Nebraska Cooperative Fish and Wildlife Research Unit

Report of Activities
July 2004 – October 2006

Cooperating Agencies
Nebraska Game and Parks Commission
The Wildlife Management Institute
University of Nebraska–Lincoln
U.S. Fish and Wildlife Service
U.S. Geological Survey (USGS) – Biological Resources Division

Nebraska Cooperative Fish and Wildlife Research Unit
University of Nebraska–Lincoln
422 Hardin Hall, 33rd & Holdrege Streets
Lincoln, Nebraska 68583-0984
Phone (402) 472-0449
Fax (402) 472-2722
Cover: Mule deer in western Nebraska
Table of Contents

Personnel and Cooperators .................................................................................................................. 1
  Coordinating Committee Members .................................................................................................... 1
  Nebraska Cooperative Fish and Wildlife Research Unit Staff ............................................................ 1
  University of Nebraska–Lincoln Faculty Cooperators ...................................................................... 2
  Nebraska Game and Parks Commission Cooperators ....................................................................... 2
  Federal Agency Cooperators ............................................................................................................. 2
  State Agency Cooperators ................................................................................................................ 2
  Private Sector Cooperators ............................................................................................................... 3
  Other Faculty Cooperators ............................................................................................................... 3
  Graduate Degree Candidates .............................................................................................................. 3
  Post-Doctoral Research Associates .................................................................................................. 4
  Research Technicians ......................................................................................................................... 4
  Federal Work-Study Students ........................................................................................................... 4
  Other Cooperative Unit Staff ............................................................................................................ 4

Projects in Fisheries Science .............................................................................................................. 5

Projects in Wildlife Science ............................................................................................................... 11

Teaching ............................................................................................................................................... 23

Training and Workshops ................................................................................................................... 25

Professional Activities ....................................................................................................................... 27
  Peer-Reviewed Publications ............................................................................................................... 27
  Presentations at Scientific Meetings .................................................................................................. 29
  Graduate Committee Service ........................................................................................................... 34
  Professional and Faculty Service ....................................................................................................... 34
  Professional Awards ......................................................................................................................... 34
Personnel and Cooperators

Coordinating Committee Members
B. K. Williams, Chief
Cooperative Research Units
U.S. Geological Survey (USGS) – Biological Resources Division
12201 Sunrise Valley Drive, MS 303
Reston, VA 20192
(703) 648-4260

John Owens, NU Vice President, IANR Harlan Vice Chancellor
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln (UNL)
202 Agriculture Hall
Lincoln, NE 68583-0708
(402) 472-2871

Kirk Nelson, Assistant Director
Nebraska Game and Parks Commission
2200 N. 33rd Street
Lincoln, NE 68503
(402) 471-0641

Pat Ruble, Midwest Field Representative
Wildlife Management Institute
93 Central Station Place
Johnstown, OH 43031-8400
(740) 966-0496 (cell)

Nebraska Cooperative Fish and Wildlife Research Unit Staff (permanent)
Craig R. Allen, Unit Leader
Kevin L. Pope, Assistant Unit Leader–Fisheries
Valerie A. Egger, Administrative Assistant
University of Nebraska–Lincoln Faculty Cooperators
  Jim Merchant, School of Natural Resources
  Mark Pegg, School of Natural Resources
  Larkin Powell, School of Natural Resources
  Tom Powers, Department of Plant Pathology
  Drew Tyre, School of Natural Resources
  Dave Wedin, School of Natural Resources

Nebraska Game and Parks Commission Cooperators
  Rex Amack, Director
  Jim Douglas, Wildlife Division Administrator
  Don Gabelhouse, Jr., Fisheries Division Administrator
  Alicia Hardin, Assistant Wildlife Division Administrator
  Jeff Hoffman, Wildlife Division
  Richard Holland, Assistant Fisheries Division Administrator
  Keith Koupal, Fisheries Division
  Bruce Morrison, Assistant Wildlife Division Administrator
  Kirk Nelson, Assistant Director
  Steve Riley, Assistant Wildlife Division Administrator
  Dean Rosenthal, Assistant Fisheries Division Administrator
  Rick Schneider, Natural Heritage Program
  Scott Taylor, Assistant Wildlife Division Administrator
  Dave Tunink, Assistant Fisheries Division Administrator
  Sam Wilson, Wildlife Division
  Gene Zuerlein, Assistant Fisheries Division Administrator

