Jonathan Spurgeon, Assistant Unit Leader Fisheries

Vacant, Assistant Unit Leader Ecology

Administrative Staff – University of Nebraska–Lincoln

Jessica Collins
Unit Staff Assistant

Gregory Brinkman
GIS Specialist I
Rainwater Basin Joint Venture

Donna Robinson
Unit Administrative Assistant

Vacant
Science Coordinator
Rainwater Basin Joint Venture

Vacant
Coordinator
Angler Survey Project

Vacant
Coordinator
Nebraska Invasive Species Council

Research Staff – University of Nebraska–Lincoln

Sylas Abarr

Becca Cusick

Alyssa Noble

Logan Waters

Tyree Brown

Ella Humphrey

Draven Ray

Jade Wawers

Wyatt Burgess

Kayli Newkirk

Bryce Ryker

GRADUATE DEGREE CANDIDATES

Doctor of Philosophy

Katie Hickie
School of Natural Resources
January 2023 – present

Deepika Garugu
School of Natural Resources
January 2023 – present

Jenna Ruoss
School of Natural Resources
January 2022 – present

Master of Science

Brett Anderson
School of Natural Resources
January 2023 – present

Connor Hart
School of Natural Resources
August 2021 – present

Braxton Newkirk
School of Natural Resources
August 2022 – present

Matthew Armstrong
School of Natural Resources
August 2022 – present

Caroline LaPlante
School of Natural Resources
August 2021 – present

Christopher Pullano
School of Natural Resources
January 2022 – present

Robyn Dausener
School of Natural Resources
August 2023 – present

Blake Logan
School of Natural Resources
January 2022 – present

Joseph Spooner
School of Natural Resources
August 2021 – present

Kyle Hansen
School of Natural Resources
August 2021 – present

Jessi Urichich
School of Natural Resources
January 2022 – present

THESES AND DISSERTATIONS

Brandon J. Barlow, M.S., December 2022

Demographic Groups Differ in Urban Recreational Behavior
University of Nebraska–Lincoln, Natural Resources. Advisor(s), Kevin Pope

Dillon T. Fogarty, Ph.D., December 2022

A Biome in Transition: Co-Produced Science for Grassland Conservation
University of Nebraska–Lincoln, Natural Resources. Advisor(s), Dirac Twidwell, Craig Allen



Graduate Brandon Barlow
Photo: Keith Hurley (NGPC)



Graduate Dillon Fogarty
Photo: Donna Robinson

COORDINATING COMMITTEE MEMBERS

Nebraska Game and Parks Commission

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Bill Moritz

Midwest Field Representative
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Fairfield, IA 52556

U.S. Geological Survey

Barry Grand

Regional Supervisor
Cooperative Research Units Program
Dadeville, AL 36853
(334) 200-8458

University of Nebraska–Lincoln

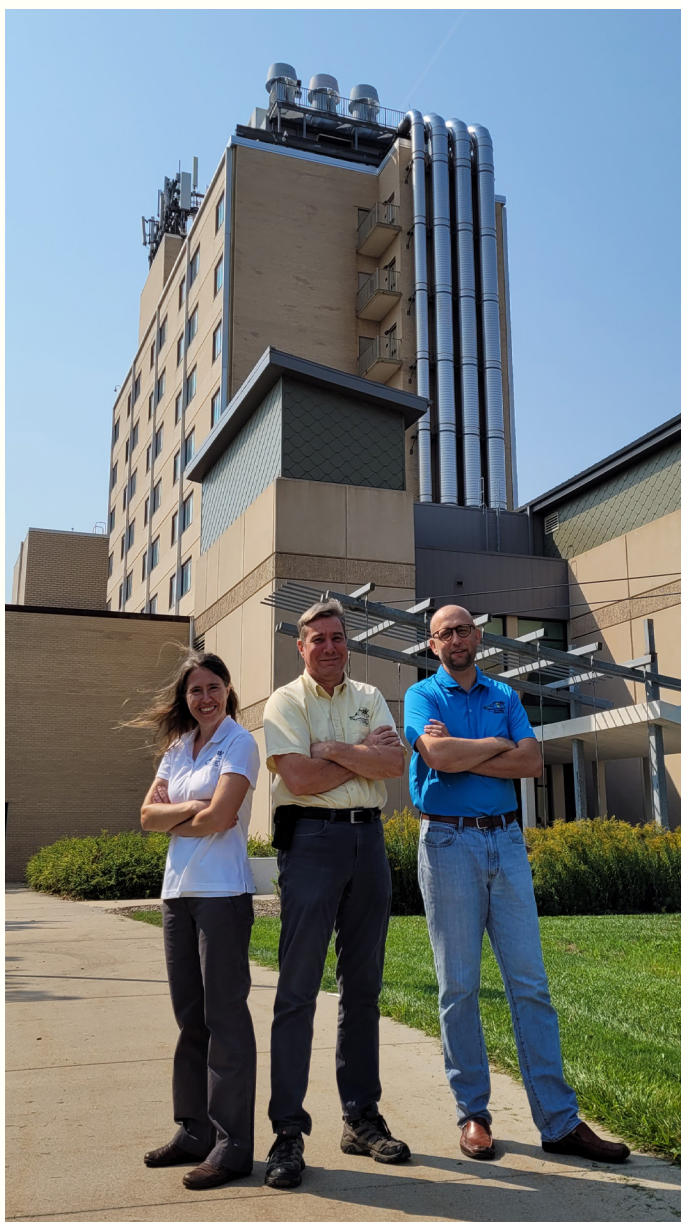
Mike Boehm

Vice Chancellor
Institute of Agriculture and Natural Resources
202 Agriculture Hall
Lincoln, NE 68583-0708
(402) 472-2871

U.S. Fish and Wildlife Service

John Carlson

Grassland Conservation Coordinator
Mountain–Prairie Regional Office
Billings, MT 59101
(406) 647-7043



Nebraska Cooperative Unit Leaders

Sarah, Kevin, Jonathan

Photo: Wilma Gerena

COOPERATING ORGANIZATIONS

*Alaska Department of Fish and Game
Threatened, Endangered, and Diversity
Program*

Arizona State University

Arkansas Game and Fish Commission

Arkansas State University

Association of Fish and Wildlife Agencies

Ball State University

Bellevue University

Bemidji State University

California State Land Commission

Canadian Forest Service

Northern Forestry Centre

Canadian Wildlife Service

Carleton University

Colorado State University

Cooperative Research Unit Program

*Arizona Cooperative Fish and Wildlife
Research Unit*

*Georgia Cooperative Fish and Wildlife
Research Unit*

*Idaho Cooperative Fish and Wildlife
Research Unit*

*Massachusetts Cooperative Fish and Wildlife
Research Unit*

*Mississippi Cooperative Fish and Wildlife
Research Unit*

*Missouri Cooperative Fish and Wildlife
Research Unit*

*Oklahoma Cooperative Fish and Wildlife
Research Unit*

*Oregon Cooperative Fish and Wildlife
Research Unit*

*South Dakota Cooperative Fish and Wildlife
Research Unit*

*New York Cooperative Fish and Wildlife
Research Unit*

*Pennsylvania Cooperative Fish and Wildlife
Research Unit*

*Vermont Cooperative Fish and Wildlife
Research Unit*

Cornell University

Dalhousie University

Dartmouth College

*Department of Environment, Food and Rural
Affairs, United Kingdom*

Ducks Unlimited

Eckerd College

*Environment and Climate Change Canada
Canadian Wildlife Service*

Fisheries and Oceans Canada

Florida Fish and Wildlife Conservation Commission

Government of Western Australia

Humboldt Universitat, Berlin, Germany

Institute of Marine Sciences, Spain

Iowa Department of Natural Resources

Iowa State University

Kansas Department of Wildlife and Parks

*Leibniz-Institute of Freshwater Ecology and
Inland Fisheries*

Louisiana State University

Loyola University

Michigan Department of Natural Resources

Michigan State University

Minnesota Department of Natural Resources

Mississippi State University

Murdoch University, Australia

National Oceanic and Atmospheric Administration

Nebraska Department of Agriculture

Nebraska Department of Environment and Energy

Nebraska Department of Transportation

Nebraska Forest Service

Nebraska Game and Parks Commission

Nebraska Invasive Species Council

Nebraska Natural Resources Districts

Nebraska Public Power District

Nebraska Weed Control Association

Norwegian Institute for Nature Research

*Ontario Ministry of Mines, Northern Development,
and Natural Resources and Forestry*

Oregon State University

Platte River Recovery Implementation Program

Platte River Whooping Crane Maintenance Trust

Potsdam University, Germany

Queens University, Canada
Rainwater Basin Joint Venture Partnership
Rhodes University, South Africa
Sea Duck Joint Venture
Simon Fraser University, Canada
Technical University of Denmark
Tel Aviv University, Israel
Texas A&M University
Texas Parks and Wildlife Department
The Nature Conservancy
The University of Southern Mississippi
The University of Queensland, Australia
The University of Western Australia
Trent University, Canada
Turner Enterprises, Inc.
Universidad Autónoma del Estado de Morelos
University of Alaska-Anchorage
University of Alaska-Fairbanks
University of Alberta
University of Arkansas at Pine Bluff
University of Calgary
University of Exeter, United Kingdom
University of Florida
University of Georgia

University of Glasgow
University of Illinois-Champaign
University of Massachusetts
University of Minnesota
Sea Grant Program
University of Nebraska at Kearney
University of Nebraska at Omaha
University of Nebraska-Lincoln
Bureau of Sociological Research
Center for Resilience in Agricultural
Working Landscapes
College of Engineering
Daugherty Water for Food Institute
Nebraska Water Center
Nebraska State Museum
Platte Basin Timelapse
School of Biological Sciences
School of Natural Resources
University of Maryland
University of New Brunswick
University of North Dakota
University of Santiago de Compostela, Spain
University of South Bohemia, Czech Republic
University of Tasmania, Australia



Early morning mist off the Platte river.
Photo: Blake Logan

University of Technology Sydney, Australia
University of Texas at El Paso
University of Toronto, Canada
University of West Florida
University of Wisconsin-Madison
University of Wyoming
Uppsala University, Sweden
U.S. Department of Agriculture
 Animal and Plant Health Inspection Service
 Natural Resources Conservation Service
 U.S. Forest Service
U.S. Department of Defense
 U.S. Air Force
 Offutt Air Force Base
 U.S. Army Corps of Engineers
U.S. Department of Interior
 U.S. National Park Service
 Homestead National Monument of America
U.S. Fish and Wildlife Service
 Alaska Region
 Aquatic Nuisance Species Task Force
 Atlantic Region
 Marine Mammals Management
 Migratory Bird Management

Northeast Region
Science Applications and Migratory
 Bird Program
Valentine National Wildlife Refuge
Wildlife and Sport Fish Restoration
U.S. Geological Survey
 Alaska Science Center
 Fort Collins Science Center
 National Climate Adaptation Science
 Center
 Northern Prairie Wildlife Research Center
 Patuxent Wildlife Research Center
 Science Support Partnership
 Upper Midwest Environmental Sciences
 Center
U.S. Environmental Protection Agency
 U.S. Government Accountability Office
 Virginia Polytechnic Institute and State
 University
Wageningen University, The Netherlands
Washington Department of Natural Resources
Washington State University
Wyoming Game and Fish Department





Chris Pullano holding a female pallid sturgeon.
Photo: Jenna Ruoss

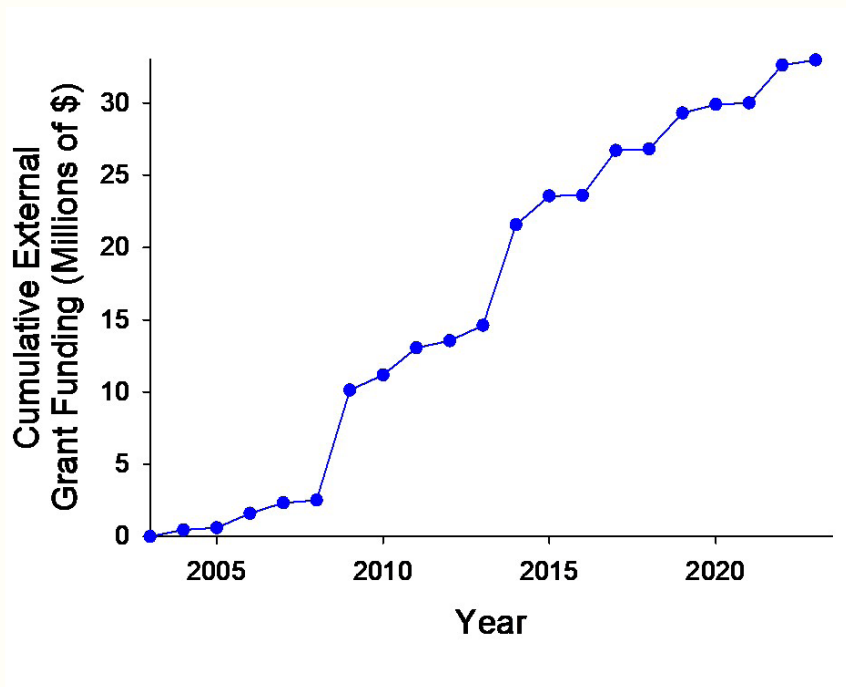
MILESTONES & HIGHLIGHTS



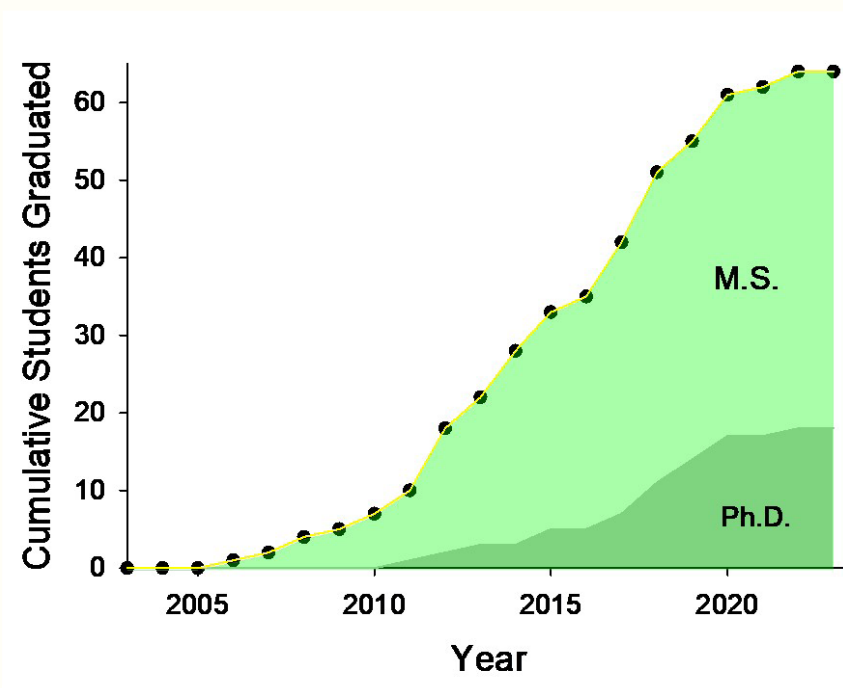
ACHIEVEMENTS

Scientists Continue to Successfully Secure External Dollars in Support of Graduate Education and Applied Research

Since establishment in 2004, the Nebraska Cooperative Fish and Wildlife Research Unit has secured over \$30 million in external funding. That is an average of over \$1.5 million generated per year.



