

From the Director's Desk ...

It was certainly an honor to recently accept MSU's formal offer, after a national search, to serve as Director of MWRRI. I am looking forward to the opportunities as well as challenges to position MWRRI as one of the leading Water Resources Research Institutes in the country. This could not have been achieved without all of you who have invested in me along my career path ...instructors, students, research and extension peers, the communities and stakeholders I have served, MSU reviewers and decision-makers, my church, my family ...what an impact you have all had on my life! I truly value your trust and investment in me.



Around MWRRI things have been moving fast! Working as a team, MWRRI staff is very busy evaluating funding opportunities; building the administrative infrastructure, support processes and tools needed to better compete for research funding; and all the while supporting the numerous activities that are a core function of the Institute as well as the new projects that went online this past year. This summer, we held a very informative meeting with our Advisory Board to discuss what each represented agency/program did related to water resources, share what we consider as water research priorities in the state, explore ways we could more effectively collaborate, and discuss potential collaborative funding opportunities. We will build upon the concepts that were developed as we move forward.

Within this issue, you will read about some of our recent and current activities – the Regional Cover Crop Symposium co-hosted by MWRRI and Delta F.A.R.M. at the Delta Research and Extension Center, our 2018 USGS 104b Water Research Program award selections, 2018 Water Resource Conference planning activities and sponsorship opportunities, and a profile of Ron Cossman with MSU's Social Science Research Center.

As we wound down this semester and year, I wish you a rewarding holiday season,

Jason

Jason Krutz, PhD

MWRRI and Delta F.A.R.M. CO-HOST REGIONAL COVER CROP SYMPOSIUM

On November 29, 2017, MWRRI and Delta F.A.R.M. (Farmers Advocating Resource Management) co-hosted a regional symposium where researchers from Alabama, Arkansas, Louisiana, Mississippi, and Tennessee presented recent research findings on the use and effectiveness of cover crops. The symposium, held at the Delta Research and Extension Center, began and ended with panel discussions among producers from Arkansas and Mississippi. Thirteen presentations were also made during the symposium and included:

- Agronomic Benefits of Cover Crops – Jeremy Ross, University of Arkansas
- Impact of Improved Soil Health on Sustainability and Profitability of Cotton – Bill Robertson, University of Arkansas Cooperative Extension Service
- Cotton Yield and Soil Health Parameters in Cover Crop Systems – Darrin Dodds, Mississippi State University Extension Service and Mississippi Agricultural and Forestry Experiment Station
- Incorporating Cover Crops in Rice Production Systems – Trent Roberts, University of Arkansas
- Cover Crop Impacts on Sugar Cane Yield and Soil Health Parameters – Paul White, USDA Agricultural Research Service, Houma, LA
- Improving Soil Health and Crop Productivity in Mississippi Utilizing Cover Crops – Jack Varco, Mississippi State University, Mississippi Agricultural and Forestry Experiment Station
- Impact of Cover Crops on Early Season Insect Pests in Agronomic Crops – Jeff Gore, Mississippi State University Extension Service and Mississippi Agricultural and Forestry Experiment Station
- Weed Management in Conservation Systems – Andrew Price, USDA Agricultural Research Service–NSDL, Auburn, AL
- Integrating Cover Crops and Herbicides for Weed Control – Larry Steckle, University of Tennessee Institute of Agriculture, Jackson, TN
- Results from the Arkansas Discovery Farm Program – Mike Daniels, University of Arkansas Cooperative Extension Service, Fayetteville, AR
- Cover Crop Effects on Soil and Water Resources – Martin Locke, USDA Agricultural Research Service–National Sedimentation Lab, Oxford, MS
- Conservation Systems – Kip Balkcom, USDA Agricultural Research Service, Auburn, AL
- Cover Crop Effects on Erosion, N and P Transport, and Corn Grain Yield – Dave Spencer, Mississippi State University College of Agriculture and Life Sciences

CEUs were available for Nutrient Management (1.5 units), Integrated Pest Management (1 unit), Soil & Water Management (2.5 units), and Crop Management (1.5 units).

Sponsors included Local Seed Co., Pennington, USDA National Resources Conservation Service, Crop Production Services, Petcher Seeds, LaCross Seed, and Southern Soil Solutions.

