

# **Tiffany L. Messer, PhD, EIT**

*Assistant Professor, Bioenvironmental*

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216 CE Barnhardt

Lexington, KY 40506

Email: [tiffany.messer@uky.edu](mailto:tiffany.messer@uky.edu)

Website: [www.mesoprogram.com](http://www.mesoprogram.com)

Phone: 859-771-4833

## **Research, Teaching, & Extension Interests**

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Nutrient Cycling, Fate, and Transport; Surface Water Hydrology Modeling; Emerging Sensor Technologies; Hydrologic and Stable Isotope Tracer Techniques; Restoration Assessments of Ecosystem Services; Environmental Policy; Ecosystem Restoration; Environmental Impacts in Developing Countries; Groundwater Hydrology Modeling; Engineering Education; Agricultural and Urban Ecosystems

## **Current Position**

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**Assistant Professor**, University of Kentucky, Department of Biosystems and Agricultural Engineering, Lexington, KY. October 2020 to present.

## **Education**

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**Doctor of Philosophy**, Biological and Agricultural Engineering, Emphasis: Ecological Engineering; North Carolina State University, Raleigh, NC; January 2011 – December 2015. Dissertation: Predicting Impacts of Rerouting Drainage Water from the Pamlico Sound to Restored Wetlands: A Hydrologic and Water Quality Assessment. Advisor: Dr. Michael R. Burchell, Ph.D. GPA: 3.77

**Master of Science**. Biological and Agricultural Engineering, Emphasis: Water Resources and Environmental Engineering and Minor: Soil Science, North Carolina State University, Raleigh, NC; August 2008 – December 2010. Thesis: Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. Advisor: Dr. Michael R. Burchell, Ph.D. GPA: 3.77

**Bachelor of Science**, Biosystems and Agricultural Engineering, University of Kentucky, Lexington, KY; August 2004- May 2008. Emphasis: Bioenvironmental Engineering. GPA: 3.57 Magna Cum Laude.

## **Employment History**

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**Assistant Professor**, University of Kentucky, Department of Biosystems and Agricultural Engineering, Lexington, KY. October 2020 – Present. Supervisor: Michael Montross, Ph.D., P.E.

Responsibilities include: Research and reaching activities related to identifying, tracing, and treating water in agroecosystems for biosystems and agricultural engineering.

**Assistant Professor**, Department of Biological Systems Engineering and School of Natural Resources, University of Nebraska –Lincoln, Lincoln, NE. January 2017 – September 2020. Supervisor: David Jones, Ph.D., P.E.

Responsibilities include: Research and Teaching activities related to identifying, tracing, and treating water in agroecosystems for biological systems engineering and school of natural resources. Examples include: receiving \$2.3M in funded grants, advising 12 undergraduate research projects, supervising(ed) 10 graduate student projects, developing and teaching interdisciplinary wetlands course, teaching every student in both the undergraduate and graduate programs during their first year.

**Postdoctoral Associate**, Biogeochemistry, Organic Chemistry, and Mass Spectrometry, Nicholas School of Environment, Duke University, Durham, NC. August 2015 – December 2016. Supervisor: Martin Doyle, Ph.D.

Responsibilities included: developed innovative methods for evaluating pesticides degradation in natural waters, mentor graduate students, published journal articles, and constructed competitive grant and fellowship applications.

**Laboratory Manager, Research, and Teaching Assistant**, Department of Biological and Agricultural Engineering, North Carolina State University, Raleigh, NC. August 2008 – August 2015. Supervisor: Michael R. Burchell, Ph.D.

Responsibilities included: modeled nitrogen transformations and loading rates in wetland systems; developed  $^{15}\text{N}$  tracer protocol, experimental design, and monitoring scheme, co-authored two funded research grants, managed wetland research laboratory, managed wetland and riparian buffer field monitoring sites, modeled wetland hydrology in DRAINMOD and developed water management plan, co-lectured and served as a teaching assistant for multiple classes for 7 years.

**Water Resources Engineering Intern**, Hazen and Sawyer, Lexington, KY and Raleigh, NC. May 2015 – August 2016. Supervisors: John Steinmetz, P.E. (Lexington) and Everette Knight, P.E. (Raleigh)

Responsibilities included: drafted future force main for Winchester, KY water treatment plant, co-authored proposals and quarterly reports, evaluated future construction site locations, researched and reported new BMP regulations in the state of North Carolina and organized webinars for modeling software in GIS and AutoCAD.

**Research and Teaching Assistant**, Biosystems and Agricultural Engineering, Lexington, KY. May 2005 – May 2008. Supervisors: Steven Workman, Ph.D., P.E. and Scott Shearer, Ph.D., P.E.

Responsibilities included: laboratory instructor for Basic Principles of Surveying, assisted in organizing water quality awareness extension events, researched flow rate effects for various forms of porous concrete, installed and evaluated erosion control measures on equine farms, and developed evapotranspiration predictor in Microsoft Excel.

**Environmental Engineering Intern**, CDP Engineers, Lexington, KY. May 2005 – December 2006. Supervisors: Sandy Camargo, P.E.

Responsibilities included: Co-developed Phase II programs for various cities in Kentucky and Ohio, surveyed future construction sites, designed rain gardens, and drafted stream restoration projects.

## **Licensure and Certification**

1. Watershed Assessment and Restoration Certificate, North Carolina State University, Expected August 2015
2. Certificate of Accomplishment in Teaching, North Carolina State University, May 2014
3. Engineer-In-Training, Commonwealth of Kentucky, May 2008 to present.

## **Summary**

### **Grants<sup>a</sup>**

<b>Role</b>	<b>Oct 2020 - present</b>	<b>Jan 2017- Sept 2020</b>	<b>&lt;2017</b>	<b>Total</b>
PI Nationally Competitive	\$479,763 (1)	\$587,073 (5)	\$291,000 (2)	\$878,073 (8)
Co-PI Nationally Competitive	-	\$1,752,203 (4)	\$49,729 (2)	\$1,801,932 (6)
PI Other	-	\$52,800 (3)	-	\$52,800 (3)
Co-PI Other	-	\$413,044 (2)	-	\$413,044 (2)
<b>Total</b>	<b>\$479,763</b>	<b>\$2,805,120 (14)</b>	<b>\$340,729 (4)</b>	<b>\$3,625,622 (19)</b>

<sup>a</sup>Number of grants in parenthesis.

### **Refereed Publications<sup>a</sup>**

<b>Role</b>	<b>2017-present</b>	<b>&lt;2017</b>	<b>Total</b>
Published	13 (9)	2 (1)	11 (9)
In Press	0	0	0
In Review <sup>β</sup>	9 (5)	0	5 (1)
In Prep for Fall 2020 Submission <sup>β</sup>	1 (1)	0	4 (3)
<b>Total</b>	<b>13 (9)</b>	<b>2 (1)</b>	<b>15 (10)</b>

<sup>a</sup>Publications in parenthesis are as first author or when graduate student under direct supervision is first author.

<sup>β</sup>Not included in total.

## Grants and Contracts

**(Total: \$3,625,622; \$1,506,340 to Messer program)**

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### Externally Funded Research Grants

**(Total: \$2,680,014; \$1,395,513 to Messer program)**

#### Current

1. **T. Messer**, M. Montano, and D. Miller. 2020. Evaluation of Nanopesticide Fate and Transport and Biogeochemical Implications in Agroecosystems, USDA-NIFA A1511 Nanotechnology for Agricultural and Food Systems, **\$479,763**. 1/1/21-12/31/2025, Messer: PI (\$383,810 to Messer Program).  
The project will investigate nanopesticide fate and transport in agroecosystems and downstream aquatic settings using a combination of microcosm, mesocosm, and field experiments. Further, impacts of nanopesticides on nitrogen processes are investigated.
2. S. Bartelt-Hunt, C. Wittich, E. James, S. Kim, Y. Li, **T. Messer**, J. Eun, X. Li, J. Steelman, C. Sim. REU Site: Sustainability of Horizontal Civil Networks in Rural Areas, NSF REU 19-582, **\$448,597** (\$22,429 to Messer Program): 5/1/2020-4/30/2023.  
Provides undergraduate summer research assistant opportunities to study best management practices in rural communities of Nebraska.
3. **T. Messer**, S. Bartelt-Hunt, and D. Snow. PFAS Exposure from WWTPs to Surface Water and Agricultural Fields. USGS 104(b). **\$19,928**. 3/1/2020 – 2/28/2021. Messer: PI (\$6,636 to Messer Program)  
The project will investigate PFAS exposure upstream and downstream of a wastewater treatment plant. Further, biosolids will be applied to agricultural fields and fate and transport of PFAS in runoff, soil, and plant uptake will be evaluated.
4. **T. Messer** and S. Comfort. 2019. Nebraska Floating Wetlands Pilot Project, **\$15,000**, 12/10/2019-12/09/2020, Messer: PI (\$7,500 to Messer Program)  
The purpose of this project is to reduce phosphate and nitrate concentrations and improve water clarity of a eutrophic pond using a sustainable system. The goals of this project are to 1) Improve the water quality of Cooper Pond by quantifying floating treatment wetland survival and growth under field conditions present in Cooper Pond and floating treatment wetland efficacy of reducing nitrate and phosphate concentrations and 2) Provide Outreach and Training on Benefits of Floating Treatment Wetland by installing a time-lapse camera to visually show the benefit of the Floating Treatment Wetlands and conducting at least two (2) public trainings to outline the benefits of the project.
5. **T. Messer**, T. Gilmore, and A. Mittelstet, 2019. LTAR Research: Testing a Novel Groundwater Age-dating Technique in Bazile Creek Watershed, **\$33,648**, 11/1/2019 – 10/30/2021, Messer: PI (\$33,658 to Messer Program)  
This project will assess groundwater transient times in a Nebraska watershed to determine new methods to determining groundwater age. The project is a subproject of a larger grant awarded to Dr. Tala Awada. Results from the project

will aide in identifying age of nitrate contamination is within groundwater systems in a region of Nebraska with nitrate concentrations exceeding Environmental Protection Agency health requirements for drinking water from wells.

6. S. Bartelt-Hunt, **T. Messer**, and D. Snow. 2019. Influence of Agrochemical Mixtures on Treatment Wetland Ecosystem Services, USDA-NIFA, **\$499,999**, 05/01/2019-04/30/2023, Messer: Co-PI (\$199,999 to Messer Program)

This project will evaluate the discrete and combined effects of specific veterinary antibiotics and an increasingly used nitrification inhibitor (nitrapyrin) to nitrogen transformation and its potential effect on nitrate-N treatment efficiency in saturated sediments and wetlands. Specific research objectives of our project are to: 1) simulate and quantify the combined effects of antibiotics and a commercial nitrification inhibitor on the nitrogen cycle in saturated pulse flow treatment wetlands; and 2) determine the overall effect of trace levels of antibiotics and nitrification inhibitors on the nitrate-N removal potential of pulse flow wetlands receiving contaminated agricultural run-off. We will first conduct microcosm incubations at a USGS research laboratory to establish the concentration levels where nitrapyrin and antibiotic mixtures affect nitrate transformation. Nitrogen and antibiotic transformation, and nitrapyrin interactions will be assessed in two sets of mesocosm wetland experiments using methods from past successful simulations. The transformation and fate of selected veterinary antibiotics will also be tracked in the mesocosms. Findings will provide new insight into whether residues of nitrification inhibitors and veterinary antibiotics in these environments will affect proposed mitigation strategies for controlling nitrogen losses from fertilized crops and managing nitrate contamination of ground and surface water. This project will accelerate research programs of two early career scientists, foster collaborations with an established USGS biogeochemist and USDA-ARS microbiologist, and will train a PhD student in environmental analytical and stable isotope methods. All activities will help to further our understanding of the potential effects of specific contaminant mixtures on nitrogen biotransformation in wetlands designed to treat run-off from urban and agricultural watersheds. Findings from this study will be disseminated through research presentations, high impact journal articles, local seminars, national conferences, technical workshops, a public magazine article, public outreach presentations, and an undergraduate wetlands class.
7. T. Gilmore, A. Mittelstet, and **T. Messer**. 2018. Survey of Groundwater Transit Times and Nitrate Delivery to Bazile Creek, Nebraska DEQ, **\$30,000**, 06/01/2018-5/31/2020, Messer: Co- PI (\$3,000 to Messer Program)

The groundwater underlying the Bazile Creek watershed has high levels of nitrate, and baseflow makes up roughly 60% of annual stream flow (Figure 1; Baseflow Index is the percent of annual stream discharge derived from baseflow). Although long-term time series are not available for stream-water nitrate concentrations in Bazile Creek, existing data suggest (1) increasing stream-water nitrate concentrations over time, and (2) nitrate concentrations that generally decrease in the downstream direction (Figure 2). The proposed work is a first step toward the overall goals of (1) understanding groundwater contribution to these spatial and

temporal trends in stream-water nitrate, and (2) gauging the magnitude and timing of future groundwater nitrate loading to Bazile Creek. The specific objectives addressed by this project are: 1. Quantify a range of timescales for delivery of groundwater nitrate to Bazile Creek, and 2. Survey nitrate concentration in groundwater that discharges to Bazile Creek.

