

# PROGRAM



54<sup>th</sup> Annual Meeting  
Dakota Chapter  
American Fisheries Society  
February 26-28, 2018  
Days Inn  
Brookings, SD

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<sup>1</sup> Names of presenters are underlined. For student presenters, undergraduates are denoted with a single asterisk (\*) and graduate students with a double asterisk (\*\*).

# Schedule-at-a-Glance

Date/Time	Event	Location
<b>Monday, February 26<sup>th</sup></b>		
1:00 – 6:00 pm	Registration / poster set-up	Hallway
2:00 – 5:00 pm	Continuing Education Workshop	C/D
5:00 – 6:00 pm	EXCOM Meeting	C/D
6:00 pm	Welcome Social	A/B
<b>Tuesday, February 27<sup>th</sup></b>		
7:00 – 8:00 am	Registration / poster set-up	Hallway
8:10 am	Welcome and Opening Remarks	C/D
8:15 am	Plenary: Drain Tiling in the Dakotas	C/D
9:40 am	Break	
10:00 am	Paper Session: Hatcheries & Non-Game	C/D
12:00 pm	Lunch	
1:00 pm	Paper Session: Cold-Water Fisheries	C/D
2:20 pm	Break	
2:40 pm	Paper Session: Environment & Water Quality	C/D
4:00 pm	Business Meeting	C/D
4:30 pm	Poster Social	C/D
6:00 pm	Dinner Banquet, Awards, Raffle, & Fisheries Telestrations Competition	C/D
<b>Wednesday, February 28<sup>th</sup></b>		
8:00 am	Paper Session: Human Dimensions	C/D
9:20 am	Break	
9:40 am	Paper Session: Reservoir & Walleye Fisheries	C/D
12:00 pm	Best Paper/Poster Awards- Adjourn	C/D
1:00 – 4:00 pm	Fisheries Summit (ND, SD, USFWS)	C/D

# Dakota Chapter AFS Meeting Program

Tuesday, February 27<sup>th</sup>

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## Plenary Session: Drain Tiling in the Dakotas

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Moderator: Geno Adams

- 8:10            Opening meeting remarks – Steve Chipps, President Dakota Chapter AFS
- 8:15            Introduction, Geno Adams, Dakota Chapter Environmental Concerns Committee Chair
- 8:20            *Hydrologic Effects of Subsurface Drainage on Downstream Flow.* **Charles Fritz**
- 8:40            *Recent Trends in Grassland and Wetland Conservation in the Prairie Pothole Region of Eastern South Dakota.* **Kurt Forman**
- 9:00            *How to Tile a Farm Field Without Draining Wetlands.* **Carter Johnson**
- 9:20            Panel Discussion
- 9:40 – 10:00   BREAK

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## Paper Session: Hatcheries & Non-game

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Moderator: Mike Barnes

- 10:00            *Increased stocking density and organic fertilizer use during Walleye fingerling production in a lined pond.* **Matt Ward**
- 10:20            *Inclusion of Bioprocessed Soybean Product in Diet and the Effects Exercise has on Rearing Performance of Brown Trout (*Salmo trutta*).* **Jill M. Voorhees**, Michael L. Brown, Steven R. Chipps, Michael E. Barnes
- 10:40            *Impacts of Devils Lake Discharges on Mussel Populations in the Sheyenne River, an Update.* **Andre DeLorme**, Louis Wieland
- 11:00            *Long-term Fish Assemblages of the Ohio River: Modified Trophic and Life History Strategies with Hydrologic Alterations and Landuse Modifications.* **Mark Pyron**, Mario Minder, Robert Shields, Caleb Artz, Meryl Mims, Julian Olden
- 11:20            *Great longevity in the native bigmouth buffalo fish (*Ictiobus cyprinellus Valenciennes 1844*) of the Red River of the North Basin: a call for further study and action.* **Alec R. Lackmann\*\***
- 11:40            *Direct and Indirect Impacts of Gizzard Shad Introductions in Smaller Impoundments in South Dakota Update.* **Brandon Vanderbush\*\***, Michael L. Brown, Melissa Wuellner, Gene Galinat, Greg Simpson, Bill Miller, David Lucchesi, Todd St. Sauver
- 12:00            LUNCH

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## Paper Session: Cold Water Fisheries

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Moderator: Jake Davis

- 1:00 *Influence of Density Reduction on the Growth Rate of Individual Brown Trout.* **Travis Rehm**\*\* , Steven R. Chipps, Jacob Davis, Greg Simpson
- 1:20 *Evaluation of instream discharge, temperature, prey availability, and thermal refuge on Rapid Creek Fisheries.* **Michaela Halvorson**\*\* , Lisa Kunza, Jacob Davis
- 1:40 *Lake Trout Introduction into Deerfield Reservoir.* **Gene Galinat**
- 2:00 *Using Water Quality and GIS to Evaluate Lake Trout Habitat in Deerfield Reservoir, South Dakota.* Lindsey Meiers, **Michelle Bucholz**, Joellyn Moine, Greg Simpson
- 2:20 – 2:40 BREAK

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## Paper Session: Environment and Water Quality

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Moderator: Mike Smith

- 2:40 *Nutrients, Pesticides and Selenium in Agricultural Tile Discharges into Public Wetlands, Madison Wetland Management District, South Dakota.* **Matthew S. Schwarz**, Bryan Schultz, Drew R. Davis, Jacob L. Kerby
- 3:00 *Effectiveness of thermal and oxygen mixing by a wind-powered water circulator in a small, shallow reservoir.* **Daniel A. James**, Gary Brundige, Landon L. Pierce, Dylan R. Turner
- 3:20 *Pesticides, Nitrates and Selenium in South Dakota Prairie Streams and Tile Effluent.* **Matthew S. Schwarz**
- 4:00 DAKOTA CHAPTER AFS BUSINESS MEETING
- 4:30 POSTER SOCIAL
- 6:00 BANQUET

Wednesday, February 28<sup>th</sup>

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**Paper Session: Human Dimensions**

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Moderator: Mike Greiner

- 8:00 *Assessing the Opinions of Native Fish Management in the Black Hills of South Dakota.* **Seth Fopma**\*\* , Larry Gigliotti
- 8:20 *Factors Explaining Angler Satisfaction in South Dakota: Is Angler Satisfaction Related to Angler Evaluation of the South Dakota Game, Fish and Parks Customer Service?* **Aaron Sundmark**\*\* , Larry Gigliotti
- 8:40 *Angling use at six rural waters as determined through remote sensing equipment.* **Greg Simpson**
- 9:00 *Angler use, success and satisfaction with community fishing ponds in southeastern South Dakota.* **David Lucchesi**, Benjamin Schall, Todd St. Sauver
- 9:20 – 9:40 BREAK

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**Paper Session: Reservoir & Lake Fisheries**

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Moderator: Bob Hanten

- 9:40 *Comparison of hydroacoustic survey designs for coldwater forage assessment in a Missouri River reservoir.* **Nicholas Kludt**\*\* , Brian D.S. Graeb, Mark J. Fincel
- 10:00 *Acoustic Tag Retention and Initial Dispersal of Hatchery-Reared Juvenile Paddlefish.* **Dylan Turner**, Daniel James, Landon Pierce, Hilary Meyer, Nicholas Starzl, Jeffrey Powell
- 10:20 *Feasibility of hydro-acoustic surveys to monitor Rainbow Smelt (*Osmerus mordax*) and Rainbow Trout (*Oncorhynchus mykiss*) in Pactola Reservoir, South Dakota).* **Jake Davis**, Nicholas Kludt, Hilary Meyer, Mark J. Fincel
- 10:40 *The "Tails" that Walleye Tell: The History of Walleye Management in Nebraska Reservoirs.* **Melissa Wuellner**, Keith Koupal, Brett Miller
- 11:00 *Comparison of Day and Night Electrofishing to Sample Smallmouth Bass in Natural Lakes of Eastern South Dakota.* **Brian Blackwell**, Todd Kaufman, Tyrel Moos, Mark Ermer, Steve Kennedy, Ryan Braun
- 11:20 *Effect of water velocity on growth, survival, and energy reserves of endogenous Pallid Sturgeon *Scaphirhynchus albus* larvae.* **Joseph Mrnak**\*\* , Steven Chippis, Daniel James
- 11:50 BEST PAPER/POSTER AWARDS – ADJOURN
- 1:00 – 4:00 FISHERIES SUMMIT (ND, SD, USFWS)

# Paper Abstracts

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## Plenary Session: Drain Tiling in the Dakotas

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### **Hydrologic Effects of Subsurface Drainage on Downstream Flow**

Charles Fritz, *International Water Institute, Fargo, ND*

The installation of subsurface drainage in the Red River Basin has greatly increased in recent years due to the region's current wet period and cropping patterns, as well as the current high commodity prices. Water managers from North Dakota and Minnesota currently have a limited window of opportunity to implement a standardized and effective risk management strategy for subsurface drainage systems. The Red River Retention Authority (RRRA) formed the Basin Technical and Scientific Advisory Committee (BTSAC) consisting of accredited hydrologists, engineers, and natural resources scientists (not policy makers) to provide sound hydrologic, scientific, and technical advice for the purpose of managing agricultural drainage development in the Red River Basin. BTSAC evaluated the hydrologic effects from extensive and widespread tile drainage within the Red River Basin and developed recommendations for local officials to manage agricultural drainage systems with the goal of maximizing benefits and minimizing potential downstream impacts.

