

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

## 2010 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

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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 Wildlife and Fisheries Sciences 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 recently established GIS Center of Excellence (GISCE) at SDSU, provide unique resources and collaborative opportunities for the South Dakota Coop Unit.

Since the early 1960s, about 225 theses and dissertations have been completed by students working through the South Dakota Coop Unit. Unit students have conducted research on a variety 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 from the Department are available at <http://wfs.sdstate.edu/wfsci.htm>. 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.

South Dakota contains a diverse array of natural resources that include glacial lakes, grasslands, wetlands, rivers, and Black Hills forests. As the South Dakota Unit begins our 48<sup>th</sup> year of service, we will continue 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/Fisheries  
[Steven.Chipps@sdstate.edu](mailto:Steven.Chipps@sdstate.edu)  
605.688.5467

**UNIT ADDRESS:** U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, South Dakota State University, Department of Wildlife and Fisheries Sciences, Box 2140B, Northern Plains Biostress Laboratory, Room 138, Brookings, SD 57007; telephone: 605-688-5467; fax: 605-688-4515; e-mail: [carol.jacobson@sdstate.edu](mailto:carol.jacobson@sdstate.edu).  
[http://www.coopunits.org/South\\_Dakota/](http://www.coopunits.org/South_Dakota/)

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## Unit Staff and Cooperators

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### **Dr. Steven R. Chipps**

Unit Leader and Adjunct Associate Professor

Ph.D. University of Idaho, 1997

Aquatic ecology; bioenergetics; invertebrate ecology

[Steven.Chipps@sdstate.edu](mailto:Steven.Chipps@sdstate.edu)

### **Dr. Charles R. Berry, Jr.,** Unit Leader (retired) and Adjunct Professor

Ph.D. Virginia Tech, 1975

Fish physiology; river ecology; endangered species

### **VACANT**

Assistant Unit Leader/Wildlife

### **VACANT**

Assistant Unit Leader/Ecology

### **Carol Jacobson**

Administrative Support Specialist

[Carol.jacobson@sdstate.edu](mailto:Carol.jacobson@sdstate.edu)

### **Di Drake**

Unit Support Specialist

[Di.Drake@sdstate.edu](mailto:Di.Drake@sdstate.edu)

### **Terri Symens**

Unit Support Specialist

[Terri.Symens@sdstate.edu](mailto:Terri.Symens@sdstate.edu)

## 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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Tony Leif, Director  
Division of Wildlife  
SD GFP  
523 East Capitol Avenue  
Pierre, SD 57501-3182

Greg Watson  
Energy Research Coordinator  
US FWS  
Denver Federal Center  
P. O. Box 25486, DFC  
Denver, CO 80225-0486

Pat Ruble  
Midwest Field Representative  
Wildlife Management  
Institute  
12748 West Bank Drive  
Millersport, OH 43046

Dr. Barry Dunn  
Dean SDSU, College of  
Agriculture and Biological  
Sciences  
Box 2207  
Brookings, SD 57007

Dr. Michael Tome  
Unit Supervisor  
Cooperative Research Units  
206 4<sup>th</sup> Avenue  
Brunswick, MD 21716

## **Research Personnel**

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### **Research Associates**

Cari Ann Hayer  
Breanna VanDeHey

### **Ph.D. Candidates**

Mark Fincel  
Daniel James  
Tobias Rapp  
Tandi Perkins

### **M.S. Candidates**

Nicholas Ahrens  
Brett Beasley  
William French  
Michael Greiner  
Mick Hanan  
Diana Iriarte  
Heather McWilliams

### **M.S. Candidates** (cont'd)

Hilary Meyer  
Stephanie Shaw  
Megan Thul  
McClain Johnson

### **Research Technicians**

Christopher Cerise  
Rajesh Chennagowni  
Nicolle Hegna  
Brent Martens  
Justin Seibert  
Mitchell Semrow  
Bradley Swanson  
Cameron Trembath  
Breanna VanDeHey  
Madeline Wedge