8. **T. Messer**, D. Snow, and M. Doyle. 2018. Photodegradation of Insecticides in Rivers Adjacent to Agricultural Intensive Regions: A Novel Water Quality Monitoring Approach, USDA-NIFA, **\$498,500**, 3/1/18-2/28/2022, Messer: PI (\$398,800 to Messer Program)

Worldwide chronic levels of insecticides in rivers continue to rise, which have significant human health and food security implications. Insecticides, once in the environment, are exposed to a range of environmental conditions, resulting in degradation and formation of potentially harmful byproducts. The overarching goal of the proposed work is to quantify the potential role of river geomorphology on photochemical transformation fate and degradation rates of two insecticides that are contaminants of emerging concern (CECs): Imidacloprid and Clothianidin. Path-specific environmental conditions of two agricultural impacted rivers in the Midwest and Southeast will be assessed. Objectives include three coupled field/laboratory research schemes: 1. Synoptic, 2. Eulerian, and 3. Lagrangian. Each objective will incorporate the development of alternative field and sensor-based approaches for studying rivers in agroecosystems. The novelty of the proposed work is we will conceptually and methodologically follow variable conditions experienced by a water particle as it travels through a river using passive drifting sensors, ultimately providing a more accurate picture of CEC fate and transport. Expected deliverables include: 1. Provide realistic recommendations for minimizing environmental impacts of these insecticides, 2. Improve current fate and transport methodology that will be transferable and scalable to other questions in rivers adjacent to agrosystems (e.g., nutrient retention), and 3. Provide undergraduate and graduate training.

9. S. Fernando, S. Bartlett-Hunt, D. Loy, **T. Messer**, G. Morota, H. Paz Manzano, A. Schmidt, D. Snow, and R. Stowell. 2018. Investigating mobile genetic elements and resistance gene reservoirs towards understanding the emergence and ecology of antimicrobial resistance in beef cattle production systems, USDA-NIFA, **\$773,607**, 2/15/2018 – 2/14/22, Messer: Co-PI (\$38,680 to Messer Program)

Our preliminary studies and proposed experiments employ some of the most powerful, genome-based methodologies and analytical chemistry methods to identify antimicrobial compounds, and genes in the environment. These approaches will be applied to both antibiotic free and antibiotic treated cattle and pens and will be implemented at the U.S. Meat Animal Research Center new antibiotic free feedlot facility. We will further our strong relationships with Nebraska and the central Plains beef producers and will work closely with them to implement our research findings. At the completion of the project, the expected outcomes of outreach activities are: 1. Improved access among producers, consumers, stakeholders and their advisors to research-based information, tools and resources

communicated in a way that facilitates improved understanding of potential AMR-related food safety risks; and 2. Improved ability among producers, consumers, stakeholders and their advisors to assess and adopt practices to mitigate potential AMR-related food safety risks.

### **Completed**

1. **T. Messer**, A. Mittelstet, and D. Snow. 2018. Pesticide Exposure in Recreational Lakes, 104(b), **\$19,997**, 3/3/2018-2/8/2019, Messer: PI (\$9,998 to Messer Program)  
This project is unique as it will provide a first glimpse at the state of recreational water resources in three watersheds of Nebraska. The **completion of this project** will: 1. Develop a vulnerability map for pesticide contamination of three recreational waters of in intensive agriculture and/or urbanized watersheds, 2. Estimate seasonal influx of pesticides into recreational lakes, and 3. Establish seed data to lead to nationally competitive proposals focused on creating larger scale vulnerability maps and identifying potential best management practices (BMPs) for the Midwest. Information gained from the project will be used to identify vulnerability periods for pesticide exposure and determine the overall load of pesticide inputs to three recreational lakes.
2. **T. Messer**, 2016. Photodegradation of Imidacloprid in Rivers Adjacent to Agricultural Facilities: A Novel Water Quality Monitoring Approach, USDA AFRI NIFA ELI Post Doc Fellowship, **\$165,000**, Messer: Fellow (\$165,000 to Messer Program).  
Project was the basis of my postdoctoral project and covered stipend and tuition with an additional yearly research allowance.
3. **T. Messer**. 2012. Predicting Impacts of Rerouting Drainage Water from the Pamlico Sound to Restored Wetlands – A Critical Component to Galvanize Stakeholder Cooperation, EPA STAR Fellowship, **\$126,000**, Messer: Fellow (\$126,000 to Messer Program).  
Project was the basis of my PhD project and covered stipend and tuition with an additional yearly research allowance.
4. Burchell, Michael R., F. Birgand, S.W. Broome, and **T.L. Messer**. 2013. A Mesocosm Study to Determine Nitrogen Assimilation Capacity of a Restored Wetland Slated to Receive Pumped Drainage Water - a Critical Component to Maximize Improvement to the Pamlico Sound. **\$29,914**. NCSU Water Resources Research Institute 03/01/2013 - 02/28/2014, Messer: Co-PI (\$0 to Messer Program).  
Project was the basis of my PhD project and covered costs for the isotopic microcosm study.
5. Burchell, M.R and **T.L. Messer**. 2012. Predicting Water Quality Impacts of Rerouting Drainage Water from the Pamlico Sound to Restored Wetlands. NCSU Sea Grant Program. **\$19,814**. 09/01/2012 – 04/30/2014, Messer: Co-PI (\$0 to Messer Program).  
Project was the basis of my PhD project and covered costs for 18 wetland mesocosm nutrient studies.

**Internally Funded Research Grants**  
**(Total: \$465,844; \$110,826 to Messer program)**

**Current**

1. **T. Messer**. 2019. FIRST: Treating Non-Point Source Cocktails: Pesticide Removal Utilizing In-stream Best Management Practices, NSF-Nebraska-EPSCoR, **\$25,000**, 4/1/2019-3/31/2020, Messer: PI (\$25,000 to Messer Program).

Activities to be supported by the first award include: FTW laboratory mesocosm experimental evaluations of one of the proposed mesocosm pesticide experiments. This activity will provide important seed data for a full NSF CAREER proposal and will provide graduate student and UCARE undergraduate training. At least one peer-reviewed journal publication is expected from this research. Other activities planned during the First Award include: 1. Securing letters of support from Nebraska One Health, Nebraska Department of Environmental Quality, Nebraska Natural Resource Districts, Arbor Day Foundation Nature Explore Pre-K Program, Lincoln Public Schools, and American Cancer Foundation, all of which have expressed interest in the project, and 2. Developing an activity in the *mesoLab* focused on pesticide removal in wetlands for use in Lincoln Public Schools, UNL sponsored high school camps, and an undergraduate wetlands course taught by PI Messer.

2. **T. Messer**. 2019. Treating Non-Point Source Cocktails: Pesticide Removal Utilizing In-stream Best Management Practices, Robert B. Daugherty Water for Food Global Institute at the University of Nebraska, **\$10,800**, 7/1/2019-6/30/2020, Messer: PI (10,800 to Messer Program).

The project investigates the potential of floating treatment wetland to improve water quality in local recreational lake waters that have high pesticide inputs. Seasonal and vegetation design impacts on floating treatment wetland treatment potential will be evaluated. The project will provide support for the Nebraska Department of Environmental Quality and to incorporate FTWs as an approved best management practice for watershed management plans and better understand nutrient removal when exposed to pesticides. Further, the project will provide a first look at realistic assessments of the environmental conditions and their impacts on treatment and prevention potential of FTWs for pesticide removal in the Midwest. These findings may be applicable to treating water in smaller waterbodies (e.g., agricultural ponds) critical to agriculture in the Midwest. Lastly, the project will provide graduate and undergraduate training, hands-on experiences for a wide range of students through the *mesoWheels* program along with practitioner training and citizen science activities.

**Completed**

1. **T. Messer**. 2018. Understanding Floating Treatment Wetland Potential for Toxic Algal Bloom Prevention in Recreational Lakes, Robert B. Daugherty Water for Food Global Institute at the University of Nebraska, **\$17,000**, 7/1/2018-6/30/2019, Messer: PI (\$17,000 to Messer Program).

The project investigates the potential of floating treatment wetland to improve water quality in local recreational lake waters that have had multiple HAB



exceedance occurrences over the past 6 six years. Seasonal and vegetation design impacts on floating treatment wetland treatment potential will be evaluated. The project will provide support for the Nebraska Department of Environmental Quality and to incorporate FTWs as an approved best management practice for watershed management plans. Further, the project will provide a first look at realistic assessments of the environmental conditions and their impacts on treatment and prevention potential of FTWs for HABs in the Midwest. These findings may be applicable to treating water in smaller waterbodies (e.g., agricultural ponds) critical to agriculture in the Midwest. Lastly, the project will provide graduate and undergraduate training, hands-on experiences for a wide range of students through the *meso*Wheels program along with practitioner training and citizen science activities.

2. A. Mittelstet, **T. Messer**, and T. Gilmore. 2017. Managing Water Resources at the U.S. Meat Animal Research Center, ARD & US MARC, **\$83,612**, 7/3/17 – 12/31/19, Messer: Co-PI (\$25,083 to Messer Program).  
The U.S. Meat Animal Research Center removes water from May to October to irrigate 15 pivots from the Big Sandy Creek tributary at the discharge point (where treated groundwater is discharged into the channel) and reservoir (Figure 1). Six of ten dams along the channel have the capability to control the discharge by adding or removing stoplogs. Often, by October, there is not enough water to irrigate the crops. To better manage the water resources, a water balance of the tributary, Big Sandy Creek and reservoir is needed. Understanding the hydrology is instrumental for managing water resources and for scientists conducting water-related research at the center. The overall goal of this project is to identify water inputs and outputs, both temporally and spatially, to aid researchers at the Animal Research Center.
3. D. Snow, **T. Messer**, S. L. Bartelt-Hunt, M. D'Alessio, D. Hage, and L. Xu. 2019. Xevo TQ-S micro System, ARD Equipment Fund, **\$329,432**, 2019, Messer: Co-PI (\$32,943 to Messer Program).  
Funds provided new equipment for evaluating water quality samples for emerging contaminants in the Nebraska Water Center. The equipment will be imperative for the success of USDA funded project described below.

