



2020 Annual Report

July 2019 — June 2020

Cooperating Agencies:

U.S. Geological Survey

Iowa Department of Natural Resources

Iowa State University

U.S. Fish & Wildlife Service

The Wildlife Management Institute

Iowa Cooperative Fish & Wildlife Research Unit

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Personnel and Cooperators

Unit Coordinating Committee

Michael Tome

Units Supervisor Cooperative
Research Units
U.S. Geological Survey, Ecosystems

Stephen Dinsmore

Interim Department Chair
Natural Resource Ecology & Management Iowa
State University

Dale Garner

Conservation & Recreation Division Chief
Iowa Department of Natural Resources

Bill Moritz

Midwest Representative
The Wildlife Management Institute

Todd Bishop

Wildlife Bureau Chief
Iowa Department of Natural Resources

Craig Czarnecki

Assistant Regional Director
U.S. Fish & Wildlife Service

Joe Larscheid

Fisheries Bureau Chief
Iowa Department of Natural Resources

Unit Faculty & Staff

Robert W. Klaver	Unit Leader and Professor of Natural Resource Ecology & Management
Clay L. Pierce	Assistant Unit Leader, Fisheries, and Professor of Natural Resource Ecology & Management
Open Position	Assistant Unit Leader, Wildlife
Casey Constable	Administrative Specialist, Department of Natural Resource Ecology & Management

Graduate Students

Ben Johnson, MS*
Ben Luukkonen, MS
Bridget Nixon, PhD
Dylan Osterhaus, MS
Jordan Giese, PhD
Karri Folks, PhD
Katelyn Miller, MS
Matt Stephenson, PhD
Nathan Tillotson, MS
Samuel Leberg, MS

Collaborating Professors

Adam Janke, NREM
Brian Wilsey, EEOB
Cassandra Nuñez, NREM
Greg Courtney, Entomology
Julie Blanchong, NREM
Kevin Roe, NREM/EEOB
Lisa Schulte-Moore, NREM
Michael J. Weber, NREM
Miranda Curzon, NREM
Stephen Dinsmore, NREM
Timothy Stewart, NREM

*Graduated

New Projects

Developing Capture Techniques and Monitoring the Movement of Sandhill Cranes Breeding in Iowa

Principal Investigator: Robert W. Klaver
Student Investigator:
Collaborators: Orrin Jones and Matthew Garrick
Duration: July 2019 – December 2021
Funding Source(s): PR funds through Iowa DNR

Goals and Objectives:

Sandhill cranes (*Antigone canadensis*) are recolonizing Iowa; however, their population affinity is uncertain. Sandhill cranes are assumed to be affiliated with the Eastern Population, which are primarily found in the Great Lakes states of eastern Minnesota, Wisconsin and Michigan. However, recent research in Minnesota discovered that cranes on the western periphery of the EP might overlap with mid-continent population sandhill cranes (MCP) thereby calling into question the affiliation of Iowa's cranes. It is increasingly important to improve our understanding of Iowa's breeding cranes. The most direct way to do so is through a field research project. However, cranes are a novel species in the modern-day Iowa landscape and there is very little previous work to rely upon. This is a pilot project to assess the feasibility of capturing sandhill cranes in Iowa.

Objectives:

1. Assess the feasibility of capturing breeding sandhill cranes in Iowa.
2. Monitor the habitat use and migration of captured cranes via GPS transmitters.

Progress:

We purchased all equipment needed for the project, including the VHS transmitters for colts and GPS/GSM transmitters for adults. We captured one adult crane on 24 May with locations automatically transmitted to Movebank.org for archiving.

CORVID-19 affected the study plan this year. We are not able to hire a technician this year through Iowa State University. The University mandated they will not allow new projects to start this year, but

Future Plans:

We will continue to monitor the activity of the crane with the transmitter for movements and the survival of family members. We will continue to capture additional cranes.

Continuing Projects

Acoustic Monitoring for Iowa Bats

Principal Investigator(s):	Julie Blanchong Adam Janke
Student Investigator:	
Collaborators:	Kelly Poole, Iowa DNR Stephanie Shepherd, Iowa DNR
Duration:	June 1, 2015 – December 31, 2020
Funding Source(s):	Iowa Department of Natural Resources

Goals and Objectives:

- Conduct acoustic surveys along drive transects and in fixed-locations to monitor bat activity
- Develop outreach materials to educate Iowa citizens about white-nose syndrome

Progress:

White-Nose Syndrome (WNS), a devastating disease associated with the mortality of millions of bats, was first documented in New York during the winter of 2005-2006, and is now confirmed in Iowa. The loss of large numbers of bats due to WNS is expected to have enormous economic impacts to agriculture. Knowledge of the abundance and distribution of bat species in Iowa is critically needed to understand the potential ramifications of WNS to Iowa. To gather data on bat abundance and distribution in Iowa, acoustic monitoring has been conducted for several summers along transects in eastern, central and southern Iowa.

In 2019, as in previous summers, we worked with the Iowa Department of Natural Resources (IDNR) to recruit and train volunteers to conduct the acoustic surveys. Relying on well-trained local volunteers to conduct drive transects was efficient and cost effective. It also increased public engagement with the project and public awareness of bats and the threat of WNS. Citizen scientists collected bat echolocation data on 14 drive transects in central, eastern, and southern Iowa and at 6 fixed-location survey sites. Each transect and stationary site was surveyed once in June and again in July.

Outreach efforts to educate landowners about bat and forest management took place through online webinars. Participants were eligible to receive tree seedlings to plant on their property to promote bat habitat.

Future Plans:

We will continue to conduct drive transect and stationary site surveys in summer 2020 to record echolocation calls. Additional drive transects and stationary sites will be added and will be designed to fit within the North American Bat Monitoring Program guidelines. ISU will train DNR volunteers and provide them will supplies to collect data. ISU will continue to be responsible for analyzing the data collected by the volunteers to quantify bat activity and identify bat species.

Survey of Psammophilic Insects in Iowa

Principal Investigator: Gregory Courtney
Student Investigator:
Collaborators:
Duration: April 2018 – April 2021
Funding Source(s): Iowa Department of Natural Resources
Wildlife Diversity Small Grants Program

Goals and Objectives:

Short-term goals:

1. Survey shifting-sand and marginal sand-bar habitats across the state for the presence and abundance of psammophilic (“sand-loving”) taxa.
2. Gather phenological and other life-history information on resident psammophilic taxa.
3. Correlate taxon richness with environmental/habitat variables to identify potential indicator taxa.
4. Make lists of taxa and images available as an interactive web-based e-source.

Long-term products:

Because this habitat has been largely ignored in most benthic surveys, this study will provide range extension information for many taxa and new records of insect species to Iowa. Specimens in ethyl alcohol will provide fresh specimens to be utilized for molecular- and phylogenetic analyses.

Progress:

To effectively survey psammophilic aquatic insects, it is necessary to sample substrates that are inherently unstable (i.e., shifting-sand!). This can be problematic (and dangerous) when river levels are high. Mid- to late-summer 2018 and 2019 were exceptionally wet in Iowa, especially in the northern half of the state. The frequency of storms through May and June led to flooding and consistently high river levels throughout the area, as well as in downstream reaches of major watersheds (e.g., Des Moines River, Iowa River). Except for sporadic and infrequent access to rivers in eastern- and central Iowa, sampling was not possible and, even in areas where sampling was possible, marginal psammophilic habitats (vs. truly aquatic habitats) were often the only alternative.