## Cooperating Faculty – South Dakota State University

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<u>Name</u>	<u>Department</u>	<u>Cooperative Activity</u>
Dr. Katie Bertrand	Wildlife and Fisheries Sciences	Ecology Studies
Dr. Michael Brown	Wildlife and Fisheries Sciences	Limnology Studies
Dr. Delvin DeBoer	Civil and Environmental Engineering	Water Quality
Dr. Charles Dieter	Biology and Microbiology	Waubay Study
Dr. Leigh Fredrickson	Wildlife and Fisheries Sciences	Wetlands Research
Dr. Brian Graeb	Wildlife and Fisheries Sciences	Ecology Studies
Dr. Daniel Hubbard	Wildlife and Fisheries Sciences	Wetland Studies
Dr. Kent Jensen	Wildlife and Fisheries Sciences	Tribal Land Management Studies
Michael Kjellsen	Wildlife and Fisheries Sciences	South Dakota Wetlands Atlas
Dr. Gary Lemme	Dean, College of AgBio Sciences	Funding
Dr. Thomas Loveland	GIS Center	Breeding Bird Study
Dr. Darrell Napton	Geography	Wetland Study
Dr. David Willis	Wildlife and Fisheries Sciences	Administration, Funding

## Regional Cooperating Scientists

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<u>Name (South Dakota Unit Person)</u>	<u>Location</u>	<u>Subject</u>
Mr. Herb Bollig (Chipps)	FWS	Hatchery Studies
Ms. Michelle Bouchard (Chipps)	USGS – EROS	Wetlands
Mr. Andy Burgess (Chipps)	SD GFP	Aquatic Invasive Species
Dr. Cathy Ezrailson (Berry)	University of South Dakota	Year of Science
Dr. James Garvey (Chipps)	Southern Illinois University	Diet Quantification
Mr. Robert Hanten, Jr. (Chipps)	SD GFP	Mercury in Fish
Dr. Scott Kenner (Berry)	SD SMT	Cheyenne River
Dr. Robert Klaver (Jenks)	USGS – EROS	Female White-Tailed Deer
Dr. Robert Klumb (Chipps)	FWS, Minnesota	Pallid Sturgeon
Mr. Keith McGilvray (Chipps)	FWS	Hatchery Studies
Dr. Diana Papoulias (Chipps)	USGS – CERC	Mercury in Fish
Dr. Craig Paukert (Chipps/Berry)	Missouri Coop Fish and Wildlife Unit	Paddlefish, GAP Analysis
Dr. Robert Pilsbury (Chipps)	University of Wisconsin	Didymo in the Black Hills
Ms. Sheri Potter (Berry)	Florida, AIBS	Year of Science
Dr. James Stone (Chipps)	SD SMT	Hg Studies
Dr. Corey Suski (Chipps)	University of Illinois	Fish Physiology
Dr. David Wahl (Chipps)	Illinois Natural History	Bioenergetics
Dr. Molly Webb (Chipps)	FWS, Montana	Lake sturgeon reproduction

## Administrative Support

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### South Dakota State University

<u>Wildlife and Fisheries Sciences</u>	<u>Work Study Students</u>	<u>Grants Administration</u>
Di Drake, Accounting Assistant	Ryan Hemme	Holly Beutler
Carol Jacobson, Secretary	Kyle Marlow	Connie Granbois
Terri Symens, Secretary	Kristopher Stahr	Jacqueline Nelson
	Aaron Sundmark	Kay Scheibe
	Christopher Sundmark	Douglas Ward

## **US Geological Survey, Cooperative Research Unit Program**

The South Dakota Unit receives administrative assistance from the Cooperative Research Unit Headquarters staff in Reston, VA. We thank Suzanne Cartagirone, Shana Coulby, Brenda Croston, Don Dennerline, Terry Linton, Rita Raines and Kevin Whalen for their administrative advice and assistance.

## **US Fish and Wildlife Service**

Sean Kelly (Region 3) and Greg Watson (Region 6) see that the Unit's work is noticed by FWS at the regional level. We have tremendous local support from the following FWS project offices and personnel: Aberdeen Wetland Acquisition Office (Patrick Russell); Brookings' Wildlife Habitat Office (Boyd Schulz, Kurt Forman); Ecological Services (ES), Bismarck, North Dakota (Steven Krentz, et al.); Gavins Point National Fish Hatchery and Aquarium (Keith McGilvray); Great Plains Fish and Wildlife Office (Wayne Stancill and Robert Klumb); Huron Wetland Management District; J. Clark Salyer NWR, North Dakota; Lacreek NWR (Tom Koerner); Madison Wetland Management District (Tom Turnow); Minnesota Valley NWR, South Dakota ES Field Office (Donald (Pete) Gober, et al.); Sand Lake NWR (Bill Schultze); and Waubay NWR (Larry Martin, Eric Salo).

