Annual Report
2003
ARKANSAS COOPERATIVE
FISH AND WILDLIFE
RESEARCH UNIT
The Unit is a Cooperative Program of the:

US Geological Survey
Arkansas Game and Fish Commission
University of Arkansas
Wildlife Management Institute
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INTRODUCTION

The Arkansas Cooperative Fish and Wildlife Research Unit first opened its doors in August 1988 as one of four units initiated that year, and one of 43 coop units across the country associated with Land Grant universities, state game and fish agencies, Wildlife Management Institute, and the U.S. Geological Survey, Biological Resources Division. The purpose of these units is to train graduate students in scientific methods of fish and wildlife management, conduct fish and wildlife research, and provide technical assistance.

Over the past 15 years the Arkansas Coop Unit has gone through a number of changes. The federal cooperator changed from the U.S. Fish and Wildlife Service to the National Biological Survey to National Biological Service and finally to U.S. Geological Survey. The University department changed from Zoology to Biological Sciences and combined with Botany and Microbiology. We have seen seven Departmental Chairs (Amlaner, Geren, Kaplan, Talburt, Rhoads, Roufa, and Davis), and four Assistant Unit Leaders move on to other coop or university positions (Annette, Martin, Griffith, Kwak) and one Unit Leader retire (Johnson).

Past research efforts have been broadly funded by state agencies (Arkansas Game and Fish Commission, Louisiana Wildlife and Fisheries, Mississippi Museum of Science), federal agencies (U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, National Park Service), and non-government organizations (Ducks Unlimited, Rocky Mountain Elk Foundation, Arkansas Audubon Society Trust, Sigma Xi). These funded projects have resulted in many scientific articles. Unit leaders have taught 6 classes in fisheries and wildlife, and produced 8 workshops to natural resource agencies.

In 1999, the Unit was reformed under a new Unit Leader, David Krementz, and soon thereafter 2 new Assistant Unit Leaders were hired, Dan Magoulick (fisheries) and Bill Thompson (wildlife). With the full support of all cooperators, this new team has begun a new era at the Arkansas Coop Unit. The opportunities that exist in Arkansas for the Unit at this time are many and exciting. With the cooperation of all parties, the new Arkansas Coop Unit will excel in producing quality graduate students, solid research and supportive technical assistance.
MISSION STATEMENT

The mission of the Arkansas Cooperative Fish and Wildlife Research Unit is to conduct programs of research, graduate education, and technical assistance that address the needs of the State of Arkansas, the region, and the nation. Research programs will pursue both basic and applied scientific questions that are relevant to the management of fish, wildlife, and their habitats. Research topics will be pursued according to Cooperator priorities, availability of collaborative expertise from Cooperators, and funding opportunities.

The educational mission of the Unit shall focus on graduate and post-graduate students. Activities will include teaching of formal graduate-level classes, chairing and serving on advisory committees, mentoring the professional development of students, and participation by Unit scientists in academic programs of the University of Arkansas. Students should be educated to prepare for advancement in broad areas of natural resource management and to serve as future leaders of resource management in the State of Arkansas. Educational programs of the Unit will be consistent with the professional standards and hiring practices of the Cooperators, similar agencies elsewhere, and relevant professional societies involved with natural resource management.

Technical assistance will be provided to Unit Cooperators in the areas of scientific expertise of the Unit. This can include assistance with interpretation of data, preparation and review of experimental designs, identification of specific research voids or needs, and rendering professional judgment. Such activities will generally serve to link the scientists’ previously established expertise to specific needs of the Cooperators or other related agencies.
### PERSONNEL AND COOPERATORS

#### COORDINATING COMMITTEE MEMBERS

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<tr>
<th>US GEOLOGICAL SURVEY</th>
<th>AR GAME AND FISH COMMISSION</th>
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<tbody>
<tr>
<td>Dr. Mike Van Den Avyle</td>
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<tr>
<th>UNIVERSITY OF ARKANSAS</th>
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<tr>
<td>Dr. Collis R. Geren, Dean Graduate School (Official Representative on Coordinating Committee)</td>
<td>Donald F. McKenzie Southeast Field Representative</td>
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Diane Moler
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POST-DOCTORAL ASSISTANT

Dr. Kirsten LeMar
CURRENT GRADUATE STUDENTS

Bret Collier (Ph.D., Wildlife – Krementz)
Sarah Coulter (M.S., Wildlife – Krementz)
Matthew Dekar (M.S., Fisheries – Magoulick)
Robert Doster (Ph.D, Wildlife – Krementz)
Shawn Hodges (M.S., Fisheries – Magoulick)
Jason Luscier (M.S., Wildlife – Thompson)
Nicholas Myatt (M.S., Wildlife – Krementz)
Michael Rabalais (M.S., Fisheries – Magoulick)
Nora Schubert (M.S., Wildlife – Krementz)
Mandy Scott (M.S., Fisheries – Magoulick)
Chris Bare (M.S., Fisheries – Magoulick)

RECENTLY GRADUATED GRADUATE STUDENTS

Amy Clifton - M.S (Krementz) Employed by USGS Kansas Cooperative Fish & Wildlife Research Unit.
Andrew James - M.S. (Krementz) Employed by Arkansas Game & Fish Commission.
Sarah Lehnen - M.S. (Krementz) Unemployed.
Frankie Loncarich - M.S. (Krementz) Employed by USGS Kansas Cooperative Fish & Wildlife Research Unit.
Benjamin Thatcher - M.S. (Krementz) Pursuing a Ph.D. at University of Tennessee – Knoxville.

UNDERGRADUATE ASSISTANT

Andrea Marston

TECHNICIANS

John Denton - Canada Goose
Rose Ann Barnhill - Grassland Birds
Jace Milliken - Grassland Birds, Camden Deer
Cora Morris - Grassland Birds
Nora Schubert - Grassland Birds
Sarah Spurrier - Grassland Birds
Scotty Winningham - Camden Deer
Kathy Kontio - Forest Birds
James MacDonald - Forest Birds
Michael Chambless - Forest Birds
Sunny Brogan - Fish Assemblages
LaDarrius Strong - Fish Assemblages
Andy Lowery - Fish Assemblages
Arkansas Coop Unit – March 2004
Missing from photo – Bret Collier, Robert Doster, Sarah Lehnen, Mandy Scott, Jason Luscier, Kirsten LeMar
RESEARCH AND FACULTY COLLABORATORS

