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

2013 ANNUAL REPORT – *CELEBRATING 50 YEARS OF SERVICE*

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. In 2013, the Unit celebrated its 50th Anniversary at SDSU. 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 240 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 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.

Steven R. Chipps
Unit Leader, Professor
Steven.Chipps@sdstate.edu
605.688.5467

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http://www.coopunits.org/South_Dakota/

CONTENTS

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COOPERATORS

South Dakota State University (SDSU); South Dakota Game, Fish and Parks (GFP); U.S. Geological Survey (USGS); Wildlife Management Institute (WMI); and the U.S. Fish and Wildlife Service (USFWS).

COORDINATING COMMITTEE

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RESEARCH PERSONNEL

Post-Doctoral Associates
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COOPERATING FACULTY – SOUTH DAKOTA STATE UNIVERSITY

Name	Department	Cooperative Activity
Dr. Katie Bertrand	Natural Resource Management	Fish ecology
Dr. Brian Blackwell	Natural Resource Management	Fish ecology
Dr. Michael Brown	Natural Resource Management	Limnology studies
Dr. Delvin DeBoer	Civil and Environmental Engineering	Water quality
Dr. Chuck Dieter	Natural Resource Management	Wildlife research
Dr. Barry Dunn	Dean, College of AgBio Sciences	Administration
Dr. Leigh Fredrickson	Natural Resource Management	Wetlands research
Dr. Brian Graeb	Natural Resource Management	Fish ecology studies
Dr. Troy Grovenburg	Natural Resource Management	Wildlife research
Dr. Jon Jenks	Natural Resource Management	Wildlife ecology
Dr. Kent Jensen	Natural Resource Management	Bird studies
Dr. Carter Johnson	Natural Resource Management	Wetland ecology
Dr. Carol Johnston	Natural Resource Management	Wetland ecology
Mr. Michael Kjellsen	Natural Resource Management	National Wetland Inventory
Dr. Gary Larson	Natural Resource Management	Plant science
Dr. Thomas Loveland	EROS-GIS Center of Excellence	Breeding bird study
Dr. Darrell Napton	Geography	Wetland study
Dr. Regg Neiger	Veterinary Sciences	Waterfowl studies
Dr. Nels Troelstrup	Natural Resource Management	Oak Lake Field station
Dr. David Willis	Natural Resource Management	Administration
Dr. Michael Wimberly	GIS Center of Excellence	Pallid sturgeon
Dr. Melissa Wuellner	Natural Resource Management	Fish ecology studies

REGIONAL COOPERATING SCIENTISTS

Name (South Dakota Unit Person)	Agency/University	Subject
Mr. Geno Adams (Gigliotti)	SD GFP	Internet Angler Surveys
Dr. Michael Anteau (Stafford)	USGS – NPWRC	Wetland and waterbird health
Dr. Jane Austin (Stafford)	USGS – NPWRC	Waterbird and wetland ecology
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
Mr. Gene Galinat (Chipps)	SD GFP	Black Hills trout
Dr. Robert Gates (Stafford)	The Ohio State University	Spring-migration ecology
Dr. James Garvey (Chipps)	Southern Illinois University	Diet Quantification
Dr. Heath Hagy (Stafford)	Illinois Natural History Survey	Waterbird foraging ecology
Dr. Daniel James (Chipps)	FWS-Pierre, SD	Rapid Creek ecology
Dr. Rex Johnson (Stafford)	FWS HAPET – Fergus Falls	Conservation planning
Dr. Dylan Kesler (Stafford)	University of Missouri	Avian ecology, modeling
Dr. Robert Klumb (Chipps)	FWS-Pierre, SD	Pallid Sturgeon
Mr. Dave Luchessi (Chipps)	SD GFP	Small impoundments
Dr. Charlie Madenjian (Chipps)	USGS Great Lakes Sci Cntr	Fish bioenergetics

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
Dr. Craig Paukert (Chipps)	Missouri Coop Fish and Wildlife Unit	Paddlefish
Dr. Aaron Pearse (Stafford)	USGS – NPWRC	Biometrics
Dr. Robert Pilsbury (Chipps)	University of Wisconsin	Didymo in the Black Hills
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
Mr. Kurt Schilling (Chipps)	FWS	Hatchery Studies
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. Pat Weatherhead (Stafford)	University of Illinois	Risk taking in ducks
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, and Dawn Van Ballegooyen (NRM), as well as personnel from the Office of Grants and Sponsored Programs: Holly Beutler, Dr. James Doolittle, Kathleen Campbell, Brenda Hayne, Kay Scheibe, and Doug Ward for their assistance and advice.

