

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

2017 ANNUAL REPORT  
OCTOBER 2016 – SEPTEMBER 2017



**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 U.S. Geological Survey, South Dakota Cooperative Fish & Wildlife Research Unit would like to extend our thanks to alumni, cooperators, students and staff for another productive year at South Dakota State University. Unit scientists are fortunate to work with a talented group of graduate students, research associates and agency biologists to address wildlife research needs in our state and region. Since 1963, over 255 students have received graduate degrees working with Unit scientists at the SD Coop Unit. Research at the South Dakota Coop Unit, guided by our Coordinating Committee, is conducted primarily by graduate students studying a range of topics that include endangered species biology, wetland ecology, fisheries management, upland game, big game management, and non-game species. 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 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.



In 2010, Professor Emeritus and Assistant Unit Leader Dr. Kenneth F. Higgins (retired) established the *Kenneth F. Higgins Waterfowl Legacy Research Endowment*, directed at supporting graduate student research that benefits wetland-dependent avian species. Contributions to the endowment can be made by contacting the SDSU Alumni Association (888.735.2257; [alumni@statealum.com](mailto:alumni@statealum.com)).

Continuing our long-standing tradition of cooperative research, the South Dakota Coop Unit looks forward to 2018 and addressing research needs of our state and federal partners to better manage fish and wildlife resources in the Northern Great Plains. Feel free to contact us for more information.

Steven R. Chipps, Unit Leader  
Larry M. Gigliotti, Assistant Unit Leader  
Joshua D. Stafford, Assistant Unit Leader

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[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. LARRY M. GIGLIOTTI**

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Human Dimensions of Wildlife Management  
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Steve Chipps, Larry Gigliotti,  
Kate Tvedt, Josh Stafford



## 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  
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Dr. Donald Marshall  
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Dr. Michael Tome  
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## RESEARCH PERSONNEL

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### Fulbright Scholar

Dr. Murugan Muthiah

### Ph.D. candidates

Lily Sweikert  
Aaron Sundmark  
Samantha Fino

### M.S. candidates

Austin Galinat  
Charles "Will" Gallman  
Jeremy Kientz  
Rebecca Kolstrom  
Joe Mrnak  
Travis Rehm  
Alex Rosburg  
Jill Voorhees

### Undergraduate research technicians

Amber Acker  
Jason Augspurger  
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Wesley Bowen  
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Tiffany Hennigs  
Denielle Meyerink  
Isaiah Porteous  
Calvin Rezak  
Riley Schubert  
Rebecca Watkins  
Kelsen Young  
Josh Zylstra

## COOPERATING FACULTY – SOUTH DAKOTA STATE UNIVERSITY

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Name	Department	Cooperative Activity
Mr. Peter Bauman	Natural Resource Management	Land use/change
Dr. Michael Brown	Natural Resource Management	Limnology studies
Dr. James Doolittle	Associate Vice President	Administration
Dr. Michele Dudash	Head, Natural Resource Management	Administration
President Barry Dunn	President, SDSU	Administration
Dr. Brian Graeb	Natural Resource Management	Fish ecology studies
Dr. Jonathan Jenks	Natural Resource Management	Wildlife ecology
Dr. Kent Jensen	Natural Resource Management	Bird studies
Dr. Carol Johnston	Natural Resource Management	Wetland ecology
Dr. Don Marshall	Interim Dean, College of ABS	Administration
Dr. Lora Perkins	Natural Resource Management	Neonicotinoids
Dr. Daniel Schöll	Vice President, Research	Administration
Dr. Nels Troelstrup	Natural Resource Management	Oak Lake Field station
Dr. Michael Wimberly	GIS Center of Excellence	Pallid sturgeon

