

# IOWA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

**ANNUAL REPORT**

**Volume 69**

**October 1, 2003 - September 30, 2004**



**COOPERATING AGENCIES:**  
U.S. Geological Survey, Biological Resources  
Iowa Department of Natural Resources  
Iowa State University  
Wildlife Management Institute

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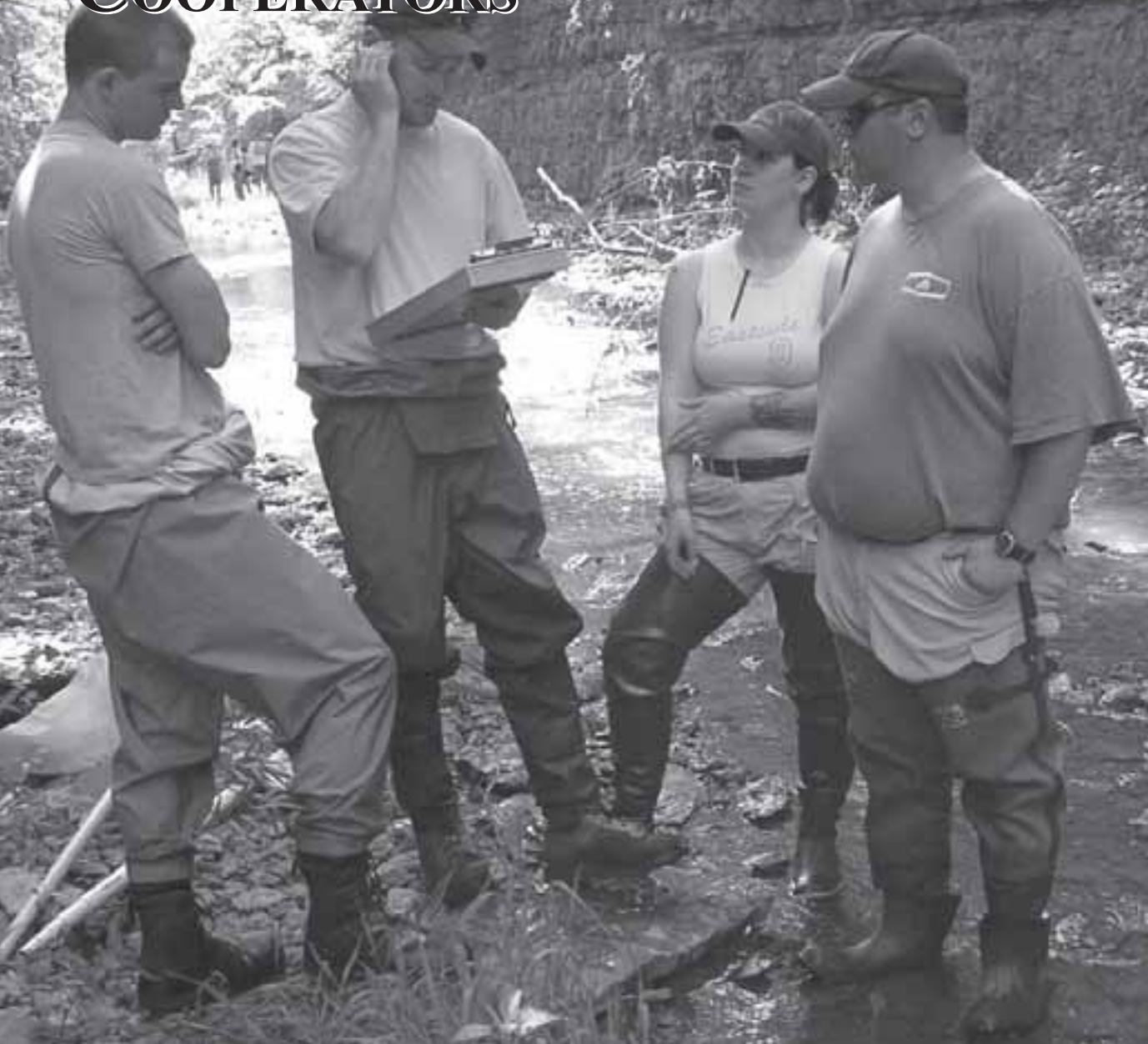
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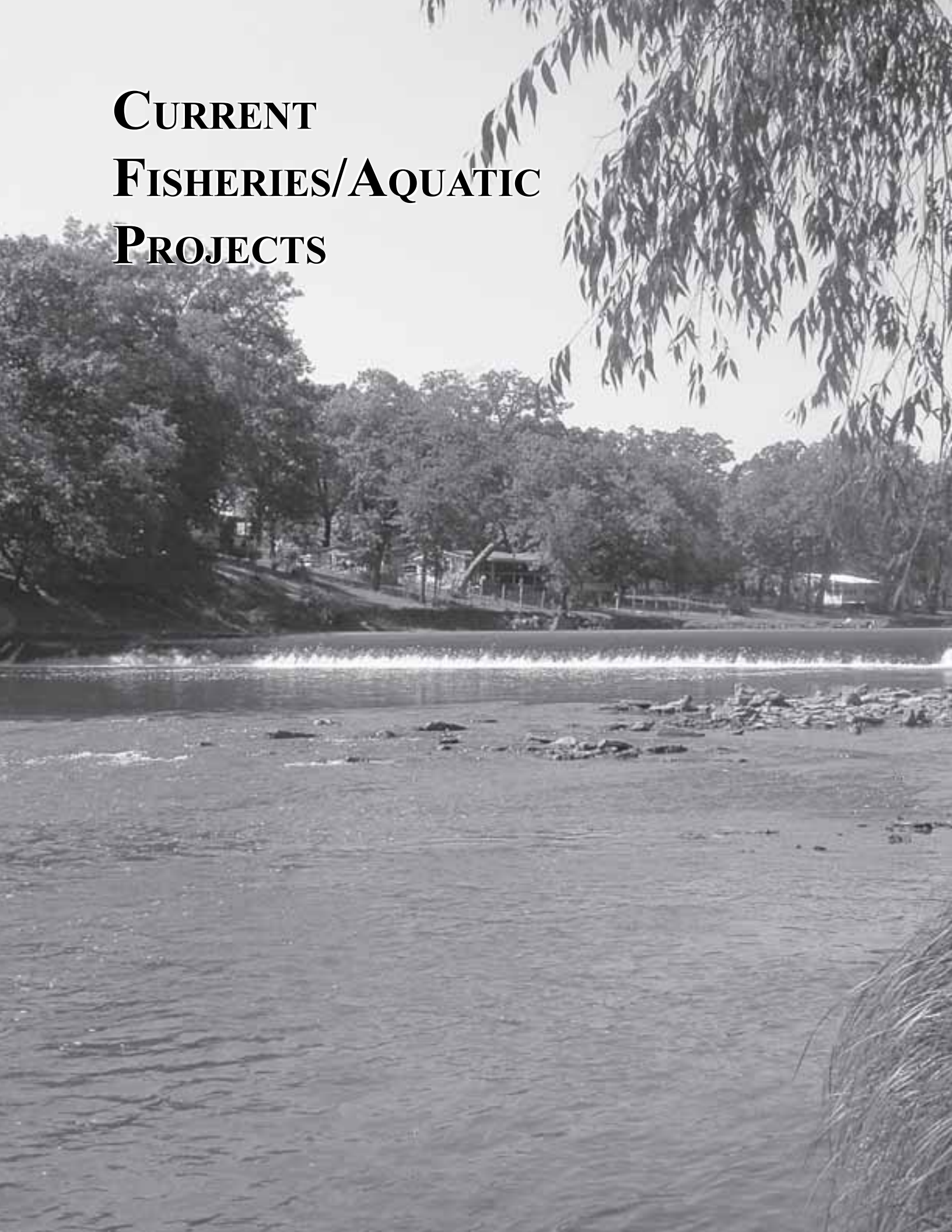
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# CURRENT FISHERIES/AQUATIC PROJECTS



## Physical Habitat component of the Iowa REMAP Program

**Principal Investigator:** Clay L. Pierce  
**Student Investigator:** David C. Rowe (M.S.)  
**Collaborators:** Thomas F. Wilton, Iowa Department of Natural Resources  
**Duration:** June 2004 to June 2007  
**Funding Source(s):** Iowa Department of Natural Resources

### Goals and Objectives:

- Quantify stream habitat conditions in 45 sites per year throughout Iowa, representing 2nd-through 5th-order streams and all major ecological subregions.
  - Determine and describe relationships of stream habitat with fish communities, invertebrate communities, stream reach characteristics, land use and ecological subregions.
  - Identify ecoregion, stream reach and land use characteristics associated with high-quality stream habitat conditions.
  - Identify stream habitat characteristics associated with high-quality invertebrate and fish communities.
  - Evaluate and recommend habitat mitigation and rehabilitation alternatives.
- 

### Progress:

Thirty-seven stream reaches, four duplicates and four least-impacted reference sites in 35 different counties throughout Iowa were sampled between June 15 and November 10 at low flow conditions. All sites were selected from a randomized systematic design of 2-5 order wadeable streams in Iowa. At each location, physical habitat was surveyed following the EPA EMAP wadeable streams physical habitat assessment protocol.

These methods quantify (by measurement or estimation) stream size, channel morphology, gradient, sinuosity, substrate size and stability, habitat complexity, cover, woody debris size and abundance, riparian vegetation cover and structure, and anthropomorphic disturbance. Measurements of stream flow, temperature, dissolved oxygen, pH and water chemistry samples were taken for each reach.

Benthic macroinvertebrate assemblage was sampled concurrently with physical habitat, following the EPA Rapid Bioassessment Protocols (RBP).

At the same locations the University of Iowa Hygiene Lab sampled the fish assemblage by single pass electrofishing, and the benthic macroinvertebrates using Hess artificial substrates and qualitative collections. At six locations the EPA RBP benthic macroinvertebrate method, UHL qualitative collection and Hess artificial substrate samples were sampled simultaneously to allow for method comparison.

### Future Plans:

An additional 45 randomly-selected wadeable stream reaches will be sampled following the EMAP wadeable streams physical habitat protocols in the summer of 2005. Landcover data for all site watersheds will be evaluated using Arcview GIS to delineate catchment area and assess current land use in each watershed based on NRCS 2000 (Iowa) landsat data. Land use, fish, macroinvertebrate, and physical habitat will be analyzed at multiple spatial scales to assess the effects of land use on biological and physical components of ecosystem integrity. The suitability of a multi-metric habitat index created by EPA for Region 7 streams is being examined for its applicability to this study.

## Radio-telemetry investigation of common carp in Clear Lake, Iowa

**Principal Investigator:** Clay L. Pierce  
**Student Investigator:** Christopher R. Penne (M.S.)  
**Duration:** June 2004 to August 2007  
**Funding Source(s):** Iowa Department of Natural Resources

### Goals and Objectives:

The purpose of this study is to document seasonal locations, tendency to aggregate, and movements of common carp in Clear Lake, Iowa. This information is necessary to evaluate potential future carp reduction strategies, such as targeted netting or poisoning. Specific objective include:

- Capture, radio-tag and track sub-adult and adult carp over a period of two years.
  - Describe and quantify the seasonal locations, tendency to aggregate, and movements of sub-adult and adult carp.
  - Interpret the results in light of the desire to reduce carp biomass through reduction strategies such as targeted netting or poisoning.
- 

### Introduction:

Reduction of carp in Clear Lake and other systems with declining water quality and high carp biomass is a key objective in improving the overall environmental health of these systems. Unfortunately, the track record of previous efforts to permanently reduce carp biomass is poor. A recent effort to reduce carp biomass in Ventura Marsh, connected to Clear Lake, illustrated the potential water quality benefits of reducing carp, but unfortunately also demonstrated how short-lived the benefits can be. Two lessons can be drawn from past carp reduction experiences: (1) efforts to reduce carp must be viewed as an on-going program rather than a one-time quick fix, and (2) detailed knowledge of the seasonal locations, movements and aggregation in the system of interest is required to accurately guide what will undoubtedly be an expensive, long-term investment in carp control activities. This proposal addresses the second point – obtaining the information necessary to efficiently guide limited resources for effective carp reduction..