US GEOLOGICAL SURVEY, COOPERATIVE RESEARCH UNIT PROGRAM

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

In Memoriam

Robert A. (Rob) Klumb
1967-2013

We dedicate this report to Rob Klumb, an exceptional colleague and friend whose life tragically ended on July 8, 2013 in Pickstown, South Dakota. A Wisconsin native, Rob received his B.S. from the University of Wisconsin-Milwaukee in 1990 and his M.S. degree from the University of Wisconsin-Stevens Point in 1997. Rob joined the Department of Natural Resources at Cornell University in 1997 where he studied bioenergetics and near-shore habitat use by larval and juvenile alewife at the Cornell Biological Field Station, earning his Ph.D. in 2003. In 2002, Rob joined the U.S. Fish and Wildlife Service in Pierre, South Dakota as a Fisheries Research Biologist and was promoted to Project Leader of the Great Plains Fish and Wildlife Conservation Office in 2009.

Rob was a talented biologist who led a variety of research projects on fishes of the Missouri River. In addition to his Federal job duties, Rob also served as an Adjunct Associate Professor at South Dakota State University, where he played a fundamental role in coordinating federal research needs with student education.

Colorful, energetic and always positive, Rob was inspirational to students and colleagues. He always took the time to avail himself to other people to help them in their professional and personal endeavors. As a mentor, he led by example, and his hands-on approach earned him a large and loyal group of colleagues. His legacy will live on in the example he set for students and future professionals.

Rob's passion for science, politics and Milwaukee-made beer ran deep and wide. His inclusiveness and open-mindedness extended to both his work and his social life, and he will be remembered for the enthusiasm he exhibited in his approach to both. From the technicians that worked under his guidance to the students he mentored to the colleagues he left behind, his loss leaves a big void in the fisheries community. **The Robert A. Klumb Memorial Award** was established in memory of Robert Klumb, a life member of the Dakota Chapter of the American Fisheries Society. The scholarship recognizes outstanding student contributions in fisheries science. Donations can be made to: Dakota AFS - Klumb Fund, USGS South Dakota Coop Unit, NPBL 2140B, South Dakota State University, Brookings SD 57007.

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

An Assessment of Juvenile Lake Sturgeon and Their Habitats in the Namakan River of Northwestern Ontario

The Namakan River of Northwestern Ontario is home to a recovering population of lake sturgeon (*Acipenser fulvescens*). Although the adult portion of this population has been well studied in recent years, very little information has been available for the juvenile (< 61 cm) portion. This study was designed to gather baseline information focused primarily at locating "nursery areas" used by juvenile lake sturgeon. Netting at 5 locations returned catches ranging from 0.9 juveniles per net at the mouth of the Namakan River and Little Eva Lake to 4.1 juveniles per net in Bill Lake, about 14 km upstream from the river mouth. Movements of ten juvenile lake sturgeon caught in Bill Lake and later aged at 4-6 years were tracked and matched to local water depth and flow. Six acoustic receivers and two "synctags" (VEMCO, Amirix Systems Ltd., Halifax, NS) were stationed in a fixed array and the study fish were implanted with acoustic transmitters. Of these, two were not detected at any point by the receivers, while the remaining eight were each relocated by receivers an average of 6,913 (range = 3,470 to 11,442) times. Areas with relatively lower (6-8 cm/s) or greater (14-16 cm/s) water velocities were used more within the 95% Kernel Density Estimator home ranges of each of the eight fish than would be expected by chance. Shallow areas (< 6 m) of the Namakan River at Bill Lake were also avoided, amounting to fewer than 2% of all detections. The most consistent peak in activity occurred with the onset of ice cover on Bill Lake. The habitats used within the Namakan River and Reservoir by juvenile lake sturgeon generally consist of deep (>10 m), flowing waters downstream of known spawning locations.

