



2014 Annual Report

July 2013 – June 2014

Cooperating Agencies:

U.S. Geological Survey, Ecosystems
Iowa Department of Natural Resources
Iowa State University
U.S. Fish & Wildlife Service
Wildlife Management Institute

Iowa Cooperative Fish & Wildlife Research Unit

338 Science II, Iowa State University
Ames, IA 50011-3221
Telephone: (515) 294-3056
Fax: (515) 294-5468
Email: coopunit@iastate.edu
www.cfwru.iastate.edu

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Personnel and Cooperators

Unit Coordinating Committee

Michael Tome

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

Dale Garner and Joe Larscheid

Wildlife and Fisheries Bureau Chiefs
Iowa Department of Natural Resources

Sue Blodgett

Department Chair
Natural Resource Ecology & Management
Iowa State University

Patrick Ruble

Midwest Representative
Wildlife Management Institute

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
Jessica Bell	Administrative Specialist, Department of Natural Resource Ecology & Management

Collaborating Professors:

Julie Blanchong, NREM
Rebecca Christoffel, NREM
Diane Debinski, EEOB
Stephen Dinsmore, NREM
Sue Fairbanks, NREM
Joseph Morris, NREM, NCRAC
Rolf Koford, Former Unit Leader
Kevin Roe, NREM/EEOB
Jennifer Vogel, EEOB
Michael J. Weber, NREM

New Projects

Acoustic monitoring for Iowa bats: preparing for White Nose Syndrome

Principal Investigator: Julie A. Blanchong
Rebecca Christoffel

Student Investigator:

Collaborators: Daryl Howell

Duration: December 2013 to December 2014

Funding Source(s): Iowa Department of Natural Resources (IDNR)

Goals and Objectives:

- Conduct acoustic surveys along drive transects and in fixed-locations to monitor bat activity

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 numerous US states and Canadian provinces. The fungus that causes WNS was detected on a big brown bat hibernating in an Iowa cave in March 2012. 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 minimal, but is critically needed to understand the potential ramifications of WNS to Iowa.

We will conduct acoustic surveys along drive transects in eastern, central, and southern Iowa established in summer 2013 to document bat echolocation activity in order to gain a better assessment of bat abundance and distribution in Iowa. In addition, four new drive transects will be established in north-central Iowa. To complement these mobile surveys, we will establish three fixed-location sites in urban areas that are difficult to survey by vehicle as well as three fixed-location sites in agricultural areas for monitoring during times of intense insect activity.

Future Plans:

An undergraduate student will be hired in winter 2014 to design four new drive transects and identify locations for the six fixed-location sites. Several undergraduates will be hired to conduct drive transects and fixed-location surveys in June-July 2014. As in 2013, drive transects and fixed-location sites will be surveyed twice. The data from summer 2014 will be analyzed following methods used in 2013. Dr. Blanchong and Dr. Christoffel will receive additional training on methodologies for analyzing bat call data. Any new analytical techniques learned during this training will be applied to data collected in both years. A final report will be submitted by the end of 2014.

Adaptive Management in Working Landscapes to Provide Habitat for Species of Greatest Conservation Need

Principal Investigators: Diane M. Debinski
James R. Miller (University of Illinois)
Walt Schacht (University of Nebraska, Lincoln)
Lois Wright-Morton

Student Investigators: Tori Pocius (Ph.D.)
Callie Griffith (M.S. University of Nebraska, Lincoln)

Duration: Nov. 15, 2013 to March 30, 2017

Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant Comp.

Goals and Objectives:

- We will develop and implement best management practices for reducing or eliminating invasive plant species on lands owned or managed by Iowa Dept. of Natural Resources (IDNR) and Missouri Dept. of Conservation (MDC) to improve habitat conditions for Species of Greatest Conservation Need and other grassland dependent wildlife.
- We will engage private landowners in grassland management for benefit of Species of Greatest Conservation Need.

Progress:

This project builds on an experiment that began in 2006 that was designed to compare plant, insect, and bird responses to three types of grassland management in Grand River Grasslands of southern Iowa: 1) patch-burn graze, 2) graze-and-burn, and 3) burn-only. Twelve pastures, four of each treatment type, served as study sites in our efforts to assess the effectiveness of patch-burn grazing in improving habitat for grassland Species of Greatest Conservation Need (SGCN).

In this new research, our goal is to test the use of adaptive management to reduce the cover of tall fescue (*Schedonorus phoenix Scop.*) within pastures. Tall fescue is a cool-season, high-moisture bunchgrass that was imported from Eurasia to the United States in the late 1800s for pasture improvement and erosion control. Although tall fescue is considered a valuable forage species, it can reduce domestic livestock performance. Alkaloids produced by endophyte-infected tall fescue are of low palatability to ungulates such as cattle, deer and elk and they may be toxic to small mammals and insects. Many ground-nesting birds are unable to use tall fescue fields as foraging or nesting habitat. The use of fire in grassland management is also complicated by the early green-up of tall fescue.

In this project the patch-burned graze pastures will serve as “controls” and their responses will be compared to the graze-and-burn pastures where a Collaborative Adaptive Management (CAM) approach will be employed. On the patch-burn graze sites, no herbicides will be applied. On the graze-and-burn sites, each pasture will be divided into three patches where different seed and herbicide treatments will be applied. In both the patch-burn grazing and the burn-and-graze treatments, there will be two grazing regimes: intensive early stocking (IES) and conventional stocking. Under IES, stocking density (number of cattle per unit area) is doubled and the grazing season is halved (April 1 to July 1) relative to conventional stocking. This approach will allow us to identify best management practices capable of converting fescue-dominated pastures to more diverse native grasslands. We expect that the highest probability of success will be accomplished by placing heavy grazing pressure on fescue early in the growing season and providing a late-season grazing deferment to benefit native warm-season grasses and forbs. This project will involve work on state-owned and privately owned lands in Iowa and Missouri. The overall goal of CAM is to increase adaptation capacity and learning within the community of landowners and natural resource professionals.

Future Plans:

This project has just recently been initiated due to the addition of a new collaborator and subcontract to the University of Nebraska Lincoln. Upcoming meetings with Iowa DNR and Missouri Dept. of Conservation will allow final determination of research sites and treatments. Data collection is just being initiated.

Missouri River Multiple Species Inventory Monitoring

Principal Investigator: Stephen J. Dinsmore
Student Investigator: Five undergraduate field technicians
Collaborators: Karen E. Kinkead, Iowa Department of Natural Resources (DNR)
Duration: 1 April 2014-15 June 2015
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Collect baseline information on vertebrates and invertebrates in accordance with the Multiple Species Inventory and Monitoring (MSIM) protocols at 15-20 sites along the Missouri River.
- Estimate probability of occupancy and abundance for select species of interest, as appropriate.
- Link findings to the Missouri River Recovery Program (MRRP) objectives for these sites.