## **Program Direction Statement**

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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 and biota. Wetland research in the Prairie Pothole Region will incorporate landscape-level influences on the fish, wildlife, invertebrates, and plant communities of wetlands. 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 research will strive to address wetland conservation, waterfowl production, development of wetland bioassessment techniques, 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**

### **Vulnerability of Age-0 Pallid Sturgeon to Predation**

Propagation of pallid sturgeon in hatcheries and reintroduction of yearlings comprise a major component of recovery efforts for this endangered fish. Stocking earlier life stages has been proposed to increase numbers in the wild and alleviate high densities of fish at hatcheries, but little is known about the vulnerability of pallid larvae to fish predation. To document vulnerability, age-0 pallid sturgeon (<100 mm) were offered to channel catfish *Ictalurus punctatus* and smallmouth bass *Micropterus dolomieu* in laboratory experiments.

Smallmouth bass consumed more age-0 pallid sturgeon (0.95 /h) than did channel catfish (0.13/h) and predation rates did not differ between water velocities supporting sustained (0 m/s) or prolonged swimming speeds (0.15 m/s). Neither predator positively selected pallid sturgeon when alternative prey was available indicating that vulnerability of age-0 pallid sturgeon to predation by channel catfish and smallmouth bass was low.

#### **FUNDING**

U.S. Army Corp of Engineers

#### **INVESTIGATORS**

Will French, M.S. & Trevor Selch, Ph.D.

#### **FACULTY**

Steven Chipps, Brian Graeb, Katie Bertrand and Robert Klumb

#### **COMPLETED**

January 2010



### **Use of Stable Isotopes to Estimate Trophic Position of Pallid Sturgeon and Shovelnose Sturgeon in the Missouri River**

Ontogenetic diet shifts are hypothesized to contribute to size-dependent mortality, yet the size or age when this change occurs in the federally endangered pallid sturgeon is essentially unknown. The purpose of this study was to quantify and compare trophic position of pallid sturgeon and shovelnose sturgeon using stable isotope analysis. Pallid sturgeon  $\delta^{15}\text{N}$  values were positively correlated with fork length and could be separated into 3 length groups (325-500mm, 500-800mm, 800-1057mm), spanning two trophic levels. In contrast, shovelnose sturgeon  $\delta^{15}\text{N}$  values suggested fish feed at a similar trophic level across the size range sampled. Pallid sturgeon  $\delta^{13}\text{C}$  values were also positively correlated with fork length and suggest two groups utilizing distinct carbon sources, whereas shovelnose sturgeon  $\delta^{13}\text{C}$  values were not correlated with fork length, suggesting a single carbon source. Patterns in isotopic composition suggested that pallid sturgeon shift from invertebrates to fish prey at larger sizes (>600 mm FL)

#### **FUNDING**

U.S. Army Corp of Engineers

#### **INVESTIGATOR**

Will French, M.S.

#### **FACULTY**

Brian Graeb, Steven Chipps, Katie Bertrand and Robert Klumb

#### **COMPLETED**

January 2010

## Land Cover Change and the Breeding Bird Survey: Rates of Change Adjacent to and Away from Roads

The Breeding Bird Survey (BBS) Strategic Plan warns that habitat sampling issues may compromise the integrity of the BBS trend estimates. It is important to know if habitat along BBS routes (roads) change at different rates than do off-road habitats. Changes in bird data need to be interpreted in light of long-term land use changes. This project is a nationwide GIS exercise that uses the current USGS Land Cover Trends (LCT) analysis to assess the BBS data within this LCT framework. Using GIS analysis, we assessed land cover change per ecoregion, by buffer distance (200, 400, and 800 m), through four time periods. Land cover change occurred similarly adjacent to roads and away from roads. Significant land cover changes occurred in pockets but no broad range trends existed across the country. Land cover change did not vary when analyzed at 200, 400, and 800 m distances from roads. This information will determine how frequently the habitat-weighting issue must be reassessed and corrections updated in the BBS. This study provides information directly relevant for modeling the relationship of habitat change and trends in bird populations. This information can be used to determine if there is a potential for problems with the BBS routes.

### FUNDING

U.S. Fish and Wildlife Service

### INVESTIGATORS

M. Hanan, M.S.

### FACULTY

Kent Jensen, Robert Klaver, and Tom Loveland

### COMPLETED

January 2010

## Influence of Physiochemical and Watershed Characteristics on Mercury Concentration in Walleye

Atmospheric deposition of mercury is a major factor contributing to mercury (Hg) contamination in aquatic food webs. We explored the influence of physiochemical and watershed attributes on mercury concentration in walleye (*Sander vitreus*, M.). Using an information theoretic approach, we found that that water quality attributes were poor predictors of walleye mercury concentration in South Dakota glacial lakes. In contrast, models based on watershed attributes and local habitat features explained >80% of the variation in walleye mercury concentration. Local habitat features such as substrate composition and maximum lake depth provided the best model in explaining walleye mercury concentration. These results show that physical habitat and watershed features were better predictors of walleye mercury concentration than water chemistry in glacial lakes of the Northern Great Plains.

