

**South Dakota Cooperative
Fish and Wildlife Research Unit
U.S. Geological Survey**

2015 ANNUAL REPORT



IN COOPERATION WITH:

South Dakota State University
South Dakota Department of Game, Fish & Parks
Wildlife Management Institute
U.S. Fish and Wildlife Service

South Dakota Cooperative Fish and Wildlife Research Unit

FOREWORD

The South Dakota Unit of the U.S. Geological Survey's Cooperative Research Unit program has served an important role in graduate education and technical assistance in fish and wildlife management at South Dakota State University since 1963. Research at the South Dakota Unit, guided by our Coordinating Committee, is conducted primarily by graduate students (M.S. and Ph.D.) studying a wide range of natural resource problems. The Unit is housed in the Department of Natural Resource Management at South Dakota State University, where we share a large supply of field equipment and on/off-campus laboratory facilities. The USGS EROS Data Center and the GIS Center of Excellence (GISCE) at SDSU provide unique resources and collaborative opportunities for the South Dakota Coop Unit.

Since 1963, about 248 theses and dissertations have been completed by students working through the South Dakota Coop Unit. Unit students have conducted research on a range of topics that include endangered species, wetland ecology, fisheries management, upland game, big game management, and non-game species. A list of theses and dissertations is available at <http://www.sdstate.edu/wfs/publications/index.cfm>. In 2010, Professor Emeritus and Assistant Unit Leader (retired) Dr. Kenneth F. Higgins established an endowment to support graduate student research at SDSU. The *Kenneth F. Higgins Waterfowl Legacy Research Endowment* is directed toward supporting graduate student research activities that benefit wetland-dependent avian species. Contributions to the endowment can be made by contacting the SDSU Alumni Association (888.735.2257; alumni@statealum.com).

In keeping with over 50 years of tradition, the Unit continues to address applied research needs of our state and federal cooperators to help manage fish and wildlife resources in the Northern Great Plains. Please feel free to contact us for more information.

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COOPERATING FACULTY – SOUTH DAKOTA STATE UNIVERSITY

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| Dr. Katie Bertrand | Natural Resource Management | Fish ecology |
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| Dr. Michael Brown | Natural Resource Management | Limnology studies |
| Dr. Delvin DeBoer | Civil and Environmental Engineering | Water quality |
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| Mr. Michael Kjellsen | Natural Resource Management | National Wetland Inventory |
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| Dr. Michael Miller | Economics | Economic Impact of Fishing |
| Dr. Darrell Napton | Geography | Wetland study |
| Dr. Regg Neiger | Veterinary Sciences | Waterfowl studies |
| Dr. Nels Troelstrup | Natural Resource Management | Oak Lake Field station |
| Dr. Michael Wimberly | GIS Center of Excellence | Pallid sturgeon |
| Dr. Melissa Wuellner | Natural Resource Management | Fish ecology studies |

REGIONAL COOPERATING SCIENTISTS

| <u>Name (South Dakota Unit Person)</u> | <u>Agency/University</u> | <u>Subject</u> |
|--|----------------------------------|-------------------------------|
| Mr. Geno Adams (Gigliotti) | SD GFP | Internet Angler Surveys |
| Dr. Michael Anteau (Stafford) | USGS – NPWRC | Wetland and waterbird health |
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| Mr. Michael Barnes (Chipps) | SD GFP | Salmonid ecology |
| Dr. James Breck (Chipps) | MI DNR | Fish bioenergetics |
| Dr. John Coluccy (Stafford) | Ducks Unlimited, Inc. | Conservation planning |
| Mr. Jake Davis (Chipps) | SD GFP | Black Hills trout |
| Mr. Kris Edwards (Chipps) | SD GFP | Hydroacoustics |
| Dr. Michael Eichholz (Stafford) | Southern Illinois University | Migration ecology |
| Dr. Mark Fincel (Chipps) | SD GFP | Hydroacoustics |
| Mr. Craig Flemming (Chipps) | US Army Corps Engineers | Pallid sturgeon |
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| Dr. Rex Johnson (Stafford) | FWS HAPET – Fergus Falls | Conservation planning |
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| Dr. Dylan Kesler (Stafford) | University of Missouri | Avian ecology, modeling |
| Mr. Dave Luchessi (Chipps) | SD GFP | Small impoundments |

| | | |
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| Dr. Brian McLaren (Chipps) | Lakehead University | Lake sturgeon ecology |
| Mr. Rocco Murano (Stafford) | SD GFP | Waterfowl ecology |
| Dr. Ben O’Neal (Stafford) | Franklin College | Radar ornithology |
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| Dr. Aaron Pearse (Stafford) | USGS – NPWRC | Biometrics |
| Dr. Robert Pilsbury (Chipps) | University of Wisconsin | Didymo in the Black Hills |
| Dr. James Rice (Chipps) | North Carolina State University | Fish bioenergetics |
| Dr. Greg Sass (Stafford) | Illinois Natural History Survey | Integrated wetland management |
| Mr. Greg Simpson (Chipps) | SD GFP | Black Hills trout |
| Mr. Todd St. Sauver (Chipps) | SD GFP | Small impoundments |
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| Dr. James Stone (Chipps) | South Dakota School of Mines & Tech. | Hg Studies |
| Mr. Sam Stukel (Chipps) | SD GFP | Pallid sturgeon |
| Dr. Corey Suski (Chipps) | University of Illinois | Fish Physiology |
| Dr. Chris Swanson (Stafford) | FWS – Kulm WMD | Grassland bird ecology |
| Dr. David Wahl (Chipps) | Illinois Natural History | Bioenergetics |
| Mr. Matt Ward (Chipps) | SD GFP | Walleye foraging |
| Dr. Molly Webb (Chipps) | FWS, Bozeman, Montana | Lake sturgeon reproduction |
| Dr. Tim Welker (Chipps) | US Army Corps Engineers | Pallid sturgeon |
| Mr. George Williams (Chipps) | US Army Corps Engineers | Pallid sturgeon |
| Dr. Steve Windels (Chipps) | National Park Service | Lake sturgeon |

ADMINISTRATIVE SUPPORT

SOUTH DAKOTA DEPARTMENT OF GAME, FISH & PARKS

The South Dakota Unit works closely with SD Department of Game, Fish and Parks. We thank Tony Leif, Tom Kirschenmann, John Lott, Geno Adams, Chad Switzer, Eileen Dowd Stukel and Emmett Keyser for their administrative assistance. We are particularly grateful to Tanna Zabel for her help and assistance with Federal Aid coordination.