## Hatch Project

### Current

1. Comfort, S., **T. Messer**, T. Franti, S. Thomas, J. Corman, and K. Pekarek. 2017. A Multidisciplinary Approach to Pond and Small Lake Restoration in Nebraska: A Cooperative Case Study using Cushman Lake (Lincoln, NE). NE 1014685. 6/1/2017-5/31/2022. Messer: Co-PI.
2. Armbrust, K.L., S. Brander, J. Burger, B. Dari, J. Gan, J. Hoverman, J.J. Jenkins, M. Kaiser, H. Li, Q.X. Li, **T. Messer**, F.C. Michel, S.J. Parikh, J. Pedersen, R. Peterson, B.K. Richards, G. Robbins, D. Schlenk, M.S. Sepulveda, D.G. Seth Carley, D. Snow, T. Sterling, and M. Tessum. 2020. Agrochemical Impacts on Human and Environmental Health: Mechanisms and Mitigation. W-4045. 10/01/2020-9/30/2025.

Messer: Co-PI.

### **University of Nebraska Funded Non-Research Grants (Total: \$11,100)**

#### **Current**

1. **T. Messer**, 2019 CAREER Club, ORED CAREER Club Fund, 11/2019-7/2020. **\$10,000**. Messer: PI (\$10,000 to Messer Program).  
Provided funds to visit Washington D.C. to meet with NSF program officers and provide guidance for resubmitting NSF CAREER proposal.

#### **Completed**

1. **T. Messer**. 2018 ASABE Annual International Meeting, IANR Travel Fund, 7/23/18, \$500. Messer: PI (\$100 to Messer Program).  
Provided funds to attend 2018 ASABE Annual International Meeting to present results from Nebraska teaching and research.
2. **T. Messer**. 2017 WETPOL Annual International Meeting, SNR/IANR Faculty Development Fund, 8/19/17. \$1,000. Messer: PI (\$1,000 to Messer Program).  
Provided funds to attend 2017 WETPOL International Meeting to participate in treatment wetland

### **External Research Grants In Review**

#### **(Total: \$1,326,035; Not Included in Total)**

1. **T. Messer**, S. Comfort, and A. Mittelstet. Surface Water Nutrient Removal in Eutrophic Ponds Using Floating Treatment Wetlands in Nebraska, 2019 Nebraska Environmental Trust, Sponsor amount: **\$300,692**, (\$99,228 to Messer Program). Submitted 9/7/2020.
2. **T. Messer**. CAREER: Impact of Pesticide and Antibiotic Cocktails on Nitrogen Removal Processes in Treatment Wetlands, NSF-Environmental Engineering, 7/1/2021-6/30/2026, **\$516,795** (\$516,795 to Messer Program). Submitted 7/29/2020.
3. **T. Messer**, S. Bartelt-Hunt, T. Gilmore, A. Schmidt, and D. Miller. Implications of Microplastic Contributions from Fertilizer Application Practices to the Nitrogen Cycle in Agroecosystems. USDA-NIFA Soil Health. **\$498,548**. (\$224,346 to Messer Program). Submitted 4/8/2020.
4. **T. Messer** and W. Hunt. Emerging Contaminant Exposure Following WWTP Processes to Surface Waters and Agroecosystems. USGS 104(b). **\$10,000**. (\$7,5000 to Messer Program). Submitted 10/9/2020.

### **Non-Awarded Grant Proposals (Not Included in Total)**

1. J. Lau, S. Bartelt-Hunt, H. Hatton-Bowers, **T. Messer**, T. Roy, and A. Schmidt. Building Resilience Against Flood-induced Chemical Contamination and Other Environmental, Social and Psychological Factors for the Vulnerable Communities with Failed On-site Wastewater Management in Rural Nebraska. EPA-G2019-STAR-E1. **\$799,833** (18% Messer, \$143,970). Submitted 9/30/2019 and has been recommended for funding.

2. M. Wilkins, I. Ciampitti, Y. Demirel, S. Dishari, I. Dweikat, T. Field, R.S. Frazier, F.J. Hay, S. Hu, D. Keshawni, J. Keshawni, F. Mattos, **T. Messer**, W. Niu, L. Pytlik Zillig, R. Saha, S. Sattler, J. Schnable, J. Shi, P. Twigg, J. Yang, and Y. Zheng. Reducing High Plains Aquifer Depletion Through Lignin Valorization And Drought-Tolerant Crop Plant Design: From Burning To Earning (B2E). USDA-NIFA Sustainable Agricultural Systems. **\$9,985,466** (3% Messer). Submitted 9/28/2019.
3. **T. Messer**, D. Snow, W. Woldt, C. Neale, and S. Comfort. Feasibility of Innovative Wetlands for Nutrient Treatment. EPA STAR Program. **\$999,413**, (40% Messer) Submitted 12/10/2019.
4. **T. Messer**, S. Comfort, and A. Mittelstet. Surface Water Nutrient Removal in Eutrophic Ponds Using Floating Treatment Wetlands in Nebraska, 2019 Nebraska Environmental Trust, Sponsor amount: **\$301,161**, (33.3% Messer). Submitted 9/3/2019.
5. **T. Messer**. CAREER: Impact of Pesticide and Antibiotic Cocktails on Nitrogen Removal Processes in Treatment Wetlands, NSF-Environmental Engineering, 7/1/2020-6/30/2025, **\$518,623** (100% Messer).
6. J. Keshwani, S. Frerichs, E. Ingram, **T. Messer**, and S. Pitla. Garden Tools: Technology Opportunities in Outdoor Learning Spaces, USDA-AFRI, 1/1/2020-12/31/2023, **\$299,802** (20% Messer).
7. J. Luck, S. Banerjee, D. Heeren, **T. Messer**, H. Nemela, and S. Pitla. INFEWS/T2 Experimentation, Technological Implementations and Novel Algorithmic Approaches for Futuristic Smart Farming, NSF, 07/01/2019-06/30/2024, **\$2,246,511** (15% Messer).
8. Y. Qi, C. Allen, **T. Messer**, C. Neale, Z. Tang, D. Uden, B. Wardlow, and W. Woldt. Mapping Wetlands for Transportation Planning in Nebraska Using GIS Predictive Models, Nebraska Department of Transportation, 07/01/2019-12/31/2020. **\$286,079** (10% Messer).
9. D. Hage, S. Bartelt-Hunt, D. Snow, **T. Messer**. Development of a new flow-based approach to directly measure the bioavailability of emerging contaminants in water and binding by these agents with soluble organic components in environmental samples, USGS 104(b), 3/1/2019-2/28/2020, **\$20,000** (5% Messer).
10. Y. Li, S. Bartelt-Hunt, T. Gilmore, M. Harner, A. Mittelstet, **T. Messer**, E. Rogan, and D. Snow. Nitrogen Legacy in Anthropogenic Landscapes: Connecting Water Quality and Citizen Science, University of Nebraska Collaboration Initiative, 7/1/18 – 6/30/20, **\$150,000**, (12.5% Messer).

11. **T. Messer**. FIRST: Flowing Through Nature: Removing *E. Coli* and Preventing Toxic Algal Blooms in High Use Waterbodies, NSF-Nebraska-EPSCoR, 4/1/2018-3/31/2019, **\$24,967**, (100% Messer), Accepted into final round of applicants.
12. J. Luck, D. Heeren, **T. Messer**, and H. Nemala, Building Market-Driven Management Approaches for Sustainable Water Quality and Quantity in Production Agriculture, USDA-NIFA, 3/1/2018-2/28/2022, **\$437,240**, (25% Messer)
13. S. Comfort, T. Franti, **T. Messer**, K. Pekarek, S. Thomas, and W. Woldt. A System Science Approach to Pond and Small Lake Restoration in Nebraska: A Cooperative Case Study using Cushman Lake (Lincoln, NE), University of Nebraska Collaboration Initiative, 1/1/18 – 12/31/19, **\$149,823** (10% Messer).
14. D. Snow, S. Bartlett-Hunt, and **T. Messer**. Cumulative Effect of Intentional and Unintentionally-Introduced Nitrogen Bio-cycle Inhibitors in Aquatic Environments, USGS 104(g), 1/1/18 – 12/31/19, **\$150,000** (33% Messer).
15. Y. Li, S. Bartlett-Hunt, X. Li, and **T. Messer**. Fate of Nitrate during Transport across the Groundwater-Surface Water Interaction under Future Climate, Department of Energy, 1/1/18-12/31/2020, **\$540,000** (25% Messer).
16. **T. Messer**, T. Gilmore, and D. Gosselin. Tracing Exported Dissolved Organic Matter from Degraded Headwater Wetlands in Agroecosystems, 4/1/2017-3/31/2018, Cycle 12 Energy Center, **\$134,985** (50% Messer).
17. S. Thomas, T. Gilmore, D. Gosselin, and **T. Messer**. Pre-proposal Sand Hills streamflow: more than a faucet? USGS 104(b), 1/1/17 -12/31/17. **\$20,000** (25% Messer).

## **Publications**

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**1: Undergraduate student, 2: Masters student, 3: Ph.D. student, 4: Postdoctoral researcher**

### **Refereed (13 Total)**

#### **Published**

1. Naderi Beni, N., Snow, D.D., Berry, E.D., Mittelstet, A.R., **Messer, T.L.**, Bartelt-Hunt, S. 2020. Measuring the occurrence of antibiotics in surface water adjacent to cattle grazing areas using passive samplers. *STOTEN*. 726: 138296. doi. [10.1016/j.scitotenv.2020.138296](https://doi.org/10.1016/j.scitotenv.2020.138296). (Impact Factor: 5.589/ Cite Score: 5.92)
2. Abimbola, O.P., Mittelstet, A.R., **Messer, T.L.**, Berry, E.D., Bartelt-Hunt, S.L., and Hansen, S.P.<sup>2</sup> 2020. Predicting *Escherichia coli* loads in cascading dams with machine learning: An integration of hydrometeorology, animal density and grazing pattern. *STOTEN*, 722: 137894. doi. [10.1016/j.scitotenv.2020.137894](https://doi.org/10.1016/j.scitotenv.2020.137894). (Impact Factor: 5.589/ Cite Score: 5.92)