## REGIONAL COOPERATING SCIENTISTS

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Name (South Dakota Unit Person)	Agency/University	Subject
Mr. Geno Adams (Gigliotti)	SD GFP	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/SDSU	Salmonid ecology
Dr. Brian Blackwell (Chipps)	SD GFP/SDSU	Fish 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
Dr. David Deslauriers (Chipps)	Canada DFO	Sturgeon bioenergetics
Dr. Michael Eichholz (Stafford)	Southern Illinois University	Migration ecology
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	Fish ecology
Mr. Rob Holm (Chipps)	FWS-Garrison, ND	Pallid sturgeon
Dr. Daniel James (Chipps)	FWS-Pierre, SD	Pallid sturgeon
Dr. Mark Kaemingk (Chipps)	University of Nebraska	Fish bioenergetics
Dr. Dylan Kesler (Stafford)	University of Missouri	Avian ecology, modeling
Dr. Wes Larson (Chipps)	University of Wisconsin-Stevens Point	Fish genetics
Mr. Dave Lucchesi (Chipps)	SD GFP	Small impoundments
Dr. Jonathan Lundgren (Stafford)	Blue Dasher Farms	Pesticides
Dr. Charlie Madenjian (Chipps)	USGS Great Lakes Science Center	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. Kevin Pope (Chipps)	University of Nebraska	MOCC training
Mr. Jeff Powell (Chipps)	FWS, Gavins Point	Pallid sturgeon
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

Dr. James Stone (Chipps)	SD School of Mines & Technology	Hg Studies
Dr. David Wahl (Chipps)	Illinois Natural History	Bioenergetics
Mr. Matt Ward (Chipps)	SD GFP	Walleye foraging
Dr. Tim Welker (Chipps)	US Army Corps Engineers	Pallid sturgeon
Mr. George Williams (Chipps)	US Army Corps Engineers	Pallid sturgeon
Dr. Tammy Wilson (Gigliotti)	National Park Service	Wildlife/Human dimensions

## **ADMINISTRATIVE SUPPORT**

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### **SOUTH DAKOTA DEPARTMENT OF GAME, FISH & PARKS**

The South Dakota Coop 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, and Dr. Michele Dudash from NRM as well as Martha Aragon, Dr. James Doolittle, Shirley Jensen, Kay Scheibe, Ann Taecker, and Doug Ward.

### **US GEOLOGICAL SURVEY, COOPERATIVE RESEARCH UNIT PROGRAM**

The USGS-CRU Headquarters staff in Reston, VA provide guidance and assistance to Unit personnel. We thank Suzanne Cartagirone, Shana Coulby, Brenda Croston, Don Dennerline, Derek Geary, Melissa Thode, 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

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The Unit's program direction is reviewed annually by our Coordinating Committee. The overall program direction will be to conduct 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 quality, livestock forage, flood reduction, ground water recharge, esthetics, and fishery potential – will be included in research efforts when appropriate. Aspects of wetland and upland research will address conservation needs, 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.



## ALUMNI NEWS

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Cooperators of the South Dakota Coop Unit provide critical support for the Unit program and in return, they benefit from research products and technical training associated with graduate education. Job placement and professional accomplishment are testaments to the success of students and research associates who have moved on to careers with Federal, State, or Non-government (NGO) partners – as well as academic institutions in the U.S. and Canada. A few recent examples:

FEDERAL AGENCIES: Dr. David Deslauriers (PhD 2015) was recently hired as a Research Scientist by Fisheries and Oceans Canada and is stationed in Winnipeg, Canada. Prior to his new position, David served as a Post-doctoral Fellow at the University of Manitoba. David received the Outstanding Young Professional Award at the 2017 annual meeting of the American Fisheries Society in Tampa, Florida.

Fred Oslund (MS 2016) has recently transferred with the US Fish and Wildlife Service to Desoto and Blair Chute National Wildlife Refuge near Blair, Iowa, where he is a Refuge Biologist.



David Deslauriers with a Pallid Sturgeon on the Missouri River, SD

STATE AGENCIES: Neil Haugerud (MS 2003), a River Ecologist with the Minnesota Department of Natural Resources, was recently ‘on location’ with Jeremy Wade, the host of *River Monsters*. The episode highlighted a dam removal / river restoration project that Neil and colleagues completed on the Mississippi River.

Jeremy Keintz (MS 2016) accepted a position as a cold-water fisheries biologist with South Dakota Department of Game, Fish and Parks and is stationed at the Outdoor Campus in Rapid City.



Neil Haugerud (left) with Jeremy Wade, Host of Animal Planet’s “River Monsters”

TRIBAL AGENCIES: Jarrett Pfrimmer (PhD 2017) is the Director of the Department of Natural Resources for the Meskwaki Nation, which represents the Sac and Fox Tribe of the Mississippi in Iowa. Based in Tama, Iowa, Jarrett’s current duties involve all aspects of natural resource management on Tribe lands, including land, air, and water quality monitoring to wildlife management.