SOUTH DAKOTA STATE UNIVERSITY

The Unit receives administrative assistance from SDSU and we wish to thank Kate Tvedt, Terri Symens, Di Drake, Dawn Van Ballegooyen from NRM as well as Martha Aragon, Holly Beutler, Dr. James Doolittle, Shirley Jensen, Kay Scheibe, Ann Taecker, and Doug Ward.

US GEOLOGICAL SURVEY, COOPERATIVE RESEARCH UNIT PROGRAM

The South Dakota Unit receives guidance from the CRU Headquarters staff in Reston, VA. We thank Suzanne Cartagirone, Shana Coulby, Brenda Croston, Don Dennerline, Terry Linton, Rita Raines, Mike Tome, John Thompson and John Organ for their advice and assistance.

US FISH AND WILDLIFE SERVICE

We thank the Great Plains Fish & Wildlife Management Office, Gavin’s Point National Fish Hatchery, Garrison National Fish Hatchery, and the National Wildlife Refuge offices for continued support of Unit-related research.

PROGRAM DIRECTION STATEMENT

The Unit's program direction is reviewed annually by our Coordinating Committee. The overall program direction will be to conduct applied research to benefit management of Northern Great Plains habitats, biota, and human dimensions. Wetland and upland research in the Prairie Pothole Region will incorporate landscape-level influences of natural and anthropogenic variation on the fish, wildlife, invertebrates, and plant communities in this region. Ecological services – such as water retention, livestock forage, flood reduction, ground water recharge, esthetics, and fishery potential – will be included in research efforts when appropriate. Applied aspects of wetland and upland research will address wetland conservation, production of waterfowl and other avifauna, human dimensions of wildlife management, and integration with agricultural and aquaculture practices. Fisheries research will focus on the management, conservation, and production of native species and sport fishes. The Unit will develop collaborative and integrative research programs with state, federal, and NGO agencies to address emerging issues dealing with climate change, land-use patterns, invasive species, and conservation of fish and wildlife of the Northern Great Plains. Because of its socio-economic and recreational value, the Missouri River provides unique challenges and opportunities in the region. Thus, the study of native, endangered, and introduced fishes and wildlife of the Missouri River will continue to be a focus of Unit research.



COMPLETED PROJECTS

Influence of Reservoir Productivity on Food Web Structure and Walleye Stocking Success in Two South Dakota Impoundments

Management of walleye fisheries in South Dakota impoundments can be hindered by factors that include poor habitat quality, eutrophication and limited natural recruitment. Richmond and Mina reservoirs, in northeastern South Dakota, are important regional fisheries managed for walleye. Natural reproduction of walleyes in both reservoirs is low, necessitating periodic stocking of fingerling fish. The extent to which factors such as prey availability and(or) environmental variation influences growth and survival of young walleyes is not known. To address these questions, we used a combined field and experimental approach to evaluate diet, growth and survival of fingerling walleye in Mina and Richmond reservoirs. Walleye <300 mm had better condition and growth in Richmond Lake because of increased proportion of fish in their diet. However, Walleye > 300 mm were larger in Mina Lake which may be the result of decreased competition and increased consumption of fish prey. Poor survival of walleye fingerlings was related to low dissolved oxygen in both Mina and Richmond lakes. C₁₃ and N₁₅ signature of Freshwater Drum was similar to Walleye in Mina Lake, especially for small individuals. Freshwater Drum may compete with Walleye for prey resources in Mina Lake and thus contribute to reduced growth of Walleye.

FUNDING

South Dakota of Game, Fish and Parks

INVESTIGATOR

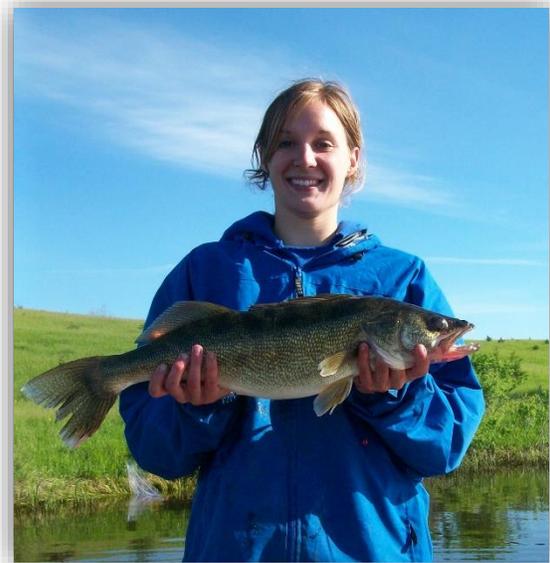
Megan Thul, M.S. candidate

FACULTY

Steve Chipps and Brian Blackwell

COMPLETION

October 2014



Evaluating the Value of the Internet for the Collection of Scientific Data (use, harvest and attitudes) from Anglers

Fishery managers have long recognized the need for and value of human dimensions information for managing the fisheries resources. Collecting good scientific data representative of the angling population is very expensive and takes months to collect and analyze. Recent advances in computer technology and widespread use of the Internet by the public have generated considerable interest in using Internet-based survey methodology. The main advantages of using the Internet are speed and cost savings. However, two major factors that reduce the validity of Internet-based survey methodology are non-response bias and sample validity resulting from incomplete coverage of the target population. It may be possible to develop correction formulas for certain data that would be applicable for longer periods without the need for expensive annual correction procedures. Such correction formulas could save SDGFP considerable amounts of effort and money and permit annual collection of reliable and valid angler data.

Two years of data have been analyzed from annual surveys of anglers for the 2011 and 2012 South Dakota fishing seasons. Internet survey data was compared with a mail survey of anglers without email addresses in SDGFP's license database and a mail survey of Internet non-responders to identify coverage and nonresponse bias of Internet surveys. This study concluded that Internet surveys, when corrected for sex, age, and percent fishing biases, can provide accurate and reliable data similar to mail surveys for the variables normally measured in the South Dakota statewide angler monitoring survey.