### FUNDING

U.S. Environmental Protection Agency

### INVESTIGATOR

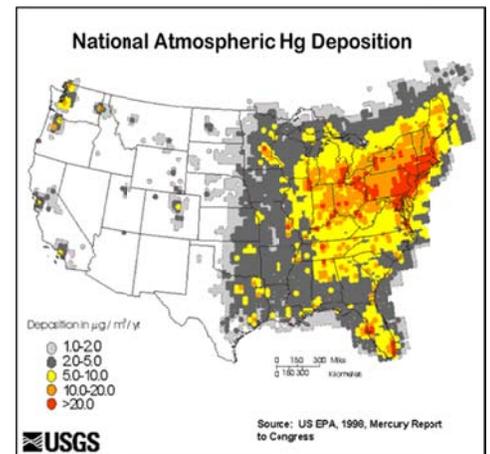
Cari Ann Hayer, Research Associate

### FACULTY

Steven Chipps and James Stone

### COMPLETED

July 2010



## **ONGOING PROJECTS**

### **Influence of an Invasive Diatom *Didymosphenia geminata* on Food Availability and Brown Trout Energetics in Rapid Creek, South Dakota**

*Didymosphenia geminata* ('Didymo') is a relatively large, easy-to-identify diatom that historically occurred in low productivity streams and lakes at northern latitudes. Since the mid-1980s, the geographic range of Didymo has expanded in many regions of Europe and North America. In many cases, these populations have taken on characteristics of an invasive species – often forming large, nuisance growths that cover stream benthos. In 2002, Didymo was reported from the Rapid Creek drainage in the Black Hills of western South Dakota. Rapid Creek represents an important brown trout *Salmo trutta* fishery for South Dakota, particularly below Pactola Reservoir – a reach that has long been recognized as a 'blue ribbon' catch-and-release fishery. The goal of this study is to quantify impacts of Didymo on trout and invertebrate resources in Rapid Creek, South Dakota. A comparative approach is being used to evaluate biological responses to drought conditions, nutrient enrichment, and water release in Didymo-infested areas of Rapid Creek, South Dakota.

#### **FUNDING**

South Dakota Department of Game, Fish and Parks

#### **INVESTIGATOR**

Daniel James,  
Ph.D.  
candidate



#### **FACULTY**

Steven Chipps

#### **EXPECTED COMPLETION**

August 2011

### **Influence of Prey Resources on Food Web Dynamics in Missouri River Impoundments**

Inter- and intra- reservoir variation in prey fish composition and abundance has an important effect on sport fish populations in the Missouri River. Coldwater habitat in Lake Oahe, for example, provides refuge for rainbow smelt – a forage species that contributes significantly to walleye production. In contrast, prey fish populations in downstream impoundments are dominated by gizzard shad, cyprinids, and young-of-year sport fishes. In the late 1990s, the decline of rainbow smelt in Lake Oahe had significant impacts on walleye production. Although the smelt population has been recovering, low water levels combined with the recent expansion of gizzard shad in Lake Oahe have resulted in a unique food web never before observed in this system. As a result, factors affecting gizzard shad abundance and distribution in Lake Oahe and their contribution to the growth dynamics of walleyes are poorly understood. This study will determine to what extent Lake Oahe walleye are foraging on gizzard shad, quantify the energetic contribution of gizzard shad to walleye growth, and evaluate temporal patterns in energy flow across Missouri River impoundments.

#### **FUNDING**

South Dakota Department of Game, Fish and Parks

#### **INVESTIGATOR**

Mark Fincel, Ph.D. candidate

#### **FACULTY**

Steven Chipps

#### **EXPECTED COMPLETION**

August 2011

## **South Dakota River Studies Completion and Public Information**

Since 1990 there has been a continuing effort to survey stream fishes throughout South Dakota to collect baseline data on species distribution, abundance, and habitat association. This effort was recently brought to a conclusion with the publication of several comprehensive works that list fishes by watershed. The synthesis of data revealed several streams have not been surveyed recently or have only been sparsely surveyed. Previous federal aid funding has been used to develop a prototype web page that includes data from 26 sites on the Bad River. The goals of this study are to 1) improve fish distribution data by conducting surveys in unsampled or sparsely sampled riverine habitats and public land, and 2) develop and test a web-based data entry protocol.