Progress:

Fieldwork for this project began in mid-April 2014 with the hiring of a field crew and site selection. Data collection is on-going and will be complete in mid-October 2014.

Future Plans:

Fieldwork will continue through 15 October 2014. At the end of the field season we will ensure all data are entered into the MSIM database, produce an annual report, and work with partners to provide analyses for select species of interest to meet management objectives.

Amphibian Populations in Farmed and CREP Wetlands in the Des Moines Lobe in Central Iowa

Principal Investigator: Clay L. Pierce
Student Investigator: vacant
Collaborators: Erin Muths, USGS Fort Collins Science Center
Mark Vandever, USGS Fort Collins Science Center
Duration: January 1, 2015 to June 30, 2017
Funding Source(s): U.S Geological Survey, Fort Collins Science Center

Goals and Objectives:

- Determine if native amphibian species (e.g. boreal chorus frogs, northern leopard frogs, American toads) are present in farmed wetlands.

Introduction:

Loss of wetlands due to land use change has contributed to widespread declines in amphibian communities throughout the U.S. The loss in numbers and diminished distribution of wetlands in agriculturally dominated landscapes affects survival, habitat availability, and population distribution of species that evolved with pre-development wetland distribution and conditions. Wetlands in such an agricultural landscape are categorized as semi-permanent restored/constructed wetlands, or seasonal wetlands that are frequently tilled and farmed. Some of these seasonal, farmed wetlands do not qualify for programs such as the Conservation Reserve Enhancement Program (CREP), but may provide appropriate habitat for amphibians despite their size. For example, in highly modified landscapes permeability (the ease with which an animal can move through the landscape) is often low because the matrix is generally hostile to the animal, such that small areas of appropriate habitat, even if not adequate for breeding populations, can provide important resources as amphibians move through the landscape (e.g., dispersal). The use of this potential habitat has not been evaluated for amphibians.

Progress:

This project is still in the planning/funding stages. No progress to report.

Future Plans:

Plans and funding will be finalized in fall 2014. A graduate student will be recruited in fall 2014 and will begin work in January 2015.

Survey of the Iowa and Wapsipinicon Rivers for juvenile Higgins-eye pearly mussels.

Principal Investigator: Kevin Roe
Student Investigator: Brandon Russom
Collaborators: IA DNR
Duration: 1 August 2013 – 10 March 2015
Funding Source(s): IA DNR

Goals and Objectives:

- The goal of the project is to determine if re-introduction efforts for the Higgins-eye pearly mussel (*Lampsilis higginsii*) have been successful.

Progress:

No progress to date

Future Plans:

The PI plans to begin surveying for mussels on the Iowa and Wapsipinicon rivers during the late summer/fall of 2014.

Factors Affecting Mercury Concentrations in Iowa Fishes

Principal Investigator: Michael Weber
Clay Pierce
Student Investigator: Nathan Mills (M.S.)
Iowa DNR Staff
Collaborators: Erin Muths, USGS Fort Collins Science Center
Mark Vandever, USGS Fort Collins Science Center
Duration: January 1, 2015 to June 30, 2017
Funding Source(s): U.S Geological Survey, Fort Collins Science Center

Goals and Objectives:

- Develop regression models to predict the concentration of mercury in a range of fishes as a function of fish total length across natural lakes, impoundments, reservoirs, and rivers to guide consumption advisories.
- Evaluate regional (e.g., north vs south, east vs west) differences in mercury concentrations to help guide consumption advisories. Include additional biotic (e.g., age, food web dynamics) and abiotic (e.g. land use, water quality) factors in models to explain additional variation in mercury concentration not explained by fish length.
- Evaluate temporal changes in mercury concentrations in largemouth bass to guide mercury sampling protocols.

Introduction:

Mercury is naturally present in the environment but levels have increased dramatically since the 19th century due to anthropogenic emissions. Mercury concentrations in fishes can be highly variable among species and populations driven by a range of biotic and abiotic factors. Larger and older fish typically have higher mercury concentrations compared to smaller and younger individuals. Understanding fish length-mercury concentration relationships is an important component of issuing fish consumption advisories because fish length is easy for anglers to measure and understand. However, large variation in mercury concentrations within a species and individuals of similar size is common. The majority of mercury in fish muscle is derived from dietary sources. Understanding trophic ecology and population dynamics (e.g., age, growth, mortality) are important aspects of understanding mercury concentrations in fishes.

Progress:

A graduate student, Nathan Mills, has been selected and has accepted the position.

DNR biologists have been collecting fish from several lakes and reservoirs. As of March 2014, 234 bluegill, 168 black crappie, 110 white crappie, 32 yellow perch, 330 largemouth bass, 139 walleye, and 48 northern pike have been collected in lakes and reservoirs across Iowa for mercury analysis.

Future Plans:

The graduate student will begin work in August 2014.

Continuing Projects

Lead in Species of Greatest Conservation Need: Free-flying Bald Eagles as Indicators

Principal Investigator: Julie Blanchong
Stephen Dinsmore
Student Investigator: William Reiter-Marolf (M.S.)
Collaborators:
Duration: January 2012 to December 2014
Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant

Goals and Objectives:

- Characterize lead levels in nesting and wintering Bald Eagles in Iowa State University
- Compare lead exposure in free-flying eagles with eagles admitted to rehabilitation centers

Progress:

The high proportion of Bald Eagles (*Haliaeetus leucocephalus*) with lead poisoning reported by wildlife rehabilitation centers and wildlife health monitoring programs has raised concern about the magnitude and consequences of lead exposure in this species and other bird Species of Greatest Conservation Need (SGCN). This study is examining the degree to which avian SGCN are being exposed to lead in their diets by examining lead levels in Bald Eagles admitted to rehabilitation centers and in nesting and wintering Bald Eagles in Iowa.

In 2012 and again in 2013, M.S. student William (Billy) Reiter-Marolf and his technician non-invasively collected fecal samples from wintering Bald Eagle roosts and from up to 110 randomly Bald Eagle nest sites in winter (during egg incubation) and again in spring (when eaglets were 3-9 weeks of age). Half of the nests were in close proximity to the Mississippi River and half were distributed throughout the rest of Iowa. Blood and fecal samples were also collected from Bald Eagles admitted to 3 rehabilitation centers in Iowa. All samples were sent to the Iowa State Hygienic Lab for lead testing. Testing is complete and we have begun to summarize and analyze the data. In 2013, Billy presented preliminary results at the Iowa chapter of the Wildlife Society annual meeting and at the national Wildlife Society meeting.