## **COMPLETED PROJECTS**

### **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. This project surveyed landowners in five states (IA, MN, SD, ND, and MI). Each state wildlife agency developed their questionnaire based on their agency's needs for information about landowners. The main objectives were to: (a) measure characteristics, attitudes, values and behaviors towards participating in a variety of conservation programs and practices, and (b) identify meaningful segments of landowners for understanding conservation behaviors. Link to dissertation: <http://openprairie.sdstate.edu/etd/1692/>

#### **FUNDING**

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

#### **INVESTIGATOR**

Lily Sweikert, Ph.D. candidate

#### **FACULTY**

Larry Gigliotti

#### **COMPLETED**

September 2017



## 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-mi<sup>2</sup> plots and 5,000 wetlands are surveyed each year for wetland condition and breeding pairs and aerial photography of each 4-mi<sup>2</sup> 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. Link to thesis: <http://openprairie.sdstate.edu/etd/1110/>

### FUNDING

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

### INVESTIGATOR

Fred Oslund, M.S. candidate

### FACULTY

Joshua Stafford, Rex Johnson (HAPET)

### COMPLETED

November 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. Link to dissertation: <http://openprairie.sdstate.edu/etd/1196/>

### 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)

### COMPLETED

April 2017



## 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. Link to thesis: <http://openprairie.sdstate.edu/etd/1731/>

### 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)

### COMPLETED

August 2017



## **ONGOING PROJECTS**

### **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**

Aaron Sundmark, Ph.D. candidate

#### **FACULTY**

Larry Gigliotti

#### **EXPECTED COMPLETION**

December 2018



## **Evaluation of cover crops for grassland nesting waterfowl and upland game birds in Eastern South Dakota**

Eastern South Dakota lies in the Prairie Pothole Region, and is the primary breeding ground for most (50-80%) North American waterfowl. Historically, the region was dominated by mixed and tallgrass prairies, interspersed with wetlands, resulting in exceptional breeding habitat for waterfowl and other grassland nesting birds. Widespread conversion to cropland, however, has resulted in the loss of >70% of native grasslands, with concomitant declines in many grassland obligate avifauna. Government conservation programs, such as the Conservation Reserve Program (CRP), have resulted in the restoration of croplands to perennial grass cover, with beneficial results for birds. However, recently high commodity prices have led many landowners to convert expiring CRP contracts back to row crops, resulting in widespread loss of suitable habitat. One important historical, and re-emerging method that may provide cover for grassland dependent wildlife is the use of cover crops. Cover cropping involves planting supplemental stands of annual grasses and/or broadleaf vegetation in conjunction with growing crops or in between conventional cash crop rotations. Agronomic and environmental benefits to cover cropping systems are diverse including increased soil quality, nutrient scavenging, reduced soil loss, nitrogen fixation, water management, and reduced compaction. Although the economic and environmental impacts of cover cropping have been documented, potential benefits to wildlife, including ground nesting birds, have not been evaluated.

### **FUNDING**

Federal Aid in Wildlife Restoration, State Wildlife Grants, South Dakota Department of Game, Fish & Parks

### **INVESTIGATOR**

Charles "Will" Gallman, M.S. Student

### **FACULTY**

Joshua Stafford

### **EXPECTED COMPLETION**

December 2019



## **Predator Dynamics and Nest Success: Changes in Foraging Patterns as a Function of the Predator Community and Landscape Composition**

Predator-prey interactions influence vital rates and predation is a major cause of nest failure of ground-nesting birds (i.e., ring-necked pheasants, waterfowl). Predator movements are influenced by patch dynamics and spatial configuration of patches on the landscape; understanding the ecology of predation and predator movements is critical to explain predator-prey interactions, habitat use (spatial and temporal), and foraging of nest predators. Movements also are influenced by vegetation composition and structural heterogeneity of vegetation and abiotic habitat components. Grassland patch dynamics can influence nest success of ground-nesting birds. Larger blocks of grassland have been associated with increased nest success of waterfowl, whereas multiple patches of intermediate-sized grassland within agricultural landscapes were associated with low nest success, most likely from predation. Finally, variation in the composition of the predator community can influence nest survival and influence nest-site selection. Identifying habitat characteristics associated with high reproduction and survival of grassland-nesting birds is an important research priority, particularly with respect to the “predator context”. With continued grassland loss associated with conversion to row crop agriculture, and changing predator communities (e.g., declines in red fox, active coyote control), understanding how habitat dynamics influence predator-prey interactions and nest success of ground-nesting birds will improve development of comprehensive management recommendations for remaining grasslands, restoration or reclamation efforts, and for active management programs that wish to modify grassland regimes or predator communities themselves to improve nesting habitat and nest survival.