Dr. Steven Beaupre – Department of Biological Sciences – University of Arkansas
Dr. Dave Evans – Department of Biological Sciences – University of Arkansas
Dr. Johnnie Gentry – Director of Museum – University of Arkansas
Dr. Jim Peterson – Water Resources Division - USGS
Dr. Larkin Powell – School of Natural Resource Sciences – University of Nebraska
Dr. Kim Smith – Department of Biological Sciences – University of Arkansas
Dr. Fred Stephen – Department of Entomology – University of Arkansas
Dr. Robert Weih – School of Forest Resources, University of Arkansas – Monticello
Dr. Don White, Jr - School of Forest Resources, University of Arkansas-Monticello
Mr. F. Broermann – U. S. Fish and Wildlife Service - Alaska
Sam Lail – Buffalo National River, National Park Service
David Mott – Buffalo National River, National Park Service
Dr. Bruce Rieman, USDA Forest Service, Boise, ID
Mr. Steve Rosenstock, Arizona Game and Fish Department, Phoenix
Dr. Vickie Saab, USDA Forest Service, Bozeman, MT
Mr. Mike Cartwright, Arkansas Game and Fish Commission, Calico Rock
Mr. Jon Dudley, USDA Forest Service, Boise, ID
Mr. Aaron Ellingson, Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins
Dr. Tom McMahon, Department of Ecology, Montana State University, Bozeman
Mr. Russ Norvell, Utah Division of Wildlife Resources, Salt Lake City
Dr. Cecil Rich, Alaska Department of Fish and Game, Anchorage
COMPLETED PROJECTS
Population Status and Distribution of Resident Canada Geese in the Western Arkansas River Valley, Arkansas

Funding Source: Arkansas Game and Fish Commission; U. S. Geological Survey, Biological Resources Division; U. S. Geological Survey, Arkansas Cooperative Fish and Wildlife Research Unit; Arkansas Audubon Society Trust

Project Duration: September 2000 to December 2002

Principal Investigator: DAVID G. KREMENTZ

Graduate Research Assistant: R. ANDREW JAMES (M.S. Student)

Research Objectives:

1. Determine method to estimate population of giant Canada geese in Arkansas.
2. Determine feasibility of estimating survival rates for giants that nest in Arkansas.
3. Evaluate the potential vulnerability of giants to hunting.

Management Implications:

1. Standardize methods for managing resident Canada goose populations.
2. Supply quantifiable documentation needed to support changes in existing Canada goose hunting regulations.

Project Summary:

In 1981, the Arkansas Game and Fish Commission began the reintroduction of giant Canada geese into the Western Arkansas River Valley, Arkansas. This population has steadily increased in numbers and dispersed throughout the state of Arkansas. Although much time and money
were spent reintroducing the geese to Arkansas, little research has been conducted to assess
distribution and quantify the population status. The goals of this research were: (1) to determine
a method to estimate the population size of giant Canada geese in the Western Arkansas River
Valley, Arkansas, and throughout the state; (2) to determine the feasibility of measuring survival
rates for giant Canada geese that nest in the Western Arkansas River Valley, Arkansas; and (3) to
evaluate the potential vulnerability of giant Canada geese from river, rural, and urban flocks in
the Western Arkansas River Valley, Arkansas to hunting.

Over the past 2 years, we banded and collared 2,500 geese in the Western Arkansas River
Valley, Arkansas. We used resightings of these neck-collared geese: 1) to estimate population
numbers in the study area, 2) to track goose movements, and 3) to determine the vulnerability of
geese from different areas of the river valley to hunting pressure. We obtained banding and
recovery data for Arkansas from the Bird Banding Laboratory, Laurel, MD to estimate survival
rates of Arkansas geese as well as survival rates of resident geese from surrounding states.

We also investigated the dispersal of Giant Canada geese to determine if dispersal was adding
to nuisance goose problems. We conducted a series of modeling exercises on Canada goose
dispersal information from nearby states. Factors affecting dispersal distances varied little among
regions and most geese were recovered at or near banding locations. This information implies
that populations in one region are not influencing populations in another through philopatric
movements, emigration, or immigration.
Survival and Movements of Greater Prairie-Chickens in the Flint Hills of Kansas

Funding Source: Northern Prairie Wildlife Research Center
Project Duration: March 2001-June 2002
Principal Investigator: DAVID G. KREMENTZ
Graduate Research Assistant: FRANKIE L. LONCARICH (M.S. Student)

Research Objectives:

1. Estimate greater prairie-chicken survival rates and compare survival rates across burning treatments
2. Document movements of greater prairie-chickens and determine if movements were dependent on burning and grazing treatments

Project Summary:

The Flint Hills region of Kansas is one of the last strongholds of the greater prairie-chicken (*Tympanuchus cupido*). However, recent changes in burning regimes and grazing practices may have caused declines in prairie-chicken populations there. We sought to document and compare survival rates and movements of greater prairie-chickens between different burning and grazing treatments in the Flint Hills. Research for this study was finished in June 2002 and an MS thesis has been completed.

Overall male survival during the breeding season 2002 was 0.73 (95% CI = 0.52 - 0.87). While the model incorporating burning had strong support, 2 other models also had strong support; therefore, we found little evidence suggesting spring burning negatively influenced male breeding season survival rates during 2002.

During the breeding season 2002 we found that burning and grazing had some impact on prairie-chicken movements but that other unaccounted for factors were also important. Home range analysis revealed that males showed strong fidelity to areas near booming grounds (< 500 m from ground) and that individual male booming ground flocks rarely overlapped. Additionally, males in burned areas were usually found in small, unburned patches of vegetation after the burn.

We recommend that land managers burn only 1/3rd to 1/4th of the individual pastures annually to leave sufficient unburned vegetation for escape and loafing cover. We also suggest that areas within 500 m of a booming ground be left unburned but booming grounds should be maintained in short vegetation through grazing.

One manuscript has been submitted and 2 others are in preparation.
Greater Prairie-Chicken Populations in Chase County, Kansas

Funding Source: Northern Prairie Wildlife Research Center
Principle Investigator: DAVID KREMENTZ
Graduate Research Assistant: AMY CLIFTON (M.S. Student)

Research Objectives:

1. The objective of this project is to provide a reliable population estimate for Greater Prairie-Chickens that could be used to detect population trends since traditional survey methods are faulty.

Management Implications:

1. Habitat management effects could be monitored by accurately measuring population trends of Greater Prairie-Chickens.

Project Summary:

Monitoring for greater prairie-chickens (Tympanachus cupido pinnatus) indicate that populations are declining. Population monitoring of grouse is based on traditional lek surveys that do not provide a population or density estimate since detectability and area of use are not estimated. Estimators, such as the joint maximum likelihood estimator from a hypergeometric distribution (JHEIE), can account for detectability and provide a reliable population estimate based on resightings. We used radio-telemetry to evaluate mark/resight surveys to estimate population sizes of chickens at 2 tallgrass prairie sites in Kansas. The population estimates were 54 (CI 50-59) on 529 km² and 87 (CI 82-94) on 736 km². The traditional lek surveys performed at the same sites resulted in populations ranges of 18-38 and 46-65 and always produced a lower population index with more variable results. We ran simulations with varying male:female ratios of marks that indicated this ratio was important in designing a population study on chickens. CIs for estimates when only males were marked at the 2 sites (CI 46-50, 76-84) did not overlap with CIs when 60% of males were marked (54-64, 91-109). The population estimate derived from this mark/resight technique is more accurate than traditional methods and would be more effective in detecting changes in prairie chicken populations.
Impacts of Prescribed Burns on Henslow’s Sparrow (*Ammodramus Henslowii*) Winter Home Range and Survival in Coastal Pine Savanna Habitats