Future Plans:

During 2014, we will complete statistical analyses of the data and prepare manuscripts for publication. Billy will prepare and defend his thesis in spring 2014. A final report will be submitted by the end of 2014.

Genetic Analysis of White-tailed Deer Population Structure in Iowa: Identifying Potential Patterns and Rates of Disease Spread

Principal Investigator: Julie Blanchong
Student Investigator: Lynne Gardner (Ph.D.)
Collaborators:
Duration: July 2011 to June 2015
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Conduct a statewide assessment of deer population genetic structure in Iowa to determine the scale of spatial autocorrelation and dispersal rates among sampled areas across the state.
- Determine the degree of genetic connectivity between free-ranging deer populations in Iowa and free-ranging deer populations in states bordering Iowa where CWD has been detected in free-ranging and/or captive deer.

Progress:

White-tailed deer (*Odocoileus virginianus*) are a valued resource for hunters, for viewing, and for state revenue. Knowledge of deer population structure can provide insight into aspects of deer ecology (e.g., dispersal) that are important for managing populations and understanding potential for disease introduction and spread. The goal of this project is to use genetic techniques to characterize deer population genetic structure in Iowa and other Midwest states with particular attention on those where chronic wasting disease (CWD) has been detected in close proximity to Iowa's borders (e.g., Illinois, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin).

Lynne Gardner, a PhD student, began work on this project in August 2011. We received several thousand deer tissue samples collected for the Iowa Department of Natural Resource's 2010-2011, 2011-2012, and 2012-2013 CWD surveillance efforts. In addition, we obtained deer tissue samples from two captive cervid facilities in Iowa, and will obtain additional samples from CWD-positive facilities in the state. We received deer samples from deer harvests in two urban communities, and deer samples have been solicited from two more urban communities. Deer tissue samples have been received from Illinois, Indiana, Kansas, Minnesota, Nebraska, Ohio, North Dakota, South Dakota, and Wisconsin, and we expect to receive samples from Missouri.

We began genotyping deer harvested in areas of low, medium, and high density in Iowa at 10 microsatellite loci. We also genotyped deer samples from two urban areas and began selecting samples from surrounding rural areas for genotyping. Preliminary results of a) genetic structure in areas of low, medium, and high deer density and b) genetic diversity in urban deer in Iowa were presented at the national Wildlife Society conference in October 2013.

Future Plans:

We will finish genotyping samples of deer harvested in areas of low, medium, and high density in Iowa. We will also sequence these samples at mitochondrial DNA (mtDNA). We will use these data to characterize population genetic structure in Iowa deer, and compare the scale of genetic structure among areas of low, medium, and high deer density. We will complete genotyping of urban and surrounding rural deer and genotype deer from captive facilities and their rural counterparts. We will use these data to quantify and compare genetic diversity and population structure between captive and free-ranging deer and between urban and rural deer in Iowa. We will also genotype deer samples from Midwest states surrounding Iowa. We will use these data to characterize genetic connectivity between deer in Iowa and several surrounding Midwest states.

Iowa Habitat and Access Program

Principal Investigator: Rebecca Christoffel
Student Investigator: James Crain
Collaborators: Peter Fritzell and Chris Jennelle, IDNR
Duration: Sept. 30, 2012 – January 31, 2015
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- The goal of this project is to assess the Iowa Habitat and Access Program (IHAP) that was established in 2010 and to determine the potential value of the program to hunters in terms of willingness to pay for program continuation beyond the initial period in which Federal funding was provided.

Obligation
Task 1: Sampling frame Description: Contractor shall develop a sampling frame (database) of hunters who utilize IHAP properties in fall of 2012 and spring 2013
Task 2: Survey instrument Description: Contractor shall develop a survey instrument to assess hunters willingness to pay for IHAP
Task 3: Landowner Interview Report Description: Contractor shall develop a report on landowner interviews to be conducted during the spring/summer of 2013 that addresses landowner satisfaction.
Task 4: Final Report Description: Contractor shall provide DNR with a final report that includes survey analysis and recommendations for IHAP based on landowner interviews and willingness to pay survey.

Progress:

Task 1 – The sampling frame was developed in 2012 and 2013, and completed during fall 2013.
Task 2: - The survey instrument was developed in conjunction with Peter Fritzell and Chris Jennelle of Iowa DNR and Catherine Kling of Iowa State University. The instrument was finalized in Spring 2014.
Task 3 – The landowner interviews were conducted in spring and summer of 2013, and the landowner interview report was completed in Fall 2013.

Future Plans:

The willingness-to-pay survey is being implemented in Summer 2014. The final report will be completed during Fall 2014.

The Use of Fire and Grazing to Improve Grassland Habitats for Species of Greatest Conservation Need

Principal Investigators:	Diane M. Debinski James R. Miller (University of Illinois) David M. Engle (Oklahoma State University) Lois Wright-Morton
Student Investigators:	John Delaney (Ph.D.), Courtney Duchardt (Ph.D., UI) Tim Lyons (Ph.D., UI) Derek Scasta (Ph.D., OSU)
Duration:	August 2010 to July 2014
Funding Source(s):	Iowa Department of Natural Resources, State Wildlife Grant Comp.

Goals and Objectives:

- We will develop specific guidelines for natural resource managers regarding the use of fire and grazing to enhance habitat conditions for Species of Greatest Conservation Need (SGCN) and other grassland-dependent wildlife in the Grand River Grasslands on approximately 2500 acres.
- We will extend what is learned on experimental pastures to nearby private lands by increasing landowner knowledge and skills in the application of restoration practices to enhance habitat conditions for SGCN and other grassland-dependent wildlife while maintaining grazing and recreational uses on 1800-3000 acres.