FUNDING

South Dakota Game, Fish and Parks

INVESTIGATOR

Kjetil Henderson, M.S. candidate

FACULTY

Larry Gigliotti

COMPLETION

December 2014



Modeling the Effects of Pattern Field Tiling on the Hydrology and Ecological Functioning of Prairie Pothole Wetlands

In the 20th century, the eastern Dakotas remained a boon for wetland-dependent wildlife, providing additional ecological services, even in a largely agricultural landscape. In the early 21st century, wetland-oriented field research in hydrology and ecology has failed to keep pace with the rate of agricultural tile drainage of the eastern Dakotas. Our analysis revealed significant potential for wetlands to have shortened surface water inundation periods and mean depths under particular tile drainage regimes. Simulated wetland-oriented hydrologic attributes showed hydroperiod reductions greater than 50% under certain tile drainage scenarios, with significantly more sensitivity to depth-based setbacks than distance-based setbacks. To minimize the greatest impacts to inundation time and mean depth, tile drains should remain above the wetland bottom and greater than 30 meters from the wetland edge.

FUNDING

U.S. Fish & Wildlife Service
U.S. Geological Survey (RWO #
105)

FACULTY

Carter Johnson

COMPLETION

December 2014



Integrated Regional Modeling of Land Use Change and Natural Vegetation Dynamics

There is a current need for spatially explicit models that can simulate multiple drivers of land cover change, including land use transitions, land management practices, natural disturbances, and natural vegetation dynamics, at regional to continental scales. The land cover change models that are currently available typically incorporate only a subset of these processes and have been implemented across much smaller spatial extents. This research project resulted in the development of the Coupled Human and Natural Geospatial Environments (CHANGE) model for integrated land cover change modeling. To create this model, we combined algorithms from an existing land use and land cover change model (FORE-SCE) with a landscape model of natural disturbances and vegetation succession. The new model was programmed in C++ and was successfully used to project future interactions of fire regime change and wildland-urban interface growth in the Colorado Front Range. Continued testing and application of the CHANGE model is ongoing.

FUNDING

U.S. Geological Survey (RWO # 109)

INVESTIGATOR

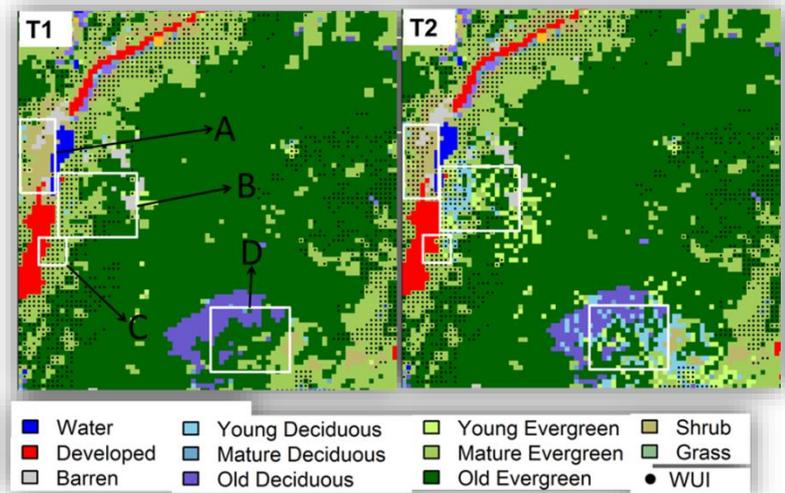
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FACULTY

Mike Wimberly

COMPLETION

March 2015



River Channel Restoration and Pecos Bluntnose Shiner Recruitment

The federally (USA) and state (NM, TX) threatened Pecos bluntnose shiner (*Notropis simus pecosensis*) persists in only one segment of the Pecos River, New Mexico. The biology of this species has been extensively studied and previous studies have suggested that the population is limited in part by downstream displacement of eggs and larvae during extended, high-discharge reservoir releases and by dewatering that occurs during drought periods when little or no water is released from upstream reservoirs. We evaluated how Pecos bluntnose shiners responded to a recent channel restoration project on the Pecos River, New Mexico. Channel restoration showed no improvement to aquatic habitat conditions, fish assemblage diversity and composition, provision of slackwater nursery areas, recruitment of early-juvenile fishes and provision of potential prey items. Periods of low discharge and streamflow intermittence likely impaired our ability to effectively assess the restoration effort. Thus, we suggest that future restoration efforts focus on a more holistic approach that includes both physical channel restoration and flow regime restoration.

FUNDING

U.S. Bureau of Reclamation (RWO # 106)

INVESTIGATOR

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FACULTY

Brian Graeb and Chris Hoagstrom (Weber State)

COMPLETION

May 2014



Quantifying Trophic Interactions and Effects of Harvest Regulations on Lake Trout and Northern Pike in Pactola Reservoir, South Dakota

Lake trout are a non-native fish in South Dakota and were first stocked in Pactola Reservoir in the late 1970s. Unlike other stocked salmonids, lake trout exhibit relatively slow growth and long maturation time, resulting in a fishery that takes years to develop. The recent, illegal introduction of northern pike in Pactola Reservoir may further complicate management options for lake trout, and other salmonid species currently managed in the reservoir. Anecdotal information from anglers and fish surveys suggest a marked increase in the abundance of northern pike and concomitant declines in catch rate of stocked rainbow trout. In this study, we used bioenergetics modeling to evaluate trophic interactions and assess annual predatory demands by Lake Trout *Salvelinus namaycush* and Northern Pike *Esox lucius* in Pactola Reservoir, South Dakota. Diets and stable isotope analyses showed ontogenetic shifts for both species. Rainbow Smelt *Osmerus mordax* accounted for 52% of the annual consumption by sub-adult Lake Trout. However, adult Lake Trout annual consumption was comprised mainly (67%) of Bluegill *Lepomis macrochirus*. Younger Northern Pike fed on an array of prey items, with Rainbow Smelt being a frequent prey item during spring (27%). Larger Northern Pike (>600 mm) fed primarily (65% of diet) on stocked Rainbow Trout *Oncorhynchus mykiss*. Except for spring consumption of Rainbow Smelt, our findings show that diets of Lake Trout and Northern Pike exhibit little overlap. Large Northern Pike are a primary source of post-stocked mortality on Rainbow Trout. Efforts to mitigate predation losses should include the reduction of Northern Pike in Pactola Reservoir and decreasing the vulnerability of stocked Rainbow Trout.

