2012 Annual Report

July 2011 – June 2012

Cooperating Agencies:

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

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Rebecca Christoffel, NREM
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David Otis, Former Unit Leader
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Michael J. Weber, NREM

New 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

Introduction:

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 will examine the degree to which avian SGCN are being exposed to lead in their diets by examining lead levels in raptors and other birds brought to wildlife rehabilitation centers and in nesting and wintering Bald Eagles in Iowa. We will non-invasively collect and test feces, and when present, feathers, for lead. In rehabilitation birds, we will also compare lead levels in feces to lead levels in blood. Identification of factors associated with elevated lead levels will contribute to a better understanding of sources of risk to SGCN and may help devise appropriate and effective management actions. These data will also serve as baseline data of lead exposure levels in SGCN for follow-up studies to assess the impacts of management actions should regulations regarding the use of lead ammunition in Iowa be amended.

Progress:

M.S. student William Reiter-Marolf began work on this project. From the Iowa DNR database of Bald Eagle nests, we randomly selected 100 nest sites to sample in 2012. Fifty nests are in close proximity to the Mississippi River and 50 are distributed throughout the rest of Iowa. We are working to secure access from landowners to study sites. We have identified active roost sites, and have begun to collect fecal samples from these sites. We have also partnered with 3 rehabilitation centers to collect samples from Bald Eagles and other SGCN submitted for rehabilitation.

Future Plans:

In 2012, fecal samples will be collected at nest sites during egg incubation and when eaglets are 3-9 weeks of age. Fecal samples will also be collected at wintering eagle roosts. Fecal and blood samples will be collected from eagles and other SGCN submitted to 3 wildlife rehabilitation centers in Iowa. Samples will be sent to the Iowa Hygiene lab for lead testing.

Iowa Breeding Bird Atlas project completion

Principal Investigator: Stephen J. Dinsmore
Student Investigator: N/A
Collaborators: Karen E. Kinkead, Iowa Department of Natural Resources (DNR)
Duration: April 2012 to December 2012
Funding Source(s): Iowa Department of Natural Resources
Goals and Objectives:

- Complete breeding bird atlas work on grid-based blocks during the 2012 field season.
- Complete data entry for all blocks visited during the 2012 field season.

Introduction:
Iowa's first Breeding Bird Atlas (BBA I) was conducted between 1985 and 1990 and provided the first comprehensive catalog of Iowa's breeding birds (Jackson et al. 1996). This effort covered 861 3x3 mile blocks statewide, which were divided into standard blocks (placed systematically across Iowa in a grid) and priority blocks (chosen on the 'basis of their unique or representative natural features'). This design was used to balance statewide coverage with the need to visit specialized habitats that were underrepresented in the grid sample.

Since 1990, Iowa has undergone multiple large-scale changes in habitat. Iowa has seen an increase in the amount of cropland enrolled in the Conservation Reserve Program and other habitat-based government programs. However, due to the biofuel/ethanol boom, Iowa is expected to lose 160 square miles of CRP to corn production in 2007, with an additional 300 square miles lost to production by 2010 (Todd Bogenshutz, Iowa DNR Farm Bill Coordinator, pers. comm.). The impacts of these changes on birds have not been measured, although anecdotal reports suggest there have been and will continue to be important changes to Iowa's breeding bird community. The Iowa Department of Natural Resources and the Iowa Ornithologists' Union have initiated a second breeding bird atlas project to help document changes in breeding birds as protected land once again becomes cropland.

The second Breeding Bird Atlas (BBA II) was initiated in 2008 and will encompass a 5-year period (2008-2012). All of the 'standard blocks' from BBA will be revisited (although they will be renamed 'grid-based blocks'). The old 'priority blocks' have been renamed 'habitat-based blocks' and a new stratified random sample was chosen. The sampling frame for habitat-based blocks included all protected properties (or property complexes) larger than 40 acres statewide. A protected property was defined as property owned by an organization such as the Iowa DNR, U.S. Fish & Wildlife Service, U.S. Army Corps of Engineers, The Nature Conservancy, Iowa Natural Heritage Foundation, etc. Current GIS habitat layers were used to classify habitat types within each of these properties. A random sample of these properties was taken in proportion to the amount of each habitat class in protected status; this resulted in a sample of 791 blocks for BBA II.

Progress:
None because project does not begin until April 2012.

Future Plans:
In 2012, four field technicians will visit primarily grid-based blocks, which may be less likely to be visited by a volunteer. They will visit as many grid-based blocks as possible while maintaining travel efficiency, and will attempt to reach the minimum level of effort (5 hours) needed to consider many of these blocks complete. Technicians will follow standard atlas protocols and enter data directly into the database managed by the Iowa Ornithologists' Union Breeding Bird Atlas webpage (http://bba.iowabirds.org).

Iowa Multiple Species Inventory and Monitoring (MSIM) Program

Principal Investigator: Stephen J. Dinsmore
Student Investigator: N/A
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
- Ensure collected data are entered into the MSIM on line database.
- Submit county occurrence records to the appropriate Iowa WAP taxonomic subcommittee. See the table at the end of the proposal for the structure and chairs of the IWAP taxonomic subcommittees.
- 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.

Introduction:

This proposal seeks to continue work began under earlier State Wildlife Grants, therefore, the some of this text follows almost exactly that in SWG #T-6-R-1, #T-6-R-2, and #T-6-R-3. However, this expands upon the program, incorporating publishing and a full peer-review of the program once all 99 counties have been surveyed.

The Iowa Wildlife Action Plan (IWAP) lists 296 species of mammals, birds, reptiles, amphibians, fish, mussels, dragonflies, butterflies, and terrestrial snails as species of greatest conservation need (SGCN). The IWAP also states that one of the primary conservation actions is to "develop scientifically reliable knowledge on the distribution, abundance, and ecological needs of all wildlife species" (IWAP, page 107). The *purpose* of this proposal is to continue the implementation of the multiple species inventory and monitoring (MSIM) program designed under a previous SWG (Iowa #T-4-P-1), which was then implemented beginning in 2007 under SWG (Iowa #T-6-R-1). The MSIM program is designed to be a statewide program, and we are expanding to encompass all 99 counties. For 2007 through 2008, we surveyed 45 public properties in 14 counties. Two of the properties (Harrier Marsh and McCoy Wildlife Management Area) have been designated as yearly monitoring locations and were surveyed in both years. Since 2007, additional properties have been designated as permanent, annual sampling locations, including: Cedar Bottoms Wildlife Management Area (WMA), DeKalb WMA in 2008, Mt. Ayr WMA, Black Hawk Marsh, Hawkeye WMA in 2009, Lakin Slough WMA, Ocheyedan WMA, and Big Wall Lake in 2010. See Figures 3 and 4 for maps of these locations.

Ideally, by 2013, sampling locations will be established in all 99 counties with some sites (25) being monitored yearly and others every 5 years based on a rotating panel design (Figure 4). The central *justification* for the MISM program is that the program will directly address Element 5 as required by Congress for each state's WAP. Specifically, Element 5 reads "Plans for monitoring SGCN and their habitats…" (IWAP, page 3). The primary *expected results* from this funding include baseline inventory data for the monitoring program. In addition, information gained with this funding will be critical in updating the IWAP, providing that required Element 1 ("Information on the distribution and abundance of wildlife…") is still included in the mandate. The program will *benefit* Iowa by providing information on wildlife species which will be necessary to evaluate whether many of the goals in the IWAP are being met. For example, the IWAP implementation committee has charged various taxonomic working groups with setting population goals for as many SGCN as possible. Many taxonomic working groups currently lack the necessary information to be able to set these goals. The MSIM program should be able to provide information needed to set these goals for many (but probably not all) SGCN. The *general approach* for the MSIM program is to 1) establish permanent sampling locations on public lands, 2) execute appropriate wildlife sampling protocols to collect data on as many SGCN as can be found in the areas, and 3) to analyze the data in a manner that will allow inferences as to the status of the species and also for management recommendations to be made.