### **Recent Trends in Grassland and Wetland Conservation in the Prairie Pothole Region of Eastern South Dakota**

Kurt Forman, *U.S. Fish and Wildlife Service, Brookings, SD*

The Prairie Pothole Region (PPR) of North America is critically important to sustaining breeding populations of a wide variety of avian species, including waterfowl, shorebirds and grassland passerines. Over the past 80 years, a broad suite of federal, state and non-governmental interests have implemented programs throughout the United States (U.S.) portion of the PPR to support grassland and wetland conservation. For example, Congress created the Small Wetlands Acquisition Program (SWAP) on August 1, 1958, by amending the 1934 Migratory Bird Hunting and Conservation Stamp Act (commonly known as the Duck Stamp Act). The SWAP as administered by the U.S. Fish and Wildlife Service has played a central role in partnering with landowners to voluntarily protect wetland and grassland habitat throughout the U.S. portion of the PPR, including South Dakota. In response to recent trends in landscape change, several reports have analyzed the complex relationship between rates of habitat conservation and habitat loss. These results illustrate a number of new challenges conservation planners face when attempting to reach previously established goals for habitat conservation and associated bird populations. In the face of these new challenges, accelerating voluntary grassland-based partnerships in support of livestock ranching has emerged as a key conservation philosophy. Partnering with ranchers through a voluntary suite of programs to conserve the remaining 5.4 million acres of native grassland in the PPR portion of South Dakota represents a unique opportunity to simultaneously support private landowners, bird populations, watershed function and water quality.

### **How to Tile a Farm Field Without Draining Wetlands**

Carter Johnson, *SDSU Department of Natural Resource Management, Brookings, SD*

The early 2000s saw large increases in agricultural tile drainage in the eastern Dakotas of North America. Agricultural practices that drain wetlands directly are sometimes limited by wetland protection programs. Little is known about the impacts of tile drainage beyond the delineated boundaries of wetlands in upland catchments that may be in agricultural production. A series of experiments were conducted using the well-published numerical model WETLANDSCAPE that revealed the potential for wetlands to have significantly shortened surface water inundation periods and lower mean depths when tile is placed in certain locations beyond the wetland boundary. Under the soil conditions found in agricultural areas of South Dakota, wetland hydroperiod was found to be more sensitive to the depth that drain tile is installed relative to the bottom of the wetland basin than to distance-based setbacks. Because tile drainage can change the hydrologic conditions of wetlands, implementation should be evaluated more closely for the potential impacts they might have on the ecological services that wetlands currently provide.

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## Paper Session: Hatcheries & Non-game

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### **Increased stocking density and organic fertilizer use during Walleye fingerling production in a lined pond**

Matthew Ward, *South Dakota Game, Fish & Parks*

Walleye Sander vitreus fingerlings (28 to 40 mm, TL) are raised annually at Blue Dog Lake State Fish Hatchery to meet fisheries management stocking needs. Lined, 0.4-ha ponds are stocked at 250,000 to 312,000 fry/ha which typically produces a 0.3 to 0.45 g (1,500 to 1,000 f/lb) fingerling. Previous attempts to increase stocking densities (e.g., 375,000 fry/ha in 0.8-ha ponds) have resulted in smaller walleye ( 5 mg/L; Ammonia as nitrogen &lt; 0.53 mg/L). The likelihood of repeating and expanding this to larger ponds at Blue Dog Hatchery is unknown.

### **Inclusion of Bioprocessed Soybean Product in Diet and the Effects Exercise has on Rearing Performance of Brown Trout (*Salmo trutta*)**

Jill M. Voorhees<sup>1</sup>, Michael L. Brown<sup>2</sup>, Steve R. Chipps<sup>3</sup>, Michael E. Barnes<sup>1</sup> <sup>1</sup>*South Dakota Game, Fish & Parks* , <sup>2</sup>*SDSU Department of Natural Resource Management*, <sup>3</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*.

This 121-day experiment evaluated the rearing performance of Brown Trout (*Salmo trutta*) fed one of two isonitrogenous and isocaloric diets (46% protein, 16% lipid) and reared at velocities of either 2.8 or 16.1 cm/s. Fishmeal was the primary protein source for the reference diet which was compared to a bioprocessed soybean ingredient that replaced approximately 67% of the fishmeal in the other diet. At the end of the experiment, there were no significant differences in gain, percent gain, feed conversion rate, nor specific growth rate between the dietary treatments. There were also no significant differences in intestinal morphology, splenosomatic, hepatosomatic, and viscerosomatic indices related to diet composition. However, gain, percent gain, feed fed, and specific growth rate were all significantly greater in Brown Trout reared at the higher velocity. No significant differences in any of the other variables measured were observed between the velocity treatments. There were also no significant interactions between the diets and velocities. Based on the results of this study, bio-processed soybean meal can replace at least 67% of the fish meal in Brown Trout diets, regardless of the rearing velocities used in this study. Higher rearing velocities are recommended to maximize juvenile brown trout growth rates.

### **Impacts of Devils Lake Discharges on Mussel Populations in the Sheyenne River, an Update**

Andre DeLorme, Louis Wieland, *Valley City State University*

Since the opening of the east end Devils Lake outlet in 2012 large volumes of water have been released into the Sheyenne River. These releases brought higher levels of sulfates and chlorides into the Sheyenne, doubled the specific conductivity of the river, disrupted normal flow regimes, and possibly accelerated erosion and sedimentation in the river. What effect does this have on the biota of the river? The Valley City State University Macroinvertebrate Lab conducted mussel surveys in the summer of 2012, 2013, 2014, and 2017. Quantitative and qualitative sampling was completed at a variety of sites along the Sheyenne River between Valley City and Lisbon, an area known to have some of the densest mussel populations in the state. Results of these surveys show some concerning trends. Data for a site located bellow the Kathryn Dam show an overall decrease in mussel densities with a density of 16.8 mussels per m<sup>2</sup> in 2013, a density of 12.85 m<sup>2</sup> in 2014, and a density of 9.73 m<sup>2</sup> in 2017. These declines are more pronounced in some species than others. Populations of the Plain PocketBook (*Lampsilis cardium*) and the Black Sandshell (*Ligumia recta*) have seen little impact. However, the Wabash Pigtoe (*Fusconaia flava*) has gone from being one of the most common mussels in this area of the Sheyenne to being less than 1% of the current population, it is close to extirpation. We feel this warrants further biota surveys on the Sheyenne River to determine the impacts of the outlet.

## **Long-term Fish Assemblages of the Ohio River: Modified Trophic and Life History Strategies with Hydrologic Alterations and Landuse Modifications**

Mark Pyron<sup>1</sup>, Mario Minder<sup>1</sup>, Robert Shields<sup>1</sup>, Caleb Artz<sup>1</sup>, Meryl Mims<sup>2</sup>, Julian Olden<sup>3</sup> <sup>1</sup>*Ball State University*, <sup>2</sup>*Virginia Tech University*, <sup>3</sup>*University of Washington*

We used Ohio River lockchamber fish rotenone survey data for 1954-2014 collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) to examine temporal assemblage variation by taxonomy, trophic traits and life history traits. Abundances of fishes were examined by ordination and subsequent axes were tested for correlation with landuse variation. Fish abundances by life history traits were tested for correlations with hydrology variables. Altered hydrology variables were identified with the indicators of hydrological alteration (IHA) software.

