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NRM Newsletter

Department of Natural Resource Management

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Winter 2017

# Department of Natural Resource Management Newsletter

Department of Natural Resource Management  
*South Dakota State University*

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## Welcome to the NRM Seasonal Newsletter!



**SOUTH DAKOTA  
STATE UNIVERSITY**

**Department of Natural  
Resource Management**  
Winter 2017



### Save the Date

**April 18<sup>th</sup>** Scholarship/Awards Banquet

**May 5<sup>th</sup>**-Graduation Gathering- treats in Bio Stress Atrium 3-5pm All undergrads, grad students, families, alumni & friends invited.

**May 6<sup>th</sup>** Graduation

### Dear Friends and Alumni,

We ended our fall semester with a lovely holiday party at the Old Sanctuary with a delicious potluck along with great company!

We are now well into our spring semester and it is rolling along well. Our enrollment is up in our undergraduate programs overall and we plan to offer a 5<sup>th</sup> major in Conservation Planning and Management starting in fall 2017. Please stay tuned for future announcements.

Our NRM graduate students continue to present their work in a fine professional manner and February is a busy month with regional scientific meetings.

I am delighted to share that two members of NRM were awarded campus level F.O. Butler awards: Chuck Dieter for Excellence in Teaching and Pete Bauman for Excellence in Extension! We also received official SDSU Student

“thank you” notes commending KC Jensen, Lora Perkins and Melissa Wuellner!

We hope to see you at our NRM Awards and Scholarship banquet on April 18<sup>th</sup> and at our graduation gathering and ceremony on May 5<sup>th</sup> and 6<sup>th</sup>.

Please let us know if you are ever coming to town so that we can reconnect!

**HEALTHY AND FULFILLING  
2017 TO ALL!**

*Michele, Dept. Head*

### PUBLIC-PRIVATE PARTNERSHIP TRAINS AWARD-WINNING STUDENTS

Three Brookings NRM graduate students revealed just how well partnerships between SDSU and private companies can function in training the next generation of scientists. Last week in Orlando Florida, Natural Resource Management Department graduate students Michael Bredeson (PhD), Claire LaCanne (MSc), and Jacob Pecenka (MSc) gave South Dakota an unprecedented showing in the student competitions at the

International Congress of Entomology meeting.

Jacob Pecenka took first place in his session, presenting his research on how dung beetles can reduce fly parasites in SD rangelands. Michael Bredeson won second prize in his session, describing how neonicotinoid seed treatments may hurt valuable predators in sunflower fields.

These students also formed the majority of the Mid-grass Prairie



Left to right: Ryan Schmid Mike Bredeson, May Berenbaum (president of the Entomological Society of America) Jacob Pecenka, Jessica Thomson and Claire

Student Debate team, winning their debate against the University of Delaware, and placing 2<sup>nd</sup> overall. Their assigned topic in the debate was “restricting use of neonicotinoid seed treatments should be prioritized over forage planting to promote honey bees”.

The International Congress of Entomology is the largest scientific meeting devoted to insects in the world, with nearly 7,000 scientists and students convening for a week of scientific exchange. More than 600 graduate students from around the world participated in the student competitions.

Clarie LaCanne is co-advised by Carter Johnson and Adjunct Jon Lundgren. Jacob Pecenka is co-advised by Sandy Smart and Lora Perkins and Adjunct Jon Lundgren. Michael Bredeson is co-advised by Sandy Smart and Adjunct Jon Lundgren.

### New Wetland Restoration Highlights Annual Research Retreat

Nels H. Troelstrup, Jr., Director OLFS

Oak Lake Field Station held its annual fall research retreat October 29 with talks from student and faculty researchers and culminating in a tour of the station's newly established



Left to right: Kaylee Faltys, Sam Cooper, Erin Peterson, Suehring, Lyntausha Kuehl, Nels Troelstrup, Kristen Akers, Bill Gibbons (AES Director), Xu Lan, Surendra Bam, kneeling front Charlie Fenster

restored wetland. Nine research presentations were delivered by students and faculty covering an array of research activity focused on prairie management, pollinator habitat, remote sensing, vegetation bud bank and prairie stream

integrity. These included projects from the departments of Natural Resource Management, Plant Science and the GSCE. After treating researchers to a hot noon meal, the group ventured outdoors on a blustery day to visit the station's newly restored wetland basin. The station worked in collaboration with the U.S. Fish and Wildlife Service to restore hydrology to a temporary wetland basin which was drained prior to 1960. This basin will serve as a focal point for field training and study of restoration success.