2018 104b WATER RESEARCH GRANT PROGRAM AWARD SELECTIONS

Microplastics in the Mississippi River and Mississippi Sound: concentrations, sources, sizes, types, and loadings to the northern Gulf of Mexico.

There is growing evidence that microplastics are harming marine organisms and finding their way into the human diet. The majority of seafood consumed by humans comes from coastal areas where microplastic particles are ubiquitous. The Mississippi River drains ~41% of the contiguous U.S. into the northern Gulf of Mexico (GOM), making the Gulf Coast particularly vulnerable to microplastic pollution. Indeed, microplastic concentrations on the inner shelf of the northern GOM are among the highest levels reported globally. These particles are causing deleterious effects on filter feeders such as oysters, a vital industry for the Gulf Coast. Thus, Mississippi is the ideal place to study microplastic pollution and its impacts on aquatic ecosystems.



Sources of microplastics include fragments of debris and microbeads in commercial products (left) that are found in coastal sands, zooplankton and small fish (right).

A heretofore overlooked problem with microplastics is sorption of MeHg, a toxin that accumulates in organisms and concentrates in the food chain. Exposure to high levels of MeHg causes deleterious effects in both humans and wildlife. This is of particular concern along the Gulf Coast because, on average, residents there consume more seafood than other U.S. residents, and because GOM seafood tends to have higher levels of MeHg compared to other U.S. coastlines. Whereas there are significant health benefits from eating seafood, it is also the greatest source of MeHg exposure. As much as 30% of Gulf Coast residents may exceed the recommended safe dose of MeHg. The GOM accounts for 41% of the US marine recreational fish catch and ~16% of commercial fish landings. Given the importance of commercial and recreational fishing to the GOM economy, and the

potential threat to the aquatic ecosystem, understanding the link between microplastics, MeHg, and impacts on the ecosystem is important to the long-term health and sustainability of the region. Examining microplastic pollutant load is the next step in advancing microplastics water research.

Microplastics concentrations on the inner shelf of the northern GOM are among the highest levels reported globally. Because their size range overlaps that of zooplankton, they are confused with prey and are accumulating in the food chain. The plastic particles are causing deleterious effects on aquatic organisms, particularly filter-feeders such as oysters. Moreover, plastics attract (sorb) certain contaminants, such as persistent organic pollutants and mercury, and thus their accumulation in biota may be an overlooked source of contaminants to ecosystems. This is a major concern to the state and region because seafood is a vital industry for Gulf Coast states, and because, on average, Gulf Coast residents consume more seafood than other U.S. residents. It is also a national problem because the majority of microplastics in the northern GOM originate from the Mississippi River, whose basin encompasses thirty-one states. Yet, surprisingly little is known about the concentrations, types, sizes, and loadings of microplastics in the river and its major tributaries, and along oyster reefs in the Mississippi Sound. This lack of data is hindering our understanding of the magnitude and sources of the problem. Our research will fill key knowledge gaps and improve people's education around microplastic pollution and its impacts.

Aquatic vegetation management to enhance multiple-user benefits of southeastern wetlands

Across the US, it has been estimated that more than \$100 million per year is spent on control of aquatic weeds (Pimentel et al. 2005), and a recent estimate for the state of Florida alone places control costs for aquatic weeds on natural areas in the range of \$32 million per year (Adams & Lee 2007). In Mississippi, two of the nine state noxious weed species listed by the Bureau of Plant Industry (BPI) are aquatic weeds, and statewide surveys are often conducted to monitor the status of these and other aquatic weeds on Mississippi water bodies. Some of the reasons for concern over such plants include the plants' abilities to: restrict access to water bodies for recreational or other direct human uses, replace desirable plant species, reduce overall biological diversity, reduce utility of aquatic or wetland habitat for wildlife, increase mosquito breeding habitat and thus insect borne disease (Mulrennen 1962), and changes to ecosystem services, such as water quality improvement (USDA, NRCS 2003).