Despite high river levels during early and mid-summer, surveys were conducted in late summer at 19 locations, all in either eastern or central Iowa. Most samples were from marginal sand rather than truly aquatic habitats, again because of high water levels. Almost all marginal samples contained a predictable assemblage of psammophilic Carabidae (e.g., *Bembidion* Latreille, *Chlaenius* Bonelli, *Clivina* Latreille, *Elaphrus* Fabricius, & *Omophron* Latreille). *Omophron* samples include 3 known species. Most truly aquatic samples include nymphs of the Common Sanddragon (*Progomphus obscurus* (Rambur)). Because of consistently high river levels during early and mid-summer, no collections of the mayfly, *Pseudiron centralis* McDunnough, were possible.

Future Plans:

Because of atypical and persistently high river-levels during summer 2018 and 2019, and their negative impact on resident populations of psammophilic organisms, I requested another 1-year extension on this grant. My hope is that 2020 will be an “average” year for precipitation and river levels, so I can effectively sample Iowa’s psammophilic taxa throughout the summer (and throughout the state!). For these reasons, another 1-year extension was granted.

Evaluation of Forest and Wildlife Responses to Aerial Applications of Glyphosate

Principal Investigator:	Miranda Curzon
Student Investigator:	Katrina Fernald
Collaborators:	Tyler Harms, Iowa DNR
Duration:	November 2018 - June 2021
Funding Source(s):	U.S. Fish and Wildlife Service's Wildlife Restoration Program and the Iowa DNR Fish and Wildlife Trust Fund

Goals and Objectives:

Objective 1. Quantify forest vegetation response to fall aerial glyphosate application and invasive honeysuckle removal. This will include an assessment of impacts to understory herbaceous plants, shrub species, tree seedlings and saplings, and mature overstory trees.

Objective 2. Evaluate the impact of spray timing on the effectiveness of aerial glyphosate treatment of invasive honeysuckle.

Progress:

With a crew of five (one graduate student and four technicians), we completed pre-treatment vegetation sampling at all three sites (Red Rock, Rathbun, and Mount Ayr WMAs) during summer 2019. This included sampling of herbaceous and woody vegetation in all strata. Additionally, the forest breeding bird community was sampled with bird counts. We also installed deer exclosures to enable assessment of the potential interactive effects of honeysuckle and deer browse on tree regeneration. Weather conditions prevented spray treatments from being applied in November, 2019, so we have identified areas that were sprayed for honeysuckle in previous years to sample during summer, 2020 for comparison with heavily infested and untreated stands already identified and sampled.

Future Plans:

The graduate student, Katrina Fernald, will work with a single field technician to repeat bird counts in the original stands identified and sampled in 2019. They will also sample vegetation and conduct bird counts in newly added stands that were treated in previous years in order to quantify the impact of aerial spray on vegetation structure and forest bird habitat. An additional graduate student is being recruited to continue with the study, now delayed by a year. Aerial treatment of selected plots is scheduled for late Fall, 2020.

Multiple Species Inventory and Monitoring (MSIM) Program

Principal Investigator:	Stephen J. Dinsmore
Student Investigator:	~20 seasonal field technicians
Collaborators:	Karen E. Kinkead, Iowa DNR Rachel A. Vanausdall, Iowa State University
Duration:	July 2015 to January 2023
Funding Source(s):	Iowa Department of Natural Resources, State Wildlife Grant

Goals and Objectives:

- Conduct MSIM surveys for birds, mammals, amphibians, reptiles, fish, mussels, butterflies, odonates, and crayfish on 50 Wildlife Management Areas annually during 2015-2018.
- Conduct MSIM surveys on 10-20 additional properties in 2016, 2017, and 2018.
- Enter collected data into the MSIM on-line database, submit county occurrence records to the appropriate Iowa WAP taxonomic subcommittee, provide additionally requested information to the IWAP subcommittees as requested, and change database records as advised.
- Analyze data using (but not limited to): Proportion of area occupied and species density (where applicable) using habitat variables from the field and/or GIS where applicable.

Progress:

In 2019 the MSIM program employed 5 field crews of 4-5 technicians each (26 technicians in total) stationed in Boone, Ruthven, Chariton, Tripoli, and Iowa City. Fieldwork for this project began with training in late March and ended on 15 October 2019. The field season began with a training session at the Boone Wildlife Research Station in late March 2019 to prepare field technicians for the field season and familiarize them with the MSIM protocols. We completed surveys implementing MSIM protocols at 69 study sites across Iowa. This total includes the 50 traditionally surveyed “permanent” MSIM sites, 15 additional public lands sites, and 4 private lands sites in an effort to expand MSIM data coverage beyond only public lands sites. All species observed during surveys were recorded with special focus given the Species of Greatest Conservation Need (SGCN). All collected data were entered into the MSIM online database.

This effort includes >1800 wildlife surveys conducted on these study sites and approximately 100 survey-related tasks such as site setup and teardown. A summary of species seen by taxa includes 35 mammals (7 SGCN), 203 birds (65 SGCN), 60 herpetofauna (41 SGCN), 79 odonates (10 SGCN), 54 lepidoptera (7 SGCN), 62 fish (21 SGCN), and 8 crayfish. We encountered many noteworthy sightings in several taxonomic groups as is usual for this program. We also made important contributions to national monarch conservation efforts by publishing two important invited papers in a national journal (*Frontiers in Ecology and Evolution*) that use the MSIM data.

Future Plans:

Field work ended in fall 2019 and a new grant (2020-2022) will continue this work for another three years. We are also working to produce more peer-reviewed publications from this important long-term monitoring.

Behavioral and Physiological Responses to Anthropogenic Disturbance in Bighorn Sheep

Principal Investigator:	Robert W. Klaver
Student Investigator:	Benjamin Johnson
Collaborators:	Cassandra Nuñez
Duration:	August 2018 – August 2022
Funding Source(s):	Iowa State University, bureau of Land Management, and the University of Memphis

Goals and Objectives:

This project covers two studies. Benjamin Johnson conducted a survey of how visitors to Glacier National Park, Montana perceived their interactions with wildlife and how they saw their presence affected resident species.

In the second phase of this project we are developing a respiratory disease monitoring program for bighorn sheep by comparing the behavior of bighorn sheep in the Park compared to populations outside of the Park with recent exposure to disease.

Glacier National Park provides refuge to iconic North American species, including bighorn sheep (*Ovis canadensis*), whose range covers diverse Department of Interior lands. Across this range, bighorns face the ongoing threat of a polymicrobial infection, Bighorn Sheep Respiratory Disease, which can reduce juvenile survival for many years, decimate populations, and lead to local extinctions. Although Glacier's bighorns are thought to be free of the disease, a corridor of contiguous wilderness connects Glacier to populations that have tested positive for the most critical pathogen associated with this disease, *Mycoplasma ovipneumoniae*. As such, efficient biosurveillance programs are essential to anticipating and mitigating the effects of Bighorn Sheep Respiratory Disease outbreaks in Glacier National Park.

However, molecular screening for Bighorn Sheep Respiratory Disease is financially and logistically challenging, requiring physical capture and multiple lab assays. Such costs preclude large-scale, continuous biosurveillance, potentially missing detections and hindering risk assessment. We will address this issue by developing an animal-behavior-based, citizen-driven biosurveillance program for Bighorn Sheep Respiratory Disease in Glacier National Park. We are cooperating with Glacier National Park, U.S. Forest Service, and Montana Fish, Wildlife, and Parks staff on this project. We will provide the NPS with a tool to detect Bighorn Sheep Respiratory Disease and thus determine when mitigation strategies are necessary.

Progress:

Benjamin Johnson successfully completed his MS program in May 2020. The average visitor was aware that their activities can affect wildlife; however, agreement with this statement was affected by demographic factors and general views on wildlife welfare. He concluded that visitors differentially recognized their impacts on wildlife. Mitigating human-wildlife conflict will continue to require both studies of wildlife behavioral ecology and research on the human dimensions of conservation and management.