### **FUNDING**

Federal Aid in Wildlife Restoration, State Wildlife Grants, South Dakota Department of Game, Fish & Parks

### **INVESTIGATOR**

Samantha Fino, Ph.D. Student

### **FACULTY**

Joshua Stafford

### **EXPECTED COMPLETION**

May 2021



## **Influence of Fish Density on Growth Rate of Brown Trout in Spearfish Creek, South Dakota**

Trout fishing provides important angling opportunities in the Black Hills of South Dakota. Creel surveys show that nearly 85% of anglers view trout as important to their fishing experience and are supportive of restrictive regulations such as reduced creel limits and (or) size restrictions.

In Spearfish Creek, South Dakota, mean biomass of Brown Trout >200 mm is about three times greater than that in Castle or Rapid creeks. However, age-3 Brown Trout in Spearfish Creek are about 30% smaller (220 mm) than similarly aged fish in Rapid Creek (315 mm; James and Chipps 2016). Because angler harvest of Brown Trout is generally low in Spearfish Creek, management options for increasing the size structure of the trout population may be limited. Liberalized regulations, for example, may have limited effect due to low angler harvest and (or) the social stigma associated with harvesting naturalized trout. From a management perspective, experimental manipulation of Brown Trout abundance shows promise as an approach for increasing the growth rate of stream-dwelling trout. Reductions in trout biomass are anticipated to reduce intraspecific competition and improve growth of age 3+ Brown Trout; these efforts can be targeted in areas where fish densities are high to improve the quality of Brown Trout sought by anglers.

### **FUNDING**

South Dakota Game, Fish and Parks

### **INVESTIGATOR**

Travis Rehm, M.S. candidate

### **FACULTY**

Steve Chipps, Jake Davis (GFP)

### **EXPECTED COMPLETION**

December 2018



## Growth Potential and Genomic Signatures of Selection in Yellow Perch

Yellow perch (*Perca flavescens*) are an important sport fish and prey component of fish communities across the Midwestern United States. In South Dakota, two distinct population types of Yellow Perch have been characterized that differ in growth, survival, and recruitment patterns. High quality populations exhibit fast growth, high mortality, low population densities, and inconsistent recruitment. In contrast, low quality populations are characterized by slow growth, low mortality, high population densities, and relatively consistent recruitment. The role of genetics in contributing to these population characteristics is currently unknown. To address these questions, we used a combination of laboratory and common garden growth experiments to compare relative growth and survival of age-0 yellow perch from the two population types. We then used high-throughput RAD sequencing to scan the yellow perch genome for genetic markers associated with population type. The laboratory and common garden experiments showed no significant differences between weight standardized specific growth rates of perch from the high and low quality populations. Results from the RAD sequencing also produced limited evidence of adaptive divergence between population types. Our results represent an important initial step towards determining the genetic basis of growth and mortality variation in this recreationally and ecologically valuable species.

### FUNDING

South Dakota Game, Fish and Parks

### INVESTIGATOR

Alex Rosburg, M.S. candidate

### FACULTY

Brian Blackwell (GFP), Steve Chipps, Justin VanDeHey (UWSP), Wes Larson (UWSP)

### EXPECTED COMPLETION

December 2017



## **Structured Decision Support for Bald Eagle Monitoring in Alaska**

Bald eagle (*Haliaeetus leucocephalus*) populations are susceptible to environmental contaminants. Consequently, bald eagles are a “vital sign” monitored by the Southwest Inventory and Monitoring Network (SWAN) in cooperation with Lake Clark National Park and Preserve (LACL), Katmai National Park and Preserve (KATM), and Kenai Fjords National Park. Inconsistencies in objectives and perceptions of state-variable importance between parks have made it difficult to integrate sampling designs under a regional protocol. Therefore it is important for the sustainability of the bald eagle monitoring program to conduct a formal process involving scientists and resource managers at the National Parks in Alaska that elucidates common objectives and fosters consensus and buy-in. Our goal is to develop a structured decision process that uses surveys to identify core values, sets objectives, identifies reasonable sampling scenarios, and choose an optimal sampling regime that optimizes objectives and minimizes cost.