Progress:

This project builds on an experiment that began in 2006 that was designed to compare plant, insect, and bird responses to three types of grassland management in Grand River Grasslands of southern Iowa: 1) patch-burn graze, 2) graze-and-burn, and 3) burn-only. We are examining bird, butterfly, and vegetation responses to each of the three treatments during the second three-year burn cycle and this project incorporates a social science component focused on working with local farmers to extend what is learned on experimental pastures. All treatment variables remain the same as in the first three-year burn cycle with the exception of stocking rate, which was reduced in 2010 compared to previous years, and it has been maintained at this reduced rate since 2010. Twelve pastures, four of each treatment type, serve as study sites in our efforts to assess the effectiveness of patch-burn grazing in improving habitat for grassland Species of Greatest Conservation Need (SGCN). Pastures range in size from 38 to 84 acres and are located at the IA DNR's Ringgold and Kellerton Wildlife Management Areas, on properties owned by The Nature Conservancy, on private properties in Ringgold County, Iowa, and at the Missouri Department of Conservation's Pawnee Prairie Preserve in Harrison County, Missouri. The three treatments are defined as follows: 1) *patch-burn graze*: burning of spatially distinct patches within the pasture and free access by cattle, 2) *graze-and-burn*: free access by cattle and burning of the entire pasture, and 3) *burn-only*: burning of the entire pasture but no grazing (typical management for protected lands in the region). Each of the three treatments is burned on a three year fire-return-interval. Patch-burn graze and graze-and-burn pastures are stocked annually from May 1 until October 1 at an average rate of 0.7 animal-unit months per acre (this stocking rate began in 2010). Burn-only pastures are not fenced. No fertilizers or herbicides have been applied in the pastures during the study, and no chemicals will be applied during the course of the current study. We hold annual field days for landowners and we organize workshops to explain the use of fire and grazing for grassland management. We also conduct in-person interviews to document landowner knowledge, attitudes, and willingness to learn about and implement conservation and restoration management practices such as prescribed fire and grazing on their lands.

Future Plans:

Three graduate students are in the process of completing degrees associated with this project. Our team has produced a large number of peer-reviewed papers from this research and we are now initiating a new project focusing on adaptive management in these same pastures. We hope to continue to study these sites and to continue our collaborative interactions with local and state land managers and private land owners.

Seasonal succession in floral resources and response of insect pollinator groups in three grassland types important for pollinator conservation in Iowa

Principal Investigators: Diane Debinski
Student Investigators: John Delaney
Collaborators: Karen Grimlund, Iowa State University
TNC Missouri
Duration: April 15, 2013 – April 15, 2014
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Provide information on differences in floral resources and pollinator communities among different types of grasslands important for conservation in the Upper Midwest.
- Quantify differences and patterns of changes in floral resources over the entire growing season.
- Understand how pollinator communities change in response to differences and seasonal changes in floral resource availability.

Progress:

We completed 12 sampling round of floral resource measurements at two week intervals from May 3rd to Oct. 5th 2014. Over this time we made a total of 768 observations at transects, counted 296,293 inflorescences and identified 144 flowering species (excluding graminoids). We observed butterflies at all of the transects over three sampling rounds (early June, late June - early July, and late July). Butterfly observations have been entered into a database but have not yet been analyzed. We also sampled bees using pan traps over two sampling rounds mid-June and mid-July. All bees have been pinned and are currently in the process of being identified to the species level. Analyses of floral resource responses are underway. Some preliminary results from the floral resource measurements are as follows: A) richness and diversity of inflorescences are lower in fallow fields compared to the other grasslands types, B) composition of floral resources over all sampling rounds is different in remnants compared to the other grassland types, and C) turnover (Bray-curtis dissimilarity from round to round) in species composition is lower in pastures than in remnants.

Future Plans:

All of the field work for this project has been completed and only a small portion of lab work remains. Analyses are ongoing, and the differences in the diversity of floral resources among grassland types are proving to be interesting, with important implications for restoration and conservation of floral resources in grasslands. We have begun writing the first manuscript for this research, which will focus on differences in floral resources among the four grassland types, and will be a chapter of John Delaney's PhD dissertation. One-two additional manuscripts will be written on the butterfly and bee responses to floral resources beginning in the fall of 2014.

Iowa Multiple Species Inventory and Monitoring (MSIM) Program

Principal Investigator: Stephen J. Dinsmore
Student Investigator: Shane S. Patterson (M.S. student)
Collaborators: Karen E. Kinkead Iowa Department of Natural Resources (DNR)
Tyler M. Harms, Research Associate, Iowa State University
Duration: January 2012 to December 2014
Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant

Goals and Objectives:

- Conduct MSIM surveys on a minimum of 113 new properties and up to 26 previously surveyed properties.
- Ensure collected data are entered 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 and change database records as advised.
- Thoroughly review the MSIM Program in 2014, based on the information collected between 2007 and 2013.

Progress:

The Iowa Multiple Species Inventory & Monitoring (MSIM) program began in 2007 on public lands with one crew responsible for 16 properties in central Iowa. In 2008, the program expanded to 2 crews, covering 29 new properties divided between southeast Iowa and south-central Iowa. The program grew to our goal of having 5 crews cover approximately 75 properties each year. In 2013, we again achieved our coverage goal with 5 crews that covered 74 properties including 21 previously-surveyed properties that are surveyed annually and 53 new properties. Crews surveyed 10 new properties in southwest Iowa (Mills, Fremont, and Page Counties), 7 in western Iowa (Harrison and Pottawattamie Counties), 13 in northwest Iowa (Emmet and Dickinson Counties), 10 in north-central Iowa (Cerro Gordo, Floyd, Franklin, and Butler Counties), and 13 in eastern Iowa (Delaware, Jackson, Jones, and Dubuque Counties; Figure 1).

Future Plans:

In 2014 we will have a scaled back field season with just 3 small crews covering all of the permanent MSIM sites statewide. After some delays, we have finally rehired a replacement for the Research Associate II at Iowa State University to replace Tyler Harms, who left in January 2014.

Northeastern Iowa Forest Monitoring

Principal Investigator: Stephen J. Dinsmore
Student Investigator: Two undergraduate field technicians
Collaborators: Katy Reeder, Iowa Department of Natural Resources
Duration: 15 April 2013 to 30 June 2015
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Monitor breeding birds with Multiple Species Inventory and Monitoring (MSIM) protocols to gauge responses to forest habitat management.
- Monitor butterflies with Visual Encounter Surveys (VES) to gauge responses to forest habitat management.

Progress:

This report summarizes accomplishments on a contract between the Iowa Department of Natural Resources and Iowa State University (Department of Natural Resource Ecology and Management) to design, conduct, and analyze surveys of the bird and butterfly community within the forested Wildlife Management Areas (WMAs) in northeast Iowa. ISU will compile the results of the bird and butterfly community surveys, conduct statistically sound and biologically relevant analyses of these data. This will contribute to an improved understanding of the distribution of bird and butterfly species, the patterns of occupancy for selected species, and the use of DNR's forested Wildlife Management Areas by birds and butterflies in northeast Iowa.

Future Plans:

The original plan was to conduct a second round of surveys in 2014, but this has been delayed one year to allow extra time for management actions to occur on each site. In 2015 we will repeat the surveys to better assess the impacts of management activities on target species of birds and butterflies.