We were not able to conduct fieldwork during summer 2020 due to safety concerns surrounding COVID-19.

Future Plans:

Sidney Brenkus will begin her MS program at University of Memphis in Fall 2020 and will conduct fieldwork during summers 2021 and 2022 in Montana on the sheep populations.

Ecology of Canada Geese in Urban Areas of Iowa

Principal Investigator:	Robert W. Klaver
Student Investigator:	Benjamin Luukkonen
Collaborators:	Orrin Jones, Iowa DNR
Duration:	June 2018 – October 2021
Funding Source(s):	PR funds through Iowa Department of Natural Resources

Goals and Objectives:

- Evaluate the movement of Canada geese captured in urban areas. Compare movements of the urban geese to the movements of geese captured in rural locations where the goose hunting season is closed.
- Determine the susceptibility of Canada geese captured in urban areas to hunting during the Special September Canada Goose season and the conventional Canada goose hunting season.
- Estimate annual harvest and survival rates for Canada geese captured in urban areas.
- Evaluate a three age-class model to estimate harvest and survival rates of Canada geese in Iowa.
- Where possible incorporate both live recaptures and dead recoveries to improve statistical precision and accuracy to band recovery models.

Progress:

We have attached 61 GPS/GSM transmitters to 79 resident Canada geese and collected > 2 million locations. Annual harvest and survival rates were calculated from both live recaptures and dead recoveries using the three age-class model.

Future Plans:

Benjamin Luukkonen is writing his thesis and preparing two manuscripts for publication. One manuscript is on movement ecology of the geese, the other is an analysis of the long-term goose banding data.

Monitoring Iowa's North American River Otter and Bobcat Populations

Principal Investigator:	Robert W. Klaver
Student Investigator:	Bridget Nixon
Collaborators:	Vince Evelsizer, Iowa DNR
Duration:	April 2015 to January 2021
Funding Source(s):	Iowa Department of Natural Resources Drake University

Goals and Objectives:

Data collected on otter and bobcat populations in Iowa by DNR staff can be used to estimate survival, harvest, age structure, and population trend using statistical population reconstruction modelling. These data, along with ancillary data, may be used to help monitor population trends in these furbearers. Similarly, to previous work done with Iowa bobcats, a habitat suitability map will also be created to better understand the relationship between landscape and habitat characteristics and otter populations.

Objectives:

1. Comparing conventional population indices to statistical population reconstruction (SPR) / integrated population modelling (IPM) to determine which model provides superior inferences that warrant its use as an otter and bobcat management tool.
2. Performing SPR / IPM to provide estimates on otter and bobcat survival, age structure, recruitment, harvest, and population trends in Iowa.
3. Using GIS to, develop a river otter habitat suitability map for Iowa based on the number of otters trapped per HUC 12 watersheds as a function of land cover and landscape metrics comparable to the suitability map developed for the bobcats.
4. Validating the habitat suitability map created in item 3.
5. Evaluating the value of current data sources and simulating potential gains by including additional auxiliary data for use in managing Iowan furbearers.
6. Publishing a final report and outlining recommendations to the Iowa DNR for future furbearer monitoring.

Progress:

We have located bobcat and river otter teeth and submitted them for aging. We have assembled locations of river otters harvested. A draft manuscript on river otter habitat suitability was prepared.

Future Plans:

We are developing an integrated population model for bobcats and river otters. Bridget Nixon is completing her dissertation.

An Index of Oxbow Restoration Quality for Topeka Shiners Based on the Fish Assemblage

Principal Investigator: Clay L. Pierce
Kevin J. Roe
Michael J. Weber

Student Investigator: Dylan M. Osterhaus

Collaborators: Corey McKinney, Iowa Soybean Association
Dan Campbell, Syngenta Crop Protection LLC
Karen Wilke, The Nature Conservancy
Aleshia Kenney, U.S. Fish and Wildlife Service

Duration: January 2019 – December 2021

Funding Source(s): Iowa Soybean Association

Goals and Objectives:

The overall goal of this study is to develop an index of oxbow restoration quality (index) for conservation of endangered Topeka shiners based on characteristics of the fish assemblage. The specific objectives are to:

1. Compile all existing data on fish assemblages in restored oxbows, including abundance of Topeka shiners and associated environmental data (water quality, habitat, restoration status)
2. Develop the index and apply to all oxbows with fish assemblage data
3. Test the index with a subset of existing test data, new data from concurrent restorations, and with environmental data
4. Synthesize results and provide public outreach, management guidance, and both oral and published dissemination of findings.

Progress:

Data from existing sources have been located and stored in a searchable database. The graduate student was recruited and has begun work.

Future Plans:

Compiling and screening existing data and development of the index will commence in summer of 2019. Testing of the index with a subset of the existing data will be done in late 2019 or 2020. Fieldwork in newly restored oxbows will commence in summer of 2019 and testing of the index with these new data will be done in 2021.

Effects of Tile Drainage on Restored Oxbows as Habitat for Endangered Topeka Shiners and Other Biota

Principal Investigator): Clay L. Pierce
Timothy W. Stewart

Student Investigator: Samuel S. Leberg

Collaborators: Keith E. Schilling, Iowa Geological Survey
Corey McKinney, Iowa Soybean Association
Dan Campbell, Syngenta Crop Protection LLC
Karen Wilke, The Nature Conservancy
Aleshia Kenney, U.S. Fish and Wildlife Service

Duration: January 2019 – December 2021

Funding Source(s): Iowa Soybean Association
ISU-NREM

Goals and Objectives:

The purpose of this study is to test whether a promising approach for reducing nutrient export to Iowa's waterways has consequences for an endangered species and other biota. This research will quantify the establishment of biota and habitat conditions in recently restored oxbows, with and without tile drainage, to test the effects of tile drainage on conservation benefits of oxbow restoration. The specific objectives are to:

1. Characterize habitat in two restored oxbows with tile drainage and two without tile drainage, and describe and test for differences between the two tile treatments
2. Characterize plants in two restored oxbows with tile drainage and two without tile drainage, and describe and test for differences between the two tile treatments
3. Characterize fish assemblages in two restored oxbows with tile drainage and two without tile drainage, and describe and test for differences between the two tile treatments
4. Characterize macroinvertebrate assemblages in two restored oxbows with tile drainage and two without tile drainage, and describe and test for differences between the two tile treatments

Progress:

Data from existing sources have been compiled and stored in a searchable database. The graduate student was recruited and has begun work. Preliminary site selection in coordination with stakeholders and landowner contact has begun. Fieldwork is being planned.

Future Plans:

Fieldwork in newly restored oxbows will commence in summer of 2019. Preliminary analyses will take place in late 2019. The activities will be repeated in 2020, and final analyses will be completed in 2021.

Evaluating Restored Mussel Population Genetics and Survivorship

Principal Investigator: Kevin J. Roe
Clay Pierce

Student Investigator: Katie Miller

Collaborators: MN DNR

Duration: Spring 2019 - Fall 2020

Funding Source(s): SWG-C

Goals and Objectives:

1. Monitor released mussels to establish survival percentages at 3 release site in Iowa.
 - a. We expect to be able to document annual growth for any individuals captured in more than one year of follow-up monitoring.
2. Analyze genetic diversity of source population for at least one target species.

Progress:

MS student Katie Miller will be conducting a survey this summer to identify suitable reintroduction sites for propagated juvenile mussels. To date the MN DNR has not been able to produce suitable numbers of juveniles for reintroduction into the Cedar River. We anticipate they will be able to provide juveniles of at least two species by the Fall of 2019.