FUNDING

South Dakota Game, Fish and Parks

INVESTIGATOR

Natalie Scheibel, M.S. candidate

FACULTY

Steve Chipps, Jake Davis (GFP), Dan James (USFWS)

COMPLETION

September 2015



ONGOING PROJECTS

Development of a Spatially Explicit Growth Model for Larval Pallid Sturgeon: A New Tool for Habitat Assessment

The pallid sturgeon (*Scaphirhynchus albus*) is a federally endangered species native to the Missouri and lower Mississippi River. Throughout much of the Missouri River system, natural reproduction by pallid sturgeon is believed to be negligible--attributed primarily to the loss of spawning habitat and(or) rearing areas. Long-term recovery and maintenance of this species will likely require significant habitat restoration efforts, with an emphasis on spawning and nursery habitat. In this study, we developed a growth model that will allow researchers to evaluate habitat quality and survival potential for age-0 pallid sturgeon. To do so, a series of studies were performed to quantify foraging dynamics and energetics of age-0 sturgeon that served as inputs in the model. Feeding response, respiration rate, swimming performance, evacuation rate and feeding satiation were quantified as functions of water temperature (12-24°C) and fish size (10-150 mm). In addition, the model was evaluated by quantifying growth in small scale mesocosms simulating natural conditions. Using empirical data, the model was applied to various sites in the Missouri River to evaluate spatially-explicit growth patterns for age-0 Pallid Sturgeon. The model should prove useful for identifying important rearing areas and habitat restoration efforts for Pallid Sturgeon, given the general lack of natural reproduction and hence, the age-0 life-stage in the Missouri River.

FUNDING

U.S. Army Corps of Engineers (RWO #104)

INVESTIGATOR

David Deslauriers, Ph.D. candidate

FACULTY

Steve Chipps, Brian Graeb, Brian McLaren
(Lakehead University)

EXPECTED COMPLETION

December 2015



Evaluating Relationships Between Wetland Quality, Land Use, and Waterbirds in the Prairie Pothole Region

Wetland drainage and upland conversion for agriculture has significantly altered the landscape of the Prairie Pothole Region of North America. As a result, this region now contains a mosaic of disturbance regimes, from relatively intact pasturelands to nearly complete wetland and upland loss and conversion. Further, wetland drainage and upland conversion continue in the region and may be accelerating due to high commodity prices and mechanized drain tiling. Consequences of conversion may disturb bottom-up processes and reduce carrying capacity for waterbirds that rely on wetlands. Conservation and management efforts require reliable information on the responses of birds to habitat loss and for efficient allocation of resources. We will investigate wetland health and degradation by measuring plasma-metabolite dynamics of spring-migrating waterfowl and other waterbirds to variation in habitat quality in the Prairie Pothole Region.

FUNDING

U.S. Geological Survey (RWO #103), South Dakota
Department of Game, Fish & Parks

INVESTIGATOR

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FACULTY

Joshua Stafford, Michael Anteau (NPWRC)

EXPECTED COMPLETION

December 2015



Development and Evaluation of a Larval Pallid Sturgeon Energetics Model

Knowledge about feeding and growth dynamics of larval pallid sturgeon (*Scaphirhynchus albus*) is important for identifying rearing areas and monitoring habitat restoration efforts. Use of ecological models to estimate growth potential of larval pallid sturgeon represents a new approach for assessing habitat suitability for this critical life stage. In this study, we developed a bioenergetics model to determine optimal temperature for growth in young-of-year pallid sturgeon. To parameterize the model, we estimated metabolic demands and growth of pallid sturgeon subjected to a range of temperatures commonly found in the Missouri River (13–24°C). We used static respirometry to quantify routine respiration rate. Exogenously feeding larvae were fed chironomids over a range of ration levels (0-50% body weight) to determine maximum consumption and estimate growth. Larval pallid sturgeon exhibited a 77% increase in metabolic rates and a 52% increase in consumption rates from 13-24°C. Critical thermal maximum was evaluated by increasing temperatures 1°C every half hour from acclimation temperatures until lethal temperatures were achieved (34°C). Upper, lethal temperatures were significantly different between endogenous and exogenous larvae acclimated at water temperatures of 13-24°C. On the average, lethal temperatures for endogenous larvae were 2.6 to 3.5°C lower than those for exogenous fish. The quantification of these bioenergetic parameters will allow us to estimate energetic requirements of larval pallid sturgeon, to make growth predictions from field observations, and to determine availability of optimal temperature ranges within the Missouri River.

FUNDING

U.S. Army Corps of Engineers (RWO #104)

INVESTIGATOR

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FACULTY

Steve Chipps

EXPECTED COMPLETION

December 2015



Human Dimensions of Habitat Loss in the Plains & Prairie Pothole LCC

The Plains & Prairie Potholes Landscape Conservation Cooperative (PPP-LCC) identified habitat loss (factors influencing land use and land conversion) as a key research need in 2012. This grassland-wetland ecosystem provides essential habitat for an array of wildlife, especially waterfowl. Temperate grasslands are one of the most threatened biomes worldwide, with the greatest threat being conversion to annual crop production. Recent studies have estimated a net loss of 1.3 million acres of grassland from 2006 to 2011 in five states (ND, SD, NE, MN, IA). Many factors contribute to loss of wildlife habitat, but ultimately it comes down to decisions made by the private landowner. Currently, economic pressures from high corn and soybean prices probably figure heavily in the decision; however, understanding how a private landowner responds to economic incentives/pressures may identify strategies to reduce habitat loss in the Plains and Prairie Pothole Region. Also, farmers and ranchers generally have more than an economic interest in their lands often with strong social and cultural ties to their lands. Moreover, half of all current farmers and ranchers are likely to retire in the next decade often resulting in the agricultural land being split among surviving relatives who do not plan to continue farming/ranching. The purpose of this study is to (1) measure attitudes and behaviors towards participating in conservation programs, (2) identify future changes in farming/ranching practices related to the aging trend of farmers/ranchers, and (3) measure the wildlife value orientations of landowners and the relationship with attitudes and intended behaviors towards participating in conservation programs.