### Progress:

In September of 2004, preliminary testing for frequency interference and range of implanted transmitters was completed, allowing investigators to select the optimal frequency and equipment for data collection. In October of 2004, ICFWRU and IDNR researchers electrofished the perimeter of Clear Lake, capturing 30 adult carp. Adult carp were surgically implanted with 48-49 MHz internal radio-transmitters with external whip antennas, measured for length and weight, and returned shortly thereafter to the area of capture. Subadult carp, which were not seen during electrofishing of the main lake, were captured from Ventura Marsh. Tagged and measured subadults were released in the main lake, directly across from the dike separating Clear Lake and Ventura Marsh.

### Future Plans:

Researchers plan to complete trials of accuracy when locating tagged fish and establish a tracking protocol by late November 2004. Routine tracking will immediately follow and continue through Fall 2006. Collected data will be used to describe and quantify the seasonal locations, movements and tendency to aggregate of sub-adult and adult carp. Results will be interpreted in light of the desire to reduce carp biomass through future reduction strategies.

## **Relationships of fish communities and availability of deep-water habitat**

**Principal Investigator:** Clay L. Pierce  
**Student Investigator:** Jennifer A. Weidner (M.S.)  
**Collaborators:** Gregory T. Gelwicks, Iowa Department of Natural Resources  
**Duration:** May 2003 to August 2005  
**Funding Source(s):** Iowa Department of Natural Resources  
**Goals and Objectives:**

The study will examine relationships of fish communities and populations of channel catfish and smallmouth bass with availability of deep-water habitat. The specific objectives are:

- To quantify the existence of quality deep-water gamefish habitat in stream sections of interest.
  - To quantify fish community characteristics in the stream sections of interest.
  - To quantify channel catfish and smallmouth bass population size and growth rates in the stream sections of interest.
  - To explore relationships of fish communities and gamefish characteristics with availability of deep-water habitat.
- 

### **Progress:**

By the end of summer 2004, 11 of 15 study reaches on 3 eastern Iowa rivers were surveyed for depth profile using a GPS/depth sonar. The collected data were entered into ArcGIS and are currently being analyzed.

Fish community data from new collections and existing databases were compiled for all of the 15 study reaches. All fish community data have been entered into a database and used in summary statistics calculations (i.e. fish IBI scores, species abundances, etc.) for each stream reach.

Smallmouth bass and channel catfish aging structures were collected from all study reaches. Structures have been cataloged and aging preparations are almost completed.

### **Future Plans:**

Depth data will be used to create depth profiles and expressions of the availability of deep-water habitat for each study reach. Further analysis will explore relationships between the availability of deep-water habitat, channel slope and basins.

The fish community summary statistics will be used to explore relationships with the availability of deep-water habitat.

Smallmouth bass and channel catfish aging structures will be used to estimate age distributions and growth rates for each study reach. These estimates will be used to further explore relationships with the availability of deep-water habitat.



## **Monitoring of Fish Movement, Condition, Community Structure and Invertebrate Communities Following Modification of Two Streambed Grade Control Structures in Turkey Creek, Cass County, Iowa.**

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

**Student Investigator:** Mary Litvan (M.S.)

**Collaborators:** Christopher Larson, Iowa Department of Natural Resources

**Duration:** March 2004 to August 2006

**Funding Source(s):** USGS - Science Support Program; Iowa Department of Natural Resources; Iowa State University; Hungry Canyons Alliance

### **Goals and Objectives:**

- To determine if a 1:15 back slope design will allow upstream and downstream passage of fishes.
  - To determine if there are differences in the condition and community structure of fish in proximity to weirs with 1:15 back slopes, 1:4 back slopes, and not associated with weirs.
  - To determine if macroinvertebrate abundance and diversity differ at weirs, and in areas both near and far from weirs.
  - To provide demonstration sites of successful structures to HCA members and other potential stakeholders involved in streambed stabilization projects.
- 

### **Progress:**

Collection of data for this project began with a successful summer field season running from June 2004 through August 2004. During these months, fish movement and fish communities were sampled in Turkey Creek, Cass County, IA and macroinvertebrate communities were sampled in nearby Walnut Creek, Montgomery County, IA.

In order to document fish movement and describe fish communities in Turkey Creek, two hoop nets and two minnow traps were set at each of seven stations for periods of twenty-four hours throughout the summer. By the end of the summer field season, 858 fish from the four target species (channel catfish, yellow bullhead, black bullhead, and creek chub) had been fin clipped and there were 285 recaptures of fin clipped fish. Of these 858 fin clipped fish, 49 were large channel catfish that were double tagged with individual specific identification numbers. All four weirs within the sampled reaches of Turkey Creek were of a 1:4 backslope design throughout the summer field season.

In late July 2004, macroinvertebrates were sampled from 20 sites in Walnut Creek which contains numerous weirs of a 1:20 backslope design. These sampled stations consisted of five sites within the weir rip-rap, five sites upstream of weirs, five sites downstream of weirs, and five sites not associated with weirs. Lab sorting and identification of these macroinvertebrates is ongoing.

Fall community sampling of Turkey Creek occurred in October 2004. Ten sites of 280 meters each were electroshocked with two backpack units in order to increase recapture numbers and evaluate fish communities living in reaches associated with weirs and reaches not closely associated with weirs. Lab identification and measuring of minnows collected from this sampling is ongoing.

### **Future Plans:**

Plans have been made for two of the 1:4 weirs in Turkey Creek to be modified to a 1:15 back slope design during the winter of 2004-2005. Following the modification of these weirs, the difference in movements over the two back slope designs (1:4 and 1:15) can be studied. Spring community electroshocking will be conducted in April 2005 and the next summer field season will commence in June 2005. Analysis of macroinvertebrate data should be completed by the end of Spring 2005.

## Development and Use of the Iowa Rivers Information System (IRIS)

**Principal Investigator:** Clay L. Pierce  
Kevin L. Kane

**Research Associates:** Patrick D. Brown  
Robin L. McNeely

**Collaborators:** Gregory T. Gelwicks, Iowa Department of Natural Resources

**Duration:** June 1995 to completion

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

**Goals and Objectives:**

- To develop the Iowa Rivers Information System (IRIS), integrating physical, chemical and biological information into a comprehensive, user-friendly, statewide information system for interior Iowa rivers.
- 

### Progress:

Currently there are a variety of data and research products available through IRIS (<http://maps.gis.iastate.edu/iris>). Information retrieval in IRIS is based on a fish-species- or reach- (river or stream segment) centric interface. One of the primary data sources is the >12,000-record Iowa fish study database. This database is a compilation of different fish sampling records from the 1800s to present day and was created for the Iowa Aquatic Gap Analysis Program. Users are able to query the database and obtain information for different species. Summaries are provided by several geographic enumeration units such as reach segment, river, hydrologic unit and county. Access to other information in the database is provided by queries which focus on a particular study, investigator and collection gear type. In addition to the database access, much of the work that Iowa Aquatic GAP has and will be producing will appear in some format on IRIS. Currently users can access individual species range maps. Ranges are represented by the 8-digit hydrologic unit code (HUC) boundary.

IRIS is based on web mapping technologies that provide some cartographic and GIS functionality. Using this technology with a set of base geospatial data layers allows for the visualization of the NHD reach data and species sample sites through interactive mapping and some basic spatial analysis. Reach-based information is provided through a river search interface. Users select a particular river and associated segments to obtain sampled species information as well as physical and other biological information. The river and stream network is an enhanced version of the National Hydrography Dataset (NHD) originally developed by the U.S. Geological Survey (USGS).

Work has been done with the Iowa DNR's Watershed Atlas program to allow users to obtain reach-based data from IRIS. Users on the Watershed Atlas use a tool provided on the Watershed Atlas to link to information about a particular reach. Reach-based data on IRIS is continually updated so the hyperlink tool provides an easy way for users to move between both systems and obtain the most current information.

### Future Plans:

Currently users have no way to visualize and save their database queries. Two functions are in development that will allow users to save query results into a format they can use in a spreadsheet program on their local computer and also generate a formatted report that includes query and map results. This will be available as a formatted webpage and also in PDF format.

Future expansion of IRIS data and capabilities will be in response to user feedback. A variety of potential users have been given an introduction to IRIS in the past year. A workshop will be held at Iowa State University in January 2005. Users will be given instruction on the current options available in IRIS and they will have the opportunity to provide feedback about IRIS and to make suggestions for features that would be useful. In addition, IRIS will be linked to the DNR Fisheries, Lake Survey, IOWATER, and other databases. Conversations have been initiated between the Iowa DNR and database administrators for the IRIS program to look at ways that the yearly collection of fish sampling information can be incorporated into IRIS.

## Iowa Aquatic Gap Analysis Project

**Principal Investigator:** Kevin L. Kane  
Clay L. Pierce  
**Research Associate:** Anna Loan-Wilsey  
**Duration:** December 2001 to December 2004  
**Funding Source(s):** U.S. Geological Survey, Biological Resources

### Goals and Objectives:

- To classify stream reaches in terms of habitat quality for aquatic species using information available in IRIS.
  - To define range extent and habitat affinity of aquatic species using existing collection data.
  - To develop models predicting presence of aquatic species.
  - To generate predicted distributions of aquatic species state-wide using models and IRIS data.
  - To guide conservation planning by evaluating regions of predicted species occurrence in relation to riparian land use and stewardship.
- 

### Progress:

The biological collection database has been completed and professionally reviewed. It contains 10,993 community fish samples dating from 1884-2002, with a total of 97,790 species occurrence records. Using this data, statewide distribution maps for each species were generated on a watershed by watershed basis, using 8-digit, 10-digit and 12-digit hydrologic unit codes (HUC). Models predicting fish species presence were also developed for each species. Statistical decision tree predictive models were developed using SPSS AnswerTree software. Those species' models that could not be developed using the statistical software were developed using information gathered from existing species location data, such as presence in a specific Mississippi River pool, or from habitat affinity literature data. For a few rare and extirpated species, no model could be developed. The models were then used to generate predicted distributions of the fish species at the level of stream reach. Documented fish species richness and predicted fish species richness were calculated by watershed (8, 10 and 12 HUC) and by stream reach. Individual atlas pages for each fish species were created that include specific information about the species, predictive models for that species, final predicted distribution map, sources of species' sampling data, and literature references.

### Future Plans:

Future plans include writing the final report and publishing the project data in an easily distributed format (e.g. CD or on the web).

## **An Integrated Immunological-GIS Approach for Bio-monitoring of Ecological Impacts of Swine Manure Pollutants in Streams**

**Principal Investigator:** James A. Roth  
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Clay L. Pierce

**Student Investigator:** Dusan Palic (Ph.D.)

**Duration:** September 2002 to September 2005

**Funding Source(s):** National Institute for Water Resources (NIWR), U.S. Geological Survey

**Goals and Objectives:**

This research is predicated on the hypothesis that low levels of swine liquid manure slurry and anaerobic lagoon liquid released to open water cause changes in immunological response in fish and increase fish susceptibility to infection. The initial objectives, therefore, are 1) to evaluate this hypothesis through a series of laboratory immunological assays applied to the test organism, the fathead minnow (*Pimephales promelas*) and 2) to identify one or more assays for use as a bio-monitoring technique to detect ecological impact of manure pollution in nature. A subsequent task involves use of digital environmental databases that are maintained and managed by the USGS BRD Iowa Cooperative Fish and Wildlife Research Unit at Iowa State University. The objective is 3) to characterize a number of Iowa watersheds and stream systems according to their potential susceptibility to hog manure pollution and to use this information to design a water quality and fish sampling regime. Finally, water and fish collected at selected stream sites will be analyzed through a battery of chemical and immunological procedures with the objectives 4) to quantitatively measure ecological impact of manure pollution on the streams, and 5) to evaluate the utility of this approach as a biomonitoring tool for environmental protection agencies.

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**Progress:**

We have developed and optimized an assay for degranulation of primary granules. The assay is capable of detecting handling and crowding stress as well as differences in various stress-causing treatments (anesthesia procedures). We established baseline values for FHM neutrophil oxidative burst, myeloperoxidase content and degranulation. We have tested our developed assays on several fish species (catfish, bluegill, largemouth bass). We have started production of GIS maps in order to determine possible manure/chemical loads within designated watersheds. We have tested electrofishing equipment and assayed fish samples with our developed techniques.

**Future Plans:**

We plan to continue development of neutrophil functional assays and to expand existing battery of assays to other fish species, as well as develop novel assays (phagocytosis, extracellular and intracellular killing, extracellular traps formation). We plan to test known immunostimulative and immunosuppressive agents, to calibrate assays and to establish baseline values for fathead minnow neutrophil function.