Future Plans:

Once re-introduction sites have been identified and juvenile mussels have been provided, we will introduce juveniles of both species and monitor their growth and survival over the next 2 years. Once source populations are identified we will sample these for genetic diversity and compare these measures to the produced juveniles to estimate the proportion of genetic diversity “captured.” This diversity could be monitored over time to evaluate changes.

Effects of Tournament Regulation Changes on Largemouth Bass Populations in Iowa

Principal Investigator:	Michael J. Weber
Student Investigator:	Andrea Sylvia (PhD) Brandon Maahs (MS)
Collaborators:	Iowa Department of Natural Resources
Duration:	February 2018 – August 2020
Funding Source(s):	Iowa Department of Natural Resources

Goals and Objectives:

1. Evaluate tournament angler group's adoption of the new bass tournament regulations
2. Assess population level effects of bass tournaments pre- and post-regulation bass tournament regulation change

Introduction:

Affinity towards largemouth bass fishing both recreationally and in tournament events is prevalent in lakes throughout Iowa. In 2011, bass anglers in Iowa comprised 44% of the total anglers in the state, spending 2,440 days targeting bass in Iowa waters. Bass tournaments in Iowa are also very popular, with some lakes seeing as many as 45 bass tournaments during the open water season every year (e.g., Brushy Creek). Past tournament regulation in Iowa consisted of registering the event with the Iowa DNR, a three bass bag limit per angler, and a 15" minimum length limit. Under these conditions, approximately 30% of the bass population in Brushy Creek is weighed in during tournaments each year (A. Sylvia, unpublished data). However, in 2017, the Iowa legislature enacted a law increasing the bag limit to five bass per angler and no minimum length limit (registration of tournaments with the DNR is still required). Once these new regulations are implemented in January 2018, they have the potential to impact largemouth bass populations on Iowa lakes with heavy tournament pressure. Yet, it is unknown to what effect these regulation changes will affect bass populations. Increasing live-well densities, tournament weigh-in procedure times, and increasing fish densities at release locations can all be affected by increased bag limits, potentially resulting in increased bass mortality. Decreasing length limit regulations of bass also cause a larger portion of bass populations to be susceptible to potential tournament associated mortality. However, not all bass tournaments may abide by the newly enacted regulations. While bass tournament regulations have become more relaxed in Iowa, many tournament fishing clubs impose more stringent self-regulation than those of the state management agency. Thus, to what extent new Iowa regulations may impact bass populations remains unknown.

Results:

Number of tournaments (max=42, min=40) was similar between pre-regulation change years (2015-2017) and post-regulation change years (2018-2019). The highest number of bass (1,808) captured by tournament anglers occurred in 2018 after the regulation change; however, the total number of bass captured by tournament anglers in 2019 was the lowest (1,431) among pre- and post-regulation change years. Total number of initial bass mortalities was highest in 2018 (54) compared to 41 bass in 2015, 17 bass in 2016, 31 bass in 2017, and 19 bass in 2019. However, percent of initial tournament mortality remained similar, ranging from 1.17% in 2016 to 2.99% in 2018 (Table 2). Additionally, number of bass per angler per tournament was similar among all years for tournament groups who did not adopt new regulations. Anglers captured less than two bass per angler per tournament across all years, ranging from 1.32 to 1.79 bass/angler/tournament across years. However, the number of bass per angler per tournament for groups that adopted new regulations increased in May and June 2018 but tournament angler catch rates were similar among months and to the pre-regulation years in 2019. Size structure of electroshocked bass was similar across all years (2015-2019). However, tournaments during 2018-2019 post-regulation change captured more bass less than 380-mm (229 bass in 2018 and 155 bass in 2019) compared to a maximum of 137 bass from 2015 to 2017 tournaments. Anglers also capture fewer bass >400 mm in 2019 compared to previous years.

Inventory of Coldwater Streams and Associated Fish Communities in the Iowa Driftless Region

Principal Investigator:	Michael J. Weber
Student Investigator:	Brett Kelly
Collaborators:	Mike Siepker, Iowa DNR
Duration:	December 2018 to December 2019
Funding Source(s):	Iowa Department of Natural Resources US Fish and Wildlife Service

Goals and Objectives:

The objectives of this project are to examine Brook Trout populations in the Driftless Area of northeastern Iowa to 1) evaluate the current spatial distribution of their populations, 2) quantify population characteristics (e.g., abundance, body size, condition), and 3) evaluate effects of biotic and abiotic factors on their distribution and population characteristics.

Introduction:

Coldwater streams occurring throughout the Paleozoic Plateau (Driftless Region) of Northeast Iowa are unique resources. However, little effort has been directed towards locating and cataloging these resources. One of the many reasons that the Driftless Region of northeastern Iowa is unique is that it represents the southwestern edge of the Brook Trout's native range. While Brook Trout were once common in the Driftless Region, they nearly disappeared throughout much of the region by the 1970s. In Iowa, the South Pine population of Brook Trout is the only relict population known to currently exist. Yet, fish surveys in other locations where remnant Brook Trout populations may persist are rare and no information exists regarding the current status of Brook Trout in Iowa. Determining if and where Brook Trout populations have persisted or increased within the Driftless Region of Iowa will allow for improved management of this unique species.

Results:

We collected 23,810 individuals of 33 different species during 141 sampling occasions across three HUC8 watersheds (Upper Iowa River, Yellow River, and Little Maquoketa) and two summer field seasons (2018 and 2019). Creek Chub were the most encountered species ($n = 87$ sites) and White Sucker comprised the most individuals ($n = 3,480$ fish; 14.62% of total catch). We observed seven non-game Species of Greatest Conservation Need (SGCN), with both Longnose Dace and Southern Redbelly Dace occurring the most frequently ($n = 33$ sites). Despite Sculpins ($n = 20$ sites) being collected at 13 fewer sites than Longnose Dace or Southern Redbelly Dace, similar numbers of Sculpins were captured as all other six non-game SGCN combined ($n = 1,232$ sculpins versus $n = 1,248$ other SGCN) and they accounted for 49.68% of the total non-game SGCN catch ($n = 2,480$ fish). Mississippi Silvery Minnow, Central Mudminnow, and Suckermouth Minnow were all SGCN that only occurred at 1 site each throughout the study. Trout species comprised 15.71% ($n = 3,741$ of 23,810 fish) of the total number of fish collected. Of those individuals, Brown Trout accounted for 87.33% ($n = 3,267$ of 3,741) of all trout and were observed at more sites ($n = 74$) than Brook Trout ($n = 19$), Rainbow Trout ($n = 11$), and Tiger Trout ($n = 2$). A total of 450 Brook Trout were collected, predominately from sites sampled in 2018 ($n = 403$ individuals). Brown Trout were collected in sympatry with Brook Trout at 78.95% ($n = 15$ of 19) of sites. Brook Trout were never found in allopatry in the Little Maquoketa watershed and were only collected twice in the Yellow River watershed ($n = 70$ individuals).

Evaluating Floral and Faunal Response to Incorporation of Early Season Forbs into Prairie Restorations

Principal Investigator: Brian J. Wilsey

Student Investigator: Nathan Soley
Daniel Deever (Starting August 2019)

Collaborators: Katy Reeder, Iowa DNR
Stephanie Shepherd, Iowa DNR
Bill Johnson, Iowa DNR
Jessica Peterson, Minnesota DNR
Chad August, Minnesota DNR

Duration: January 2019 – January 2022

Funding Source(s): USGS, Competitive State Wildlife Grant

Goals and Objectives:

The objective of the overall project is to restore and diversify native prairies in northwestern Iowa and southwestern Minnesota for non-game species. Prairie plantings often lack early and very late flowering forbs that are important to bees, butterflies and other animal species. The goal of the project is to evaluate establishment techniques (seed vs. transplant additions), management (mowing vs. no mowing), phenological flowering state (early vs. late) and number of species (1, 3 or 6) on forb establishment success and usage of plots by bees and butterflies. Results will be used to develop best management practices for establishing meaningful abundances of the focal plant species.