FUNDING

U.S. Fish and Wildlife Service (RWO # 112)

INVESTIGATOR

Lily Sweikert, Ph.D. candidate

FACULTY

Larry Gigliotti

EXPECTED COMPLETION

December 2017



Social & Economic Impact of Fishing in Selected Small Lakes & Impoundments in South Dakota

South Dakota Game, Fish and Parks (GFP) has expressed a need for information to estimate the Direct Economic Impact (DEI) of fishing and other water-related recreation in selected small lakes and impoundments to local and state economies. GFP's strategic plan for the East River Fisheries Management Area (SDGFP, 2014a) lists a total of 257 natural lakes and impoundments (Table 1); the strategic plan for West River Fisheries Management area (SDGFP, 2014b) lists two natural lakes and over 100 small lakes and ponds under GFP management; and the strategic plan for the Black Hills Fisheries Management Area (SDGFP, 2014c) lists 47 small lakes and ponds under GFP management. Over time many of these lakes will require very expensive habitat renovation projects (e.g. dam repair, dredging, docks and boat ramps, complete fish renovations, etc.) to improve or maintain quality recreational services. Economic information of the value of fishing and other water-related recreation can help inform decisions regarding expensive habitat renovation projects. Combined with usage information this information was used to estimate the value of recreational activities at various lakes and to justify expenditures for improving amenities and services provided by South Dakota.

FUNDING

South Dakota Game, Fish and Parks

INVESTIGATOR

Joshua Fergen, Ph.D. candidate

FACULTY

Larry Gigliotti

EXPECTED COMPLETION

December 2018



Dynamics of Wetland and Grassland Wetland Ecosystems in the Northern Great Plains

The U.S. Geological Survey is engaged in an on-going research effort to better understand wetland and grassland ecosystems and their associated biotic communities in the Northern Great Plains (NGP). Of specific research interest are the influences of landscape modification to support agriculture, habitat fragmentation, climate change, invasive plant and animal species, and runoff of chemicals and sediments on native flora and fauna. This project will use and update a historical (1960s) dataset to quantify dynamics of wetlands and their plant communities in the NGP. We will use this long-term comparison to investigate drivers affecting the biota and ecosystem function of wetland and grassland ecosystems, including land use and climate change. This project will directly contribute to priority information needs and conservation programs of partners and partnership organizations in the NGP, such as the Prairie Pothole and Northern Great Plains Joint Ventures.

FUNDING

U.S. Geological Survey-CRU, and Northern Prairie Wildlife Research Center - (RWO #108)

INVESTIGATOR

Ryann Cressey, M.S. candidate

FACULTY

Joshua Stafford, Jane Austin (NPWRC)

EXPECTED COMPLETION

December 2015



Settling Dynamics of Breeding Ducks in the U.S. Prairie Pothole Region, 1987-2011

In 1988, the U.S. Fish and Wildlife Service created two Habitat and Population Evaluation Teams to conduct an annual sample of wetlands and waterfowl (Cowardin et al 1995) in the U.S. Prairie Pothole Region. The goal of this survey is to estimate the impacts to lands in the National Wildlife Refuge System on waterfowl breeding populations and production. Approximately 583 4-mi² plots and 5,000 wetlands are surveyed each year for wetland condition and breeding pairs and aerial photography of each 4-mi² plot captures images of approximately 20,000 wetlands and surrounding uplands. Each year these aerial photos of plots are manually interpreted to estimate wetland ponded area and changes in upland land use. The resulting dataset spans 24 field seasons, making it a unique long-term habitat and population database. The objective of this study is to quantify the influence of local-scale factors on waterfowl pair density, using such variables as terrain relief and position, abundance and proximity of woody vegetation, emergent cover types and hydrologic conditions.

FUNDING

U.S. Fish and Wildlife Service, Region 3 HAPET Office

INVESTIGATOR

Fred Oslund, M.S. candidate

FACULTY

Joshua Stafford, Rex Johnson (HAPET)

EXPECTED COMPLETION

December 2015



Survival, Distribution and Relative Predation of Naturally-produced Rainbow Trout in the Deerfield Reservoir system

Rainbow trout are an important sport fish species in the Black Hills of South Dakota. While primarily stocked into lakes and streams to provide put-and-take fisheries, reproduction and subsequent recruitment into the adult population has been observed in two locations in the Black Hills. In one of those locations, Deerfield Reservoir, naturally reproduced rainbow trout were estimated to make up around 25% of the total population. Although rainbow trout are recruiting into the Deerfield Reservoir population, there is still a lack of knowledge regarding the spawning habitats utilized by rainbow trout in the system, as well as the survival and potential consumption of naturally reproduced fish. Given the reproduction and recruitment observed in Deerfield Reservoir, it would be desirable to managers to remove stockings and manage the fishery for wild rainbow trout. In order to fill in the existing knowledge gaps and provide managers with a greater comprehension of this unique rainbow trout fishery, our study will focus on achieving a better understanding of the production, survival, and distribution of naturally produced rainbow trout, as well as the diet composition of piscivorous fishes and potential predation on rainbow trout in Deerfield Reservoir.

FUNDING

South Dakota Game, Fish and Parks

INVESTIGATOR

Jeremy Kientz, M.S. candidate

FACULTY

Steve Chipps, Jake Davis (GFP), Dan James (USFWS)

EXPECTED COMPLETION

October 2015



Growth Potential and Genetic Diversity of Yellow Perch in South Dakota

Yellow perch (*Perca flavescens*) are a key component in fisheries throughout their range due to their value as an abundant and easily targeted sport fish, quality table fare, and their importance as a prey species for other piscivorous sport fish. Previous research on perch in South Dakota has identified two distinctly different population types which were characterized by differing growth, survival, and recruitment patterns. High quality populations exhibited fast growth, larger fish, low population densities, and inconsistent recruitment across years. In contrast, low quality populations were characterized by slow growth, high population densities comprised of smaller fish, and relatively consistent recruitment. An additional mortality component has been brought to question as well, with some populations seeing few individuals surpassing three years of age which limits the sport fish value of those fisheries. It is currently unknown whether these differing population characteristics are due to genetic differences. To address these questions, this project has developed the following objectives: 1) determine if differences exist in protein coding regions of yellow perch DNA among populations in South Dakota waters; 2) relate yellow perch genetic structure to perch growth and mortality rates; and 3) compare relative survival and growth of age-0 yellow perch from two distinct population types.