Biologists at the Sam D. Hamilton Noxubee National Wildlife Refuge (NNWR) have identified certain problematic aquatic plants, specifically American lotus (*Nelumbo lutea*), white/fragrant waterlily (*Nymphaea odorata*), and water shield (*Brasenia schreberi*), as key obstacles to achieving the multiple use needs of refuge lakes and associated wetlands. The

biologists at NNWR further indicated that these issues are experienced by many other refuges, wildlife management areas, and private waterbodies in Mississippi and adjacent states. Few methods currently are known that allow the control of these regionally specific aquatic weeds, while simultaneously enhancing the diversity of desirable species and maintaining areas of open water that are needed for many species of wildlife and for human use of these facilities. This project aims to determine effective means of controlling these aquatic plant species and then cooperate with NNWR personnel in disseminating our findings among other refuges and similar land management areas. Accomplishing this work will address such water resource priorities as enhancing recreational water use, maintaining fish and wildlife habitat quality, and maintaining surface water quality.

The work we propose would explore a variety of chemical control measures (herbicides) to reduce the abundance of key nuisance plant species, while maintaining diversity of desirable species and also minimizing any negative impacts on key water quality parameters (e.g., dissolved oxygen, nitrogen, and phosphorus). Thus, this work would address numerous focus areas of the Mississippi Water Resources Research Institute, including natural resources conservation, wetland ecology, water quality, and management of problematic aquatic plant species. The ultimate objective of this work is to discover methods to control nuisance aquatic vegetation in wetland and aquatic habitats of areas like NNWR, while minimizing impacts on non-target vegetation and water quality. We will cooperate with NNWR staff in distributing our findings to land managers throughout the region who encounter similar habitat management challenges, in addition to distributing this information through more typical science outlets of peer-reviewed journals and conference proceedings.

2018 MISSISSIPPI WATER CONFERENCE PLANNING ACTIVELY UNDERWAY

Planning and preparation are actively underway for next spring's statewide water conference. MWRRI's Advisory Board and the water research community have always been essential in providing planning and preparation support. To continue expansion of the depth and breadth of the conference, the Institute would like to reach out for additional support from interested organizations, agencies, businesses, and individuals desiring to have roles in the conference. Several of these opportunities are described below.

Call for Session Organizers and Abstracts

The Mississippi Water Resources Research Institute (MWRRI) is pleased to issue a call for session organizers and abstracts (presentations and posters) for the 2018 Mississippi Water Resources Conference. The event will be held in Jackson, MS on April 3-4, 2018 at the Jackson Hilton. This well-attended annual conference is the premiere water resources event in Mississippi and regularly features a wide range of session topics of statewide, regional, and national interest. Abstracts are now being accepted from individuals/teams that desire to organize and moderate special sessions on water topics of their choice as well as persons that wish to perform oral and/or poster presentations. We again will feature a student competition for oral and poster presentations and monetary awards for 1st, 2nd and 3rd place in each category.

Abstracts should be submitted to Jessie Schmidt (jessie.schmidt@msstate.edu) by Friday, January 19, 2018. Session organizers will be expected to develop and submit a session abstract, solicit session presenters, and moderate the session during the conference. Individual presenters will be required to submit abstracts for their oral presentations and/or posters. All session organizers and presenters whose abstracts are accepted are required to register for the conference and pay their registration fee which will cover all conference activities for the dates they register. The full conference registration of \$225 (\$275 for late registration after February 28, 2018) for professionals and \$50 for full-time students (\$100 for late registration). A one-day registration for Tuesday is available for \$150 (professionals) or \$30 (students). Cancellations after March 1, 2018 will be responsible for payment of their registration fee.

Papers and poster presented at the conference will be published in the Proceedings which is usually released near the end of the conference year. Authors will be expected to adhere to guidelines and deadlines established for submission of their manuscripts. Manuscripts will be the sole responsibility of the authors and presenters as MWRRI does not edit manuscripts for the Proceedings.