We also plan to start developing flow path analysis tools for determining hot and cold spots in streams and watersheds that GIS indicates are either heavily or minimally impacted. Also, we plan to define locations of sampling stations within a designated watershed based on the stream channel and flow characteristics.

During summer 2005 we plan to do field trials on designated sampling points within selected watersheds/streams. We will provide NIWR with a time estimate for additional work, if needed. Due to delays in experimental system construction (water heater installation) during 2004, laboratory manure exposure trials may extend into early 2006.

**COMPLETED  
WILDLIFE/TERRRESTRIAL  
PROJECTS**



## Bird survey of the Kellerton Bird Conservation Area (BCA)

**Principal Investigator:** Rolf R. Koford  
**Collaborators:** Brad Jacobs, Missouri Department of Conservation  
Jane Fitzgerald, American Bird Conservancy  
Melvin Moe, Iowa Department of Natural Resources  
**Duration:** June 2000 to August 2004  
**Funding Source(s):** Iowa Department of Natural Resources  
**Goals and Objectives:**

- Document occurrence of grassland-bird species using the Kellerton BCA during the nesting season and estimate relative abundance of songbirds.
  - Compare abundance of breeding birds in three habitat types/treatments (grazed cool-season grasses, CRP planted with cool-season grasses, hayed cool-season grasses) in the Kellerton BCA.
- 

### Progress:

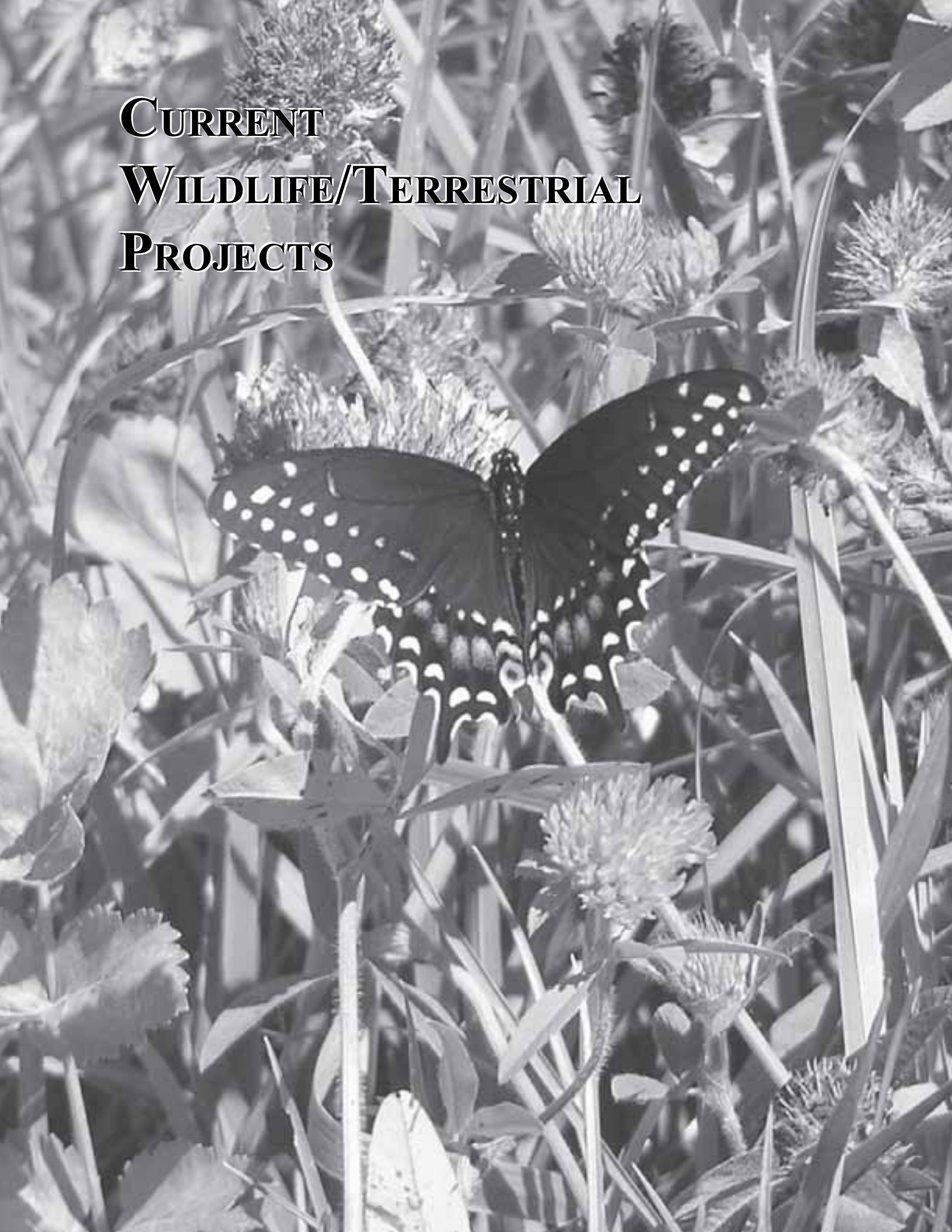
To document the occurrence of grassland-bird species, we surveyed (with point counts) the core area of the Kellerton BCA in 2000, 2002, and 2004, using a grid of 51 points in the first two years and 78 (to accommodate the enlarged size of the core) in the third. Grassland birds seen consistently in all three survey years were Bobolink, Common Yellowthroat, Dickcissel, Eastern Meadowlark, Grasshopper Sparrow, Henslow's Sparrow, Red-winged Blackbird, Sedge Wren, and Upland Sandpiper. Grassland species seen in fewer surveys were Horned Lark, Killdeer, Northern Harrier, Ring-necked Pheasant, and Western Meadowlark. Grassland species detected, but not during point-count surveys, included Greater Prairie-chicken and Short-eared Owl. Twenty three other species were seen but these do not depend just on grasslands; included were American Goldfinch, Brown-headed Cowbird, Brown Thrasher, Cedar Waxwing, Eastern Kingbird, Field Sparrow, Gray Catbird, Northern Mockingbird, Northern Bobwhite, and Willow Flycatcher. Also seen, but not on point counts, were Barn Swallow (flyovers), Red-bellied Woodpecker, Red-headed Woodpecker, Red-tailed Hawk, and Wild Turkey. Notable in this species list is the regular occurrence of the State-Threatened Henslow's Sparrow, which was detected in both the original survey area and the newly acquired land.

To compare abundance in the three habitat types in the BCA, we conducted point counts (at three times in each of two years) in twelve grassland fields—four each with grazed cool-season grasses, Conservation Reserve Program (CRP) land planted with cool-season grasses, and hayed cool-season grasses. We detected 25 species in the survey, mostly Bobolinks and Red-winged Blackbirds. Bird abundance varied among habitats in ways that were consistent with known habitat preferences. For example, Bobolinks, a species known to favor dense grass, were about twice as abundant in CRP and hayland as they were in pasture. Similar patterns were apparent among Dickcissels and Henslow's Sparrow. A species that prefers less grass, the Grasshopper Sparrow, was an order of magnitude more abundant in pasture than it was in CRP or hayland. In the Missouri BCA's, there are six habitat types/treatments, the three surveyed in Iowa plus grazed warm-season grasses, CRP planted with warm-season grasses, and hayed warm-season grasses. Combined data from the two states reveal two significant preliminary findings. First, there were significant interactions between BCA's and habitat types/treatments, indicating that the pattern of variation of bird abundance among habitat types/treatments is different in the different BCA's. Second, although some species occurred widely in the 20 grassland areas, some species were more restricted. Species that may need special consideration are Bell's Vireo, Bobolink, Henslow's Sparrow, Upland Sandpiper, Western Meadowlark, and Yellow-breasted Chat.

### Conclusions and Recommendations:

The regular occurrence of Henslow's Sparrow, an area-sensitive species, along with three species of conservation concern (Greater Prairie-chicken, Northern Harrier, and Short-eared Owl) that require large expanses of grassland because of their large home ranges, indicates that the BCA core is providing habitat for species targeted by regional bird conservation plans. The habitat comparisons in Iowa provide information that will be useful for managers who select a list of target species and want to know which land use treatments or management to promote in the BCA for the species of highest management concern. In the region that includes Missouri, providing recommendations for grassland land use in BCA's may have to be geographically tailored.

**CURRENT  
WILDLIFE/TERRESTRIAL  
PROJECTS**



## **Planning and design of field surveys for wildlife species of greatest conservation need in Iowa**

**Principal Investigator:** David L. Otis  
**Research Associate:** Karen Kinkead  
**Duration:** August 2004 to August 2006  
**Funding Source(s):** Iowa Department of Natural Resources

### **Goals and Objectives:**

- Develop sampling strategies based on Iowa GAP databases and distribution maps that will provide scientifically based information on the current distribution and abundance of target species.
  - To identify field survey methods to be used with the sampling strategies to gather field data.
  - To develop a State Wildlife Grant proposal that will implement the sampling strategies and field data collection methods and define a process to update the databases.
- 

### **Introduction:**

The Iowa Department of Natural Resources (IDNR) has statutory authority for the conservation and management of 674 vertebrate wildlife and fish species, 30 species of invertebrates currently on the state's threatened or endangered list, and their associated habitats. As required by the State Wildlife Grants (SWG) program established by Congress, the IDNR has begun a process to develop a State Comprehensive Wildlife Conservation Plan (SCWCP) that will identify those wildlife species of greatest conservation need and develop conservation actions to improve their status.

The Iowa Gap Analysis Program (GAP) was completed in 2004 by a team of Iowa State University (ISU) faculty and staff. GAP uses an integrated, GIS-based analysis of vegetative land cover, land protection status, and predicted vertebrate species distribution to identify landscapes within a state with the greatest potential and need for conservation of wildlife biodiversity. The predicted distribution of a given species is derived from wildlife survey data, research studies, historical records and expert knowledge of the breeding range of the species. Within this range, species are predicted to occupy all patches of suitable land cover types, as determined by review of the scientific literature on the biology of the species and local expert opinion. Predicted species distribution maps have been completed for 403 species of birds, 72 species of mammals, 76 species of reptiles and amphibians, and 153 species of fish that reside in or have a portion of their breeding range in Iowa. GAP used the best information available, recognizing that the habitat and distribution models that were produced may be outdated and might require ground-truthing and modification before they accurately reflected current conditions.

The SCWCP will be submitted for approval by June 2005, but for many nongame species, the first conservation action recommended will undoubtedly be to improve the information on their current status and distribution. Statistically valid survey techniques must be developed to document status and distribution, and to additionally evaluate the effects of management actions and anthropogenic threats. The GAP atlas of predicted species distribution maps provides a sampling frame that could be used to develop field surveys to determine a species presence and abundance within its predicted range. Data derived from field surveys can also provide a basis for evaluation of the accuracy of GAP species-habitat models, which will improve utility in designing conservation programs.

### **Progress:**

Recruitment of a post-doctoral research associate (Kinkead) to lead the project was successfully completed in August, 2004. Initial tasks have been to become familiar with the Iowa GAP analysis and the status of the draft SCWCP. Initial ideas concerning monitoring and evaluation priorities have been discussed with the SCWCP Steering Committee.

### **Future Plans:**

We will continue to provide input on the SCWCP as requested on monitoring objectives and field designs. Analyses in support of several potential monitoring designs will be conducted to assess relative cost and logistical constraints. Upon completion of the SCWCP in 2005, more specific design and planning can proceed.



## National mourning dove banding study

**Principal Investigator:** David L. Otis  
**Collaborators:** Multiple state and federal migratory webless gamebird coordinators  
**Duration:** January 2003 to December 2006  
**Funding Source(s):** U.S. Fish and Wildlife Service  
 Multiple state wildlife agencies

### Goals and Objectives:

- Estimate of age-specific harvest rates and band reporting rates in a representative set of subregions in each of the 3 national dove harvest management units.
  - Estimated band reporting rates with the same subregions.
  - Establish protocols, training, and cost estimates for a future coordinated nationwide banding program designed to monitor harvest and survival rates.
  - Provide information on geographical distribution and derivation of harvest.
  - Provide initial estimates of annual survival and breeding site fidelity of subregion breeding populations.
- 

### Introduction:

Efforts are in progress to use the best available data to construct first generation population models of mourning doves, in support of improved harvest management strategies for this important wildlife resource. These models depend in turn on submodels that relate annual survival rate and reproductive rate to harvest rate. Estimates of survival and harvest rates currently used in these models have been derived from band recovery data collected from 1965-1975, because no large-scale banding programs have been in place since that era. Models that assume additive, compensatory, and partially compensatory relationships between harvest and survival rate on a regional (subregion) scale have been developed, but new data will be required to begin to assess the relative weights of empirical support for the different models. Information from this study will be used to update and improve population models developed to support harvest management strategies.