Progress:

The PI met with Iowa DNR personnel, developed an experimental design, and identified sites to be used for the study. Seeds of early (wood betony, prairie phlox, pasque flower) and late flowering species (New England aster, silky aster, and gray goldenrod) have been purchased, and transplants of each species have been grown in the greenhouse. Seeds were tested for viability, and were weighed out for planned seed additions. In 2019, a large experiment was established that varies mowing (establishment vs. none), planting method (seeds vs. transplants [plugs]), early vs. late flowering species, and species diversity (1 vs. 3 early flowering vs. 3 late flowering vs. 6 species) on plant and flower establishment, bee visitation, and butterfly visitation. This experimental setup was applied to three fields in Northern Iowa and SW Minnesota.

Future Plans:

Experimental plots are embedded in approximately 10 acre, first-year prairie plantings that were seeded with a seed mix that left out the target species listed above. Plant survival rate and flower production will continue to be assessed through the 2020 growing season. Mowing treatments (none or establishment mowing) have been assigned to each of the three sites. Plant establishment and flower production was measured in 2019 and 2020, and bee and butterfly visitation are being sampled in May-June, July and August-September 2020 and 2021.

Reproductive Ecology of Asian Carp in Southeastern Iowa Rivers

Principal Investigators:	Michael J. Weber Clay L. Pierce
Student Investigator:	Aaron Matthew (M.S.) Nathan Tillotson (M.S.)
Collaborators:	Kim Bogenschutz, Iowa DNR Jason Euchner, Iowa DNR
Duration:	July 2013 - October 2019
Funding Source(s):	Iowa Department of Natural Resources US Fish and Wildlife Service

Goals and Objectives:

Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*) are invasive species spreading throughout the Upper Mississippi River Basin (UMRB). Like many invasive species, Asian carp have negative economic and ecological impacts. The Upper Mississippi River (UMR) is divided by a series of lock and dams, creating lotic habitat below dams followed by pooled, lentic habitat before the next dam. Pooled sections of the UMR limit reproductive success and inhibit expansion. The objectives of this project are to evaluate reproduction of Bigheaded Carp in the Upper Mississippi River.

Progress:

Egg and larval fishes were sampled from 2014–2018 at the mouths of three major UMR tributaries (Des Moines, Skunk, and Iowa rivers), at Keosauqua on the Des Moines River, as well as the mouths of two additional tributaries (Rock and Wapsipinicon rivers), UMR P17, and UMR P15 from 2016 – 2018. Genetic identification of eggs captured from 2014 – 2016 and yolk-sac larvae collected from 2014 – 2017 revealed successful spawning of Bigheaded Carp in the Mississippi, Des Moines, Skunk, and Iowa rivers. Larval Bigheaded Carp were also at the mouth of the Skunk River in 2018, whereas larvae collected from the other locations during 2018 are still being identified. However, age-0 Bigheaded Carp post yolk-sac absorption were absent from our samples from 2014 – 2017. In 2018, we captured 200 juvenile Silver Carp (~120 mm) and one juvenile Bighead Carp in a backwater of the Skunk River. Juvenile hatch dates matched larval Bigheaded Carp capture dates, indicating that our ichthyoplankton sampling did a good job of detecting reproductive events and that there was no differential survival of Bigheaded Carp between the yolk-sac to juvenile stages. Additionally, adult age structure indicates that Bigheaded Carp recruitment is consistent and recently completed otolith microchemistry revealed that a large portion of adult Bigheaded Carp captured above Lock and Dam 19 were produced from this area.

Across the UMR, highest larval densities (up to 2,900 Bigheaded Carp larvae/m³) from 2014-2017 occurred at low to intermediate adult abundance when the CV of discharge and temperature was low and when the 20 d cumulative discharge was high. Cumulatively, our findings provide evidence of annual Bigheaded Carp reproduction in the UMR up to the Iowa River and now their successful recruitment to the juvenile stage above Lock and Dam 19. Successful Bigheaded Carp reproduction in the UMR will likely facilitate their spread further North in the UMR which can have serious implications for both native fish communities and the public.

Future Plans:

Sampling in 2019 will occurring when river conditions permit. Laboratory analysis, data entry, and statistical analysis are ongoing.

Completed Projects

Restoring Royalty to the Prairie: Habitat Improvement for the Regal Fritillary and Monarch Butterfly

Principal Investigator: Stephen J. Dinsmore
Student Investigator: One undergraduate field technician
Collaborators: Katy Reeder, Iowa Department of Natural Resources
Stephanie Shepherd, Iowa Department of Natural Resources,
Rachel A. Vanausdall, Iowa State University
Duration: January 2017 to December 2019
Funding Source(s): Iowa Department of Natural Resources Diversity Program

Goals and Objectives:

- Conduct Visual Encounter Surveys (VES) and line transect surveys for butterflies at each prairie site.
- Conduct vegetation surveys to estimate canopy cover, tree stem density, and ground cover composition, and document the presence of host plants and nectar resources for target butterfly species.

Progress:

In 2019 we conducted the second round of post-treatment surveys. Surveys were conducted from 10 June to 13 August 2019 at 37 remnant prairie sites. More than half of the sites (n = 26) had received some sort of management activity since the first round of surveys in 2017. We also surveyed for violets and milkweed, which are important nectar sources in these habitats. Surveys were successful with repeat visits to all sites and we were able to document the presence of two target butterfly species (monarch and regal fritillary) at multiple sites.

Future Plans:

The project is now complete and the next steps are to translate research findings into management recommendations.

Southern Iowa Forest Monitoring

Principal Investigator: Stephen Dinsmore
Student Investigator: Benjamin West (M.S. student), two undergraduate field technicians
Collaborators: Jeff Goerndt, Iowa Department of Natural Resources
Duration: August 2015 to May 2020
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

We will conduct surveys of the birds in Stephens State Forest, Sedan Bottoms WA, and Sand Creek Bird WA. These sites are included in Bird Conservation Areas (BCAs) where conservation actions for birds are a priority. Survey plots will be in existing woodland areas of these BCAs on IA DNR land. In addition, the purpose is to compile the results of the bird community surveys and conduct statistically sound and biologically relevant analyses of the data. Ultimately, we hope that this improves our understanding of the distribution of birds, the patterns of occupancy for selected species, and the use of IA DNR's forested Wildlife Management Areas and State Forests by birds in southern Iowa.

Progress:

Field work (4 summers) is complete and Ben West has successfully defended his M.S. thesis. His thesis will substitute for the project final report.

Future Plans:

Publish results in peer-reviewed journals articles and assist with local plans to develop a Birding Trail in this area.

Evaluating wetland use patterns among spring-migrating ducks in Iowa's Prairie Pothole Region to inform strategic wetland restoration and management

Principal Investigator: Adam Janke
Student Investigator: Derek Ballard
Collaborators: Orrin Jones (IDNR)
Duration: November 2017 – May 2020
Funding Source(s): USFWS Region 3 Migratory Birds Joint Venture

Goals and Objectives:

The goal of this research is to address information gaps in the understanding of duck use of modern prairie wetland landscapes during spring migration to inform wetland conservation priorities in intensively farmed regions of the PPR. These landscapes are traditionally out of the scope of breeding-focused habitat conservation programs in the region and therefore may be best-served by an alternative conservation and management paradigm than typically used across the PPR landscape for breeding-habitat conservation. The specific objectives of our proposed research are to:

Document the relative use of key wetland types by spring-migrating ducks to understand the contribution of specific wetland classes to migrants at the landscape scale

Describe the spatial distribution of ducks during spring migration in the Iowa PPR.