3. Hansen, S.<sup>2</sup>, **Messer, T.L.**, Mittelstet, A., Berry, E.D., Bartelt-Hunt, S., Abmibola, F. 2020. *Escherichia Coli* Concentrations in Waters of a Reservoir System Impacted by Cattle and Migratory Waterfowl. *STOTEN*. 705(25), <https://doi.org/10.1016/j.scitotenv.2019.135607>. (Impact Factor: 5.589/ Cite Score: 5.92)
4. **Messer, T.L.**, K.R. Douglas-Mankin, N.G. Nelson, and J.R. Etheridge. 2019. Wetland Ecosystem Resiliency: Protecting and Restoring Value Ecosystems. *Transactions of American Society of Agricultural and Biological Engineering*, 62(2): 1541-1543. doi: [10.13031/trans.13578](https://doi.org/10.13031/trans.13578). (Impact Factor: 3.82)
5. Keilhauer, M.<sup>2</sup>, **Messer, T. L.**, Mittelstet, A., Corman, J., Franti, T. 2019. Nitrate Removal Potential of Floating Treatment Wetlands Amended with Spent Coffee: A Mesocosm Scale Evaluation. *Transactions of American Society of Agricultural and Biological Engineering*. 62(6): 1619-1630. doi: [10.13031/trans.13431](https://doi.org/10.13031/trans.13431). (Impact Factor: 3.82)
6. Hansen, S.<sup>2</sup>, **T. L. Messer**, and A. Mittelstet. 2019. Mitigating the Risk of Atrazine Exposure Across Nebraska, USA: Identifying Hot Spots and Hot Times in Surface Water Watersheds. *Journal of Environmental Management*, 250: 109424. doi: [10.1016/j.jenvman.2019.109424](https://doi.org/10.1016/j.jenvman.2019.109424). (Impact Factor: 4.865/ Cite Score: 5.32)
7. **Messer, T.L.**, F. Bír gand, and M.R. Buchell. 2019. Diel Fluctuations of High Level Nitrate and Dissolved Organic Carbon Concentrations in Constructed Wetland Mesocosms. *Ecological Engineering*, 133: 76-87. doi: [10.1016/j.ecoleng.2019.04.027](https://doi.org/10.1016/j.ecoleng.2019.04.027). (Impact Factor: 3.406/ Cite Score: 3.73)
8. Mittelstet, A. R., Gilmore, T. E., **Messer, T.L.**, Rudnick, D. R., Heatherly, T. 2019. Evaluation of Watershed Characteristics to Identify Best Management Practices to Reduce Nebraskan Nitrate Concentrations from Nebraska to the Mississippi/Atchafalaya River Basin. *Agriculture, Ecosystems, and the Environment*. 277: 1-10. doi: [10.1016/j.agee.2019.02.018](https://doi.org/10.1016/j.agee.2019.02.018). (Impact Factor: 3.954/ Cite Score: 4.42)
9. **Messer, T.L.**, M.R. Burchell, and F. Bír gand. 2017. Comparison of Four Nitrate Removal Kinetic Models in Two Distinct Wetland Restoration Mesocosm Systems. *Water*, 9: 517-537. doi: [10.3390/w9070517](https://doi.org/10.3390/w9070517). (Impact Factor: 2.524/ Cite Score: 2.66)
10. **Messer, T.L.**, M.R. Burchell, F. Bír gand, S. Broome, and G. Chescheir. 2017. Nitrate Removal Potential of Restored Wetlands Loaded with Agricultural Drainage: A Mesocosm Scale Experimental Approach, *Ecological Engineering*, 106: 541-554. doi: [10.1016/j.ecoleng.2017.06.022](https://doi.org/10.1016/j.ecoleng.2017.06.022). (Impact Factor: 3.406/ Cite Score: 3.73)
11. **Messer, T.L.**, M.R. Burchell, J.K. Böhlke, and C.R. Tobias. 2017. Tracking the Fate of Nitrate through Restored Wetlands: A Mesocosm Scale <sup>15</sup>N Enrichment Tracer Study, *Ecological Engineering*, 106: 597-608. doi: [10.1016/j.ecoleng.2017.06.016](https://doi.org/10.1016/j.ecoleng.2017.06.016). (Impact Factor: 3.406/ Cite Score: 3.73)

12. Wiseman, J., M.R. Burchell, G.L. Grabow, D.L. Osmond, and **T.L. Messer**. 2014. Groundwater nitrate concentration reductions in a riparian buffer enrolled in the NC Conservation Reserve Enhancement Program. *Journal of American Water Resources Association*, 50(3): 653-664. doi. [10.1111/jawr.12209](https://doi.org/10.1111/jawr.12209). (Impact Factor: 2.462/ Cite Score: 2.49)
13. **Messer, T. L.**, M.R. Burchell, D.L. Osmond, and G.L. Grabow. 2012. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. *Ecological Engineering*, 47: 397-407. doi. [10.1016/j.ecoleng.2012.06.017](https://doi.org/10.1016/j.ecoleng.2012.06.017). (Impact Factor: 3.406/ Cite Score: 3.73)

**In Press**

None

**Publications In Review/Prep (Not Included in Total)**

1. **Messer, T.L.**, Moore, T.L., Nelson, N., Ahiablame, L., Bean, E., Boles, C., Hall, S., McMaine, J., and Schlea, D. Invited: Constructed Treatment Wetlands for Agroecosystems: A Synthesis for Nutrient Removal. *Transactions of ASABE*. [In Review] (Impact Factor: 3.82)
2. Abimbola, O.P., Mittelstet, A.R., **Messer, T.L.**, Berry, E.D., and Griensve, A. Modeling and prioritizing interventions using pollution hotspots for reducing nutrients, atrazine, and *E. coli* concentrations in a watershed. *Journal of Environmental Management*. [In Review]
3. **Messer, T.L.**, Mittelstet, T., and Ruyle, J. Sunday with Scientist: Engineering Wetlands Families meet a scientist and explore wetlands at a Natural History Museum. *Connected Science Learning*. [In Review]
4. Zhang, L., Tang, Z., **Messer, T.L.**, Burbach, M., Hayes, M., Yuzhen, Z, and Hu, Q. Evaluating Wetland Conservation Efforts of Local Comprehensive Plans in Nebraska. *Wetlands Ecology and Management*. [In Review] (Impact Factor: 2.25)
5. Richards, G., Gilmore, T., **Messer, T.L.**, Snow, D. and Mittelstet, A.R. Nitrate dynamics within the nested watersheds of a gaining headwater agricultural stream, Nebraska, USA. *Agriculture, Ecosystems, and the Environment*. [In Review] (Impact Factor: 3.954/ Cite Score: 4.42)
6. Russell, M., Mittelstet, A.R., **Messer, T.L.**, and Korus, J. Evolution of three streambanks before and after stabilization and record flooding. *Ecol. Eng.* [In Review] (Impact Factor: 3.406/ Cite Score: 3.73)
7. Satiroff, J.<sup>2</sup>, **Messer, T.L.**, Snow, D., and Mittelstet, A.R. Pesticide exposure in recreational lakes: Nebraska case study. *Environmental Pollution*. [In Review] (Impact Factor: 6.792)

8. Weijia, N.<sup>4</sup>, Mittelstet, A., **Messer, T.L.**, and Tang, Y. Impact of climate and land use on economic development of a watershed – A case Study of Boaxing watershed in Giant Panda National Park. *Sustainability*. [In Review] (Impact factor: 2.59).
9. Borsuah, J.<sup>3</sup>, **Messer, T.L.**, Snow, D., Comfort, S., and Mittelstet, A. Literature Review: Global neonicotinoid occurrence in aquatic environments. *Water*. [In Review]. (Impact Factor: 2.524/ Cite Score: 2.66).
10. Trejo, B.<sup>2</sup>, **Messer, T.L.**, Bartelt-Hunt, and Snow, D. Fate and transport of pharmaceutical antibiotics adjacent to feedlot. *STOTEN*. [In Prep with Planned Submission November 2020]. (Impact Factor: 5.589/ Cite Score: 5.92)

#### **Non-Refereed Publications (13 Total)**

1. **Messer, T. L.**, M.R. Burchell, and F. Birgand. 2014. Determining the Nitrogen Loads for Rerouted Agricultural Drainage Water into Restored Wetlands – An Experimental and Modeling Approach. ASABE Paper No. 1895614. Montreal, Canada: ASABE.
2. **Messer, T. L.** and M.R. Burchell. 2014. Tracing the Fate of Nitrate through Restored Wetlands: A mesocosm <sup>15</sup>N Tracer Study. ASABE Paper No. 1892505. Montreal, Canada: ASABE.
3. **Messer, T. L.**, M.R. Burchell, D.L. Osmond, and G.L. Grabow. 2011. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. ASABE Paper No. 1111361. Louisville, KY: ASABE.
4. **Messer, T.L.**, M.R. Burchell, A.S.Tilak, and J.D. Wiseman. 2010. Effectiveness of Nitrate Reduction in Riparian Buffers: A Riparian Buffer Hydrologic and Biogeochemical Evaluation. ASABE Paper No. 1009104. Pittsburgh, PA: ASABE.
5. Wiseman, J.D., M.R. Burchell, **T.L. Messer**, and A.S. Tilak. 2010. Groundwater Nitrate Reduction Processes in a Riparian Buffer Enrolled in the NC Conservation Reserve Enhancement Program. ASABE Paper No. 1009119. Pittsburgh, PA: ASABE.
6. Tilak, A.S., M.R. Burchell, M.A. Youssef, R.R. Lowrance, R.G. Willams, **T. Messer**, and J. Wiseman. 2010. Hydrologic Analysis of a Riparian Buffer Enrolled in Conservation Reserve Enhancement Program in North Carolina Using Riparian Ecosystem Management Model (REMM). ASABE Paper No. 1009197. Pittsburgh, PA: ASABE.
7. **Messer, T. L.**, M.R. Burchell, and F. Birgand. 2014. Determining the Nitrogen Loads for Rerouted Agricultural Drainage Water into Restored Wetlands – An Experimental and Modeling Approach. ASABE Paper No. 1895614. Montreal, Canada: ASABE.

8. **Messer, T. L.** and M.R. Burchell. 2014. Tracing the Fate of Nitrate through Restored Wetlands: A mesocosm <sup>15</sup>N Tracer Study. ASABE Paper No. 1892505. Montreal, Canada: ASABE.
9. **Messer, T. L.**, M.R. Burchell, D.L. Osmond, and G.L. Grabow. 2011. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. ASABE Paper No. 1111361. Louisville, KY: ASABE.
10. **Messer, T.L.**, M.R. Burchell, A.S.Tilak, and J.D. Wiseman. 2010. Effectiveness of Nitrate Reduction in Riparian Buffers: A Riparian Buffer Hydrologic and Biogeochemical Evaluation. ASABE Paper No. 1009104. Pittsburgh, PA: ASABE.
11. Wiseman, J.D., M.R. Burchell, **T.L. Messer**, and A.S. Tilak. 2010. Groundwater Nitrate Reduction Processes in a Riparian Buffer Enrolled in the NC Conservation Reserve Enhancement Program. ASABE Paper No. 1009119. Pittsburgh, PA: ASABE.
12. Tilak, A.S., M.R. Burchell, M.A. Youssef, R.R. Lowrance, R.G. Willams, **T. Messer**, and J. Wiseman. 2010. Hydrologic Analysis of a Riparian Buffer Enrolled in Conservation Reserve Enhancement Program in North Carolina Using Riparian Ecosystem Management Model (REMM). ASABE Paper No. 1009197. Pittsburgh, PA: ASABE.
13. **Graham, T.** 2008. Water Resources Intern Experience. *Kentucky Environmental and Natural Resource Spring Newsletter*.

### Other Publications (3 Total)

1. **Messer, T.L.** 2020. *Case Study: Floating Wetlands*. H<sub>2</sub>O Today Smithsonian Traveling Exhibit.
2. **Messer, T. L.** Floating Treatment Wetlands. Lincoln, NE. KZUM radio Interview. 4 December, 2019.
3. **Messer, T. L.** 2019. NRES/BSEN 468/868: Wetlands. University of Nebraska Digital Commons. Lincoln, NE. Peer Review of Teaching Project.

### Presentations

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*1: Undergraduate student, 2: Masters student, 3: Ph.D. student, 4: Postdoctoral researcher*

### Invited Speaker and Keynote Presentations (4 Total)

1. **Messer, T.L.**, Water Quality and Conservation: A Global Perspective. Glenwood, IA, 2018 Iowa Women Gaining Ground Conference. 10 March 2018.
2. **Messer, T.L.**, Constructed Wetlands for Onsite Wastewater Treatment. Grand Island, NE, 2018 Onsite Wastewater Management Conference. 14 February 2018.