This is a 3-year project in which the first and third years involve only standard bands, and the second year involves use of both reward and standard bands. The rationale is that the first year will provide the opportunity for participating states to establish banding locations, train personnel in trapping techniques, age and sex assignment, and cost evaluation. The second year provides the essential data for estimation of reporting rates, and the third year provides an additional estimate of harvest rate, and initial estimates of survival and site fidelity rates (using recapture as well as dead recovery data). Banding will occur in July and August of 2003-2005.

### Progress:

Contemporary and statistically reliable estimates of harvest rates, survival rates, and geographical distribution of harvest throughout the U.S. are necessary to improve science-based harvest management of mourning doves. A 3-year national pilot banding program was initiated in 2003 to produce data for estimation of these demographic parameters survival and harvest rates and geographical distribution of harvest. During the summers of 2003 and 2004, state and federal cooperators in 27 states have banded and released approximately 60,000 doves. This cooperative effort between state wildlife agencies, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey Bird Banding Laboratory will result in much needed information for improvement of dove harvest management. The study will also serve as the basis for a planned operational nationwide banding program designed to produce annual comprehensive estimates of harvest and survival rates.

### Future Plans:

Banding and recovery data from 2003-2004 will be analyzed and used to make adjustments as appropriate for the 2005 field season.

## **Development and evaluation of mourning dove population models for optimizing harvest management strategies in the Central Management Unit, Eastern Management Unit, and Western Management Unit**

**Principal Investigator:** David L. Otis  
**Student Investigator:** David Miller (Ph.D.)  
**Duration:** October 2001 to March 2006  
**Funding Source(s):** U.S. Fish and Wildlife Service  
Texas Parks and Wildlife Department  
Multiple State Wildlife Agencies

### **Goals and Objectives:**

- Use historical band recovery, harvest age ratio, recruitment survey, and auxiliary data as appropriate to develop simple structural models of annual survival and reproduction.
  - Use structural equations developed in #1 as the basis for development of a small set of population life cycle models for each of the 3 management units.
  - Use a range of plausible parameters values, based on historical literature, to investigate the sensitivity of predicted population trajectories to change in individual parameters, including harvest rates.
  - On a regional or management unit scale, compare predicted population trajectories from different models to Call-Count Survey (CCS) trends, as a coarse check on model validity.
  - Make recommendations regarding the need for and design of survey programs for estimation of population parameters.
- 

### **Progress:**

Statistical models of the relationship between harvest rate and annual survival rate have been developed for each management unit, based on re-analysis of band recovery and harvest data from 1965-1975, which is the most recent period of sufficient banding effort. These models make different assumptions about the compensatory versus additive effect of harvest mortality. Two peer reviewed manuscripts have been published from this work. A simple structural model of annual recruitment has been developed and parameterized using data from the published literature. The model predicts a range of possible annual recruitment within large geographical regions as a function of breeding season length, nest success, and fledging rate. A manuscript based on this work has been published. Survival and productivity models have been combined into a population model, and predictions from this model have been compared to trends derived from Call Count Survey data during comparable time periods. Comparisons reveal positive bias in model predictions, probably due to bias in population parameter estimates.

A harvest strategy based on annual population change estimates derived from annual population estimates based on harvest data was developed and evaluated for management use. This alternative to use of mechanistic population models as the basis for harvest management was motivated by a request from the U.S. Fish and Wildlife Service for interim harvest strategies that could be implemented during the period that development of models and generation of new population data is incomplete. Use of this strategy was incorporated into management plans in the Eastern and Central Management Units.

### **Future Plans:**

- 1) Development and evaluation of statistical models for estimation of annual recruitment from banding data. This theoretical work is necessary to calibrate harvest age ratio estimates that could be generated by annual wing surveys of harvested birds.
- 2) Further evaluation and development of the management strategy based on harvest data.

## Identification of nest success and brood habitat selection of the Northern Bobwhite in relation to landscape spatial patterns and habitat composition

**Principal Investigator:** David L. Otis  
**Student Investigator:** Lisa Potter (M.S.)  
**Collaborators:** Todd Bogenschutz, Chuck Steffen, Iowa Department of Natural Resources  
**Duration:** January 2003 to June, 2006  
**Funding Source(s):** Iowa Department of Natural Resources  
 Iowa Cooperative Fish & Wildlife Research Unit

### Goals and Objectives:

- Estimate the probability of nest success as a function of habitat composition and landscape spatial pattern.
  - Describe the composition and spatial pattern of habitat cover at and around nest sites.
  - Estimate brood rearing habitat selection as a function of habitat composition and landscape spatial pattern.
  - Estimate the probability of brood success as a function of habitat composition and landscape spatial pattern.
- 

### Progress:

Although large scale habitat characteristics describing bobwhite habitat needs have been extensively investigated, data for land managers on how and where to implement the suggested habitat improvements and land management changes are lacking. Microhabitat features describing nesting sites and their possible influence on nest fate is also lacking in the literature, as well as the requirements of juvenile bobwhites during the brood rearing season. Thus, essential information necessary to properly manage and create quality bobwhite habitat is unavailable.

The initial field season at Lake Sugema Fish and Wildlife Area (LSWA) in Van Buren County, Iowa and an adjacent township dominated by production agriculture was completed in 2003. Twenty bobwhite were captured, equipped with radio transmitters, and monitored for mortality and breeding information. An initial protocol for sampling vegetation parameters at and near nest sites and at brood rearing locations was developed and tested for several nest sites and broods associated with radioed birds. Protocols for collection of telemetry data and for estimating brood success and survival were also developed and tested.

In the 2004 field season, 73 bobwhite were trapped on the 2 study areas. There were a total of 33 mortalities, and the suspected causes of mortality were: 1 domestic cat, 9 mammals, 2 transmitter failures, 9 raptors, 1 transmitter related, and 11 unknown. Three deaths occurred while brooding, 8 while incubating a nest, and the remaining 22 mortalities occurred during daily activities.

Thirty-one nests were located throughout the season and 12 of the nests were successful. Of those 12, 10 had a 100% hatch rate. Seven males and 24 females incubated nests. Seven broods were tracked for a period of 4 weeks or longer, and habitat and vegetation parameters were tracked in used areas.

### Future Plans:

Telemetry and vegetation databases from 2003 and 2004 field seasons will be finalized and edited in preparation for statistical analysis. GIS coverages of the 2 study areas will be finalized for use in habitat and nest success analyses. Results from these analyses will be described in thesis form. In 2005, another field season will be conducted using field protocols finalized in 2004. Data and results from 2003 – 2005 will then be compiled and a manuscript prepared for publication.

## **Amphibian malformation and disease in midwestern landscapes**

**Principal Investigator:** David L. Otis  
**Student Investigator:** Jennifer Loda (M.S.)  
**Collaborators:** David Green and Rebecca Cole, USGS National Wildlife Health Center  
**Duration:** October, 2002 to October, 2005  
**Funding Source(s):** USGS National Wildlife Health Center

**Goals and Objectives:**

- Summarize USGS data on spatial and temporal distribution and magnitude of occurrence of amphibian malformation and disease.
  - Provide sampling design recommendations for future survey programs.
  - Estimate the strength of relationships between malformation incidence and population demographics, and a suite of biological and environmental variables, with an emphasis on parasitic disease.
- 

**Progress:**

Malformation and disease databases were received from the National Wildlife Health Center (NWHC) and were reformatted into a relational Access database, and initial descriptive analyses were completed. The objective of using this database to do exploratory modeling of response variables of interest as a function of biotic and abiotic factors was dropped due to lack of access to archived biotic data and inconsistencies in field data collection protocols.

Project objectives have been refocused on investigations of the potential role of parasitic trematodes in the incidence of anuran malformation in wetlands in agricultural landscapes, and interactions with parameters of wetland characteristics such as nutrient and agricultural chemical loads.

**Future Plans:**

The project will likely involve both field and laboratory/mesocosm studies. There is limited information available on the distribution and abundance of potential parasite densities and the mechanisms by which these parasites could cause malformations and/or decreases in population vital rates such as recruitment. We are currently reviewing literature and refining relevant questions to be pursued. We are investigating potential field sites in Iowa that would represent gradients in both wetland condition and density of potential parasites, and we will discuss the potential of conducting controlled mesocosm studies to address specific questions that would improve our ability to interpret anticipated challenges in interpretation of results from field studies.

## Development and evaluation of sampling designs for Chronic Wasting Disease surveillance programs

**Principal Investigator:** David L. Otis  
 William R. Clark  
 Sarah M. Nusser

**Student Investigator:** Ling Huang (M.S.)

**Duration:** October 2002 to October 2005

**Funding Source(s):** USGS National Wildlife Health Center

**Goals and Objectives:**

- Develop a set of alternative sampling designs for detection and estimation of prevalence and spatial pattern of Chronic Wasting Disease (CWD) in a given area.
  - Evaluate the statistical operating characteristics (bias, precision) and cost-efficiency of the designs under alternative sets of assumptions about the spatial epidemiology and ecology of the disease and its host.
  - Develop expertise and products that are adaptable for use by natural resource agencies with a variety of surveillance objectives and circumstances.
- 

### Progress:

The primary goal of this project is to evaluate the properties of CWD prevalence estimates generated from a range of statistical and convenience sample designs. A critical aspect of this research is to develop simulation methods that can be applied to different landscape settings and under alternative hypotheses about the spread and maintenance of CWD. Our approach starts with the National Land Cover Data, a common geographic coverage available nationwide. We simulate deer density on the landscape using data on habitat preferences from the literature and the Iowa Department of Natural Resources. Initially we have used a county in northeastern Iowa with a mixture of forest and agriculture typical of midwestern landscapes. Our approach is completely general so that it could be applied to any state in the region. Deer are simulated on the landscape using an algorithm that distributes deer proportional to the expected density in each habitat stratum. We assign individual deer as diseased or not diseased based on expected prevalence (proportion of the population that is infected with detectable disease). In our simulations of CWD we have used 1.5% prevalence at the county level. The spatial distribution of disease in the population is simulated using three different methods. We sample from the simulated deer and disease distribution, testing ideal probability sampling designs: simple random sampling (SRS), stratified random sampling (STS) using land cover class or township as strata and cluster sampling of townships and sections. Finally, we simulate the “purposeful” sampling mechanisms that most states have implemented: examining all road killed deer reported, and examining deer shot and reported by hunters.

The complete set of simulation algorithms, statistical procedures, and the Monte Carlo design parameters have been verified and finalized.

### Future Plans:

The computer simulations will be completed and summarized in a thesis. We will then discuss future directions of the project with colleagues at NWHC. These directions might include increased future emphasis on sampling designs for evaluation of disease control programs or for investigation of the spatial epidemiology of CWD in Midwestern landscapes.

## **Development and evaluation of quantitative techniques for use in applied ecology**

**Principal Investigator:** David L. Otis  
**Collaborator:** Gary C. White, Colorado State University  
**Duration:** Continuing

**Goals and Objectives:**

- Develop new or improved techniques for statistical estimation and associated statistical inference procedures regarding animal population parameters and their dynamics
- 

**Progress:**

The focus of this project is development and evaluation of statistical techniques used to investigate hypotheses concerning compensatory mortality in exploited wildlife populations. This topic is of fundamental interest to population biologists. However, despite the development by many authors of a collection of density- dependent population models and functional representations of the relationship between annual survival and harvest rates, statistical analysis techniques for empirical investigation of these phenomena are extremely limited. In the case of band recovery data from exploited gamebird species, standard practice has been to incorporate ultrastructure functions into band recovery models. Satisfactory performance of this approach has been inconsistent, and limited Monte Carlo simulations of the statistical performance of the estimator have revealed some problematic distributional and bias properties. Furthermore, the sensitivity of the estimator for detecting annual survival rate and harvest rate relationships is unknown.