Educators Continue to Successfully Advise Graduate Students Toward Completion of Their Graduate Programs



Since establishment in 2004, the Nebraska Cooperative Fish and Wildlife Research Unit has graduated 46 M.S. students and 18 Ph.D. students. That is an average of 3 students graduating per year.

RECOGNITIONS

Best Student Presentation Award

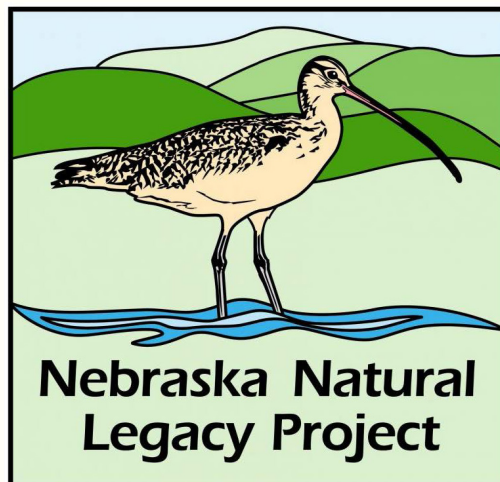


Joe Spooner presenting at AFS in Ponca.

Photo: Unknown

Joe Spooner received the Best Student Presentation Award at the 2023 Nebraska Chapter of the American Fisheries Society Meeting held at Ponca State Park.

Connor Hart received the Best Student Presentation Award at the 2022 Nebraska Natural Legacy Conference held at University of Nebraska, Chadron.



Considered for Outstanding Edited Book by The Wildlife Society

Harvest of Fish and Wildlife: New Paradigms for Sustainable Management, a book co-edited by Kevin Pope and Larkin Powell, was again listed as one of the top five titles considered by The Wildlife Society for outstanding edited book.



Kevin Pope and Larkin Powell

Photo: Kevin Pope

Golden Pillar Award

Golden Pillar Award

Aldo Leopold famously suggested that there are those among us that simply cannot live without the sights, sounds, and understanding of wild populations of fish and wildlife. As part of the mission of the Nebraska Cooperative Fish and Wildlife Research Unit, we also champion these sentiments and acknowledge that there are those among us that we depend on to further that message now and for future generations. The Nebraska Cooperative Fish and Wildlife Research Unit has a focus on graduate-research education centered on fishery and wildlife sciences. Most importantly, our Unit is a cooperative endeavor among a diverse array of individuals that enhance our ability to provide a world-class education to prepare students in a myriad of careers that support conservation and management of natural resources.

We recognize and appreciate that cooperator support is essential to conducting research and preparing students. Such cooperator support comes in many forms provided by an army of individuals. Even so, there are a select few supporters that go well beyond the call of duty. A tradition started by Nebraska Unit scientists in 2010, the Golden Pillar Award, honors and recognizes outstanding individuals who are “pillars of support”; their support is foundational to the success of the Nebraska Cooperative Fish and Wildlife Research Unit. Award recipients are recognized at our annual meeting, but their contributions are felt and appreciated each day.

This year we recognize three individuals who have worked endlessly to ensure continued success and relevancy of fish and wildlife research in Nebraska and on a world stage while also enhancing the contributions of the Nebraska Cooperative Fish and Wildlife Research Unit. It brings us great joy to award Dr. Larkin Powell, Dr. Mark Pegg, and Dr. Richard (Rick) Holland each the Golden Pillar Award.



Larkin Powell

Larkin (UNL) has risen through the ranks at the University of Nebraska-Lincoln because of his diligence and visionary approach to education and research. Throughout his career, Larkin has always been looked to for leadership. Larkin’s leadership has shaped the education of every student affiliated with the Nebraska Cooperative Fish and Wildlife Research Unit both directly and indirectly. Larkin’s work on developing and teaching methods to estimate fish and wildlife demographics has greatly enhanced the research capacity of students as well as provided management agencies with critical information to support decision making. In addition to technical support, Larkin is passionate about providing our graduate students with the moral support and encouragement to tackle big problems and think creatively.

Mark (UNL) is the students’ professor; no faculty member anywhere cares more about students than Mark. Mark has raised the standards for—and visibility of—the fisheries program at the University of Nebraska-Lincoln. In doing so, Mark has shaped the vision of the Nebraska Cooperative Fish and Wildlife Research Unit and shaped the career paths of many of our students, many of whom are now our collaborators. Mark has tirelessly engaged our students in formal



Mark Pegg

and informal settings to challenge perceptions and to think critically about the world around them (oftentimes without them knowing it) and to be passionate and responsible stewards of our natural resources. Every research project conducted by the Nebraska Unit regarding fisheries science has been enhanced by Mark's involvement.

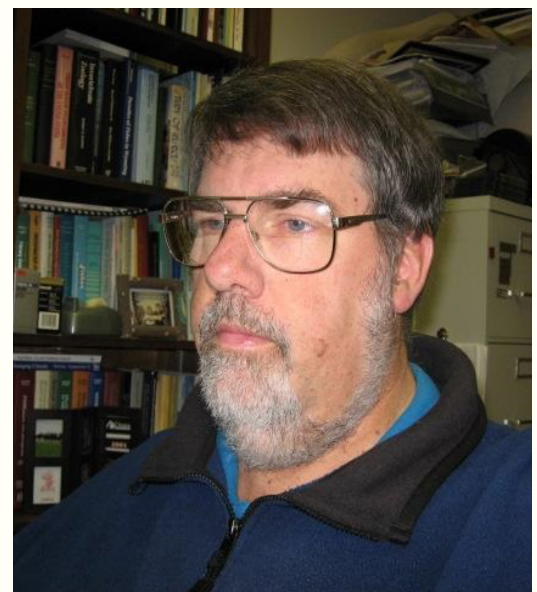
Rick (NGPC) is a quiet warrior, always in the background, and always thinking 4-6 "chess" moves ahead. Rick is one of the few remaining individuals that was there (he was a student at the time), and remembers well, when the "Nebraska Unit" was almost established in the 1980s (but became the Kansas Unit instead). Thankfully, dedicated folks like Rick continued to work toward the eventual establishment of the Nebraska Unit in 2004. Rick's greatest influence on the Nebraska Cooperative Fish and Wildlife Research Unit and fisheries research across Nebraska has been his long-term efforts to continually build capacity, both for research and graduate education.

Sometimes those efforts involved passionate speeches and lengthy written diatribes—always with a well-intentioned heart—about budgetary responsibilities or zooplankton dynamics (earning him the nickname Dr. Zoo). Rick's steady hand and unrelenting support for science and maintaining the rigors of the scientific process are clearly evident in each and every project conducted on sport fish and species of greatest conservation need.

Thanks Larkin, Mark, and Rick for your unwavering support, which we know will continue for many years to come! Larkin, Mark, and Rick join a distinguished list of supporters with a proven unwavering commitment to us and the education of tomorrow's conservation leaders. We take this opportunity to recognize our Golden Pillars, and to once again thank them publicly for their tireless support of the Cooperative Research Unit Program.

Golden Pillar Award recipients.

Year	Awardees
2010	John Owens
	Kirk Nelson
	Steve Riley
2015	Valerie Egger
2016	Donald (Don) Gabelhouse, Jr.
	Scott Taylor
2021	Jim Douglas
2022	Caryl Cashmere
	Wilma Gerena
2023	Larkin Powell
	Rick Holland
	Mark Pegg



Rick Holland



Measuring a flathead catfish.
Photo: Unknown

IDEA
EXCHANGE



OPPORTUNITIES ABOUND

Collaboration is a partnership; the act of producing or making something together. Collaboration can take place between two people or many people, between strangers or best friends. To collaborate is to commit to the possibility of producing something greater than would be produced alone.

Creativity is the act of turning new and imaginative ideas into reality. Creativity is characterized by the ability to perceive things in new ways, to find hidden patterns, to make connections between unrelated phenomena, and to generate solutions. Creativity is deceptively difficult to create.

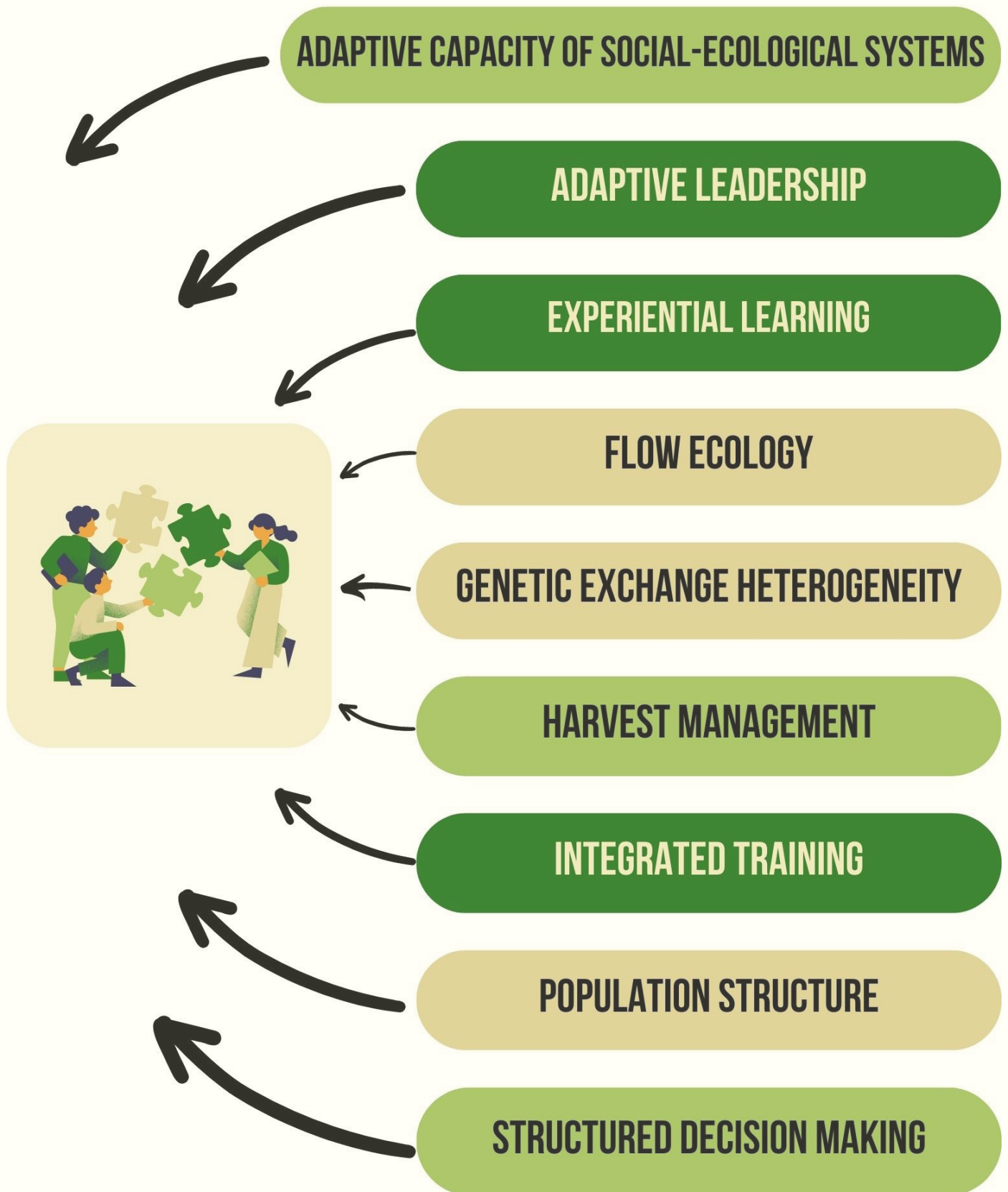
Fun collaborations generally involve group creativity, a synergistic progression of outlandish ideas and thoughts. To that end, a list of topics that Nebraska Cooperative Fish and Wildlife Research Unit scientists relish pondering, discussing, and waxing poetic is provided on the next page. Please engage in fun collaboration—opportunities abound.

Fun collaborations involve a synergistic progression of outlandish ideas and thoughts.



Nebraska Cooperative Fish & Wildlife Research Unit collaborating with
Nebraska Game & Parks Commission.

Photo: Justin Haag, Nebraskaland Magazine





Brett Anderson and Ella Humphery obtaining sonar readings in the field.
Photo: Connor Hart

RESEARCH PROJECTS



ANGLER BEHAVIOR IN RESPONSE TO MANAGEMENT ACTIONS ON NEBRASKA RESERVOIRS - PART III

Principal Investigator(s): Kevin L. Pope, Christopher J. Chizinski, Mark A. Kaemingk
Graduate Student(s): Brandon Barlow, M.S. (2022), Olivia DaRugna, M.S. (2020), Kyle Hanson, M.S., Derek Kane, M.S. (2021), Ben Mordhorst, M.S. (August 2021 – January 2023).