Identify wetland factors associated with use or avoidance by spring migrating ducks, including landscape context, vegetation composition, wetland size, and basin characteristics.

Progress:

During 2019-2020 we completed the field work for the project, conducted analyses on the field data, and gave 2 oral presentations on the work at the national meeting of The Wildlife Society and Iowa Chapter of the Wildlife Society.

Future Plans:

Derek Ballard (M.S. expected August 2020) is in the process of completing the data analyses and writing the final report.

Iowa Community Fishing Survey

Principal Investigator: David Keiser
Student Investigator:
Collaborators:
Duration: July, 2018 – Jan, 2019 July, 2018 – Jan, 2019
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

The survey is conducted to elicit fishing experience and preference from residents from around 20 Iowa urban communities.

Progress:

July, 20 2018 – October, 31 2018: survey work
November, 1 2018 – January, 9 2019: drafting a summary report

Conclusions and Recommendations:

Around 700 out of 2500 surveys were returned, the survey responses were compiled and sent to Iowa DNR as required.

Surveys for Red-backed Voles

Principal Investigator: Michael Rentz
Student Investigator:
Collaborators:
Duration: Fall 2019
Funding Source(s): Iowa Department of Natural Resources
Wildlife Diversity Small Grant

Goals and Objectives:

The red-backed vole (*Myodes gapperi*) is a State-Listed Endangered species known from a single population in and around Pilot Knob State Park in northern Iowa. This species was last confirmed in the Park (and therefore the state) in 1982. More recent trapping efforts have not uncovered any specimens. Given the work intensiveness of live-trapping and the low odds of capture I proposed to look for the species using downward-facing trail cameras following Bondi et al. 2010 and DuBois 2016. I hoped to discover photographic evidence of the species still living in the Park.

Progress:

I began “trapping” on September 3rd, 2019 and had 6 cameras running continuously (minus dead batteries, etc) until November 9th, 2019. I trapped at 34 locations throughout the Park for a total of 396 uncorrected trap nights. I recorded 20,552 images/videos of which 4151 contained animals. At least 14 species of mammal were identified. *Peromyscus* (both *leucopus* and *maniculatus*) were the most frequently encountered animals, followed by the three resident species of tree squirrels. I detected no positively identified images of red-backed voles, though a relative handful of images/videos (n=~10) could not be conclusively ruled out due to image blurriness, brevity, or capture of only parts of the animal not including the diagnostic tail.

Future Plans:

As I still own the cameras it would be possible to do another run of filming this Fall, though course demands may preclude that.

Conclusions and Recommendations:

Despite a relatively thorough search across the Park I failed to confirm the presence of red-backed voles. Absence of proof is not proof of absence, though the situation is not comforting. The species is likely extirpated from the State.

Reproductive ecology of Bigheaded Carp in Southeastern Iowa rivers

Principal Investigators: Michael J. Weber
Clay L. Pierce

Student Investigator: Aaron Matthew (M.S.)
Nathan Tillotson (M.S.)

Collaborators: Kim Bogenschutz (IDNR)
Jason Euchner (IDNR)

Duration: July 2013 - October 2019

Funding Source(s): Iowa Department of Natural Resources
US Fish and Wildlife Service

Goals and Objectives:

Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*) are invasive species spreading throughout the Upper Mississippi River Basin (UMRB). Like many invasive species, Asian carp have negative economic and ecological impacts. The Upper Mississippi River (UMR) is divided by a series of lock and dams, creating lotic habitat below dams followed by pooled, lentic habitat before the next dam. Pooled sections of the UMR limit reproductive success and inhibit expansion. The objectives of this project are to evaluate reproduction of Bigheaded Carp in the Upper Mississippi River.

Progress:

Egg and larval fishes were sampled from 2014–2019 at the mouths of three major UMR tributaries (Des Moines, Skunk, and Iowa rivers), at Keosauqua on the Des Moines River, as well as the mouths of two additional tributaries (Rock and Wapsipinicon rivers), UMR P17, and UMR P15 from 2016 – 2018. Genetic identification of eggs captured from 2014 – 2016 and yolk-sac larvae collected from 2014 – 2017 revealed successful spawning of Bigheaded Carp in the Mississippi, Des Moines, Skunk, and Iowa rivers. Larval Bigheaded Carp were also at the mouth of the Skunk River in 2018, whereas larvae collected from the other locations during 2018 are still being identified. However, age-0 Bigheaded Carp post yolk-sac absorption were absent from our samples from 2014 – 2017. In 2018, we captured 200 juvenile Silver Carp (~120 mm) and one juvenile Bighead Carp in a backwater of the Skunk River. Juvenile hatch dates matched larval Bigheaded Carp capture dates, indicating that our ichthyoplankton sampling did a good job of detecting reproductive events and that there was no differential survival of Bigheaded Carp between the yolk-sac to juvenile stages. No Bigheaded Carp larvae were collected during 2019, likely due to flooding that limited sampling.

A recent objective (Matthews MS thesis) was to investigate how adult biomass and river temperature and discharge affect maximum annual Bigheaded Carp larval production along the UMR using a Ricker stock-recruitment model. Adult Bigheaded Carp biomass ranged from 0.0 to 880.9 kg/hr. whereas maximum annual larval densities ranged from 0.0 to 2,869.4 larvae/m³. Annual variation in maximum Bigheaded Carp larval density was best explained by adult male and female biomass and the 30-day discharge coefficient of variation (CV).

Future Plans:

Sampling in 2020 was cancelled due to COVID-19 will occurring when river conditions permit. Laboratory analysis, data entry, and statistical analysis are ongoing.

Honors and Awards

Clay Pierce

- Collaborator role in a project that received national recognition as a "2020 Top Ten Waters to-Watch" by the USFWS National Fish Habitat Partnership

Jordan Giese

- Iowa State NREM Teaching and Instruction Award

Samuel Leberg

- 2020 Keith McNurlen Award Recipient
- Recipient of the 2020 Elaine Boge Scholarship

Ben Luukkonen

- Lavon Tortenson Graduate Scholarship 2020. Department of Natural Resource Ecology and Management, Iowa State University. 3rd Place Student Poster Presentation.
- 2019. 8th North American Duck Symposium, Winnipeg, Manitoba, Canada.

Dylan Osterhaus

- Janice Lee Fenske Memorial Award Finalist at the 2020 Midwest Fish and Wildlife Conference
- David P. Fellows Great Plains Nature Center Scholarship 2020 Recipient
- C.E. Farnsworth Memorial Award

Matt Stephenson

- Winner 2020 NREM Ignite Talks

Nathan Tillotson

- Kenneth Carlander Memorial Graduate Scholarship Award. 2020

Professional Activities

Teaching/Learning Opportunities

Robert Klaver

- Analysis of Animal Populations (A_ECL 611) Fall 2018

Clay Pierce

- Fisheries Science (A_ECL 520), Spring 2019

Jordan Giese

- Instructor: AEcl 458 Ornithology Lecture, Spring 2020
- Teaching Assistant: AEcl 371 Ecological Methods, Fall 2019

Samuel Leberg

- Attended Mixed Effects Modeling Workshop for the statistical program R at the 80th Midwest Fish & Wildlife Conference

Ben Luukkonen

- Science with Practice (AGEDS 312), Co-mentor, Fall 2019

Matthew Stephenson

- Prairie Strips Wildlife Habitat, Indiana Wildlife Society Training, Fall 2019
- Animal Ecology 458: Ornithology, Iowa State University, Spring 2020