An alternative approach to the use of fixed effect ultrastructure models is possible if annual harvest rates and survival rates are considered random effects. We envision an underlying process correlation between these 2 rates that is randomly perturbed by a collection of additional biotic and abiotic factors. The perturbation could be temporal, as in the case of released banded cohorts from single population for a series of years. Alternatively, if banding is done in multiple populations, we might consider survival and harvest as fixed effects in a given population, and assume random spatial perturbation in the parameters.

We constructed underlying models with known functional relationships between harvest and natural mortality in a seasonally exploited population, and used Monte Carlo simulation to generate annual samples of band recovery data. These datasets were analyzed using fixed effect ultrastructure models by using customized SAS code in PROC IML. General performance of the ultrastructure estimators was poor due to pathological distributional characteristics, poor precision, and computational instability in the algorithms. We recommend against use of this technique in the future.

We derived 2 new statistical procedures for estimation of the process correlation between harvest and annual survival rate, which is taken as the metric for evaluating the degree of compensatory mortality in the exploited population. The weighted least squares approach was not sufficiently numerically stable, and therefore we pursued a likelihood approach based on a bivariate normal distribution. This estimator generally had good statistical properties of small bias and achieved confidence interval coverage for the process correlation parameter.

**Future Plans:**

We plan to continue to evaluate this procedure in populations with more complicated demographic structures, and explore the use of additional algorithms to improve numerical stability and performance of the technique.

## Habitat and landscape associations of grassland birds in the Spring Run Complex of northwestern Iowa

**Principal Investigator:** Rolf R. Koford  
**Student Investigator:** L. Embere Hall (M.S.)  
**Collaborators:** Doug Harr, Bruce Ehresman, Iowa Department of Natural Resources  
**Duration:** January 2003 to May 2005  
**Funding Source(s):** Iowa Department of Natural Resources (DNR)  
 U.S. Fish and Wildlife Service

### Goals and Objectives:

- Map habitats on the Spring Run Complex using a classification scheme that reflects differing management and potentially different bird communities.
  - Relate bird abundance (using a density index) to habitats, vegetation composition and structure.
  - Estimate nest success for common grassland bird species and relate variation in nest success to vegetation and landscape composition and structure. Compare success on restored sites to success on remnant prairie sites.
  - Assess the likelihood that grassland birds (dickcissels and bobolinks) will re-nest on their original territories in restored grassland sites and remnant prairie sites following a nest failure.
  - Assess abundance of grassland snakes on remnant and restored sites. Examine differences in grassland snake abundance at the edge of restored habitat patches and at the interior of habitat patches.
- 

### Progress:

Our research examines the effects of grassland restoration on grassland breeding birds. The end of August marked the end of our second, and final, field season.

Objective 1: During 2003 and 2004 we ground truthed color infrared orthophotos taken in April 2003. We also ground truthed 2002 landcover raster data available from the Iowa DNR. We are currently incorporating this landscape information into a GIS of the Spring Run Complex and the surrounding remnant prairie sites. We will use the GIS to relate bird counts and nest fates to landscape composition and structure.

Objective 2: We surveyed birds on 15 restored grassland sites in the Spring Run Complex. We used 10-minute, 50m fixed-radius point counts to evaluate relative bird abundance on sites with high perimeter/grassland ratios and low perimeter/grassland ratios. Counts were randomly located within each site, were at least 150m apart and were 20m or more from road, fence and tree edges. Each site was surveyed during three periods: 20 May-5 June, 6 June-22 June, and 23 June-6 July. In 2003, we detected 34 species (including fly-overs), and in 2004, we detected 43 species. Vegetation composition and habitat structure data were collected at each survey point. These data will be correlated with passerine abundance estimates to determine habitat preferences.

Objective 3: Even though a high density and diversity of birds seem to be breeding in these areas, these areas may not be source habitats for birds. We located and monitored nests in both years on restored and remnant grassland sites. After a nest terminated (i.e. fledged young or failed) we recorded vegetation composition and structure at the nest sites.

Passerine nests common to both habitats included bobolinks, dickcissels, red-winged blackbirds and sedge wrens.

Preliminary nest survival analyses indicate remnant sites had higher nest survival probabilities than restored sites.

Objective 4: While nest success estimates provide insight into general productivity of a species, they do not account for the influence of re-nesting attempts or multiple clutches on seasonal fecundity. In 2003 we color marked 69 birds in both habitat types. Of the 54 female dickcissels and bobolinks that we marked, 4 remained on their territories after a nest failure. Because of the low number of resightings in 2003, we significantly reduced the resources directed at this question in 2004. Of the 15 females banded in 2004, none was resighted on her territory following a nest failure.

Objective 5: In 2004 we marked and monitored grassland snakes on our nest searching sites. While we monitored snakes in both habitats, the primary goal of this work was to document the difference in snake abundance, if any, on the edge and interior of grassland patches. We captured approximately 730 individuals of 4 snake species from 1 May-21 August. Plains garter snakes composed 66% of the total capture number. Preliminary analysis indicates that snakes were most abundant in the interior of grassland habitat patches.

### Future Plans:

Data analysis and thesis preparation will continue throughout the winter and into spring 2005.

## **Bird And bat mortality associated with the Top of Iowa Wind Farm**

**Principal Investigator:** Rolf R. Koford  
**Student Investigator:** Aaftab Jain (M.S.)  
**Collaborators:** Guy Zenner, Alan Hancock, Iowa Department of Natural Resources  
**Duration:** August 2002 to May 2005  
**Funding Source(s):** Iowa Department of Natural Resources  
U.S. Fish and Wildlife Service

### **Goals and Objectives:**

- Measure the length of time bird-collision evidence remains available to be found by investigators during the spring, summer and fall seasons.
  - Develop a detection correction factor for each investigator that searches for bird-collision evidence to correct for evidence that may be overlooked.
  - Estimate bird and bat mortality resulting from impacts with wind-generator towers and turbine blades, with emphasis on mortality during the spring and fall migration periods.
  - Estimate bird and bat species composition, relative abundance, habitat use, flight patterns and the relative mortality risk at turbine sites versus non-turbine sites, and also in relation to distance from the wind farm.
  - To estimate differences in waterfowl use of quarter sections with and without turbines inside the area that is closed to Canada goose hunting to determine the impacts of turbines on waterfowl feeding behavior and assess the relative mortality risks to feeding waterfowl.
- 

### **Progress:**

The consecutive field seasons extended from March 15 to December 15 (2003 and 2004). Mortality surveys and point counts began on March 15, 2003 and 2004, while the waterfowl aspect of the study occurred in the Fall of 2003 and 2004. Waterfowl behavior, land use and flight behavior were observed and data were stored in Excel and ArcView GIS. We found a total of 7 birds and 75 bats over two years. We corrected for search efficiency, scavenging and search effort to create estimates of birds and bats killed in 2003 and 2004. These estimates are 526 ( $\pm 193$ ) and 905 ( $\pm 265$ ) bats in 2003 and 2004, respectively; and 35 ( $\pm 48$ ) and 80 ( $\pm 74$ ) birds in 2003 and 2004, respectively. Point counts were conducted to compare bird activity in fields with and without turbines, and also to compare bird activity on the windfarm with a similar region to the southwest of the windfarm. Bat detectors were used to compare bat activity in fields with and without turbines. No consistent differences were found between relative bird and bat activity at tower, tower-with-transect and non-tower sites or between bird activity on or off the windfarm, in 2003 and 2004. No significant differences were found between Canada Goose foraging behavior on or off the windfarm in the fall of 2003.

### **Future Plans:**

Data analysis of the mortality, point count and waterfowl study data for 2003 and 2004 are ongoing. Avian flight behavior requires further analysis to determine proportions of time that birds spend in risky flight (within/near turbine-blade sweep area). Mortality estimates may require revising to correct for the numbers of carcasses that are found near vs. far from the tower base.



## A Landscape Approach to Grassland Bird Conservation in the Prairie Pothole Region of Iowa and Minnesota

**Principal Investigator:** Rolf R. Koford  
**Student Investigator:** Shane S. Patterson (M.S.)  
**Collaborators:** David Naugle and Frank Quamen, University of Montana; Rex Johnson and Diane Granfors, USFWS Habitat and Population Evaluation Team, Fergus Falls, MN; Ron Reynolds, Neal Niemuth, and Mike Estey, USFWS Habitat and Population Evaluation Team, Bismarck, ND  
**Duration:** August 2001 to March 2005  
**Funding Source(s):** Iowa Department of Natural Resources  
 Minnesota Department of Natural Resources  
 U.S. Fish and Wildlife Service

### Goals and Objectives:

- Assess local and landscape factors affecting grassland bird use in the Prairie Pothole Region (PPR) of MN and IA.
  - Develop species-specific habitat models for grassland-bird species of conservation priority. These models will enable us to take information garnered from individual study sites and expand to a regional scale.
  - Apply species-specific habitat models in a GIS context to identify priority grassland-bird landscapes throughout the PPR of IA and MN.
  - Examine how the detectability of grassland birds varies as a function of distance from an observer. Use program DISTANCE to evaluate variation in species behavior and observer performance during point transects.
- 

### Progress:

In 2004, new study sites were selected in the tallgrass portion of the Prairie Pothole Region (PPR) in Iowa and Minnesota, supplementing our sample of sites surveyed in previous years. Our study aims to determine the best remaining segments of habitat for an array of declining obligate grassland-bird species in the PPR. The same methods are being used by our collaborators at the University of Montana in the mixed-grass segment of the PPR in Montana, North Dakota, and South Dakota. We randomly allocated 440 point-count sites to specific grassland locations identified on Geographic Information System coverages provided by the USFWS HAPET offices, as described in the FY 2003 annual report (Volume 68).

At each site, we surveyed birds for 10 minutes within 100m fixed-radius point counts from sunrise to 10:00 am, 20 May to 01 July. For each grassland bird detected within a count circle, we recorded time of detection, distance from bird to observer, land-cover type utilized, and sex when identifiable. Occurrence data were also collected for non-focal species and flyovers within the count radius and for focal species detected outside of the count circle.

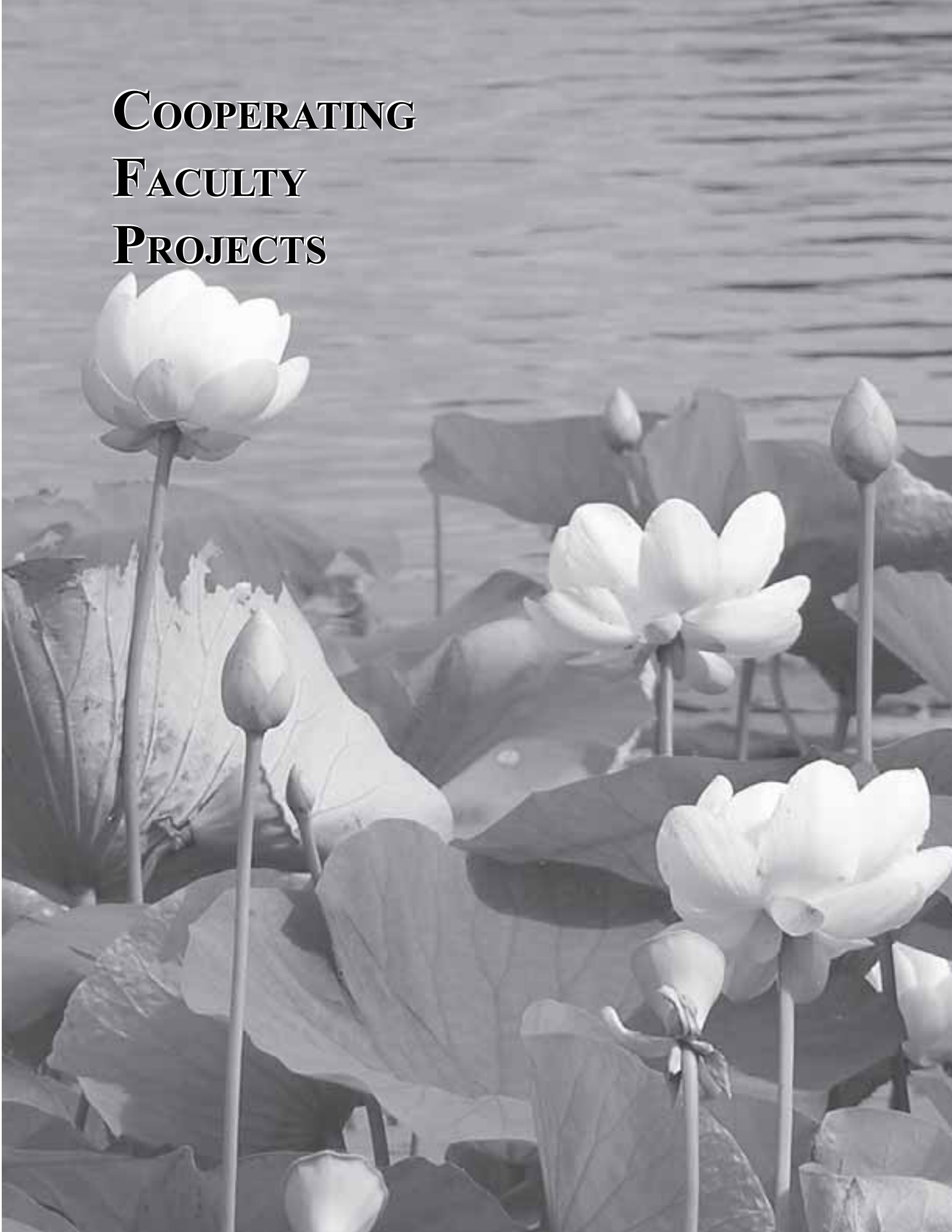
By utilizing a single-visit approach across a broad area, our study also provided a unique opportunity to examine detectability of grassland birds. With data collected by multiple observers in both the mixed-grass and tallgrass portions of the PPR, we used program DISTANCE to generate detection functions for territorial males detected during point transects. Within each region, we examined variation among observers (separately for each species) and species (pooled among observers for each species). As expected, detectability varied noticeably with regard to both observer and species. We reached similar conclusions via DISTANCE analyses from our 2003 data set. Furthermore, we evaluated year-to-year differences in observer performance with DISTANCE results from three counters who sampled in 2003 and 2004.?