**Funding Sources:**
- U.S. Fish and Wildlife Service,
- Arkansas Game and Fish Commission,
- Mississippi Museum of Natural Science,
- Arkansas Audubon Society Trust,
- Sigma Xi

**Project Duration:**
- 1 December 2000 to 1 December 2002

**Principal Investigator:**
- DAVID G. KREMENTZ

**Graduate Research Assistant:**
- BENJAMIN S. THATCHER (M.S. Student)

**Research Objectives:**

1. To estimate survival rates and home range sizes of wintering Henslow’s Sparrows
2. To investigate the effects of cool season and warm season prescribed fires on survival and movements of wintering Henslow’s Sparrows

**Management Implications:**

1. To adjust prescribed burning regimes on Mississippi Sandhill Crane National Wildlife Refuge and similar coastal habitats.

**Project Summary:**

Large numbers of Henslow’s Sparrows winter within the fire-dependent savannas of the Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR), Jackson County, MS. The MSCNWR is managed with both prescribed growing season and dormant season fires, but the effects of this fire management regime on wintering Henslow’s Sparrow populations is not well known. Our primary objectives were to determine the effects of prescribed fire seasonality and frequency on wintering Henslow’s Sparrow movement patterns, home range sizes, and survival rates. Fieldwork was conducted within wet pine savanna study plots during January and February of 2001 and 2002. Study plots represented treatment types differing in the age (1 or 2 growing seasons elapsed; hereafter age1 or age2) and season (growing, dormant) of last fire, and in the
year they were monitored (2001, 2002). Henslow’s Sparrows (n=94) were target mist-netted, fitted with radio transmitters, and monitored daily. We used known-fate modeling in the program MARK to analyze Henslow’s Sparrow survival data. Important factors in Henslow’s sparrow survival included burn-age (with higher survival in recently burned sites) and the year the study was conducted (with lower survival in 2001 likely due to drought conditions), whereas the season of burn was not an important factor. We determined daily movements and used the Animal Movement Extension in ArcView to calculate 95% fixed kernel home range sizes for 42 Henslow’s Sparrows that met minimum sample size requirements (n ≥ 18 locations). We detected no differences in daily movements or home range sizes resulting from burn season or burn age. We found that Henslow’s Sparrow daily movements (2001: 25.82 m + 0.42; 2002: 13.79 m + 0.22) and 95% fixed kernel home range sizes (2001: 0.74 ha + 0.17; 2002: 0.37 ha + 0.07), were larger in 2001 than in 2002, likely due to drought conditions. Our results indicate that recently burned (1 growing season elapsed) savannas provide high quality wintering habitats, and suggest that managers can improve conditions for wintering Henslow’s sparrows by ensuring that a large percentage of savannas are burned each year. The absence of detectable burn season effects on survival, home range size, and daily movements suggests that managers can use both growing- and dormant-season burns to maintain Henslow’s Sparrow winter habitats. However, winter burning temporarily eliminates herbaceous cover and may therefore negatively impact Henslow’s Sparrows by forcing them to disperse from established home ranges. One manuscript has been submitted and another is in preparation.
A color-marked least sandpiper at Yazoo National Wildlife Refuge, Mississippi.

Turnover Rates of Pectoral and Least Sandpipers During Fall Migration in the Lower Mississippi Alluvial Valley

Funding Source: U. S. Fish and Wildlife Service, Ducks Unlimited, Mississippi Cooperative Fish and Wildlife Research Unit, Arkansas Game and Fish Commission

Project Duration: July 2001 to August 2003

Principal Investigator: DAVID G. KREMENTZ

Graduate Research Assistant: SARAH E. LEHNEN (M.S. Student)

Research Objectives:


Management Implications:

1. Turnover rate estimates will be used to estimate shorebird use days during fall migration in the Lower Mississippi Alluvial Valley.

2. Turnover rates will be used in estimating the amount of shorebird habitat required for fall migrating shorebirds in the LMAV.

Project Summary:

Turnover rate is the average length of time that a sandpiper remains within the LMAV during fall migration, whereas stopover duration is the average length of time that a migrating sandpiper remains at 1 stopover site. Based on these definitions, turnover rate = stopover duration × number of sites used in the LMAV. We estimated stopover durations for migrating least and pectoral sandpipers at five sites in the Lower Mississippi Alluvial Valley (LMAV) during Fall 2001 and 2002. We used length-biased sampling and program DISTANCE to estimate stopover duration for 106 pectoral sandpipers radio-marked during Fall 2001 and 2002. For least sandpipers, we individually color-marked and resighted 293 least sandpipers and then used Pradel’s recruitment models to estimate time at site before capture and apparent survival models.
to estimate time at site after capture. We used QAICc ranking in program MARK to select the best models for time at site before and after capture. Using program SODA, we used these models to generate estimates of stopover duration at each site. Our estimates of stopover duration for pectoral sandpipers in the LMAV were 7.4 days (95% CI = 5.6-9.7) during Fall 2001 and 12.7 days (95% CI = 10.9-14.7) during Fall 2002. For least sandpipers, our estimates of stopover duration were 8.5 days (95% CI = 5.0-12.8), at Bald Knob NWR, Arkansas, 12.8 days (95% CI = 10.0-15.9) at Yazoo NWR, Mississippi, and 21.0 days (95% CI = 16.0-27.9) at Morgan Brake NWR, Mississippi, during Fall 2002. We decided on 10-15 days as a reasonable estimate of stopover duration for fall migrating sandpipers in the LMAV. Based on radio-marked pectoral sandpipers relocated during Fall 2002, many pectoral sandpipers used ≥ 2 stopover sites in the LMAV. Assuming that most shorebirds use 2 stopover sites in the LMAV, we estimated the turnover rate in the LMAV during fall migration to be 20 – 30 days. This turnover rate estimate is greater than the 10-day turnover rate that was used by the LMAV Joint Venture Migratory Bird Science Team to model shorebird migration, indicating that more shorebird habitat may be required in the LMAV during fall migration. Two manuscripts are in preparation.
CURRENT PROJECTS
The Ecology of Bull Elk in Arkansas

Funding Source:
AR Game and Fish Commission,
Rocky Mountain Elk Foundation,
University of Arkansas-Monticello,
National Park Service

Project Duration:
January 2003 to December 2006

Principal Investigators:
DON WHITE, JR., School of Forest Resources,
University of Arkansas-Monticello, Monticello, AR
MICHAEL E. CARTWRIGHT, Arkansas Game and
Fish Commission, Calico Rock, AR,
WILLIAM L. THOMPSON, USGS Arkansas
Cooperative Fish and Wildlife Research Unit,
ROBERT C. WEIH, JR., School of Forest Resources,
University of Arkansas-Monticello, Monticello, AR, and
SAM LAIL, Buffalo National River, National Park
Service, Harrison, AR