Federal Agency Cooperators
  NOAA Great Lakes Environmental Research
  U.S. Army Corps of Engineers
  U.S. Fish and Wildlife Service, Boyer Chute National Wildlife Refuge
  U.S. Fish and Wildlife Service, DeSoto National Wildlife Refuge
  U.S. Fish and Wildlife Service, Ecological Services, Nebraska Field Office
  U.S. Fish and Wildlife Service, Fort Niobrara–Valentine National Wildlife Refuge
  U.S. National Park Service / Cooperative Ecosystems Study
  USDA Animal and Plant Health Inspection Service (APHIS)
  USDA National Resource Conservation Service (NRCS)

State Agency Cooperators
  Nebraska Department of Agriculture, Noxious Weed Program
  Texas Parks and Wildlife Department
  The Nebraska Environmental Trust
Private Sector Cooperators
Aquatic Consultants, Inc.
In-Fisherman, Inc.
The Nature Conservancy
Turner Foundation

Other Faculty Cooperators
John Dettmers, Great Lakes Fishery Commission and University of Illinois at Urbana–Champaign
Elizabeth Forys, Environmental Sciences, Eckerd College, Florida
C. S. Holling, Department of Zoology, University of Florida
Mac Horton, Department of Entomology, Clemson University
Wayne Hubert, USGS–Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming
Wayne Landis, Institute of Environmental Toxicology, Huxley College of the Environment, Western Washington University
Pablo Marquet, Departamento de Ecología, Universidad Católica de Chile, Santiago
John McCarty, Department of Biology, University of Nebraska–Lincoln
Magnus Nyström, Department of Systems Ecology, Stockholm University, Sweden
Garry Peterson, School of the Environment and the Department of Geography, McGill University, Montreal, Canada
Reynaldo Patiño, USGS–Texas Cooperative Fish and Wildlife Research Unit, Texas Tech University
Jan Sendzimir, International Institute for Applied Systems Analysis, Austria
Joan Walker, USDA Forest Service, Clemson University
Gene Wilde, Department of Natural Resources Management, Texas Tech University
L. LaReesa Wolfenbarger, Department of Biology, University of Nebraska Omaha

Graduate Degree Candidates
Christopher Chizinski, Ph.D., Department of Natural Resources Management, Texas Tech University (TTU) (co-advisor G. Wilde), January 2002 – present
Tim Davis, Ph.D., Department of Entomology, Clemson University (CU), co-advisor (advisor P. M. Horton), January 1999 – present
Elizabeth Forbus, MS, School of Natural Resources, UNL, January 2005 – present
Ahjond Garmestani, Ph.D., Department of Public Policy, CU, awarded May 2006
Nathan Gosch, MS, School of Natural Resources, UNL, May 2006 – present
Caleb Huber, MS, Department of Natural Resources Management, TTU (co-advisor R. Patiño), January 2005 – present
Aaron Lotz, Ph.D., School of Natural Resources, UNL, January 2005 – present
Katherine Manry, Ph.D., Department of Biological Sciences, CU, July 2003 – present,
Charles E. Springs, Jr. Fellowship recipient, Battelle Fellowship recipient
Thad Miller, MS, School of Natural Resources, UNL (co-advisor Jim Merchant), January 2006 – present
Kristine Nemec, Ph.D., School of Natural Resources, UNL, August 2006 – present
Lindsey Reinarz, MS, Biology, University of Nebraska Omaha, co-advisor (advisor L. Wolfenbarger), May 2006 – present
Don Wardwell, MS, School of Natural Resources, UNL, August 2004 – present, UNL
  Larrick Student Travel Award recipient
Justin Williams, MS, School of Natural Resources, UNL, August 2006 – present
Sam Wilson, MS, School of Natural Resources, UNL, August 2006 – present