### **FUNDING**

National Park Service (RWO #115)

### **INVESTIGATOR**

Rebecca Kolstrom. M.S. candidate

### **FACULTY**

Tammy Wilson (NPS), Larry Gigliotti, Michele Dudash

### **EXPECTED COMPLETION**

October 2018



## 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

July 2017



## **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, Ph.D. candidate

### **FACULTY**

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

### **EXPECTED COMPLETION**

July 2018



## **Effect of water velocity and temperature on energy reserves, growth, and survival of larval Pallid Sturgeon *Scaphirhynchus albus***

As with many fishes, the recruitment bottleneck for Pallid Sturgeon is believed to occur during their early life history. Recent work in the upper Missouri River has linked anoxic conditions in river-reservoir transition zones to recruitment failure in Pallid Sturgeon. In addition to oxygen availability, water velocity is believed to play an important role in affecting dispersal and survival of larval Pallid Sturgeon in the Missouri River. Larval Pallid Sturgeon require longer migration distances and drift at faster rates than Shovelnose sturgeon (*Scaphirhynchus platorynchus*). As a result, we see distinct, behavioral differences between larval Pallid and Shovelnose sturgeon in the transition from drifting to benthic foraging behavior. Empirical data also reveal that larval Pallid Sturgeon can take over twice as long (~14 days post hatch, dph) as Shovelnose Sturgeon (~6 dph) to switch from endogenous to exogenous feeding. Thus, the combined effects of water velocity (i.e., dispersal rate) and water temperature (i.e., development rate) play an important role in affecting the dispersal distance of Pallid Sturgeon larvae from hatching locations. The objective of this study is to quantify the combined effects of water velocity and temperature on growth, energy reserves, survival, and estimated dispersal of endogenous larval Pallid Sturgeon

### **FUNDING**

U.S. Department of Energy (WAPA)

### **INVESTIGATOR**

Joseph Mrnak, M.S. candidate

### **FACULTY**

Steve Chipps and Dan James (FWS)

### **EXPECTED COMPLETION**

September 2019



## **Influence of mink predation on Brown Trout survival and size-structure in Rapid Creek, South Dakota**

Beginning in the early 2000s, declines in brown trout (*Salmo trutta*) abundance in Rapid Creek, South Dakota concerned fisheries managers. Annual population surveys indicated that abundance of adult brown trout (> 200 mm total length) had declined by approximately 70%. Although environmental conditions such as drought can influence standing stock of brown trout, factors affecting trout survival are poorly known. Recent data from Rapid Creek shows that growth and condition of adult trout is high compared to other populations in the Black Hills. Additionally, diet analysis of brown trout in Rapid Creek shows that food availability is an unlikely source of mortality. However, recent work by Davis et al. (2016) showed that predation by mink (*Mustela vison*) accounted for up to 32% of brown trout mortality in Rapid Creek, with over 83% of mink-related predation events occurring during the spring. Limited refuge habitat (e.g., deep pools) combined with high water clarity in Rapid Creek may enhance capture and foraging success by mink on adult trout. Moreover, the lack of stationary ice cover in tail water reaches such as that below Pactola Reservoir, has been linked to increased predation on trout by predators such as mink and river otter (*Lutra lutra*). At present, factors affecting mink-trout interactions within and downstream of the catch-and-release area is unknown. The purpose of this project is to assess impacts of mink predation on trout populations in Rapid Creek, Pennington County, South Dakota. Data gathered in this study will provide insight into the effectiveness of management techniques such as instream habitat improvements and (or) predator block management on trout populations.