Agricultural landuse decreased and forest land use increased during this period. Ten IHA hydrology variables in four hydrology statistics groups were significantly altered during this time period. Ohio River fish assemblages are modified from 50 years ago, with decreased omnivore abundance and increased piscivore abundance. Our multivariate procedures revealed a temporal, directional trajectory in the fish assemblages that was correlated with landuse variation. Only the intermediate life history trait category varied temporally. However, equilibrium and opportunistic strategists decreased in abundance with increased flow variation (increased minimum flows and rise rates, and with decreased fall rates), periodic strategists increased in abundance with increased flow variation (increased minimum flows and rise rate, and decreased fall rates). We discuss food web effects with landuse and hydrologic variation and compare to other longterm fish assemblage results.

## **Great longevity in the native bigmouth buffalo fish (*Ictiobus cyprinellus* Valenciennes 1844) of the Red River of the North Basin: a call for further study and action**

Alec Lackmann<sup>\*\*</sup>, *North Dakota State University*

The bigmouth buffalo fish (*Ictiobus cyprinellus*) is the largest catostomid. The family Catostomidae is known for its high diversity in North America (NA), home to 77 of 78 total species. Bigmouth buffalo (BMB) were once broadly distributed from southern Canada to Louisiana. During the 19th Century they became economically important to commercial fisherman, with millions of kilograms harvested annually. By the late 19th Century BMB populations were overharvested, prompting an effort to supplement the native NA fish fauna with the Eurasian common carp (*Cyprinus carpio*), which became a notorious invasive species by 1900. Recently, BMB have been increasingly targeted by both commercial harvest and sport bowfishing. This native fish resource has remained understudied, especially in North Dakota, in spite of these increasing threats. We have found bigmouth buffalo to live to 104 years old, exactly four times longer than previously reported. Furthermore, 70 of the 80 fish collected in the Red River Basin were greater than 75 years old. The paucity of younger fish suggests this population is in an extended period of reproductive failure. Reasoning from the case of the long-lived lake sturgeon (*Acipenser fulvescens*), further study and proper management will be essential to bringing these buffalo back from the road to extinction.

## **Direct and Indirect Impacts of Gizzard Shad Introductions in Smaller Impoundments in South Dakota Update**

Brandon Vanderbush<sup>1\*\*</sup>, Michael Brown<sup>1</sup>, Melissa Wuellner<sup>2</sup>, Gene Galinat<sup>3</sup>, Greg Simpson<sup>3</sup>, Bill Miller<sup>3</sup>, Dave Lucchesi<sup>3</sup>, Todd St. Sauver<sup>3</sup> <sup>1</sup>*South Dakota State University*, <sup>2</sup>*University of Nebraska at Kearney*, <sup>3</sup>*South Dakota Game, Fish & Parks*

Gizzard Shad have been stocked into several smaller impoundments across South Dakota. These introductions provide an opportunity to investigate the potential direct benefits that Gizzard Shad as prey may have on recreationally important fishes, particularly on improved growth rates. Further, Gizzard Shad may also provide indirect benefits if larger piscivores can apply predation pressure to overabundant Black Bullheads. Thus, the objectives of this study are to: 1) document the relative contribution of age-0 Gizzard Shad to the food habits of the fish community (where applicable) in Bear Butte Lake, Curlew Lake, Lake Alvin, and Lake Marindahl; and 2) evaluate whether a subsequent increase in piscivore growth will increase the potential to control Black Bullhead populations through consumption. We present preliminary results from food habits sampling in Bear Butte Lake and Lake Curlew. Sampling was completed monthly from May to September 2017. Most predators consumed mainly Cladocera and various invertebrates in May and June and then switched to Gizzard



Shad between July and September. In all months excluding September, at least a few Channel Catfish, Largemouth Bass and Northern Pike consumed one or more Black Bullheads. Sampling will switch to Lakes Alvin and Marindahl in 2018. The collective results from West and East River impoundments should help to address the question as to whether other Gizzard Shad stockings have the potential to improve sport fisheries in other small impoundments across the state.

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## **Paper Session: Cold Water Fisheries**

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### **Influence of Density Reduction on the Growth Rate of Individual Brown Trout**

Travis Rehm<sup>1\*\*</sup>, Steven Chipps<sup>2</sup>, Jacob Davis<sup>3</sup> and Greg Simpson<sup>3</sup> <sup>1</sup>*South Dakota State University*, <sup>2</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*, <sup>3</sup>*South Dakota Game, Fish & Parks*

Brown Trout *Salmo trutta* in many lotic systems suffer from reduced growth rates due to high densities of fishes and in many cases managers have little tools at their disposal to combat these slow growth rates. One management tool proposed is localized manual reductions in fish density. To test the viability of these reductions, we studied the relationship between density and growth of individual fishes. In Spearfish Creek, South Dakota, we sampled fish in fourteen sites (425 m in length) in the summer of 2016. Sites were located within two separate reaches, Spearfish Canyon and the town of Spearfish. We completed 50% reductions in fish densities (>100 mm) at 7 sites during 2016 field season. Tagging of Brown Trout using PIT (passive integrated transponders) tags was performed within all sites, ~150 per site. All sites were resampled during 2017. Growth was estimated as absolute growth rate and specific growth rate for all PIT tag recapture fish. We detected an increase in growth rate within density reduction sites in the canyon reach. However, no increase in growth was observed for the town reach. We attributed these differing effects of density reduction to the different initial densities and mean lengths at age (greater densities and reduced length at age, within the canyon reach). We conclude that density reduction could be used as a viable management technique to increase the size of stream dwelling fishes. However, managers must consider initial population characteristics (density, mean length at age) prior to implementation.

### **Evaluation of instream discharge, temperature, prey availability, and thermal refuge on Rapid Creek Fisheries**

Michaela Halvorson<sup>1\*\*</sup>, Lisa Kunza<sup>1</sup>, Jacob Davis<sup>2</sup> <sup>1</sup>*South Dakota School of Mines and Technology*, <sup>2</sup>*South Dakota Game, Fish & Parks*

Water temperature and flow are critical components of determining suitability of stream and river habitat to most freshwater fish species. Rapid Creek has developed a temperature gradient with increasing temperatures from the tail waters of Pactola Dam to Rapid City. By examining the relationship between macroinvertebrates, fish, flow, temperature gradient, temperature variability, and water quality, our objective is to explain the variability in fish abundance and condition as well as shifts in macroinvertebrate assemblages in Rapid Creek. We collected macroinvertebrates and water quality parameters, electroshocked fish, deployed temperature loggers, and obtained discharge data from USGS stations in Rapid Creek from June to September 2017. Discharge and temperature explained the majority of the variability in fishery condition and abundance. Adult fish abundance decreased as the temperatures increased in late summer. The latest Black Hills Management Plan indicated a decrease in Rapid Creek fishery classification from Class BR1 to BR2 in Pactola Basin and BR3 in lower sections due to the number of wild brown trout decreasing to less than 150 per acre.

### **Lake Trout Introduction into Deerfield Reservoir**

Gene Galinat, *South Dakota Game, Fish & Parks*

Hatchery brood stock lake trout were introduced into Deerfield Reservoir, South Dakota, in April 2015 with additional stockings in November 2015 and October 2016. The stocked lake trout were large fish averaging 8 lbs/fish in April 2015 and 5 lbs/fish in November 2015 and October 2016. Fall trap netting was used to assess lake trout condition and carryover. Average relative weight dropped significantly ( $t=2.36$ ,  $df = 7$ ,  $P = 0.009$ ) from 86.2 in the second year to 77.0 during the third year after introduction. Lake trout from each stocking were captured during trap netting. A year-long angler survey was also conducted (1 Nov 2015 to 31 Oct 2016) to assess angler satisfaction, percent of anglers targeting the newly introduced species, angler acceptance of a possible length regulation on lake trout, and catch and harvest of all fish species.

Twelve percent of anglers targeted lake trout throughout the angler survey period and 14% of anglers targeted lake trout during the ice fishing season. Over 97% of lake trout anglers were in favor of a more restrictive length regulation on the newly created fishery. An estimated 940 lake trout were caught during the angler survey with 119 harvested. Average length of measured lake trout that were harvested was 25.1 inches. Stocking adult hatchery lake trout had an immediate angling effect and provided a trophy fish aspect to Deerfield Reservoir.

### **Using Water Quality and GIS to Evaluate Lake Trout Habitat in Deerfield Reservoir, South Dakota**

Lindsey Meiers, Michelle Bucholz, Joellyn Moine, Greg Simpson, *South Dakota Game, Fish & Parks*

Lake trout prefer temperatures less than 19 °C and dissolved oxygen levels greater than 4 mg/l. Temperature and dissolved oxygen profiles were taken during the summer and fall of 2015 and were used with a recent depth map of Deerfield Reservoir, South Dakota to compute lake volumes. Adequate lake trout habitat existed throughout the study, but was markedly reduced in August and September when water volumes were 1.9 X 10<sup>6</sup> m<sup>3</sup> and 4.8 X 10<sup>6</sup> m<sup>3</sup>, respectively.