Post-Doctoral Research Associates
  Ahjond Garmestani

Research Technicians
  Alicia Admiraal
  Chad Brock
  Brian Franzone
  Kent Fricke
  Lizette Peters
  Landon Pierce
  Lindsey Reinarz
  Jeffrey Stittle

Federal Work-Study Students
  Garth Goede
  Rachel Schulte
  Sam Tobin
  John Walrath

Other Cooperative Unit Staff
  Christopher Kelly, Coordinator, Invasive Plants Monitoring and Modeling
Projects in Fisheries Science
Habitat alterations and accidental introduction of white perch into Branched Oak Lake have shifted the fish community from one dominated by littoral (near-shore) species (e.g., largemouth bass and bluegill) to one dominated by pelagic (open-water) species (e.g., white perch and gizzard shad). Along with the change in the fish community, angler trips to Branched Oak Reservoir have declined by 85% over the last two decades. Further, the white perch population has become stunted (high density of slow growing individuals that mature at a small size). Like Branched Oak Lake, Pawnee Lake historically supported an active and diverse fishery, and has experienced similar habitat alterations and accidental introduction of white perch. However, unlike Branched Oak Lake, stunting has not yet occurred for the white perch population in Pawnee Lake. This provides an opportunity to examine white perch interactions with other fishes in two similar Nebraska water bodies at different white perch population stages (i.e., stunted and non-stunted). Food habits and diet-overlap among white perch, crappie, walleye, white bass, and channel catfish are currently being evaluated. This project will help document potential competition bottlenecks that exist between white perch and other fish species of importance in the hopes of developing a management program to eliminate stunted status for the white perch population in Branched Oak Lake and to prevent stunting of the white perch population in Pawnee Lake.
Predators of White Perch at Branched Oak and Pawnee Reservoirs

Principal Investigator: Kevin L. Pope
Graduate Student(s): Nathan Gosch, MS
Project Duration: January 2006 – December 2008
Funding: Nebraska Game and Parks Commission
Project Location: Branched Oak Lake (Lancaster County) and Pawnee Lake (Lancaster County), Nebraska

Sedimentation and erosion have significantly altered the habitat of Branched Oak Lake, resulting in loss of usable littoral habitat and a predominance of turbid open-water areas. This loss of critical habitat coupled with the introduction of the white perch has changed the population dynamics within the fish community. White perch numbers have increased precipitously over the last decade resulting in stunted white perch populations in Branched Oak Lake. It has been hypothesized that the unchecked white perch population is severely limiting recruitment of sportfishes such as walleye. Control is thus needed for this stunted white perch population. Chemical renovation of Branched Oak Lake has been considered; however, logistical difficulties have precluded this action. Work is currently underway to assess the feasibility of biological control of white perch via predation. The purpose of this project is to quantify food habits of adult white crappie, walleye, channel catfish, flathead catfish, hybrid striped bass and white bass to determine which, if any, of these fishes prey on white perch. Like Branched Oak Lake, Pawnee Lake historically supported an active and diverse fishery, and has experienced similar habitat alterations and accidental introduction of white perch. However, unlike Branched Oak Lake, the Pawnee Lake white perch population has not yet stunted. Thus, an opportunity exists to document predators of white perch in populations with two different size structures, allowing for predictions of likely changes in food habits of predators with purposeful changes in the targeted prey (white perch) population. This project will provide information about food habits of predatory fishes that could allow for refinement of the current management program for stunted white perch populations in Nebraska reservoirs.
**Recruitment of Walleye and White Bass in Irrigation Reservoirs**

Principal Investigator: Kevin L. Pope

Graduate Student(s): Beginning January 2007, Christopher Lewis, Ph.D.; Dustin Martin, MS