Funding
U.S. National Park Service, Ontario Ministry of Natural Resources, Lakehead University

Investigator
Cam Trembath, M.S. candidate

Faculty
Brian McClaren and Steve Chipps

Expected Completion
December 2012

ONGOING PROJECTS

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

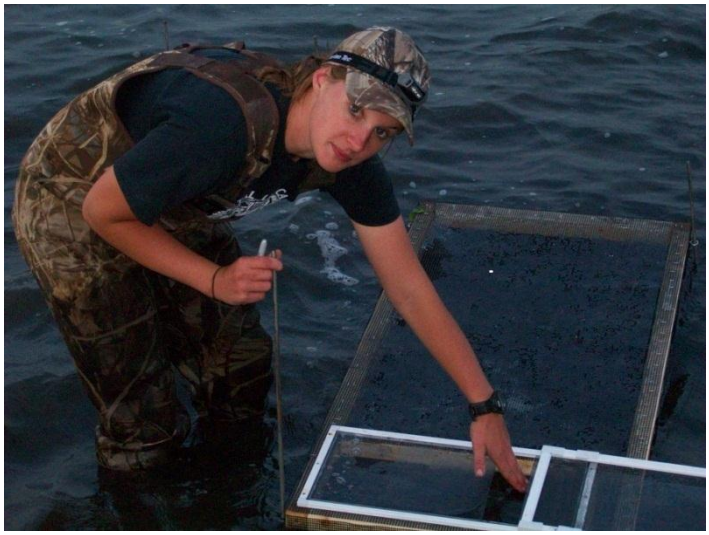
Management of walleye fisheries in South Dakota impoundments can be hindered by factors that include poor habitat quality, eutrophication and limited natural recruitment. Richmond and Mina reservoirs, in northeastern South Dakota, are important regional fisheries managed for walleye. Natural reproduction 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 are using a combined field and experimental approach to evaluate diet, growth and survival of fingerling walleye in Mina and Richmond reservoirs.

FUNDING
South Dakota Department of Game, Fish & Parks (F-15-R-1521)

INVESTIGATOR
Megan Thul, M.S. candidate

FACULTY
Steve Chipps and Brian Blackwell

EXPECTED COMPLETION
November 2013



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. Thus, knowledge about feeding and growth dynamics of larval pallid sturgeon is important for identifying rearing areas and monitoring habitat restoration efforts. The goal of this study is to develop a model that could be used to evaluate spatially-explicit growth potential for larval pallid sturgeon. By combining physiological energetics and functional feeding responses with site-specific, environmental conditions, the approach developed here will enable biologists to identify important rearing areas in the Missouri River.

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

INVESTIGATOR
David Deslauriers, Ph.D. candidate

FACULTY
Steve Chipps, Robert Klumb, Brian Graeb, Brian McLaren

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)

INVESTIGATOR
Adam Janke, Ph.D. candidate

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 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. However, to accomplish this will require a better understanding of larval fish energetics. We will develop a larval pallid sturgeon bioenergetics model using a generalized mass-balance equation,

$$C = (Ms + Ma + SDA) + (F + U) + (G),$$

where food consumption (C) is balanced by 1) respiratory demands (Ms, Ma, and SDA), 2) waste losses (F and U) and 3) growth processes (G). Here, Ms equals standard metabolism, Ma is energy expenditure due to activity, SDA is specific dynamic action, F and U are losses due to egestion and excretion, respectively, and G represents somatic growth and gonad production. Standard metabolism (Ms) is modeled as a function of body mass and water temperature. Other parameters are defined as a constant proportion of consumed energy (i.e., SDA, F, and U) or as a fixed multiplier of standard metabolism.

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

INVESTIGATOR
Laura Heironimus, M.S. candidate

FACULTY
Steve Chipps, Robert Klumb (USFWS)

EXPECTED COMPLETION
December 2015

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 1978 and 1979. Recent collections of small <250 mm lake trout also suggests that natural reproduction is occurring in the reservoir. Unlike other stocked salmonids, lake trout exhibit relatively slow growth and long maturation time, resulting in a fishery that takes years to develop. By the early 2000s, lake trout were reported to be a popular sport fishery in Pactola Reservoir; with the state record being broken three times in the summer of 2003. However, since then, mean length of lake trout in the catch has remained about the same with few fish exceeding 400 mm, thus contributing little to a trophy fishery. Moreover, body condition of lake trout is generally poor as indicated by a mean relative weight (W_r) of less than 85. Slow growth and poor condition of lake trout indicate that density dependent factors may be impacting the population.