Project Coordinator(s): Derek Kane (May 2021 – March 2023)

Duration: January 2019 – December 2024

Funding: Nebraska Game and Parks Commission

Location: Statewide Nebraska
FISHHUNT.UNL.EDU

Recreational angling, a billion-dollar industry, is the most influential factor structuring fish populations in inland systems. Given its importance and the reliance in North America on sportspersons to fund conservation activities (i.e., the North American Model of Wildlife Conservation), natural resource agencies invest substantial resources to manage angler-fish interactions to ensure long-term sustainability. It is important for us to understand angler behavior in metropolitan areas because the landscape is becoming more urbanized. We anticipate that urban fisheries function differently than their rural counterparts.

This project currently has eight study components.

1. Omaha Angler Survey. Anglers were interviewed April-October on-site at Prairie Queen, Schwer, Halleck, and Standing Bear during 2019, at Benson, Flanagan, Fontenelle, and Walnut Creek during 2021, at Zorinsky, Prairie View, and Lawrence Youngman during 2022, and at Flannagan and Cunningham during 2023. These interviews are intended to add to statewide angler survey datasets, which are valuable for assessing changes in angler participation, catch, and harvest. These extended datasets allow for

relational assessments of changes in angling participation while considering environmental conditions and management actions on large spatiotemporal scales.

2. Omaha Angler Effort. Anglers were counted at 22 public waterbodies in the Omaha area from February 2019 through January 2020. In addition, the Nebraska Game and Parks Commission continued angler counts at 10 of the waterbodies from April 2020 through October 2020. Angler effort was highly variable with most angler effort occurring in west Omaha. Larger waterbodies typically receive the most fishing effort. Most anglers accessed waterbodies from the bank rather than from a boat. Half of the waterbodies surveyed received more than 20,000 hours of angling effort; four of these waterbodies received more than 60,000 hours, which is comparable to many large, rural fisheries in the state. Towl and Halleck received the most angler effort per unit of area, with approximately 7,500 angler hours per acre.

3. Omaha Recreation Survey. Recreational anglers express a variety of behaviors and specializations, making angling forecasting and management difficult. During February-March 2020, we surveyed—in collaboration with the University of Nebraska's Bureau of Sociological Research—a subset of Omaha residents that purchased a Nebraska fishing license during 2019. We used mail-surveys (email and pre-paid envelopes) with an intent to quantify demographics, behaviors, and visitation rates to Omaha metropolitan waterbodies (and other prominent Nebraska waterbodies) during 2019. Behavioral differences are evident across the Omaha area.

4. Understanding Variation of Recreational Angler Effort. Waterbody size (i.e., surface area) accounted for 60% of the variance in angler effort across 73 Nebraska waterbodies during

2009-2019. The relationship between the size of a resource and the amount of use the respective resource receives can be utilized by natural resource managers to produce broad-scale estimations of system use, guide the allocation of management resources according to expected system use, predict how changes in system size may affect the amount of use, and highlight how different user groups may interact with systems of various sizes. For instance, utilizing the waterbody size-angler effort relationship allows us to predict that anglers exert over 4,750,000 hours of effort annually on public waterbodies in Nebraska.

5. Recreational Use of Valentine National Wildlife Refuge. Valentine National Wildlife Refuge is an important social-ecological system that provides a variety of recreational opportunities for visitors. We used windshield surveys to understand participation and potentials for social conflicts and ecological impacts of hunting, fishing, and wildlife watching (including touring, hiking, photography, and environmental education) groups. Social and ecological intensities varied across lake types (e.g., fishing vs. non-fishing) and seasons, highlighting intense-impact areas and periods on the refuge. Accounting for the diverse recreational activities and social and ecological intensities will allow managers of Valentine National Wildlife Refuge and other social-ecological systems the ability to concomitantly preserve ecological resources, prioritize conservation efforts, and minimize visitor conflicts.

6. Lake McConaughy Angler Survey. Lake McConaughy is an important fishery in western Nebraska. We interviewed anglers on-site during daytime during April-October 2022 and during nighttime during April-May 2022 and 2023. These interviews were in response to public concerns surrounding potential overharvest of walleye during the springtime walleye spawn, especially large individuals that are economically and ecologically important in the walleye population. Catch rates of walleye for walleye-seeking anglers during April 2022 were 0.5 walleye/hour fishing during nighttime and 0.2 walleye/hour during daytime.

7. Ogallala. Lake Ogallala (and its associated canal and river) provides a unique trout fishery in western Nebraska. We are surveying anglers during 2023 to gather baseline data for use in future evaluations of management actions designed to reduce the biomass of the common carp population in Lake Ogallala.

8. Economic valuation of recreational fishing. Economic values of individual fisheries are important pieces of information, especially for prioritizing management actions and allocating limited resources. We have teamed up with Dr. Max Melstrom, an economics professor at Loyola University Chicago, to develop a model to assign economic values for public reservoirs throughout Nebraska.



Anglers launching a boat at Glenn Cunningham Lake.

Photo: Kevin Pope

AQUATIC INVASIVE SPECIES PREVENTION PROGRAM

Principal Investigator(s): Kevin L. Pope

Project Coordinator(s): Allison Zach

(September 2013 - March 2023)

Duration: April 2011 – December 2022

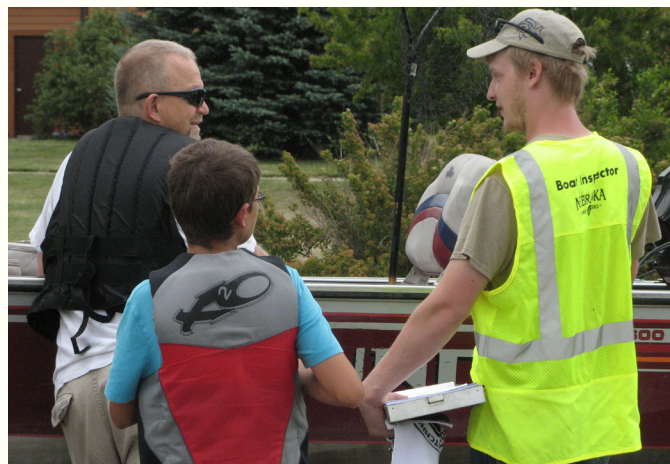
Funding: U.S. Fish and Wildlife Service;
Nebraska Public Power District

Location: Statewide Nebraska

NEINVASIVES.COM

The Nebraska Invasive Species Program has facilitated development and implementation of a Nebraska Aquatic Invasive Species Prevention Program. Goals are to:

- Decrease the risk of introductions of aquatic invasive species in Nebraska through a watercraft inspection and decontamination program;
- Increase public awareness of aquatic invasive species through an integrated outreach and education program; and
- Increase local and regional collaborations for prevention and management of aquatic invasive species through directed and coordinated communications.



Watercraft inspector

Photo: Allison Zach

Boater surveys, watercraft inspections and outreach activities have been conducted since 2011 to increase public awareness of aquatic invasive species and promote prevention actions among watercraft users. In addition, the Coordinator served on regional aquatic invasive species panels to coordinate prevention and management efforts across state lines, delivered webinars to various audiences, provided over 15,000 outreach

materials to partners, and collected water samples to assistance the U.S. Geological Survey eDNA pilot study on zebra mussel detection. Advertisements were ran in Nebraska Game and Parks Commission's guides and other printed publications, and on two billboards. Two (one permanent at Lewis and Clark Lake and one trailered) CD3 waterless watercraft cleaning station were purchased; we monitor use of both units through an online platform.



CD3 cleaning station

Photo: cd3systems.com/

ASSESSMENT OF ANGLER SATISFACTION IN THE MAINSTEM MISSOURI RIVER, NEBRASKA

Principal Investigator(s): Kevin L. Pope, Christopher J. Chizinski, Jonathan J. Spurgeon, Kirk D. Steffensen

Graduate Student(s): Caroline LaPlante, M.S.

Duration: August 2021 – December 2023

Funding: Nebraska Game and Parks Commission

Location: Tailwater of Gavins Point Dam
FISHHUNT.UNL.EDU

Satisfaction, an attitude-like judgment of an event based on pre-event expectations, of recreational participants is important to natural resource managers. A growing concern throughout freshwater ecosystems in North America is the negative effects of aquatic invasive species on water-based recreational activities. However, positive effects of aquatic invasive species on water-based recreational activities are possible.

The American paddlefish is a popular target among fishers on the Missouri River, which has thriving populations of bighead carp and silver carp (collectively referred to as “bigheaded carp”).

Bigheaded carp, native to Asia, are invasive species in North America. It is likely that multiple ecological and sociological factors contribute to satisfaction of fishers targeting American paddlefish in the Missouri River.

To understand the influence of bigheaded carp on paddlefish-fishers’ satisfactions, we are quantifying fishers’ expectations and outcomes during archery and snagging seasons on two temporal scales—day and season. Our *a priori* prediction was that the presence of bigheaded carp would positively influence satisfactions of fishers during archery season (by providing additional opportunities to shoot fish) and negatively influence satisfactions of fishers during snagging season (by increasing work, via bycatch of bigheaded carp, required to harvest an American paddlefish). Preliminary results are somewhat consistent with our prediction. The presence of bigheaded carp did enhance satisfactions of fishers during archer season, but did not diminish satisfactions of fishers during snagging season.



Archery fisherman taking aim while spotters look on.

Photo: Kevin Pope

ASSESSMENT OF ANGLER USE AND CATCH DURING 2020 AND 2022 AT SUTHERLAND RESERVOIR, NEBRASKA

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

Project Coordinator(s): Derek Kane (May 2021 – March 2023)

Duration: March 2020 – January 2023

Funding: Nebraska Public Power District

Location: Sutherland Reservoir, Nebraska

The Nebraska Public Power District is a publicly owned utility and a political subdivision of the State of Nebraska. Its chartered service territory is vast, including all or parts of 86 of Nebraska's 93 counties. The utility works through partnerships to help serve more than an estimated 600,000 Nebraskans with retail and wholesale electric power and energy-related services. The Nebraska Public Power District owns and manages

Sutherland Reservoir, a 3,000-surface-acre reservoir located three miles south of Interstate 80 Exit at Sutherland, Nebraska, as part of its hydropower system with the Nebraska Game and Parks Commission overseeing most of the recreation areas at this reservoir. The purpose of this study is to estimate angler use and catch at Sutherland Reservoir, Nebraska, from April through October 2021 (intended 2020, but delayed due to pandemic) and 2022. Specifically, we obtain monthly estimates of angler pressure, catch, and harvest. This information will allow the Nebraska Public Power District to evaluate angler use and the influence of the fishery at Sutherland Reservoir, and is a required component of Nebraska Public Power District's hydropower operating license.



Zander Kaemingk enjoys an exciting day fishing.

Photo: Mark Kaemingk

ASSESSMENT OF SILVER CARP AND BIGHEAD CARP IN THE PLATTE RIVER, NEBRASKA: EMPHASIS ON POPULATION DISTRIBUTION, POPULATION DEMOGRAPHICS, AND REPRODUCTION

Principal Investigator(s): Jonathan J. Spurgeon, Mark A. Pegg, Kirk D. Steffensen

Graduate Student(s): Blake Logan, M.S., Jessi Urichich, M.S.

Duration: January 2022 – June 2024

Funding: Nebraska Game and Parks Commission

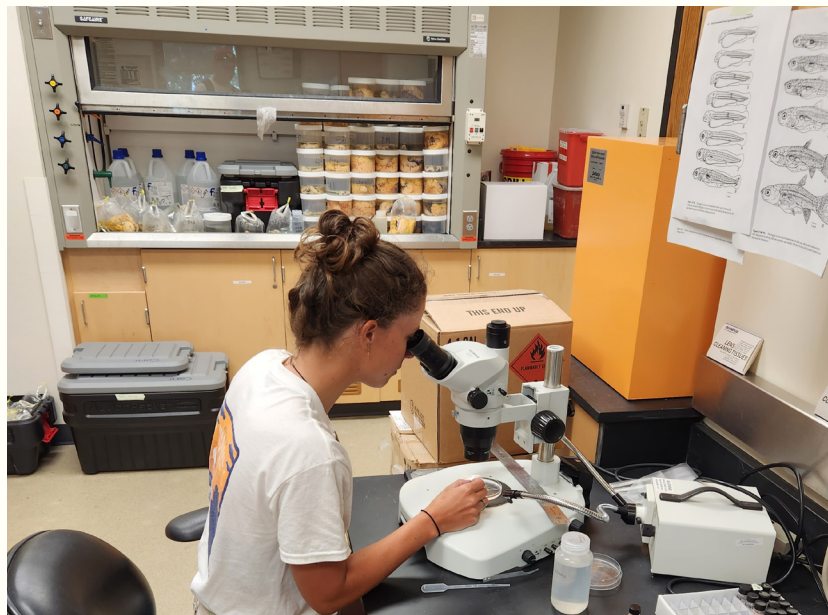
Location: Lower Platte River, Nebraska

Understanding the population characteristics and recruitment of Silver Carp and Bighead Carp within the Platte River system is imperative to prevent further expansion and mitigate the risks to human interests and the native fish communities. The study objectives of this project are to: (1) assess the prevalence of spawning, reproductive success, early recruitment, and habitat use of young-of-year Silver Carp and Bighead Carp within the lower Platte River, and (2) assess the temporal and spatial distribution and reproductive characteristics including—but not limited to—size, age at reproductive maturity and fecundity of Silver Carp and Bighead Carp populations on the Platte River and lower reaches of major tributaries of the Platte River.



A juvenile carp.

Photo: Jessi Urichich



Jessi Urichich working with samples of invasive carp.