Project Duration: September 2006 – August 2011

Funding: Nebraska Game and Parks Commission

Project Location: Enders Reservoir, Medicine Creek Reservoir, Red Willow Reservoir, and Swanson Reservoir, Nebraska

The five reservoirs within Nebraska’s Republican River watershed (Swanson, Enders, Red Willow [also referred to as Hugh Butler], Medicine Creek [Harry D. Strunk], and Harlan County) were built primarily for flood control and irrigation, resulting in large water-level fluctuations within and between years. These reservoirs also provide important fisheries for anglers in southwest Nebraska; walleye and white bass are of particular importance in these reservoirs. However, continued annual stockings of walleye have been necessitated because of low natural reproduction and recruitment of young. In contrast, white bass populations are self-sustaining within these reservoirs, although recruitment is extremely erratic (i.e., weak or missing year-classes are common) in all but Harlan County Reservoir. We believe that a “recruitment bottleneck” could exist for walleye and perhaps white bass in these irrigation reservoirs. The purpose of this project is to gain an understanding of the factors affecting recruitment of walleye and white bass in Enders, Medicine Creek, Red Willow, and Swanson Reservoirs. The primary focus will be documenting the relative importance of spawning habitats and determining when the suspected recruitment bottleneck for walleye and white bass occurs in southwest Nebraska irrigation reservoirs. This information is vital for understanding reservoir fish ecology in semiarid regions.
Projects in Wildlife Science
Amphibian Monitoring Techniques (in Relation to Wetland Qualities and the Surrounding Landscape – Rainwater Basin Region)

Principal Investigator: Craig R. Allen

Graduate Student(s): Aaron Lotz, Ph.D.

Project Duration: January 1, 2005 – September 30, 2006

Funding: Nebraska Game and Parks Commission

Project Location: Rainwater Basin, Nebraska

We developed a pilot program focused on the spatial distribution of wetlands in Nebraska’s Rainwater Basin landscape. The intent is to monitor populations of amphibians in south-central Nebraska that have a heavy anthropogenic influence, in order to detect changes in presence in this region over time. Data collected will be provided to the national monitoring program as well. We gathered data that can provide inferential insight into the presence, or absence, of amphibian species and changes in individual species presence and community composition 1) following ongoing restoration activities, 2) following ongoing anthropogenic landuse/landcover changes, 3) in relation to existing wetland-patch network characteristics, 4) in relation to adjacent upland landuse/landcover and, 5) in relation to environmental contaminants originating as runoff from adjacent farmed lands. Results will help guide management activities in this ecologically important region and serve as a model for similar monitoring and study in other herpetologically rich areas. We expect that if our methodologies are proven usable by Nebraska Game and Parks Commission staff as a way to assess land management practices, they will readily translate to other regions where similar land management is being implemented. Additionally, we assessed biases associated with amphibian call surveys and utilized methods to account for differences in detectability inherent in call survey techniques. A manuscript is in press and is listed at the end of this document.
River otters have become reestablished in Nebraska after their reintroduction in the mid 1980s and early 1990s. The species is currently listed as threatened in Nebraska (S2). Despite the high profile of the reintroduction and the otters’ role as a flagship species, relatively little is known about river otter ecology in Nebraska. The Nebraska Cooperative Fish and Wildlife Research Unit with the Nebraska Game and Parks Commission initiated this project in October 2006 with the objective of collecting home range and habitat use information on river otters along the big bend area of the Platte River using remote sensing (radio telemetry). We plan to capture and radio-tag approximately ten northern river otters on and near the Platte River, a core component of the species’ distribution in Nebraska. During the approximately one year long monitoring portion of the pilot project, we will collect data on daily and seasonal movements, home range, habitat use, survival, response to hydrological changes in the Platte, and relationship to abundance data from bridge surveys. These data, in conjunction with the results of an ongoing river otter health and reproductive survey and results from NGPC’s annual otter bridge survey, will help to close existing information gaps and contribute to the creation of the Nebraska River Otter Management Plan and the Statewide Comprehensive Conservation Plan. As of late October, 2006, four otters had been captured and implanted with motion and mortality sensing transmitters.
The relationship between restoration diversity and ecological functions, such as pollination, soil development, invasion resistance and herbivore control remains poorly understood. Ecological functions, goods and services include such factors as pollination of native and crop plants, control of herbivore populations, resistance to biological invasion, production of soils, production of biodiversity, etc. Invasion by aggressive plant species, erosion of diversity over time, and failure to withstand drought or other disturbances are all possible results of unsuccessful restoration efforts. Because restoration of grasslands is an important on-going management activity on many public lands in Nebraska, we are investigating the relationship between species diversity in prairie restorations, and ecological functions at relatively large spatial and temporal scales utilizing restorations along the Platte River in south-central Nebraska. We have identified existing high diversity restorations and low diversity remnant grasslands (pastures) as large scale study sites (~100 acre). We also established twenty-four 0.75-acre plots which are planted to six replicates each of four treatments: high diversity sites of ~100 species, high diversity sites at twice the normal seeding rates (to be similar with NRCS practices), and CP25 sites (15 species) at normal and half-normal seeding rates. These sites are currently being used to assess invasion resistance among the treatments, and to assess soil development and nematode populations. Large scale sites are currently being used to investigate differences in herbivory, and 2006 data indicate that herbivory rates are lower on high diversity sites. We will also investigate the export of this service (herbivory reduction) to adjacent row crop agricultural fields.
Understanding Invasions and Extinctions