### **FUNDING**

South Dakota Department of Game, Fish and Parks

### **INVESTIGATORS**

Luke Borgstrom, M.S. and Cari Ann Hayer

### **FACULTY**

Charles Berry and Katie Bertrand

### **EXPECTED COMPLETION**

January 2011

## **Status and Distribution of Fishes in Select North Dakota Rivers and Streams**

Rivers and streams provide unique and/or localized sport fishing opportunities for rural communities in North Dakota. Many of these tributaries also provide important spawning and rearing habitat for fish populations in the main stem Missouri River. The goal of this study is to provide information that will assist in management of riverine fishes (Missouri River basin) of North Dakota. Specific objectives are to conduct field surveys of fish and habitat conditions on select rivers and streams of western North Dakota, synthesize information on distribution of all species, and provide regional distribution maps and narrative summaries for river fishes using GIS location data.

### **FUNDING**

North Dakota Department of Game and Fish

### **INVESTIGATORS**

McClain Johnson, M.S. candidate

### **FACULTY**

Brian Graeb and Charles Berry

### **EXPECTED COMPLETION**

December 2010

## Lake Sturgeon Population Characteristics, Movements and Habitat Use in Namakan Reservoir

The lake sturgeon (*Acipenser fulvescens*) is a Minnesota state-listed species of special concern. In Canada, western populations of lake sturgeon are considered to be endangered and the Rainy River-Lake of the Woods populations to be of special concern. Since the late 1800s lake sturgeon populations have declined in the Laurentian Great Lakes. These declines have been attributed to loss or fragmentation of crucial spawning, nursery, and feeding habitats. This project has two objectives: 1) to document the population characteristics of lake sturgeon in Namakan Reservoir and relate recruitment patterns to historical hydrological and reservoir-operation variables to better understand effects of climate and dam operation, and 2) to identify seasonal habitat use and reproductive patterns in lake sturgeon. This information will be used to assess effects of existing threats to spawning and foraging habitat.

### FUNDING

U.S. National Park Service

### INVESTIGATOR

Stephanie Shaw,  
M.S. candidate

### FACULTY

Steven Chipps  
and David Willis



### EXPECTED COMPLETION

April 2011

## Spatial Distribution of Rocky Mountain Sandhill Cranes in Response to Habitat Conditions During the Annual Cycle

This study documents the annual life cycle of sandhill cranes to changing habitat availability in the intermountain corridor from Idaho to Mexico. Study areas include FWS refuges and surrounding private land in parts of five states including Idaho, Colorado, and New Mexico, in two flyways (Central and Pacific), and in two countries (USA and Mexico). Objectives are to 1) identify wetland and agricultural habitats along the corridor; 2) summarize long-term hydrologic and climatic data for wetland systems; 3) monitor seasonal use of selected wetland and agricultural habitats by cranes; 4) link chronology and extent of movements with climatic, hydrologic, wetland, and agriculture conditions; and 5) monitor habitat conditions of selected wetlands and link with timing, type, and duration of use by cranes. The information is important in the Comprehensive Conservation Planning process on FWS refuges because the role of refuges is identified within the surrounding private landscapes.

### FUNDING

U.S. Fish and Wildlife Service

### INVESTIGATOR

Tandi Perkins, Ph.D. candidate

### FACULTY

Leigh Fredrickson

### EXPECTED COMPLETION

April 2011

**Water Quality, Nutrient Dynamics and Factors Affecting Water Clarity in U.S. Bureau of Reclamation Reservoirs**

Belle Fourche, Keyhole, Jamestown, and Heart Butte are operated by the U.S. Bureau of Reclamation and represent significant regional water resources. Recreational use within these units has increased in recent years. To meet these demands, Resource Management Plans (RMP) have been completed that address several needs related to overall management of the units. The purpose of the RMPs is to foster stewardship of public lands within the units. As changes in land management and recreation occur, baseline data on water quality are needed. Moreover, upstream water discharges associated with coal bed methane extraction could potentially affect water quality (e.g., salinity) in several units. The purpose of this study is to document baseline water quality characteristics, algal biomass, turbidity, and zooplankton composition. Data collected in this study will be used to model nutrient dynamics and develop predictive models for quantifying factors affecting water clarity in Bureau of Reclamation reservoirs.