Developing a Model to Predict Canada Goose Breeding Pair Densities in the Midwest Using National Wetlands Inventory Data

Principal Investigator: Robert Klaver
Student Investigator: Brenna Towery (M.S.)
Collaborators:
Duration: January 2013 to August 2015
Funding Source(s): Iowa Department of Natural Resources (IDNR); U.S. Geological Survey

Goals and Objectives:

- In order to develop a model to predict giant Canada goose breeding pair densities in Iowa, we will first reclassify the NWI data by modifying the current Cowardin classification system to a simplified classification system based on wetland vegetation and permanence.
- We will also identify all sections in the state with potential Canada goose nesting habitat and assign each section to a class based on their predicted numbers of breeding pairs.
- In addition, we will determine giant Canada goose nest success at Rice Lake Wildlife Management Area, and other areas where nest densities have historically been very high.

Progress:

The NWI wetlands have been re-classified from the Cowardin classification system to a simplified system based on wetland vegetation and permanence. The 199 wetland types identified in Iowa under the Cowardin classification were condensed into 10 wetland types. The re-classification was accomplished with the aid of Iowa DNR waterfowl biologists Guy Zenner and Orrin Jones. The wetland classes are: lake, quarry, river-good, river-poor, marsh-semipermanent, marsh-seasonal, marsh-temporary, swamp-semipermanent, swamp-seasonal, and swamp-temporary. Within the 160 2 mi² plots surveyed in Iowa from 2005-2009, Canada geese were only observed at 7 wetland types. Following re-classification, all sections in Iowa with potential Canada goose nesting habitat were identified using a GIS, and data files were compiled. The data were explored using R (R Core Team 2013), and the data are clearly nonlinear and include many zero counts. A general model incorporating survey counts and wetland type, number and size was applied to the data using regression analysis methods. Poisson and negative binomial generalized linear models were tested, and the negative binomial models performed better based on the AIC. Once the appropriate distribution was determined, I tested various models by incorporating a list of predetermined variables. Using backward stepwise procedures, the most parsimonious model included wetland types, number of wetlands, area of wetlands, and a quadratic of the area variable.

Canada goose nests were located and monitored at Rice Lake Wildlife Management Areas (WMA) and Big Wall Lake during the 2013 spring nesting season. One hundred Canada goose nests were found at Rice Lake and Joice Slough, with 21 nests hatched. The data from these two wetlands within Rice Lake WMA were analyzed separately within Program MARK, but results showed that survival at Rice Lake and Joice Slough was not significantly different. This is not surprising because their habitats are nearly identical and they are only separated by a paved road. Multiple models have been tested using the measured covariates and the group model, which estimated daily survival rate (DSR) for Big Wall Lake separately from Rice Lake and Joice Slough, was the most parsimonious. The DSR of nests at Rice Lake and Joice Slough was 0.94 and, with a 28-day nesting period, nest survival is 0.18. Twenty-nine Canada goose nests were found at Big Wall Lake, with 18 nests hatched. The DSR of nests found at Big Wall Lake was 0.97, and the nest survival estimate is 0.43. This data analysis is not complete.

During the 2014 Canada goose nesting season, nests were located and monitored at Rice Lake WMA, Big Wall Lake, East Twin Lake, Lower Morse WPA, and Union Hills WPA. A total of 164 nests were monitored. Analysis in Program MARK indicated that nest survival at Union Hills and Lower Morse WPA were not statistically different. These nests were in elevated structures, and thus, the DSR of these nests was 0.99, with a nest survival estimate of 0.78. These sites exhibited the highest rates of nest survival. East Twin Lake and Big Wall Lake are both shallow marshes with very similar nesting habitat. Analysis in Program MARK indicated that survival at these sites was not statistically different. The DSR of these nests was 0.963, with a nest survival estimate of 0.347. Interestingly, this year, nest survival at Rice Lake and Joice Slough were not similar enough to be combined. This is likely due to the draw down of Rice Lake for restoration. There was a noticeable

difference in Canada Goose nesting behavior at these sites. At Rice Lake, it seemed that geese were mostly nesting on only one island, compared to last year when geese densely nested on at least 5 islands. Because of this, there was a slight increase in the number of geese nesting at Joice Slough. DSR of nests at Rice Lake was 0.964, with a nest survival estimate of 0.358. DSR of nests at Joice Slough was 0.981, with a nest survival estimate of 0.584.

Future Plans:

In the final year of my graduate assistantship, I will finish analyzing my Canada goose nesting data to determine the final nest survival estimates. I will also be finalizing the stratification of Iowa sections for the breeding ground survey.

Functional Assessment of Missouri River Mitigation Wetlands in Iowa

Principal Investigator: Rolf R. Koford
David L. Otis

Student Investigator: Tyler Grant (Ph.D.)

Collaborators: Karen Kinkead, Angi Bruce, Iowa Department of Natural Resources
NE, KS, MO State agencies and universities

Duration: June 2009 to May 2014

Funding Source(s): U.S. Army Corps of Engineers

Goals and Objectives:

- Evaluate herpetofauna habitat function of restored wetlands in the Missouri River floodplain
- Relate species response to management practices and physical attributes of wetlands
- Integrate results from comparable studies in collaborating states to produce models to inform adaptive management of existing and future mitigation programs

Progress:

In 2013, field work was conducted from late March to mid-August. Field work proceeded as planned and using the same protocols from 2012. The water table was lower and ~50 sites were surveyed with call surveys, tadpole surveys, and metamorph surveys. The fewer number of sites and increased efficiency resulted in more surveys than in 2012. We conducted 12-13 call surveys, 12-15 tadpole surveys on most sites, and 6-10 metamorph surveys on most sites. Habitat surveys were conducted at each site twice over the summer, once before significant green vegetation had grown, and once after the vegetation had grown in. Drift fences were installed again at PD33 and PT6. In 2013, substantial breeding occurred in PD33 and thousands of Woodhouse's toad metamorphs were captured leaving the wetland. Turtle trapping was conducted from July 22 to August 9 at 5 wetlands. False map turtles were particularly abundant at PT47 in 2013. Population size was estimated as 78.43 (95% CLs 73.93, 104.8) at PT47. The number of turtles captured at other sites was still too low for population analysis, as it was in all previous years.

Future Plans:

Final analyses and reports are being generated for the U.S. Army Corps of Engineers.

Conclusions and Recommendations:

Turtles and anurans in the Missouri River floodplain occupy a range of wetlands from large, deep, fish-inhabited wetlands near the river to small, fishless, often-temporary wetlands. Anurans occupy a range of wetlands from sandy, poorly vegetated to heavily vegetated wetlands. A diverse community of anurans and turtles indicates that diverse habitat exists and that other species adapted to niches along that continuum also are present. The Corps and Iowa Department of Natural Resources could take active measures to increase the number of wetlands at points along the continuum where they are uncommon. A primary result from the multi-state analysis is that a shallow slope at some places in the wetland is an important habitat characteristic for most anuran species.