Principal Investigator: Craig R. Allen
Graduate Student(s): Aaron Lotz, Ph.D.
Project Duration: August 31, 2005 – December 31, 2008
Funding: U.S. Geological Survey
Project Location: Lincoln, Nebraska (Empirical Analysis of Global Mediterranean-Climate Ecosystems)

Mediterranean-climate regions support large human populations resulting in extensive, and outside the Mediterranean Basin proper, rapid, anthropogenic transformation. Compared to other continental areas, Mediterranean regions have been invaded by a large number of non-indigenous organisms, including vertebrates. Concomitant with invasions, declines and extinctions have transformed the faunas of Mediterranean ecoregions. Our project objectives are to 1) compare the vertebrate body mass structures of Mediterranean-climate ecosystems, and 2) examine the effects of invasions and extinctions in Mediterranean-climate ecosystems on body mass structure and alpha, beta and gamma diversity. Data sets have been developed from published literature and communication with scientists in five countries, and analysis is underway.
**Evaluation of the Nebraska Landowner Incentives Program (LIP) for Species at Risk**

Principal Investigator: Craig R. Allen

Graduate Student(s): Elizabeth Forbus, MS


Funding: Nebraska Game and Parks Commission
U. S. Geological Survey

Project Location: Southeastern Nebraska

The size of the Landowner Incentive Programs and Partnerships in terms of funding, cooperation and stakeholder involvement requires an assessment of program success. Such an assessment should be an adaptive process that will continue throughout the implementation of the program. During this early stage of the Landowner Incentives Program, the assessment needs to proceed on two fronts: landowner involvement and the response of species at risk. This research project focuses on the response of species at risk. Assessment has focused on elements that are likely to respond rapidly, such as vegetation structure (which are directly manipulated in the LIP), insect communities (which have short generation times), and bird communities (which respond to vegetative structure). Other programs and management activities are identical to LIP activities (e.g., removal of invasive trees occurs on many state and federally managed properties and is an activity supported in LIP programs), and may be utilized to assess the success of the LIP programs.