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. Northern pike first appeared in lake surveys in 2003. 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. To ensure that the management goals for lake trout and other salmonid species in Pactola Reservoir are ecologically sound and to better understand the impacts of northern pike, information on lake trout and northern pike population attributes, and growth dynamics are being investigated.

FUNDING
South Dakota Game, Fish and Parks

INVESTIGATOR
Natalie Scheibel, M.S. candidate

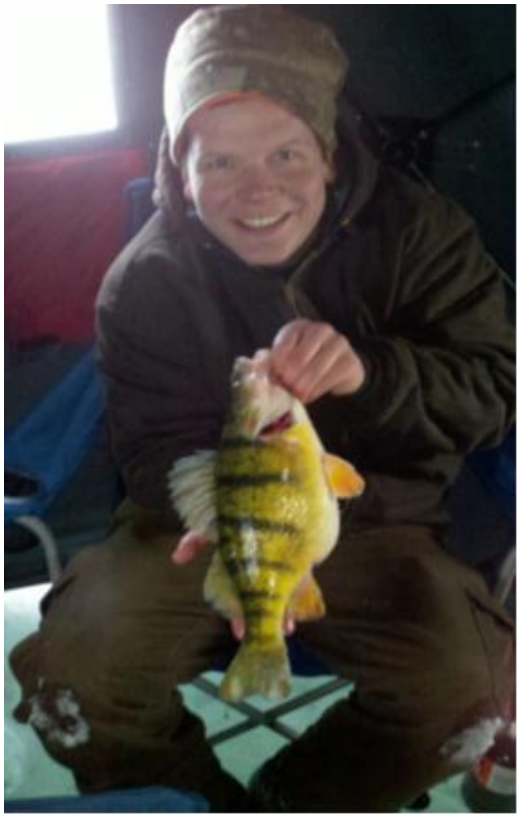
FACULTY
Steve Chipps, Dan James (USFWS)

EXPECTED COMPLETION
December 2015

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. Weighting by sex and age will be evaluated for correcting possible Internet survey bias and estimates of the percent of licensed anglers not fishing will be estimated based on the 2011 and 2012 data surveys.



FUNDING
S.D. Game, Fish and Parks

INVESTIGATOR
Kjetil Henderson, M.S. candidate

FACULTY
Larry Gigliotti

EXPECTED COMPLETION
June 2014

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
September 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
September 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
September 2015

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

INVESTIGATOR
M.S. candidate (TBD)

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

EXPECTED COMPLETION
December 2016

TEACHING

STEVE CHIPPS

Fall 2012: *Aquatic Invertebrate Ecology*

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.

LARRY GIGLIOTTI

Fall 2012: *Advanced Human Dimensions*

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, or local level of government or an NGO, with a basic level of understanding of the social aspects of management and some practical applied human dimensions skills.

Joshua Stafford

Spring 2013: *Wildlife Research Design*

This course will provide 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.

THESES AND DISSERTATIONS

Trembath, C.A. 2013. An assessment of juvenile Lake Sturgeon movement and habitat use in the Namakan River of Northwestern Ontario. Lakehead University, Thunder Bay, Ontario, CA. 44 pp.