**FUNDING**

Bureau of Reclamation

**INVESTIGATOR**

Michael Greiner, M.S. candidate

**FACULTY**

Steven Chipps

**EXPECTED COMPLETION**

December 2010

**Below-Ground Food Production in Habitats Utilized by the Rocky Mountain Population of Greater Sandhill Cranes Throughout the Intermountain Corridor**

There is a lack of data describing type, quality, availability, and distribution of foods in many habitats used by the Rocky Mountain Population (RMP) of greater sandhill cranes (*Grus canadensis tabida*) across their range and life cycle. Throughout the Intermountain West Corridor (IWC) RMP cranes have adapted to, and now forage within, agricultural fields and natural wetlands depending on life cycle events and availability of agricultural foods. Across the entire IWC there have been significant changes in the agricultural economy, agricultural practices, as well as changes in climatic conditions and land use. Spatial and temporal information on the abundance, distribution, and nutrient composition of invertebrate and plant foods found in wetland and agricultural habitats is critical for RMP crane management across the annual cycle and along their migration corridor. This information will enable resource managers to understand the role wetland management has in providing quality foraging habitats for migratory RMP cranes.

**FUNDING**

U.S. Fish and Wildlife Service

**INVESTIGATORS**

Diana Iriarte and Brett Beasley, M.S. candidates

**FACULTY**

Leigh Fredrickson

**EXPECTED COMPLETION**

April 2011

## **Estimating Forage Production for Waterbirds and Waterbird Responses to Habitat Management in Wetland Management Units on Lacreek National Wildlife Refuge**

Lacreek NWR provides critical food resources for migratory waterbirds in western South Dakota, including waterfowl and shorebirds. The refuge is the winter home to over half of the High Plains population of Trumpeter Swans. The objectives of the study are to: 1) estimate annual, wetland seed production; 2) determine if restoration efforts are producing desired results along wetland edges; 3) determine hydrological variables (periodicity, depth, duration) within each of these communities; 4) determine the response of waterfowl and shorebirds using wetlands during migration periods; and 5) determine breeding density for all bird species using the selected vegetative communities. This study will provide information required to quantify forage production in managed wetland habitats. This information is critical for the development of a habitat management plan for the refuge and for ensuring that the refuge is providing food resources for migrating and wintering waterbirds.



Credit: Tom Koerner/USFWS

### **FUNDING**

U.S. Fish and Wildlife Service

### **INVESTIGATOR**

Heather McWilliams, M.S. candidate

### **FACULTY**

Kent Jensen, Charles Berry and Robert Klaver

### **EXPECTED COMPLETION**

May 2011

## **THESES AND DISSERTATIONS**

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Borgstrom, L. J. 2010. Fish community assembly in the Forest River, North Dakota, and resolution of *Campostoma* species presence. M.S. Thesis, South Dakota State University, Brookings, SD.

French, W.E. 2010. Predation vulnerability and trophic interactions of pallid sturgeon. M.S. Thesis, South Dakota State University, Brookings, SD.

Shaw, S.L. 2010. Lake sturgeon population attributes, reproductive structure, and distribution in Namakan Reservoir, Minnesota and Ontario. M.S. Thesis, South Dakota State University, Brookings, SD.

Hanan, M. D. 2009. Land cover change and the breeding bird survey: rates of change in relation to roads. M.S. thesis, South Dakota State University, Brookings, SD.

## **AWARDS AND HONORS**

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Mark Fincel, Ph.D. candidate:

- 2010 Sigma Xi scholarship

Dan James, Ph.D. candidate:

- Honorable mention, 2010 American Fisheries Society Writing Contest
- Travel grant, 2010 Wild Trout Symposium

Stephanie Shaw, M.S. candidate:

- 2010 Skinner Award  
Honorable mention
- 2010 Outstanding Graduate Student (Fisheries)

Charles Berry, Unit Leader (retired):

- received a plaque commemorating 25 years of service to the Department of Wildlife and Fisheries Sciences; presented by Dr. David Willis at the 61<sup>st</sup> Buffalo Banquet.
- received the Water Conservationist of the Year Award from the South Dakota Wildlife Federation (below).
- received a STAR (Special Thanks for Achieving Results) award for exceeding performance standards for the Federal FY 09.

Steven Chipps, Unit Leader:

- received a plaque from the Society of Wetland Scientists for his service as Associate Editor of *Wetlands*, 2007-2009.
- received his 10-year pin from the USGS.
- received a STAR (Special Thanks for Achieving Results) award for exceeding performance standards for the Federal FY 09.



## SCIENTIFIC PRESENTATIONS

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Berry, C. 2009: The Year of Science and public understanding of science. Presented at the 2009 Eastern South Dakota Water Conference, Brookings, South Dakota.