More flooding is likely to occur at some point in the future. Some species were very resilient to the flood while others were not. Refugia wetlands above the floodline would aid those species that were not resilient in recolonizing after floods.

Conservation, Habitat Use, and Genetic Diversity of a Translocated Population of Greater Prairie-chickens in Iowa

Principal Investigator: Jennifer Vogel
Co-Principal Investigator: Diane Debinski
Collaborators: Stephanie Shepherd, Iowa DNR
Duration: 2013-2016
Funding Source(s): State Wildlife Grant (IDNR, USFWS)

Goals and Objectives:

- Evaluate the genetic diversity of the existing small population of greater prairie-chickens in Iowa and examine the effects on genetic diversity of supplementing the current population with translocated birds.
- Develop a habitat suitability model and examine habitat use for greater prairie-chickens in Iowa. We will use current satellite landcover data along with local scale habitat data to develop a habitat suitability model for greater prairie-chickens in Iowa.

Progress:

Genetics: We collected 111 blood samples from translocated birds in 2014. Blood samples from 2012 and 2013 are being processed at the University of North Texas.

Lek Surveys: We conducted prairie-chicken lek surveys weekly for 6 weeks during the spring of 2014.

Habitat Surveys: For grasslands within 3km of active lek sites, we are continuing to conduct vegetation surveys that include measuring visual obstruction and determining vegetation composition. We will use this vegetation data to assess habitat use of prairie-chickens within 3km of the active lek sites.

Telemetry: We attached 12 ARGOS satellite/GPS transmitters to 10 female and 2 male prairie-chickens in Nebraska prior to transport. All of the birds with our transmitters were released in Iowa in April 2014. We are tracking location data with weekly downloads from the ARGOS satellite system for the 2014 birds as well as one remaining bird from 2013. We collected over 3,100 GPS locations in 20 Counties in Iowa and 18 Counties in Missouri from the 2013 marked birds. Prairie-chicken location data, along with land cover data from the U.S. Geological Survey National Land Cover Database, will be used as the basis for a landscape level habitat suitability model.

Future Plans:

We will continue habitat surveys of the areas around the 3 active leks for the remainder of the 2014 field season. We will continue monitoring the locations of the birds with transmitters via weekly downloads from the ARGOS Web System. We will continue work on both the local and landscape level habitat use models.

Distribution and Population Dynamics of Asian Carp in Iowa Rivers

Principal Investigator: Michael J. Weber
Clay L. Pierce
Student Investigator: Carlos Camacho
Collaborators: Kim Bogenschutz, Iowa DNR
Jason Euchner, Iowa DNR
Duration: July 1, 2013 – June 30, 2016
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Evaluate adult population characteristics (abundance, distribution, size structure) and dynamics (recruitment, growth, mortality) of Asian carp among select Iowa rivers, including the Mississippi, Des Moines, Skunk, Iowa, and Cedar rivers
- Evaluate Asian carp reproduction (fecundity, larval and juvenile densities) and recruitment in select Iowa rivers, including the Mississippi, Des Moines, Skunk, Iowa, and Cedar rivers

Progress:

In summer 2013, Asian carp were collected during preliminary sampling in the Mississippi, Des Moines, and Cedar rivers. In the Des Moines River, 120 Silver carp were captured with boat electrofishing ranging from 480-810 mm with 95% of the individuals being 520-660 mm. Additionally, 21 Bighead carp were captured ranging from 560-1080 with the majority (52%) being 700-820 mm. In the Mississippi River, 109 Silver carp were captured ranging from 560-920 mm with 73% of the individuals being 620-740 mm. An additional 11 Bighead carp were caught ranging from 680-1120 mm. In the Cedar River, 1 Silver carp (881 mm) and 1 Bighead carp (1080 mm) were caught. Field observations suggest Bighead carp may not be as numerous as Silver carp in these locations. Asian carp numbers appear to be less abundant above compared to below Lock and Dam 19 but fish above the dam may be larger and in better condition.

Future Plans:

Additional sampling for all life stages of Asian carp will occur in spring-summer 2014 and 2015.

Completed Projects

Acoustic transect monitoring and White Nose Syndrome response plan for Iowa bats

Principal Investigator: Julie A. Blanchong
Rebecca Christoffel

Student Investigator:

Collaborators: Daryl Howell

Duration: July 2012 to December 2013

Funding Source(s): Iowa Department of Natural Resources (IDNR)

Goals and Objectives:

- Conduct acoustic surveys along drive transects to monitor bat activity
- Prepare a White Nose Syndrome response and management plan for Iowa

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 numerous US states and Canadian provinces. The fungus that causes WNS was detected on a big brown bat hibernating in an Iowa cave in March 2012. 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 minimal, but is critically needed to understand the potential ramifications of WNS to Iowa.

Objective 1. Acoustic monitoring of Iowa bats

Establish and conduct acoustic surveys for bats along transects in eastern, central, and southern Iowa to document bat activity, abundance, and distribution.

Fifteen transects in eight counties in Iowa (two transects in Boone, Clayton, Dubuque, Jackson, Lucas, Story, and Warren and one in Hamilton) were driven twice during June-July 2013. Calls emitted during bat echolocation were recorded using an Anabat SD2 detector in 15s intervals using a vehicle-mounted microphone. Bats were most active 30 and 60 minutes after sunset. Nightly activity levels for each transect ranged from a minimum of 1.4% of recordings that contained bat activity in Warren County to a maximum of 22.9% of recordings that contained bat activity in Dubuque County, with a statewide mean of 11.3%. Calls were separated into two kHz groups (low and high); 54.9% of recorded call sequences were identified as belonging to the low kHz group while 42.5% were belonged to the high kHz group. We identified a small proportion of calls to species. The most frequently identified species were big brown, Eastern, and hoary bats. We also identified bats of the genus *Myotis* as a group.

Objective 2. White nose syndrome response and management plan

Develop an Iowa-specific white nose syndrome response plan containing WNS response objectives, management tools, management of contaminated environments, results monitoring, and restoration plans.

The Iowa "White-Nose Syndrome Response and Management Plan" was developed using Michigan's plan as a model. A draft of the plan was shared with Iowa DNR and U.S. Fish and Wildlife Service for feedback, and the plan was finalized in December 2013.

A final report for this project was submitted to the IDNR in December 2013.