In 2005, pretreatment, base-line data were collected and followed by the removal of invasive trees such as red cedar. This data included assessment of vegetation using the Floristic Quality Index, and estimation of bird densities. Herpetofauna data was collected using coverboards, but was sparse and discontinued for 2006. The second, 2006, season of data collection focused on bird species using transect methods, and is currently being analyzed.
Monitoring, Mapping and Risk Assessment for Non-Indigenous Invasive Species in Nebraska

Principal Investigator: Craig R. Allen and Jim Merchant; Chris Kelly, Program Coordinator

Graduate Student(s): Justin Williams, MS

Project Duration: May 4, 2006 – December 31, 2008

Funding: Nebraska Environmental Trust

Project Location: Statewide, Nebraska

Biological invasions are a growing threat to both human enterprise and ecological systems. This project provides resources to the public and private sector on 1) the potential spread and impact of non-indigenous species in Nebraska, 2) actual and potential maps of non-indigenous species range (habitat specific maps at high resolution), 3) information regarding identification and management of potential invaders, 4) centralized information on management and impacts and potential spread of currently established non-indigenous species (a Web portal), 5) outreach within Nebraska to county-level governments and individual stakeholders regarding the management, surveillance and control of non-indigenous species, and 6) an organizational and informational Nebraska conference on non-indigenous species impacts—their spread and management—focusing on state-of-our-knowledge, and coordination of disparate management and information-provisioning efforts with a goal towards unifying disparate efforts. We became fully staffed in August, 2006, and a Web site is being developed.
**Spatial Risk Assessment of Invasive Species Impacts on Native Species in Nebraska**

Principal Investigator: Craig R. Allen and Jim Merchant

Graduate Student(s): Thad Miller, MS

Project Duration: August 31, 2005 – December 31, 2008

Funding: Nebraska Game and Parks Commission
U. S. Geological Survey

Project Location: Statewide, Nebraska

This project conducts spatially-based risk analyses for species and communities identified as at-risk. This project focuses on assessments of the risk to native species from non-native invasive species in Nebraska. It will also conduct community-level risk assessments to evaluate the risk faced by those communities identified as “at-risk” by the Nebraska Game and Parks Commission Legacy Project. Modeling of both stressors and targets will be based on species-habitat associations with the use of relevant auxiliary data, as per Gap Analysis protocols. Several different GIS landcovers are available for the State of Nebraska and we will likely have to make use of several of them, as all have different strengths and weaknesses. Where possible, we will utilize the methods described in Allen et al. (2001) to incorporate minimum viable population modeling based on minimum critical areas for vertebrate models. Products will include spatial models of stressors and targets, models of spatial overlap, hazard indices, and relative risk indices for each target. Stressors (invasive species on the Nebraska Watch List) and targets have been identified and modeling is currently underway.
Cross Scale Structure and Scale Breaks in Complex Systems

Principal Investigator: Craig R. Allen
Graduate Student(s): Aaron Lotz, Ph.D.; Donald Wardwell, MS
Project Duration: July 1, 2004 – January 1, 2007
Funding: James S. McDonnell Foundation
Project Location: University of Nebraska–Lincoln, Clemson University

This research was motivated by the discovery of regular patterns of deviation from scaling laws and the continuous distributions of attributes of complex systems. These suggest that systems organize over discrete ranges of scale, and that organization abruptly shifts with changes in scale. If this is so, scaling laws serve only as the baseline from which to measure those departures, and those departures indicate “scale breaks” (transitions) between scales of structure in complex systems. Patterns of scale breaks from a scaling law baseline may provide clues of the processes that lead to the emergence of the scaling relationships themselves. At the minimum, investigating departures from scaling laws give us a clue into the nature of structure and process of the system in question and helps us understand and perhaps predict phenomena that have puzzled ecologists and other scientists, such as the generation of biological diversity and the emergence of phenomena such as resilience.