Photo: Kyle Hansen

AT-RISK SPECIES MONITORING

Principal Investigator(s): Kevin L. Pope

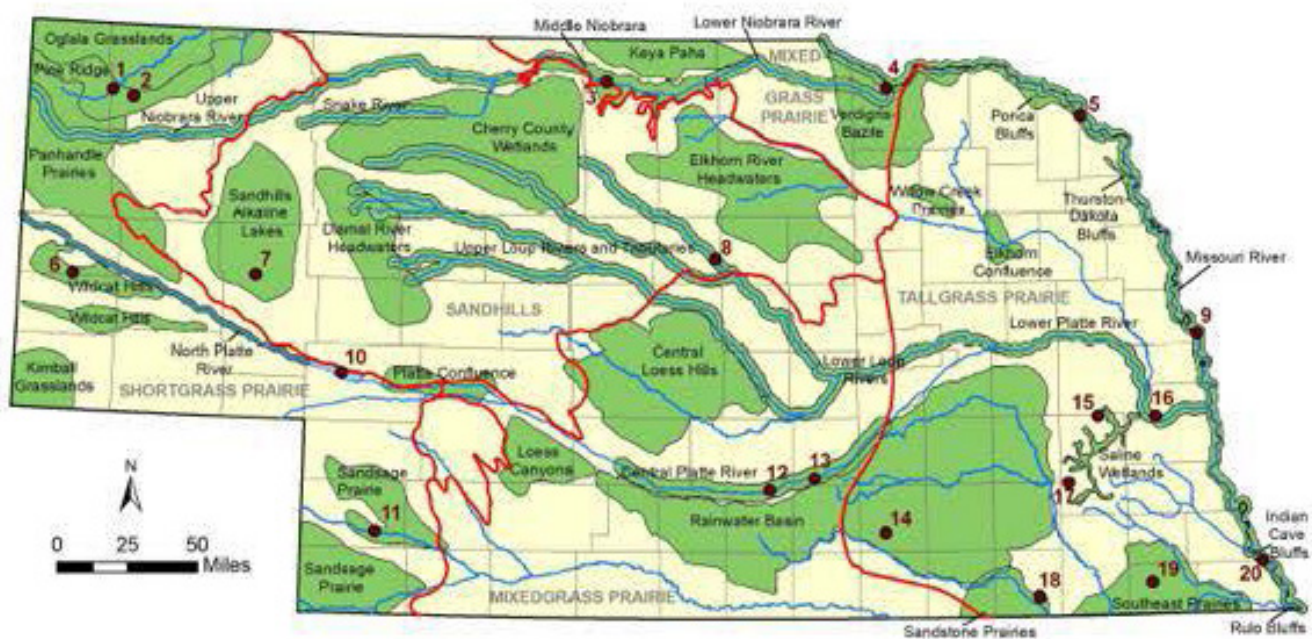
Duration: June 2023 – December 2023

Funding: Nebraska Game and
Parks Commission

Location: Nebraska Statewide

Conservation decision-makers need the best and most current scientific data and information available. The Nebraska Natural Heritage Program, within the Nebraska Game and Parks Commission, maintains the most comprehensive database in the state for at-risk species, natural communities, and Biologically Unique Landscapes, identified in the Nebraska Natural Legacy Project State Wildlife Action Plan. Organizations and agencies use this information to inform conservation planning and

implementation and to facilitate the environmental review of projects to reduce the potential for negative impacts to Nebraska's at-risk species and natural communities. This project provides personnel assistance to the Nebraska Natural Heritage Program Zoologist on at-risk species field investigations and data compilations, ultimately helping to inform and advance conservation of at-risk species in Nebraska.



Nebraska's biologically unique landscapes

Photo: Nebraska Natural Legacy Project, Nebraska Game and Parks Commission

BAT CONSERVATION AND RECOVERY IN NEBRASKA AND WYOMING

Principal Investigator(s): Dirac Twidwell, Kevin L. Pope

Project Coordinator(s): Baxter Seguin (February 2019-June 2020), Christopher Fill (September 2020 - February 2023)

Duration: February 2019 – January 2023

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

Location: Statewide Nebraska and statewide Wyoming

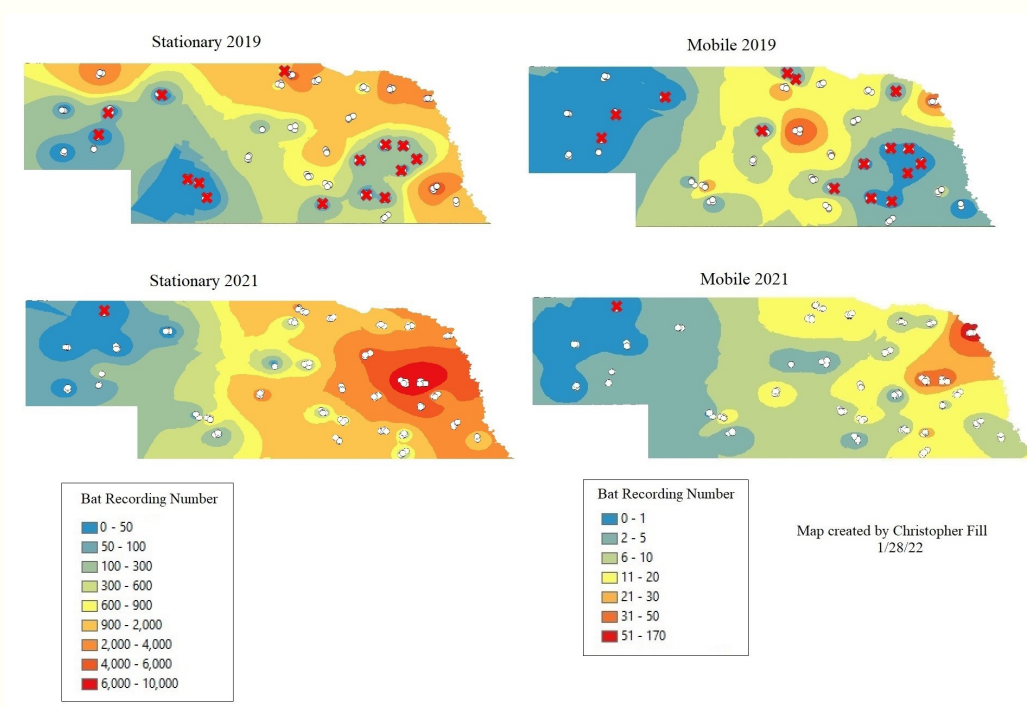
There are mounting concerns for North American bats due to continuing and emerging threats from disease, habitat loss, fragmentation, and wind-energy development. Although these threats are likely to increase in severity, there is an opportunity to improve our knowledge of bat occurrence and habitat use, to learn how landscape changes affect local bat populations, and to establish regional monitoring that can inform local and national

resource management decisions. This is especially true across Nebraska, which encapsulates edges of several bat species' ranges.

We implemented the North American Bat Monitoring Program (NABat) in Nebraska to survey statewide bat species distributions and activity. Thirty-five monitoring areas were established across the state to sample with bat acoustic detectors each year, comprising about 120 sites, and involving about 100 landowners. Much of this data was collected by volunteers (citizen scientists); we were excited by our successes in building an extensive and reliable citizen science network for bat monitoring.

We documented 12 bat species during our monitoring efforts, including some that have experienced dramatic population declines in other parts of the country from the invasive fungal disease that causes white-nose syndrome. Some

species we found statewide, whereas we detected other species only in certain areas of Nebraska. Overall bat activity has been generally greatest in eastern parts of the state, and least in central and southwestern parts of the state, perhaps an effect of fewer available tree roots. Future sampling efforts could be used to gather evidence of activity changes and range expansions by these bat species.



Acoustic Map

Map created: Christopher Fill

BROWN TROUT MOVEMENT AND THERMAL DYNAMICS IN LITTLE RED RIVER TAILWATER, ARKANSAS

Principal Investigator(s): Steve E. Lochman (University of Arkansas at Pine Bluff), Jonathan J. Spurgeon

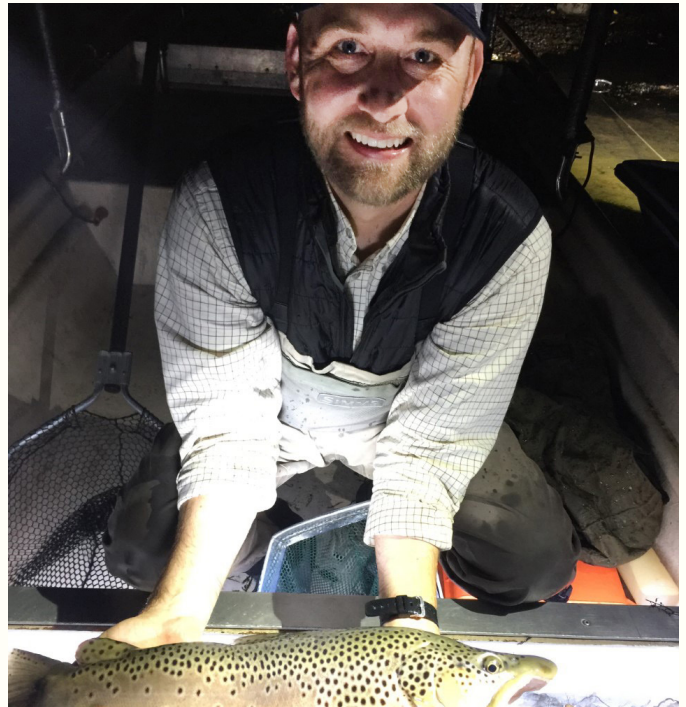
Graduate Student(s): Levi Olhersen, M.S., Hayden Wall, M.S.

Duration: August 2022 – June 2025

Funding: Arkansas Game and Fish Commission

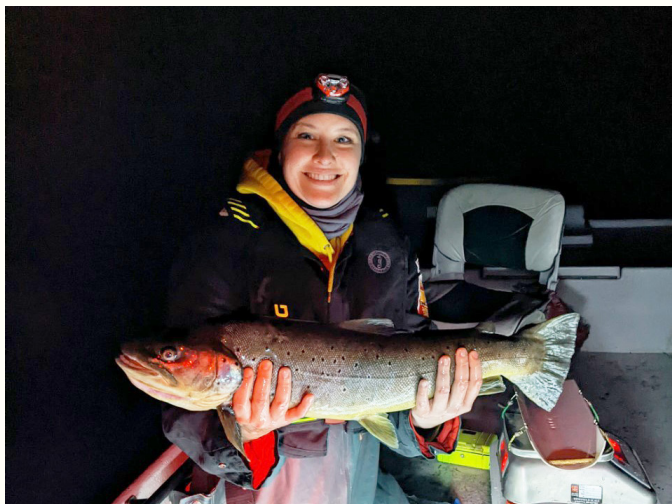
Location: Little Red River, Arkansas

The population of Brown Trout below the Greers Ferry dam on the Little Red River is unique among trout populations in Arkansas. It is the only self-sustaining trout fishery in the State. Whereas other trout fisheries in tailwaters below dams on the White River and its tributaries require stocking to sustain the fishery, no Brown Trout stocking is required in the Greers Ferry tailwater. Trout are managed in the tailwater from the dam to approximately 48 km downstream. However, there are reports of trout below the current managed section and interest exists in potentially



Brown trout sampled using boat electrofishing
in Little Red River, Arkansas

Photo: Joe Kaiser



Brown trout sampled using boat electrofishing
in Little Red River, Arkansas

Photo: Joe Kaiser

extending the management zone. However, limited information exists regarding population dynamics and habitat conditions—particularly thermal conditions—below the current management zone. This project will assess the current distribution of Brown Trout and Rainbow Trout below the current management zone and estimate population demographics. Further, this project will assess seasonal movement patterns of Brown Trout between managed and unmanaged river segments. In addition to population demographics, the project will model seasonal and inter-annual fluctuations in water temperature along the length of the tailwater in an effort to predict periods of potential thermal stress under varying water-flow scenarios.

DEVELOPMENT OF A MOLECULAR APPROACH TO AGE PACIFIC WALRUS: A NOVEL APPLICATION OF EPIGENETIC AGING FOR CLOSE-KIN MARK-RECAPTURE

Principal Investigator(s): Sarah A. Sonsthagen, Robert E. Wilson, William S. Beatty (U.S. Geological Survey)

Duration: October 2019 – October 2024

Funding: U.S. Fish and Wildlife Service; U.S. Geological Survey

Location: Bering Sea, Chukchi Sea, Alaska

The Pacific walrus is an ice-associated pinniped that ranges over continental shelf waters in the Bering and Chukchi Seas. Sea ice provides habitat for Pacific walrus life-history events and provides a platform for animals to rest between foraging bouts at productive, remote offshore areas. Estimating abundance and vital rates of the Pacific walrus population is, therefore, logistically and scientifically challenging. In 2013, the U.S. Fish and Wildlife Service initiated a five-year genetic mark-recapture project to test the efficacy of an alternative approach to estimating population abundance, survival, and reproduction. Age is an important piece of information in mark-

recapture studies that can reduce uncertainty and increase precision of parameter estimates. Although a method to age walrus based on facial characteristics is available, preliminary results indicated a high level of observer error. An improved aging technique is needed to allow development of more complex traditional mark-recapture models and aid development of close-kin mark-recapture models.

We are developing an approach to age walruses based on epigenetic signatures, which only requires DNA from sampled individuals. We have identified potential age-related epigenetic markers in walrus by whole methyl DNA sequencing samples derived from calves (0 year old) and adults (≥ 6 years old) with museum specimens of known-age individuals based on tooth cementum annuli analyses. We are partnering with coastal communities to obtain samples from hunter harvested walrus to quantify the accuracy and precision of age-related markers across age classes.



Pacific walrus on ice floe in Chukchi Sea, Alaska

Photo: Sarah Sonsthagen

EFFECTS OF WOODY ENCROACHMENT AND MANAGEMENT ON GRASSLANDS OF NEBRASKA'S SANDHILLS

Principal Investigator(s): Sarah A. Sonsthagen,
Andy Bishop (U.S. Fish and Wildlife Service)

Graduate Student(s): Rachel Rusten, Ph.D.