AWARDS AND HONORS

Charles E Bessey Award for Best Paper, Journal of Great Plains Research
(S. Kahara and S. Chipps)

Best Poster Award, Dakota Chapter American Fisheries Society
(N. Scheibel and S. Chipps)

Best Poster Award, Dakota Chapter American Fisheries Society
(B. Smith, T. Rapp, T. Stevens, J. Grote, and S. Chipps)

2012 Best Student Paper Award, North Central Division, American Fisheries Society
(N. Scheibel and S. Chipps)

Edward D. & Sally M. Futch Graduate Fellowship, Ducks Unlimited, Inc. (A. Janke)

2013 Outstanding PhD Student Award, South Dakota Chapter of the Wildlife Society (A. Janke)

SCIENTIFIC PRESENTATIONS

Behney, A. C., R. O'Shaughnessy, M. W. Eichholz, and J. D. Stafford. 2012. Patterns of duck foraging behavior during Spring Migration in Illinois. 73rd Midwest Fish and Wildlife Conference. Wichita, KS. December 11. (Contributed Oral)

Behney, A. C., R. O'Shaughnessy M. W. Eichholz, and J. D. Stafford. 2013. Ecological Factors Influencing Foraging Behavior of Ducks during Spring Migration. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Contributed Oral)

Cressey, R., J. Austin, and J. D. Stafford. 2013. Changes in Prairie Pothole Region wetland plant communities and wetland conditions after 50 years. Annual meeting of the Society of Wetland Scientists, Duluth, MN. June 5. (Contributed Poster)

Dembkowski, D.J., S.R. Chipps, and B.G. Blackwell. 2013. Sport Fish Population Attributes As Influenced By Water Level Fluctuations in Glacial Lakes. 143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, September 11. (Contributed Poster)

Dembkoski, D.J., S.R. Chipps, and B.G. Blackwell. 2013. Sport fish population attributes as influenced by water level fluctuations in glacial lakes. Dakota Chapter of the American Fisheries Society, Bismarck, ND. (Contributed Oral)

Deslauriers, D., B.D.S. Graeb, R.A. Klumb, and S.R. Chipps. 2013. Discerning between actual and available energy sources for juvenile shovelnose sturgeon. Missouri River Natural Resources Conference, Jefferson City, Missouri, March 11-13th. (Contributed Oral)

Deslauriers, D., J.M. Howell, J.C. Sholley, and S.R. Chipps. 2013. The influence of prey energy density on fish consumption rate. Dakota Chapter of the American Fisheries Society, Bismarck, ND (Contributed Oral)

Fincel, M.A., D. J. Dembkowski, and S.R. Chipps. 2013. Influence of Variable Prey Abundance On Walleye Diets and Growth in a Large Missouri River Reservoir. 143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, September 11. (Contributed Poster)

Gigliotti, L.M. 2012. South Dakota hunters and anglers: Under the microscope. Presented at the Brookings Wildlife Federation, Brookings, SD. November 2. (Invited Oral)

Gigliotti, L.M. and K. Henderson. 2013. Non-response bias associated with statewide angler surveys conducted by Internet. 143rd Annual Meeting, American Fisheries Society, Little Rock, AR, September 10. (Contributed Oral)

Gigliotti, L.M. 2013. Wildlife Value Orientations of South Dakota citizens. Presented at the ISSRM, Estes Park, CO. June 5. (Contributed Oral)

Grote, J., J. Mecham, T. Rapp, T. Stevens, B. Smith, and S.R. Chipps. 2013. Do boat ramps influence aquatic invertebrate composition in near-shore areas? Dakota Chapter of the American Fisheries Society, Bismarck, ND. (Contributed Poster)

Hagy, H. M., J. D. Stafford, and R. M. Kaminski. 2012. Experimentally estimating foraging thresholds for dabbling ducks during migration and winter. 73rd Midwest Fish and Wildlife Conference. Wichita, KS. December 11. (Contributed Oral)

Hagy, H. M., J. D. Stafford, M. L. Schummer, A. T. Pearse, and R. M. Kaminski. 2013. Practical Application of and Potential Bias Associated with Foraging Thresholds in Estimates of Carrying Capacity for Waterfowl. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 29. (Contributed Oral)

Hawk, L. C., M. W. Eichholz, and J. D. Stafford. 2013. Application of Light-level Geolocation to Waterfowl Management. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 29. (Contributed Oral)

Heironimus, L., J. Breeggemann, D. Deslauriers, A. Janke, and S.R. Chipps. 2013. Fish influence on invertebrate captures in activity traps. Dakota Chapter of the American Fisheries Society, Bismarck, ND. (Contributed Poster)

Henderson, K. and L.M. Gigliotti. 2013. Evaluating coverage bias on Internet-based angler surveys. 143rd Annual Meeting, American Fisheries Society, Little Rock, AR, September 12. (Contributed Oral)