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## **Paper Session: Environment & Water Quality**

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### **Pesticides, Nitrates and Selenium in South Dakota Prairie Streams and Tile Effluent.**

Matthew S. Schwarz, *U.S. Fish and Wildlife Service, Pierre, SD*

Increased use of subsurface agricultural tile drainage in eastern South Dakota may degrade water quality and harm aquatic life. The Big Sioux River, James River and Vermillion River basins drain over 22,500 square miles of eastern South Dakota, most of which is dominated by row-crop agriculture. The rivers and streams in these basins provide public recreation, drinking water for livestock and people, and habitat for a variety of wildlife species including aquatic invertebrates, fish, amphibians, birds and mammals. However, the South Dakota Natural Heritage Program has categorized 10 species of fish at least 12 species of freshwater mussels in eastern South Dakota as imperiled or critically imperiled. The South Dakota Department of Environment and Natural Resources has also found that the majority of assessed streams in these basins have water quality impairments in accordance with the Clean Water Act. Thus in 2016, the U.S. Fish and Wildlife Service, in partnership with the U.S. Environmental Protection Agency and the East Dakota Water Development District, initiated a two-year effort to measure water quality at 15 stream sites with occurrence records for federally endangered Topeka shiners. On a monthly basis from April to Sept, we sampled stream sites and tile effluent for water temperature, pH, specific conductivity, pesticides, nitrates and selenium. Concentrations of nitrates, pesticides and selenium in tile effluent and stream sites exceeded water quality benchmarks for the protection of aquatic life. Further assessment and development of strategies to protect water quality and aquatic life from tiling are needed.

### **Effectiveness of thermal and oxygen mixing by a wind-powered water circulator in a small, shallow reservoir**

Daniel A. James, Gary Brundige<sup>1</sup>, Landon L. Pierce, Dylan R. Turner, *U.S. Fish and Wildlife Service, Pierre, SD*, <sup>1</sup>*Ellsworth Air Force Base, SD*

Thermal and oxygen stratification during the warm summer months is common in small reservoirs, which can lead to problems for fish if temperatures are too high in the epilimnion and oxygen is too low in the cooler hypolimnion. Aerators and lake mixers have been placed in reservoirs to remedy such problems, but evaluations of their effectiveness are not commonplace, particularly in small, shallow reservoirs. We placed a wind-powered water circulator in Gateway Lake, a small (2.2 ha, 4.3 m max depth) reservoir on Ellsworth Air Force Base, South Dakota on July 10, 2017. From May to October 2017, we periodically collected temperature and dissolved oxygen profiles in Gateway Lake at three locations including one each at 5 m, 44 m, and 67 m from the circulator location. In addition, we placed temperature monitors at the bottom and top of the water column at each location. Finally, we conducted the same sampling regime at one site in Heritage Lake, a small (1.2 ha, 3.7 m max depth) reservoir located within 0.5 km of Gateway Lake. We compared temperature and dissolved oxygen values with Gateway Lake and between lakes to determine the effectiveness of the water circulator.

## **Nutrients, Pesticides and Selenium in Agricultural Tile Discharges into Public Wetlands, Madison Wetland Management District, South Dakota.**

Matthew S. Schwarz<sup>1</sup>, Bryan Schultz<sup>2</sup>, Drew R. Davis<sup>3</sup>, Jacob L. Kerby<sup>3</sup>, <sup>1</sup>*U.S. Fish and Wildlife Service, Pierre, SD*, <sup>2</sup>*U.S. Fish and Wildlife Service, Madison, SD*, <sup>3</sup>*University of South Dakota*

There are approximately 4.4 million acres of wetlands in the Prairie Pothole Region of the Dakotas that provide essential habitat for wildlife, improve water quality, and provide flood control benefits. However, these wetlands are increasingly receiving discharges from agricultural tile drainage. We measured pollutants in tile effluent and evaluated water quality and habitat degradation at Waterfowl Production Areas managed by the U.S. Fish and Wildlife Service. Eighteen wetland sites were periodically sampled from 2011 to 2015. These sites were divided into three site categories: 1) Tile Wetland for wetland sites that directly receive tile outfall discharges but may also receive surface runoff of agricultural chemicals, 2) Surface Wetland for wetland sites that receive surface runoff of agricultural chemicals but have no known tile discharge inputs, and 3) Reference Wetland for wetland sites that are well buffered from agricultural chemicals in surface runoff and receive no direct tile outfall discharges. Concentrations of nutrients, pesticides and selenium in tile effluent exceeded water quality benchmarks for the protection of aquatic life. There were also differences in pollutant concentrations between wetland site categories, with Tile Wetlands having higher concentrations of select pesticides, chlorophyll-a, and selenium than Reference Wetlands. Tile Wetlands also exhibited selenium bioaccumulation in wetland biota (plants, aquatic invertebrates, and duck eggs) and had overall lower South Dakota Wetland Rapid Assessment Protocol scores. From the results of this study, we will recommend actions to reduce agricultural pollutant discharges into public wetlands.

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## **Paper Session: Human Dimensions**

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### **Assessing the Opinions of Native Fish Management in the Black Hills of South Dakota**

Seth Fopma<sup>1\*\*</sup>, Larry Gigliotti<sup>2</sup>, <sup>1</sup>*South Dakota State University*, <sup>2</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*

Fisheries management has traditionally focused on the preservation and proliferation of fishes valued by the managing society. Typical management has almost exclusively focused on sport and native fishes. Recent trends in societal values have extended the management of fisheries to include non-game species. Mountain Sucker, *Catostomus platyrhynchus*, is a native, non-game species of conservation concern in South Dakota. Recent surveys suggest that Mountain Sucker have declined in both distribution and density across the Black Hills. To properly assess the best-management practices for Mountain Sucker in the region, we must assess the societal attitudes towards the active management of native species. A stratified-random sample of Black Hills area residents (4,200) were surveyed using a modified Tailored design method (24% return) to assess attitudes towards native, non-game fisheries management in the Black Hills. K-means cluster analysis was used to categorize respondents into three distinct groups (apathetic, utilitarian angler, and conservation angler) defined by attitudes towards native fisheries management. Further analysis revealed significant differences in angling activity between groups. Results will guide managers towards appropriate native fish management practices.

### **Factors Explaining Angler Satisfaction in South Dakota: Is Angler Satisfaction Related to Angler Evaluation of the South Dakota Game, Fish and Parks' Customer Service?**

Aaron Sundmark<sup>1\*\*</sup>, Larry Gigliotti<sup>2</sup>, <sup>1</sup>*South Dakota State University*, <sup>2</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*

The primary goal for fisheries management agencies is to provide sustainable angling opportunities for people through responsible fisheries management. However, the objectives associated with this goal may change in accordance to what anglers want from fishing trips in order to be satisfied. We found that satisfaction was significantly higher in 2015 when anglers participated in fly fishing and selected trout as their preferred species, and when they participated in fishing tournaments and clubs. Satisfaction was significantly lower when anglers reported fishing as their most important form of recreation, when they had no species preference, and when they did not fish with non-residents in 2015. We found ratings

of SDGFP customer service to be significantly higher in 2015 when anglers were female and when they preferred trout fishing in the Black Hills. Ratings were significantly lower when anglers fished more days, and reported fishing as their most important form of recreation. Using regression, variables explaining the most variation in angler satisfaction were ratings of SDGFP customer service, days fished, and ice fishing participation (adj.  $R^2=0.12$ ). The variables explaining the most variation in ratings of SDGFP customer service were angler satisfaction, ice angling participation, and days fished (adj.  $R^2=0.11$ ). Since angler characteristics were only able to explain about 10-12% of the variation in these response variables, these results suggest that more effort is needed in order to determine the factors that affect how anglers report their satisfaction, and their image of fisheries management agencies.

### **Angling use at six rural waters as determined through remote sensing equipment**

Greg Simpson, *South Dakota Game, Fish and Parks*

Six western South Dakota waters were sampled for angler usage via remote sensing techniques. Access to these waters was monitored using Trafx vehicle counters and verified with a Plotwatcher video system. Each counter was verified for a 15 day period. Counter verification had a range from 0.76 to 1.06. These data emphasize the need to have the trial period to verify actual counts from the Trafx units at each sampling locale. Total visits to these lakes ranged from 0.6 to 54.3 per day. Actual use at these waters was determined through still photos taken every thirty-minutes throughout the daylight period. Results show a variety of angling use at these remote waters. Information on use of these remote waters would not have been determined without implementing data collection using remote sensing equipment. Lessons learned through the process are also discussed.