### Wetlands Inventory Project Returns

Pete Bergmann

Thanks to the dedication and effort of many members of the Department of Natural Resource Management, most notably retired project leader Mike Kjellsen, the Wetlands Inventory has returned to the Department of Natural Resource Management. The department has received a 3 year grant to update the National Wetlands Inventory data for 413 topographical quadrangles in the Sandhill region of Nebraska. Former Wetlands Inventory employee Peter Bergmann has returned to restart the project. We are hoping to add another photo-interpreter in the near future. The Wetland Inventory project began in 1980 in an old trailer house at the wildlife farm. Since that time the project has moved to several different locations on campus. Currently the project will be located in room 157 of the Mc Fadden Biostress building. Since the project began wetland mapping projects have been conducted in more than 20 states.

### Dr. Phillip Fay, USDA-ARS, Temple, TX visit

Dr. Phillip Fay, a grassland ecologist with the USDA Grassland, Soil and Water Research Laboratory in Temple, TX visited NRM 17-18 January 2017. Dr. Fay was invited by the graduate students and nominated by Josh Harvey; NRM grants up to three outside speaker selections to the graduate students each year. Dr. Fay visited with faculty and students for two days and presented a seminar entitled, "Atmospheric CO<sub>2</sub>, Climate, and Productivity in Simple and Diverse Grasslands." The seminar included results from a 10-year experiment in central Texas examining the response of grasslands in different soil types to elevated CO<sub>2</sub>. Dr. Fay demonstrated that the high atmospheric CO<sub>2</sub> expected by the year 2100 will have different effects on grassland plant communities depending on soil type with greater change on coarse-textured soils. Dr. Fay's work illustrates the complexities of predicting ecosystem response to climate change and suggests that future plant communities may differ from those we observe today.



Muthiah Muruganandam and USGS Steve Chipps

## SDSU researchers examine how land use changes affect lakes and streams

Christie Delfanian

Examining how land-use changes may affect water quality and fisheries resources in lakes and rivers will help natural resource agencies manage wildlife populations, according to Steven Chipps, leader of the U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit at South Dakota State University. The fisheries biologist and Muthiah Muruganandam, a Fulbright scholar from the Indian Council of Agricultural Research, will use existing data to track changes in the characteristics and water quality of surface waters in northeastern South Dakota.

As a senior scientist at the Indian Institute of Soil and Water Conservation, Muruganandam has been doing research on natural resource management and fisheries and aquatic system management, in particular, for more than 20 years. The 18-month research project is supported by the Fulbright Scholar program.

Recent changes in land use have been well documented in South Dakota, according to Chipps, an adjunct faculty member in SDSU's Department of Natural Resource Management. Between 2006 and 2012, more than 1.4 million acres of grasslands were converted to cropland, with the largest change occurring in east central and northeastern South Dakota.

Nested within this landscape are surface waters that include lakes

and rivers, Chipps pointed out. "We don't know how changes in land use may affect surface water quality or to what extent lakes and streams in eastern South Dakota have been impacted."

The researchers will access more than 20 years of data from federal and state agencies including the Department of Natural Resources, the East Dakota Water Management District, U.S. Geological Survey and the South Dakota Game, Fish and Parks Department.

"We're doing a lot of data mining," Muruganandam said. They hope to use long-term data from water quality assessments to evaluate relationships between beneficial water uses and land use patterns. Those beneficial water uses include fish and wildlife propagation, recreation and stock watering sources, in addition to more specific uses such as domestic water supply.

Accumulation of sediment and nutrients, such as nitrates and phosphates, adversely impacts water quality, according to Muruganandam. Increased vegetation, lower oxygen levels and decreased water clarity can adversely impact recreational fish, such as yellow perch, bass and crappies.