Research Objectives:
1. Develop a landcover map for the Buffalo River watershed
2. Evaluate the feasibility of various bull elk capture techniques
3. Estimate age-class specific movement and dispersal patterns and rates, seasonal home range sizes, and habitat use of bull elk
4. Estimate age-class specific survival rates and causes of mortality of bull elk
   Assess the health and physical condition of bull elk
5. Develop a GIS model to predict the location of bull elk in the Buffalo River watershed

Management Implications:
1. Results will be used to develop management recommendations for maximizing bull elk condition, productivity and survival in the Buffalo River area
Project Summary:

Thirty-five bull elk (11 yearlings and 24 adults) were captured 18-20 February 2003, by net gunning (24 bulls) or darting (11 bulls) from a helicopter on the Buffalo National River and adjacent state and private lands in northern Arkansas. Immediately after capture, 6 elk ≥1.5-years-old were fitted with either collars containing Global Positioning Systems (hereafter called GPS collars) and 29 animals were fitted with VHF transmitters. Each GPS collar was equipped with a time-controlled, drop-off mechanism that will allow recovery of the collar without capturing the animal. Each GPS collar also was equipped with a VHF tracking beacon to permit relocations of radio-marked elk from the ground or from aircraft and, eventually, for retrieval of collars. The GPS collars were programmed to record geographic position at 6-hour intervals. Such detailed relocation data is needed to understand movement rates, diel habitat use, to map travel corridors, and for detailed home range analysis. We collected chest girth measurements, a canine tooth, a 20 cc blood sample, ticks, and rectal temperature from captured each elk before its release. The mean number of antler points among the adult bulls captured was 4.7 (left) and 4.6 (right).

Elk locations have been obtained from rotary-wing aircraft from flights conducted weekly during daylight hours since March 2003. To date, 6 collared bull elk have died. Three were legally harvested and 3 were found dead (probably illegally killed). Two collars fell off, probably due to fighting among bulls during the rut. Time and cause of mortality have been determined with a mortality indicator switch located in the radiocollars.
Evaluation of a Mark-resight Technique for Estimating
White-tailed Deer Abundance in Arkansas

Funding Source: Arkansas Game and Fish Commission
Project Duration: November 2002 to June 2005
Principal Investigator: WILLIAM L. THOMPSON
DAVID G. KREMENTZ
Post-doc KIRSTEN LeMAR

Research Objectives:

1. Evaluate a mark-resight method for estimating deer numbers for possible use by AGFC to intensively monitor deer population trends within select areas of Arkansas.
2. Estimate survival rates, movement rates, habitat use, and home range size of white-tailed deer near Camden, Arkansas.

Management Implications:

1. Provides a reliable means to monitor local and statewide deer populations, which would be important information for managing white-tailed deer in Arkansas.

Project Summary:

Management of the white-tailed deer population by the Arkansas Game & Fish Commission (AGFC) requires information about demographics, habitat use, movements and estimates of population abundance. Population abundance estimates of deer are not easily acquired because of; the secretive nature of deer, the wide range of habitat types found throughout Arkansas, reliance on ad hoc methods, and little free time to conduct surveys by AGFC field personnel. Most state agencies in the Southeast rely on roadside spotlight counts as an index for monitoring deer populations. However, these counts underestimate deer abundance by some unknown amount, which varies across habitats and time. Further, these counts cannot be properly extrapolated beyond surveyed areas adjacent to roads. Thus, reliability of counts obtained via spotlight surveys for
monitoring deer populations is questionable at best. Therefore, we will evaluate the usefulness and feasibility of a mark-resight method for estimating white-tailed deer abundance within a private hunting club near Camden, Arkansas. We initiated capturing and marking deer in summer 2003. Through winter 2003, only 5 deer were marked. Capturing deer has proven difficult despite trying a number of different methods. We are continuing to experiment with new methods of capturing deer.
The Importance of Lower Mississippi River Alluvial Valley Reforestation and Wetland Restoration Sites to Wintering Migratory Birds

**Funding Sources:**  
U.S. Fish and Wildlife Service,  
U.S. Geological Survey, Biological Resources Division

**Project Duration:**  
September 1999 – May 2004

**Principal Investigator:**  
DAVID G. KREMENTZ

**Graduate Research Assistant:**  
ROBERT H. DOSTER (Ph.D. Student)

**Research Objectives:**

1. Determine the species composition and population density of migrant birds wintering in and utilizing early-successional vegetation sites in the Lower Mississippi River Alluvial Valley.
2. Characterize the vegetation in early-successional fields and model the relationship between habitat characters and bird species richness and abundance.
3. Focus on two wintering grassland bird species of conservation concern (Sedge Wren and Le Conte’s Sparrow) by describing their specific wintering habitat requirements for purposes of conservation management.
4. Determine the breeding origin of selected bird species wintering in the Lower Mississippi River Alluvial Valley, through analysis of stable isotopes incorporated in feathers, for use in conservation planning between breeding and wintering sites.

**Management Implications:**

1. Compare management and landscape attributes between study sites and determine which management regime is most beneficial to the greatest number of species and to those species that are in particular need of conservation attention.
2. Formulate management recommendations based on research objectives for the purpose of a region-wide conservation strategy aimed at providing optimal wintering habitat for the greatest number of short-distance migrant bird species.

**Project Summary:**

Significant efforts to restore bottomland hardwood forests and associated wetlands have been undertaken throughout the Lower Mississippi River Alluvial Valley (LMAV) in recent years. These restoration activities have resulted in large acreages of early-successional habitats.
throughout the region. Early-successional habitats are utilized by a number of grassland bird species as winter refugia. Considering that grassland birds, as a whole, are experiencing population declines and in view of the fact that little research has been done on their winter ecology, we are investigating the role that these restored habitats within the LMAV play for this group of birds. In total, 69 sites throughout the LMAV of Arkansas, Louisiana and Mississippi were surveyed in winter 2000, 2001 and 2002 for bird species richness, abundance and distribution. Associated measurements of vegetation structure were also collected for all sites. In addition, species-specific habitat measurements were made for two species of conservation concern within the region: Sedge Wren (*Cistothorus platensis*) and Le Conte’s Sparrow (*Ammodramus leconteii*). Analysis of the resulting population data for all sites and bird species, the relationship of vegetation structure and landscape parameters, and the specific winter habitat preferences of species of concern are nearing completion.