### Future Plans:

Future plans include further synthesis and incorporation of findings into a thesis. Chapters from the thesis will be submitted for publication following the thesis defense. Papers will address various aspects of grassland-bird detectability, including themes summarized in the preceding progress report. An additional paper will include the efficacy of one visit vs. two visits at a given site for surveys of obligate grassland birds on a broad scale. This examination involved a comparison of detection rates from one count conducted early in the 2003 nesting season to a second count done later (ca. two weeks) in the same nesting season.



**COOPERATING  
FACULTY  
PROJECTS**



## Fertilization strategies for plastic-lined fish culture ponds

**Principal Investigator:** Joseph E. Morris  
**Student Investigator:** Sarah E. Kaatz (M.S.)  
**Duration:** July 2000 to December 2003  
**Funding Source(s):** Iowa Department of Natural Resources  
**Goals and Objectives:**

- To determine the plankton and benthic communities of plastic-lined hatchery ponds, and
  - To modify nutrient levels to improve the zooplankton and benthic communities essential to growth and development of larval fish.
- 

**Progress:**

A completion report was submitted in December 2003.

**Conclusions and Recommendations:**

Organic fertilizers are important in the culture of walleye in plastic-lined ponds. The years that organic fertilizers were used, there was more prey available, both zooplankton and benthic invertebrates, to the young fish. However, we noted in each year of the study that nitrogen was limiting, and that more inorganic nitrogen was added to adjust to the targeted ratios. Alfalfa pellets were the organic fertilizer used throughout the study; however, alfalfa pellets tend to add only a minimal amount of nitrogen to the ponds. Soybean meal, another organic fertilizer, is known to have higher amounts of nitrogen compared to alfalfa pellets (7% for soybean meal vs. 2% for alfalfa hay [Snow 1957]). Clouse (1991) stated that soybean meal is 44% protein, and alfalfa meal is 18% protein. Therefore, it may be advantageous to use soybean meal in place of alfalfa pellets as the organic fertilizer in the future.

Walleye fingerlings may consume formulated feed if the natural prey base is unavailable. In such a case it would be important to feed. However, if one is managing for zooplankton and benthic invertebrates with the application of organic fertilizers and can sustain a natural prey base, formulated feed is not needed for the culture of walleye in plastic-lined fish culture ponds. Furthermore, there are still questions as to the timeline of when food should be added. We noted some fish consumed formulated feed: the zooplankton population was depleted at this time, and the benthic numbers were beginning to decline. However, there was some remnant of the natural food base. It is unclear if we would have had better success getting the walleye on formulated feed if we had waited longer to harvest them, thus giving the natural food base more time to decline. However, this was not a feasible option since we did not want to allow cannibalism in our culture ponds.

In conclusion, for the culture of fingerling walleye in plastic-lined ponds, we recommend managing for a natural prey base of zooplankton and benthic invertebrates with the use of organic fertilizers, and monitoring water quality parameters, such as ammonia, nitrogen, total phosphorus, dissolved oxygen, temperature and pH; water quality needs to be assessed at all stages of the culture period. The application of supplemental commercial fish diets might be useful when the natural food base in the ponds becomes depressed.

## Best Management Practices for Channel Catfish Culture in Plastic-Lined Ponds

**Principal Investigator:** Joseph E. Morris  
**Student Investigator:** Len Kring (M.S.)  
**Duration:** July 2003 to June 2006  
**Funding Source(s):** Iowa Department of Natural Resources

### Goals and Objectives:

- To identify best management practices for culturing channel catfish in plastic-lined ponds.
  - To model the nitrogenous and phosphorus outputs derived from culturing channel catfish in plastic-lined ponds.
- 

### Progress:

In 2000, the Iowa Department of Natural Resources began using 10 0.4-ha and six 0.04-ha plastic-lined ponds at the Rathbun Fish Hatchery and Research Facility (Moravia, Iowa) to culture game fish that are subsequently stocked into public waters. During the first 3 years of use, inconsistent growth and survival of channel catfish (*Ictalurus punctatus*) were evident. Two separate studies were composed to better understand the culture of channel catfish in these ponds. The effects of stocking density was investigated in the 0.4-ha production ponds. In 2003, stocking densities were 75,000 and 112,000 fish/ha. No significant differences were seen in catfish production; although fish in the lower treatment were slightly larger. The only significant difference with regard to water quality was that the ponds stocked with 112,000 fish/ha had higher concentrations of total phosphorus. In 2004, the same ponds were stocked at rates of 38,000 and 75,000 fish/ha. The fish in the lower treatment exhibited significantly higher specific growth and normalized biomass. These fish were also significantly longer and heavier at harvest. Ponds stocked at a rate of 75,000 fish/ha had significantly higher concentrations of ammonia, total phosphorus and chlorophyll a. In 2004, the six 0.04-ha plastic-lined ponds were used in conjunction with six 0.08-ha earthen ponds located at the Iowa State University Horticulture Station (Ames, Iowa), to assess the effects of dietary protein percent on the production of channel catfish. Plastic-lined ponds that received the 28% protein feed exhibited significantly higher levels of total phosphorus and turbidity. Earthen ponds that received the 36% protein feed displayed significantly higher concentrations of ammonia and chlorophyll a. Fish fed the 36% protein diet in the plastic-lined ponds had significantly higher relative weights ( $W_r$ ) than fish fed the 28% protein diet. There was a significant difference in harvest lengths and weights in the earthen, with the fish fed the 36% protein feed being longer. A stocking density between 38,000 and 75,000 fish/ha should be used to culture channel catfish fingerlings in plastic-lined ponds in Iowa, with fish being fed a feed that contains over 28% protein.

### Future Plans:

At the completion of fish harvests in October 2005, the effect of feeding rates will be assessed related to the water quality parameters measured during the culture period. Future studies will investigate the use of diets with both lower protein as well as phosphorus for culture of channel catfish fingerlings in plastic-lined ponds.

## Genetic variability and geographic structure of *Lampsilis higginsii* mussels in the upper Mississippi River and tributaries

**Principal Investigator:** Bonnie S. Bowen

**Student Investigators:** Tin Chi Solomon Chak, B.S. expected May 2005

Tiffanie Kuhn Johnson, B.S. May 2004

Justin Church, B.S. May 2003

**Duration:** September 2001 to September 2004

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

### Goals and Objectives:

- Assess the genetic variability and geographic structure within and among five populations of *Lampsilis higginsii* in the Upper Mississippi, St. Croix, and Wisconsin Rivers using three segments of the mitochondrial DNA genome from 30 animals per population.
  - Make management recommendations regarding relocations of individuals among populations, specifically with regard to (a) numbers of animals to be relocated and (b) appropriate geographical sites for relocations.
  - Assess the level of genetic variability (number of alleles and percent heterozygosity) of microsatellites in a sample of *Lampsilis higginsii*.
  - Provide recommendations on utility of microsatellites for identification of individual females and determination of multiple paternity in *L. higginsii*.
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### Progress:

The Higgins' Eye Pearlymussel, *Lampsilis higginsii*, is a Federally endangered species, which is in jeopardy of extinction throughout its range, the Upper Mississippi River (UMR) and several associated tributaries. Plans for recovery of this species include a Relocation Plan submitted by the St. Paul District (MVP), Army Corps of Engineers (COE), to augment and/or create *L. higginsii* populations throughout its range. The Relocation Plan includes relocation of adult individuals and a propagation program. Information on the genetic characteristics of *L. higginsii* populations was obtained to make scientifically sound decisions regarding the numbers, localities, and logistical concerns of proposed relocations. The current project focused on surveying genetic variation at three mtDNA genes (1027 nucleotides) of *cytochrome-b*, *cytochrome c oxidase I*, and *16S rRNA* from an extensive sample of individuals (130) that are distributed throughout the range of the species. We also surveyed nuclear DNA microsatellite variation in 41 individuals, using the genetic primers developed by Eackles and King for the congener *Lampsilis abrupta*. Both the mtDNA and microsatellite analyses were completed in 2004.

### Conclusions and Recommendations:

We found a surprisingly high level of genetic variation within populations of *L. higginsii*, using both mtDNA and microsatellite DNA markers. Using mtDNA, we detected 24 genetic forms (haplotypes), which clustered into four groups (clades). Statistical analyses of the mtDNA survey indicate that *Lampsilis higginsii* does not contain genetically distinct populations in the portions of the St. Croix and Mississippi Rivers that we studied. The level of genetic variation is high in *L. higginsii*, compared with other endangered species. We found that a small number of individuals sampled contained the mtDNA form typically found in *Lampsilis siliquoidea*, a common and widespread congener that occurs in the Midwest. Similar observations have been made in other animal groups. Additional research is required to determine the cause of this finding and the implications it has for conservation of *L. higginsii*. Our survey of nuclear DNA using microsatellites included DNA of 41 individuals from several localities and from individuals that have been used in the captive propagation project. We detected between 6 and 25 alleles per locus. This high level of genetic variation at nuclear loci is consistent with the mtDNA findings. A significant deficiency of heterozygotes at most microsatellite loci appears to be due to null alleles, which would limit the utility of these microsatellite primers for studies of paternity and maternity in *L. higginsii*.

The high level of genetic variation that we detected in *L. higginsii* represents a valuable genetic resource that should be preserved in this endangered species. We recommend that when relocations occur, a large number of individuals should be used in order to preserve as much genetic variation as possible and that more than 100 females should be used in the propagation program. Even though we did not find evidence of differentiation among populations, we recommend that animals used for relocations to new populations should come from nearby sources.

# Effects of Prairie Restoration Using Fire and Grazing Regimes on the Butterfly Community of Iowa's Loess Hills

**Principal Investigator:** Diane M. Debinski  
 Rolf R. Koford  
 James R. Miller

**Student Investigator:** Jennifer Vogel (M.S.)

**Duration:** May 2004 to April 2007

**Funding Source(s):** Iowa DNR  
 U.S. Fish and Wildlife Service

## Goals and Objectives:

- Evaluate how grazing and burning management regimes affect butterfly species richness and abundance on Broken Kettle Grasslands Preserve.
  - Determine whether butterfly eggs or early instar larvae can survive a burn.
  - Assess whether *S. idalia* butterfly populations within a 0.5-5 km<sup>2</sup> area management unit within the Loess Hills prairie can recover within one or two years after a prescribed burn.
  - Provide recommendations on best management practices for prairie restoration based on the results of this study combined with relevant information from the literature.
- 

## Introduction:

The Loess Hills of western Iowa contain some the state's largest expanses of unplowed native grasslands. Many of these grasslands have historically been used as pastures and hay meadows and have experienced significant degradation and invasion of woody species.