Duration: August 2023 – July 2028

Funding: U.S. Geological Survey

Location: Sandhills, Nebraska

Loss of grassland habitat to woody encroachment is widespread and ongoing in Nebraska's Sandhills. Woody encroachment has been identified as the most severe threat affecting grassland-obligate breeding birds, as these species do not appear to use encroached areas. As grassland bird species are experiencing the sharpest declines of avifauna guilds, evaluations of tolerance levels to woody encroachment of grasslands will provide valuable information to guide conservation and restoration efforts.

Through our research we aim to (1) evaluate the response of grassland birds to eastern red cedar removal, (2) evaluate changes in grassland bird communities and abundance among grassland patches at different stages of successional change, (3) inform best management practices to provide guidance on eastern red cedar removal and management, and (4) develop a monitoring program to evaluate grassland bird response to woody cover management. We are partnering with U.S. Fish and Wildlife Service, Rainwater Basin Joint Venture, Nebraska Game and Parks Commission, Natural Resources Conservation Service, and University of Nebraska-Lincoln.



Dickcissel

Photo: Elaine R. Wilson, NaturePics, www.naturespicsonline.com

EVALUATING REPRODUCTION, HARVEST, TIMING OF SEASON, CONNECTIVITY AND SPATIAL ECOLOGY OF WILD TURKEYS IN NEBRASKA

Principal Investigator(s): Sarah A.

Sonsthagen, Andrew R. Little, Mark P. Vrtiska

Graduate Student(s): Robyn Dausener, M.S.;

Surya Deepika Garugu, Ph.D.; and Kathryn

Hickle, Ph.D.

Duration: August 2022 – December 2026

Funding: Nebraska Game and
Parks Commission

Location: Western Nebraska

Wild turkeys are an important game species in Nebraska and across the United States of America. Managers and hunters have reported declines in the number of wild turkeys in Nebraska, similar to declines in other states and regions. Though specific causes of the declines have not been identified, most populations have reported low productivity (e.g., nest success, brood survival), but other causes also may exist. To reverse this decline, state wildlife agencies have reduced wild turkey bag limits and prioritized habitat management efforts to increase recruitment and adult female survival in the breeding season. These efforts have slowed wild turkey population declines across the country, but populations continue to decrease in certain areas, suggesting there are other site-specific factors affecting growth rates (e.g., landcover availability, brood and hen survival). Knowledge of ecology and population dynamics at local scales

is needed to understand the causes of decline and inform conservation efforts in statewide and nationwide efforts to reduce (and ultimately reverse) current population trends.

We are applying a multifaceted approach to examine the ecology and population dynamics of wild turkeys in Nebraska and specifically aim to: (1) estimate annual reproductive parameters, (2) determine space use and habitat selection of males and females, (3) examine the influence of



Surya Deepika Garugua and Jade Wawers tagging turkeys.

Photo: Justin Haag (Nebraskaland Magazine)

habitat patch connectivity on effective dispersal (gene flow), (4) estimate survival and harvest rates, (5) evaluate the influence of male social status on patterns of parentage in clutches, and (6) describe gobbling activity. We are partnering with University of Georgia, Nebraska Game and Parks Commission, and Nebraska Chapter of The National Wild Turkey Federation for field data collection.

GENES ACROSS THE LANDSCAPE: EVALUATING MIGRATORY CONNECTIVITY IN THE RUSTY BLACKBIRD

Principal Investigator(s): Sarah A. Sonsthagen, Robert E. Wilson, Steven N. Matsuoka (U.S. Geological Survey), Jim A. Johnson (U.S. Fish and Wildlife Service), Dean W. Demarest (U.S. Fish and Wildlife Service), Luke L. Powell (University of Glasgow)

Duration: October 2017 – October 2024

Funding: U.S. Fish and Wildlife Service; U.S. Geological Survey

Location: Boreal region of North America and eastern United States of America

The rusty blackbird has lost 90% of its global population since 1970 and is predicted to lose another 50% in the next 19 years. The rusty blackbird has a large migratory range (breeding in remote areas across the continental boreal biome, wintering over the eastern half of United States of America) and the many stressors hypothesized to be contributing to its decline vary across the annual cycle. More comprehensive

knowledge of migratory connectivity is needed to understand the causes of decline and efficiently link conservation efforts across this species' annual cycle. A foundational step in evaluations of migratory connectivity are assessments of population genomic structure, as those data provide a basis to infer the natal origins of birds sampled at key migration stopover sites and important wintering areas.

The population decline raised the following questions, "Are breeding areas structured across their range?", "How are breeding areas linked across the annual cycle?", and "What breeding areas may be more susceptible to environment induced population declines?"

By applying a population genomics approach, we determined that rusty blackbirds are structured across their breeding range with areas in the east experiencing greater restrictions in dispersal than western counterparts. Given the presence of genetic structure, we obtained samples from stopover sites and winter areas and developed a multi-locus genetic assay to evaluate migratory connectivity by assigning birds sampled at non-breeding sites to natal areas. We are testing for genotype-environment association to evaluate the adaptive capacity of rusty blackbirds and identify areas of high conservation value and genomic vulnerability. We partnered with the Rusty Blackbird International Working Group, Alaska Department of Fish and Game, Audubon New Hampshire, Canadian Wildlife Service, Biological Research Institute, and researchers to obtain samples.



Rusty Blackbird - Wisconsin, USA

Photo: Matt Boley

Macaulay Library at the Cornell Lab of Ornithology (ML329522001)

IMPROVING OUR UNDERSTANDING OF THE POPULATION STRUCTURE AND HARVEST COMPOSITION OF AMERICAN COMMON EIDERS

Principal Investigator(s): Sarah A. Sonsthagen, Chris Dwyer (U.S. Fish and Wildlife Service), Scott G. Gilliland (Environment and Climate Change Canada)

Duration: October 2013 – October 2023

Funding: U.S. Fish and Wildlife Service; Sea Duck Joint Venture; U.S. Geological Survey; Canadian Wildlife Service

Location: Coastal regions in northeastern North America

Each year, common eiders migrate from nesting areas along the northern coastlines to ice-free waters farther south where birds from several different breeding areas form winter flocks. Along the Atlantic coast, there are differences in population trends among the main eider breeding areas; numbers of breeding birds in northern Canada are increasing, those in central Canada are stable, whereas numbers of birds in the Gulf of Maine are declining. Declines in the Gulf of Maine raised concerns among biologists and hunters. As common eiders are susceptible to overharvest, in 2016, management agencies augmented harvest regulations in an attempt to reduce hunting pressure on eiders that breed in the Gulf of Maine.

Differences in population trends and changes in harvest regulations raised two questions, “Where are birds from different breeding areas harvested, and in what proportion?” and “Have changes in hunting regulations affected harvest rates differently among populations?”

The tendency of female common eiders to breed in the area where they hatched is so strong that each breeding population has a unique genetic

fingerprint. Therefore, we applied genetic methods to determine the population structure of American common eiders and to probabilistically assign sport-harvested common eiders to their breeding (source) areas. This information will help determine whether this subspecies should be managed differently across its range and if changes in harvest composition occurred following the implementation of harvest regulation changes for sea ducks in the Atlantic Flyway.

The project is finalizing genetic information collected from common eiders harvested in the USA and Canada for the 2013 – 2014 to 2019 –



Common Eider - Manitoba, Canada

Photo: Liam Singh

Macaulay Library at the Cornell Lab of Ornithology (ML35730861)

2021 seasons and 30 breeding reference locations. We partnered with the Nunatsiavut Government and the NunatuKavut Community Council to collect samples from Labrador. Hunter harvested wings were provided by the U.S. and Canadian Parts Collection Surveys.

INFLUENCE OF MULTI-SCALE HABITAT CHARACTERISTICS ON PALEBACK DARTER OCCUPANCY

Principal Investigator(s): Jonathan J. Spurgeon, Steve E. Lochmann (University of Arkansas at Pine Bluff)

Graduate Student(s): Katie Morris, M.S. (University of Arkansas at Pine Bluff), Maxwell Hartman, M.S. (University of Arkansas at Pine Bluff)

Duration: May 2020 – June 2023

Funding: Arkansas Game and Fish Commission; U.S. Fish and Wildlife Service

Location: West-central Arkansas

Freshwater fishes are in decline at a global scale following widespread anthropogenic alteration including extensive habitat change.



Paleback Darter underwater in
Ouachita Mountain Ecoregion stream, Arkansas

Photo: Katie Morris

Conservation of freshwater fishes is limited, in part, due to deficiencies in understanding how local- and broad-scale habitat characteristics influence species' occupancy across landscapes. Identification of multiscale habitat characteristics that drive species' occupancy may inform the types and scale of habitat management projects needed

to facilitate species' expansion into historical distributions or identify areas suitable for potential translocation within a species' native range. Furthermore, information is needed regarding how species complete parts of their life history including reproduction. The proposed objectives of this project are to 1) quantify regional occupancy and capture probability, 2) model the relative influence of local- and broad-scale habitat characteristics on occupancy and capture probability, and 3) assess local- and broad-scale habitat characteristics associated with spawning of Paleback Darter (*Etheostoma pallidorsum*). The proposed study will occur in the headwater and upper Ouachita (including the Caddo River) drainages within west-central Arkansas. We will use a standard

occupancy study design (i.e., all sites visited a minimum number of times) to estimate occupancy and detection probability for Paleback Darter. Local-scale (e.g., streambed gradient, substrate, in-stream and riparian habitat features, water temperature, and water flow) and broad-scale (e.g., stream order, stream fragmentation, location within watershed, watershed land-use) habitat characteristics will be estimated using in-stream measurements and geographic information system (GIS) software. Predictions of species' occupancy and detection probability along

with the habitat-specific model coefficients estimated with this study can provide quantifiable measures to guide state and federal conservation designations for Paleback Darter and inform future habitat rehabilitation projects designed to increase habitat availability for multiple life stages including spawning.

INVENTORY AND ASSESSMENT OF STREAM CROSSINGS AND THEIR INFLUENCE ON MOVEMENT OF SPECIES OF GREATEST CONSERVATION CONCERN WITHIN OUACHITA HIGHLANDS ECOREGION IN ARKANSAS

Principal Investigator(s): Jonathan J. Spurgeon

Graduate Student(s): Katie Morris, M.S. (University of Arkansas at Pine Bluff)

Duration: May 2020 – June 2023

Funding: Arkansas Game and Fish Commission; U.S. Fish and Wildlife Service

Location: Arkansas

There is growing concern that fishes of conservation concern are limited by their ability to move and access habitats necessary to complete key aspects of their life history. Fish movement is affected to an unknown degree due to thousands of low-water road crossings that are part of Arkansas' rural road networks. Movement among habitats is particularly necessary for fishes of conservation concern that exhibit restricted ranges from endemism, anthropogenic alteration, or a combination of the two. Restricted movement of individuals may severely influence the ability of species to recolonize areas within a watershed following localized extirpations within watersheds. Stream crossings are an anthropogenic alteration that may greatly reduce fish movement within and among streams due to physical metrics of the crossing (i.e., perch height, width/depth ratio, entrenchment ratio, and water velocity). At the same time, Arkansas has great diversity of stream fishes, many which are endemic to few watersheds where stream crossings are prevalent. There is a great need to replace barriers with new structures that improve movement for fishes as a means to facilitate conservation of species of

greatest conservation concern. However, limited understanding exists regarding the combination of metrics that create barriers for many species of greatest conservation concern including the Paleback Darter, Caddo Madtom, Ouachita Darter, Beaded Darter and more common species with very distinct genetic lineages including the Ouachita strain of Smallmouth Bass. Capacity and funding are limited to remove barriers and it is imperative that our resources are utilized efficiently and effectively to maximize ecological benefits for species of greatest conservation need. Two major needs exist to ensure ecological benefits are obtained with barrier removal and that limited resources for barrier removal are used effectively. First, we lack a sufficient stream crossing inventory populated with stream-crossing metrics from which to categorize stream crossings as likely barriers. Second and related, we lack a predictive tool that uses inventory metrics to prioritize crossings based on the likelihood a crossing prevents fish movement. We anticipate a multi-phase project over the next several years to address the information gap regarding the limited inventory of stream crossing metrics, the lack of a predictive tool to assess crossing probability of being a barrier, and assessment of the influence of barrier removal on colonization of habitats by species of greatest conservation need throughout Arkansas. Our goal for phase-I of the project is to develop a predictive tool (e.g., random forest model) based on variables derived from the Southeast Aquatic Resources Partnership (SARP) for use in prioritizing stream crossings that pose significant threats to disrupting fish community structure in Arkansas streams.

INVESTIGATING THE ROLE OF HYBRIDIZATION IN THE DECLINE OF GRAY-HEADED CHICKADEES

Principal Investigator(s): Sarah A.

Sonsthagen, Robert E. Wilson, Jim A. Johnson (U.S. Fish and Wildlife Service), Travis L. Booms (Alaska Department of Fish and Game), Steven N. Matsuoka (U.S. Geological Survey)

Graduate Student(s): Matthew Armstrong, M.S.

Duration: March 2020 – October 2024

Funding: U.S. Geological Survey

Location: Alaska and northwestern Canada

The gray-headed chickadee was historically common in Alaska and northwestern Canada. In recent years, populations have been extirpated or declined. Based on a thorough review of best available information, species numbers are in the hundreds to low thousands and are scattered across Alaska and the Yukon Territory. Coincident with the decline of gray-headed chickadees, the boreal chickadee has increased in abundance or recently colonized areas once occupied by gray-headed chickadees.

The shift in the most common chickadee species present in areas where gray headed-chickadees were once common, raised the following questions, “Has interspecific competition for resources lead to the decline and extirpation of gray-headed chickadees?” and “Are gray-headed chickadees hybridizing with boreal chickadees resulting in demographic or genetic swamping and subsequent population decline?”