FUNDING

South Dakota Game, Fish and Parks

INVESTIGATOR

Alex Rosburg, M.S. candidate

FACULTY

Brian Blackwell (GFP), Justin VanDeHey (UWSP), and Steve Chipps



Effectiveness of Roundup® Ready Alfalfa for Nesting Habitat and Seedbed Preparation

Ring-necked pheasant and waterfowl populations provide bountiful recreational opportunities for residents and visitors of South Dakota, providing a strong economic boost for local economies. This provides strong incentives for the maintenance and sustainability of their populations. With a rapidly changing landscape to agricultural production, primarily due to the loss of CRP, management of remaining grasslands is imperative to the success of upland nesting game birds. Traditional management practices to provide nesting/brood rearing cover involve the use of agricultural crops to prepare tracts of land for grassland restoration, providing negligible benefits for wildlife during this time. New techniques to reduce the use of agriculture in restorations are being explored, including using Roundup® ready (RR) alfalfa as a means to prepare seedbeds for grassland restoration. RR alfalfa could provide nesting cover as well as an economically feasible way of controlling invasive and noxious weeds during restoration. The effectiveness of using RR alfalfa in grassland restorations and how upland nesting game birds utilize these tracts is unexplored, however, creating a knowledge gap in our understanding of the best management practices for grasslands. This study aims to close the gap in knowledge and help us manage grasslands for the benefit and sustainability of upland nesting game bird populations.

FUNDING

South Dakota Game, Fish and Parks
U.S. Fish and Wildlife Service
South Dakota State University
USGS, South Dakota Coop Unit

INVESTIGATOR

Neal Martorelli, M.S. candidate

FACULTY

J. Stafford, R. Haffele, J. Freidel, T. Runia, and R. Murano
(GFP)

EXPECTED COMPLETION

December 2016



Evaluation of the James River Conservation Reserve Enhancement Program in South Dakota

Although much of the original wetland area in the lower 48 states of the United States has been lost, progress has been made in recent decades to reduce additional loss and restore wetlands in watersheds throughout the Midwest. The Conservation Reserve Enhancement Program (CREP) is a valuable tool for wetland conservation, focusing the enrollment of wetland acreage in regions of priority determined by each state. The United States Department of Agriculture introduced CREP in 1998, forming partnerships with state and nongovernmental organizations in an effort to address specific regional conservation priorities. In South Dakota, a CREP project was proposed and approved for the James River watershed. The program was intended to provide a variety of environmental benefits and improvements, such as reducing peak flooding, sediment, phosphorus, and nitrogen pollution, and channel stabilization. The program aims to provide habitat for breeding non-game wildlife, specifically bobolink, upland sandpiper, chestnut-collared longspur, western meadowlark, grasshopper sparrow, savannah sparrow, dickcissel, and sedge wren. Projections also indicate production of 285,000 pheasants and 60,000 ducks annually from the project. Further, this CREP project was unique in that all lands under contract would also be required to allow public use through South Dakota's Walk-in Area program. This project aims to assess effects of CREP on water quality in the James River, its tributaries, and watershed wetlands and evaluate functional and numerical responses of avifauna to the James River CREP program.

FUNDING

South Dakota Game, Fish & Parks
U.S. Fish and Wildlife Service
South Dakota State University
USGS, South Dakota Coop Unit

INVESTIGATOR

Jarrett Pfrimmer, Ph.D. candidate

FACULTY

J. Stafford, K. Bertrand, E. D. Stukel (GFP), M. Norton, and R. Murano (GFP)

EXPECTED COMPLETION

December 2017



An Assessment of Direct Mortality to Avifauna from Wind Energy Facilities in North Dakota and South Dakota

Potential impacts of large wind energy developments to migratory and resident bird populations in the Prairie Pothole Region (PPR) within North Dakota and South Dakota remain poorly understudied even though 2,230 turbines are actively generating power in these states and numerous wind energy projects have been proposed for future development. Conservation agencies (both state and federal) entrusted with the protection of migratory birds and resident wildlife require empirical information to make informed decisions that minimize potential negative impacts to waterfowl, shorebirds, waterbirds, songbirds, galliformes, and raptor species that rely on large intact blocks of mixed-grass prairie and abundant wetlands to meet their life-history requirements. However, no information on potential direct mortality from wind turbines is available for the Missouri Coteau portion of the PPR across these avian guilds. Additionally, the Missouri Coteau is considered the most productive landscape for nesting waterfowl in North America. Because of the unique topographical characteristics of the Missouri Coteau and its importance to avian communities, site-specific information is in need to inform managers and wind energy developers regarding the siting of wind farms in areas whereby adverse impacts from direct mortality to birds are minimized.

FUNDING

U.S. Geological Survey (RWO # 110)

INVESTIGATOR

Bri Graff, M.S. candidate

FACULTY

Troy Grovenburg, J. Stafford, J. Jenks,
C. Swanson (USFWS), K. Jensen, R.
Klaver (USGS), S. Kempema (GFP)

EXPECTED COMPLETION

October 2015



Assess the Current Status of Reintroduced Swift Fox in Southwestern South Dakota

Since establishing that restored swift fox (*Vulpes velox*) populations in western South Dakota were in jeopardy of extinction due to high potential mortality, an additional factor that could further affect population viability of swift foxes has colonized rangeland within the distribution of the species. Plague (*Yersinia pestis*) is now evident within black-tailed prairie dog (*Cynomys ludovicianus*) towns throughout western South Dakota. Although the relationship between swift foxes and prairie dogs is controversial, swift foxes have been documented consuming prairie dogs during the pup-rearing period. Swift fox prefer shorter vegetation structure and become displaced as a result of the lack of vegetative clipping provided by prairie dogs. Vegetation height likely impacts the ability of fox to detect predators, which will greatly affect survival. Since the highly successful reintroduction in this area, there has been an apparent decline in the local swift fox population that seems directly related to plague, recent weather patterns, and possibly increased coyote numbers. Nevertheless, no information on the status of swift foxes in western South Dakota has been collected since a viability analysis completed in 2011, which was based on data collected pre-colonization of plague. Consequently, the status of swift fox in areas where prairie dog towns have been decimated by plague, including the Badlands Region, is unknown. Therefore, the purpose of this study is to determine the current status of swift fox as it relates to the Badlands National Park area and the historic population in Fall River County in southwestern South Dakota. This region of the state is within the historic distribution of the species and is representative of the area of effect of previous successful restoration efforts for the species conducted during the past decade.