As a part of their efforts to restore Loess Hill prairies, land managers have implemented prescribed fire as a tool to invigorate prairie plants and discourage the encroachment of woody species onto the prairies. In addition to fire, managers have used rotational grazing management regimes for many of their lands in an effort to improve them. Managing prairies with grazing can improve both plant species diversity and bird species diversity when used in a moderate grazing regime. However, some researchers have expressed concerns about the use of fire and intensive grazing on sensitive invertebrate species.

In particular, researchers have become increasingly concerned about the response of insect species to fire management in prairie remnants. Some have even suggested that local populations of these insects on fragmented preserves will not survive repeated burns conducted for management purposes. This study will determine how grazing and burning management regimes affect butterfly species richness and abundance on Broken Kettle Grasslands Preserve.

## Progress:

The first field season was completed during the summer of 2004. Butterfly surveys were conducted on 74 survey sites from June 1 to August 14. At each site, butterflies were surveyed for 30 minutes in a 50m by 50m plot on warm (21°C to 35°C), sunny (less than 50% cloud cover and between 1000 and 1830 hrs), and calm (sustained winds below 16 km/hr) days. Over 1800 individuals of 45 different butterfly species were encountered during the surveys. Data collected during the 2004 field season are currently being prepared for analyses.

## Future Plans:

Initial statistical analyses will be conducted during the winter of 2004/2005. Butterfly surveys will be continued during the 2005 field season.

## Distribution and population dynamics of bobcats in Iowa

**Principal Investigator:** William R. Clark  
**Student Investigator:** Stephanie Koehler (M.S.)  
**Collaborators:** Todd Gosselink & Ron Andrews, Iowa Department of Natural Resources  
**Duration:** July 2003 to June 2006  
**Funding Source(s):** Iowa Department of Natural Resources  
**Goals and Objectives:**

- Solidify data about the distribution of suitable habitat and the presence of bobcats throughout Iowa.
  - 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 across Iowa.
  - Determine demographic rates of bobcats in Iowa, including recruitment and survival.
  - Evaluate genetic similarity of the Iowa population in relation to potential dispersal linkages with populations in other states.
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### Progress:

**Monitoring:** In the fall of 2003, we distributed bobcat sighting post cards to Iowa DNR personnel and the general public. Since then, 174 sightings/tracks have been reported throughout Iowa. After evaluating trail cameras and considering track surveys we implemented a bow hunter diary. We mailed report cards to 8998 bow hunters prior to the 2004 bow hunting season asking hunters to record the numbers of bobcats seen per hour in the field.

**Movements and habitat use:** Within the 8 county study area (Warren, Marion, Clarke, Lucas, Monroe, Decatur, Wayne, Appanoose) we radio collared an additional 19 bobcats since October of 2003. These bobcats were captured by ISU and Iowa DNR personnel and by private trappers who had reported their captures. To date, a total of 22 bobcats have been fitted with collars and over 4,700 ground and aerial locations have been collected on these individuals. In addition, GPS collars have been recovered from 3 bobcats with a total of 373 usable locations. Preliminary estimates of winter home ranges averaged 55 sq. km (females) and 90 sq. km (males), and summer home ranges averaged 25 sq. km (females) and 65 sq. km (males). We recorded dispersal of 6 juvenile bobcats (3 females and 3 males) from February-May 2003. Bobcat dispersal movements lasted from 21-76 days. Straight-line dispersal distances ranged from 14.4-78.4 km. We have observed only 3 mortalities of radio collared bobcats (2 automobile kills and 1 incidental trapping) with an estimated annual survival for all ages and sexes of 0.81.

**Population structure:** With the help of Iowa DNR and County Conservation Offices, we have collected 120 bobcat carcasses from at least 20 counties. The cause of mortality was known for 58 of the carcasses and was classified as follows: 26% were automobile kills, 72% were incidentally trapped, and <1% were illegally shot. The carcasses were 40% female and 60% male. Age structure from these carcasses based on cementum annuli was 42 (0 yrs), 37 (1 yr), 12 (2 yr), 11 (3 yr), 4 (4 yr), 2 (5 yr), 1 (9 yr. old). We examined reproductive tracts from 48 female bobcat carcasses, dissecting ovaries and counting corpora lutea. This indicated that 22% of the yearlings had been pregnant and that 100% of the adults were actively breeding or had been bred in the past.

**Genetic analyses:** We have reviewed the literature on dispersal and genetic structure of bobcats and other felid species. We have sent samples from 142 bobcats to the Laboratory of Genomic Diversity for analyses.

### Future Plans:

In fall of 2004 and throughout the winter of 2005 we will deploy an additional 20 VHF/GPS radio collars in our primary study area in southern Iowa. Beyond routine relocation, we are focusing intensive sequential sampling on dispersing juveniles in late winter and females and kittens during the spring and summer. We are combining the telemetry locations with landscape data to examine spatial patterns and dispersal corridors using GIS. We will also continue to collect bobcat carcasses statewide. We will begin analyses of the bow hunter sighting survey.



# Landscape Ecology of Mississippi River Mussels: Multiple Scale Metapopulation Perspective in Unionid Population Biology

**Principal Investigator:** John A. Downing  
**Student Investigator:** Daelyn Woolnough (Ph.D.)  
**Collaborators:** Teresa Newton, USGS, Upper Midwest Environmental Sciences Center  
**Duration:** September 2002 to September 2005  
**Funding Source(s):** USGS, Upper Midwest Environmental Sciences Center  
**Goals and Objectives:**

- To determine whether unionid populations in the Upper Mississippi River function as metapopulations.
  - To determine whether fish host populations in the Upper Mississippi River function as metapopulations.
  - To determine whether one species of fish host could contribute to population connectivity of unionid species or if multiple species are necessary to provide connectivity of populations.
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## Progress:

A GIS database of historic mussel beds and survey sites from historic articles and maps was completed and converted into ArcGIS and ArcView layer/shape files. A total of 15 mussel beds/survey sites with area were digitized as polygons, 240 mussel beds/survey sites were digitized as lines (e.g., SCUBA line or transect survey), and 129 sites were incorporated into the GIS as point features. These sites are from Pool 10 of the Upper Mississippi River (UMR) to Pool 22 of the UMR. Author, citation, and UMR pool number were incorporated to the fields for this database and a metadata file was created to aid future users of these digitized data. These data will be used for confirmation, as a test dataset, of any connectivity trends we calculate in Pool 8.

A geo-referenced searchable database of predictor variables to be used for mussel bed conditions of the 1120 selected mussel beds in Pool 8 was created. For these beds, total species richness, species richness for selected study species, and species richness for mussels that do not normally use fish hosts were recorded as well as number of live individuals for each of these categories. Also, two categories were broken down into the 20 species that will be used in this study: number of live individuals by species and meristic data availability for these species. Area sampled, depth of sample, and gear used were also recorded for this database as well as a link to the USGS mussel database through a sample lookup number which is unique to both databases. Database notes to explain coding are also included with the database.

Two field trips to understand the protocol for the USGS fish host sampling and mussel collection in the UMR were conducted during the summer of 2004. It was decided that mussel samples using PONAR grabs would be left out of the analyses of this project due to the small sampling size of a PONAR grab and the bias this could bring to the data. The fish collection from 1993-2002 changed in 2002 in that 4 gear types were dropped from the survey protocol. It was determined that the 6 species of fish that varied significantly in numbers when the data was analyzed were not fish hosts and therefore we could use all data from 1993-2002 providing us with a full 10 year dataset.

Hypotheses were developed for this project to test the importance of host fish in structuring unionid populations and communities in large rivers. Hypotheses focus on the following parameters: overall condition of mussel beds (e.g., species richness, species abundance, and size structure in mussel beds), host fish home range, host fish abundance, diversity of host fish (i.e., specialist or generalist mussel species), proximity of mussel beds to one another, size of mussel beds, differences in connectivity to mussel beds that have mussels that do not use fish hosts to beds that do use fish hosts and the effect of grid size and extent of spatial analyses.

## Future Plans:

In the future, we will determine spatial autocorrelation of data through the use of variograms, create a host fish probability surface by using kriging analyses, and determine connectivity matrices for each fish host species. A neutral model will be created to compare the connectivity that host fish provide to the connectivity of non-host fish.

## **Avian Response to Prairie Restoration in the Loess Hills of Western Iowa**

**Principal Investigator:** James R. Miller  
**Student Investigator:** Tracy Walker (M.S.)  
**Collaborators:** Doug Harr and Bruce Ehresman, Iowa Department of Natural Resources  
**Duration:** July 2003 to September 2005  
**Funding Source(s):** Iowa Department of Natural Resources  
**Goals and Objectives:**

- Quantify vegetation response to clearing on all avian survey plots.
  - Relate avian habitat use (as measured by species occurrence/abundance) to a gradient of grassland habitat conditions, as defined by local (patch) characteristics and landscape context.
  - Estimate nest success for common grassland bird species and relate variation in nest success to local (around the nest) habitat conditions and landscape context.
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### **Progress:**

During our second field season, we continued to conduct avian surveys on the 57 plots established in 2003 at Broken Kettle Grasslands Preserve (BKG) and surrounding properties. Here we observed 47 species and, as in 2003, the Grasshopper Sparrow (*Ammodramus savannarum*) and Dickcissel (*Spiza americana*) were the most numerous. Again, grassland birds were virtually absent from Five Ridge Prairie Park. We also conducted surveys at the Loess Hills State Forest Preserve (Monona County, n=11 points), private lands at Grant Center (Monona County, n=9), Hitchcock Nature Area and surrounding private lands (Pottawattamie County, n=9), and The Nature Conservancy's Folsom Point Preserve and surrounding private lands (Mills County, n=9). A total of 92 nests were monitored at BKG, with those of the Grasshopper Sparrow most numerous (n=57), as in 2003.

### **Future Plans:**

We are now focusing on data analyses and manuscript preparation.

# **Publications and Other Activities**



# Publications and Reports

## Scientific

- Hoxmeier, R. J. H., D. H. Wahl, M. L. Hooe, and C. L. Pierce. 2004. Growth and survival of larval walleye in response to prey availability. *Transactions of the American Fisheries Society* 133: 45-54.
- Liao, H., C. L. Pierce, and J. G. Larscheid. 2004. Consumption Dynamics of the Adult Piscivorous Fish Community in Spirit Lake, Iowa. *North American Journal of Fisheries Management* 24:890-902.
- Nusser, S. M., W. R. Clark, J. Wang, and T. R. Bogenschutz. 2004. Combining data from state and national monitoring surveys to assess large-scale ecological impacts of agricultural policy. *Journal of Agricultural, Biological, and Environmental Statistics* 9(3):1-17.
- Otis, D. L. 2004. Comparison of the distribution of mallard harvest in the Mississippi and Atlantic Flyways between periods of restrictive and liberal hunting regulations. *Journal of Wildlife Management* 68:351-359.
- Phillips, M. L., W. R. Clark, S. M. Nusser, M. A. Sovada, and R. J. Greenwood. 2004. Analysis of predator movement in prairie landscapes with contrasting grassland composition. *Journal of Mammalogy* 85:187-195.
- Scott, D. P., J. B. Berdeen, D. L. Otis, and R. L. Fendrick. 2004. Harvest parameters of urban and rural morning doves in Ohio. *Journal of Wildlife Management* 68:694-700.

## Theses and Dissertations

- Kaatz, S. E. 2003. Benthic invertebrate management in plastic-lined fish culture ponds. M.S. thesis, Iowa State University, Ames. 81 pp.
- Wiewel, A. S. 2003. Assessing small mammal abundance and diversity in North Dakota grasslands. M.S. thesis, Iowa State University, Ames. 92 pp.

## Technical and Semi-Technical Reports

- Andres, B., Bart, J., Hack, M., Humberg, D., Koneff, M., Laskowski, H., Nichols, J., Otis, D., Roberson, J. 2004. Monitoring Avian Conservation: Rationale, Design, and Coordination. Prepared by: The Coordinated Bird Monitoring Working Group of the International Association of Fish and Wildlife Agencies. 30pp.
- Cox, R.R., Jr., Eadie, J.M., Otis, D.L., Reinecke, K.J. 2004. Science-based allocation of resources for waterfowl conservation in the contiguous U.S.: implications for the Migratory Bird Conservation Fund. Report to U.S. Fish and Wildlife Service MBCF Allocation Process (MAP) Team. 5pp.
- Kitchell, J.F., Grimes, C., Lindley, S.T., Otis, D.L., Schwarz, C. 2003. Report to the Adaptive Management Work Group, Glen Canyon Dam Adaptive Management Program. An Independent Review of Ongoing and Proposed Scientific Methods to Assess the Status & Trends of the Grand Canyon Population of the Humpback Chub (*Gila cypha*). 21pp.
- Loan-Wilsey, Anna, R. L. McNeely, P. D. Brown, K. L. Kane and C. L. Pierce. 2004. A comprehensive biological inventory database for the Iowa Aquatic Gap Analysis Project. Gap Analysis Bulletin No.12:2-3. USGS/BRD/Gap Analysis Program, Moscow, Idaho.