3. **Messer, T.L.**, Balancing N Inputs and Outputs: The Puzzling Case of Nitrogen Cycling in Restored Wetlands. Lincoln, NE. Nebraska Water Symposium. 26 October 2017.
4. **Messer, T.L.**, Completing the puzzle of nitrogen cycling in restored wetlands. Big Sky, MT. 7<sup>th</sup> International Symposium for Wetland Systems for Water Pollution Control (WETPOL). 23 August 2017. (Invited Mini-Keynote Speaker)

#### Conference Presentations (63 Total)

1. Hildebrand, PJ<sup>1</sup>, **Messer, T.L.**, McKercher, L.<sup>2</sup>, and Russell, M.<sup>3</sup> Evaluating Water Quality Data of Nebraska Lakes for
2. Eutrophication and Treatment. UNL UCARE Virtual Conference. July 8, 2020.
3. Stover, J.<sup>1</sup>, **Messer, T.L.**, McKercher, L.<sup>2</sup>, and Russell, M.<sup>3</sup> Floating Treatment Wetland Placement in Nebraska Lakes. UNL UCARE Virtual Conference. July 8, 2020.
4. Lindgren, J.<sup>2</sup> and **Messer, T.L.** Neonicotinoid Pesticide and Nutrient Removal in Floating Treatment Wetland Mesocosms. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. July 12-16, 2020.
5. Borsuah, J.<sup>3</sup> and **Messer, T.L.** Hot Spots” and “Hot Times” of Neonicotinoid Pesticides in Agriculturally Dominated Watersheds. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. July 12-16, 2020. Poster.
6. McKercher, L.<sup>2</sup>, **Messer, T.L.**, and Comfort, S. Assessment for Scaling Up Floating Treatment Wetlands from Microcosm to Field Scale. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. July 12-16, 2020.
7. **Messer, T.L.**, Little, H., and Oathout, K. Nutrient Removal Potential of Established Floating Treatment Wetlands Receiving Carbon Amendments. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. July 12-16, 2020.
8. **Messer, T.L.**, Moore, T.L., Nelson, N., Ahiablame, L., Bean, E., Boles, C., Hall, S., McMaine, J., and Schlea, D. Constructed Treatment Wetlands for Agroecosystems: A Synthesis for Nutrient Removal. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. July 12-16, 2020.
9. Lindgren, J.<sup>2</sup>, **T.L. Messer**, and Jessica Satiroff<sup>2</sup>. Neonicotinoid Pesticide and Nutrient Removal in Floating Treatment Wetland Mesocosms. American Ecological Engineering Society 2020 Virtual Poster Symposium, June 1-5, 2020.

10. Trejo, B.<sup>2</sup>, **T.L. Messer**, S.L. Bartelt-Hunt, and D. Snow. Occurrence and Persistence of Antibiotics Administered to Cattle in a Newly Established Feedlot. Midwest Antimicrobial Resistance Consortium, May 29, 2020.
11. **Messer, T.L.**, D. Snow, and A. Mittelstet. Treating the Water Quality Cocktail Entering Recreational and Agricultural Lakes. Nebraska Water Conference, Norfolk, NE, October 10, 2019.
12. Bartelt-Hunt, S.L., N.N. Beni<sup>3</sup>, B. Trejo<sup>2</sup>, O. Hassan, **T.L. Messer**, J. Gilley, S.L. 2019. Fate of microplastics after land application of biosolids. International Association of Food Protection Conference, Louisville, KY, July 21-24, 2019.
13. **Messer, T.L.**, M. Keilhauer<sup>2</sup>, D. Snow, and A. Mittelstet. 2019. Pesticide exposure in recreation lakes. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
14. Trejo, B.<sup>2</sup>, N.N. Beni<sup>3</sup>, M. Sutton, O. Hassan, **T.L. Messer**, J. Gilley, S.L. Bartelt-Hunt. 2019. The fate of microplastics (MP) in an agricultural system after land application of biosolids. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
15. Satiroff, J.<sup>2</sup>, **T.L. Messer**, A. Mittelstet, D. Snow, and M. Greiner. 2019. Identifying Common Use Pesticide Degradation Byproducts and Pathways. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
16. Russell, M., A. Mittelstet, **T.L. Messer**, and J. Korus. 2019. Quantification of erosional and depositional processes near implemented streambank stabilization practices. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
17. Abimbola, O., A. Mittelstet, **T. L. Messer**, and E. Berry. 2019. Fuzzy-logic based approach for *E. coli* load predication in cascading dams. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
18. Abimbola, O., A. Mittelstet, **T. L. Messer**, and E. Berry. 2019. Modeling the effects of land use and agricultural management on nutrient loss, atrazine, and *E. coli* concentrations in a watershed using SWAT. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, July 7-10, 2019.
19. **Messer, T.L.**, M. Keilhauer<sup>2</sup>, D. Snow, and A. Mittelstet. 2019. Pesticide accumulation in recreation lakes. 2019 American Society of Ecological Engineers Annual Meeting, Asheville, NC, June 5, 2019.

20. Johnson, M.<sup>1</sup> and **T.L. Messer**. 2019. Ecotoxicology Assessment of Carbon Amendment to Floating Treatment Wetlands. 2019 UCARE Poster Showcase, Lincoln, NE, 15 April, 2019.
21. **Messer, T.L.** and M. Keilhauer<sup>2</sup>. 2019. Nutrient Removal Utilizing Floating Treatment Wetlands. 2019 Daughterly Water for Food Showcase, Lincoln, NE, April 4, 2019. Poster presentation.
22. Russell, M., A. Mittelstet, and **T.L. Messer**. 2019. Quantification of erosional and depositional processes near implemented streambank stabilization practices. 2019 Daughterly Water for Food Showcase, Lincoln, NE, April 4, 2019. Poster presentation.
23. Satiroff, J.<sup>2</sup>, **T.L. Messer**, and A.R. Mittelstet. 2018. Removal of Common Use Pesticides by Floating Treatment Wetlands in the Midwest. Nebraska Water Center Symposium. 25 October, 2018. Lincoln, NE. Poster presentation.
24. Hansen, S.P.<sup>2</sup>, **T.L. Messer** and A.R. Mittelstet. 2018. Spatiotemporal Analysis of Atrazine and Nitrate in Surface Waters across Nebraska. Nebraska Water Center Symposium. 25 October, 2018. Lincoln, NE. Poster presentation.
25. Keilhauer, M.<sup>2</sup> and **T.L. Messer**. 2018. Removal of Common Use Pesticides by Floating Treatment Wetlands in the Midwest. Nebraska Department of Environmental Quality. 10 October, 2018. Lincoln, NE. Presentation.
26. **Messer, T.L.**, Challenging Discipline Perceptions in Ecological Engineering Using Interdisciplinary Team Design Projects. 2018 International ASABE Meeting, 31 July 2018. Detroit, MI.
27. **Messer, T.L.**, S. Hansen<sup>2</sup>, and A. Mittelstet. Mitigating the Risk of Atrazine in Surface Waters Across Nebraska. 2018 International ASABE Meeting, 31 July 2018. Detroit, MI.
28. Keilhauer, M.<sup>2</sup> and **T. Messer**. Nutrient Treatment Potential of Floating Treatment Wetlands. 2018 American Society of Ecological Engineering Conference. 14 June, 2018. Houston, TX.
29. Hansen, S.<sup>2</sup> and **T. Messer**. Mitigating the risk of atrazine in surface waters across Nebraska. 2018 American Society of Ecological Engineering Conference. 13 June, 2018. Houston, TX.
30. **Messer, T.L.**, L. Ferguson, and M. Doyle. Photodegradation of Imidacloprid in Southeastern Rivers. 2017 International ASABE Meeting. 18 July 2017. Spokane, WA.

31. Keilhauer, M.<sup>2</sup> and **T.L. Messer**. Nutrient Removal Capacity of Floating Treatment Wetlands. Society of Wetland Scientists Conference. 30 May 2018. Denver, CO.
32. Nguyem, A.<sup>1</sup>, **T.L. Messer**, and \*Keilhauer, M. Evaluation of floating treatment wetlands on high use lake waters. UNL Environmentors Program Poster Competition. 15 May 2018. Lincoln, NE. (Poster Contest: 1st Place).
33. Mittelstet, A.R., **T.L. Messer**, and T.E. Gilmore. "Managing Water Resources at the U.S. Meat and Animal Research Center", *Invited Speaker* at 3<sup>rd</sup> Annual Meeting of IANR ARD and US MARC on Enhanced Research Collaborations, US Meat Animal Research Center, Clay Center, NE, November 29, 2017
34. Keilhauer, M.<sup>2</sup> and **T.L. Messer**. Nutrient Removal Capacity of Floating Treatment Wetlands. Nebraska Water Symposium. 26 October 2017. Lincoln, NE. (Poster Contest: 3<sup>rd</sup> Place).
35. Hansen, S.P.<sup>2</sup>, **T.L. Messer**, and A.R. Mittelstet. Natural Contributions of *E. coli* at a Nebraskan Animal Facility. Nebraska Water Symposium. 26 October 2017. Lincoln, NE.
36. Abimbola, O.P., A.R. Mittelstet and **T.L. Messer**. Impact of Conservation Practices on Pollutant Loads in the Big Sandy Creek Watershed. Nebraska Water Symposium. 26 October 2017. Lincoln, NE.
37. **Messer, T.L.**, M. Doyle, M.R. Burchell, and F. Birgand. Do First Order Nitrate Removal Models Accurately Predict Nitrate Removal in Wetlands and Stream? 2016 American Society of Ecological Engineering Conference. 9 June 2016. Knoxville, TN.
38. **Messer, T.L.**, L. Ferguson, and M. Doyle. Photodegradation of Imidacloprid in Rivers: A Novel Water Quality Monitoring Approach. 2016 American Society of Ecological Engineering Conference. 8 June 2016. Knoxville, TN.
39. **Messer, T.L.** and M.R. Burchell. A <sup>15</sup>N tracer evaluation of the impact of nitrate load and soil type on nitrogen cycling in restored wetlands. 2015 International ASABE Meeting. July 29, 2015. New Orleans, LA.
40. **Messer, T.L.**, M.R. Burchell, and F. Birgand. An evaluation of the reliability of for nitrate reduction models. 2015 International ASABE Meeting. July 28, 2015. New Orleans, LA.
41. **Messer, T.L.**, M.R. Burchell, and F. Birgand. Comparison of four nitrogen removal kinetic models in two distinct wetland ecosystems receiving agricultural drainage water. 2015 Water Resource Research Institute Conference. 18 March 2015. Raleigh, NC.