Progress and Future Plans:

A Research Associate II (Tyler M. Harms) was hired at Iowa State University to help with various aspects of this project, especially data analyses and preparing publications for the peer-reviewed literature. Seasonal positions have also been advertised and interviews will be conducted in early February so they can be hired in time to start in early April 2012.

Urban Fisheries Development Plans in Central Iowa

Principal Investigator: Joseph E. Morris
Student Investigator: Steven J. Konrady (M.S.)
Collaborators: Ben Dodd, Iowa Department of Natural Resources (DNR)
Barb Gigar, Iowa DNR
Duration: February 2012 to April 2014
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Develop list of lakes and ponds in public ownership near incorporated cities in nine counties of Central Iowa
- Examine social, physical, chemical, and biological characteristics of the sites and their respective watersheds
- Determine potential for sustainable fishery development at selected sites
- Create list of priority sites based on potentials in all categories by working with DNR staff
- Determine management needs for priority lakes and develop restoration strategies
- Assist focal area stakeholders with funding guidance

Introduction:

This project will serve as a continuation and expansion of the Urban Fisheries Development project from June 2009-May 2010 (Iowa DNR) and June 2010-Jan 2012 (ISU Coop Unit). Previously, work was dedicated solely to the City of Des Moines, Iowa however this project's scope will be expanded to all of Central Iowa. It will include the nine counties found in the Iowa DNR's Boone Fish Management district and their associated municipal, county, private, and state properties that hold public fishing lakes and ponds that are not under existing, well developed Iowa DNR management plans. A detailed analysis of biological, physical, and social characteristics that affect these sites and their associated watersheds will be conducted in order to prioritize them as areas of greatest need and potential as sustainable urban fisheries. This prioritization will be used as a guide for future management plan implementation.

Progress:

A matrix for prioritization of these sites was developed in conjunction with the previous work of the Iowa DNR and ISU for the City of Des Moines pond sites. Additionally, a sociological study of nationwide urban fisheries programs and Iowa's own fledgling program was developed by a sister study in the ISU Sociology Department by M.S student Angela Carter and PIs Lois Wright Morton and Rebecca Christoffel. Both of these will be integral to the future progress of this project. Cooperation with the Iowa DNR's fish management staff out of the Boone Wildlife Research Station has been continued for this project and will be another key factor. Contacts within city and county governments within the project area have also been partially established in conjunction with DNR staff.

Future Plans:

Using satellite imagery and local government contacts, public access fishing lakes within 20 miles of incorporated cities falling under the project scope mentioned in the introduction will be identified and listed. The aforementioned matrix will be modified and applied to the listing of available public fishing sites in order to rank them and narrow the list to a workable number. Further investigation of many of the top priority sites will be used to strengthen the matrix's prioritization ability. These investigations will include analysis of available data and acquisition of new data in several categories including social, physical, chemical, and biological characteristics of the sites and their respective watersheds.

These goals will be accomplished in the first year and a half of the project and will lead to final priority classification of all lakes. Further analysis of the top 15 priority sites in Central Iowa will be conducted to assess needed management and restoration strategies with the goal of establishing or maintaining sustainable fisheries at these sites. These strategies will be formulated into appropriate management plans for the sites and used by the local governments and the Iowa DNR to apply for grant funding for implementation. This work is in conjunction with the Iowa DNR's mission to provide quality, sustainable fisheries for Iowa's urban areas.

Comparison of Amphibian Habitat Suitability in USDA CREP Wetlands & Natural Wetlands in the Des Moines Lobe of Iowa

Principal Investigator: Clay L. Pierce
Student Investigator: Rebecca Reeves (M.S.)
Collaborators: Erin Muths, US Geological Survey (USGS), Fort Collins Science Center
Mark Vandever, USGS, Fort Collins Science Center
Duration: September 2011 to December 2013
Funding Source(s): U.S. Geological Survey, Fort Collins Science Center, SSP

Goals and Objectives: As a first step to addressing the question "do CREP wetlands in agricultural landscape facilitate source or sink amphibian populations" we propose to compare several amphibian life history parameters and potential stressor covariates in CREP and natural reference wetlands. In general, the reference sites will be natural depressional wetlands within the same watershed as CREP sites, but their location is such that they do not intercept tile runoff. In contrast, CREP wetlands are constructed at locations in the landscape where agricultural runoff (i.e., tile drainage) is intercepted via gravity flow, below where the tile system discharges at the tile outlet.

The utility of these wetlands will be assessed for their ability to provide habitat and landscape connectivity to amphibians in the Des Moines Lobe by examining water quality, presence of amphibian disease, and estimating survival, reproduction, and stress levels in native frogs.

Specifically, the research questions are:

- Within-year adult survival of chorus frogs (*Pseudacris trisoriata*) is higher at the reference site and is related to water quality
- Developmental instability in leopard frogs (*Rana pipiens*) is related to water quality
- Reproductive effort and success in both species are related to water quality
- *Batrachochytrium dendrobatidis*, a fungus that has been proposed as a contributing factor for worldwide amphibian declines, is more prevalent in chorus and leopard frogs at CREP sites versus the reference sites

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Introduction:

Loss of habitat caused by land use change has resulted in widespread declines in amphibian communities throughout the U.S. The Des Moines Lobe in Iowa historically contained a high density of small depressional wetlands embedded in a prairie grassland landscape, which typifies the prairie pothole region of North America. However, 95-99% of these wetlands have been lost since the conversion of Iowa's landscape to intensive row crop agriculture in the late 19th century. Remaining wetlands are exposed to agricultural chemical inputs that represent a potential source of physiological stress for amphibians. Chytrid fungus (*Batrachochytrium dendrobatidis*, Bd.), a disease that has been proposed as another contributing factor in worldwide amphibian declines, has also been documented in this region. Wetlands restored or constructed under various USDA programs are an effective way to address high priority conservation needs (e.g., loss of habitat) on and around agricultural ecosystems. For example, amphibians may be attracted to permanent water, but suffer negative effects from water quality (e.g., pesticide loads inherent in such an agricultural system). Restoration and construction of wetlands is a promising approach for reducing nitrate loads in heavily tile-drained areas like the Des Moines Lobe.

The Iowa CREP is a state-federal partnership with a goal of adding 3,600 ha of wetlands and associated grassland buffers in a 37 county region of the most intensively tile-drained region in north-central Iowa. The primary objective of the program is to improve water quality by reducing nitrogen loading into Iowa streams by 300 to 600 tons per year (USDA 2001). An additional objective is to provide wildlife habitat. Currently there is information available from monitoring some existing CREP wetlands (e.g., buffer vegetation, input/output flows, nitrate reduction efficacy), and potential amphibian habitat value has been estimated using existing habitat models, but no field studies have been done to determine whether amphibians are actually using CREP wetlands and if that use is resulting in successful reproduction.

Progress:

We plan to begin sampling in March 2012.

Continuing Projects

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 southern Iowa and free-ranging deer populations in northern Missouri where CWD has been recently detected in a captive cervid facility.

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., Missouri).

Lynne Gardner, a PhD student, began work on this project in August 2011. Work thus far has focused on securing samples from harvested deer across Iowa and the Midwest. To that end, we received several thousand deer tissue samples collected for the Iowa Department of Natural Resource's 2009 and 2010 CWD surveillance program.
In addition, we obtained ~300 deer tissue samples from two captive cervid facilities in Iowa. Deer samples have been solicited from deer harvests in 8 urban communities and two state parks. Deer sampling kits were also distributed to 200 Iowa DNR staff across the state who hunt, and to 80 staff, faculty and student hunters from Iowa State University. Finally, deer tissue samples have been requested from 11 other states in the Midwest.