Berry, C. R. 2010. SDSU science and public opinions about science and scientists. Guest Lecture, SDSU GIS Center of Excellence, Brookings, South Dakota.

Chipps, S.R. 2010. Modeling mercury dynamics in fishes using bioenergetics models. Invited lecture, Biology Department, Lakehead University, Ontario, Canada.

Fincel, M. J. and S. R. Chipps. 2010. Prey effects on walleye growth in the Missouri River. Annual meeting of the South Dakota Chapter of Walleyes Unlimited, Rapid City, South Dakota.

Fincel, M. J. and S. R. Chipps. 2009. Factors affecting walleye growth in the Missouri River. 70<sup>th</sup> Annual Midwest Fish and Wildlife Conference, Springfield, Illinois.

Fincel, M. J. and S. R. Chipps. 2010. The influence of variable prey abundance on walleye growth in a large Missouri River reservoir. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

French, W., B. Graeb, K. Bertrand, S. Chipps, and R. Klumb. 2009. Isotope analysis of sturgeon diets. 70<sup>th</sup> Annual Midwest Fish and Wildlife Conference, Springfield, Illinois.

Greiner, M. and S. Chipps. 2009. Urban bass management in South Dakota. 70<sup>th</sup> Annual Midwest Fish and Wildlife Conference, Springfield, Illinois.

Greiner, M. J., S.R. Chipps, and D. Lucceshi. 2010. Development of urban and community based fisheries in South Dakota. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

Greiner, M.J., and S.R. Chipps. 2010. Assessment of angler use and satisfaction of urban-based fisheries in South Dakota. Annual meeting of the American Fisheries Society, Pittsburgh, PA.

Grohs, K. L., R. A. Klumb, and S. R. Chipps. 2010. Spatial patterns of macroinvertebrate abundance and composition in the Missouri River downstream of Fort Randall and Gavins Point dams, South Dakota and Nebraska. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

Hegna, N. L., D. O. Lucchesi, and S. R. Chipps. 2010. Angler age demographics of community-based lakes in South Dakota. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

James, D. A. and S. R. Chipps. 2010. Comparison of brown trout diets from *Didymosphenia geminate* impacted and non-impacted streams. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

ames, D., K. Mosel, and S. Chipps. 2009. Influence of light availability on *Didymosphenia geminata* in a montane stream. 70<sup>th</sup> Annual Midwest Fish and Wildlife Conference, Springfield, Illinois.

James, D. and S.R. Chipps. 2010. The influence of *Didymosphenia geminata* on fisheries resources in Rapid Creek, South Dakota –an eight year history. Wild Trout X Symposium, West Yellowstone, MT.

Johnson, M. S., B. D. S. Graeb, C-A. Hayer, C. R. Berry Jr., and S. Gangl. 2010. Seasonal use of tributaries by Missouri River fishes in the Garrison Reach, North Dakota. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

McCutcheon, C., L. Stetler, J. Stone, and S. Chipps. 2009. Relations between water quality and mercury fish tissue concentrations for natural lakes and impoundments in South Dakota. Eastern South Dakota Water Conference, Brookings, South Dakota

Meyer, H.A., S.R. Chipps, R.A. Klumb, and B.D.S. Graeb. 2010. Growth, metabolism, and energy density of juvenile pallid sturgeon fed commercial and natural diets. World Sturgeon Conservation Society, Bozeman, MT.

Rapp, T., B. D. S. Graeb, S. R. Chipps, R. A. Klumb. 2010. Laboratory examination of habitat preferences by juvenile pallid sturgeon with focus on predation. Annual Meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

Rapp, T., B.D.S. Graeb, S.R. Chipps, and R.A. Klumb. 2010. Influence of predation on habitat selection by juvenile pallid sturgeon. World Sturgeon Conservation Society, Bozeman, MT.

Rapp, T., B.D.S. Graeb, S.R. Chipps, and R.A. Klumb. 2010. Laboratory examination of juvenile pallid sturgeon habitat selection with focus on predation. Annual meeting of the American Fisheries Society, Pittsburgh, PA.

Seibert, J. R., S. R. Chipps, and D. H. Wahl. 2010. Effects of prey energy density on feeding and growth of age-0 walleye. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

Shaw, S. L., S. R. Chipps, D. W. Willis. S. Windels, and D. McCleod. 2009. Lake sturgeon population attributes in Voyageurs National Park. 70<sup>th</sup> Annual Midwest Fish and Wildlife Conference, Springfield, Illinois.