However, Chipps explained, "A lot of things come into play, not just land use." Northeastern South Dakota typically goes through cycles of drought and flooding that affect water availability and aquatic production. "That dynamic has gone on for eons," he said.

In terms of fish populations, Chipps noted, "A newly flooded lake is very productive. When the water level decreases or stays

static, fish production declines over time. We end up with a stagnant system."

The researchers hypothesize that current approaches for dealing with excess water, such as wetland draining and tiling, could stabilize water levels in small lakes and impoundments. This then interrupts the normal ebb and flow that is advantageous to fish populations. "If the data show that lake water levels are becoming more stable, this will change how we look at managing fish," Chipps noted. Environmental impacts on water resources can put pressure on aquatic ecosystems that, in the short term, can have a more dramatic effect than climate change.

## COMPLETED PhD and MS Projects



PhD David Deslauriers

## **Growth Potential of Age-0 Pallid Sturgeon in the Missouri River: Insight From an Individual Based Model**

The Pallid Sturgeon (*Scaphirhynchus albus*) is a federally endangered species native to the Missouri and lower Mississippi River. Throughout much of the Missouri River system, natural reproduction by pallid sturgeon is believed to be negligible--attributed primarily to the loss of spawning habitat and(or) rearing areas. Long-term recovery of this species will likely require significant habitat restoration efforts, with an emphasis on spawning and nursery habitat. In this study, we developed a growth model that will allow researchers to evaluate habitat quality and survival potential for age-0 pallid sturgeon. Using an individual-based modeling approach, we evaluated growth potential of Pallid Sturgeon in the Missouri River. The model, developed for age-0 sturgeon, combines information on functional feeding response, bioenergetics and swimming ability to regulate consumption and growth within a virtual foraging arena. Empirical data on water temperature, water velocity, and prey density were obtained from three sites in the Missouri River and used as inputs in the model to evaluate hypotheses concerning factors affecting pallid sturgeon growth. The model was also used to evaluate the impacts of environmental heterogeneity and water velocity on fish growth variability, foraging success and dispersal ability. Growth was simulated for a period of 100 days using 100 individuals. Higher growth was shown to occur at sites where high densities of Ephemeroptera and Chironomidae larvae occurred throughout the growing season. Highly heterogeneous habitats (i.e., wide

range of environmental conditions) and moderate water velocities (0.3 m/s) were also found to positively affect growth rates. The model developed here provides an important tool for evaluating growth hypotheses and(or) identifying habitats in the Missouri River that are favorable to age-0 pallid sturgeon growth.



PhD Adam Janke

### **Evaluating Relationships Among Wetland Quality, Land Use, and Waterbirds in the Prairie Pothole Region**

The conversion of grassland and wetland ecosystems in the Prairie Pothole Region (PPR) has been a pervasive challenge for conservationists dating back to the early 1900's. The legacy of steadily increasing agricultural intensity in the southern portions of the PPR, including eastern South Dakota, has left many wetland ecosystems in a matrix of intensive agricultural production. With little surrounding nesting cover, these wetlands have limited potential for waterfowl reproduction but may still play an important role each spring facilitating migration of waterfowl en route to more northerly breeding areas. Our research sought to understand the

contributions of wetlands in intensively farmed landscapes for migrating ducks. We measured a number of biotic attributes of wetlands including the density of aquatic invertebrates and submersed macrophytes and use by spring-migrating ducks. We also measured concentrations of lipid metabolites circulating in plasma of female lesser scaup (*Aythya affinis*) and blue-winged teal (*Anas discors*) to understand refueling performance of migrants using wetlands with variable biotic and abiotic characteristics. Duck abundance, refueling performance, and prey availability were generally similar across the upland cultivation gradient, if not slightly greater in more intensively farmed landscapes. These results suggest wetlands in intensively farmed landscapes in eastern South Dakota currently confer similar benefits to migrating waterfowl as those in less intensively farmed landscapes. Further, they raise questions about whether wetlands in intensively farmed landscapes are indeed resilient to adjacent land use or simply compensate for degradation through increased productivity characteristic of landscapes with intensive crop production; an important question for setting wetland restoration priorities in the region.