### **Angler use, success and satisfaction with community fishing ponds in southeastern South Dakota**

David Lucchesi, Benjamin Schall, Todd St. Sauver, *South Dakota Game, Fish & Parks*

A creel survey designed to determine angler use, catch, harvest, demographics, preferences, and satisfaction on six community fishing ponds (CFP) in southeastern South Dakota was conducted from April through August 2017. Trail cameras set to take one still photograph every hour were used to collect additional angler counts at the Worthing and Hurley CFPs. Creel clerks interviewed 71 parties at the six CFPs over the survey period. Total fishing pressure varied from 0 h at Marion CFP to 1,315 h (80% CI,  $\hat{A} \pm 324$ ) at Freeman CFP. Estimates of summer fishing pressure from trail camera counts were more precise than those from creel clerk counts, but they were not significantly different. Largemouth Bass *Micropterus salmoides*, Bluegill *Lepomis macrochirus*, and Black Bullhead *Ameiurus melas* were the species caught most often. However, anglers harvested very few fish of any species. Freeman CFP provided the best fishing for Largemouth Bass (catch per hour of  $0.44 \hat{A} \pm 0.36$ ) and Bluegill ( $1.40 \hat{A} \pm 0.77$ ), followed by Tea South CFP. About 74% of parties interviewed on all of the CFPs were satisfied with their fishing trip with only 4% dissatisfied. Two-thirds of anglers interviewed were under age 18 (kids), 45% of parties were only kids, and 37% of parties were a combination of kids and adults. Most kids (74%) picked Largemouth Bass as their favorite fish to catch while Largemouth Bass and Yellow Perch *Perca flavescens* were the top picks among adults. Survey findings will be used to guide future management strategies and access improvements.

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## **Paper Session: Reservoir & Lake Fisheries**

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### **Comparison of hydroacoustic survey designs for coldwater forage assessment in a Missouri River reservoir**

Nicholas B. Kludt\*\* , Brian D.S. Graeb, Mark J. Fincel<sup>1</sup>, *South Dakota State University* ,<sup>1</sup>*South Dakota Game, Fish & Parks*

Rainbow Smelt and Cisco are the primary coldwater forage species in Lake Oahe, South Dakota. Understanding the dynamics of these species is an important aspect of Walleye and Chinook Salmon management. As these coldwater species are pelagic and heterogeneously distributed throughout the stratified reservoir zone, they have been historically surveyed using hydroacoustics. Hydroacoustics offers the ability to efficiently survey large areas, but can be time consuming. We compared the traditional cross-sectional transects ( $2.5 \hat{A} \pm 0.8$  km) with an abbreviated longitudinal transect ( $0.5 \hat{A} \pm 0.0$

km) survey, using a paired design replicated over three months and two years (n=97). We then analyzed the observed target densities of Rainbow Smelt and Lake Herring using a mean square error (MSE) approach. Observed densities were highly correlated for both Rainbow Smelt ( $r = 0.91$ ) and Cisco ( $r = 0.94$ ). Decomposing MSE revealed random error components of 67.3% and 99.7% of Rainbow Smelt and Cisco, respectively, indicating no systemic differences between the paired estimates. In either case, estimates were statistically comparable to a 1:1 line with a zero intercept, indicating high observational agreement. These results show no discernible difference between survey designs. While travel time between sites will remain constant, the difference between longitudinal (6 min) and cross sectional (30 min) transect scanning times equates to an 80% time savings (1 hr, 42 mins vs. 8 hr, 38 mins). We therefore recommend the adoption of the longitudinal design for future standardized sampling of Lake Oahe coldwater stocks.

### **Acoustic Tag Retention and Initial Dispersal of Hatchery-Reared Juvenile Paddlefish**

Dylan Turner<sup>1</sup>, Daniel James<sup>1</sup>, Landon Pierce<sup>1</sup>, Hilary Meyer<sup>2</sup>, Nicholas Starzl<sup>3</sup>, Jeffrey Powell<sup>3</sup>, <sup>1</sup>*U.S. Fish and Wildlife Service, Pierre, SD*, <sup>2</sup>*South Dakota Game, Fish & Parks*, <sup>3</sup>*U.S. Fish and Wildlife Service, Yankton, SD*

Paddlefish *Polyodon spathula* are a large river species native to several major rivers and tributaries throughout the USA. Overall, abundance of Paddlefish has been declining due to habitat modifications (i.e., channelization, dams, and water quality) and unsustainable commercial harvest. Within parts of the Missouri River, populations have been sustained with hatchery stocking, but within Lake Sharpe, Paddlefish are nearly extirpated. The South Dakota Department of Game, Fish and Parks and U.S. Fish and Wildlife Service have stocked Lake Sharpe since 2015 with adult and juvenile Paddlefish to restore the fishery. In 2017, an additional 40K+ juvenile Paddlefish were stocked, and a Vemco receiver array was established throughout Lake Sharpe. Little is known about initial juvenile dispersion and tag retention, therefore our objectives were to examine tag retention, fish health, suture viability, and initial dispersal within Lake Sharpe. We surgically implanted acoustic telemetry tags (Vemco V8-4x) into 50 individuals to track initial dispersion while 20 dummy tags were implanted into fish to test retention. After three months, Paddlefish implanted with dummy transmitters and held at Gavins Point National Fish Hatchery had a 95% tag retention rate and zero mortality. Initial dispersion results showed a majority of stocked Paddlefish moved away from their stocking location and utilized a large portion of the reservoir in a short time frame.

### **Feasibility of hydro-acoustic surveys to monitor Rainbow Smelt (*Osmerus mordax*) and Rainbow Trout (*Oncorhynchus mykiss*) in Pactola Reservoir, South Dakota**

Jake Davis, Nicholas Kludt<sup>1</sup>, Hilary Meyer, Mark Fincel, *South Dakota Game, Fish & Parks*, <sup>1</sup>*South Dakota State University*

Current sampling gears (i.e. modified fyke nets and benthic experimental gill nets) may not be appropriate methods of estimating relative abundance of Rainbow Smelt (*Osmerus mordax*) and hatchery-reared Rainbow Trout (*Oncorhynchus mykiss*) in Pactola Reservoir, South Dakota. Thus, the objectives of this study were to evaluate the utility of hydro-acoustic surveys to estimate the standing stock of Rainbow Smelt and hatchery-reared Rainbow Trout. In 2015, paired day and night hydro-acoustic surveys were conducted in May and June. Consecutive night hydro-acoustic surveys were conducted monthly from June through August in 2015 and May through July in 2016. Estimates of both species were substantially higher during nighttime sampling events in comparison to daytime surveys. Differences in estimates were observed in consecutive samples; however, consecutive estimates within months were similar (e.g. highest in same months). Estimates of adult Rainbow Smelt were highest in August of 2015 and July of 2016. Annually, estimates of Rainbow Trout increased each month and were highest in August of 2015 and July of 2016. Hydro-acoustic surveys showed to be a viable method for estimating Rainbow Smelt abundance within Pactola Reservoir and we suggest that surveys should occur in August. However, hydro-acoustic surveys were not a viable method to track standing stock of hatchery-reared Rainbow Trout. We expected estimates to decline throughout the summer months as fish are exposed to harvest and natural mortality. However, the opposite was observed in the present study where estimated Rainbow Trout abundance increased throughout the summer.

## **The "Tails" that Walleye Tell: The History of Walleye Management in Nebraska Reservoirs**

Melissa Wuellner, Keith Koupal<sup>1</sup>, Brett Miller, *University of Nebraska at Kearney*,<sup>1</sup>*Nebraska Game & Parks*

Due to their popularity among anglers across their native range, Walleye *Sander vitreus* have been heavily managed through stocking (of Walleye and prey), harvest regulation, and habitat restorations. However, many states continue to see declines in Walleye populations despite these efforts. Similar declines have been noted in Nebraska, particularly in reservoirs that provide most of the recreational fishing hours in the state. Both Harlan County Reservoir and Lake McConaughy, two important Walleye fisheries in Nebraska, were stocked with Walleye for a few years immediately following creation of these reservoirs, but limited stocking occurred for the next 20 to 30 years as natural recruitment supported self-sustaining fisheries during most years. Since the late 1980s, however, stocking of Walleyes has occurred nearly every year as natural recruitment declined. In recent years, stocking has contributed 70 to 90% of year classes, and stocked individuals grow relatively fast. Previous research has focused on identifying the factors that influence adult Walleye relative abundance in these stocked systems. In this presentation, we will present the history of Walleye management in Harlan County Reservoir and Lake McConaughy and of research that has advanced our understanding on the dynamics of Walleye recruitment in these systems.