All submissions must include the following information:

- Title
- Type of Presentation (oral, poster, both)
- Presenter's Name, Title and Affiliation
- Presenter's Address (business preferred, if applicable), Phone, Fax and Email
- Any Co-authors and Affiliation
- Whether a Student (and, if so, name of major advisor)
- Abstract

Abstracts for session topics, oral presentations, and posters may address any water-related topic and should contain 200-400 words. Examples of potential session topics include, but are not limited to, the following:

Sponsor and Exhibitor Opportunities

Sponsorships are extremely important in this era of declining federal/state budgets to ensure we continue to facilitate the transfer of knowledge among researchers, stakeholders, and management entities. Sponsorship opportunities are varied and include the following:

- Host/co-host breakfast (\$600 full sponsor/\$300 co-sponsor for a single day or \$1,000 full sponsor/\$500 co-sponsor for both days)
- Host/co-host luncheon (\$1000 full sponsor/\$500 co-sponsor for a single day or \$1,800 full sponsor/\$900 co-sponsor for both days)
- Host/co-host welcome icebreaker (\$1,200 full sponsor/\$600 co-sponsor)
- Host morning refreshment break (\$400 full sponsor/\$200 co-sponsor for a single day or \$600 full sponsor/\$300 co-sponsor for both days)
- Host afternoon refreshment break (\$400 full sponsor/\$200 co-sponsor for first day)
- Host/co-host the poster session/reception icebreaker (\$750 full sponsor/\$375 co-sponsor)
- Sponsor student oral presentation competition (\$300)
- Sponsor student poster competition (\$300)
- Exhibitor table/space (\$500)

Sponsorships of \$500 and above will receive one (1) complimentary registration. A second person from the same agency can register for \$150. All sponsors and exhibitors will be recognized on the 2018 MWRC poster (company logo), from the podium, at luncheons, and in the program book as well as online conference website. Please contact Jessie Schmidt (jessie.schmidt@msstate.edu) for information.

2018 Annual Mississippi Water Resources Conference

Hilton Jackson – Jackson, MS

April 3-4, 2018

Sponsor & Exhibitor Application



Name: _____

Title: _____

Company/Organization: _____

Address: _____

City/State/Zip: _____

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		<u>Full Sponsor</u>	<u>Co-sponsor</u>
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AM Break	Single Day – \$400 (full sponsor) or \$200 (co-sponsor)	<input type="checkbox"/>	<input type="checkbox"/>
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PM Break	(First Day) \$400 (full sponsor) or \$200 (co-sponsor)	<input type="checkbox"/>	<input type="checkbox"/>
Icebreaker	\$1,200 (full sponsor) or \$600 (co-sponsor)	<input type="checkbox"/>	<input type="checkbox"/>
Student Oral Competition	\$300 (full sponsor)	<input type="checkbox"/>	
Student Poster Competition	\$300 (full sponsor)	<input type="checkbox"/>	
Exhibitor Table	Both Days – \$500 (full sponsor)	<input type="checkbox"/>	
Exhibitor Space (standup exhibits)	Both Days – \$500 (full sponsor)	<input type="checkbox"/>	

- Sponsorships of \$500 and above will receive one (1) complimentary registration. A second person from the same organization can register for \$150.
- All sponsors and exhibitors will be recognized on the 2018 MWRC poster (company logo), from the podium, at luncheons, and in the program book as well as online on the conference website.
- In order to be included in the program book, all payments must be received no later than Friday, March 1, 2018.
- Sponsorship Questions: Please contact Jessie Schmidt, jessie.schmidt@msstate.edu

Please email this form to Jessie Schmidt, jessie.schmidt@msstate.edu
or mail to MWRRI, Box 9547, Mississippi State, MS 39762

Researcher Profile: Dr. Ronald E. Cossman

Research Professor, Social Science Research Center, Mississippi State University

Tell us a little bit about your background and your current position.

I have a pretty convoluted academic past. My Bachelor's degree is in Economics from the University of North Florida, my Masters is in Demography and Population Studies from the Florida State University and my Ph.D. is in Geography from the University of Colorado, Boulder. You could say that I am a jack of all disciplines but master of none. But the great advantage that I have is that I am familiar with the materials and methods for a number of disciplines and I can speak the language of those disciplines, which is tremendously helpful when you are working on interdisciplinary teams.