Laura Heironimus MS

### Development and Application of a Larval Pallid Sturgeon Energetics Model

Knowledge about feeding and growth dynamics of larval pallid sturgeon (*Scaphirhynchus albus*) is important for identifying rearing areas and monitoring habitat restoration efforts. Use of ecological models to estimate growth potential of larval pallid sturgeon represents a new approach for assessing habitat suitability for this critical life stage. In this study, we developed and tested a bioenergetics model for young-of-year pallid sturgeon. To parameterize the model, we measured metabolic rate and growth of pallid sturgeon subjected to a range of temperatures commonly found in the Missouri River (13–24°C). We then used the model to evaluate effects of pre- and post-dam water temperatures on larval growth rates in the lower (LMR) and upper (UMR) Missouri River. Using information on prey composition and water temperature, we found that growth increased by 1.0% but decreased by 65 % from pre- to post-dam periods in the LMR and UMR, respectively. Our modeling results revealed that accumulated thermal units (ATU) during the growing period in the LMR were similar

between pre- and post-dam periods but declined by 54% in the UMR. Our findings suggest that cold water from deep-release storage reservoirs negatively impacted growth of larval Pallid Sturgeon within at least 110 km downstream; however, at distances greater than 960 km below impoundments, the negative impacts from cold water releases below dams are no longer detected. With six major dams along the main stem upper Missouri River, thermal depression may be an important cause of recruitment failure in Pallid Sturgeon and we recommend that future efforts evaluate the spatial distribution of cold water impacts on larval Pallid Sturgeon growth and survival.



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

Potential impacts of large wind energy developments to migratory and resident bird populations in the Prairie Pothole Region (PPR) within North Dakota and South Dakota remain poorly understudied even though 2,230 turbines are actively generating power in these states and numerous wind energy projects have been proposed for future development. Conservation agencies (both state and federal)

entrusted with the protection of migratory birds and resident wildlife require empirical information to make informed decisions that minimize potential negative impacts to waterfowl, shorebirds, waterbirds, songbirds, galliformes, and raptor species that rely on large intact blocks of mixed-grass prairie and abundant wetlands to meet their life-history requirements. However, no information on potential direct mortality from wind turbines is available for the Missouri Coteau portion of the PPR across these avian guilds. Additionally, the Missouri Coteau is considered the most productive landscape for nesting waterfowl in North America. Because of the unique topographical characteristics of the Missouri Coteau and its importance to avian communities, site-specific information is in need to inform managers and wind energy developers regarding the siting of wind farms in areas whereby adverse impacts from direct mortality to birds are minimized.



Jeremy Kientz MS

### Survival, Abundance and Relative Predation of Wild Rainbow Trout in Deerfield Reservoir, South Dakota

South Dakota’s Black Hills lakes and streams are home to many trout species. While Brook and Brown Trout populations are sustained almost entirely by

natural reproduction, most Rainbow Trout populations are supplemented with hatchery stockings due to their lack of reproduction, poor survival, and failure to recruit into adult populations. Deerfield Reservoir is an exception, where wild Rainbow Trout are known to successfully reproduce. Nonetheless, Rainbow Trout continue to be stocked due to uncertainties regarding the proportion of wild fish in the population. These uncertainties stem from an inability to distinguish between wild and hatchery Rainbow Trout. Our work focused on identifying new techniques to classify Rainbow Trout and their origins using analysis of carbon and nitrogen stable isotopes in fin and muscle tissues and analysis of otolith microchemistry. We found that wild Rainbow Trout can be classified with greater than 90% accuracy using stable isotope signatures in pectoral fin or muscle tissue. Using otolith microchemistry to identify natal tributary stream origin, we found that natal origin (stream) for wild Rainbow Trout could be classified with over 80% accuracy. Based on Ba and Mn concentration (mmol mol<sup>-1</sup>) in the fish's otoliths, we found that 67% of wild Rainbow Trout in Deerfield Reservoir originated from Castle Creek, whereas 33% were classified to South Fork Castle Creek. These results indicated that Castle Creek likely contributes a greater number of wild Rainbow Trout recruits to the Deerfield Reservoir population than South Fork Castle Creek. Overall our results revealed that a healthy, sustainable population of wild Rainbow Trout exist in Deerfield Reservoir. Fisheries managers can use the results of our study to identify future management strategies for Deerfield Reservoir and the wild Rainbow Trout population.