Shaw, S. L., S. R. Chipps, S. Windels, D. McLeod, M. A. H. Webb, and D. W. Willis. 2010. Lake sturgeon population attributes and reproductive structure in Namakan Reservoir, Voyageurs National Park, MN-ON. Annual meeting of the Minnesota Chapter of the American Fisheries Society, Duluth, Minnesota.

Shaw, S.L., S.R. Chipps, M.A. Webb, S. Windels, D. McLeod, and D.W. Willis. 2010. Movement and reproductive structure of lake sturgeon in Voyageurs National Park, Minnesota. Annual meeting of the American Fisheries Society, Pittsburgh, PA.

Wuellner, M. R., B. J. Galster, B. D. S. Graeb, T. M. Selch, S. R. Chipps, and D. W. Willis. 2010. Competition between walleye and smallmouth bass in a controlled setting. Annual meeting of the Dakota Chapter of the American Fisheries Society, Spearfish, South Dakota.

### **TECHNICAL AND POPULAR PUBLICATIONS**

---

Berry, C. 2009. Five Steps for Citizen Scientists. South Dakota Wildlife Federation Out-of-Doors 49(11):1,3.

Berry, C. R. 2009. Year of Science in Review. South Dakota Wildlife Federation Out of Doors 49(12):1,3.

Chipps, S. R. 2010. Column: Guest Director's Line. Greetings from the Education Section. Fisheries 35:292, 295.

Jackson, D.C., S.R. Chipps, and M.L. Brown. 2010. Fisheries education in the 21<sup>st</sup> century: challenges and approaches to training the next generation of fisheries scientists. Fisheries 35:264,301.

### **SCIENTIFIC PUBLICATIONS**

---

Berry, C. R. Jr. 2009: The Year of Science: public understanding of science. proceedings of the South Dakota Academy of Science 88:15-24.

Carey, M.P., K.O. Maloney, S.R. Chipps, and D.H. Wahl. 2010. Effects of littoral habitat complexity and sunfish composition on fish production. Ecology of Freshwater Fish 19:466-476.

Chipps, S. R., H. D. Symens, and H. Bollig. 2009. Influence of cladoceran composition and abundance on survival of age-0 paddlefish. Pages 411-422 in C.P. Paukert and G.D. Scholten, editors. Paddlefish management, propagation, and conservation in the 21<sup>st</sup> century: building from 20 years of research and management. American Fisheries Society, Bethesda, Maryland.

Fincel, M. J., S. R. Chipps, and R. A. Voldseth. 2010. Chemically-mediated predator inspection behavior by fathead minnow (*Pimephales promelas*). Journal of Freshwater Ecology 25:279-283.

French, W. E., B. D. S. Graeb, S. R. Chipps, K. N. Bertrand, T. M. Selch, and R. A. Klumb. 2010. Vulnerability of age-0 pallid sturgeon *Scaphirhynchus albus* to fish predation. Journal of Applied Ichthyology 26:6-10.

Galat, D. L., C. R. Berry Jr., E. J. Peters, and R. G. White. 2009. Missouri River Basin. Pages 184-209 in A. Benke and C. Cushing editors. Field Guide to the Rivers of North America. Academic Press.

Hamel, M.J., N.S. Richards, M.L. Brown, and S.R. Chipps. 2010. Avoidance of strobe lights by zooplankton. Lake and Reservoir Management 26:212-216.

Hoagstrom, C. and C. Berry. 2010. Native range of walleyes in the Missouri River drainage. North American Journal of Fisheries Management 30:642-654.

James, D. A., S. H. Ranney, S. R. Chipps, and B. D. Spindler. 2010. Invertebrate composition and abundance associated with *Didymosphenia geminata* in a montane stream. *Journal of Freshwater Ecology* 25:235-241.

James, D. S., J. W. Wilhite, and S. R. Chipps. 2010. Influence of drought conditions on brown trout biomass and size structure in the Black Hills, South Dakota. *North American Journal of Fisheries Management* 30:791-798.

Thomson, S. K. and C. R. Berry Jr. 2009. Stream fishes inhabit livestock watering ponds (dugouts) near Six Mile Creek, Brookings County, South Dakota. *Proceedings of the South Dakota Academy of Science* 88:127-138.

Wuellner, M. R., S. R. Chipps, D. W. Willis, and W. E. Adams Jr. 2010. Interactions between walleyes and smallmouth bass in a Missouri River reservoir with consideration of the influence of temperature and prey. *North American Journal of Fisheries Management* 30:445-463.