Henderson, K. and L. M. Gigliotti. 2013. Evaluating the value of the Internet for collection of scientific data (use, harvest and attitudes). Dakota Chapter of the American Fisheries Society. Bismarck, ND (Contributed Oral)

Hennig, J. D., T. J. Benson, K. W. Stodola, A. P. Yetter, and J. D. Stafford. 2013. Implementing a new aerial survey method to estimate abundance of spring-migrating waterfowl. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Contributed Poster)

Hennig, J. D., T. J. Benson, K. W. Stodola, A. P. Yetter, and J. D. Stafford. 2012. A new survey approach for estimating abundance and distribution of non-breeding waterfowl. 73rd Midwest Fish and Wildlife Conference. Wichita, KS. December 11. (Contributed Poster)

Hine, C.S., R. V. Smith, A. P. Yetter, M. M. Horath, J. D. Stafford, and H. M. Hagy. 2013. Waterbird Response to a Restored Illinois River Floodplain Wetland. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Contributed Poster)

Janke, A. K., B. Werner, J. D. Stafford, and W. C. Johnson. 2012. Influence of simulated wetland dynamics on breeding waterfowl abundance in the U.S. Prairie Pothole Region. 73rd Midwest Fish and Wildlife Conference. Wichita, KS. December 11. (Contributed Oral)

Janke, A. K., B. Werner, J. D. Stafford, and W. C. Johnson. 2013. Influence of simulated wetland dynamics on breeding waterfowl abundance in the U.S. Prairie Pothole Region. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 28. (Contributed Oral)

Janke, A. K., J. D. Stafford, M. J. Anteau, and R. Murano. 2013. Evaluating Wetland-ecosystem health in the Prairie Pothole Region using real-time nutrient dynamics of waterfowl – Project Update. South Dakota Department of Game, Fish & Parks Fall Wildlife Staff Meeting, Madison, South Dakota. September 19. (Invited Oral)

Lucchesi, D., S.R. Chipps, M. Greiner, and L. Gigliotti. 2013. Angler use, demographics and factors influencing trip satisfaction with people fishing the Brookings area lakes. Dakota Chapter of the American Fisheries Society, Bismarck, ND. (Contributed Oral)

O'Shaughnessy, R, A. Behney, M. Eichholz, and J. Stafford. 2013. Testing the Ideal Free Distribution of Spring Migratory Waterfowl Along the Wabash River, Illinois. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 28. (Contributed Oral)

Pfrimmer, J. D. and J. D. Stafford. 2013. Avian use of Conservation Reserve Enhancement Program lands in the James River Watershed – Project Update. South Dakota Department of Game, Fish & Parks Fall Wildlife Staff Meeting, Madison, South Dakota. September 19. (Invited Oral)

Quist, M. C., M. E. Mather, D. L. Parrish, S. R. Chipps, T. J. Kwak, and C. P. Paukert. 2013. The voices of reality: why effective fisheries education is challenging and practical ways to move forward. 143rd Annual Meeting of the American Fisheries Society, Little Rock, Arkansas, September 11. Platform (Invited Oral)

Scheibel, N., and S.R. Chipps. 2013. Quantifying effects of lake trout and northern pike on stocked salmonids in a coldwater reservoir. Annual meeting of the American Fisheries Society, Little Rock, Arkansas, September 11. (Contributed Oral)

Scheibel, N.C., S.R. Chipps, A. Galinat. 2013. Quantifying prey consumption and growth of northern pike in Pactola Reservoir. Dakota Chapter of the American Fisheries Society, Bismarck, ND. (Contributed Poster)

Scheibel, N.C., S.R. Chipps, and J.L. Davis. 2012. Seasonal prey consumption by lake trout and northern pike in Pactola Reservoir, South Dakota. 73rd Midwest Fish and Wildlife Conference, Wichita, KS (Contributed Oral)

Smith, R.V., J. D. Stafford, A. P. Yetter, C. J. Whelan, C. S. Hine, M. M. Horath, and H. M. Hagy. 2013. Foraging Threshold of Spring-migrating Dabbling Ducks in Central Illinois. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Contributed Oral)