### **FUNDING**

South Dakota Game, Fish and Parks

### **INVESTIGATOR**

Austin Galinat, M.S. candidate

### **FACULTY**

Steve Chipps and Jon Jenks

### **EXPECTED COMPLETION**

December 2019



**Impacts on Rainbow Trout *Onchorhynchus mykiss* rearing performance of dietary bio-processed plant-based protein and water velocity.**

Carnivorous fish species, like rainbow trout, *Onchorhynchus mykiss*, require high levels of dietary protein. Historically, fish meal has been the primary protein source, but its supply is variable, limited, and relatively expensive. Alternative protein sources are needed to meet the dietary protein demand for ever-increasing aquaculture production. In addition to specific dietary requirements, salmonids may react positively to exercise during hatchery rearing, with increased growth and feed conversion. While fish meal alternatives have received considerable research focus, no studies have examined the use of plant-based diets in conjunction with exercise. The objective of this research is two-fold. This study will examine the replacement of fish meal with a novel solid-state fermented soybean meal product in salmonid diets during typical hatchery rearing practices, and further evaluate the utility of this alternative protein source in the diets of salmonids subjected to rigorous exercise during hatchery rearing.

**FUNDING**

South Dakota Game, Fish and Parks

**INVESTIGATOR**

Jill Voorhees, M.S. candidate

**FACULTY**

Mike Brown, Mike Barnes and Steve Chipps

**EXPECTED COMPLETION**

May 2018



## TEACHING

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### LARRY GIGLIOTTI

Spring 2017: *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.

### JOSHUA STAFFORD

Spring 2017: *Wildlife Research Design* (3 credits)

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.

## AWARDS AND HONORS

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**DAVID DESLAURIERS**, *Early Career Professional Award*, Education Section American Fisheries Society, Tampa Bay, FL (2017)

**JEREMY KIENZT**, *Young Professional Award*, Dakota Chapter of the American Fisheries Society, Jamestown, ND (2017)

**NEAL MARTORELLI**, *Outstanding M.S. Student Award*, South Dakota Chapter of The Wildlife Society, Oacoma, SD (2017)

**TRAVIS REHM**, *Marty Seldon Outstanding Graduate Student Scholarship*, Wild Trout XII Symposium, West Yellowstone, MT (2017)



Travis Rehm (L) receives the 2017 Marty Seldon Scholarship at Wild Trout XII

## SCIENTIFIC PRESENTATIONS

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1. Chipps, S.R., and M. Fincel. 2017. Climate change and fisheries production: modeling the long-term effects of water availability on angler use in Lake Oahe, South Dakota. Western South Dakota Hydrology Conference, Rapid City, SD.
2. Gigliotti, L. M. & Don Carlos, A. W. 2017. Wildlife value orientation stability among South Dakota residents: Setting the stage for a longitudinal Analysis. 102<sup>nd</sup> Annual Meeting of the South Dakota Academy of Science, Mitchell, SD.
3. Gigliotti, L. M. and Chase, L. 2017. Importance of fishing as a segmentation variable in the application of a social worlds model. 102<sup>nd</sup> Annual Meeting of the South Dakota Academy of Science, Mitchell, SD.
4. Gigliotti, L.M. and L.A. Sweikert, L.A. 2017. Human dimensions of habitat loss in the Plains and Prairie Pothole region: North Dakota landowner survey results. North Dakota Action Group Meeting, Bismarck, ND.
5. Gigliotti, L.M. and L.A. Sweikert. 2017. Understanding Iowa landowners' values, attitudes, and behaviors towards wildlife and wildlife habitat. Paper presented at The Wildlife Society 24<sup>th</sup> Annual Conference. Albuquerque, NM.
6. Gigliotti, L.M. and L.A. Sweikert. 2017. Values and behaviors of landowners in the upper Midwest. Pathways Conference. Estes Park, CO.
7. Janke, A.K., M. Anteau, and J.D. Stafford. 2017. On bait buckets and Boreal ducks: Associations between migrant duck physiology and a wetland-ecosystem engineer. 41<sup>st</sup> Annual Meeting of The Waterbird Society, Reykjavik, Iceland.
8. Martorelli, N. and J.D. Stafford. 2017. Evaluation of gamebird production in Roundup© Ready alfalfa used for seedbed preparation during perennial grassland conversion on state game production areas in eastern South Dakota. Annual Meeting of the South Dakota Chapter of The Wildlife Society, Oacoma, South Dakota.
9. Muruganandam M. and S.R. Chipps. 2017. Does traditional knowledge affect ecosystems and should it be revisited? 147<sup>th</sup> Annual Meeting of the American Fisheries Society, Tampa, FL.
10. Muruganandam M. and S.R. Chipps. 2017. Impacts of droughts, floods and cold waves on fish and fisheries resources in Uttarakhand Himalayas, India. Western South Dakota Hydrology Conference, Rapid City, SD
11. Muruganandam M. and S.R. Chipps. 2017. Management of streams and rivers by watersheds vis-à-vis fisheries management. Western South Dakota Hydrology Conference, Rapid City, SD.
12. Muruganandam M., S.R. Chipps, and P.K. Mishra. 2017. Constraint analysis on fish farming and extension needs in Northwestern Himalayas, India. National Aquaculture Extension Conference, Boise, ID.