Future Plans:

In winter-spring 2012, we will catalog and map the location of samples received from the sources indicated above, and begin to select a subset of samples for genotyping. In summer 2012, we will optimize microsatellite and mtDNA genotyping protocols and genotype a subset of animals to elucidate the optimum sampling strategy within Iowa and across the Midwest. In fall 2012, we will continue to genotype samples from deer harvested in Iowa and solicit additional deer tissue samples. In the future, we will use these data to determine the geographic distance over which deer across Iowa are genetically correlated, to compare population genetic characteristics between captive and free-ranging deer, and to investigate genetic signatures of early 20th century restoration efforts. Genetic data will also be used to estimate rates and distances of gene flow across Iowa relative to surrounding Midwestern states, compare genetic attributes among states, and identify any landscape features or other factors contributing to observed population genetic patterns.

Population Dynamics and Dispersal of Bobcats in Iowa

Principal Investigator: William R. Clark
Student Investigator: Dawn Reding (Ph.D.)
Collaborators: Todd Gosselink, Iowa Department of Natural Resources
Anne Bronikowski, Iowa State University
Duration: July 2006 to December 2012
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Determine local habitat selection by bobcats, including home range characteristics and dispersal patterns in relation to forest, grassland, and agricultural land and the configuration of these habitats
- Evaluate population monitoring techniques that can be reliably and efficiently used to survey bobcats both at the local scale and also across Iowa
- Determine demographic rates of bobcats in Iowa, including recruitment and survival

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Progress:

Field and laboratory work has been completed for this study, but some data analysis continues. On Objective 1, we completed analysis of movement paths from 23 bobcats and built resource selection functions using case-control logistic regression. Analyses indicate that movement path selection through Iowa's landscape is related to the proportion of forest, grassland, and cropland both within 100 m of the path and within the 750 m buffer around the path. Despite observing the influence of habitat heterogeneity on movement behavior, we did not detect an effect of landscape configuration on fine-scale genetic structure.

Regarding Objective 2, we incorporated the 2009 bowhunter observation survey (BOS) data into analyses that were then summarized in a paper by Linde et al. (2012 Journal of Wildlife Management 76(3). The linear regression models of relative BOS abundance at the county-level and logistic regressions of presence at HUC 12 watershed scale led to the same conclusion that bobcats are present and abundant where perennial grassland habitat is interspersed with patches of forests. Hard edge between forest and cropland was negatively related to abundance. Brushy edge associated with cottontail abundance was positively related.

We have now processed over 1000 carcasses that we used to reach final estimates of demographic parameters (Objective 3). Litter size averaged 3.2 kittens and pregnancy rate peaks at 83% of 3-year-old females. Surprisingly,estimated annual survival of 1 and 2 aged bobcats (77%) exceeds that of 3-5 aged animals (60%). Our best estimate of population growth rate is 1.09 (CI 0.99 - 1.19).

Regarding Objective 4, we have completed three manuscripts on landscape genetics. In the regional paper we identified 6 putative subpopulations within the midwestern states. The regional pattern in genetic variation (based on microsatellite markers) is a result of recent human influence, like conversion of the Corn Belt, and more natural ecological barriers, like forest and prairie transition. But analysis of mitochrondrial DNA variation from more than 1700 samples collected across the continent revealed a major phylogeographic break between bobcats in eastern versus western United States with the transition zone occurring along the Great Plains. These two lineages apparently were separated about the time of Pleistocene glaciation. The constrast between the origin of genotypes in evolutionary time versus the variation that has arisen more recently reinforces the conclusion that the landscape genetic variation in bobcats that we currently see is largely the result of anthropogenic changes in habitat and population levels in the last 200 years.

Future Plans:

This is the last year of the project and our focus is on final publication of results. We continue to refine estimates of survival, dispersal, and population trends

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
Ryan N. Harr

Student Investigators: John Delaney (Ph.D.), Courtney Duchardt (Ph.D., UI)
Tim Lyons (Ph.D., UI), Eric Harold (Ph.D., UI)
Derek Scasta (Ph.D., OSU)

Duration: August 2010 to July 2013

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 will examine bird, butterfly, and vegetation responses to each of the three treatments during the second three-year burn cycle and this project will also incorporate a social science component focused on working with local farmers to extend what is learned on experimental pastures. All treatment variables will 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. 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 beginning 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 proposed study. We have begun our work with landowners, holding field days and workshops to explain the use of fire and grazing for grassland management. We also conducted 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:

Our research will continue for two more field seasons, with data collection and analysis of plant, butterfly, and bird responses to the prescribed fire and grazing treatments. Social science approaches will also continue, with the goal of building a strong landowner group that will grow and develop a management program of their own. We will work with landowners to use assessment techniques to collect baseline datasets on their own properties that will enable them to track changes in their grasslands as they begin to implement restoration practices over the coming years.

Testing the Use of Patch-Burn Grazing to Provide Habitat for Species of Greatest Conservation Need

Principal Investigators: Diane M. Debinski
David M. Engle (Oklahoma State University)
Ryan N. Harr
Postdoctoral Associate: Raymond Moranz, ISU
Duration: October 2010 to September 2012
Funding Source(s): Iowa Department of Natural Resources (DNR), State Wildlife Grant

Goals and Objectives:

- Conduct controlled experiments to test the effects of patch-burn grazing on species distribution patterns of butterfly taxa in the Grand River Grasslands.
- Quantify the response of grassland-obligate and Species of Greatest Conservation Need (SGCN) butterflies to changes in vegetation structure and composition.

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. It will focus on examining butterfly responses to each of the three treatments during the second three-year burn cycle. All treatment variables will 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. 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 pastures 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 beginning 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 proposed study. The 2011 field season involved distance sampling of the butterfly community as well as surveys of vegetation structure and composition. We observed three SGCN butterflies in 2011: Regal Fritillary, Edwards' Hairstreak, and Two-Spotted Skipper.

Future Plans:

The research focuses specifically on butterfly responses, with particular interest in responses of SGCN. We will investigate how butterflies respond to the treatments and to the changes in vegetation structure and composition associated with the treatments. Our initial efforts have been to synthesize and analyze the butterfly and vegetation data collected from 2007-2011. The 2012 field season will involve distance sampling of the butterfly community as well as surveys of vegetation structure and composition.

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 2011 survey season was 1 June to 15 July. During this time we were able to conduct 956 point counts across the three study sites. At these points we detected 12,529 individual birds of 67 species. The five species most commonly detected were Red-winged Blackbird (2425 detections), Brown-headed Cowbird (1068 detections), Common Grackle (1164 detections), American Robin (925 detections), and Killdeer (842 detections) (Table 1). We have begun preliminary analyses of bird density for selected species in relation to proximity to wind turbines.

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

We monitored a total of 360 Red-winged Blackbird nests and 68 American Robin nests. Nests were found 1 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 11 July 2011 through 5 October 2011 at four turbine and four control sites in Story County, Iowa. This resulted in 178 detector nights across 40 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.

Future Plans:

In 2012 we plan to increase our sample of point counts by repeating our methods from 1 June 2012 through 15 July 2012. We will also continue to search for and monitor Red-winged Blackbird and American Robin nests. In 2012, we hope to increase our sample of nests closer to the turbine base, perhaps by speaking with wind farm operators to locate turbines that may have wetlands or other nesting habitat closer to their base. We also hope to increase our search effort for Dickcissel nests, a species that we were not successful in locating any nests this season. We hope to monitor bat activity at additional points in Story County, Iowa during the 2012 season, hopefully increasing both the number of points monitored (with a goal of 60 individual points) and the number of detector nights.