## **Comparison of Day and Night Electrofishing to Sample Smallmouth Bass in Natural Lakes of Eastern South Dakota**

Brian Blackwell, Todd Kaufman, Tyrel Moos, Mark Ermer, Steve Kennedy, Ryan Braun, *South Dakota Game, Fish & Parks*

Smallmouth Bass *Micropterus dolomieu*, an important sport fish and apex predator, are commonly sampled by fisheries personnel using night electrofishing. We assessed day and night electrofishing catch per hour of effort (CPUE), sampling precision (i.e., coefficient of variation [CV]) and size structure of Smallmouth Bass in eight northeast South Dakota natural lakes during 2013 to 2016 to determine if day electrofishing was a viable option for population assessment. Night CPUE was generally greater than day CPUE in paired samples. Significant differences in CPUE for fish >180 mm TL were identified in approximately one third of lake-year comparisons. Day and night CPUE were more likely to be significantly different in fish <350 mm TL. A significant linear relationship was identified between day CPUE and night CPUE for all fish. Coefficients of variation of CPUE were similar between day and night samples. Significant differences in proportional size distribution (PSD) were identified for 6 of 15 day-night pairs, but no pattern was identified and no differences in proportional size distribution of preferred-length fish (PSD-P) values were found. A linear relationship was identified between day and night PSD and day and night PSD-P and neither relationship differed from the 1:1 line. A significant curvilinear relationship was present between the percent deviations (PD) of day and night CPUE across Secchi depths. We believe that day electrofishing can be used to assess Smallmouth Bass populations in eastern South Dakota natural lakes.

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

Joseph Mrnak<sup>1\*\*</sup>, Steven Chipps<sup>2</sup>, Daniel James<sup>3</sup>, <sup>1</sup>*South Dakota State University*, <sup>2</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*, <sup>3</sup>*U.S. Fish and Wildlife Service, Pierre, SD*

Pallid Sturgeon *Scaphirhynchus albus* are a federally endangered species endemic to the Missouri River basin and the lower Mississippi River. Successful natural reproduction has been limited for decades and in addition, a recruitment bottleneck is hypothesized to occur during the drift phase of endogenous larvae. Understanding factors that affect survival of Pallid Sturgeon larvae is key given their critical status and ongoing recovery efforts. In this study, we evaluated the effects of water velocity on growth, survival, and energy depletion of endogenous Pallid Sturgeon larvae (18 mm TL). We tested three water velocity treatments at a temperature of 16.3 °C; treatments included no velocity (0 cm/s), intermediate velocity (range, 1 to 7 cm/s), and high velocity (2 to 16 cm/s). Growth rate of Pallid Sturgeon larvae was similar across water velocities, ranging from 0.76 to 0.84 mm/d. However, energy reserves of Pallid Sturgeon larvae maintained in the no flow treatment declined significantly compared to larvae in the intermediate and high velocities. Moreover, larvae in the no velocity treatment experienced significantly greater mortality than those maintained in tanks with flow. In natural environments, areas with no flow may pose a significant source of mortality to endogenous Pallid Sturgeon larvae.

## List of Posters

Fish Tissue Mercury Analysis from North Dakota's Lotic Waterbodies. **Aaron Larsen**

Exploring Daphnia size structure to investigate potential for Rainbow Smelt and Cisco competition. **Allison J. Shorter**\*, Joseph M. Kretchman, Nicholas B. Kludt, Brian D.S. Graeb, Mark J. Fincel

Influence of Mink Predation on Brown Trout Survival and Size-Structure in Rapid Creek, South Dakota. **Austin G. Galinat**\*\*\*, Steve R. Chipps, Jonathan A. Jenks, Jacob L. Davis, Greg Simpson

Comparison of short-term survival of electroshocked and ladder caught Chinook Salmon in Lake Oahe, South Dakota. **Brandon Maahs**, Hilary Meyer, Robert Hanten, Mark Fincel

Spatial and Temporal Distribution of Microcystins in Harlan County Reservoir. **Chuck Mordhorst**\*\*, Keith Koupal, Melissa Wuellner, Mike Archer

Catch Raceway Escapement of Chinook Salmon at Whitlocks Bay Spawning Station. **Dylan Gravenhof**, Brandon Maahs, Hilary Meyer, Robert Hanten, Mark Fincel

Age-at-stocking effect on recruitment, growth, and condition of Pallid Sturgeon. Landon Pierce, Daniel James, **Dylan Turner**

Growth Assessment of Brown Trout *Salmo trutta* and Rainbow Trout *Oncorhynchus mykiss* in Long Pine Creek, Nebraska. Brett Roberg, **Garrett Rowles**\*\*

Little Missouri River Sampling. **Samuel Hultberg**, Tait Ronnigen, Josh Wert

Impacts on Rainbow Trout (*Onchorhynchus mykiss*) Rearing Performance of Dietary Bioprocessed Plant-based Protein and Water Velocity. **Jill Voorhees**, Michael L. Brown, Steve R. Chipps, Michael E. Barnes.

Success of Stocking Walleye in Select Bays of a Large Missouri River Reservoir. Mark J. Fincel, **Robert Hanten**, Dan Jost, Jason Jungwirth, **Hilary Meyer**, Kyle Potter, Mike Smith.

Indexing Walleye Recruitment in Eastern South Dakota Natural Lakes. **Todd Kaufman**, Brian Blackwell, Michael Brown

## Poster Abstracts

### **Fish Tissue Mercury Analysis from North Dakota's Lotic Waterbodies.**

**Aaron Larsen**, *ND Department of Health, Division of Water Quality*

Using data from the 2013-2014 National Rivers and Streams Assessment, the North Dakota Department of Health evaluated fish tissue mercury concentrations from 49 randomly selected locations across the state. Tissue samples were collected from a variety of fish species using both fish plugs and whole fish fillets. Results ranged from a low of 39.6 ng/g in a common carp from Lightning Creek near Hettinger to 599 ng/g in a northern pike from the Heart River. By species, bigmouth buffalo, smallmouth bass and sauger had the highest median concentrations with 566 ng/g, 493 ng/g and 483 ng/g, respectively. Based on river basin, Cedar Creek had the highest median value of fish tissue mercury concentrations while the Grand River basin had the lowest median value. A total of 24.5% of sites exceeded the US E.P.A. human health criterion of 300 ng/g.

## **Exploring *Daphnia* size structure to investigate potential for Rainbow Smelt and Cisco competition.**

Allison J. Shorter\*, Joseph M. Kretchman\*, Nicholas B. Kludt, Brian D.S. Graeb, Mark J. Fincel<sup>1</sup>  
*South Dakota State University, <sup>1</sup>South Dakota Game, Fish & Parks*

Emerging research in Lake Oahe, SD, has shown Rainbow Smelt abundances are inversely related to those of Cisco. This suggests an interaction whereby low Rainbow Smelt abundance allows Cisco to produce large year classes. To evaluate the potential that competition is occurring, we analyzed the 2017 Lake Oahe *Daphnia* size structure and spatial distribution. Both zooplanktivores preferentially feed on large *Daphnia pulex*, *D. schodleri*, and *D. galeata mendota*, and can depress *Daphnia* size structure at high fish density. We hypothesized that size structure would be depressed in the presence of greater fish densities, providing concern regarding interspecific competition. Using ANOVA, we determined there was a significant difference in *Daphnia* density between months ( $p < 0.01$ ), size between months ( $p < 0.01$ ), and size within months by transect in July ( $p < 0.01$ ), September ( $p = 0.05$ ). It appears *Daphnia* size structure is being reduced by predation but we were not able to assign predation pressures to a specific species. It is more likely a combination of high predation by multiple species contributing to the observed effect.