Ryann Cressey MS

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

Wetlands in Stutsman County, North Dakota were revisited after 50 years to assess changes in wetland conditions and plant communities within wetland zones in the Prairie Pothole Region. Within this region, a severe drought occurred in 1988-1992 followed by the longest deluge starting in 1993 with wetlands still impacted today. In 2013 and 2014, we revisited 80 of the original wetlands measuring water depths and specific conductivity as well as measuring wetland size from aerial imagery. Additionally, we conducted quadrat-based vegetation surveys within 4 wetland zones (i.e., wet meadow, shallow marsh, deep marsh, and open water) to examine changes in species composition, frequency, abundance, and to document progression of invasive plant species. Although wetlands across the study area responded to deluge conditions differently, plant communities within wetland zones were only 25 % similar in species composition across all study areas from the 1960s to 2013-14. Moreover, invasive plant species increased in frequency and

became some of the most abundant species within wetland zones. Climatic extremes in combination with invasive plant species greatly impacted species composition, frequency and abundance of individual plant species in plant communities within wetland zones across our study area.



A juvenile gizzard shad

### The contribution of Missouri River reservoir side-channel and floodplain habitats to mainstem fish populations: the effects of losing connectivity between Hipple Lake and Lake Sharpe.

William Radigan MS

Catastrophic flooding of the Missouri River in 2011 has had lasting effects on floodplain habitats (i.e. floodplain lakes) and side-channel habitats (e.g. canals, side-channel embayments, stilling basins, and tributaries) in Lake Sharpe, SD. Floodplain and side-channel habitats are rare habitat in Lake Sharpe, a mainstem Missouri River reservoir, and are thought to be crucial habitat for prey and sport fish. Hipple Lake, the only warm-water floodplain embayment in Lake Sharpe, is in danger of losing connectivity to the reservoir because of sedimentation resulting from the 2011 flood. To evaluate Hipple Lake's natal and adult contribution to Lake Sharpe's

fishery, otolith microchemistry was used to quantify fish movement and natal origins. These data will be used to inform management decisions regarding restoring Hipple Lake's connectivity to the main channel. Canals were important only for Gizzard Shad (*Dorosoma cepedianum*), whereas a tributary was important only for White Bass (*Morone chrysops*). A warm-water floodplain embayment, Hipple Lake, was important for natal recruitment of Bluegill (*Lepomis macrochirus*), Crappies (*Pomoxis spp.*), Largemouth Bass (*Micropterus dolomieu*), and Gizzard Shad. A cold-water side-channel embayment, La Framboise, was important for White Bass, Sauger (*Sander canadensis*), and Walleye (*Sander vitreus*) natal recruitment and adult use, as well as adult use for Bluegill, Yellow Perch (*Perca flavescens*), and Largemouth Bass. A stilling basin was important for Yellow Perch and Gizzard Shad. The main channel was equal or more important than side-channel and floodplain habitats for Bluegill, Crappie, Yellow Perch, Smallmouth Bass, Largemouth Bass and Sauger natal recruitment, and more important than side-channel and floodplain habitats for Crappie, Yellow Perch and Smallmouth Bass adult movement. Gizzard Shad collected at all sites moved frequently throughout the entire reservoir. This research shows the disproportional importance of warm-water floodplain embayments, canals, stilling basins and tributaries to Gizzard Shad recruitment in large reservoirs. Sport fish were found to utilize different habitats, with the floodplain and side-channel

contribution to natal recruitment and adult movement varying from negligible to significant, dependent on species. Natal recruitment and movement patterns varied to a small extent on an annual scale for some species, and movements have changed to a small extent for some species since the 2011 flood.