Conclusions and Recommendations:

Bat activity was generally higher in the eastern portion of the state. This difference may be tied to differences in habitat across the state. Qualitatively, the eastern counties appear to be more densely forested than any of the central or southern counties. Counties that had low activity levels seemed to be more heavily agricultural with only sparse patches of forested habitat.

The Iowa White-Nose Response and Management Plan will be shared with identified partners to guide their activities associated with WNS, such as research, teaching and educational outreach. As new information becomes available and as WNS eventually is documented in Iowa, the plan will periodically be reviewed and updated.

Funding has been secured to conduct additional bat acoustic monitoring in 2014. During summer 2014, acoustic drive transects established in 2013 will be re-surveyed. In addition, four new drive transects will be established in north-central Iowa. To complement these mobile surveys, we will establish three fixed-location sites in urban areas that are difficult to survey by vehicle as well as three fixed-location sites in agricultural areas for monitoring during times of intense insect activity. As in 2013, drive transects and fixed-location sites will be surveyed twice. The data from summer 2014 will be analyzed following methods used in 2013.

Impact of Wind Farms on Birds and Bats in Iowa

Principal Investigator: Stephen J. Dinsmore
Student Investigator: Molly K. Gillespie (M.S.)
Collaborators: Karen E. Kinkead, Iowa Department of Natural Resources (DNR)
Duration: October 2010 to August 2013
Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant

Goals and Objectives:

- *Document bird use at wind farm sites in Iowa.* I will employ point counts and distance sampling techniques to provide an assessment of bird community responses at wind farms and paired control sites. This will produce a measure of community response (species richness) and species-specific density estimates as a means for comparisons. [field work from May to July in 2011 and 2012]
- *Monitor nesting success of birds in response to proximity to wind turbines.* I will locate and monitor nests of one or more common species (probably Dickcissel or Red-winged Blackbird) to determine if nest success is related to proximity to wind farms. The probability of successfully completing a nesting attempt is an important demographic parameter and will be the means for comparing results. [field work from May to July in 2011 and 2012]
- *Monitor bat proximity to wind turbines using Anabat technology.* I will place Anabat receivers at wind farm and control sites to monitor species composition and encounter frequency at each site. Anabats do not allow individuals to be identified, so I will rely on call encounter rates by species as a measure for comparisons. [field work from May to July in 2011 and 2012]

Progress:

Objective 1) Document bird use at wind farm sites in Iowa

The 2012 survey season went from 1 June to 15 July. During this season we were able to conduct 924 point counts across the 3 sites. At these points we detected birds from over 47 species. The five species most commonly detected included Killdeer (625 detections), Vesper Sparrow (627 detections), Dickcissel (1014 detections), Red-winged Blackbird (1870 detections), and Common Grackle (734 detections).

Objective 2) Monitor nesting success of birds in response to proximity to wind turbines

We monitored a total of 217 Red-winged Blackbird nests during the incubation stage and 191 during the nestling stage. Nests were found 250 m from the turbine base out to 10 km from a turbine.

Objective 3) Monitor bat proximity to wind turbines using Anabat technology

Bat activity was monitored from 5 June through 5 October 2012 at eight turbine and eight control sites in Story County, Iowa. This resulted in 510 detector nights across 48 different points in Story County. We then used an activity index to determine the number of 1-min intervals which contained bat activity (Miller 2001), and this was then converted to a fraction of minutes with activity to account for changes in search effort over the course of the season as sunset and sunrise changed.

Conclusions and Recommendations:

Our study documented avoidance behavior (particularly with grassland and generalist species, including Dickcissel, Common Yellowthroat, Red-winged Blackbird, and American Robin), attraction behavior (mostly by agricultural species, especially the Killdeer), and multiple examples of species unaffected by turbine proximity (including Song Sparrow and Common Grackle). Additionally, we found significantly lower species richness at two of our three sites at the turbine base as compared to points ≥ 250 m from the turbine. Our work also demonstrated that the breeding bird community in Iowa's intensive agricultural landscape has low densities and species richness, suggesting that overall impacts to breeding birds may effect fewer species and individuals here than in native habitats with greater species richness. Future plans call for continued development of wind energy resources in Iowa, primarily on lands currently managed for agriculture, which may help to limit impacts to avian communities.

We found negligible effects of wind turbine proximity on the survival of Red-winged Blackbird (*Agelaius phoeniceus*) nests. However, previous studies have shown that raptors will avoid nest sites near wind turbines, and our study did not attempt to look at nest site selection due to the lack of nesting habitat near turbines. Because each species and site may have different responses to wind turbine proximity, we suggest

that this be studied in other, perhaps more sensitive, species such as Dickcissel. This study focused on a generalist species breeding in an agricultural landscape, and possibly represents a species and habitat least likely to be affected by wind energy development.

Contrary to other studies, we found no evidence that bats are attracted to wind turbines, with the probability of activity actually being lowest near the turbine base. However, there was no turbine effect on the level of activity, indicating that perhaps turbines placed in an agricultural landscape have a negligible effect on bat behavior. Unlike the previous study of bat activity in Iowa, we found differences in activity between our control and turbine sites, with activity more likely at our control site. This could have been due to the closer proximity of the control site to roosting areas, or another unmeasured landscape variable. We recommend that future studies attempt to incorporate before-after-control-impact study design to determine if differences in activity are due to turbines or other factors.

Others have suggested that directing wind energy development on disturbed lands, which already have lower wildlife value, could help reduce the future impacts of wind energy development on more sensitive bird species. Our findings lend further support to assertions that placing wind turbines in already disturbed lands (e.g., agricultural fields) minimizes impacts to birds and bats, and specifically avoids placing many specialist species at greater risk. By broadening our understanding of the indirect effects of wind turbines to include behavioral responses, avian nest survival, and bat activity we can refine siting guidelines that will limit the effects of wind farms on the surrounding habitat while still offering the benefits of “green” energy.

Urban Fisheries Development Plans in Central Iowa

Principal Investigator: Dr. Joseph E. Morris
Student Investigator: Steven Konrady
Collaborators: Iowa Department of Natural Resources
Duration: 2012-2014
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- An Urban Fisheries Project was created in 2012 as a collaborative effort between Iowa State University Cooperative Fish and Wildlife Unit and the Iowa Department of Natural Resources. Study and development of fishing resources in central Iowa's urban communities were the main goals of this two-year project.