Reproductive Ecology of White-tailed Jackrabbits in Central Iowa

Principal Investigator: W. Sue Fairbanks
Student Investigator: Corey Lange (B.S.)
Collaborators: Todd Bogenschutz, Mark McInroy, IA Department of Natural Resources
Duration: June 2010 to May 2012
Funding Source(s): Iowa Department of Natural Resources, Wildlife Diversity Small Grants Program

Goals and Objectives:

- To identify number and timing of births of litters in white-tailed jackrabbits in central Iowa
- To determine number of offspring born per litter
- To assess habitat use by females and young offspring
- To estimate survival of young jackrabbits

Progress:
Although we captured, opportunistically, three young jackrabbits the year before this study began, all from different nests, we were unable to find any young in 2010, despite radio-tracking collared females and conducting intense searches in fields of their home ranges. We have continued to track radio-collared male and female jackrabbits to supplement the sample size from a previous study, for estimating survival rates. In an attempt to provide useable information as an outcome of this grant, we are gathering information on the occurrence of jackrabbits across the state of Iowa to characterize, using GIS, types of landscapes in which remnant populations still exist. We expect the results will assist with focusing on efforts to locate and monitor remaining populations of this declining species in the state.

Future Plans:
We are planning a meeting between the Iowa DNR and other biologists to pool data on jackrabbit locations in the state. An undergraduate student, Corey Lange, will work on a GIS analysis to characterize landscapes surrounding areas with remaining jackrabbits. We will divide locations into single jackrabbit sightings and multiple jackrabbit sightings to minimize the effects of incidental or dispersing animals biasing our characterization.

Functional Assessment of Missouri River Mitigation Wetlands in Iowa

Principal Investigator: Rolf R. Koford
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 2011, field work was conducted from late March to early August. The Missouri River at the beginning of the field season as relatively high and reached record levels over the summer. It was only possible to operate a few drift fences for a few weeks before they were all flooded. Call surveys and habitat surveys became the primary focus. More survey points were added as the water levels rose. However, flood waters eventually were so deep that the majority of the mitigation sites were under several feet of water. A few tadpole surveys were conducted before then. After the flooding plateaued, new survey points were selected at the edge of the new waterline and on islands in the mitigation sites. At the new survey points, numerous surveys were conducted: call surveys, tadpole surveys, metamorph surveys, and turtle trapping. The results will provide important insight into the response of the study species to historic flooding.

In October, the mitigation sites were visited after the flood waters had largely receded. Many previously important wetlands were completely filled with sediment but some new wetlands were created. The drift fences appear to be a complete loss, with some being carried away by the flooding and some buried under sediment around wetlands that don't exist anymore.

Future Plans:
In 2012, the new landscape will be mapped. The new and extant old wetlands will be surveyed using call surveys, tadpole surveys, and metamorph surveys. Drift fences comprised of silt fences and funnel traps will be installed at new wetlands. Turtle trapping will establish use of new wetlands by turtles.

Best Management Practices for Hybrid Striped Bass Culture

Principal Investigator: Joseph E. Morris
Student Investigator: James Wamboldt (M.S.)
Collaborators: Alan Johnson, Iowa Department of Natural Resources (DNR)
Jay Rudacille, Iowa DNR
Duration: June 2010 to December 2014
Funding Source(s): Iowa DNR

Goals and Objectives:

- Perform literature search on extensively-reared hybrid striped bass (HSB) and review past hatchery records to determine relationships between rearing techniques, survival, and water quality.
- Identify best management practices for movement of hybrid striped bass fry to Iowa's hatcheries.
- Identify best management practices for culturing hybrid striped in plastic-lined and earthen ponds in Iowa.
- Compile, analyze, and publish in federal aid documents and appropriate journals the best management practices for rearing hybrid striped bass in earthen and plastic-lined ponds

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Progress:

In addition to the field portion of this study, we also conducted a Hybrid Striped Bass Survey in 2011. The survey was sent to hatcheries throughout the US with questions pertaining to physical, chemical, biological, and logistical components of HSB production. The goal of this survey was to 1) identify existing production practices, 2) examine the success of each technique, and 3) determine the best management practices for culturing phase-I and II HSB in Iowa hatcheries. Survey results from 23 respondent hatcheries were compiled and compared to values published in literature. This information, as well as previous production experience at Mt. Ayr, was used to guide our HSB culture operations starting in May 2011.

The 2011 culture season focused on two experimental studies. In the first study, we tested the effect of using commercial fish feed on fish production in lined ponds at the Rathbun Research Facility. The second study focused on the need of organic fertilizers in earthen ponds at Mt. Ayr Hatchery. On May 20, fry from Kansas were stocked at both locations at a rate of 80,000 fry/acre, 4-6 days after pond flooding. Water quality, zooplankton, and benthic samples were collected weekly until fish were harvested on June 23 (Rathbun) and June 22-27 (Mt. Ayr).

Although there is still a question concerning whether or not larval HSB actually use and digest fish feed in ponds, results from the 2011 culture season do indicate feeding these ponds resulted in increased growth rates at Rathbun. However, there was no difference in survival with overall 43% survival regardless of feed being used or not. In contrast, results from the Mt Ayr Hatchery do indicate treatment differences. Survival rate was higher in fertilized ponds than unfertilized ponds, 54% vs 23%, respectively; growth rate was similar between the two treatments. Water quality was similar between treatments at both hatcheries.

Survival rates were higher in this first year of research and more consistent than previous production at Mt Ayr Hatchery and do represent the first time for their culture at Rathbun. One reason for improved and more consistent survival may be due to water quality in fry transportation bags during shipment. Mount Ayr Hatchery staff typically obtain fry from a hatchery in Oklahoma, which has low alkalinity waters that is poorly buffered. In 2010 depressed pH levels were observed during fry transportation, which may be linked to poor survival after transportation. In 2011 transport water from the Kansas hatchery was about 200 alkalinity units higher than typical alkalinity of Oklahoma water. Therefore improved survival and consistency in 2011 may be due to greater buffer capacity associated with increased alkalinity.

Future Plans:

In addition to repeating the 2011 treatments at Mt. Ayr and Rathbun sites, earthen ponds located at the Iowa State University Horticulture Station will be used to test the effect of stocking densities on fish production. , Future research will also determine the effects of alkalinity levels of transport water and fry densities in transport bags on post stocking survival rates of HSB.

Effects of Introduced Common Carp and Invading Zebra Mussels on Water Quality and the Native Biological Community of Clear Lake, Iowa

Principal Investigator: Clay L. Pierce
Timothy W. Stewart
Student Investigator: Michael E. Colvin (Ph.D.)

Collaborators: Joe Larscheid, Iowa Department of Natural Resources (DNR)
Jim Wahl, Iowa DNR
Duration: May 2007-June 2012
Funding Source(s): Iowa Department of Natural Resources
Goals and Objectives:

- Develop a lake ecosystem model for Clear Lake, Iowa

Progress:

To date, all data have been acquired, processed and entered into a database. Two manuscripts entitled "Strategies to control a common carp (*Cyprinus carpio)* population by pulsed commercial harvest" and "Semi-discrete biomass dynamic modeling: an improved approach for assessing fish stock responses to pulsed harvest events" have been submitted to the North American Journal of Fisheries Management and the Canadian Journal of Fisheries and Aquatic Sciences respectively. In January 2012, a technology transfer was held to demonstrate the Clear Lake Ecosystem Simulation (CLESM) model to Iowa DNR employees. The session was a resounding success evaluating the impacts of ongoing lake restoration and invasive common carp and zebra mussels.

Future Plans:

At least two additional manuscripts will be completed; the first is a food web analysis of the Clear Lake Ecosystem and the second is a dynamic simulation model of the Clear Lake ecosystem that both will be submitted as companion papers to the journal Ecological Modeling.

Occurrence and Abundance of Topeka Shiners in West-Central Iowa

Principal Investigator: Clay L. Pierce
Michael C. Quist
Student Investigator: Bryan Bakevich (M.S.)
Collaborators: Daryl Howell, Iowa DNR
Greg Gelwicks, Iowa DNR

Duration: August 2009 to September 2012
Funding Source(s): Iowa Department of Natural Resources, Endangered Species
U.S. Geological Survey, Science Support Partnership (SSP)

Goals and Objectives:

- Describe the distribution and occurrence (i.e., presence-absence) of Topeka shiners in west-central Iowa
- Estimate the density of Topeka shiners in west-central Iowa
- Describe and define abiotic factors (i.e., physical and chemical habitat) and biotic interactions (i.e., predators, competitors) associated with the occurrence and abundance of Topeka shiners in Iowa waters.