## **Influence of Mink Predation on Brown Trout Survival and Size-Structure in Rapid Creek, South Dakota.**

Austin G. Galinat<sup>1\*\*</sup>, Steve R. Chipps<sup>2</sup>, Jonathan A. Jenks<sup>1</sup>, Jacob L. Davis<sup>3</sup>, Greg Simpson<sup>3</sup>, <sup>1</sup>*South Dakota State University*, <sup>2</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*, <sup>3</sup>*South Dakota Game, Fish & Parks*

Population surveys of adult Brown Trout (*Salmo trutta*; > 200 mm) in Rapid Creek, SD have shown that trout abundance has declined by over 70% in recent years. Although factors influencing their survival are poorly known, recent studies show that food availability is an unlikely source of mortality given high growth and body condition of Brown Trout. Predation by Mink (*Mustela vison*) has been offered as a hypothesis to explain reduced adult Brown Trout abundance after a telemetry study revealed that apparent mortality of radio-tagged fish was 32%. Limited refuge habitat 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. At present, the abundance, distribution, and home range of Mink in Rapid Creek are unknown and the factors affecting mink-trout interactions within the area are unknown. Addressing these questions is important for optimizing management decisions and habitat improvement efforts aimed at enhancing the quality of wild trout fisheries. The purpose of this project is to assess impacts of Mink predation on trout populations in Rapid Creek. Data gathered in this study will provide insight into the effectiveness of management techniques such as in-stream habitat improvements and predator block management on trout populations.

## **Comparison of short-term survival of electroshocked and ladder caught Chinook Salmon in Lake Oahe, South Dakota.**

Brandon Maahs, Hilary Meyer, Robert Hanten, Mark Fincel, *South Dakota Game, Fish & Parks*

South Dakota Game, Fish, and Parks current collection methods for Chinook Salmon (*Oncorhynchus tshawytscha*) require the use of both electrofishing and a fish ladder to meet egg quotas. However, the impacts of each collection method on the short-term survival of Chinook Salmon are unknown. Thus, we evaluated short-term survival of electrofished versus ladder returned Chinook Salmon at the Whitlock Bay Salmon Spawning Station on Lake Oahe, South Dakota in October 2017. Individually numbered T-bar anchor tags were used to track each fish from collection to mortality of fish held in the spawning station raceways where we assumed full survival was a fish that lived until it was spawned. We used a Kruskal-Wallis test to examine differences in survival between collection methods ( $\hat{I} \pm = 0.05$ ). A total of 938 Chinook Salmon were captured and tagged (344 via electrofishing and 594 ascended the fish ladder); of which 17% (64) of fish captured by electrofishing and 10% (59) of ladder returned fish died prespawn. Median days alive prespawn was 8 days for salmon captured by electrofishing and 9 days for ladder returned Chinook Salmon. Ladder returned Chinook Salmon survived longer than salmon collected by electrofishing, however, this difference was not statistically significant ( $X^2 = 1.56$ ,  $p = 0.21$ ). Our results suggest electrofishing may have a slightly greater impact on short-term survival; however, this difference is not great enough to require change in current capture and handling methods to meet egg demands.



## **Spatial and Temporal Distribution of Microcystins in Harlan County Reservoir.**

Chuck Mordhorst<sup>1\*\*</sup>, Keith Koupal<sup>2</sup>, Melissa Wuellner<sup>1</sup>, Mike Archer<sup>3</sup>, <sup>1</sup>*University of Nebraska at Kearney*, <sup>2</sup>*Nebraska Game & Parks Commission*, <sup>3</sup>*Nebraska Department of Environmental Quality*

Microcystins are toxins produced by harmful cyanobacterial blooms. As global occurrences of harmful algal blooms increase, the importance of understanding the spatial and temporal dynamics of microcystins has increased. We examined the spatial and temporal variation in the distribution of microcystins across Harlan County Reservoir between May and October 2017. Concentrations of microcystins were compared between reservoir zones (upper, middle, lower) and across seasons using a repeated-measures analysis of variance. Sampling will be repeated in 2018. This study will provide information that may be used to guide contact advisories for water recreation and consumption in the future.

## **Catch Raceway Escapement of Chinook Salmon at Whitlocks Bay Spawning Station.**

Dylan Gravenhof, Brandon Maahs, Hilary Meyer, Robert Hanten, Mark Fincel, *South Dakota Game, Fish & Parks*

South Dakota Game, Fish, and Parks collects spawning Chinook Salmon (*Oncorhynchus tshawytscha*) in Lake Oahe, SD, via a fish ladder and capture facility. It is unknown how many fish ascend the ladder, and are able to escape. We conducted a mark-recapture study to determine escapement. All male salmon that entered the catch raceway were tagged with T-bar floy tags and returned to the raceway. Fish in the catch raceway were sorted 3 times a week (e.g., Monday, Wednesday, and Friday) and all recaptures were recorded. We found 159 of 383 (41.5%) tagged males escaped at some point during the spawning process. Of those 159 escapees, 98 of the fish never returned. These fish were on site for an average of 3 days before escaping. Of the 61 fish that left and returned, 61 escaped and returned 1 time, 61 escaped and returned twice, and 8 fish escaped and returned 3 times. The number of days on station for fish that returned was 2, 2, and 1 days, respectively. Week 1 had the highest percentage of escapement with 57.5% of the fish escaping. The percentage escapement decreased each week with only 15.2% escapement by Week 4. Our management recommendations for the Whitlocks Bay Spawning Station are to lower the percentage of salmon escaping the station by improving the gate system that connects the catch raceway to the return ladder. This action could be particularly important if females are exhibiting the same escapement trends as males in this study.

## **Age-at-stocking effect on recruitment, growth, and condition of Pallid Sturgeon.**

Landon Pierce, Daniel James, Dylan Turner, *U.S. Fish and Wildlife Service, Pierre, SD*

Federally-endangered Pallid Sturgeon are stocked to prevent extinction until sufficient natural reproduction and recruitment occurs. Initial survival of hatchery-reared Pallid Sturgeon (HRPS) increased with stocking age in the upper and lower Missouri River, but how stocking age affects performance of HRPS in the middle Missouri River remains unclear. Therefore, our objective was to evaluate the age-at-stocking effect on recruitment, growth, and condition of HRPS in the middle Missouri River. Over 4,000 HRPS from the 2008 year class were stocked into the middle Missouri River that included 3,410 age-0 and 637 age-1 fish. We used recapture data of these individuals from standardized surveys within the Pallid Sturgeon Population Assessment Program to evaluate the effects of age-at-stocking on the number recaptured, growth in length and weight, and body condition. We recaptured 34 (1% of stocked) individuals stocked at age-0 and 31 (4.9%) individuals stocked at age-1. Length, weight, and body condition did not differ among stocking ages at any age. Age-0 stockings will likely recruit to the population and perform similar to age-1 stockings, but stocking age-1 individuals is preferred because increased survival rate and likely reduced variability in survival rates between year classes of age-1 stockings result in more predictable effects of stocking on population size and genetic structure (i.e., effective population size).

## **Growth Assessment of Brown Trout *Salmo trutta* and Rainbow Trout *Oncorhynchus mykiss* in Long Pine Creek, Nebraska.**

Brett Roberg<sup>1</sup>, Garrett Rowles<sup>2\*\*</sup>, <sup>1</sup>*Nebraska Game & Parks Commission*, <sup>2</sup>*University of Nebraska at Kearney*

Long Pine Creek, located in Nebraska's Brown and Rock counties, represents the longest self-sustaining trout stream in Nebraska and is one of four streams classified as having a statewide importance to recreational fishing (highest valued resource). The Nebraska Game and Parks Commission (NPGC) recently developed the cool water stream initiative for better preserving unique resources while striving to maximize fishery potential. Standard surveys from the 5-year average have shown relative abundances for rainbow and brown trout to remain consistent at 0.704 and 0.416 fish/m, respectively. Size distributions for these management species found that 95% of the fish collected were < 300 mm in total length. The objectives of this study are: 1) describe annual growth of brown and rainbow trout using length at age of both species of trout in Long Pine Creek; and 2) investigate some potential causes of the observed slow growth rates. Otoliths were taken from a subsample of 5 fish per 10 mm length category to use for aging. Length-at-age data in Long Pine Creek indicated that the growth potentials for both of these species were greatly reduced compared to the AFS North American standards for both species. Thus, these sportfish populations have been shown to require longer life-spans to reach memorable sizes desired by many anglers. Here, we present evidence of slow growing populations of brown and rainbow trout and possible management implications such as a survey of available prey, a change in stocking practices, and the continuation of habitat improvements.