- Miller, J. R., and T. A. Walker. 2004. Avian Response to Prairie Restoration in the Loess Hills of Western Iowa. Annual Report to the Iowa Department of Natural Resources.
- Otis, D.L. 2004. Mourning Dove National Strategic Harvest Management Plan. U.S. Fish and Wildlife Service. 15pp.
- Samuel, M.D., Joly, D.O., Wild, M.A., Wright, S.D., Otis, D.L., Werge, R.W., Miller, M.W. 2003. Surveillance strategies for detecting chronic wasting disease in free-ranging deer and elk: results of a CWD surveillance workshop. USGS National Wildlife Health Center Report. 40pp.

## Posters and Papers Presented at Professional Meetings

- Bowen, B.S. 2004. The endangered *Lampsilis higginsii*: using mitochondrial and microsatellite DNA data for developing propagation and recovery plans." Invited presentation at the Conservation Genetics Workshop on Imperiled Freshwater Mollusks and Fishes, sponsored by Freshwater Mollusk Conservation Society, National Conservation Training Center, Shepherdstown, West Virginia.
- Cherko, E. C., T. W. Stewart, C. L. Pierce, and D. D. Stokke. 2004. Potential of recycled fishing line as fish habitat: effectiveness of different formulations based on invertebrate colonization (poster). Iowa Academy of Science annual meeting, Cedar Falls, Iowa.
- Clark, W. R. and T. R. Bogenschutz. Simulating the effects of the buffer initiative on ring-necked pheasants in Iowa landscapes. Presented at the 64th Midwest Fish and Wildlife Conference, Kansas City, Missouri.
- Frohauer, N. K., C. L. Pierce and L. W. Kallemeyn. Simulating long-term threats to muskellunge in Shoepack Lake, Voyageurs National Park, Minnesota (contributed paper). American Fisheries Society, Madison, Wisconsin.
- Heitke, J. D. C. L. Pierce, G. T. Gelwicks and G. A. Simmons. Fish assemblage, habitat and land cover relationships in Iowa streams: biotic and abiotic conditions in the context of intensive agricultural land use (invited symposium talk). American Fisheries Society, Madison, Wisconsin.
- Jain, A., R. Koford, A. Hancock, and G. Zenner. 2003. Bird and bat mortality at a northern Iowa windfarm: preliminary results. Midwest Fish and Wildlife Conference, Kansas City, Missouri.
- Koford, R.R., and D.J. Horn. 2004. Landscape composition influences the relationship between relative abundance of grassland birds and field size. North American Prairie Conference, Madison, Wisconsin
- Kring, L. M. and J. E. Morris. 2004. Channel Catfish Culture in Midwestern Plastic-Lined Ponds, Annual meeting of the American Fisheries Society, Madison, Wisconsin.
- Kring, L. M. and J. E. Morris. 2003. Channel Catfish Culture in Midwestern Plastic-Lined Ponds, Annual meeting of the Nebraska Aquaculture Association, Kearney, Nebraska.
- Loan-Wilsey, Anna K., R. L. McNeely, P. D. Brown, K. L. Kane and C. L. Pierce. 2004. A statewide stream fish community database for biological assessment (invited poster). Iowa Water Monitoring Conference, Ames, Iowa.
- Loan-Wilsey, Anna K., R. L. McNeely, P. D. Brown, K. L. Kane and C. L. Pierce. A statewide stream fish community database for biological assessment (poster). Ecological Society of America, Portland, Oregon.
- Miller, J. R., and T. A. Walker. Response of grassland birds to prairie restoration in the Loess Hills, Iowa. Iowa Department of Natural Resources Wildlife Bureau Statewide Meeting, Springbrook Conservation Education Center, Guthrie County Iowa.

- Otis, D.L. and G. C. White. 2003. Evaluation of ultrastructure and random effects band recovery models for estimating relationships between survival and harvest rates in exploited populations. Euring Technical Meeting 2003, Radolfzell, Germany.
- Patterson, S.S., and R. R. Koford. 2004. DISTANCE analysis: a look at variation in species behavior and differences in observer ability. Cooper Ornithological Society, La Crosse, Wisconsin.
- Pierce, C.L., M.A. Pegg, P.J. Braaten, and C.S. Guy. Growth of channel and flathead catfish in the Missouri and lower Yellowstone Rivers (invited symposium talk). Midwest Fish & Wildlife Conference, Kansas City, Missouri.
- Spencer, R. J., and W. R. Clark. Testing a theoretical model of nest site selection in turtles and water birds. Presented at Society for Integrative and Comparative Biology, New Orleans, Louisiana.
- Tessin, D.H., W.R. Clark, P.M. Dixon, and D.W. Howerter. Spatial analysis of nest location and predation event point patterns. 3rd North American Duck Symposium, Sacramento, California.
- Weidner, J. A., C. L. Pierce, G. T. Gelwicks, and G. A. Simmons. Relationships of fish communities and availability of deep-water habitat (poster). American Fisheries Society, Madison, Wisconsin.
- Wiewel, A. S., W. R. Clark, and M. A. Sovada. Associations between small mammal populations and vegetation characteristics in the Northern Great Plains. Presented at the 64th Midwest Fish and Wildlife Conference, Kansas City, Missouri.
- Woolnough, D.A. Downing, J.A. and T. Newton. May 2004. Metapopulation characteristics of unionid communities in the Upper Mississippi River. North American Bethological Society 52nd Annual Meeting. Vancouver, British Columbia, Canada.

## Service

### *Graduate Committee Assignments*

- Alex Piel - Masters (Koford)
- Embere Hall - Masters (Otis)
- Haishin Ozawa - Masters (Otis)
- Tricia Knoot - Masters (Koford)
- Andrew Fowler - Masters (Pierce)
- Daelyn Woolnough - PhD (Pierce)
- Dusan Palic - PhD (Pierce)
- Edward Klimksiek - Masters (Koford)
- Finn Pillsbury - Masters (Otis)
- Leanne Martin - Masters (Koford)
- Ling Huang - Masters (Otis)
- Lisa Potter - Masters (Koford)
- Paul Colbert - Masters (Otis)
- Pencheng Lu - PhD (Otis)
- Rich Leopold - Masters (Pierce)
- Russ Powers - Masters (Otis)
- Sara Kaatz - Masters (Pierce)
- Stephanie Koehler - Masters (Koford)
- Tanya Pereira - Masters (Pierce)

### *Courses Taught*

- Restoration Ecology AEcl 535 (Koford - 3 hrs, 8 students, 2003/08/19 to 2003/12/12)
- Restoration Ecology A Ecl 535 (Koford - 3 hrs, 8 students, 2004/08/19 to 2004/12/14)
- Stream Ecology A Ecl 518 (Pierce - 3 hrs, 15 students, 2004/01/10 to 2004/05/05)

### *University Committees and Workgroups*

- Chair, Department Graduate Curriculum subcommittee (Otis)
- Chair, Department Safety and Facilities committee (Van Beek)
- Chair, Errington Lecture committee (Otis)
- Member, Department Awards committee (Van Beek)
- Member, Department Chair Search committee (Otis)

- Member, Department Chair Search committee (Van Beek)
- Member, Department Computer Facilities committee (Van Beek)
- Member, Department Safety and Facilities committee (Pierce)
- Member, Errington Lecture committee (Koford)
- Member, Errington Lecture committee (Van Beek)
- Member, Fish Biologist Faculty Search committee (Pierce)
- Member, Governing Committee, Program in Ecology and Evolutionary Biology (Otis)
- Member, Graduate Admissions committee (Otis)
- Member, Stream Ecosystem Ecologist Faculty Search committee (Pierce)
- Member, University Professional & Scientific Council; Vice President 2003-2005 (Van Beek)
- Member, Wildlife Ecologist Faculty Search committee (Otis)

#### *Invited Seminars*

- Population Models in Support of Harvest Management of Mourning Doves, University of Arkansas 2004/04/19 (Otis)

#### *Non-Society Memberships*

- Member, Working Group, Mourning Dove Strategic Planning Committee (Otis)
- USGS representative to the Mississippi Flyway Technical Committee (Otis)

#### *Society Involvement - Committees*

- Member, 2005 Program Committee for Annual Meeting of the The Wildlife Society (Otis)

#### *Society Involvement - Memberships*

- American Fisheries Society (Pierce)
- American Ornithologists' Union (Koford)
- American Society of Mammalogists (Koford)
- Biometric Society (Otis)
- Cooper Ornithological Society (Koford)
- Ecological Society of America (Koford)
- Ecological Society of America (Otis)
- Sigma Xi (Koford)
- Society for Conservation Biology (Koford)
- Society for Ecological Restoration (Koford)
- The Wildlife Society (Koford)
- The Wildlife Society (Otis)

#### *Society Involvement - Officer*

- President, The Wildlife Society Iowa Chapter (Koford)
- Executive Board Member-at-Large, Iowa Chapter, The Wildlife Society (Otis)

#### *Technical Assistance/Outreach*

- Served on expert panel of quantitative ecologists and fisheries biologists to provide advice on population parameter estimation protocols for management of endangered fish in the Colorado River (Otis)
- Served on expert ad hoc team asked to provide guidance to IAFWA, USGS, FWS on protocols for Coordinated Bird Monitoring in North America (Otis)
- Served on expert panel of waterfowl biologists to review and make recommendations to USFWS regarding allocation process for Migratory Bird Conservation Funds (Otis)

- Provided data sets, reports and published articles to Iowa Department of Natural Resources Aquatic Education Program for development of an interactive aquatic education (grades 4-8) package titled, “Corridors of Exploration: Iowa's Rivers.” (Pierce)

## Awards

At the Iowa Ornithologists' Union fall meeting in Crescent, IA on October 11, 2003, Jim Dinsmore presented Shane Patterson with the IOU's student scholarship award. The honor is given to individuals who have demonstrated academic aptitude and a genuine interest in the study of ornithology and avian conservation. As part of the award, a total of approximately \$100 was allocated for registration, meals, and lodging at the IOU's fall meeting. A one-year membership extension in the IOU was also granted as part of the honor.

At the Iowa Ornithologists' Union (IOU) 2004 spring meeting on May 15, 2004 in Village Creek, IA, Sharon Stilwell presented Shane Patterson with the IOU's student scholarship award. This honor is bestowed upon individuals who have demonstrated academic aptitude and a genuine interest in the study of ornithology and avian conservation. The award included \$55.00 to defray the costs of registration, meals, and lodging at the spring meeting. Patterson, now a two-time recipient of the accolade, also received another one-year membership extension in the IOU.

Tracy Walker, unit-affiliated student, has distinguished herself with several awards in the past year:

- J. E. Weaver Competitive Grant. 2004. The Nature Conservancy - Nebraska Chapter. (\$1,000)
- LaVon Tostenson Scholarship. 2004. Department of Natural Resource Ecology and Management, Iowa State University. (\$800)
- Student Membership Award. 2004. Three-year full membership in the American Ornithologists' Union and complementary subscription to *The Auk*. American Ornithologists' Union.
- Frances M. Peacock Scholarship. 2004. Garden Club of America and Cornell Lab of Ornithology. (\$4,000)

## News

In October 2003, Steve Cordts (MS 1999) moved from Texas to Bemidji, Minnesota, to assume a position as Waterfowl Specialist with the Minnesota Department of Natural Resources.

Upon graduation, Sarah Kaatz accepted a position as limnologist with the Hygienic Laboratory, University of Iowa, Coralville.

Hongsheng Liao (PhD 2001) was hired in August 2004 as Lab Manager of the Center for Quantitative Fisheries Ecology at Old Dominion University in Norfolk, Virginia.

Andy Wiewel is now a contract employee of the U.S. Geological Survey, working in Guam as the small mammal biologist on the brown tree snake project.





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