Nathan Tillotson

- Taught radi telemetry, trap netting (fyke, mini-fyke, and clover-leaf), and gill netting for ISU Fisheries Techniques Lab (2019)
- Taught boat/trailer maintenance and fieldwork preparedness for ISU Fisheries Techniques lab (2019)

Graduate Committee Service

Robert W. Klaver

Advisor/Co-Advisor

- Karri Folks (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)
- Ben Johnson (M.S. Department of Natural Resources Ecology & Management, Iowa State University)
- Ben Luukkonen (M.S. Department of Natural Resources Ecology & Management, Iowa State University)
- Bridget Nixon (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)
- Matt Stephenson (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)

Committee Member

- Zach Dienes (M.S. Department of Natural Resources Ecology & Management, Iowa State University)
- Katrina Fernald (M.S. Department of Natural Resources Ecology & Management, Iowa State University)
- Jordan Giese (Ph.D., Department of Natural Resource Ecology & Management, Iowa State University)
- Emily Grausgruber (Ph.D. Department of Natural Resource Ecology & Management, Iowa State University)
- Blake Mitchell (M.S. Department of Natural Resources Ecology & Management, Iowa State University)
- Robert Valek (Ph.D., Sustainable Agriculture, Iowa State University)

Clay Pierce

Advisor/Co-Advisor

- Sam Leberg (M.S., Department of Natural Resources Ecology & Management, Iowa State University)
- Katelyn Miller (M.S., Department of Natural Resources Ecology & Management, Iowa State University)
- Dylan Osterhaus (M.S., Department of Natural Resources Ecology & Management, Iowa State University)
- Nathan Tillotson (M.S., Department of Natural Resources Ecology & Management, Iowa State University)

Committee Member

- Brett Kelly (M.S., Department of Natural Resources Ecology and Management, Iowa State University)
- Emily Grausgruber (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)
- Bridget Nixon (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)
- Andrea Sylvia (Ph.D., Department of Natural Resources Ecology & Management, Iowa State University)
- Robert Weber (M.S., Department of Natural Resources Ecology and Management, Iowa State University)

Professional Service & Outreach

Robert Klaver

- Participated in the Iowa DNR Wildlife Bureau Statewide meeting
- Evaluated abstracts for The Wildlife Society 2019 meeting
- Peer review articles for multiple scientific journals
- American Society of Mammalogists, Member, 1996 – present
- Great Plains Natural History Society, Member, 2010 – present
- Iowa Action Plan Implementation Committee, Member, 2012 – present
- The Wildlife Society
 - Member, 1974 - Present
 - Iowa Chapter, Member, 2012 – present
 - North Central Section, Member, 2012 – present

Clay Pierce

- Interviewed by Iowa Soybean Association writer for article on restoring multipurpose oxbows for improving water quality and habitat for an endangered species that was published online and sent to regional and national news outlets, May 2020
- Invited by a group from the Environmental Defense Fund and Purdue University to join an online focus group to discuss our collaborative multipurpose oxbow restoration program, April 20, 2020
- Interviewed by Iowa State University College of Agriculture and Life Science News Service for article on restoring multipurpose oxbows for improving water quality and habitat for an endangered species that was published online and sent to regional and national news outlets, November 2019
- Invited by The Nature Conservancy to speak about the conservation value of oxbow restoration to a breakfast meeting of influential business leaders at the Des Moines Botanical Center, September 4, 2019
- Invited by Iowa Water Center to serve as a water professional interviewee for their high school student essay
- Iowa Department of Natural Resources, Iowa Wildlife Action Plan – Fish Subcommittee Chair (2008 to present)
- American Fisheries Society
 - Member 1987 to present
 - Iowa Chapter member 1994 to present
 - Continuing Education Committee Chair (1997 to present)
 - Organized 15 continuing education courses
 - Taught one continuing education course

Jordan Giese

- American Ornithological Society Membership Committee
- American Ornithological Society Communications Committee

Ben Luukkonen

- Iowa State University, Natural Resource Ecology and Management, Graduate Student Organization, Treasurer, April 2019-April 2020
- The Wildlife Society, Student Member

Dylan Osterhaus

- Iowa State University Student Subunit of the American Fisheries Society Member
- Iowa Ornithologists' Union Member
- American Fisheries Society Member

Matthew D. Stephenson

- Iowa Ornithological Union, Member, 2015-present
- The Wildlife Society, student member 2014-present

Nathan Tillotson

- Iowa State University, Natural Resource Ecology and Management, Graduate Student Organization
- Graduate and Professional Student Senate, 2019 - Present

Presentations

Davis, E. D., T. C. Swearingen, **R. W. Klaver**, and C. N. Jacques. 2019. Evaluating survival and cause-specific mortality of bobcats in west-central Illinois. 26th Annual Conference of The Wildlife Society, Reno, Nevada. 29 September – 3 October 2019.

Jacques, C. N., Phillips, E. C., C. P. Lehman, **R. W. Klaver**, A. R. Jarding, S. P. Rupp, and J. A. Jenks. 2020. Evaluation of an elk detection probability model in the Black Hills, South Dakota. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Stratman, T. J., C. C. Helmke, **R. W. Klaver**, and C. N. Jacques. 2020. Estimating density, occupancy. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Helmke, C. C., T. J. Stratman, **R. W. Klaver**, and C. N. Jacques. 2020. Evaluating bias in telemetry location data from radiocollared bobcats. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Helmke, C. C., T. J. Stratman, **R. W. Klaver**, and C. N. Jacques. 2020. Evaluating bias in telemetry location data from radio collared bobcats. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Jacques, C. N., T. C. Swearingen, S. E. Jenkins, E. D. Davis, and **R. W. Klaver**. 2020. Evaluating survival and cause-specific mortality of adult bobcats in west-central Illinois. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Rexroad, K. A., S. A. Dubay, B. D. Walker, S. E. Jenkins, **R. W. Klaver**, and C. N. Jacques. 2020. Examining the immunocompetence handicap hypothesis using southern flying squirrels. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Rexroad, K. A., **R. W. Klaver**, S. E. Jenkins, and C. N. Jacques. 2020. Estimating density of southern flying squirrels in fragmented Midwestern landscapes using spatial capture-recapture models. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Jacques, C. N., C. C. Helmke, T. J. Stratman, and **R. W. Klaver**. 2020. Comparing the efficacy of two immobilization drug combinations for the chemical restraint of bobcats. 80th Annual Meeting Midwest Fish and Wildlife Conference, Springfield, Illinois. 26 – 29 January 2020.

Rexroad, K. A., **R. W. Klaver**, S. E. Jenkins, and C. N. Jacques. 2020. Estimating density of southern flying squirrels in fragmented Midwestern landscapes using spatial capture-recapture models. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Rexroad, K. A., S. A. Dubay, **R. W. Klaver**, and C. N. Jacques. 2020. Examining the immunocompetence handicap hypothesis using southern flying squirrels. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Stratman, T. J., C. C. Helmke, T. C. Swearingen, S. E. Jenkins, E. D. Davis, **R. W. Klaver**, and C. N. Jacques. 2020. Evaluating survival and cause-specific mortality of adult bobcats in west-central Illinois. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Helmke, C. C., T. J. Stratman, **R. W. Klaver**, and C. N. Jacques. 2020. Influence of landscape metrics on home range use by bobcats in fragmented Midwestern landscapes. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Helmke, C. C., T. J. Stratman, **R. W. Klaver**, and C. N. Jacques. 2020. Comparing the efficacy of two immobilization drug combinations for the chemical restraint of bobcats. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Stratman, T. J., C. C. Helmke, **R. W. Klaver**, and C. N. Jacques. 2020. Estimating density, occupancy, and survival of bobcats in north-central Illinois landscapes. Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Stratman, T. J., T. C. Swearingen, S. E. Jenkins, E. D. Davis, **R. W. Klaver**, and C. N. Jacques. 2020. Estimating density of bobcats in west-central Illinois landscapes using spatial capture-recapture. Poster Presentation, Annual Meeting Midwest Ecology and Evolution Conference, Macomb, Illinois. 28 February – 1 March 2020.