13. O'Neal, Benjamin J, J.D. Stafford, R.P. Larkin, and A.K. Janke. 2017. Effects of weather on the timing of migratory departure in fall-migrating ducks. 41<sup>st</sup> Annual Meeting of The Waterbird Society, Reykjavik, Iceland.
14. Rehm, T., S. Chipps, and J. Davis. 2017. Influence of fish density on growth rate of brown trout in Spearfish Creek, SD. 53<sup>rd</sup> Annual meeting Dakota Chapter American Fisheries Society, Jamestown, ND.
15. Rehm, T.R., S.R. Chipps, K.L. Young, G. Simpson, and J. Davis. 2017. Effect of fish removal on movement patterns of Brown Trout (*Salmo trutta*). Wild Trout Symposium XII, West Yellowstone, MT.
16. Rehm, T.R., S.R. Chipps, K.L. Young, G. Simpson, and J. Davis. 2017. The effect of large scale density reductions on movement patterns of Brown Trout (*Salmo trutta*). 147<sup>th</sup> Annual meeting of the American Fisheries Society, Tampa, FL.
17. Rezac, C., C. Kirkeeng, S.R. Chipps, J. Breeggemann, and B.D.S. Graeb. 2017. Habitat hypotheses and the implications on largemouth bass production. 147<sup>th</sup> Annual meeting of the American Fisheries Society, Tampa, FL.
18. Rosburg, A., B. Blackwell, S. Chipps, J. VanDehey and W. Larson. 2017. In-situ growth and genetic diversity of yellow perch (*Percia flavescens*) in South Dakota. 53<sup>rd</sup> Annual meeting Dakota Chapter American Fisheries Society, Jamestown, ND.
19. Rosburg, A.J., B.G. Blackwell, S.R. Chipps, J.A. VanDeHey, and W.A. Larson. 2017. Growth and genetic diversity of yellow perch populations in the Prairie Pothole Region. 77<sup>th</sup> Annual Midwest Fish & Wildlife Conference, Lincoln, NE.
20. Sass, G.G., A.L. Rypel, and J.D. Stafford. 2017. Inland fisheries habitat management: lessons learned from Wildlife Ecology and a proposal for change. 77<sup>th</sup> Midwest Fish and Wildlife Conference, Lincoln, Nebraska.
21. Sundmark, A. and L.M. Gigliotti. 2017. Economic impacts of angling: A survey of small South Dakota lakes. 147<sup>th</sup> Annual Meeting of the American Fisheries Society, Tampa, FL.
22. Sweikert, L.A., and L.M. Gigliotti. 2017. Comparing tools for understanding land use decisions. Pathways Conference 2017. Estes Park, CO.
23. Sweikert, L.A., and L.M. Gigliotti. 2017. Conserving the Plains and Prairie Pothole Eco-region: Using an easy way to understand landowners' decisions. The Wildlife Society 24<sup>th</sup> Annual Conference. Albuquerque, NM.
24. Sweikert, L.A., and L.M. Gigliotti. 2017. Saving the grasslands: Using social science to inform Farm Bill Conservation Programs. Annual Meeting of the International Association for Landscape Ecology. Baltimore, MD.