Understanding the role, if any, hybridization has on the decline of gray-headed chickadees is an important first step in defining and prioritizing appropriate and effective conservation recovery actions. We are evaluating the extent of hybridization between the declining gray-headed chickadee and the recent colonizer, the boreal chickadee with two analytical approaches – estimating gene flow between species and temporal changes in genetic diversity within boreal chickadees – and reduced representation genomic data. We are partnering with museums and the Canadian Wildlife Service to obtain samples.



Boreal Chickadee - Alaska, USA

Photo: Alan D. Wilson Nature's Pics, www.naturespicsonline.com

JUNIPER INVASIONS AND LANDSCAPE INTERVENTION: A STATEWIDE ASSESSMENT

Principal Investigator(s): Dirac Twidwell
Graduate Student(s): Dillon Fogarty, Ph.D.
Duration: January 2016 – August 2023
Funding: Nebraska Game and Parks Commission
Location: Statewide Nebraska
CEDARLITERACY.UNL.EDU

Eastern redcedar invasion is one of the largest threats to grasslands in the Great Plains. Our overall objective is to:

- Assess the vulnerability of Nebraska's imperiled grasslands to redcedar invasion and develop tools that enhance the potential to implement landscape interventions that prevent the spread of redcedar or restore degraded wildlife habitat following transformation to a woody-dominated state.

We developed geospatial tools that quantify the risk and vulnerability of woody encroachment in Nebraska's grasslands, published a corresponding vulnerability guide that provides a science-based framework for better managing woody encroachment, and worked with stakeholders across the state to facilitate adoption of new best practices for reducing woody encroachment.

Integration of geospatial risk and vulnerability tools with our vulnerability guide for managing woody encroachment has allowed us to work directly with stakeholders on the co-production of new strategies for implementing landscape interventions. Our woody transitions map layer (<https://rangelands.app/>) uses remote sensing data on the co-occurrence of grass and woody plants to provide an index of the severity of transition from grassland to woodland. This product shows a rapidly growing risk of woody encroachment in the Great Plains and helps managers identify where landscape interventions

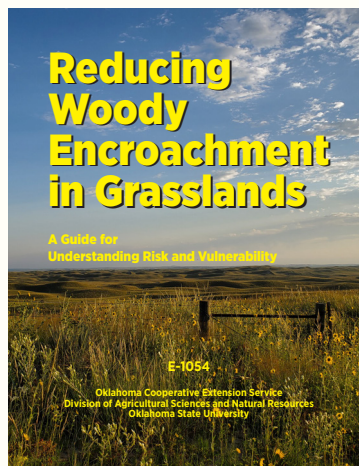
can be strategically implemented. The woody transitions layer has been widely adopted as a key component of large-scale conservation planning in the Great Plains and is available on the Rangeland Analysis Platform. In addition, we have developed

a statewide map layer that details the stages of woody encroachment throughout Nebraska's grasslands. Encroachment stages directly correspond to grassland risk and vulnerability and can be used as targets for managing risk. These geospatial tools are best used in the context of our new vulnerability guide *Reducing Woody Encroachment in Grasslands: A Guide for Understanding Risk and Vulnerability*. The vulnerability guide provides a framework for managing each stage of the woody encroachment process and offers new best practices for scaling up management.

Through engagement and outreach, the guide now serves as the science-foundation for the newly launched Nebraska Great Plains Grassland Initiative, an effort to conserve Nebraska's last best grasslands.



Eastern Redcedar in the Sandhills of Nebraska
Photo: Dillon Fogarty



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

Principal Investigator(s): Kevin L. Pope

Council Coordinator(s): Allison Zach

(September 2013-March 2023)

Duration: January 2020 – December 2024

Funding: Nebraska Game and Parks

Commission

Location: Statewide Nebraska

NEINVASIVES.COM

The Nebraska Invasive Species Council focuses on early detection, prevention and management of invasive species (taxa of concern) within the state of Nebraska. The members of this council are committed to minimizing the harmful effects of invasive species in an effort to promote healthy landscapes and healthy citizens. To help fulfill this commitment, the University of Nebraska-Lincoln hired Allison Zach as the Coordinator for the Nebraska Invasive Species Council in September 2013. In this capacity, Allison served as a liaison with Nebraska's Governor and State Legislature. Allison developed and provided invasive species outreach and education to Nebraska resource agencies, individual stakeholders, educators and the general public regarding. She served on the North American Invasive Species Management Association (NAISMA) Board, and is the NAISMA Play, Clean, Go committee Chair.

The Nebraska Invasive Species Council develops 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 Council created a 2-sided outreach card in 2020 and updated its adaptive management in 2021. The Council's website has a reporting tool; concerned citizens have identified new infestations of zebra mussels and other invasive species. Allison referred reports to an appropriate invasive species expert for investigation and guidance.



MULTI-SCALE HABITAT NEEDS OF AT-RISK FISHES IN NEBRASKA

Principal Investigator(s): Jonathan J.

Spurgeon, Thad W. Huenemann

Graduate Student(s): Joseph Spooner, M.S.,

Braxton Newkirk, M.S., Connor Hart, M.S.

Duration: August 2022 – February 2025

Funding: Nebraska Game and Parks Commission; U.S. Geological Survey

Location: Niobrara and Elkhorn river basins, Nebraska

The distribution and abundance of prairie-river fishes is maintained through demographic processes that occur over multiple scales embedded within a habitat matrix. Degradation of the habitat matrix in rivers, however, can limit completion of demographic processes (e.g., recruitment and movement) that may exacerbate the time for recolonization or permanently reduce their distribution and abundance. A major limitation exists, however, due to a lack of understanding of fish-habitat relationships



Measuring a Stone Cat from Deer Creek.

Photo: Braxton Newkirk

at multiple spatial and temporal scales for many SGCN. A prominent question that remains unanswered is what habitat features at different spatial scales promote the presence of a species? This research is being conducted with support from and in collaboration with the Nebraska Game and Parks Commission. This study will set the stage for future work assessing fish-habitat relations by identifying locations most likely to contain species of interest. Benefits from this study may also feed data into the Nebraska Conservation and Environmental Review Tool (CERT), commonly used as a review for proposed projects and potential impacts within areas of at-risk species presence.



Braxton Newkirk and Connor Hart electrofishing on Deer Creek.

Photo: Ella Humphrey

NORTHERN PEARL DACE POPULATION DEMOGRAPHICS IN SANDHILLS ECOREGION STREAMS

Principal Investigator(s): Jonathan J. Spurgeon,
Thad W. Huenemann

Graduate Student(s): Joseph Spooner, M.S.,

Duration: August 2021 – February 2023

Funding: Nebraska Game and Parks
Commission

Location: Sandhills Ecoregion

Quantified evidence of changes to population demographics of small-bodied stream fishes stemming from habitat modification is limited. To sustain populations of at risk species through habitat rehabilitation, information is needed regarding demographic responses including survival and movement among the mosaic of habitat patches present in stream systems. A collaborative study with the Nebraska Game and Parks Commission was initiated to assess the population demographic response of Northern Pearl Dace to stream channelization in the Nebraska Sandhills Ecoregion. This work may benefit decisions regarding needs for habitat rehabilitation within agriculture-dominated landscapes as well as inform species status assessments within State Wildlife Action Plans.



Joseph Spooner using p-Chip microtransponder tags to record information from captured prairie stream fish.

Photo: Jonathan Spurgeon

PALLID STURGEON BIOLOGY IN THE PLATTE RIVER AND ITS TRIBUTARIES

Principal Investigator(s): Mark A. Pegg, Kirk D. Steffensen, Jonathan J. Spurgeon

Graduate Student(s): Christopher Pullano, M.S., Jenna Ruoss, Ph.D.

Duration: January 2022 – December 2026

Funding: Platte River Recovery Implementation Program

Location: Lower Platte River, Nebraska

The Pallid Sturgeon is a U.S. threatened species that primarily inhabits the Missouri River and lower Mississippi River. Ongoing work in the mainstems of large rivers has provided much critical information regarding the biology and ecology of the species. However, substantial knowledge gaps exist regarding the species use and dependence on tributaries of the mainstem Missouri and lower Mississippi rivers. This project is intended to assess habitat use and availability for Pallid Sturgeon in the Platte River, Nebraska. Additionally, this project will assess the occurrence of spawning behavior and potential spawning success within the Platte River, Nebraska.



Jenna Ruoss and Christopher Pullano holding recently tagged female Pallid Sturgeon.

Photo: Jonathan Spurgeon



Jenna Ruoss sampling Pallid Sturgeon larvae on Platte River.

Photo: Jessi Urichich

POPULATION DEMOGRAPHICS AND MOVEMENT PATTERNS OF SILVER CARP AND BIGHEAD CARP IN THE ARKANSAS AND WHITE RIVERS, ARKANSAS

Principal Investigator(s): Jonathan J.

Spurgeon, Steve E. Lochmann (University of Arkansas at Pine Bluff)

Graduate Student(s): Andrew Althouf, M.S. (University of Arkansas at Pine Bluff), Jeffery Stevens, M.S. (University of Arkansas at Pine Bluff)

Duration: January 2021 – September 2023

Funding: Arkansas Game and Fish Commission

Location: Arkansas

Silver Carp and Bighead Carp have invaded much of the Mississippi River basin and pose threats to ecological functioning. However, despite much work on the two species in some locations (i.e., upper Mississippi River basin), there is a paucity of knowledge regarding basic population demographics in the lower Mississippi River basin. We will assess demographics including age structure, size structure, survival, and relative abundance of both Silver Carp and Bighead Carp in the Arkansas River and the White River. Furthermore, we will assess movement at local and broad spatial scales using a combination of passive and active tracking methods. Results from this study will aid in defining population boundaries, provide baseline demographic parameters for population modeling, and assess potential areas (e.g., lock and dam complexes or backwater areas) where management actions, including removal, may be feasible.



University of Arkansas at Pine Bluff graduate student securing acoustic receiver cable to tree

Photo: Jamie Kindschuh

RAINWATER BASIN JOINT VENTURE SCIENCE

Principal Investigator(s): Kevin L. Pope, Andy A. Bishop (Rainwater Basin Joint Venture Partnership)

Science Coordinator: Dana Varner (September 2014 - November 2022)

GIS Specialist: Greg Brinkman

Duration: October 2014 – December 2023

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

Location: Statewide Nebraska

RWBJV.ORG

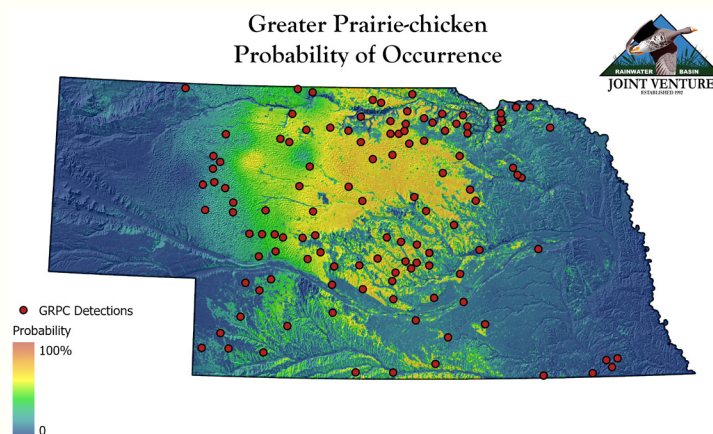
The mission of the Rainwater Basin Joint Venture is to build and facilitate partnerships that work to advance habitat conservation for millions of migratory birds using strategies based on sound science in Nebraska's mixed-grass prairie region. The Management Board of the Rainwater Basin Joint Venture is committed to implementing the U.S. Fish and Wildlife Service's Strategic Habitat Conservation framework. This science-based model requires a commitment of resources to develop a strong biological foundation for delivering conservation planning and designing research and monitoring efforts. In partial fulfillment of this commitment, a Science Coordinator position and a GIS Specialist position are housed at the University of Nebraska-Lincoln.

Dana Varner served as the Science Coordinator from October 2014 through November 2022, and Greg Brinkman began serving as the GIS Specialist in January 2022. Both positions work with the Rainwater Basin Joint Venture science team to develop models and decision support tools that help identify areas where conservation is most likely to benefit migratory birds and other wildlife.

Dana helped monitor and evaluate the success of ongoing and past habitat conservation projects, collaborating with researchers from various federal and state agencies and non-governmental conservation organizations. Dana recently wrapped up six years of data collection for a survey of waterfowl using Rainwater Basin playas during spring migration. Since leaving the Cooperative Research Unit, Dana took a position at Western EcoSystems Technology, Inc. where she continues to assist in the analysis of the Rainwater Basin spring waterfowl migration data. Results of this study will be used to help guide conservation delivery in this critical stopover region.

Greg focuses on providing additional GIS capacity and support to the Nebraska Game and Parks Commission in conjunction with the goals of the Rainwater Basin Joint Venture. Greg has been working on creating statewide abundance-and-occurrence models for Greater Prairie-chickens and Sharp-tailed Grouse. These models are based on a long-term data collection effort led by the Nebraska Game and Parks Commission. These models will contribute to better targeting of management for prairie grouse.

Both Greg and Dana have been collaborating with Nebraska Game and Parks Commission and University of Nebraska researchers to build a decision support tool that can be used by partners to identify priority landscapes based on customized criteria that can include seasonal waterfowl population abundance, upland and wetland habitats, and ecosystems goods and services.



Probability of occurrence map for
Greater Prairie-chicken

Map created by: Greg Brinkman

SAMPLING EFFICIENCY ASSESSMENT FOR SILVER CARP AND BIGHEAD CARP IN NEBRASKA MID-ORDER STREAMS AND RIVERS

Principal Investigator(s): Jonathan J. Spurgeon, Mark A. Pegg, Kirk D. Steffensen

Graduate Student(s): Brett Anderson, M.S.