FUNDING

U.S. Geological Survey (RWO # 111)

INVESTIGATOR

Sarah Nevison, M.S. candidate

FACULTY

J. Jenks, J. Stafford, E. Childers (NPS), J. Delger (NPS)

EXPECTED COMPLETION

October 2016



Investigating the Role of Super-shedders in Respiratory Disease Persistence and Transmission in Bighorn Sheep

Bighorn sheep (*Ovis canadensis*) respiratory disease is a major impediment to recovering bighorn sheep populations in western North America. Current understanding of the transmission dynamics of respiratory pathogens, believed to play a role in the etiology of this disease, is limited. The purpose of this study is to investigate aspects of these transmission processes, and specifically to determine if variability exists in the shedding rates of pathogens within individual bighorn sheep and the importance of this variability in sustaining the disease. Our hypothesis is that respiratory disease persists in bighorn sheep populations through infection of a small number of chronically infected or “super-shedder” animals that drive disease transmission in bighorn sheep herds. To test this hypothesis, we will capture free-ranging bighorn sheep with a known history of pathogen shedding and house them in a captive facility. We will then monitor their pathogen shedding patterns through time and classify individuals as either chronic, intermittent or non-shedders. Once we have established their shedding status we will perform commingling experiments of individuals from the various groups, and monitor shedding rates to determine if an individual’s shedding status changes based on its association with individuals exhibiting different shedding patterns. We will also monitor the effect of commingling on individual lamb survival. Through this experiment we hope to elucidate the importance of pathogen shedding patterns in bighorn sheep respiratory disease which will lead to the development of effective management strategies to recover bighorn sheep populations.

FUNDING

U.S. Geological Survey (RWO # 113)

INVESTIGATOR

Brandi Crider, M.S. candidate

FACULTY

J. Jenks, D. Walsh (USGS), F. Cassirer (IDFG), T. Besser (WSU)

EXPECTED COMPLETION

December 2016



Frances Cassirer

TEACHING

STEVE CHIPPS

Fall 2014: *Ecology of Aquatic Invertebrates*

This course covered the phylogeny, life-history, habitats and ecology of major freshwater invertebrates. Students developed an appreciation for biomonitoring theory and studied the impacts of exotic and invasive species.

JOSHUA STAFFORD

Spring 2015: *Wildlife Research Design*

This course provided students with exposure to the philosophy of science and critical thinking, important foundational work regarding wildlife study design and implementation, and an understanding of basic statistical tools and techniques that may be useful in their own research.

LARRY GIGLIOTTI

Spring 2015: *Public Involvement Principles & Techniques* (3 credits)

This course is designed to provide students aspiring to work in fisheries and wildlife or other natural resource management fields, whether at the federal, state, local level of government or an NGO, with a basic level of understanding of the public involvement principles and techniques.

AWARDS AND HONORS

DAVID DESLAURIERS, *Rob A. Klumb HAMMS Award*, Natural Resource Management, SDSU (2015)

ADAM JANKE, *Gay Simpson Memorial Award for Waterfowl Research*, Central Flyway Technical Section Committee (2014)

JEREMY KIENTZ, *Best Student Paper Award*, Dakota Chapter American Fisheries Society (2015)

JARRETT PFRIMMER, *Best Student "Open" Presentation Award*, South Dakota Chapter of The Wildlife Society (2015)

LILY SWEIKERT, *Kevin Honness Memorial Scholarship*, The Great Plains Natural Science Society (2015)

SCIENTIFIC PRESENTATIONS

Chipps, S.R., and M.J. Fincel. 2015. Climate change and fisheries production: Modeling the long-term effects of water surface elevation on fishing effort in Lake Oahe, South Dakota. 51st Annual Meeting Dakota Chapter American Fisheries Society, Bismarck, ND.

Chipps, S.R. 2015. Factors affecting mercury concentration in South Dakota fish. East Dakota Water Development District, Brookings, SD.

Cressey, R.L., J.E. Austin, and J.D. Stafford. 2015. Changes in wetland plant communities and wetland conditions in the Prairie Pothole Region after 50 years. Annual Meeting of Society of Wetland Scientists, Providence, Rhode Island.

Cressey, R. L., J. E. Austin, and J. D. Stafford. 2015. Changes in wetland plant communities and wetland conditions in the Prairie Pothole Region after 50 years. North Dakota Chapter The Wildlife Society, Mandan, North Dakota.

Cressey, R.L., J.E. Austin, and J.D. Stafford. 2015. Changes in wetland plant communities and wetland conditions in the Prairie Pothole Region after 50 years. Annual Meeting of South Dakota Chapter of The Wildlife Society, Oacoma, South Dakota.

Dembkowski, D., D.W. Willis, B. Blackwell, and S.R. Chipps, M. Wuellner. 2015. Estimating the influence of smallmouth bass predation on recruitment of age-0 yellow perch in South Dakota glacial lakes. 145th Annual meeting of the American Fisheries Society, Portland, OR.

Deslaurier, D.D., L. Heironimus, T. Rapp, B.D.S. Graeb, R.A. Klumb, and S.R. Chipps. 2015. Development and application of a spatially-explicit growth model for age-0 Pallid Sturgeon. 19th Annual Missouri River Natural Resources Conference, Nebraska City, NE.

Deslauriers, D., L.A. Heironimus, T. Rapp, S.R. Chipps, B.D.S. Graeb, and R.A. Klumb. 2015. Development and application of a spatially explicit growth model for age-0 pallid sturgeon. 145th Annual meeting of the American Fisheries Society, Portland, OR.

Deslauriers, D., S.R. Chipps, J.A. Breck, and C.P. Madenjian. 2015. Fish Bioenergetics 4.0: the inauguration of a new era. 145th Annual meeting of the American Fisheries Society, Portland, OR.

Gigliotti, L.M. 2014. A human dimensions study of law enforcement. Pathways to Success Conference: Integrating Human Dimensions into Fisheries and Wildlife Management. Estes Park, CO.

Gigliotti, L.M., and K.R. Henderson. 2015. Reasons anglers did not respond to an internet survey and evaluation of data quality. South Dakota Academy of Science, 100th Meeting. Oacoma, SD.