## New SDSU report provides status of native grasslands and woodlands in eastern SD

### Pete Bauman, Field Specialist

SDSU Extension, in partnership with a variety of non-government, state, and federal agencies, has recently released a public report on the status of native plant communities in eastern South Dakota (links to the full report and data are provided below). The report is based on a



comprehensive look at the eastern South Dakota landscape that incorporated the use of field and tract-level historic Farm Service Agency (FSA) cropland history, coupled with high resolution aerial photographs provided through the USDA National Agriculture Imagery Program (NAIP). Most other land use analysis relies on interpretation of satellite imagery and other National Agriculture Statistics Service (NASS) data to estimate current or recent land

use, and while those interpretations can help define large-scale trends in land use, they cannot provide a cumulative or comprehensive assessment of the sum-total of all historic land cropping and other land conversion. The SDSU project required staff technicians to evaluate all historic land use data on a section-by-section basis. In total, technicians evaluated approximately 22.6 million acres, or about 35,000 square miles of land in the 44 counties east of the Missouri River.

Surprisingly, the term 'native' can have several interpretations, with some persons assuming a former crop field planted to native grasses should be qualified as native. However, the SDSU study relied on an ecological definition of the term, quantifying lands as potentially native only if there was no evidence of historic soil disturbance from farming, development, or other human causes. If historic soil disturbance was confirmed, those acres were removed. For example, a gravel pit, cattle feedlot, golf course, or small town would all be removed, as would a grass hayfield, CRP, or other habitat on a previously farmed field, regardless of how long ago the farming occurred. The intent of this analysis was to set a benchmark for the status of truly native grasslands and woodlands. These lands are an incredible asset to South Dakota's agricultural and natural resources heritage and the industries that rely on them, including but not limited to grazing, hunting, tourism, and recreation. In addition, the importance of these lands to wildlife, water, and soil quality cannot be overstated. Reports by both conservation and agricultural groups have recognized major losses of grasslands converted to row-crop agriculture in recent years. None of these reports however can define exactly how



much of that conversion impacted native grasslands in relation to other grass cover types like CRP, hayfields, or tame pastures. The new SDSU data will set a comparative benchmark that has been lacking in previous reports, allowing future analysis to determine actual rates of loss of native grasslands. Understanding this critical component of South Dakota's grassland communities is critically important as native grasslands, once converted, can never be truly restored to their full suite of ecological functions. Overall, SDSU identified 5,488,025 acres of eastern South Dakota land that is still potentially native, representing about 24% of the entire eastern South Dakota landscape. Of the approximately 5.5 million acres of native lands remaining in eastern South Dakota, over 5.4 million acres are native grasslands, with about 100,000 acres categorized as woodlands.

Overall, when the total of fee title ownership and permanent protections, such as conservation easements, were assessed, it was determined that only 962,734 acres of native lands (about 17.5%) had any type of permanent protection from future conversion to cropland or other uses. In total, the amount of land in eastern South Dakota that is both native and under some level of permanent protection, represents only 4.3% of the 22.6 million-acre eastern South Dakota landscape. Current and historic management of native grasslands is the primary factor in how those lands function for private and public goods and services. Well managed native grasslands provide superior grazing and recreational opportunities, in addition to public services associated with air, water, and soil quality. Wildlife habitat is also a critical component, and well

managed native grasslands are key resources for declining grassland-obligate birds, mammals, reptiles, pollinator plants, and insects. Conversely, poorly managed native habitats subject to intensive continuous grazing, over application of chemicals or fertilizers, or general neglect, do not often provide the long-term ecological stability or profit potential that well-managed tracts do.

In this study, SDSU was not able to determine the overall quality of the remaining tracts of native habitats. It is believed however that most remaining tracts, if subject to improved management, would likely provide improved return on investments to landowners and the public, through improved grazing systems, reduced chemical costs and other inputs, improved water retention and productivity, and improved wildlife habitat. To view the full report: <http://igrow.org/up/resources/07-2001-2016.pdf> To access all data, GIS layers, Geodatabases, report, charts, and maps: [http://openprairie.sdstate.edu/data\\_land-easternSD/1/](http://openprairie.sdstate.edu/data_land-easternSD/1/)



**Brookings Wildlife Federation Connections with SDSU through the Year**

The Brookings Wildlife Federation (BWF) was started in the 1970s on the South Dakota State University campus by Dr. Ray Linder, Leader of the South Dakota Cooperative Fish and Wildlife Research Unit. Ray started holding brown-bag lunches so students could discuss wildlife issues.