Scale breaks in attributes of animal communities such as body masses correlate strongly with a set of poorly understood biological phenomena that seem to mix contrasting attributes. These phenomena include invasion, extinction (high species turnover), increased population variability, migration and nomadism. Recently, it has been demonstrated that the body masses of endangered and invasive species in a community occur at the edges of body mass aggregations two to four times as often as expected by chance. That correlation is consistent in all data sets examined so far. Those include four different taxa in two different ecosystems. It may seem surprising that both invasive and declining species are located at the edge of body-mass aggregations. These results suggest that something similar must be shared by the two extreme biological conditions represented by invasive species and declining species. An examination of the phenomena of nomadism in birds in an Australian Mediterranean climate ecosystem found that nomadic birds also cluster about scale breaks (occur at the edge of body mass aggregations). The clustering of these phenomena at predictable scale breaks suggests variability in resource distribution or availability is greatest at these states. Location at scale breaks affords species great opportunity, but also potential crisis. Complex behaviors such as migration and rapid adaptation leading to speciation may evolve most efficiently and commonly at scale breaks, where there is the greatest potential reward, although with the highest potential cost. This project specifically investigates cross-scale structure and its implications in ecosystems.
**Resilience in Ecosystems**

Principal Investigator: Craig R. Allen

Graduate Student(s): Donald Wardwell, MS

Project Duration: July 1, 2004 – January 1, 2007

Funding: James S. McDonnell Foundation

Project Location: Lancaster County, Nebraska

We are conducting experimental and empirical tests of the model of cross-scale resilience proposed in 1998. One prediction following from that model is that birds of different body size respond differently to resources as they “scale up” and aggregate in larger concentrations. An example of this occurs with pest outbreaks—when larger volumes of trees are infested with insects such as spruce budworm, larger bird species begin to exploit the pest, and are drawn from broader areas to do so. This provides a robust check on outbreaks over a broad range of spatial and temporal scales.

We have conducted simulations comparing *actual* distributions of function across animal size classes against *simulated* distributions, and found that the richness of function across size classes in real ecological systems is more constant than expected. Field research began in May 2006 to measure the difference in spatial response of birds of different body size to resources aggregated at different levels in row crop agricultural fields. Analysis of that data is currently underway.
An Adaptive Management Approach for Selecting Habitat Improvement Targets in the Shortgrass Prairie Ecosystem

Principal Investigators: Andrew Tyre, Craig Allen, Mike Fritz and Scott Taylor; Naikoa Aguilar-Amuchastegui, Post-Doc Research Associate

Graduate Student(s): none

Project Duration: September 1, 2006 – August 31, 2007

Funding: U.S. Fish and Wildlife Service

Project Location: Western Nebraska

The focus of this newly-awarded project is to explicitly develop some of the models needed for an adaptive resource management approach to managing the shortgrass prairie ecosystem, and to outline how they could be applied to one important management decision: the selection of land for conservation incentive programs. Five Tier I shortgrass prairie species from the Nebraska Natural Legacy plan (Burrowing Owl, Ferruginous Hawk, McCown's Longspur, Mountain Plover, and Swift Fox) favor prairie dog-influenced grassland. The project will be initiated by predicting the distribution of this habitat based on an existing set of aerial survey data. The specific objectives we will pursue are to 1) predict the potential distribution of high quality shortgrass prairie by using cutting edge statistical methods to combine existing datasets surveying prairie dog-influenced grassland, 2) design a new survey to maximize efficient detection of temporal change by using the predictions from Objective 1 to identify regions of greatest uncertainty, and 3) prioritize land for conservation incentives that maximizes increased habitat for minimum cost by combining the predictions from Objective 1 with an optimization model.
Teaching

Craig Allen

Spring 2006: Natural Resources (NRES) 896, *Ecology of Biological Invasions*

Biological invasions are an accelerating global phenomenon with potential far-reaching economic and ecological impacts. This course is intended to increase students’ understanding of invasions and their impacts. It draws from plant, invertebrate and vertebrate examples. The focus is primarily upon animal invasions and understanding the effects on structure, process and function of “native” ecological systems. Towards the latter part of the semester, time is devoted to developing and testing hypotheses related to invasions. Some areas covered include which species invade, which communities are invaded, invasion processes, control and management, invasions and extinctions, impacts on native species, impacts on ecosystems, economic impacts, global comparisons, community and ecosystem assembly. A manuscript resulting from the class project, with all students as coauthors, is currently being drafted.