I joined the Social Science Research Center (SSRC) at Mississippi State as a pre-doc (I was 6 months away from walking) in 2001. The SSRC was officially established in 1950. It is based on the premise that social, economic, political, and social-environmental problems are so complex that they require a multidisciplinary approach. The SSRC has grown to more than \$8 million in funding from grants and contracts and we have, on any given day, about 100 research scientists, faculty members, collaborators, graduate students and undergraduate student working on projects. In the 16 years that I have been here I have worked with collaborators in economics, public administration, sociology, criminology, anthropology, landscape architecture, and most flavors of agricultural research. It has been truly rewarding to work with very talented



collaborators from across campus, the nation and the world. Although I must admit that I miss the exchange program that we had with the University of Catania in Sicily.

What are your current research activities and interests?

I am currently Co-PI with Richard Ingram (PI) on a 15-state, 2-year project for the Hypoxia Task Force and Gulf of Mexico Alliance through grants from EPA and the Gulf Star Program. The focus is on nutrient and hypoxia reduction in the Mississippi River Basin and across the Gulf of Mexico. In the first phase we were focusing on the use of social indicators as a metric for nutrient reduction activities. Social indicators are the attitudes, knowledge, beliefs, habits and practices among individuals and groups, and in this case agriculture producers. The first reason that we are focusing on social indicators is that nutrient pollution is anthropogenic, so it'll take changes in human attitudes, knowledge, beliefs, habits and practices to lead to real nutrient reductions. Second, statistically significant changes in knowledge and practices can be measured over a relatively short period of time, versus environmental metrics which can take years or decades to show a statistically significant change. Third, social indicators can be less expensive than environmental monitoring. Finally, measuring social indicators involves those that use and manage the nutrients that are creating downstream hypoxic conditions. After all, they are the individuals who are making the final decisions.

We have completed the first-year analysis. During the second year we are going to pivot and focus on civic engagement. For example, what are the precursors that facilitate the organic emergence of a grass roots organization like the (made up) Defenders of Catalpa Creek or the Friends of the Mighty Mississippi? The groups commonly form to take on water quality and flow roles and responsibilities. They can include land owners, river users and visitors, people generally concerned with the environment, schools, youth groups and religious groups. If we can get a better handle on what leads to their formation, we are in a position to nurture the formation of those groups. I think most can agree that we need more allies to manage and protect our environment. This is one way to marshal more human capital talent and resources. So, this next phase will involve a lot of reaching out to grass roots organizations, primarily environmental, to learn about their history and capabilities.

How does the Water Resources Research Institute fit into your future plans? How can we help you be successful?

The MWRRI is the "go to" center for water issues in Mississippi and the Mississippi River Basin. It brings together a host of very, very, talented scientists. In the past two years, I have had the pleasure and honor of working with these people on a wide range of concept papers, white papers and research grant proposals. The Institute is clearly the state center for applied research and is set to become a regional center as we grow the Institute's research portfolio.

What I and some of my social science colleagues bring to MWRRI is a focus on the human-environmental nexus. I regularly sit in meeting with environment engineers (sorry to call you out but you know who you are) who are hotly debating a technical solution to an environmental issue. I remind them that, “This problem was either caused by humans, affects humans, and/or humans will be the solution. So, humans must be part of the equation.” Social indicators are a viable complementary metric to environmental measures. If we can harness civic engagement we can bring valuable allies to the table to help us realize environmental goals that benefit all of us.

About the Mississippi Water Resources Research Institute (MWRRI)

The institute exists as both a federal and a state research unit. Established in 1964, the MWRRI is one of 54 institutes (one in each state, The District of Columbia, Guam, Puerto Rico, and the Virgin Islands) that form a national network to solve water problems of state, regional, or national significance. In 1983, the Mississippi legislature formally designated the MWRRI as a state research institute. Federal funds designated for the institute are used to consult with state water officials to develop coordinated research, technology transfer and training programs that apply academic expertise to water and related land-use problems. These various activities are funded through an annual grant from the United States Geological Survey (USGS). Mississippi state appropriations provide additional funds for cost share. The institute also assists state agencies in the development of a state water management plan, maintaining a technology transfer program, and serves as a liaison between Mississippi and federal funding agencies.

If you or someone that you know would like to receive this publication please email jessie.schmidt@msstate.edu to be added to the MWRRI listserv.

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