### **Little Missouri River Sampling**

Samuel Hultberg, Tait Ronnigen, Josh Wert, *U.S. Fish and Wildlife Service, Bismarck, ND*

An inventory of fish species of the Little Missouri River was conducted in August of 2017. This survey is a continuation of sampling done by the U.S. Fish and Wildlife service that dates back to 1997. The primary goal of this survey is to monitor existing species richness, species abundance, and to identify a long term trend in data that will be used to assess future impacts of the river. During the four day sampling period, a total of 22 sites (Figure 1) were used to collect data. These sites were chosen based out of the 40 historic sites used in previous years. Many of these sites could only be accessed on private land by gaining landowner permission while others required a permit from Theodore Roosevelt National Park and from North Dakota State Trust Lands. The sites that were used during this survey start at the South Dakota border and stretch north until the Little Missouri River meets Lake Sakakawea.

### **Impacts on Rainbow Trout (*Oncorhynchus mykiss*) Rearing Performance of Dietary Bioprocessed Plant-based Protein and Water Velocity**

Jill M. Voorhees<sup>1</sup>, Michael L. Brown<sup>2</sup>, Steve R. Chipps<sup>3</sup>, Michael E. Barnes<sup>1</sup> <sup>1</sup>*South Dakota Game, Fish & Parks*, <sup>2</sup>*SDSU Department of Natural Resource Management*, <sup>3</sup>*U.S. Geological Survey SD Cooperative Fish & Wildlife Research Unit*.

Two experiments, using different Rainbow Trout strains (Erwin x Arlee and Shasta), examined the dietary replacement of fish meal with a bioprocessed soybean product (BPSP). The dietary treatments were either FM or BPSP replacing 60% or 80% of the dietary FM. Flow treatments were: the minimal velocity averaged approximately 3 cm/s for both experiments and six to ten times the minimal velocity, depending on the experiment. Feed conversion ratio (FCR) was significantly improved in fish fed diets where 60% of the FM was replaced with BPSP. There were also no significant differences in trout weight, length, condition factor, relative fin length, hepatosomatic index, splenosomatic index, or viscerosomatic index among the dietary treatments. None of the dietary treatments were significantly affected by water velocity. However, compared to lower water velocities, higher velocities produced significantly higher FCR and SGR in Shasta strain Rainbow Trout. FCR was also significantly higher in the high velocity tanks of the Erwin-Arlee strain, but SGR was not significantly different between the velocities. Fin indices were not significantly different between the velocities in either strain. In conclusion, up to 80% of the FM component of Shasta strain rainbow trout diets can be replaced with FSBM with no decrease in rearing performance. Also, up to 60% can be replaced in Erwin x Arlee diets. Diets containing BPSP produced similar results to the FM control under both rearing velocities. However, higher rearing velocities generally led higher FCR.

## **Success of Stocking Walleye in Select Bays of a Large Missouri River Reservoir**

Mark J. Fincel, Robert Hanten, Dan Jost, Jason Jungwirth, Hilary Meyer, Kyle Potter, Mike Smith, *South Dakota Game, Fish & Parks*

We compared the performance of two differing sizes and stocking densities of Walleyes, *Sander vitreus*, to natural reproduction in Lake Oahe, South Dakota. Walleye fry were stocked in May 2017 in one bay of lower Lake Oahe. In June, small fingerlings were stocked in select bays of lower Lake Oahe; 3 bays received low density stockings (60,000 individuals) and 1 bay received a high density stocking (120,000 individuals). All stocked fish were marked using oxytetracycline (OTC). Fall age-0 electrofishing was used to evaluate stocking success through the first summer. Moreover, non-stocked bays in lower and upper Lake Oahe were used as controls to assess natural reproduction in those respective areas. Low catch rates of fall age-0 Walleyes were observed in lower Oahe where no stockings occurred or where Walleye fry were stocked. Slightly higher abundances of fall age-0 Walleyes were observed in bays that received low density stockings of small fingerlings. Abundance of fall age-0 Walleye at the high density small fingerling stocking site was comparable to sites in upper Lake Oahe where natural reproduction is high. These results suggest that high density stockings of small fingerling Walleyes can produce fall age-0 abundances similar to natural reproduction in bays of upper Lake Oahe. Our data suggest that high density stockings may be a viable tool for bolstering Walleye production in select bays of lower Lake Oahe.

## **Indexing Walleye Recruitment in Eastern South Dakota Natural Lakes**

Todd Kaufman, Brian Blackwell, Michael Brown<sup>1</sup>, *South Dakota Game, Fish & Parks*, <sup>1</sup>*South Dakota State University*

Because of the popularity of Walleyes *Sander vitreus* and the need for recurrent supplemental stockings, substantial resources are allocated to their management in eastern South Dakota (ESD) natural lakes. Since the late-1990s, fall night electrofishing has been used to monitor age-0 Walleye population parameters and index future year-class strength in select ESD waters with limited evaluation. In this study, long-term data sets were used to evaluate the utility of fall electrofishing age-0 Walleyes to index future year-class strength (i.e., age-2 CPUE) in ESD natural lakes. While high age-0 CPUE™s did not ensure strong recruitment to age 2, positive correlations identified between ranked age-0 and age-2 indices for most lakes suggest that fall night electrofishing provides a coarse, but useful index of recruitment in ESD natural lakes. Additionally, knowledge of recruitment patterns and factors that influence those patterns were of interest. Therefore in a subset of lakes, Walleye recruitment patterns were assessed and an information-theoretic approach was used to evaluate the influence of select abiotic and biotic predictor variables on recruitment. Walleye recruitment was highly variable within and among lakes from 1998-2013 and fluctuations in recruitment were generally non-synchronous. A priori models performed poorly and much of the variation in Walleye recruitment remained unexplained. Models receiving the most support included adult Northern Pike *Esox lucius* relative abundance and reduced models that included winter severity.

## **Officer Candidate Biographies**

### **President-Elect:**

#### **Jeremy Kientz**

I grew up in Rapid City and fishing was a frequent highlight throughout my youth. From a very young age I remember having a strong attachment to being on the water, which I suppose played a large role in my joining the U.S. Navy straight out of high school in 2005. After traveling the world via aircraft carrier, I realized I would soon end my enlistment and needed a new direction. In 2009 upon completion of my service I returned to my passion for fishing and pursued degrees in Environmental Biology (B.S.) and Fisheries Science (M.S.). Nearing completion of my master's at SDSU, in July 2015 I accepted a fisheries biologist position with SDGFP at McNenny State Fish Hatchery in Spearfish, South Dakota. Most recently I transferred from the hatchery to the regional office in Rapid City where I have been working as a fisheries biologist since May, 2017.

I first became involved with the Dakota Chapter of the American Fisheries Society (AFS) back in 2013 when I began graduate school. Since that time I have given numerous oral and poster presentations as well as served in various capacities. In 2014 I served as the secretary of the AFS student subunit at SDSU. I am currently serving as the chair of the North Central Division's Salmonid Technical Committee which is in the process of being revitalized after years of inactivity. AFS has provided me with numerous benefits in my short career and I hope to continue serving AFS at the local, regional, and national level in the future.

### **Vice President:**

#### **Aaron Larson**

Greetings Dakota Chapter! I am 2001 graduate from the University of North Dakota where I received a bachelor's degree in Fisheries and Wildlife Biology. From 2001 – 2006, I worked as an Aquatic Ecology Research Technician with the Illinois Natural History Survey participating in several fisheries management and aquatic ecology research projects. Currently, I am the Biological Monitoring Coordinator for the Watershed Management Program within the North Dakota Department of Health's Division of Water Quality. My primary focus is evaluating aquatic life use of river and stream systems throughout the State by developing and/or refining IBI's (Index of Biotic Integrity) for fish and macroinvertebrates communities. In 2012, I co-authored a largemouth bass publication in the North American Journal of Fisheries Management and I've been an active member of the Dakota Chapter for the past several years. I look forward to serving the chapter to the best of my abilities if awarded the opportunity.

### **Secretary/Treasurer (Two-year Term):**

#### **Amy Gebhard**

I grew up in West Fargo, North Dakota, in an active outdoor family that loves to spend time at the lake. After high school, I went to Valley City State University where I double majored in Biology and Fisheries and Wildlife Sciences with a concentration in Fisheries. From here, I married Alex Gebhard and moved to Cookeville, Tennessee to pursue a Master's degree in Biology at Tennessee Tech University, under the direction of Dr. Josh Perkin. After graduating in December 2016, I was on a job hunt until last June when I was offered a Resource Biologist position out of Chamberlain, South Dakota. My husband and I have thoroughly enjoyed the great hunting and fishing opportunities we missed when we were living in Tennessee. We are so grateful to be living back in the Midwest – in South Dakota.

**Dakota Chapter Officer Election Ballot**

**(Write Name)**

**President-Elect**

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**Vice President**

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**Secretary/Treasurer**

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