Progress:

The second and final field season for this project ended in September of 2011. We sampled 50 sites throughout the known range of Topeka shiners in central Iowa. Over the past two seasons, we sampled 96 field sites. This included 67 instream and 29 off-channel (i.e. oxbow) sites. We collected data on both fish and habitat characteristics to use in our modeling of Topeka shiner habitat associations. All data has been entered into a master database to be used for the analysis. Distribution, abundance, and density of Topeka shiners has been determined from the past two years of field data. Preliminary results from the analysis have been interpreted and presented at the 72nd Midwest Fish and Wildlife Conference in Des Moines, Iowa and the 141st Annual Meeting of the American Fisheries Society in Seattle, Washington.

Future Plans:

This year, we will continue analyzing the data gathered over the past two years. We will build multiple logistic regression models to determine the abiotic and biotic factors associated with Topeka shiner occurrence in central Iowa. Separate models will be built for instream and off-channel habitats due to drastic differences in physical habitat. A third model will be developed from all sites. Only variables that may predict Topeka shiner occurrence in both habitat types, such as biotic factors and instream vegetation, will be used for this last model.

We will also examine how differences in fish assemblages influence Topeka shiner occurrence. We will approach this very similarly as we did the logistic regression models (instream, off-channel, all sites). We will use non-parametric multi-dimensional scaling to visualize the differences between the assemblages of each sample site. We will then use permutation tests to see if there are differences between Topeka shiner and non-Topeka shiner sites. Individual variables and species abundances will also be examined to identify important factors associated with these assemblage differences.

Lastly, we will begin work on the phenology of 12 oxbows sampled monthly during the 2011 field season. Temperature and volume of the oxbows will be calculated and interpolated to have continuous data throughout the season. We will then look at how fish assemblages changed throughout the season as oxbow volume and temperature have changed. Since Topeka shiners were found in some of these oxbows, we will examine how they react to changes in habitat and fish assemblage.

Developing Benchmarks of Biological Integrity for Iowa Lake and Reservoir Restoration Success

Principal Investigator: Michael C. Quist
John Downing
Student Investigator: Jesse Fisher (Ph.D.)
Collaborators: Michael McGhee, George Antoniou, Joseph Larscheid, George Schoelten, Randall Schultz
Duration: January 2008 to December 2012
Funding Source(s): Iowa Department of Natural Resources
Goals and Objectives:

- To provide ecological benchmarks of lake and reservoir restoration through an integrated, interdisciplinary approach combining measures of macroinvertebrate and fish assemblages, and water quality.

Progress:

Six water bodies representing a wide range of trophic conditions in Iowa were sampled seasonally in 2008 with multiple gears (i.e., seines, benthic trawls, fyke nets, gill nets, electrofishing) to determine standard sampling protocols for future sampling. Data collected from this subset of lakes and reservoirs was analyzed and sampling methods were determined. During 2009, 2010, and 2011 13 additional water bodies were sampled each year (i.e., 39 total) with benthic trawling during summer (mid June-July), and fyke netting and nighttime electrofishing during fall (mid September-October). Data from 2008-2011 has been entered into databases and preliminary summarization and analysis has begun. Sampling from 2008 to 2011 has yielded a total 56 species and 194,626 fish across all lakes. Additionally, age and growth data for six focal species (i.e. common carp, black bullhead, black crappie, bluegill, largemouth bass, and walleye) is being processed, aged, and entered.

Future Plans:

In 2012, data collected will be used to identify fish and invertebrate community and population data that discriminate between lakes with “good” and “poor” water quality characteristics, and develop indices of biological integrity. This information will be combined with water quality monitoring data to establish benchmarks for assessing biotic impairment and lake/reservoir restoration success.

Fish Species of Greatest Conservation Need in Iowa's Nonwadeable Rivers: Distribution, Relative Abundance, and Influences from Potential Movement Barriers

Principal Investigator: Michael Quist
Clay Pierce
Student Investigator: Timothy Parks (M.S.)
Collaborators: Gregory Gelwicks, Greg Simmons, and Thomas Wilton; Iowa Department of Natural Resources (DNR)
Duration: January 2010 to September 2012
Funding Source(s): Iowa Department of Natural Resources

Goals and Objectives:

- Describe the distributions of fish species of greatest conservation need in Iowa's nonwadeable rivers.
- Evaluate the influence of potential movement barriers and anthropogenic stressors on fish distributions in Iowa's nonwadeable rivers.
- Determine effects of dams and instream habitat characteristics on fish assemblage structure in Iowa's nonwadeable rivers

Progress:

The fish assemblages of North America's inland waters are considered to have highest temperate freshwater fish biodiversity in the world. Of these freshwater ecosystems, large rivers are capable of supporting the majority of this biodiversity. Unfortunately, most large rivers are highly altered due to the many anthropogenic stressors on the landscape. Since the distributions of many of these riverine fishes are largely unknown, the effects of these stressors are poorly understood. The Iowa Wildlife Action Plan has identified 68 fishes as species of greatest conservation need (SGCN). Fish species represent the largest faunal group amongst all species listed as SGCN in Iowa. It is believed that the majority of fish SGCN (i.e., 35 species) are suspected to occur in the large interior rivers of Iowa, so it is critical to understand these habitats and their associated stressors in order to provide adequate conservation tools and information for the Iowa DNR. In 2010 and 2011, nonwadeable sampling protocols were employed to collect fish and habitat data to meet the objectives of this research. The objectives of this project were to (1) describe the current fish distributions (particularly, fish SGCN), (2) evaluate the influence of potential movement barriers and anthropogenic stressors on fish distributions, (3) and determine the effects of dams and habitat characteristics on fish assemblage structure in Iowa's non-wadeable rivers.

After the 2011 field season, 37,324 fish were sampled from 33 reaches of the Cedar and Iowa rivers. Altogether, trawl samples accounted for 56% of the total catch. The total catch was composed of 85 species and two hybrids. Fish SGCN represented 23% of the total species richness (23 species) which accounted for 10% to the total catch. The most commonly sampled SGCN was the slenderhead darter, which occurred in 85% of sites in the Cedar and Iowa rivers. The other 22 fish SGCN occurred in 3-42% of sites. Preliminary results from multivariate ordinations and cluster analyses revealed that fish distributions Cedar and Iowa rivers exhibited longitudinal spatial structure. Recent analyses explored stressor and habitat associations with fish assemblage structure. The relative abundance of macrohabitat generalists was highly correlated with the Human Stressor Index, proximity to dams, stream size (i.e., bank full width and depth), and longitudinal river position. This may indicate that fish assemblage structure varies with proximity to anthropogenic disturbance or with longitudinal position (i.e., increased river size and habitat diversity). Current fish assemblage data were also analyzed with additional historical fish data from the Wapsipinicon, Maquoketa, and Des Moines rivers to describe the current fish distributions and the persistence of fishes in Iowa's interior nonwadeable rivers.

Future Plans:

In 2012, data analysis will be completed and final results will be available in April.

Completed Projects

White-nose Syndrome Communications Outreach Campaign

Principal Investigator: Rebecca A. Christoffel
Julie A. Blanchong
Student Investigator: Kelly Siebert (B.S.)
Collaborators: Iowa Department of Natural Resources
Duration: June 2010 to June 2011
Funding Source(s): Iowa Department of Natural Resources, Endangered Species

Goals and Objectives:

The goal of the communications and outreach campaign is to inform target audiences of white-nose syndrome (WNS) in bats and its rapid spread toward Iowa, and to gain cooperation from Iowa cavers and others to take precautions to minimize the potential to spread disease from one cave or bat population to another, with an ultimate goal of keeping white-nose syndrome from decimating Iowa's cave bat populations and their associated hibernacula.