42. **Messer, T.L.**, and M.R. Burchell. Where is nitrate going in restored wetlands? A  $^{15}\text{N}$  Tracer Evaluation on Nitrogen Cycling in Restored Wetlands. NCSU Graduate Research Symposium. 25 March 2015. Raleigh, NC. (Poster Contest: 3<sup>rd</sup> Place in Ag and Life Sciences Division).
43. **Messer, T.L.** and M.R. Burchell. Where is nitrate going in restored wetlands? A  $^{15}\text{N}$  Tracer Evaluation on Nitrogen Cycling in Restored Wetlands. Purdue Future Faculty Workshop. 2 March 2015. West Lafayette, IN. (Poster).
44. **Messer, T.L.** and M.R. Burchell. Where is nitrate going in restored wetlands: A Mesocosm  $^{15}\text{N}$  Tracer Study. 58<sup>th</sup> Annual Meeting of the Soil Science Society of North Carolina. 21 January 2015. Raleigh, NC.
45. **Messer, T.L.** and M.R. Burchell. Tracing the Fate of Nitrate through Restored Wetlands: A mesocosm  $^{15}\text{N}$  Tracer Study. 2014 International ASABE Meeting. July 15, 2014. Montreal, Canada.
46. **Messer, T.L.**, M.R. Burchell, and F. Birgand. Defining Ideal Loads of Nitrogen for Rerouted Drainage Water into Restored Forested Wetlands – An Experimental and Modeling Approach. 2014 International ASABE Meeting. July 16, 2014. Montreal, Canada.
47. **Messer, T.L.** and M.R. Burchell. Tracking the  $\text{NO}_3^-$  Fate through Restored Wetlands: A  $^{15}\text{N}$  Tracer Study. 2014 AEES Conference. 10 June 2014. Charleston, SC.
48. M.R. Burchell, **Messer, T.L.**, and F. Birgand. Determining Ideal Nitrogen Loads in Restored Forested Wetlands Slated to Receive Agricultural Drainage. 2014 AEES Conference. 10 June 2014. Charleston, SC.
49. **Messer, T.L.** and M.R. Burchell. Tracing the Fate of  $\text{NO}_3^-$  through Restored Wetlands: A Mesocosm  $^{15}\text{N}$  Tracer Study. 2014 Water Resource Research Institute Annual Conference. 20 March 2014. Raleigh, NC.
50. **Messer, T.L.** and M.R. Burchell. Methods for Tracing the Fate of  $\text{NO}_3^-$  through Restored Wetlands: A Mesocosm  $^{15}\text{N}$  Tracer Study. North Carolina State University Graduate Research Symposium. 26 March 2014. Raleigh, NC. (Poster).
51. **Messer, T.L.**, M.R. Burchell, and F. Birgand. Determining Ideal Nitrogen Loads in Rerouted Drainage Water into Restored Forested Wetlands – An Experimental and Modeling Approach. 2014 Water Resource Research Institute Annual Conference. 20 March 2014. Raleigh, NC.
52. **Messer, T.L.**, M.R. Burchell, and F. Birgand. Determining Ideal Nitrogen Loads in Rerouted Drainage Water from the Pamlico Sound to Restored Forested Wetlands – An Experimental and Modeling Approach. 2013 International ASABE Meeting. 22 July 2013. Kansas City, MO.

53. Burchell, M.B., **T. L. Messer**, and F. Birgand. Determining Ideal Nitrogen Loads for Two Distinct Restored Wetland Soils – An Experimental and Modeling Approach. WRRRI 2013 Annual Conference. 20-21 March 2013. Raleigh, NC.
54. **Messer, T.L.**, M.R. Burchell, G.M. Chescheir, and K.L. Bass. Determining Ideal Hydraulic Loads in Rerouted Drainage Water from the Pamlico Sound to Restored Forested Wetlands Utilizing DRAINMOD. 2013 International ASABE Meeting. 22 July 2013. Kansas City, MO. (Poster).
55. Bass, Kris, M.R. Burchell, G. Chescheir, and **T. Messer**. Lux Farms Hydrologic Restoration Project: An Innovative Partnership for Agriculture and Water Quality at the End of the World, North Carolina. Stream Restoration in the Southeast: Innovations for Ecology Conference. 15-18 October 2012. Wilmington, NC.
56. **Messer, T.**, M.R. Burchell, and G.M. Chescheir. Determining Ideal Nitrogen Loads of Rerouted Drainage Water from the Pamlico Sound to Restored Forested Wetlands. 2012 Water Resources Research Institute Conference. 27 March 2012. Raleigh, NC. (Poster).
57. **Messer, T.L.** and M.R. Burchell. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. 2011 International ASABE Meeting. 8 August 2011. Louisville, KY.
58. **Messer, T.L.** and M.R. Burchell. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. 11th Annual Meeting Engineering for Ecological Services. 24 May 2011. Asheville, NC.
59. **Messer, T.L.** and M.R. Burchell. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. North Carolina Graduate Research Symposium. 21 March 2011. Raleigh, NC. (Poster).
60. **Messer, T.L.** Effectiveness of Nitrate Reduction in Riparian Buffers: A Riparian Buffer Hydrologic and Biogeochemical Evaluation. 2010 International ASABE Meeting. 23 June 2010. Pittsburgh, PA.
61. **Messer, T.L.**, J. Wiseman, A. Tilak, M.R. Burchell, D. Osmond, and M. Youssef. Field Assessment and Modeling of Groundwater Nitrate Reduction in Riparian Buffers. Water Resources Research Institute Conference. 30-31 March 2010. Raleigh, NC. (Poster).
62. Burchell, M.R., A. Tilak, J. Wiseman, and **T. Messer**. Effectiveness of Nitrate reduction in Differing Riparian Buffers. Soil and Water Conservation Exhibition. 2-4 January 2010. Raleigh, NC. (Poster).
63. **Messer, T.** Effectiveness of Nitrate Reduction in Differing Riparian Buffer Widths. 2009 International ASABE Meeting. 23 June 2009. Reno, NV. (Poster).

### Seminars (6 Total)

1. **Messer, T.L.**, The Messy Journey to the Development of the *meso* Research Program. Lexington, KY, 2020. University of Kentucky ASABE Student Branch. 7 October 2020. (12 people)
2. **Messer, T.L.**, The Messy Journey to the Development of the *meso* Research Program. Lincoln, NE, 2019 Biological Systems Engineering Colloquium Series. 11 December 2019. (60 people)
3. **Messer, T.L.** Instructional Improvement Plan. Lincoln, NE. Department of Biological Systems Engineering Teaching Workshop, 8 May, 2019. (40 people)
4. **Messer, T.L.** Evaluating Treatment Wetlands Using Mesocosms. Lincoln, NE. Department of Biochemistry. 22 February 2019. (15 people)
5. **Messer, T.L.**, How should water quality be monitored in natural systems? A tale of diverse techniques and scales. Lincoln, NE. 2017 UNL Biological Systems Engineering Graduate Student Seminar. 19 April 2017. (20 people)
6. **Messer, T.L.**, Water Quality Research: The Importance of Diverse Monitoring Techniques and Scales. Lincoln, NE. 2017 UNL Environmental and Water Resources Engineering Graduate Student Seminar. 10 February 2017. (20 people)

### Extension Presentations (17 Total)

1. **Messer, T.L.** E. coli and Emerging Pathogens. Norfolk, NE. Natural Resource Conservation Service Training Event. 20 November, 2019. (50 people)
2. **Messer, T.L.** E. coli and Emerging Pathogens. North Platte, NE. Natural Resource Conservation Service Training Event. 6 November, 2019. (50 people)
3. **Messer, T.L.** Water Quality Lessons for Preschoolers for Extension Educators Webex. Lincoln, NE. UNL Extension Service. 29 October, 2019. (10 people)
4. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. North Hills Homeowners Association. 9 October, 2019. (30 people)
5. **Messer, T.L.** Pesticide accumulation in recreation lakes Webex. Tennessee Department of Environmental Quality, Knoxville, TN, 23 August, 2019. (15 people)
6. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Lincoln Parks and Recreation. 21 August, 2019. (15 people)
7. **Messer, T.L.** Monitoring Floating Treatment Wetlands. Lincoln, NE. Teledyne ISCO. 12 August, 2019. (10 people)

8. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Department of Environment and Energy. 18 April, 2019. (20 people)
9. **Messer, T.L.** E. coli Fate and Transport in Agricultural Systems. Lincoln, NE. Department of Environment and Energy. 22 May, 2019. (40 people)
10. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Wilderness Hills Golf Course. 17 May, 2019. (3 people)
11. **Messer, T.L.** Treatment Wetlands. Lincoln, NE. Nebraska Department of Transportation. 3 March, 2019. (15 people)
12. **Messer, T.L.** What are wetlands? Lincoln, NE. Dimensions Education Eat and Explore. 7 February, 2019. (200 people)
13. **Messer, T.L.** Lincoln Public Schools STEM Share – Presented *meso*Wheels Program for Lincoln Public Schools curriculum, March 15, 2019. (200 people)
14. **Messer, T.L.** Kure Beach Sand Dune Infiltration System Extension Workshop, North Carolina State University, Kure Beach, NC. 2012. (40 people)
15. **Messer, T.L.** Best Management Practices Extension Workshop, North Carolina State University, Raleigh, NC. 2011. (60 people)
16. **Messer, T.L.** Wetland Mesocosm Laboratory Professional Tour, North Carolina State University, Raleigh, NC. 2012-2014. (15 people)
17. **Messer, T.L.** Composting Extension Workshop, University of Kentucky, Lexington, KY. 2004. (30 people)



## Teaching and Advising

### \* University Means Not Available

#### Courses Taught

##### <sup>1</sup>*BSEN/NRES 350: Water Resources Engineering, University of Nebraska-Lincoln*

Semester	Number of Students	Course Quality	Teaching Quality
<sup>1,3</sup> Fall 2020	18	In Progress	In Progress

<sup>1</sup>Developed Course.

<sup>3</sup>Scale: 1 to 5.

##### <sup>1</sup>*BSEN/NRES 468/868: Wetlands, University of Nebraska-Lincoln*

Semester	Number of Students	Course Quality	Teaching Quality
<sup>2</sup> Spring 2018	28	3.27	3.46
<sup>2</sup> Spring 2019	21	3.46	3.60
<sup>3</sup> Spring 2020	23	4.44	4.44

<sup>1</sup>Developed Course.

<sup>2</sup>Scale: 1 to 4.

<sup>3</sup>Scale: 1 to 5.

##### <sup>1</sup>*AGEN 112: Computer Aided Problem Solving (Co-Taught), University of Nebraska-Lincoln*

Semester	Number of Students	Course Quality	Teaching Quality
<sup>2</sup> Spring 2019	78	2.78	3.19
<sup>3</sup> Spring 2020	82	4.29	4.29

<sup>1</sup>Developed Course.

<sup>2</sup>Scale: 1 to 4.

<sup>3</sup>Scale: 1 to 5.

##### <sup>1</sup>*BSEN/AGEN 889: Graduate Seminar, University of Nebraska-Lincoln*

Semester	Number of Students	Course Quality	Teaching Quality
<sup>2</sup> Fall 2017	20	3.33	3.68
<sup>2</sup> Fall 2018	24	3.42	3.71
<sup>3</sup> Fall 2019	20	4.74	4.74
<sup>3</sup> Summer 2020	6	4.95	4.95

<sup>1</sup>Developed Course.

<sup>2</sup>Scale: 1 to 4.

<sup>3</sup>Scale: 1 to 5.

##### <sup>1</sup>*BSEN 896: Special Topics: Analytical Chemistry Methods, University of Nebraska-Lincoln*

Semester	Number of Students	Course Quality	Teaching Quality
Fall 2019	1	Not Evaluated	Not Evaluated

Fall 2020	1	In Progress	In Progress
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<sup>1</sup>Developed Course.

***BSEN 957: Vadose Zone (Co-Taught), University of Nebraska-Lincoln***

Semester	Number of Students	Course Quality	Teaching Quality
<sup>2</sup> Spring 2018	20	3.00	3.17

<sup>2</sup>Scale: 1 to 4.

***BAE 200: Computer Methods in Biological Engineering Laboratory Instructor), North Carolina State University***

Semester	Number of Students	Course Quality	Teaching Quality
Fall 2008	28	Not Evaluated	Not Evaluated
Fall 2009	37	Not Evaluated	Not Evaluated
Fall 2010	39	Not Evaluated	Not Evaluated
Fall 2011	36	Not Evaluated	Not Evaluated
Fall 2012	42	Not Evaluated	Not Evaluated
Fall 2013	55	Not Evaluated	Not Evaluated
Fall 2014	54	Not Evaluated	Not Evaluated

***AEN 103<sup>1</sup>: Basic Principles of Surveying (Laboratory Instructor), University of Kentucky***

Semester	Number of Students	Course Quality	Teaching Quality
Fall 2007	22	Not Evaluated	Not Evaluated

<sup>1</sup>Developed Course.