Gigliotti, L.M. 2015. Using human dimensions in the management of Black Hills deer and mountain lions. University of North Dakota Biology Seminar, Grand Forks, ND.

Greiner, M.L., D.O. Lucchesi, S.R. Chipps, and L.M. Gigliotti. 2015. Take me fishing: the influence of kids on angler satisfaction. 145th Annual meeting of the American Fisheries Society, Portland, OR.

Henderson, K.R., and L.M. Gigliotti. 2014. Angler surveys: Internet samples can be representative. Pathways to Success Conference: Integrating Human Dimensions into Fisheries and Wildlife Management. Estes Park, CO.

Henderson, K.R., and L.M. Gigliotti. 2015. Angler satisfaction in South Dakota. South Dakota Academy of Science, 100th Meeting. Oacoma, SD.

Kientz, J.L., S.R. Chipps, and J.L. Davis. 2015. Movement and survival of wild Rainbow Trout within the Deerfield Reservoir system, South Dakota. 51st Annual meeting Dakota Chapter American Fisheries Society, Bismarck, ND.

Kientz, J.L., S.R. Chipps, and J.L. Davis. 2015. Abundance, survival, and relative predation of wild Rainbow Trout within the Deerfield Reservoir system, SD. Black Hills Fly Anglers, Rapid City, SD.

Martorelli, N. P. and J. D. Stafford. 2015. Evaluation of Waterfowl Production in Roundup® Ready Alfalfa Utilized for Perennial Grassland Conversion on Game Production Areas in Eastern South Dakota. South Dakota Game Fish and Parks Region 2 Annual Meeting, Project Update, Chamberlain, South Dakota.

Pfrimmer, J.D., L. Gigliotti, J.D. Stafford, D. Schumann, and K. Bertrand. 2015. Motivations for enrollment into the Conservation Reserve Enhancement Program in the James River Watershed. Human Dimensions Seminar, South Dakota State University, Brookings, South Dakota.

Pfrimmer, J.D., D. Schumann, J.D. Stafford, and K. Bertrand. 2015. Learning from Conservation Reserve Enhancement Program research in South Dakota: Where do we go from here? Izaak Walton League of America Mike Williams Lecture Series, Watertown, SD.

Pfrimmer, J., L.M. Gigliotti, J. Stafford, D. Schumann, and K. Bertrand. 2015. Motivations for enrollment into the Conservation Reserve Enhancement Program in the James River Watershed of South Dakota. TWS, South Dakota Chapter Annual Meeting, Oacoma, SD.

WORKSHOPS & TRAINING

S. Chipps:

Instructor, U.S. Department of Interior, Motorboat Operator's Certification Course (MOCC), Brookings, SD. April, 2015.

L. Gigliotti:

Instructor, Pathways to Success: Principles of Public Involvement Workshop, 75th Midwest Fish and Wildlife Conference, Indianapolis, IA. February 8, 2015.

J. Stafford:

Instructor, ATV Safety: USGS Off-Road Utility Vehicle Safety Training (ORUV) ATV/UTV, Brookings, SD. May 2015. (2 courses)

THESES AND DISSERTATIONS

Thul, M.D. 2014. Influence of food web structure and environmental conditions on Walleye stocking success in two South Dakota impoundments. M.S. thesis, South Dakota State University, Brookings, SD. 142 pp.

Scheibel, N.C. 2015. Age, growth, and trophic interactions of Lake Trout and Northern Pike in Pactola Reservoir: implications for Lake Trout management. M.S. thesis, South Dakota State University, Brookings, SD. 102 pp.

Heironimus, L.B. 2015. Development and application of a larval Pallid Sturgeon bioenergetics model. M.S. thesis, South Dakota State University, Brookings, SD. 69 pp.

Henderson, K.R. 2014. Evaluating the value of the internet for the collection of scientific data (use, harvest, and attitudes) from anglers. M.S. thesis, South Dakota State University, Brookings, SD. 118 pp.

Deslauriers, D. 2015. Development and application of a spatially-explicit model for estimating growth of age-0 Pallid Sturgeon in the Missouri River. Ph.D. dissertation, South Dakota State University, Brookings, SD. 169 pp.

SCIENTIFIC PUBLICATIONS

Breegemann, J.J., M.A. Kaemingk, T.J. DeBates, C.P. Paukert, J.R. Krause, A.P. Letvin, T.M. Stevens, D.W. Willis, and S.R. Chipps. 2015. Potential direct and indirect effects of climate change on a shallow natural lake fish assemblage. *Ecology of Freshwater Fish* 24:685-692.

Dembkowski, D.J., D.W. Willis, B.G. Blackwell, S.R. Chipps, T.D. Bacula, M.R. Wuellner. 2015. Influence of Smallmouth Bass predation on recruitment of age-0 Yellow Perch in South Dakota glacial lakes. *North American Journal of Fisheries Management* 35:736-747.

Fincel, M.J., S.R. Chipps, B.D.S. Graeb, and M.L. Brown. 2015. Diet breadth and variability in *Sander spp.* inferred from stable isotopes. *River Research and Applications*. DOI:10.1002/ra.2916

James, D.A., M.L. Bothwell, S.R. Chipps, and J. Carreiro. 2015. Use of phosphorus to reduce blooms of the benthic diatom *Didymosphenia geminata* in an oligotrophic stream. *Freshwater Science*. DOI:10.1086/683038.

Janke, A. K., M. J. Anteau, N. Markl, and J. D. Stafford. 2015. Is income breeding an appropriate construct for North American ducks? *Journal of Ornithology*. DOI:10.1007/s10336-015-1200-y

Sidie-Slettedahl, A. M., K. C. Jensen, R. R. Johnson, T. W. Arnold, J. E. Austin, and J. D. Stafford. 2015. Evaluation of autonomous recording units for detecting three species of secretive marsh birds. *Wildlife Society Bulletin* 39: 626-634.

Stafford, J. D., A. K. Janke, M. J. Anteau, A. T. Pearse, A. D. Fox, J. Elmberg, J. N. Straub, M. W. Eichholz, and C. Arzel. 2014. Spring migration of waterfowl in the northern hemisphere: a conservation perspective. *Wildfowl Special Issue* 4:70-85.