- Inform public and private cave owners about WNS and gain their cooperation in taking actions to monitor their bat populations for evidence of the disease and to slow the spread of the disease.
- Inform veterinarians, public health departments and wildlife rehabilitators about WNS in bats, ongoing research and techniques being used to treat the syndrome, and actions to reduce the spread of the disease.
- Inform pest control operators of WNS, its identification, how and to whom to report incidences or suspected incidences of the disease, and actions to reduce the spread of the disease.
- Inform interested citizens/individuals about white-nose syndrome in bats and actions that they can take to reduce the spread of the disease among populations.

Progress:

Kelly Siebert worked with us on this project as a part of her honors project. With her assistance, we developed Web site content for posting on the Iowa DNR Web site (http://www.iowadnr.gov/IDNRSearchResults.aspx?q=white-nose%20syndrome). These materials were submitted and reviewed by Iowa DNR and US Fish and Wildlife Service. We produced a Powerpoint presentation and accompanying script for use by wildlife professionals and naturalists. We surveyed wildlife rehabilitators, veterinarians and nuisance wildlife control operators, regarding their awareness and knowledge of white-nose syndrome, and provided each audience with information pertaining to white-nose syndrome and what to do with a suspected case of white-nose syndrome, as well as how to minimize inadvertent spread of the disease. We produced a brochure about white-nose syndrome for these audiences and for people visiting areas in which bats reside in Iowa, particularly cave areas along the Mississippi River. These brochures are available for interested individuals who visit these sites. We conducted educational workshops about white-nose syndrome for County Conservation Board naturalists and for County and campus-based Extension personnel. We provided programs about white-nose syndrome to the Big Bluestem Audubon Society, Ames, Iowa and the Ames Anglers. We produced a voice-over Powerpoint for interested individuals available at http://www.ncrac.org/fl-gal/whitenose/index.htm. We designed WNS informational signs for posting at known hibernation sites for bats in Iowa. Kelly Siebert participated in a poster presentation of her work on the project during Spring 2011 at Iowa State University. We submitted our final report on the project to Iowa Department of Natural Resources in summer 2011.

Conclusions and Recommendations:

Many opportunities have presented themselves to continue this educational outreach campaign aimed at stopping the human-mediated spread of white-nose syndrome. One such opportunity is the invitation to share the final white-nose syndrome Powerpoint presentation with Rich Geboy of US Fish & Wildlife Service for posting on the US Fish & Wildlife Service white nose syndrome website. It is also posted on the white-nose syndrome page of the WildTracks website (http://wildtracks.nrem.iastate.edu) for viewing by interested individuals. A voice-over Powerpoint presentation is also available on this same page. Additional opportunities to present workshops for naturalists, nuisance wildlife control operators, wildlife rehabilitators and others will continue to be pursued, as well as distributing materials and presenting programs on white-nose syndrome to various audiences.

Refinement of National Survey Protocols for Monitoring Secretive Marsh-birds

Principal Investigator: Stephen J. Dinsmore
Student Investigator: Tyler M. Harms (M.S.)
Collaborators: Karen E. Kinkead, Iowa Department of Natural Resources (DNR)
Duration: September 2008 to September 2011
Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant

Goals and Objectives:

- Compare responses of secretive marsh-birds to call-broadcasts for morning and evening survey periods in Iowa to determine which survey period produces the greatest response rate.
- Compare seasonal responses of secretive marsh-birds in Iowa by conducting a second round of call-broadcast surveys in June and July, after the standard monitoring period.

Progress:

All fieldwork was completed in summer 2010 and work during the last year included the completion of a M.S. thesis, preparation of a final project report, and preparation of manuscripts for submission to peer-reviewed journals. Three papers were submitted in 2011; one has been accepted in *Waterbirds*, one is in review in *Wetlands*, and the third is in a second round of revisions for *Wildlife Society Bulletin*. One additional paper that was not part of the M.S. thesis will be submitted sometime in 2012.

Conclusions and Recommendations:

The North American Marsh Bird Monitoring Program has prompted several research projects examining population and habitat ecology of secretive marsh-birds, as well as ongoing research evaluating the efficacy of call-broadcast surveys for monitoring these birds across the U.S. This study aimed to provide information on the population status and habitat associations of secretive marsh-birds in Iowa. We estimated population density ranged from 0.019 birds/ha for least bitterns to 0.12 birds/ha for pied-billed grebes and concluded that density of each species was different in different areas of the state due to contrasting microhabitat characteristics. We argue that distance sampling is a rigorous method that provides a precise population estimate, although the potential exists for violating the second assumption that birds are detected at their initial location.

Our work also found that wetland size was the single habitat characteristic that positively affected probability of occupancy of all species. Water depth and percent coverage and height of emergent vegetation (specifically cattail) were important characteristics affecting wetland occupancy by marsh-birds. These findings provide valuable information about habitat associations of marsh-birds in Iowa and offer guidance to land managers regarding wetland restoration and management.

Lastly, we determined that response rates of secretive marsh-birds vary between early and late in the survey season. Response rates varied by time of day for pied-billed grebes only, although this variation was only evident late in the survey season. We suggest that marsh-bird surveys in Iowa be conducted from 15 May to 15 June during both morning and evening to obtain adequate detections for estimating site occupancy and density. This recommendation deviates from currently accepted recommendations to complete marsh-bird surveys in Iowa between 15 April and 31 May.

Overall, this study increased our general knowledge about population status and habitat associations of secretive marsh-birds in Iowa. Findings from this study will also be contributed to the national database to establish large-scale population trends of these birds. We hope that information from this study will guide future marsh-bird research and monitoring, as well as wetland restoration and management decisions.

Diagnostic/Feasibility Restoration Study – Easter Lake

Principal Investigator: John Downing
Student Investigator: n/a
Collaborators: Michael McGhee, Iowa Department of Natural Resources
Duration: September 2007 to October 2011
Funding Source(s): Iowa Department of Natural Resources, Lake Restoration
Goals and Objectives:

- To provide the Iowa Department of Natural Resources with a diagnostic and feasibility study of Easter Lake, Polk County, Iowa for planning a lake restoration program on the lake and its watershed.

Progress:
ISU has completed all work associated with this contract. The Easter Lake Diagnostic/Feasibility Study Report was submitted to Iowa DNR in 2011. Findings from this study have been presented at numerous venues, including the City of Des Moines and Polk County council meetings and several public meetings. The Easter Lake Technical Advisory Committee is currently working with a consulting firm to develop restoration strategies for Easter Lake based on findings from this study.

Conclusions and Recommendations:
Easter Lake has poor water quality, with symptoms including low water clarity, large algal blooms dominated by Cyanobacteria (blue-green algae), high bacteria concentrations, and low oxygen concentrations in bottom waters during summer. The lake receives high loads of sediment, nutrients, and bacteria from its predominantly urban watershed, especially the Yeader Creek watershed. Currently, Easter Lake is filling with sediment that will enhance Cyanobacteria problems and shorten the useful lifetime of the lake. The Iowa DNR Lakes Restoration Program established a Water Quality Target (WQT) of ≥4.5 ft Secchi depth at least 50% of the time from April to September for Iowa lakes. Total phosphorus loads from the watershed would need to be reduced by 50% to meet the State WQT. Although it is not practical to achieve the State WQT through watershed and in-lake engineering options alone, goals can be met by combining effective engineering options with various best management practices (BMPs) within the watershed that reduce phosphorus loading to receiving streams by 42%. Engineering options include stream stabilization, dredging existing detention ponds in the Southern watershed, constructing in-lake detention basins in the Western and Southern arms, and fisheries renovation. A table following this summary shows predicted phosphorus savings, predicted water clarity (Secchi depth), and estimated costs associated with various engineering options. Potential BMPs to reduce phosphorus loading from the watershed include reducing phosphorus fertilizer application to lawns, removing lawn clippings, picking up pet waste, and improved street sweeping. Ultimately, the DNR, Polk County and City of Des Moines officials, watershed residents, stakeholders, and the general public will need to develop a strategy for reducing phosphorus loading to Easter Lake if state water quality goals are to be met. Water quality monitoring (at least two years post-restoration) is recommended to document the effectiveness of the Easter Lake restoration plan.