*Habitat measurements of grasslands on Wetland Reserve Program land in Woodruff County, Mississippi*
The Influence of Land Use, Flow Regime and Habitat Variability on the Fish Assemblage Structure of Arkansas Ozark Streams

Funding Source: National Park Service  
Project Duration: 1 July 2002 to 31 July 2004  
Principal Investigator: DANIEL D. MAGOULICK  
Graduate Research Assistant: MANDY SCOTT (M.S. Student)

Objectives:

1. Determine the relationship between land use (on multiple spatial scales) and flow variability, flood frequency, and flood intensity in the Arkansas Ozarks.
2. Investigate possible effects of flow and habitat variability on fish assemblage structure in Ozark headwater streams.
3. Determine the responses to high streamflow velocities of select species from these assemblages in a laboratory flume.
4. Combine data from Geographic Information Systems, USGS flow gages, field collection, and laboratory investigations to model relationships between land use, flow regime, habitat variability and fish assemblage structure.

Management implications:

1. Development of a predictive model that relates fish assemblage structure to land use and hydrology.
2. Ability to predict impacts of changes in land use on stream fish assemblages.

Project Summary:

Streams can have highly variable flow regimes for many reasons, one of which is land use in the watershed. Because much of the forested land in the Arkansas Ozarks is currently being cleared for agriculture, the impact on the hydrology and fish communities of these basins is
an issue that should be addressed. In the summers of 2002 and 2003 we sampled eleven Ozark headwater streams to assess fish assemblage structure and habitat. These data were combined with GIS-derived land use information and daily flow data from United States Geological Survey to analyze possible relationships between land use, flow regime, habitat complexity and fish assemblage structure. Analyses are ongoing, but we have found that watersheds in the Boston Mountains have less agricultural land use and more variable flow regimes than Springfield-Salem Plateau watersheds. Forty-one fish species were collected over both seasons. Fish densities were higher in 2003, as water volume was less due to a drier year. Fish density was negatively correlated with water depth and stream canopy cover, likely because of increased numbers of the algae-grazing minnow *Campostoma anomalum* in streams with degraded streambanks. A laboratory experiment was conducted in September 2003 to compare the swimming abilities of *Campostoma anomalum, Notropis cardinalis, Etheostoma spectabile, Lepomis cyanellus*, and *Lepomis megalotis*. *Campostoma* and *Notropis* had higher critical swim speeds than the two sunfish (*Lepomis*) species, and darters (*Etheostoma*) had highly variable critical swim speed values. The better swimming ability of *Campostoma anomalum* may help explain its persistence in flood-disturbed headwater streams of the Boston Mountains. From this study it appears that land use is probably not affecting fish assemblage structure in the Ozarks through alteration of flow regime. However, increased riparian zone clearing may be affecting fish assemblage structure by other means, such as allowing more sunlight to reach the stream or increasing siltation and other pollutants. Final analyses of these relationships are still in progress.
Impacts of Harvest Management on the Age and Sex Structure of White-Tailed Deer
(*Odocoileus virginianus*) Populations in Arkansas

**Funding Source:** Arkansas Game and Fish Commission

**Project Duration:** 1 July 2000 to 31 July 2004

**Principal Investigator:** DAVID G. KREMENTZ

**Graduate Research Assistant:** BRET A. COLLIER (Ph.D. Student)

**Research Objectives:**

1. Determine impact of harvest management strategies (e.g. antler point restrictions) on sex and age structure of white-tailed deer harvest in Arkansas.
2. Determine if harvest management strategies influence white-tailed deer harvests differently dependent upon spatial scale.
3. Investigate the human dimension of statewide white-tailed deer management practices.

**Management Implications:**

1. Establish management recommendations based on the impact of harvest management strategies in Arkansas.
2. Verify the effectiveness of harvest management strategies and determine if harvest differences between states under those strategies and those states that are not.
3. Gather baseline information on how AGFC can assist private landowners managing white-tailed deer.
4. Estimate at which spatial scale harvest management strategies influence deer demography.

**Project Summary:**

We are investigating the impact of a statewide antler restriction on the age structure and sex ratio of white-tailed deer (*Odocoileus virginianus*) harvested in Arkansas between 1984-2003. Our objectives are 1) to determine which factors have the most influence on white-tailed deer
population demography pre- and post the establishment of a statewide antler restriction, 2) determine whether influence of the antler restriction is scale dependent and 3) to gather demographic information on white-tailed deer hunters in Arkansas. Between Fall 2000 and Summer 2002, we surveyed hunting camps registered in the Arkansas Deer Camp Program and Arkansas hunting license purchasers to gather information on management practices in use on private land and on hunter opinions, preference, and attitudes concerning current and future white-tailed deer management in Arkansas. Analysis of hunting club management practices and hunter demographic data has been completed and final project reports were delivered to the AGFC in October (White-Tailed Deer Management on Private Lands in Arkansas) and January (Opinions, Preferences, and Attitudes of Hunters on White-Tailed Deer Management in Arkansas), respectively. Currently, we have constructed a white-tailed deer population model to model the dynamics of Arkansas’s white-tailed deer population under the statewide antler restriction both locally and at higher spatial scales. We are using this population model in combination with decision theory to 1) evaluate the impacts of localized harvest regulations and 2) to evaluate the influence of spatial scale on white-tailed deer harvest structure and underlying population dynamics.
Movement and Habitat Use of Smallmouth Bass (*Micropterus dolomieui*)
in the Buffalo National River drainage of Arkansas

**Funding Source:** National Park Service  
**Project Duration:** March 2003 to May 2005  
**Principal Investigator:** DANIEL D. MAGOULICK  
**Graduate Research Assistant:** CHRISTOPHER BARE (M.S. Student)

**Research Objectives:**

1. Document spatial and temporal use of Bear Creek/Buffalo River by smallmouth bass.  
2. Determine which habitat types are biologically important to smallmouth bass throughout the course of the year.

**Management Implications:**

1. Help land managers determine whether a proposed dam should be constructed in the upper reaches of Bear Creek, a tributary of the Buffalo National River.

**Project Summary:**

Smallmouth bass are an important link in the food chain, as well as a valuable natural resource for visitors to the Ozark Plateau. Previous studies have revealed a wide range of movement patterns by smallmouth bass related to seasonal changes in water temperatures and discharge. In a nearby Missouri Ozark stream, smallmouth bass moved extensively during spring and fall, but were found to move very little during the rest of the year (Todd and Rabeni, 1989). In Wisconsin, radio-tagged adult smallmouth bass traveled up to 109 km downstream to reach deep pools used as winter refuge (Langhurst and Schoenike, 1990). In Bear Creek, seasonal changes in water temperature and discharge may affect movements of bass; summer drying can be extreme, with large portions of the stream drying completely or becoming isolated pools. Tributary streams like Bear Creek may also provide valuable spawning habitat in the spring for adult smallmouth bass. Using radio telemetry, accurate locations of fish (within 3 to 5 meters) can be obtained, providing the opportunity to measure habitat characteristics selected by an individual. We expect to have eighty transmitters implanted and tracking will take place daily during the summer field season. In an effort to provide detailed movement data of smallmouth bass during winter months, our survey will also include tracking throughout the entire year.
Weir trap used for monitoring fish movements in Bear Creek

Factors Affecting Migration and Recruitment in Headwater Fish Assemblages of Buffalo National River, AR

Funding Source: National Park Service
Project Duration: 1 July 2002 to 31 July 2004
Principal Investigator: DANIEL D. MAGOULICK
Graduate Research Assistant: SHAWN HODGES (M.S. Student) MATTHEW DEKAR (M.S. Student)

Research Objectives:

1. Document the seasonal fluctuations in fish community species composition, relative abundance, and migration patterns at the macrohabitat, reach, and watershed scale.
2. Document larval drift densities and rates as components of fish community recruitment in the upstream, middle, and downstream reaches of Bear Creek.