25. Young, K., R. Rehm, S. Chipps, and J. Kientz. 2017. A non-lethal method of sex determination in Brown Trout. 53<sup>rd</sup> Annual meeting Dakota Chapter American Fisheries Society, Jamestown, ND

## **WORKSHOPS & TRAINING**

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### **STEVE CHIPPS:**

FISH BIOENERGETICS 4.0: Introduction and overview of bioenergetics modeling using R. Dakota Chapter American Fisheries Society Conference, Jamestown, North Dakota. February 2017.

U.S. Department of Interior, MOTORBOAT OPERATOR CERTIFICATION COURSE. Brookings, South Dakota, May 2017.

### **JOSHUA STAFFORD:**

U.S. Department of Interior, ATV/UTV CERTIFICATION COURSE. Brookings, South Dakota, May 2017.

## **THESES AND DISSERTATIONS**

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MARTORELLI, N.P. 2017. Evaluation of Gamebird Use and Thermal Characteristics of Alfalfa and Perennial Grasses in Eastern South Dakota. M.S. Thesis. South Dakota State University. 161 pp. <http://openprairie.sdstate.edu/etd/1731/>

OSLUND, F.T. 2016. Impacts of Wetland Characteristics on Duck Use in the Prairie Pothole Region (PPR) 1987-2013. M.S. Thesis. South Dakota State University. 136 pp. <http://openprairie.sdstate.edu/etd/1110/>

PFRIMMER, J.D. 2017. An Integrated Evaluation of the Conservation Reserve Enhancement Program in South Dakota. Ph.D. Dissertation. South Dakota State University. 131 pp. <http://openprairie.sdstate.edu/etd/1196/>

SWEIKERT, L.A. 2017. Human dimensions of habitat loss in the Plains and Prairie Pothole Ecoregion. Ph.D. Dissertation. South Dakota State University. 198 pp. <http://openprairie.sdstate.edu/etd/1692/>

## PEER-REVIEWED PUBLICATIONS

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1. Deslauriers, D., A.J. Rosburg, and S.R. Chipps. 2017. Development of a foraging model framework to reliably estimate daily food consumption of young fishes. *Canadian Journal of Fisheries and Aquatic Sciences* 74:1668-1681.
2. Deslauriers, D., L. Heironimus, and S.R. Chipps. 2016. Lethal thermal maxima for age-0 pallid and shovelnose sturgeon: implications for shallow water habitat restoration. *River Research and Applications* 32:1872-1878.
3. Deslauriers, D., L.A. Heironimus, T. Rapp, B.D.S. Graeb, R.A. Klumb, and S.R. Chipps. 2017. Growth potential of age-0 Pallid Sturgeon in the Missouri River: insight from an individual based model. *Ecology of Freshwater Fish*. <http://onlinelibrary.wiley.com/doi/10.1111/eff.12337/epdf>
4. Hagy, H.M., J.D. Stafford, R.V. Smith, A.P. Yetter, C.S. Hine, M.M. Horath, and C. Whelan. 2017. Opportunity costs influence food selection and giving-up density of dabbling ducks. *Journal of Avian Biology* 48:804–814.
5. Hagy, H.M., C.S. Hine, M.M. Horath, A.P. Yetter, R.V. Smith, and J.D. Stafford. 2016. Waterbird response indicates floodplain wetland restoration. *Hydrobiologia* <https://link.springer.com/content/pdf/10.1007%2Fs10750-016-3004-3.pdf>
6. Janke, A.K., M.J. Anteau, and J.D. Stafford. 2017. Long-term spatial heterogeneity in mallard distribution in their core North American breeding range. *Wildlife Society Bulletin* 41:116–124.
7. Meyer, H.A., S.R. Chipps, B.Graeb, and R.A. Klumb. 2016. Growth, food consumption and energy status of juvenile Pallid Sturgeon fed natural or artificial diets. *Journal of Fish and Wildlife Management* 7:388-396.
8. Pfrimmer, J., L. Gigliotti, J., Stafford, D., Schumann, and K. Bertrand. 2017. Motivations for enrollment into the Conservation Reserve Enhancement Program in the James River Basin of South Dakota. *Human Dimensions of Wildlife* 22:382-389.
9. Sass, G.G., A.L. Rypel, and J.D. Stafford. 2017. Fisheries Habitat Management: Lessons learned from Wildlife Ecology and a Proposal for Change. *Fisheries* 42: 197–209.