2010 Iowa Lakes Monitoring

Principal Investigator: John Downing
Student Investigator: n/a
Collaborators: Lisa Fascher, Iowa Department of Natural Resources
George Antoniou, Iowa Department of Natural Resources
Duration: June 2010 to February 2011
Funding Source(s): Iowa Department of Natural Resources
Goals and Objectives:

- To provide the Iowa Department of Natural Resources with lake monitoring data, including water chemistry, biological, and limnological analysis of Iowa's lakes.

Progress:

ISU has completed all work associated with this contract. Monitoring data were submitted to and approved by Iowa DNR. Data were uploaded to the Iowa Lakes Information System website (http://limnology.eeob.iastate.edu/lakereport/) and are freely accessible to the general public. Formatted data were also submitted to Iowa DNR for upload to the Iowa STORET water quality database.

Conclusions and Recommendations:

Iowa DNR will use water quality data collected and analyzed during this project to fulfill Clean Water Act requirements. Water quality data from 2010 (this project) were added to a database containing water quality data collected in Iowa lakes since 2000. Iowa DNR uses this comprehensive monitoring dataset to identify lakes for restoration and document water quality improvements resulting from past restoration activities. 2010 water quality data showed that Iowa lakes continue to be highly productive systems with phytoplankton communities dominated by Cyanobacteria because of high nutrient loading from watersheds. ISU and Iowa DNR have signed a contract to continue monitoring water quality in Iowa lakes through 2013.

Bird Response to Enhanced Vegetation Diversity in the Spring Run Complex of Northwestern Iowa

Principal Investigator: Rolf R. Koford
David L. Otis
Student Investigator: Jennifer Vogel (Ph.D.)
Collaborators: Todd R. Bogenschutz, Iowa Department of Natural Resources
Duration: June 2006 to August 2011
Funding Source(s): Iowa Department of Natural Resources, State Wildlife Grant
U.S. Fish and Wildlife Service

Goals and Objectives:

- Quantify bird use of 4 habitat types that have been or might be established on managed land in the Spring Run Complex.
- Monitor vegetation composition and structure in each habitat.
- Estimate nest success, nestling growth rate, and brood survival of common bird species using each habitat type.
- Measure invertebrate populations in the three habitat types.

Progress:

The Spring Run Wetland Complex of northwest Iowa is one of the largest grassland units in the state. It has been recognized as an official site in the National Audubon Society's Important Bird Areas program. Previous research indicated that increased vegetation diversity could enhance the reproductive success of grassland birds. The Spring Run Study Area includes 24 study fields arranged in a complete block design, six blocks each with four field types: (1) Cool Season - introduced grasses planted before 2000, (2) Warm Season (new) - a mix of native tall-grass species planted since 2000, (3) Warm Season (mature) - a mix of native tall-grass species planted before 2000, and (4) High Diversity - a diverse mixture over 40 species of forbs and native grasses planted since 2000.

The most abundant bird species we encountered during the study were Bobolink (*Dolichonyx oryzivorus*), Common Yellowthroat (*Geothlypis trichas*), Red-winged Blackbird (*Agelaius phoeniceus)*, and Sedge Wren (*Cistothorus platensis*). Bird densities were not consistently higher or lower in any one of the 4 planting types. Bobolink densities, however, were higher in cool-season fields than in any of the other field types. Both vegetation characteristics and food resources were important in explaining grassland bird densities.

High diversity fields had 5 times more native forb species than warm-season fields and nearly 20 times more native forb species than cool-season fields. High diversity fields had 3 times higher plant species richness than cool-season fields and about 1.5 times higher plant species richness than both of the warm-season planting types. Cool-season fields had lower vegetation diversity and lower plant species richness than all 3 of the other planting types. Visual obstruction was lower in the newly planted warm-season fields, but the newer warm-season fields and the high diversity fields both had more variation in visual obstruction among measurements within a field than the other 2 planting types. Aranae (spiders) biomass was highest in cool-season fields. Four additional invertebrate Orders had higher biomass in cool-season fields, but these differences were not statistically significant.

Red-winged Blackbird nest survival was influenced by year, vegetation height/density, and variation in the availability of invertebrate food resources throughout the nesting season. Nest survival was more than twice as high in mature warm-season fields (36%) than in cool-season fields (14%). Red-winged Blackbird nestling size at fledging differed among grassland planting type, but nestling growth rates did not differ either among planting type or between sexes. Mature warm-season fields had smaller nestlings than either cool-season fields or high diversity fields. Male nestlings were larger than females at fledging with regard to mass, wing, and tarsus measurements Nestling baseline stress levels were lower in the warm-season planting type than in either cool-season or high diversity plantings. We found no evidence of differences in baseline stress levels between males and females. More intensive management activity and larger brood sizes were related to increased stress levels.

Conclusions and Recommendations:

Bird density and diversity have been enhanced in the Spring Run Complex. Grassland bird species have distinct habitat requirements and management for grassland birds not a “one size fits all” approach. Instead a variety of planting types and management strategies that would allow for a mosaic of vegetation characteristics are necessary to conserve grassland birds. Given the importance of cool season grass plantings for Bobolinks in our study, consideration must be given to the impact that elimination of these plantings may have on the future of Bobolink populations in Iowa.

Urban Fisheries Development Plans in City of Des Moines

Principal Investigator: Joseph E. Morris
Student Investigator: Steven Konrady (M.S.)
Collaborators: Ben Dodd, Iowa Department of Natural Resources (DNR)
Barb Gigar, Iowa DNR
Duration: June 2010 to January 2012
Funding Source(s): Iowa DNR

Goals and Objectives:

- Determine potential of lakes and priority of lakes
- Sample fisheries, aquatic vegetation, and anglers (via creel survey)
- Review existing IOWATER data
- Produce a publication on urban ponds

Progress:

Lake priority was assigned based on data gathered throughout the survey, public input from the sister project on sociology (Rebecca Christoffel, PI – Angie Carter, M.S student in ISU Soc), municipality input from Des Moines Park and Recreation stakeholders, and management input from Iowa DNR staff. Further fisheries, vegetation, and angler surveys were conducted in the four high priority ponds (two of four for angler survey). IOWATER data review was also conducted for the four priority areas. Publication production was completed by ISU faculty/staff and is in the final stages of publishing. Final reports are being drafted for submittal to Iowa DNR and Des Moines staff.

Conclusions and Recommendations:

Bathymetric maps revealed a high amount of sedimentation in three of the four ponds, typical of many ponds in Iowa. One area, being an abandoned quarry pit with limited watershed, sedimentation is expected to be lower. Sediments entering ponds carry phosphorus, which increases water fertility and encourages aquatic vegetation growth due to the combination of nutrients and shallow depths. These factors combine to increase probability of winter fish kills. The amount of sediment that enters a pond is related to the ratio of watershed to pond area, watershed land use as well as other watershed characteristics, e.g., soil type and land slope. Our recommendations call for reducing sediment load through typical watershed management practices including sediment retention basins and watershed stabilization. Maintenance issues including watershed erosion, excessive woody vegetative growth on dams, and access limitations have also been identified. Recommendations to address these issues have been drafted and include typical solutions such as tree removal, dam inspection/repair, and access improvements.