**Guest Lectures**

1. MSYM 354 (Soil Conservation), Presented on 11/21/19.
2. NRES 101 (Introduction to Natural Resources), Presented on 10/16/19.
3. NRES 101 (Introduction to Natural Resources), Presented on 10/17/19.
4. BSEN 100 (Introduction to Biological Systems Engineering), Presented on 9/24/19.
5. ENVR 189H (Environmental Justice Honors), Presented on 9/24/19.
6. BSEN 355 (Introduction to Ecological Engineering), Presented on 3/12/19.
7. NRES 101 (Introduction to Natural Resources), Presented on 10/11/18.
8. BSEN 100 (Introduction to Biological Systems Engineering), Presented on 9/18/18.
9. MSYM 354 (Soil Conservation), Presented on 9/20/18.
10. BSEN 455 (Nonpoint Source Pollution), Presented on 11/17/17
11. MSYM 354 (Soil Conservation), Presenting on 11/16/17.
12. BSEN 355 (Introduction to Ecological Engineering). Presented on 3/16/17.
13. BSEN 355 (Introduction to Ecological Engineering), Presented on 3/9/17.

## **Graduate Student Major Advising**

Full Member of the Graduate Faculty since 1/1/17

### **Completed**

1. Samuel Hansen, M.S. Biological Systems Engineering. 2019. Predictive Modeling of Fate and Transport of Three Prevalent Contaminants in Midwest Agroecosystem Surface Waters: Nitrate-N, Atrazine, and *Escherichia coli*. June 2017 – May 2019. Advisor. Current Position: Environmental Engineer at Nebraska Department of Environment and Energy (Lincoln, NE).
2. Mary Keilhauer, M.S., Natural Resources, 2019. Nitrate Removal and Placement of Floating Treatment Wetlands in the Midwest. August 2017-June 2019. Advisor. Current Position: Water Resources Engineering MIG (Denver, CO).
3. Brittany Trejo, (M.S.), Environmental Engineering. May 2020. Fate and Transport of Veterinary Antibiotics on Feedlots. August 2018-May 2020. Co-Advisor. Current Position: Water Resources Independent Contractor (New Mexico).
4. Jessica Satiroff, (M.S.), Environmental Engineering. May 2020. Fate and Transport of Neonicotinoids Entering Recreational Lakes. August 2018- May 202. Co-Advisor. Position: Water Resources Independent Contractor (Omaha, NE).

### **In-Progress**

1. Josephus Borsuah, (Ph.D.), Natural Resources. May 2022. Fate and Transport of Neonicotinoid Pesticides. August 2019-Present. Advisor.
2. Nasrin Naderi, (Ph.D.), Civil and Environmental Engineering. May 2022. Fate and Transport of Neonicotinoid Pesticides. August 2019-Present. Co-Advisor.
3. Matthew Russell, (Ph.D.), Biological Systems Engineering. May 2023. Fate and Transport of Neonicotinoid Pesticides. May 2019-Present. Advisor.
4. Julia Lindgren, (M.S.), Environmental Engineering. December 2020. Floating Treatment Wetland Potential to Remove Neonicotinoid Pesticides. August 2019-Present. Advisor.
5. Levi McKercher, (M.S.), Natural Resources, May 2021. Floating Treatment Wetland Potential to Remove Neonicotinoid Pesticides. August 2019- Present. Co-Advisor.
6. Dayana Rodriguez Jimenez, (M.S.), Environmental Engineering. May 2022. Development of Wetland Delineation Method Utilizing Drone Imaging. August 2019-Present. Advisor.
7. Dakota Altman, (M.S.), Applied Science, May 2022, Photo journaling of Wetlands throughout Nebraska – A Time Lapse Project. May 2020 – Present. Advisor.
8. Justin Caniglia, (M.S.), Natural Resources, May 2022. Fate and Transport of PFAS from Biosolid Applications to Agricultural Soils. May 2020- Present. Advisor.

## **Graduate Student Advisory Committee Member**

### **Completed**

1. Linda Schott, Ph.D. Biological Systems Engineering. 2018. Soil Health Effects and Stakeholder Perceptions of Manure and Woody Biomass Application to Cropland in

- Nebraska. January 2017 – May 2018. Current Position: Assistant Professor at the University of Idaho (Twin Falls, ID). Advisor: Amy Schmidt.
2. Femi Abimbola Ph.D. Modeling Streambed Vertical Hydraulic Conductivity, Water Quality Pollutants, and Best Management Practices Using Machine Learning and the Soil and Water Assessment Tool. Biological Systems Engineering. 2019. January 2017- December 2019. Postdoctoral Associate University of Nebraska-Lincoln. Advisor: Aaron Mittelstet.
  3. Mara Zelt, M.S. Biological Systems Engineering. 2019. Persistence and Mitigation of Antibiotic Resistance in Manure and Manure-Amended Soils. January 2017- December 2019. Research Technician at the University of Nebraska – Lincoln. Advisor: Amy Schmidt.

### **In-Progress**

1. Ligang Zhang, (Ph.D.), Natural Resources. 2021. Advisor: Zhenghong Tang
2. Mikaela Cherry, (Ph.D.), Natural Resources. 2021. Advisor: Troy Gilmore
3. Brandi Brown, (Ph.D.), Biological Systems Engineering. 2021. Advisor: Mark Wilkins
4. Galen Richards, (M.S.), Natural Resources. 2021. Advisor: Troy Gilmore
5. Matthew Greiner (M.S.), Entomology, 2021. Advisor: Ana Maria Velez
6. Matthew Russell, (M.S.), Natural Resources. 2020. Advisor: Aaron Mittelstet
7. Yaser Kishawi, (Ph.D.), Natural Resources. 2022. Advisor: Aaron Mittelstet

### **International Interns**

**Weijia Ni**, (Ph.D.) Sichuan University, Chengdu, China, Water Quality Modeling of the Dam Removal in the Western Mountains of China, September 2018 – August 2020, Co-Advisor.

### **Undergraduate Student Advising**

#### **Undergraduate Research Assistants**

1. Benjamin Wordens, 2019-Present, FRYE Scholar, Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
2. Samantha Perez, 2019, REU Scholar, Advisor
3. Helen Little, 2018-Present, UCARE Scholar, Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
4. Ken Oathoat, 2018 – Present, Research Assistant, Biological Systems Engineering Undergraduate, Expected Graduation 2020, Advisor
5. Garrett Isom, Summer 2019, Research Assistant, Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
6. Trevor Kaslon, Summer 2019, Research Assistant, Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
7. Alexa Davis, 2017-2018, UCARE Scholar, UNL School of Natural Resources Master's Student, Expected Graduation 2020, Advisor
8. Autumn Dunn, 2017-2018, UCARE Scholar, Master's Student in Nicholas School of Environment Duke University, Expected Graduation 2021, Advisor
9. Maddie Johnson, 2018-2019, UCARE Scholar, Kiewit, Kansas City

10. Bailey Monroe, 2017-2018, UCARE Scholar, NRCS, Iowa, Advisor
11. Brody Zabel, Summer 2018, Biological Systems Engineering Undergraduate, Expected Graduation 2020, Advisor
12. Rob Schroeder, Undergraduate Cabela's Apprenticeship, UNL School of Natural Resources Master's Student, Expected graduation 2020, Advisor

### **Senior Design**

1. BSEN 470/480: Senior Design. Pine Lake Reservoir Restoration. Fall 2019 and Spring 2020. 5 Students. Advisor.
2. BSEN 470/480: Senior Design. Floating Mechanism for Water Quality Sensor: *mesoFlow*. Fall 2018 and Spring 2019. 4 Students. Advisor and Sponsor.
3. BSEN 470/480: Senior Design. Best Management Design for Omaha Transportation Site. Fall 2018 and Spring 2019. 4 Students. Advisor.
4. BSEN 470/480: Senior Design. Rainwater Management Design for Omaha Extension Building. Fall 2017 and Spring 2018. 4 Students. Advisor.
5. Matthew Greiner, 2018-2019, School of Natural Resources Senior Thesis
6. Alexa Davis, 2017-2018, School of Natural Resources Senior Thesis
7. Autumn Dunn, 2017-2018, School of Natural Resources Senior Thesis

### **Average number of undergraduate students advised per year**

**2020** - 10

**2019** - 10

**2018** - 14

**2017** - 8

## **Honors and Awards**

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### **National and International Research Awards and Recognition**

1. USDA AFRI NIFA ELI Post Doc Fellowship, Duke University (2016)
2. EPA STAR Fellowship, North Carolina State University (2013)
3. Nominated for 2019 and 2020 ASABE Gale A. Holloway Professional Development Award

### **Regional and Local Research Awards and Recognition**

1. Water for Food Fellow, University of Nebraska (2017-Present)

### **Regional, Local and University Teaching Awards and Recognition**

1. University of Nebraska-Lincoln College of Engineering Research Recognition (2019)
2. Nominated for University of Nebraska-Lincoln IANR Outstanding Research Award (2019)
3. Peer Review of Teaching Project Fellow, University of Nebraska-Lincoln, Lincoln, NE, (2018-2019)
4. University of Nebraska-Lincoln Parents Recognition Award (2019)
5. Nominated for CASNR Outstanding Teaching Award (2019)
6. Certificate of Accomplishment Teaching Program, North Carolina State University, Raleigh, NC (2014)

7. North Carolina State University College of Agriculture and Life Sciences Professional Development Award (2011)
8. University of Kentucky Biosystems & Agricultural Engineering Outstanding Senior Award (2008)
9. University of Kentucky Student Excellence Award (2006)

## **Professional Organization Membership**

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1. American Ecological Engineering Society, 2012-present
2. American Society of Agricultural and Biological Engineers (ASABE), 2004-present
3. American Society of Agricultural and Biological Engineers (ASABE) Committees, NRES-25 (2008-current), NRES-28 (2008-current), NRES-02 (2018-2020), P-120 (2017-current)
4. Alpha Epsilon Honors Society, 2007

## **Professional Development**

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### **Research Professional Development**

1. USDA SARE Funding Workshop, 1 August, 2019
2. University of Nebraska-Lincoln College of Engineering Promotion and Tenure Training, 24 July, 2019
3. Department of Energy, Demystifying the U.S. Department of Energy Workshop, December 2018
4. University of Nebraska-Lincoln Write Winning Grant Proposals, March 2017
5. University of Nebraska-Lincoln NSF CAREER Workshop, March 2017
6. University of Nebraska-Lincoln Treatment Wetland Training Workshop, August 2017
7. Purdue Future Faculty Workshop. 1-3 March 2015. West Lafayette, IN.
8. Virginia Tech Future Faculty Program. 11-14 2015. Blacksburg, VA.
9. Navigating the Dangerous Waters of Plagiarism Workshop. North Carolina State University, 2012
10. How to Handle a Phone Interview Workshop. North Carolina State University, 2012
11. How Business Ideas are Born Workshop. North Carolina State University, 2012
12. Writing Federal Research Proposal Workshop. North Carolina State University, 2012
13. North Carolina State University Graduate Student Professional Development Workshop: 1 of 34 students selected in the College of Agriculture and Life Sciences to participate in a weekend workshop to learn advanced professional development, interviewing, and personal management.
14. North Carolina Graduate Student Research Symposium: Selected from Biological and Agricultural Engineering Department to present “Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer.”
15. University of Kentucky Engineering Leadership Class: 1 of 16 students selected from the College of Engineering to participate and gain insight in styles of leadership by meeting with accomplished leaders whose responsibilities impact engineering in Kentucky, the United States, and the world.

16. University of Kentucky Leadership Summit: 1 of 100 leaders from the university chosen by President Todd to encourage positive change for the University of Kentucky community.
17. Federal University of Viçosa in Viçosa, Brazil Study Abroad Program: Sponsored by the University of Kentucky to learn Portuguese and assist in a research study of an innovative irrigation system for rice, while networking with professors and students for future research projects between universities.