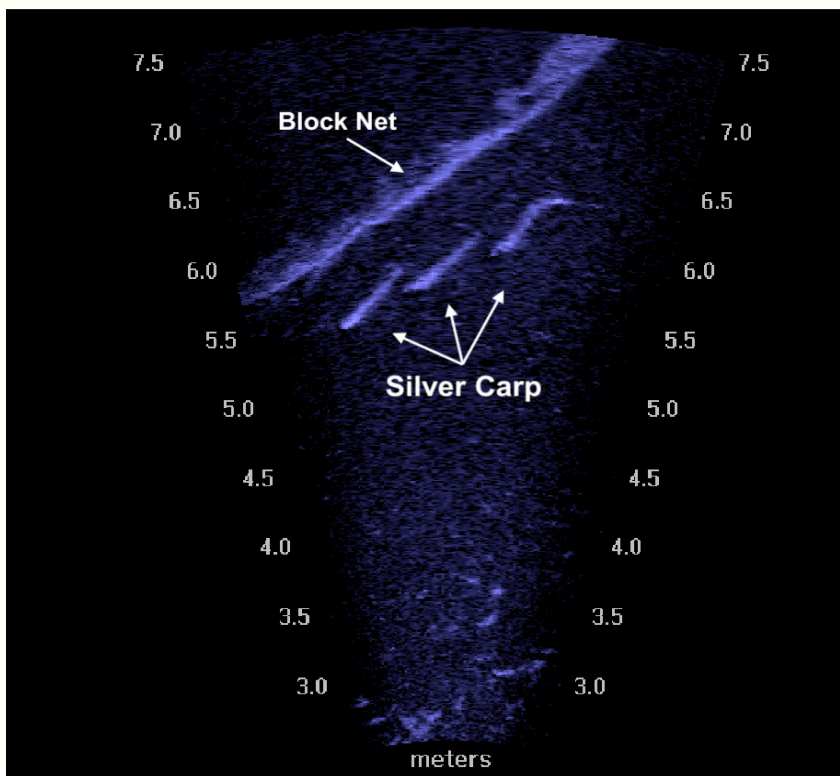
Duration: January 2023 – March 2025

Funding: Nebraska Game and Parks Commission

Location: Lower Platte River, Nebraska

Currently, eDNA is being used to investigate the distribution of invasive carp among lotic systems in Nebraska. However, attempts to verify eDNA results via live-fish collection have seen limited success due in part to limited understanding of life-stage specific habitat use within prairie systems and the sampling methods to collect individuals effectively among different habitat types. Therefore, the study objectives of this project are to: (1) investigate sampling methods (i.e., towed trawls, various net configurations, and different electrofishing methods) that can effectively sample the invasive carp population, and (2) devise a sampling protocol for use in prairie systems that can target different life stages of invasive carp populations. Such a protocol can be used to inform information gaps based on desired management objectives including documenting presence, assessing demographic rates, or eradication efforts. We will employ multiple gear-types during spring, summer, and fall starting in 2023 and continuing into 2024. We will focus sampling efforts in mid-order prairie streams and rivers that are tributaries to the Missouri River and the Platte River in Nebraska. Streams and systems may include the Blue River, Nemaha Rivers, and Papillion Creek, along the Missouri River. Streams and systems may include the Salt Creek, Elkhorn River, Shell Creek, and Loup River along the Platte River. We will use information from eDNA results to direct sampling to locations with

both positive and negative results for presence of invasive carp. Lower reaches of these systems may be accessible by boats using traditional sampling gear. We will sample river and stream reaches higher in the watersheds where traditional methods are not easily employed.



Sonar of block net redirecting Silver Carp.

Photo: Brett Anderson

THE THERMAL TOLERANCE AND HEAT SHOCK PROTEIN REGULATION OF BIGMOUTH SHINER FROM NEBRASKA SANDHILLS STREAMS

Principal Investigator(s): Ella Humphrey,
Jonathan Spurgeon

Duration: June 2023 – May 2025

Funding: UNL UCARE and Cabela's
Apprenticeship

Location: Sandhills Ecoregion and UNL
Aquatic Biodiversity Conservation Laboratory

Stream fishes within the Sandhills Ecoregion of Nebraska may experience extreme environmental shifts due to climate change and an increase in existing anthropogenic pressure on the High Plains Aquifer (HPA; Falke et al., 2011). As a result of climate change, Nebraska is predicted to have an increase in temperature and precipitation; under different emissions scenarios the temperature will increase between 4-9°F while unusually heavy precipitation events will increase between 10-29%. Between periods of heavy precipitation, severe drought will occur, particularly in the summer months (Bathke et al., 2014; Shulski, 2020). The increased temperatures and drought may result in increased plant evapotranspiration with implications for the efficiency at which the HPA can recharge (Falke et al., 2011; Adane et al., 2019). Climate change and associated depletion of the HPA stemming from anthropogenic alteration may result in the disconnection of groundwater-fed streams from the water table and the formation of isolated pools in downstream reaches. Hydrologically isolated pools are then subject to extreme climatic conditions such as increasing temperatures (Falke et al., 2011; Perkin et al., 2015). The long-term effect of groundwater depletion in conjunction with three prolonged droughts occurring between 2001-2013 has already been associated with the rapid extirpation of pelagic stream fishes in the HPA

region (Perkin et al., 2015). Assessments regarding how stream fish adapt to extreme temperature conditions in newly disconnected pools may inform predictions regarding species statuses in the future. The abundance and distribution of bigmouth shiners across varying hydrologic and thermal environments in Nebraska (Hrabik et al., 2015) suggest this species has a level of adaptive capacity to occupy a gradient of conditions. This study will assess how Bigmouth Shiners (*Notropis dorsalis*) occupying Nebraska Sandhills streams may adapt to increased water temperatures caused by climate change by evaluating 1) the difference in thermal tolerance of bigmouth shiners acclimated at 15°C, 20°C, or 30°C, 2) the different heat shock proteins expressed between the three thermally distinct acclimation groups, and 3) the difference in the level of expression of heat shock proteins between the three acclimation groups during heat shock treatment.



Ella Humphrey quantifying fish habitat.
Photo: Braxton Newkirk

WETLANDS OF NEBRASKA: AN OUTREACH AND EDUCATION PROJECT

Principal Investigator(s): Kevin L. Pope, Michael Farrell, Michael L. Forsberg, Ted LaGrange

Producer and Project Manager: Mariah Lundgren

Producer(s): Dakota Altman, Ethan Freese, Grant Reiner, Brooke Talbott

Duration: October 2019 – December 2022

Funding: Environmental Protection Agency; Nebraska Game and Parks Commission; Ducks Unlimited (matching)

Location: Statewide Nebraska

PLATTEBASINTIMELAPSE.COM

Informing people about Nebraska's wetland resources and the important services these systems provide is a keystone to continuing to develop and refine our state's wetland program. The main objective of this project was to produce and distribute a series of integrated outreach and education products to increase awareness of the importance of wetlands in Nebraska and an understanding of the need for wetland conservation. The products include:



Wetlands Team Meeting

Photo: Unknown



WETLANDS
of nebraska

--Five feature films about Nebraska's wetlands and the wildlife and people that depend on them--- Sandhills, Playas, Saline, Riverine, and Urban. The films were produced by the talented Platte Basin Timelapse team at the University of Nebraska-Lincoln, and will take you on a journey across Nebraska. You will meet some interesting characters and will get a chance to see some scenes and wildlife that few people get to experience.

--A shorter overview film.

--Five ESRI StoryMaps---Sandhills, Playas, Saline, Riverine, and Urban.

--An updated Guide to Nebraska's Wetlands and their Conservation Needs publication.

--A new booklet for kids entitled Wetlandology.

--Two educational videos about plant adaptations and animal engineers that were developed specifically for classroom use.

--An educator guide to the products and paired lesson plans for the educational videos are nearing completion and will be shared soon.

These products, which provide up-to-date information about Nebraska's wetlands, are aligned with the Nebraska Statewide education standards and deliver information in a format that is favorable to today's audiences.

Partners on the project include Nebraska Game and Parks Commission's award-winning NEBRASKAland Magazine, the Platte Basin Timelapse group at the University of Nebraska--Lincoln, and Ducks Unlimited.

WORKING TO CONSERVE NEBRASKA ESA SPECIES

Principal Investigator(s): Kevin L. Pope

Duration: August 2023 – December 2032

Funding: U.S. Fish and Wildlife Service

Location: Statewide Nebraska

Nebraska is home to numerous federally threatened and endangered species. The Endangered Species Act of 1973 mandates protection of all individuals of these species, including the habitats on which they depend. The project is a collaboration of researchers and natural

resource managers across multiple agencies, including the U.S. Fish and Wildlife Service and the Nebraska Game and Parks Commission. This project enables quick responses to local (within Nebraska) concerns that arise concerning federal threatened or endangered species.



Piping Plover

Photo: Gene Nieminen U.S. Fish and Wildlife Service national digital library.



Measuring a flathead catfish.

Photo: Justin Haag,
Nebraskaland Magazine

PROFESSIONAL ACTIVITIES



TEACHING

Kevin Pope

Spring 2023: Natural Resources (NRES) 965 - Managed Aquatic Systems

Team taught with Mark Pegg (UNL-SNR) and Samodha Fernando (UNL-Animal Science), this course is designed to increase students' understanding of ecological processes that occur in regulated river basins along with associated problems and opportunities that arise with fishery management (focus is primarily on fishes and microbes). A unique aspect of this course is the presence of all three professors in the classroom; that is, this course is truly team-taught, providing students the formal opportunity to interact with three faculty members that have differing experiences and sometimes differing opinions.

Sarah Sonsthagen

Spring 2023: Natural Resources (NRES) 898 - Special Topics: Applications of Genomics in Conservation

A discussion-based course to further understanding of principles and theories of genomics and genetics of natural populations and how these approaches can be applied to ecological questions to inform conservation.

Jonathan Spurgeon

Spring 2023: Natural Resources (NRES) 803 - Ecological Statistics

Model-based inference for ecological data, generalized linear and additive models, mixed models, survival analysis, multi-model inference and information theoretic model selection, and study design.



Students and Instructors in NRES 965, spring 2023 class.
Photo: Kevin Pope

GRADUATE COMMITTEE SERVICE

Kevin Pope

Paula Guastello (Ph.D., School of Natural Resources, UNL) (ended program December 2023)

Connor Hart (M.S., School of Natural Resources, UNL)

Israt Jahan (Ph.D., School of Natural Resources, UNL)

Matthew Larréy (Ph.D., School of Biology Sciences, UNL)

William Radigan (Ph.D., School of Natural Resources, UNL)

Kelcy Tousignant (M.S., Simon Fraser University)

Sarah Sonsthagen

Joshua Brown (Ph.D., University of Texas at El Paso)

Kathryn Hickie (Ph.D., School of Natural Resources, UNL)

Blake Logan (M.S., School of Natural Resources, UNL)

Jennifer Murray (M.S., University of Nebraska at Omaha)

Katie Piecora (M.S., School of Natural Resources, UNL)

Joseph Spooner (M.S., School of Natural Resources, UNL)

Krista Starr (M.S., School of Natural Resources, UNL)

Brandy Williams (Ph.D., Biological of Sciences, UNL)

Jonathan Spurgeon

Mitch Magruder (M.S., School of Natural Resources, UNL)

Josh Kocik (M.S., School of Natural Resources, UNL)

Caroline LaPlante (M.S., School of Natural Resources, UNL)

Shannon Smith (Ph.D., Virginia Institute of Marine Sciences)

Derek Owens (M.S., University of Arkansas at Pine Bluff)

Andrew Althoff (M.S., University of Arkansas at Pine Bluff)

Jamie Kindschuh (M.S., University of Arkansas at Pine Bluff)

Katie Morris (M.S., University of Arkansas at Pine Bluff)

Geoffrey Stevens (M.S., University of Arkansas at Pine Bluff)

PROFESSIONAL AND FACULTY SERVICE

Kevin Pope

- Member, Book Editorial Advisory Board, American Fisheries Society
- Planning Team Member, Federal Agencies Fisheries Summit
- Member, Nebraska Conservation Roundtable
- Member, Nebraska Invasive Species Council
- Member, UNL School of Natural Resources, Graduate Committee
- Facilitator, University of Nebraska Prairie Streams Working Group
- U.S. Geological Survey Representative, National Fish Habitat Action Plan-Reservoir Partnership

Sarah Sonsthagen

- Associate Editor, *Frontiers in Conservation Science*.
- Associate Editor, *Ornithological Applications*.
- Member, Rainwater Basin Joint Venture, Conservation Planning Workgroup
- Member, UNL School of Natural Resources, Graduate Course Organization Committee
- Reviewer, Wilson Ornithological Society Research Grants

Jonathan Spurgeon

- Associate Editor, *North American Journal of Fisheries Management*
- Member, UNL School of Natural Resources, Graduate Course Organization Committee
- Member, University of Nebraska Prairie Streams Working Group
- Member, U.S. Geological Survey Prairie Streams and Fishes Research Initiative

TRAINING ASSISTANCE, WORKSHOPS, AND OUTREACH ACTIVITIES

Kevin Pope

- Instructor, Over-the-Water training course, Lincoln, NE
- Instructor, ATV/UTV Operator Safety Training Course, Lincoln, NE

Sarah Sonsthagen

- Presenter *The Arctic in a changing environment: examples wildlife*, Kansas State University, Division of Biology Seminar.

Jonathan Spurgeon

- Invited Author, article for the Wildlife Management Institute's *Outdoor News Bulletin*
- Instructor. Over-the-Water training course, Lincoln, NE
- Instructor. Motorboat Operators Certification Course, Lincoln, NE

IANR Discovery Days

The Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln had a series of events focused on sharing campus’ science with the local community while building relationships. The “East Campus Discovery Days and Farmers Market” occurred in June, July, and August. NECFWRU showcased boats we use out in the field, provided information to the community of the different studies and projects we work on, and highlighted the importance of our unit.



Jonathan Spurgeon showing Liam and Eloise Collins NECFWRU's airboat.

Photo: Jessica Collins

Collaborations

Jessica Collins helping with clean up along
Deadman's Run on UNL East Campus.

Photo: Donna Robinson



Donna Robinson working with NGPC
at Fort Robinson for family camp.