The NWF celebrated its 80th anniversary in 2016. SDSU's Dept of Wildlife and Fisheries (now



Chuck Berry on the left and Spencer Vaa on the right the current BWF president holding

Natural Resources Management, NRM) has always been involved with the BWF. The BWF supports state policies that help SDSU and the NRM Department, and provides a yearly award for an outstanding fish and wildlife student – in 2016 to Mitchell Sabers, a Junior in the NRM Department. NRM faculty and students find the BWF's monthly Infolunches a welcoming place to talk about their research. Today, the 150-members are still a mix to "town and gown" folks. The group's main interests are natural resource conservation and out-of-doors activities, particularly hunting, fishing, and shooting sports.

The main activities are helping with Kids Fishing Weekend (called Trout Extravaganza), holding monthly information lunches called "Infolunch," sending monthly

newsletter, supporting SDWF's Black Hills Conservation Camp for youth, involvement in local and regional conservation issues, monitoring state conservation policies, public information and education, and funding small grants and recognition awards

In 2017, the BWF will be in its 37<sup>th</sup> year of serving the Brookings community and state as an advocate for natural resource conservation and SDSU education and research. Membership is \$30/yr, which includes membership in the SDWF (<http://www.sdwf.org/>).

For more information contact BWF President Spencer Vaa 695-6867 or write to BWF, Box 104, Brookings, SD 57006.



PhD student Dave Schuman  
with Blue Sucker

# Opportunities to support the NRM Department:

## 1) Student Education Enhancements, Scholarships, and Endowments:

**Your impact:** Expanding undergraduate scholarship dollars available to support students enrolled in Ecology and Environmental Science, Natural Resource Law Enforcement, Rangeland Ecology and Management and Wildlife and Fisheries Sciences. Expanding competitive graduate student research awards.

- The Natural Resource Management Department. Funds that enable strategic initiatives in academic and research programs through implementation of the department strategic plan.
- Clifford H. Fiscus Endowment that helps supports our NRM Departmental seminar series. Clifford H. Fiscus (B.S. 1950) was a long-time friend of the department. In 2004, he provided an endowment to the department that is used to bring guest speakers to campus. This is an important aspect of our graduate student training and pursuit of scholarly excellence.
- NRM Education Fund. This fund enables talented undergraduate students to present their research at local and national meetings.
- Program Targeted Scholarships. Gifts of less than \$1000 can be targeted toward undergraduate scholarships funds in (1) Ecology and Environmental Science, (2) Natural Resource Law Enforcement, (3) Rangeland Ecology and Management, (4) Wildlife and Fisheries Sciences.

*-If you are interested in donating at the \$1000 level or above, we can work with you to develop a named scholarship. A list of our current named scholarships can be found at:  
<https://www.sdstate.edu/nrm/academics/scholarships/upload/Undergrad-Scholarships.pdf>*

- Dave Willis Fisheries Research Award Endowment  
This Endowment was established to honor Dr. Willis' life work and to sustain his legacy through promoting excellence in fisheries education and research. We encourage and appreciate your support of Dave's legacy through a donation to support the growth of this **endowment**. Gift pledges can be made over multiple years or as single donations. Proceeds will be used to provide competitive research awards to graduate and undergraduate fisheries students who have demonstrated scholarly excellence in fisheries science and best personify Dave's exceptional career and service to our nation's natural resources.
- Kenneth F. Higgins Waterfowl Legacy Research Endowment  
This Endowment honors the life and the distinguished career of Dr. Ken Higgins, a former wildlife research biologist with the U.S. Department of the Interior and the South Dakota Cooperative Fish and Wildlife Research Unit, and a professor emeritus in the Department of Wildlife and Fisheries Sciences at South Dakota State University.
- Clifford H. Fiscus Waterfowl Research Endowment  
The Fiscus Waterfowl Research Endowment fund honors the life of of Mr. Fiscus, who earned a degree in Wildlife Management at South Dakota State College. This endowment provides support for waterfowl research activities which may enhance future management or welfare of waterfowl or other wetland dependent avian species and/or their habitats.
- Pheasants Forever Upland Game Bird Research Endowment



This Endowment honors the efforts of the Brookings County Pheasant Restoration Association and the Brookings County chapter of Pheasants Forever. An initial donation of \$25,000 established the principal for this endowment.