Osterhaus, D. M., S. S. Leberg, C. L. Pierce, and T. W. Stewart. 2020. An index of oxbow restoration quality for Topeka shiners based on the fish assemblage (contributed paper). Iowa Chapter, American Fisheries Society, Moravia, IA, March 2020

Leberg, S. S., D. M. Osterhaus, T. W. Stewart, and **C. L. Pierce**. 2020. Effects of tile drainage on restored oxbows as habitat for endangered Topeka shiners and other biota (contributed paper). Iowa Chapter, American Fisheries Society, Moravia, IA, March 2020.

Osterhaus, D. M., S. S. Leberg, C. L. Pierce, and T. W. Stewart. 2020. An index of oxbow restoration quality for Topeka shiners based on the fish assemblage (contributed paper). Upper Midwest Stream Restoration Symposium, Stillwater, MN, March 2020.

Leberg, S. S., D. M. Osterhaus, T. W. Stewart, and **C. L. Pierce**. 2020. Effects of tile drainage on restored oxbows as habitat for endangered Topeka shiners and other biota (contributed paper). Upper Midwest Stream Restoration Symposium, Stillwater, MN, March 2020.

Pierce, C. L., C. McKinney, and K. E. Schilling. 2020. A Win-Win for Iowa's Stream Corridors - Restoring Multipurpose Oxbows for Habitat and Water Quality (invited). Iowa Department of Natural Resources Wildlife Bureau Statewide Meeting, Moravia IA. February 2020.

Leberg, S. S., D. M. Osterhaus, T. W. Stewart, and **C. L. Pierce**. 2020. Effects of tile drainage on restored oxbows as habitat for endangered Topeka shiners and other biota (poster). Midwest Fish and Wildlife Conference, Springfield, IL, January 2020.

Osterhaus, D. M., S. S. Leberg, C. L. Pierce, and T. W. Stewart. 2020. An index of oxbow restoration quality for Topeka shiners based on the fish assemblage (poster). Midwest Fish and Wildlife Conference, Springfield, IL, January 2020.

Swanson, J. E., E. Muths, **C. L. Pierce**, S. J. Dinsmore, M. W. Vandever, M. L. Hladik, and K. L. Smalling. 2019 Exploring the amphibian exposome in an agricultural landscape using telemetry and passive sampling (invited). Midwest Partners in Amphibian and Reptile Conservation meeting, Madrid, IA. August 2019.

Giese, J.C., L.A. Schulte, and **R. W. Klaver**. 2020. Estimating the effect of prairie strips on grassland birds. Midwest Fish and Wildlife Conference, Springfield, IL.

Giese, J.C., L.A. Schulte, and **R. W. Klaver**. 2020. Estimating the effect of prairie strips on grassland birds. 2020 STRIPS Research Symposia, Ames, IA.

Leberg, Samuel. "Effects of Tile Drainage on Restored Oxbows as Habitat for Endangered Topeka Shiners and other Biota." 2020 Iowa AFS Meeting. March 3-4, Moravia, IA.

Leberg, Samuel. "Effects of Tile Drainage on Restored Oxbows as Habitat for Endangered Topeka Shiners and other Biota." 2020 Upper Midwest Stream Restoration Symposium. February 23-26, Stillwater, MN.

Leberg, Samuel. "Effects of Tile Drainage on Restored Oxbows as Habitat for Endangered Topeka Shiners and other Biota." The 80th Midwest Fish & Wildlife Conference. January 26-29, 2020. Springfield, IL.

Leberg, Samuel. "Effects of Tile Drainage on Restored Oxbows as Habitat for Endangered Topeka Shiners and other Biota." The Annual NREM Grad Student Poster Symposium. December 6, 2020. Ames, IA.

Luukkonen, B. L., R. W. Klaver, O. E. Jones. 2019. Canada goose survival and recovery rates in urban and rural areas of Iowa. 8th North American Duck Symposium, Winnipeg, Manitoba, Canada, August 2019.

Luukkonen, B. L., R. W. Klaver, O. E. Jones. 2019. Movement of Canada geese in urban and rural areas of Iowa. National Wildlife Society Conference, Reno, Nevada, October 2019.

Luukkonen, B. L., R. W. Klaver, O. E. Jones. 2020. Movement and survival of Canada geese in urban and rural areas of Iowa. Mississippi Flyway Gamebird Technical Section Meeting, Paducah, Kentucky, February 2020.

Luukkonen, B. L., R. W. Klaver, O. E. Jones. 2020. Movement of Canada geese in urban and rural areas of Iowa. Iowa Chapter of the Wildlife Society, Ames, Iowa, February 2020.

Miller, K.A., K. Roe, C. Pierce. 2020. Restoring Freshwater Mussels in the Cedar River Watershed. Ecology and Evolutionary Biology Spring Symposium, Ames, Iowa, February 2020.

Stephenson, M.D., L.A. Schulte, and **R.W. Klaver.** 2019. Prairie strips improve passerine nest survival in Midwestern landscapes. NREM Departmental Poster Session, Ames, Iowa. 6 December 2019

Stephenson, M.D., L.A. Schulte, and **R.W. Klaver.** 2020. Snake and small mammal occupancy. 2020 STRIPS Research Symposia, Ames, Iowa. 10 January 2020.

Stephenson, M.D., L.A. Schulte, and **R.W. Klaver.** Nest Survival. 2020 STRIPS Research Symposia, Ames, Iowa. 10 January 2020.

Stephenson, M.D., L.A. Schulte, and **R.W. Klaver.** Grassland bird nest density and survival in prairie strips on farms as they relate to vegetation metrics and habitat fragmentation. Midwest Fish and Wildlife Conference, Springfield, Illinois. 27 January 2020.

Wilson, R.O., **M.D. Stephenson,** L.A. Schulte. Body size in common garter snake, prairie ringneck snake, and western foxsnake in relation to prairie strip, diverse grassland block, and low diversity grassland habitat types in Iowa. Iowa Wildlife Society Annual Meeting, Ames, Iowa. 11 February 2020.

Yuza-Pate, K., **M.D. Stephenson,** L.A. Schulte, **R.W. Klaver.** Nest thieves on the prairie: quantifying the relationship between reconstructed prairie and cowbird parasitism of host species. Iowa Wildlife Society Annual Meeting, Ames, Iowa. 11 February 2020.

Stephenson, M.D., R. Ruden, L.A. Schulte, **R.W. Klaver,** and J. Adelman. Snake fungal disease in Iowa. Iowa Wildlife Society Annual Meeting, Ames, Iowa. 11 February 2020.

Stephenson, M.D., L.A. Schulte, and **R.W. Klaver.** Are prairie strips quality habitat? Iowa State NREM IGNITE Talks, Ames, Iowa. 6 March 2020.

Tillotson, N. A., M. J. Weber, **C. L. Pierce.** 2019. Invasive Asian Carp Dynamics and Reproduction in the Upper Mississippi River Basin. Iowa Division of the Izaak Walton League of America Dr. Keith McNurlen Award Research Symposium. Oral presentation. Ames, IA.

Tillotson, N. A., M. J. Weber, **C. L. Pierce.** 2020. Effects of Silver Carp and Bighead Carp on growth rates and prey selection of Freshwater Drum larvae in the Upper Mississippi River. Iowa Chapter of the American Fisheries Society. Oral presentation. Moravia, IA.

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