Management Implications:

1. Information gained by this study will aid in interpreting the extent to which the Buffalo River depends upon Bear Creek and other tributaries to provide a fish species pool and as a potential spawning and nursery location.
2. Results will aid in interpreting the effects of barriers to fish movement, such as dams or stream drying.
3. Provide insight into the dynamics of fish reproduction and recruitment in intermittent and perennially interrupted streams.

Project Summary:

The Army Corps of Engineers is currently reviewing a permit application for the construction of a dam in the headwaters of Bear Creek, a tributary to the Buffalo National River. The decision is based in part on the assumption that the fish community will be minimally impacted due to the intermittent nature of Bear Creek and the idea that fish in small, intermittent streams move little. In the summer of 2003, we completed an extensive mark-recapture study in Bear Creek and
sampled headwater sites in the Buffalo River watershed. In addition, we used weir traps to monitor directional fish movements and sampled larval drift in Bear Creek to quantify dispersal and recruitment rates. From these data, we will evaluate the seasonal relationships between the Buffalo River’s fish community and the fish communities in the perennial and intermittent portions of Bear Creek and other Buffalo River tributaries.
American Woodcock (*Scolopax minor*) Fall Migration Ecology in the Central Region

**Funding Source:** U.S. Fish and Wildlife Service  
**Project Duration:** Fall 2001 – Summer 2004  
**Principal Investigator:** DAVID G. KREMENTZ  
**Graduate Research Assistant:** NICHOLAS A. MYATT (M.S. student)

**Research Objectives:**
1. Document American woodcock fall migration routes in the Central Region  
2. Determine the timing of woodcock fall migration  
3. Investigate woodcock habitat use during fall migration

**Management Implications:**
1. Establish baseline data on woodcock fall migration ecology.  
2. Map woodcock fall migration routes.  
3. Identify priority areas for future woodcock management.  
4. Determine the range of habitats used during fall migration.

**Project Summary:**

Despite decreased hunter bag limits and shortening of the hunting season, American woodcock (*Scolopax minor*) populations have been declining since singing ground surveys began in 1968. Woodcock have been extensively studied on the breeding grounds and to a lesser extent on the wintering grounds, but virtually no research has been conducted on the specie’s fall migration ecology. We know roughly when woodcock leave the breeding grounds and when they arrive on the wintering grounds, but little is known about the period in between.

In the Fall of 2001 we began a 3 year study to document American woodcock fall migration routes, timing, and habitat use in the Central Region. From fall 2001 to Fall 2003, 582 radio-marked woodcock migrated from three study sites in Minnesota, Wisconsin, and Michigan. We
conducted aerial searches from fixed-wing aircraft throughout the migration period and once birds arrived on the wintering grounds. Our primary search efforts were in Iowa, Illinois, Missouri, Kansas, Oklahoma, Arkansas, Kentucky, Tennessee, Mississippi, Louisiana, and Texas. We conducted 224 hours of aerial telemetry and found 42 possible radio-marked woodcock locations. We confirmed 32 of these locations by flushing the radio-marked bird while the remaining locations were unconfirmed due to lack of access or absence of the radioed bird when we arrived.

Our research found that woodcock use different migration routes than those published in the 1970’s. Woodcock appear to migrate in a series of long jumps, sometimes staying at one stopover location for periods exceeding one week. We have also identified priority areas for future woodcock management in the Central Region.
Field sparrow (Spizella pusilla) nest located in a field in the Wedington Unit of Ozark National Forest, Arkansas.

Short-term Responses of Grassland Bird Populations to Timing of Haying in Northwest Arkansas

Funding Source: AR Game and Fish Commission; U.S. Geological Survey, Biological Resources Division, Cooperative Fish and Wildlife Research Unit

Project Duration: August 2001 to June 2003

Principal Investigator: WILLIAM L. THOMPSON

Graduate Research Assistant: JASON D. LUSCIER (M.S. Student)

Research Objectives:

1. Evaluate short-term responses of grassland bird populations to timing of haying in Northwest Arkansas by evaluating nest survival, species richness, and bird density.

Management Implications:

1. Wait until mid-June to hay fields in Northwest Arkansas.
2. Future studies on timing of haying on grassland birds in these study areas perhaps should focus on estimating bird densities to obtain more conclusive results.

Project Summary:

North American grassland bird species have declined due to habitat loss and conversion from native, warm-season to non-native, cool-season grasses for cattle grazing and haying. Cool-season grasses are typically hayed at the peak of the breeding season, adversely affecting reproductive success of grassland birds. I evaluated short-term responses of grassland birds to timing of haying in Northwest Arkansas during 2 breeding seasons (2002 and 2003). During 2002, I evaluated species richness and nest survival of grassland birds in 3 unhayed (reference) fields, 1 field hayed early in the breeding season (19 May), and 1 field hayed during the middle of the breeding season (1 June) in the Wedington Unit of the Ozark National Forest. There were
more species per ha in early and mid-hayed fields than in unhayed fields at the end of the breeding season, suggesting that these haying events provided better forage and cover for more species during the end of the breeding season. There were too few data to discern a haying effect on nest survival. During 2003, I evaluated nest survival and bird densities in 3 unhayed (reference) fields, 2 fields hayed early in the breeding season (26-31 May 2003), and 4 fields hayed late in the breeding season (17-25 June 2003) in Benton and Washington Counties in Northwest Arkansas. I only detected 1 nest that was initiated in fields after early haying (26 May); however, I was not able to separate the effect from early haying from the temporal effect of 26 May. There were more dickcissels in unhayed fields than in early hayed fields after early haying, suggesting a negative effect of early haying on dickcissel densities. There was a trivial haying effect on eastern meadowlark densities. With fewer nest initiations and decreases in dickcissels after early haying during 2003, fields in Benton and Washington Counties in Northwest Arkansas should not be hayed until after the middle of June to allow for more nests to fledge young. For future research in these same areas, more nests will need to be located and monitored, requiring more fields, money, and personnel. Therefore, future studies on timing of haying on grassland birds in these study areas perhaps should focus on estimating bird densities to obtain more conclusive results.