### **Teaching Professional Development**

1. University of Nebraska-Lincoln Safe Spaces Training, October 2019
2. University of Nebraska-Lincoln IANR Fall Faculty Training, 28 August, 2019
3. University of Nebraska-Lincoln School of Natural Resources Fall Faculty Training, 23 August, 2019
4. University of Nebraska-Lincoln Peer Review of Teaching Project Training, 7 May, 2019
5. University of Nebraska-Lincoln Creating Rubrics, BSE CIPA Brown Bag, 17 April, 2019
6. University of Nebraska-Lincoln Peer Review of Teaching Project Training, 13 April, 2019
7. University of Nebraska-Lincoln IANR Water Conference, 14 March, 2019
8. University of Nebraska-Lincoln Instruction Design Techniques in the Flipped, Blended, and Traditional Classroom Workshop, August 2018
9. University of Nebraska-Lincoln Undergraduate Curriculum Workshop, May 2017, May 2018, May 2019
10. University of Nebraska-Lincoln CASNR Winter Interim Teaching and Learning Workshop, 2018, 2019, 2020
11. University of Nebraska-Lincoln Training for Suicide Prevention: Question, Persuade, Refer, January 2018
12. Writing Learning Outcomes: North Carolina State University, September 18-21, 2013.
13. Learning Styles. North Carolina State University. January 14-18, 2013.
14. Managing Disruptive Classroom Behavior. North Carolina State University. October 22-26, 2012.
15. Establishing Credibility in the Classroom. North Carolina State University. July 23-27, 2012.
16. Motivational Teaching Strategies. North Carolina State University. July 6, 2012.
17. Effective Questioning Techniques. North Carolina State University. June 25, 2012.

## Service

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### Manuscript Editorship

1. Guest Associate Editor, Transactions of American Society of Agricultural and Biological Engineering, September 2018 - Current

### Manuscript Review

1. Journal of Ecological Engineering (2 reviews - 2016, 4 reviews -2017, 3 review – 2018; 1 review - 2020)
2. Biogeochemistry (2 reviews - 2017)
3. Environmental Science & Technology (1 review - 2018)
4. Transactions of American Society of Agricultural and Biological Engineering (1 review – 2018; 10 review -2019; 1 review -2020)
5. Journal of Environmental Quality (1 review – 2018, 1 review – 2019)
6. Geoderma (1 review – 2018)
7. Desalination and Water Treatment (1 review -2018)
8. Science of the Total Environment (1 review -2020)

### Proposal Review

1. Water Advance Research and Innovation (WARI) Fellowship Panel (October 2019)
2. 104(g) Review Panel (April 2019)
3. USDA SBIR NIFA Review Panel (January, 2018; February, 2019)
4. The National Academies of Sciences, Engineering, and Medicine Cycle 19 of the U.S. Egypt Science and Technology Joint Fund (March, 2018)
5. North Carolina Sea Grant Review Panel (April, 2017)

### Departmental

#### Leadership positions on Department Committees

1. Student Success Committee, 2019- present, Co-Chair
2. North Carolina State University Biological and Agricultural Engineering GSA President (2009-2010)
3. University of Kentucky Biosystems and Agricultural Engineering Student President (2007-2008)

#### Membership positions on Department Committees

1. External Relations Committee, 2019 – present, Member
2. Soil/Water Committee, 207 – present, Member
3. Environmental Science Committee, 2017- present, Member
4. Facilities Committee, 2018-2019, Member
5. CIPA Committee, 2018-2019, Member
6. Colloquium Committee, 2018-2019, Member
7. Undergraduate Curriculum Committee, 2018, Member
8. North Carolina State University Biological and Agricultural Engineering Recruitment Weekend, 2009-2014, Assistant
9. North Carolina State University Biological and Agricultural Engineering High School Summer Camp, 2009-2014, Assistant



## College

1. Healthy Agricultural Systems, Member, 2019 - present
2. IANR Science Literacy Initiative Advisory Board, 2018 - present
3. College of Engineering Undergraduate Scholars Program, 2018 – present
4. Nebraska Water Center Advisory Board, 2018 – present
5. North Carolina State Graduate Student Association Assistant Representative, 2010-2012
6. North Carolina State University Engineering Leadership Weekend. 2009-2012
7. University of Kentucky Engineering Ambassador, 2005-2008
8. University of Kentucky Ag Student Council Senior Representative, 2007-2008
9. University of Kentucky Ag Student Council Treasurer, 2006-2007

## University

1. UNL CASNR Dean Search Committee, Member, Fall 2018

## Regional and National Service Roles

### Regional

1. Private Onsite Wastewater Treatment System Advisory Committee
2. 2019-2020 Nebraska ASABE Section President
3. 2018-2019 Nebraska ASABE Section Meeting Coordinator
4. 2017-2018 Nebraska ASABE Section Secretary/Treasurer
5. 2016-2017 Nebraska ASABE Section Newsletter Coordinator

### National

1. NRES-25, American Society of Agricultural and Biological Engineers (ASABE), Streams, Wetlands, and Reservoirs Group, Vice Chair, 2020-present
2. ASABE E 05/03, American Society of Agricultural and Biological Engineers (ASABE), Digital Strategy Committee, Vice Chair, 2020-present
3. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Outgoing Chair, 2019-2020
4. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Chair, 2018-2019
5. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Vice-Chair, 2017-2018
6. P-120, ASABE, Student Scholarships Judge, 2019- present
7. NRES-25, ASABE, Streams, Reservoirs, and Wetland Group, Standards Chair, 2015-2018
8. NRES, ASABE, Student Poster Competition Judge, 2017-present
9. ASABE Speed Networking Volunteer, 2016- present
10. American Society of Ecological Engineers, Student Poster Competition Judge, 2017-present

## Technical Session Moderator

1. Section Moderator, Waterborne Pathogens and Emerging Contaminants, 2019 American Society of Agricultural and Biological Engineering International Meeting, virtual, 2020.
2. Section Moderator, Waterborne Pathogens and Emerging Contaminants, 2019 American Society of Agricultural and Biological Engineering International Meeting, Boston, MA, July 7-10, 2019.
3. Section Moderator, Treatment Wetlands, 2019 American Ecological Engineering Society Meeting, Ashville, NC, June 4, 2019.
4. Section Moderator, Nutrient, Removal, and Recycle Part 2, Detroit, MI, July 30, 2018.
5. Section Moderator, Stormwater Management I, American Society of Ecological Engineering, Houston, TX, June 12, 2018.
6. Section Moderator, Nitrogen Removal in Wetlands, WETPOL Conference, Big Sky, MT, August 23, 2017.

## Other Service

### University Service Events

1. 7/1/2020 H<sub>2</sub>O Today Virtual Field Trip at Morrill Hall (150 people)
2. 1/25/2020 Introduce a Girl to Engineering Day at UNL Innovation Campus (300 people)
3. 10/27/2019 Sunday with a Scientist at Morrill Hall (150 people)
4. 10/14/2019 Dr. Carol Swarts Tour of *meso*LAB (5 people)
5. 9/6/2019 Lincoln Parks and Recreation Tour of *meso*LAB (5 people)
6. 8/16/2019 Daughterly Water for Food Interview and Tour of *meso*LAB (5 people)
7. 7/17/2019 United States Geological Service Tour of *meso*LAB (10 people)
8. 6/11/2019 Big Red Summer Camp Presenter
9. 4/22/2019 Newman Grove High School Tour of *meso*LAB (30 people)
10. 10/24/2018 Distinguished Scholars Days Mock Lecture
11. 6/26/18 UNL Environmentor Tour of *meso*LAB (30 people)
12. 2018 Women in Science Dinner Host (150 people)
13. 7/3/18 UNL Environmentor Tour of East Campus Beaver Dam (30 people)
14. 6/18/18 Big Red Summer Camp Presenter (30 people)
15. 2017 Water for Food Graduate Student Poster Competition Judge (30 people)
16. 2017-2018 Environmenter (Mentored local high school student on wetland laboratory experience) (1 person)
17. 2012-2014 Wetland Mesocosm Laboratory Undergraduate Tour, North Carolina State University, Raleigh, NC, 4 occasions (30 people)
18. 6/2012 Kure Beach Sand Dune Infiltration System Tour, North Carolina State University, Raleigh, NC (25 people)
19. 22 April 2015. Hyde County Wetland Restoration Project Stakeholders Meeting. (20 people)
20. June 2013. Hyde County Wetland Restoration Project Stakeholders Meeting (15 people)
21. 25 October 2012. Groundwater Nitrate Reductions within Upstream and Downstream Sections of a Riparian Buffer. North Carolina State University Biological and Agricultural Mini-Seminar for Dr. Vladimir Novotny. Raleigh, NC. (10 people)

22. October 2012. Hyde County Wetland Restoration Project Stakeholders Meeting (25 people).
23. June 2011. Hyde County Wetland Restoration Project North Carolina Department of Natural Resources Meeting (25 people).

### **College Service Events**

1. E2 Day Session Presenter (20 high school students), 2018, 2019, 2020
2. Strategic Discussion for Nebraska Presenter, 2018
3. ENGR 10 Video Presenter, 2018
4. Eureka! Girls Inc. Demo, 2018
5. UNL Spring Research Fair Graduate Poster Competition Judge, 2017

### **Unit Service Events**

1. 12/3/2019 Engineering Day Robotic Car Judge
2. 12/1/2019 Fall Environmental Studies Showcase Judge
3. Student recruitment meetings
  - a. 3/7/2019 - Malayna Wingert
  - b. 4/22/2019 - Drake Spohr
  - c. 8/5/2019 - Caleb Lohrberg
4. Engineering Day Robotic Car Judge, 2018, 2019
5. 2017 Lego League Recruitment Activity: Storm the Drain Presentation/Activity
6. Faculty Flip, 22 February, 2017
7. Engineering Day Edible Car Judge, 2017

### **Unit Community Development**

1. 5/15/2019 Led establishment of Mother's Room in Biological Systems Engineering Department
2. 8/15/2017 –Establisher and organizer of the Chalk Talk Group, which is comprised of five research teams that meet bi-weekly throughout the year to discuss academic and industry career planning techniques.

### **Community and Non-professional Service**

1. Dimensions Education Nature Explore, Pre-K Board, 2019-current
2. Fred Olds Elementary Science Fair: Judged fourth and fifth science fair projects (2013-2105).
3. Forest View Elementary Durham, NC: Designed and installed rain garden learning center at low-income school (2011).
4. Lunch Box Program: Contributed and delivered food boxes to low income families (2011-2013).
5. English as a Second Language: Offered childcare services for students (2012).
6. Make a Wish Foundation: Ran ½ marathon to support foundation (2011).
7. Stream Cleanup: Assisted in a cleanup at Jordan Lake in Raleigh, NC (2010).
8. Walk for the Cure: Raised money and walked for cancer research (2004 – 2009)

## **Technical Skills**

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- Analytical chemistry equipment: Seal AQ300, Hach Lachat, DOC analyzer, UV-vis spectrometer, CPS+ Photosimulator
- Wetland, stream, and stormwater BMP design, water quality monitoring, and hydrology modeling.
- Stable isotope protocol development, experimental design, and implementation.
- Rod Surface Elevation Table (rSET) station setup and monitoring
- Programming in Microsoft Office, DRAINMOD, Matlab, R Studio, and SAS.
- Experience with AutoCAD, ArcGIS, SWAT, Surfer, and JMP programming and design.
- Portuguese Language: Completed Portuguese Level 1 and 2 in Viçosa, Brazil.
- Extensive surveying experience.