Photo: Christy Christianson

PRESENTATIONS

83rd Midwest Fish and Wildlife Conference

Hansen, K. F., M. A. Kaemingk, K. A. Hurley, C. J. Chizinski, and K. L. Pope. 2023. Influence of demographics of fish license holders on recreational participation. 83rd Annual Meeting, Midwest Fish and Wildlife Conference, Overland Park, Kansas.

Hart, C. H., J. J. Spurgeon. 2023. In-stream heterogeneity analysis and prediction of distributions for tier-1 cyprinids using modelling of fluvial and related landscape features of Nebraska streams. 83rd Midwest Fish and Wildlife Conference. Overland Park, Kansas.

Kane, D. S., and K. L. Pope. 2023. Using recreational creel surveys to address fisheries management questions. 83rd Annual Meeting, Midwest Fish and Wildlife Conference, Overland Park, Kansas.

LaPlante, C. M., K. L. Pope, C. J. Chizinski, and K. D. Steffensen. 2023. Fisher satisfaction in the presence of invasive species. 83rd Annual Meeting, Midwest Fish and Wildlife Conference, Overland Park, Kansas.

Logan, B., and J. J. Spurgeon. 2023. Population Connectivity, Demographics, and Occupancy of Invasive Carp in the Platte River and its Tributaries. 83rd Midwest Fish and Wildlife Conference. Overland Park, Kansas.

Newkirk, B.M. and J. Spurgeon. 2023. Abiotic and biotic environmental associations of at-risk fish species occurrence in the Sandhills Ecoregion, Nebraska. 83rd Midwest fish and Wildlife Conference, Overland Park, Kansas (poster).

Pullano, C., J. Ruoss, J. Spurgeon, and M. Pegg. 2023. Monitoring Pallid Sturgeon in the lower Platte River and its tributaries. 83rd Midwest Fish and Wildlife Conference. Overland Park, Kansas.



Kyle Hansen presenting at Midwest Fish & Wildlife.

Photo: Kevin Pope

Spooner, J., and J. J. Spurgeon. 2023. p-Chip microtransponders: field applications to population demographics of Northern Pearl Dace. 83rd Midwest Fish and Wildlife Conference. Overland Park, Kansas.

Urichich, J., and J. J. Spurgeon. 2023. Seasonal bigheaded carp (*Hypophthalmichthys* spp.) reproductive readiness and recruitment variation along a hydrological gradient in Nebraska's prairie streams. 83rd Midwest Fish and Wildlife Conference. Overland Park, Kansas.

102nd Annual Meeting of the American Society of Mammalogists

Hafliger, T. J., R. E. Wilson, A. G. Hope, S. A. Sonsthagen. 2023. Landscape genomics of free-ranging deer (*Odocoileus*) within Kansas. The 102nd Annual Meeting of the American Society of Mammalogists, Anchorage, Alaska.

Talbot, S. L., Sage, G. K., Farley, S. D., Lindqvist, C., Cook, J. A., Rode, K., and Sonsthagen, S. A. 2023. Diversity at genes associated with immune response in two eastern Beringian ursids. The 102nd Annual Meeting of the American Society of Mammalogists, Anchorage, Arkansas.

153rd American Fisheries Society

Althoff, A., S. Lochmann, J. Stevens, and J. Spurgeon. 2023. Diel Movements and Macrohabitat Use of Silver Carp in Arkansas. Annual Meeting, American Fisheries Society. Grand Rapids, Michigan. August 2023.

LaPlante, C. M., C. J. Chizinski, K. L. Pope, and K. D. Steffensen. 2023. Relevancy of fishing: the influence of invasive species on recreational fisher satisfaction. 153rd Annual Meeting, American Fisheries Society, Grand Rapids, Michigan.

Spooner, J., and J. Spurgeon. 2023. Population demographics of Northern Pearl Dace in the Nebraska Sandhills Ecoregion. National Meeting, American Fisheries Society. Grand Rapids, Michigan. August 2023.

Stevens, J., C. Barshinger, J. Spurgeon, M. Eggleton, and S. Lochmann. 2023. Environmental Influences on Silver Carp Population Ecology across the Mississippi River Basin. Annual Meeting of the American Fisheries Society. Grand Rapids, Michigan. August 2023.

Wall, H., A. Althoff, R. Gary, J. Kaiser, J. Kindschuh, D. Owens, L. Olhausen, J. Spurgeon, J. Stevens, and S. Lochmann. 2023. Brown Trout Catch and Release Survival and Movement in a Southern Hydropeaking Tailwater. Annual Meeting of the American Fisheries Society. Grand Rapids, Michigan. August 2023.

Annual Nebraska Natural Legacy Conference

Newkirk, B.M. and J.J. Spurgeon. 2022. Multi-scale habitat associations of fishes of Greatest Conservation Need in the Sandhills Ecoregion, Nebraska. Annual Nebraska Natural Legacy Conference, Chadron, Nebraska.

Hart, B.M. and J.J. Spurgeon. 2022. In-stream heterogeneity analysis and prediction of distributions for tier-1 cyprinids using modelling of fluvial and related landscape features of Nebraska streams. Annual Nebraska Natural Legacy Conference, Chadron, Nebraska.

Latin America and Caribbean Fisheries Congress

Pope, K. L., S. Bonar, and N. Mercado-Silva. 2023. Updating AFS standard methods for sampling freshwater fish in North America. Latin America and Caribbean Fisheries Congress, Cancun, Mexico.

Missouri Natural Resource Conference

Hansen, K. F., M. A. Kaemingk, K. A. Hurley, C. J. Chizinski, and K. L. Pope. 2023. Influence of demographics of fish license holders on recreational fishing. Annual Meeting, Missouri Natural Resource Conference, Osage Beach, Missouri.

Southern Division American Fisheries Society Annual Meeting

Althoff, A., J. Spurgeon, J. Stevens, J. Kindschuh, and S. Lochmann. 2023. Movement Behaviors of Invasive Silver Carp *Hypophthalmichthys molitrix* in Two Rivers of Central Arkansas. Southern Division American Fisheries Society Annual Meeting. Norfolk, Virginia.

Morris, K. M., J. J. Spurgeon, D. T. Lynch, M. Cole, and S. E. Lochmann. 2023. Using boosted regression tree model to predict road-stream crossing barrier severity scores in the Ouachita Mountain Ecoregion in west-central Arkansas. Southern Division American Fisheries Society. Norfolk, Virginia.

Stevens, J. N., C. E. Barshinger, J. J. Spurgeon, M. A. Eggleton, and S. E. Lochmann. 2023. Environmental influences on Silver Carp population ecology across the Mississippi River basin. Southern Division American Fisheries Society Annual Meeting. Norfolk, Virginia.

DATA RELEASES

Sonsthagen, S. A., and B. J. Pierson. 2017. Peregrine Falcon (*Falco peregrinus*) mtDNA and microsatellite genetic data, Alaska, Canada and Russia, 1880-2012 (ver 2.0, June 2022): U.S. Geological Survey data release, <https://doi.org/10.5066/F7F18WV0>

Sonsthagen, S. A., and S. L. Talbot. 2020. Genetic data from Cooper's Hawks, North America North America (ver 2.0, January 2022): U.S. Geological Survey data release, <https://doi.org/10.5066/P914SGB1>

Sonsthagen, S. A., and R. E. Wilson. 2020. Genomic data from ptarmigan and grouse, Alaska (ver 2.0, December 2021): U.S. Geological Survey data release, <https://doi.org/10.5066/P9DDB01R>

Sonsthagen, S. A., R. E. Wilson, P. Lavretsky, and S. L. Talbot. 2021. Genomic data of North American Sea Ducks: U.S. Geological Survey data release, <https://doi.org/10.5066/F7T43RK9>

Sonsthagen, S. A., R. E. Wilson, S. M. Matsuoka, J. A. Johnson, D. W. Demarest, D. Stralberg, and L. L. Powell. 2021. Rusty blackbird (*Euphagus carolinus*) genetic data, North America: U.S. Geological Survey data release, <https://doi.org/10.5066/F7T43R9Q>



Kevin Pope presenting at the 2022-2023 Nebraska Cooperative Annual Meeting.

Photo: Donna Robinson

PEER-REVIEWED PUBLICATIONS

2023

Augusto da Silva Coelho, F., S. Gill, C. M. Tomlin, M. Papavassiliou, S. D. Farley, J. A. Cook, S. A. Sonsthagen, G. K. Sage, T. H. Heaton, S. L. Talbot, and C. Lindqvist. 2023. Ancient bears provide insights into Pleistocene ice age refugia in Southeast Alaska. *Molecular Ecology* 33:36413656.

Bouska, K., B. Healy, M. Moore, C. Dunn, J. Spurgeon, and C. Paukert. 2023. Diverse portfolios: investing in tributaries for restoration of large river fishes in the Anthropocene. *Frontiers in Environmental Science*. 11:1151315.

Christie, K., R. E. Wilson, J. A. Johnson, C. Friis, C. Harwood, L. McDuffie, E. Nol, and S. A. Sonsthagen. 2023. Movement and genomic methods reveal mechanisms promoting connectivity in a declining shorebird: the lesser yellowlegs. *Diversity* 15(5):595.

De Amaral, F., R. E. Wilson, S. A. Sonsthagen, R. Sehgal. 2023. Diversity, distribution, and methodological considerations of Haemosporidian infections among Galliformes in Alaska. *International Journal for Parasitology: Parasites and Wildlife* 20:122132.

Fill, C. T., C. R. Allen, J. F. Benson, and D. Twidwell. 2023. Spatial and temporal activity patterns among sympatric tree-roosting bat species in an agriculturally dominated great plains landscape. *PloS ONE* 18(6):e0286621.

Franz, M., L. Whyte, T. Atwood, D. Menning, S. Sonsthagen, S. Talbot, K. Laidre, E. Gonzalez, and M. McKinney. 2023. Fecal DNA metabarcoding shows credible short-term prey detections and explains variation in the gut microbiome of two polar bear subpopulations. *Marine Ecology Progress Series* 704:131147.

Gaughan, S., J. A. Kyndt, J. D. Haas, K. D. Steffensen, P. M. Kočovský, and K. L. Pope. 2023. Using the gut microbiome to assess stocking efforts of the endangered Pallid Sturgeon, *Scaphirhynchus albus*. *Lite* 13:309.

Melstrom, R. T., M. A. Kaemingk, N. W. Cole, J. C. Whitehead, C. J. Chizinski, and K. L. Pope. 2023. Valuing angling on reservoirs using benefit transfer. *North American Journal of Fisheries Management* 43:400-416.

2022

Chizinski, C. J., M. P. Gruntorad, J. J. Lusk, L. R. Meduna, W. M. Inselman, and J. J. Fontaine. 2022. The influence of the COVID-19 pandemic on spring turkey hunting. *Journal of Wildlife Management* 86:e22202.

Corral, L., T. J. Frink, and J. J. Fontaine. 2022. Is time partitioning the currency of coexistence for a grassland canid community? *Wildlife Biology* 2022:e01027.

Corral, L., E. F. Stuber, T. J. Frink, A. A. Bishop, and J. J. Fontaine. 2022. Can scale-dependent landcover relationships explain canid community composition independent of intraguild occupancy? *Landscape Ecology* 37:249266.

DaRugna, O. A., C. J. Chizinski, K. L. Pope, L. A. Powell, and M. A. Kaemingk. 2022. Visualizing social-ecological intensities for sustainable management of complex systems. *Journal of Environmental Management* 304:114224.

DaRugna, O. A., M. A. Kaemingk, C. J. Chizinski, and K. L. Pope. 2022. Heterogeneity of recreationists in a park and protected area. *PLoS ONE* 17(5):e0268303.

- Donovan, V. M., C. P. Roberts, D. T. Fogarty, D. A. Wedin, and D. Twidwell. 2022. Targeted grazing and mechanical thinning enhance forest stand resilience under a narrow range of wildfire scenarios. *Ecosphere* 13:e4061.
- Eaton, M. D., P. Benites, L. Campillo, R. E. Wilson, and S. A. Sonsthagen. 2022. Gull plumages are, and are not, what they appear to human vision. *Annales Zoologici Fennici* 59:187-203.
- Elmore, J. A., M. R. Fullerton, D. T. Fogarty, and S. R. Loss. 2022. Do Red-cockaded Woodpecker (*Dryobates borealis*) cavity locations provide olfactory concealment from predators? *The Wilson Journal of Ornithology* 134:148-154.
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Kevin Pope, Jordan Katt, and Tony Barada electrofishing along the Branched Oak Lake, Nebraska.

Photo: Keith Hurley

GRAND VISION

Our nation's fish and wildlife species face increasingly complex threats and challenges. Ensuring a healthy future for these species and resources benefits all Americans, contributing to the abundance of our food supply, the well-being of diverse cultures and communities, and the future of biodiverse ecosystems. The Nebraska Cooperative Fish and Wildlife Research Unit plays a critical role in making that future possible.

EVOLVING CHALLENGES DEMAND EVOLVING INSIGHTS

We advance knowledge and understanding through cutting-edge, interdisciplinary science.

COMPLEX CHALLENGES CALL FOR COLLABORATION

We work closely with a wide range of partners, build mutually beneficial and respectful relationships, and connect diverse stakeholders with one another.

INFORMED DECISION-MAKING REQUIRES ACCURATE DATA

We provide timely information and innovative tools to partners in all aspects of ecosystems stewardship, from the conservation and sustainable use of crucial fisheries and wildlife to the recovery of imperiled species.

WISE CONSERVATION NEEDS TRUST

We conduct and provide unbiased, policy-neutral scientific research for use in determining management policy and practice.

Through the 21st century and beyond, the Nebraska Cooperative Fish and Wildlife Research Unit will use our expertise, state-of-the-art equipment and facilities, and unique association with the Nebraska Game and Parks Commission, the University of Nebraska–Lincoln, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and the Wildlife Management Institute (and many other stakeholders) to deliver the targeted research and foundational scientific advancements needed to conserve fish and wildlife species in a changing world.



Nick Manzi holding a flathead catfish during barge electrofishing on Salt Creek, Nebraska.

Photo: Blake Logan