**Funding Source:** David Causey Grant-in-Aid Award

**Project Duration:** 1 July 2002 to 31 July 2004

**Principal Investigator:** DANIEL D. MAGOULICK

**Graduate Research Assistant:** MICHEAL R. RABALAIS (M.S. Student)

**Research Objectives:**

1. Test the hypothesis that environmental changes do not prevent *O. eupunctus* from surviving and growing in their former range.
2. Determine the extent of resource (habitat) partitioning between *O. eupunctus* and *O. neglectus*.
3. Test the hypothesis that introduced *O. neglectus* outcompete native *O. eupunctus*.

**Management Implications:**

1. Information from this study will help determine current impacts and predict future impacts of the invading crayfish species on native species.
2. Understanding mechanisms of displacement and effects of introduced crayfish on native species will allow managers to develop informed strategies regarding the need for mitigation and potential success of mitigation efforts.
3. Information gained here will be especially important in making decisions regarding the conservation of three species that are potentially at risk from this invasion, *Orconectes eupunctus*, (locally rare and uncommon and globally imperiled) *Orconectes marchandi* (both locally and globally imperiled), and *Cambarus hubbsi*.

**Project Summary:**
The crayfish *Orconectes neglectus chaenodactylus* has recently been introduced into the Spring River drainage in southern Missouri and northern Arkansas and appears to be displacing the native species *O. eupunctus*. The objectives of this study were to: 1) determine if *O. eupunctus* can grow and survive in its former range, 2) test for habitat partitioning by *O. eupunctus* and *O. neglectus chaenodactylus* where they occur together, 3) test for shifts in habitat use and selection by both species when in the presence of one another, and 4) determine if *O. neglectus chaenodactylus* negatively impacts growth and survival of *O. eupunctus*. *O. eupunctus* gained significantly more weight in its present range than in its former range over the course of 117 days, although there was no significant difference in carapace length over the same time period. At a site where the two species overlap, there was no apparent partitioning of habitats between the two species, and there was no shift in habitat use, habitat selection, and species-environmental relationships by *O. eupunctus* when in the presence of *O. neglectus chaenodactylus*. Furthermore, *O. neglectus chaenodactylus* did not significantly affect the growth and survival of *O. eupunctus* in competition experiments. This study suggests that competition is not a major factor in the displacement of *O. eupunctus* from its former range by *O. neglectus chaenodactylus*, but that environmental changes may prevent *O. eupunctus* from growing in their former range. Further study is needed to examine other potential effects of *O. neglectus chaenodactylus*, as well as the effect of environmental change on *O. eupunctus*. 
A Virginia rail radio-marked at Four Rivers Conservation Area, Missouri.

Sora and Virginia Rail Fall Migration Ecology at Four Rivers Conservation Area in Missouri

Funding Source: Arkansas Audubon Society Trust, David Causey Grant-In-Aid Award, Swartz Endowed Fellowship, U.S. Geological Survey, Biological Resources Division, Arkansas Cooperative Fish and Wildlife Research Unit

Project Duration: August 2002 to November 2003

Principle Investigator: DAVID G. KREMENTZ

Graduate Research Assistant: NORA D. SCHUBERT (M.S. Student)

Research Objectives:

1. Estimate stopover durations for soras (*Porzana carolina*) and Virginia rails (*Rallus limicola*) at Four Rivers Conservation Area, Missouri (Four Rivers).
2. Document habitat use at Four Rivers using radio telemetry.

Management Implications:

1. Estimates of stopover duration and habitat use will provide managers with knowledge of sora and Virginia rail habitat requirements.

Project Summary:

Research suggests that many rail species are declining, or their status is unknown due to lack of quantitative population trends throughout most of their range. Because reliable survey techniques to detect and monitor rails have not been developed, basic life history information and population trends are lacking or incomplete for many rail species. We initiated this study to address fall migration ecology and habitat use of soras and Virginia rails.

In 2002, a pilot study was conducted throughout OK, AR and MO to delineate potential study sites to study stopover duration, habitat use and effects of management practices on soras and
Virginia rails. We determined that Four Rivers was an ideal study site for conducting this research because of the abundance of soras at Four Rivers, limited funding, and manager interest.

In 2003, the first rail was observed during the first week of August. Peak migration was from about 19 September to 26 October. Many rails departed from Four Rivers in late October. Transmitters were placed on 19 soras and 8 Virginia rails during September to 14 October. Of the 27 rails radio-marked, 18 migrated, 2 died, 3 slipped their transmitters and 4 had unknown fates. The last two radio-marked rails migrated on 9 November. The number of locations collected per bird ranged up to 22. Analysis of stopover duration in response to weather conditions, and habitat use in relation to movements, water depth, and vegetative components is underway.
The Effects of Forest Management on Wood Thrush in the Bottomland Hardwood Forests of Louisiana

Funding Source: Louisiana Department of Wildlife and Fisheries
Project Duration: 1 May 2003 to 31 May 2005
Principal Investigator: DAVID KREMENTZ
Graduate Research Assistant: SARAH COULTER (M.S. candidate)

Research Objectives:

1. To assess the effects of forest management on wood thrush survival, productivity, movement patterns and densities.
2. To assess the effects of forest management on breeding bird diversity and density and survival.

Management Implications:

1. Provide information on which forest types are preferred by wood thrush.
2. Provide information on the relative success of wood thrush breeding in forests treated with different harvesting practices.
3. Provide information on the scale and patterns of land-use by wood thrush including home range size, daily distance traveled and density.
4. Provide baseline data on avian communities present after various harvesting practices including survival estimates for several species of interest.

Project Summary:

The Atchafalaya Basin is the largest publicly owned contiguous tracts of bottomland hardwood forest in the United States. The Sherburne Wildlife Management Area contains over 30,000 acres of hardwood forest owned cooperatively by the Louisiana Department of Wildlife and Fisheries (LDWF), the U.S. Army Core of Engineers and the U.S. Fish and Wildlife Service. The LDWF are currently managing the area using forestry practices aimed at speeding succession and providing a diversity of habitats for both game and non-game species. Our project will examine the effects of these forestry practices on breeding birds. We focused our study on wood thrush as they are considered a forest interior species sensitive to management. During summer
2003, we radio-marked 30 adult wood thrush and tracked their daily movements. Using these data we estimate survival rates, home range sizes, and productivity among treatments. We also surveyed birds to estimate overall avian diversity and density among treatments. Finally, we conducted an extensive mark-recapture program aimed at estimating survival rates for 5 other passerines.
**Resident tailwater rainbow trout**

**Effect of catch and release areas on movement and mortality of resident rainbow trout in Bull Shoals and Norfork tailwaters.**

*Funding Source:* Arkansas Game and Fish Commission  
*Project Duration:* 1 January 2004 to 31 December 2006  
*Principal Investigator:* DANIEL D. MAGOULICK  
*Graduate Research Assistant:* Graduate student to be determined

**Research Objectives:**

1. Determine effects of catch and release areas on movement and mortality of resident rainbow trout in Bull Shoals and Norfork tailwaters.  
2. Determine whether trout maintain home ranges within the tailwater and the relationship between home range size and special regulation areas.  
3. Determine movement, mortality and habitat use of rainbow trout prior to installation of planned habitat improvement projects.