Stafford, J. D. 2013. Closing remarks to the 6th North American Duck Symposium: The Future of Waterfowl Ecology and Management. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Invited Oral)

Stafford, J., A. Janke, A. Pearse, M. Anteau, M. Eichholz, A. Fox, J. Straub, J. Elmberg, and C. Arzel. 2013. Waterfowl Habitat Use and Selection – Spring Migration and Pre-breeding. Plenary Presentation. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 28. (Invited Oral)

Yetter, A. P., M. M. Horath, R. V. Smith, J. D. Stafford, H. M. Hagy, and T. J. Benson. 2013. Ecology of Fall-Migrating Mallards in the Illinois River Valley. 6th North American Duck Symposium and Ecology and Management of North American Waterfowl Conference, Memphis, TN. January 30. (Contributed Poster)

WORKSHOPS & TRAINING

S. Chipps:
Motorboat Operator Certification Course (MOCC), Brookings, SD. May, 2013.
Motorboat Operator's Certification Course (MOCC), Lincoln, NE. April, 2013.
Beyond Before-After-Control-Impact (BACI): an experimental design for detecting environmental change. 73rd Midwest Fish and Wildlife Conference, Wichita, KS.

L. Gigliotti:
An Overview of Adaptive Management. Annual meeting of the Dakota Chapter of the American Fisheries Society, Bismarck, ND. February 26, 2013.

J. Stafford:
Firearms Safety Training. Reston, VA. 17-19 April 2013.
ATV/UTV Trainer Certification. Pasco, WA. 16-21 June 2013.
Scenario Planning Towards Climate Change Adaptation. Shepardstown, WV. 15-19 July 2013.

TECHNICAL AND POPULAR PUBLICATIONS

Gigliotti, L.M. 2013. Survey says: South Dakotans love wildlife. South Dakota Conservation Digest, 80(4):4-7.

SCIENTIFIC PUBLICATIONS

Dassow, J., M. W. Eichholz, J. D. Stafford, and P. J. Weatherhead. 2012. Experimental evidence that nesting ducks use mammalian urine to assess predator abundance. Auk 129:638–644.

Fincel, M.J., S.R. Chipps, B.D.S. Graeb, and K.R. Edwards. 2013. Larval gizzard shad characteristics in Lake Oahe, South Dakota: A species at the northern edge of its range. Journal of Freshwater Ecology 28:17-26

French, W.E., B.D. S. Graeb, K.N. Bertrand, S.R. Chipps, and R.A. Klumb. 2013. Size-dependent trophic patterns of pallid sturgeon and shovelnose sturgeon in a large river system. Journal of Fish and Wildlife Management 4:41-52.

Garvey, J.E., and S.R. Chipps. 2012. Diets and energy flow. Pages 733-780 *in* A.V. Zale, D.L. Parrish, and T.M. Sutton, editors. Fisheries Techniques, 3rd edition. American Fisheries Society, Bethesda, Maryland.

Gray, M. J., H. M. Hagy, J. A. Nyman, and J. D. Stafford. 2013. Management of wetlands for wildlife. Pages 121-180 *in* J. T. Anderson and C. A. Davis, editors. Wetland Techniques: Volume 3: Applications and Management. Springer Science. DOI 10.1007/978-94-007-6907-6_4 — IPDS: 038465; BAO Date: October 12, 2012

Shaw, S.L., S.R. Chipps, S.K. Windels, M.H. Webb, and D.T. McLeod. 2013. Influence of sex and reproductive status on seasonal movement of lake sturgeon in Namakan Reservoir, Minnesota-Ontario. Transactions of the American Fisheries Society 142:10-20.

Schaeffer, T.W., D.E. Spengler, C.W. Schoenebeck, M.L. Brown, and S.R. Chipps. 2012. Effect of feeding-fasting cycles on oxygen consumption and bioenergetics of yellow perch. Transactions of the American Fisheries Society 141:1480-1491.

Stafford, J. D., M. W. Eichholz, and A. C. Phillips. 2012. Mute Swans (*Cygnus olor*) on submerged aquatic vegetation in Illinois River valley backwaters. Wetlands 32:851–857.