- **Kevin Honness Memorial Scholarship Announcement**  
The Honness Scholarship is awarded each year (31 March) to student members of the Great Plains Natural Science Society. Two awards (\$500 each) are currently available, **one for graduate** and one for **undergraduate** researchers; preference will be given to students conducting research in the Great Plains. Applications will be accepted each year from 1 November until 28 February. Interested students can find additional details and application form at <http://www.sdstate.edu/nrm/organizations/gpnss/kevin-honness-memorial-scholarship.cfm>.
- **Curtis M. Twedt Upland Game Research Endowment**  
Curtis M. Twedt, a native of Volga, SD, graduated in Wildlife and Fisheries Sciences in 1959. Dr. Twedt enjoyed a 31-year career with the Nebraska Game and Parks Commission as an upland game and research biologist. The recipient of the Twedt research grant shall be selected by the Department of Natural Resource Management at SDSU. The long-term vision of the Department is to eventually be able to provide a graduate research assistantship from this endowment.
- **Jesse W. West Research Endowment**  
This Endowment is intimately tied to the Pond Boss magazine and forum. It honors the life of Jesse W. West, a Mississippian and professor of geology. While teaching geology “summer camp” in the west, including Colorado, California, and the Black Hills (one of his favorite geologic places), he developed a love of the area and its people, which he shared with his family. His strong belief in helping others along their journey in applied science is the cornerstone of Jesse's endowment.

2) Off Campus Research Facilities - Oak Lake Field Station or Wildlife and Fisheries Research Unit (existing resources to which you could contribute are identified below).

**Your impact:** Expanding endowed undergraduate research opportunities grants for our Oak Lake Field Station and Wildlife and Fisheries Research Unit; Funding to support construction of off-campus teaching and research facilities and/or purchase large research equipment.

- **Charles and Marcia McMullen Undergraduate Research Award.**  
An *Endowment* recently established in honor of Dr. Charles and Marcia McMullen who have been long-time supporters of the Oak Lake Field Station. Chuck served as the first director of the Oak Lake Field Station and was instrumental in working with President Robert Wagner to establish the field station as a resource to students interested in the natural sciences. This endowment provides support for NRM undergraduate students interested in conducting undergraduate research at the station.
- **Oak Lake John Haertel Memorial Research Award**  
An *Endowment* established in honor of Dr. Jon Haertel, vertebrate biologist in Biology & Microbiology. Jon's love of vertebrate animals and long-time contributions to the study of vertebrates resulted in establishment of this endowment to support undergraduate research on vertebrates at the Oak Lake Field Station.
- **Rogen-Trooien Oak Lake Endowment**  
An *Endowment* established in honor of Alvera Rogen and the Trooien Family who had a long-time family connection and interest in the Oak Lake Field Station. This fund was established to support long-term maintenance and development of facilities at the Oak Lake Field Station toward the education and development of students interested in South Dakota natural resources.
- **Oak Lake Field Station Fund**

A flexible field station account developed using unrestricted gifts to the Oak Lake Field Station and utilized for newsletters, web site, hospitality expenses and meeting attendance in relation to field station operations and programs.

- 3) Endowed research faculty positions in Ecology or Environmental Science, Range Ecology or Range Management, Wildlife Biology and Fisheries Biology.

**Your impact:** Faculty endowments provide funding for perpetuity that will allow the Department to recruit exceptional faculty members and provide them with the resources that are essential to their ability to do their critical work.

*(Targeted gifts would also be appreciated to support the purchase of research equipment and enhancement of research lab facilities in each of the areas identified above.)*

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Please return this form or contact our Foundation partners, Mike Barber (605.321.6468) to learn more about how you can make a difference in the Department of NRM.



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