**Management Implications:**

1. This study will determine the effect of catch and release areas on movement and mortality rates of resident rainbow trout in Bull Shoals and Norfork tailwaters.  
2. This information will help managers to determine the effectiveness of special regulation areas.  
3. Knowledge of movement and mortality rates of resident rainbow trout will help managers determine stocking effectiveness and potential causes for low numbers of trout returned to creel.  
4. Knowledge of site fidelity, home range and movement patterns will permit managers to determine effective sizes of special regulation or habitat manipulation areas.
Project Summary:

Special regulations have been instituted on portions of the cold tailwater fisheries in Arkansas. Catch and release areas have been located along the Bull Shoals and Norfork tailwaters to “exploit” trout “growth potential”. The logic behind these catch and release areas is that exploitation rates of trout will decrease and residence times will increase. In other words, trout should stay in the system longer, and therefore grow larger. This hypothesis assumes that, 1) trout do not move out of the special regulation areas, 2) trout do not suffer high mortality rates within the special regulation areas, and 3) the forage base is sufficient for growth within the special regulation areas. In this project, we will address the assumptions one and two and we will address the third assumption in a companion project.
The relationship between forage base and trout production in catch and release areas on Bull Shoals and Norfork tailwaters.

Funding Source: Arkansas Game and Fish Commission

Project Duration: 1 January 2004 to 31 December 2007

Principal Investigator: DANIEL D. MAGOULICK

Graduate Research Assistant: Ph.D. student to be determined

Research Objectives:

1. Determine proportions of prey items consumed by brown trout and rainbow trout in special regulation areas of Bull Shoals and Norfork tailwaters.
2. Determine relative contributions of various food sources to trout production.
3. Determine whether the prey base is limiting trout production.
4. Determine effectiveness of gut contents analysis and stable isotope analysis in developing a bioenergetics model.

Management Implications:

1. This study will determine whether the prey base is adequate to support trout production within special regulation areas on Bull Shoals and Norfork tailwaters.
2. This information will help managers to determine if stocking rates are appropriate for the system and whether special regulation areas can achieve their stated goal of exploiting trout “growth potential”.

3. An understanding of the relative contribution of prey items, such as sculpins and crayfish, to trout production will provide managers information that will be valuable in determining potential impacts of bait harvest on trout production.

4. All of this information should help fishery biologists to better manage the Bull Shoals and Norfork tailwater trout fisheries.

Project Summary:

Special regulations have been instituted on portions of the cold tailwater fisheries in Arkansas. Catch and release areas have been located along the Bull Shoals and Norfork tailwaters to “exploit” trout “growth potential”. The logic behind these catch and release areas is that exploitation rates of trout will decrease and residence times will increase. In other words, trout should stay in the system longer, and therefore grow larger. This hypothesis assumes that, 1) trout do not move out of the special regulation areas, 2) trout do not suffer high mortality rates within the special regulation areas, and 3) the forage base is sufficient for growth within the special regulation areas. In this project, we will address the third assumption and we will address assumptions one and two in a companion project.
PRODUCTIVITY
Honors and Awards

Jason D. Luscier - Scott D. Shull Award, Department of Biological Sciences, University of Arkansas.
Christopher Bare, Leggett Fellowship, University of Arkansas, 2003.
Matthew Dekar - Causey Grant-in-Aid of Research- Department of Biological Sciences, University of Arkansas.
Mandy K. Scott - Causey Grant-in-Aid of Research- Department of Biological Sciences, University of Arkansas.
Nora D. Schubert - Causey Grant-in-Aid of Research- Department of Biological Sciences, University of Arkansas.
Nora D. Schubert - Professor Delbert Swartz Endowed Fellowship.

Courses Taught

Thompson, W. L., Ecological Research Design
Magoulick, D. D., Quantitative Approaches to Conservation Biology
Krementz, D. G., D. D. Magoulick and W. L. Thompson, Fish & Wildlife Seminar

Scientific Publications


Technical and Semi-Technical


Theses and Dissertations


Papers Presented


Posters Presented

Luscier, J. D., and **W. L. Thompson**. Short-term responses of grassland bird populations to timing of haying in Northwest Arkansas. 64th Midwest Fish and Wildlife Conference, Kansas City, Missouri, December 2003.


Committees/Task Forces/Recovery Teams

Krementz, D. G., Mississippi Flyway Technical Section webless game bird working group
Krementz, D. G., IAFWA American woodcock task force
Krementz, D. G., LMAV JV migratory bird science team
Krementz, D. G., LMAV JV Monitoring and inventory working group
Krementz, D. G., President, Arkansas State Chapter of The Wildlife Society
Krementz, D. G., Member BISC Graduate Studies Committee
Krementz, D. G., 6th Woodcock and Snipe Conference at Nantes, France. Scientific Committee.
Krementz, D. G., Arkansas Game & Fish Commission Waterfowl Team
Magoulick, D. D., Arkansas Zebra Mussel Task Force
Magoulick, D. D., Associate Editor, North American Journal of Fisheries Management
Magoulick, D. D., Member BISC Computer Committee, 2000-present
Magoulick, D. D., Transactions of the American Fisheries Society Best Paper Award Committee, 2003
Magoulick, D. D., Southeastern Imperiled Fishes Task Force of the Southeastern Fishes Council member, 2001-
Thompson, W. L. Arkansas Project Advisory Committee - Rocky Mountain Elk Foundation
Thompson, W. L. Arkansas Oak Decline Consortium
Thompson, W. L. Research Subcommittee of the Arkansas Quail Committee
Thompson, W. L. Executive Board Member, Biometrics Working Group, The Wildlife Society

TECHNICAL ASSISTANCE

Training Offered

Thompson, W. L. Taught a 2-day workshop on using programs MARK and NOREMARK to estimate survival rates and abundance to 14 fish and wildlife biologists with the Arkansas Game and Fish Commission. Russellville, AR, August 18-19, 2003.

Thompson, W. L. Taught a 1-day workshop on using program MARK to estimate abundance and survival rates from data on marked animals to 9 faculty and graduate students in the Department of Biological Sciences, University of Arkansas. Fayetteville, AR, January 19, 2004.


Thompson, W. L. Provided assistance with study design and data analysis to AGFC Biologist Jeff Quinn for his paddlefish project on the Arkansas River.

Krementz, D. G. Provided assistance with study design and analysis to AGFC Biologists Mike Checkett and Andrew James on “robo” duck study.

Training Received

Magoulick, D. D., Advanced GIS analysis, AFS course.

Krementz, D. G. Waterfowl Habitat Management – Active vs. Passive Management, Mississippi Flyway Technical Section Workshop.