Spring 2007: Natural Resources (NRES) 896, *Landscape Ecology*

The focus of this course will be on the investigation of spatial heterogeneity and pattern: how to characterize patterns, how they develop and change through time, and its implications for populations, communities, and ecosystem processes. We will explore both theoretical and applied aspects of landscape ecology. Additionally, students will develop and complete a project focusing on some aspect of landscape ecology and employing methods of spatial analysis. Upon completion of this course, students will have knowledge of a number of prominent issues in landscape ecology.

Kevin Pope

Spring 2007: Natural Resources (NRES) 896, *Managed Aquatic Ecosystems* (team-taught with Mark Pegg, UNL)

Anthropogenic disturbances are commonplace in inland waters of developed and developing countries. This course is designed to increase students’ understanding of ecological processes that occur in regulated river basins and associated problems or opportunities that arise with fishery management. The focus is primarily on fishes and understanding how structure, process and function of aquatic systems are influenced by human activities. Topics covered include river continuum concept, Thorton’s reservoir continuum model, nutrient cycling, population dynamics, biotic interactions and river-reservoir interfaces. A unique aspect of this course is the presence of both professors in the classroom; that is, this course is truly team-taught, providing students the formal opportunity to interact with two faculty members that have differing experiences and sometimes differing opinions.
Training and Workshops

Craig Allen

- Co-instructor, Workshop on Advances in Macroecological Methods, Department of Animal Ecology, Swedish University of Agricultural Sciences, Umeå, Sweden, October 2005.


Kevin Pope

- Instructor, Motorboat Operator Certification Course, Lubbock, Texas, December 2005

- Co-instructor, Motorboat Operator Certification Course, Lincoln, Nebraska, April 2006

- Co-instructor, Motorboat Operator Certification Course, Brookings, South Dakota, May 2006
Professional Activities

Peer-Reviewed Publications


**Presentations at Scientific Meetings**


Allen, C. R. Resilience and Novelty in Ecosystems and other Complex Systems. Texas Tech University, Biology Department, Seminar Series. Lubbock, Texas, November 2005. *(Invited by graduate student association)*


Allen, C. R. Resilience in ecosystems and other complex systems. School of Biological Sciences Seminar Series, University of Nebraska–Lincoln. Lincoln, Nebraska, February 2005. (Invited presentation)

Allen, C. R. The Nebraska Cooperative Fish and Wildlife Research Unit. Center for Grassland Studies Advisory Board. Lincoln, Nebraska, October 2004. (Invited presentation)


Graduate Committee Service

Craig Allen
- James Eckberg (Ph.D., School of Biological Sciences, UNL)
- Robert George (Ph.D., University of Queensland, Australia—external dissertation examiner)
- Mathew Giovanni (MS, School of Natural Resources, UNL)
- Max Post van der Burg (Ph.D., School of Natural Resources, UNL)
- Shana Sundstrom (MS, University of Calgary, Canada)

Kevin Pope
- Jennifer Hogue (MS, School of Natural Resources, UNL)
- Bart Durham (Ph.D., Dept. of Natural Resources Management, TTU)
- Joy Ferenbaugh (Ph.D., Department of Biology, TTU)

Professional and Faculty Service

Craig Allen
- Associate Editor (Macro and Landscape Ecology), Ecology and Society
- Board of Directors, The Resilience Alliance (http://www.resalliance.org)
- Board of Directors, Nebraska Chapter of The Wildlife Society
- Steering Committee, Midwest Fish and Wildlife Conference
- Steering Committee, Nebraska Partnership for All-Bird Conservation

Kevin Pope
- Associate Editor, Transactions of the American Fisheries Society
- Book Editorial Advisory Board, American Fisheries Society
- Faculty Advisor/Instructor, Conservation Leaders for Tomorrow Program

Professional Awards

Kevin Pope
- Outstanding Fisheries Worker of the Year for Fisheries Education, Texas Chapter of the American Fisheries Society
We extend our appreciation to the staff and students of the Nebraska Cooperative Fish and Wildlife Research Unit, and to the U.S. Fish and Wildlife Service for photographs used in this report.