Progress:

To accomplish those goals, potential sites were identified and their functionality as an urban fishery was evaluated. A methodology for site selection was developed; hereafter referred to as a site selection matrix. This matrix was used to efficiently incorporate many sampling metrics used in fisheries management into a scoring rubric to rank and prioritize sites. This allowed for quick evaluation of a large number of sites to help determine those best focused on for future improvements. The matrix attempts to capture variation in the key fisheries statistics of water quality, vegetation, lake physical features, and fish assemblage to determine which have the most impact on a site's viability as an urban fishing resource. While angling resource requirements vary among different user groups, the goal of using the matrix is to identify sites with greatest overall potential as a sustainable fishery for the widest range of users. Using historical data from the 2009-2012 stage of the Urban Fisheries Project, baseline matrix scores were created for priority, secondary, and eliminated sites. Through principle component analysis, the impactful factors in appropriate site selection were discovered and each category in the site selection matrix was weighted accordingly. With that guideline in place, new locations sampled in 2012-2014 were assigned matrix scores and ranked on the scale built, in part, by historical data. Each site was then ranked and delineated into priority groups: primary, secondary, and eliminated.

Conclusions and Recommendations:

These guidelines, rankings, and priority groups are useful for fisheries managers who have a large number of sites to work with at any one time. Choosing sites that rank highly within the context of the matrix for fisheries and amenities improvements allows managers to maximize the potential return on investment for available funding and efforts. For this project, preliminary management recommendations were provided for five "priority" sites including Georgetown and Sawgrass ponds, Ankeny; Marina Cove Pond, Polk City; City Pond, West Des Moines; and Prairie Heritage Pond, Altoona. While the matrix is structured to efficiently capture metrics used in fisheries management, parameters not well captured by a simple statistic (i.e., social and community concerns) must also be considered. A willing or motivated community initiative and partnership can potentially result in projects being more viable than indicated by status assigned using the matrix. Acknowledging the potential social complexity is important; however, the matrix is still helpful in determining a starting point when looking for a potential urban fishery. The five selected sites ranked well using the matrix, but final selection was adjusted slightly to account for the more intangible nature of the community-driven initiatives or jurisdiction at the final sites.

Comparison of Amphibian Habitat Suitability In USDA CREP and Reference Wetlands in the Des Moines Lobe of Iowa

Principal Investigator: Clay L. Pierce
Student Investigator: Rebecca Reeves (M.S.)
Collaborators: Erin Muths, USGS Fort Collins Science Center
Mark Vandever, USGS Fort Collins Science Center
Duration: September 2011 to December 2014
Funding Source(s): U.S. Geological Survey, Fort Collins Science Center, SSP

Goals and Objectives:

- Compare amphibian species richness in restored CREP and reference wetlands in central Iowa
- Estimate lethal and sub-lethal impacts to adult leopard frogs (*Lithobates pipiens*) in CREP and reference wetlands in central Iowa by estimating survival rates and population sizes and characterizing developmental stress exhibited by frogs (via fluctuating asymmetry and body condition)
- Estimate and compare chorus frog (*Pseudacris maculata*) population sizes in reference and restored wetlands in central Iowa
- Characterize abiotic factors (e.g., depth, hydroperiod, water pH, turbidity, nutrient concentrations, and conductivity) and environmental stressors (e.g., predators, emergent diseases, as well as parasite and pesticide exposure) experienced by amphibians in restored and reference wetlands in central Iowa

Progress:

All project objectives were completed, a final report will be submitted in July, and three manuscripts are being prepared for publication.

Conclusions and Recommendations:

We sampled environmental characteristics and amphibian populations in six wetlands (3 CREP and 3 reference) between 2011 and 2013. As anticipated, given their purpose, water samples from CREP wetlands had higher concentrations of nitrogen. Additionally, we tested water, frog tissue, and sediment samples for nearly 100 agricultural contaminants, including fungicides, insecticides, herbicides and degradation products. While we found contaminants in all samples, there were no differences in concentrations between CREP and reference wetlands. Compounds detected in amphibian tissue were similar to those detected in water and sediment samples, so it is likely that frogs are picking up contaminants from their habitat. We found no differences in amphibian species richness or adult leopard frog survival rates between wetland types. Reductions in leopard and chorus frog population size correlated with extended hydroperiods and the presence of fish and non-native bullfrogs (*Lithobates catesbeiana*) in wetlands. The amphibian chytrid fungus was detected in all wetlands, but was found in higher concentrations in water samples from reference wetlands. Exposure to the amphibian chytrid fungus is known to increase hind limb asymmetry in frogs. In line with this, leopard frogs from reference wetlands exhibited higher levels of developmental stress (i.e., reduced body condition and increased size differences between paired limbs) than frogs from CREP wetlands. Overall, our findings suggest that CREP and reference wetlands are valuable components of the amphibian habitat available in central Iowa. Maintaining a complex of fish-free wetlands with variable hydroperiods may reduce the impacts of drought and variable rainfall on amphibians in central Iowa.

Evaluation of an electric barrier to reduce walleye escapement

Principal Investigator: Michael J Weber
Student Investigator: None
Collaborators: Mark Flammang, George Scholten, IDNR
Duration: April 1, 2013 – July 31, 2013
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Evaluate the potential effectiveness of an electric barrier at reducing walleye escapement from reservoirs. Laboratory experiments were used to compare walleye behavior, escapement, and mortality using four pulse (0, 0.3, 0.5, and 0.8 ms) and three voltage (0, 60, and 80 V) settings.

Introduction

Fish entrainment through dams, hydroelectric projects, or into cooling water intakes has been shown to have negative impacts on fish populations. In Iowa, walleye escapement from Rathbun Lake can approach 30% annually with an associated large economic cost. Section 316(b) of the Clean Water Act has required that “best technology available” be used to minimize adverse environmental impacts resulting from operation of cooling water intake structures. Thus, evaluations of barriers to reduce walleye escapement are needed. Several different types of nonphysical barriers have been employed, such as constant light, strobe lights, underwater sound, bubble curtains, electrical current, or a combination of the above. A recent barrier evaluation found that a sound-air-light barrier was minimally effective at reducing walleye escapement. The use of electric barriers has been successful at reducing movement of fishes for over 60 years. However, few formal evaluations currently exist that assess their ability to successfully deter fish movements.

Progress

All trials have been completed at Rathbun Fish Hatchery, data has been analyzed, and the final report has been completed. Our results demonstrate that a pulsed DC electric barrier was successful at reducing approaches and increasing deflections of walleyes when it was activated, suggesting that fish avoided the barrier. Altered behavior resulted in a 70% reduction in escapement. However, pulse width and voltage did not influence escapement rates. No walleyes died during control trials whereas mortality ranged from 0.5-5.7% when the barrier was activated and was highest at the highest barrier setting (80 V, 0.8 ms).

Conclusions and Recommendations:

Additional work is needed to evaluate the effect of flow rate on escapement rates using these barriers and the utility of electrical barriers in field settings under a wider range of conditions and on additional species.