A variety of fish species appeared in the ponds with the diversity being similar to ponds stocked in accordance with recommendations by the Iowa DNR. Fish assemblages are the typical stunted panfish with low bass numbers as seen in many Iowa waters. Crappie and bluegill numbers were often high, but small size may deter some anglers. Largemouth bass numbers were low in some ponds but restocking and catch and release promotion efforts of previous years may help aid this. In two ponds the channel catfish populations were identified as being excellent for the fishery and additional stocking is not needed at this time. Continued promotion of largemouth bass catch and release/regulation, panfish harvest, and channel catfish stockings in lakes found to be devoid of them (two of four) is recommended. While the limited size distribution and inclusion of other species, e.g., gold fish, common carp, and green sunfish, indicates limited management, the fishery in these ponds may nonetheless serve the intended client base: youth fishing. In ponds that are periodically flooded by the nearby Des Moines River, i.e., Tai Dam and Case Lake, management of the fisheries may be more problematic if flooding conditions return.

In conclusion, Iowa's ponds are often nutrient-rich systems that are able to support abundant fish populations but at times can be plagued with excessive aquatic vegetation and systematic poor water quality issues, e.g., low dissolved oxygen. The ponds surveyed in this project had similar management issues as ponds located in agricultural settings, high nutrient loads, shallow depths, and excessive vegetation. Due to limited funding, we recommend that the priority system this study developed be used to emphasize areas of highest need and focal points for management improvements and possible grant funded restoration work. A continuation/expansion of this project is also being implemented.

Development of Harvest Management Strategies for Mourning Doves

Principal Investigator: David Otis
Philip M. Dixon
John Sauer, U.S. Geological Survey, Patuxent Wildlife Research Center

Duration: July 2006 to June 2011
Funding Source(s): U.S. Fish and Wildlife Service

Goals and Objectives:

- Develop statistical techniques for combining Call Count Survey (CCS) and population growth rate estimates derived from banding and harvest data to produce reliable predictions of population status and trend.
- Develop a detailed harvest management framework that continuously integrates monitoring data, population models, and harvest and population objectives into a harvest management system.
- Develop a Banding Needs Document driven by information required for accomplishment of objectives above.

Progress:

I provided to Dove Technical Committees updated regional and management unit estimates of 2007 – 2009 recruitment rates based on the Mourning Dove Parts Collection Survey. I consulted with FWS biologists on revision of annual population abundance estimates used in the interim dove harvest strategy and on technical approaches for evaluation of alternative next generation harvest strategies.

Conclusions and Recommendations:

All project goals were achieved and products have been incorporated into the monitoring programs and harvest strategies that have been successfully implemented by federal and state agencies responsible for mourning dove harvest management. The final phase of this effort to improve harvest management will be to transition into an informed decision-strategy based on demographic population models and explicit management goals, as envisioned in the Mourning Dove National Strategic Harvest Management Plan.

Age Structure and Growth of Common Carp Populations in Malheur National Wildlife Refuge

Principal Investigator: Clay L. Pierce
Student Investigator: Michael E. Colvin (Ph.D.)
Collaborators: Linda Beck, US Fish & Wildlife Service
Duration: May 2011 to December 2011
Funding Source(s): U.S. Geological Survey, Science Support Partnership (SSP)
Goals and Objectives:

- Evaluate dorsal spines and otoliths to estimate age in common carp populations
- Estimate growth of common carp populations

Progress:
Structures were received in 2011 and processing began in September 2011. All structures were processed and age estimated by December 2011. Analysis of structure bias and age and growth is ongoing. A manuscript entitled: "Comparisons of common carp (Cyprinus carpio) dorsal spine and otoliths for estimating age and growth" is nearing completion and targeted for publication in North American Journal of Fisheries Management. A second manuscript entitled: "Age and growth of common carp (Cyprinus carpio) in Malheur National Wildlife Refuge: implications for population management" is in preparation and targeted for publication in the Journal of Fish and Wildlife Management.

Conclusions and Recommendations:

Age estimation.—Dorsal spines were biased for common carp greater than 5 years of age. If there are no concerns with lethal sampling, otoliths should be used to estimate age.

Age and growth.—Age and growth varied for carp populations within the refuge management units. The Silvies River population contained fast growing young fish while the remaining populations sampled were older, slow growing fish. Estimated instantaneous mortality rates (*Z*) varied among populations, indicating that management may need to be done on a population basis.

Iowa Stream Fish Species of Greatest Conservation Need: Using IAGAP Products to Refine Prioritization and Guide Assessment

Principal Investigator: Clay L. Pierce
Michael C. Quist
Student Investigator: Anthony R. Sindt (M.S.)
Collaborators: Gregory Gelwicks, Iowa Department of Natural Resources (DNR)
Thomas Wilton, Iowa DNR

Duration: August 2008 to May 2011
Funding Source(s): Iowa DNR, State Wildlife Grant

Goals and Objectives:

- Refine Iowa's prioritization of stream fish species of greatest conservation need (SGCN).
- Test the potential of Iowa Aquatic Gap Analysis Program (IAGAP) models for predicting the occurrence of fish SGCN in wadeable Iowa streams.
- Better understanding of the occurrence and distribution of high-priority fish SGCN in wadeable Iowa streams.

Progress:

During FY2012 all project objectives were completed, final reports were submitted, and manuscripts were prepared for submission to select scientific journals.

Conclusions and Recommendations:

Freshwater systems are among the most endangered ecosystems in the world, and many freshwater species are consequently highly threatened and vulnerable to extinction. In Iowa, 68 fish species have been identified as species of greatest conservation need (SGCN). Before locations in streams and watersheds can be identified as potential conservation sites, the distribution, status, and habitat requirements of fish SGCN must be better understood. Fish species distribution models developed as a component of the Iowa Aquatic Gap Analysis Project (IAGAP) are a potential conservation tool, but the effectiveness of these models needs to be evaluated before they are relied on for conservation planning. Thus, the objectives of this study were to 1) evaluate the status of fish SGCN by comparing historical and contemporary fish assemblage surveys, 2) test the effectiveness of IAGAP models for predicting the occurrence of fish SGCN in wadeable Iowa streams with an independent dataset, and 3) identify large-scale (i.e., GIS-measured) and small-scale (i.e., instream) habitat features that influence fish SGCN occurrence. During spring and summer 2009 and 2010 fish assemblages and instream habitat were sampled from 86 wadeable stream segments in the Mississippi River drainage of Iowa. Frequencies of occurrence in stream segments where species were historically documented were used to assess the status of ten species and frequencies of occurrence in stream segments where species were predicted present and absent by IAGAP models were used to evaluate the performance of twelve species distribution models. Furthermore, multiple-logistic regression analyses were used to evaluate the associations of large-scale and small-scale habitat variables with the occurrences of seven fish SGCN.

Results showed that the status of ten Iowa fish SGCN was highly variable. The frequency of occurrence in stream segments where historically documented varied from 0.0% for redfin shiner *Lythrurus umbratilis* to 100.0% for American brook lamprey *Lampetra appendix*. Frequencies of occurrence greater than 80.0% suggest that the current distributions of banded darter *Etheostoma zonale*, American brook lamprey, and southern redbelly dace *Phoxinus erythrogaster* are similar to historical distributions. In contrast, redfin shiner, slender madtom *Noturus exilis*, tadpole madtom *Noturus gyrinus*, blackside darter *Percina maculate*, and slenderhead darter *Percina phoxocephala* were collected in 40.0% or fewer of the stream segments where previously documented, suggesting declines in their distributions. Twelve IAGAP models were evaluated by comparing model-predicted presences and absences to surveyed species presences and absence. Overall correct classification rates varied from 0.34 for the tadpole madtom model to 0.84 for the longnose dace *Rhinichthys cataractae* model. The IAGAP models for banded darter, southern redbelly dace, and longnose dace were the only models that performed better than would be expected by random chance. Thus, a majority of the IAGAP models failed to accurately predict the occurrences of fish SGCN with an independent dataset. Results for the third objective revealed that both large-scale and small-scale habitat variables can explain occurrences of fish SGCN, but combinations of small-scale and large-scale variables predicted the occurrences of most species with the greatest accuracy. Thus, conservation of fish biodiversity will require managing for habitat complexity across a broad spectrum of landscapes and environmental gradients.