Tiffany L. Messer, PhD, EIT

Assistant Professor, Bioenvironmental

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Current Position

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

Education

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

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 teaching activities related to identifying, tracing, and treating water in agroecosystems for biosystems and agricultural engineering. Examples include: receiving over $1.1M in funded grants, advising 2 undergraduate summer research projects, supervising(ed) 7 graduate student projects, developing and teaching interdisciplinary water resources course, chairing the department recruiting committee.

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}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, **e**valuated 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. & 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.

Summary

Prior to beginning my position at the University of Kentucky (UK), I served in a tenure assistant professor position in the Biosystems Engineering Department at the University of Nebraska-Lincoln (UNL). In an effort to separate accomplishments prior to my transfer and continuation into a tenure track position in the Biosystems and Agricultural Engineering Department major accomplishment have been separated to represent work: a) completed at UK (October 2020-current), b) Initiated at UNL and completed at UK (2020-2021), c) Completed at UNL (January 2017 – October 2020), d) completed prior to UNL (prior to January 2017).

Grants[α]

Role	UK Since Oct 2020	UNL Jan 2017 – Sept 2020	Prior to UNL Prior to 2017	Total
PI Nationally Competitive	$1,008,868 (2)	$532,158 (2)	$291,000 (2)	$1,832,026 (6)
Co-PI Nationally Competitive	-	$1,752,203 (4)	$49,728 (2)	$1,801,931 (6)
PI Other	$179,354 (5)	$142,725 (6)	-	$302,142 (9)
Co-PI Other	$9,922(1)	$413,044 (2)	-	$422,966 (3)
PI In-Review [β]	-	-	-	-
Co-PI In-Review[β]	$25,000 (1)	-	-	-
Total	**$1,198,145 (7)**	**$2,840,130 (14)**	**$340,728 (4)**	**$4,379,003 (25)**

[α]Number of grants in parenthesis.
[β]Not included in total.

Refereed Publications[α]

Role	UK Since Oct 2020	UNL Jan 2017 – Sept 2020	Prior to UNL Prior to 2017	Total
Published	8 (3)	11 (8)	2 (1)	21 (12)
In Press	2 (2)	-	-	2 (2)
In Review[β]	2 (1)	-	-	3 (2)
In Prep for 2021 Submission[β]	3(3)	-	-	3 (3)
Total	9 (4)	11 (8)	2 (1)	23 (14)

[α]Publications in parenthesis are as first author or when graduate student under direct supervision is first author.
[β]Not included in total.

Presentations[α]

Role	UK Since Oct 2020	UNL Jan 2017 – Sept 2020	Prior to UNL Prior to 2017	Total
Invited Speaker	2	4	-	6
Conference (Self)	3	8	24	35
Conference (Student from Research Team)	24	20	-	32
Conference (Collaborator)	1	7	4	12
Invited Seminars	3	5	-	8
Media Interviews/ Press Releases	7	2	-	9
Invited Extension Trainings	1	13	3	17
Total	30	59	31	109

Teaching

Activity	UK Since Oct 2020	Initiated at UNL Completed at UK	UNL Jan 2017 – Sept 2020	Prior to UNL Prior to 2017	Total
Courses Developed	1	1	4	1	7
Courses Taught	1	1	12	8	22
Guest Lectures	4	-	14	-	18
Graduate Students Currently Advising	5	2[β]	-	-	7
Graduate Students Completed	-	2	4	-	6
Undergraduate Students Advised	-	-	44	-	44

[β]Two of the graduate students I was advising prior to my move stayed at UNL and I continue to be their major graduate advisor. I retained full graduate advising status at UNL until the completion of their degrees. The MS student will complete his degree July 2021 and the PhD student is anticipated to complete his degree in Summer 2022.

Grants and Contracts

(Total: $4,279,003; $2,174,395 to Messer program)

Externally Funded Research Grants

(Total: $3,633,957; $1,900,483 to Messer program)

Current

1. **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, **$529,105** ($529,105 to Messer Program). Submitted 7/29/2020. Recommended for funding and awaiting award.

   The goal of this CAREER project is to improve our understanding of the cumulative effect of increased use and occurrence of commonly used antibiotics and pesticides on nitrogen transformation processes in wetlands while engaging communities by establishing an innovative citizen science and education platform to improve water quality across generations and communities using treatment wetlands. The proposed program will complete the following **objectives**: identify water quality parameters impacting nutrient removal efficacy of land-based and **innovative** floating treatment wetland systems; use 15N enrichments to determine nitrate removal pathways; create a toolkit for identifying ideal placement and sizing of wetlands using three-dimensional multiparameter in-situ sensor technologies; train future practitioners through mentorship; establish pre-K and high school curriculums to deliver hands-on ecological systems education; and design and engage citizen science opportunities and water quality training virtually and at field locations.

2. **T. Messer**, M. Montano, and D. Miller. 2021. 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.

3. 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.

4. **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 Clothiandin. 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. Sypnotic, 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.

5. 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. 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.

2. **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 ($33,648 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.

3. 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.

4. **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.

5. **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.

6. 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.

7. 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: $745,045; 273,911 to Messer program)

Current

1. **T. Messer** and W. Ford. 2021-2022 CAFÉ Research Activity Award. **$2,937.60**, 11/10/2021 – 6/30/2022. ($2,937.60 to Messer Program).

   Per- and polyfluroalkyl substances (PFAS), which are known to be carcinogenic, and pesticides, specifically a class that has been reported to impact honeybees, will be monitored upstream, downstream, and instream of two wastewater treatment plants during Spring 2022. This sampling campaign will provide a graduate student publishable data for a MS thesis, provide important seed data for recent calls from USGS, USDA, EPA, NSF, and NIH federal funding for better understanding fate, transport, treatment, and human exposure of PFAS and pesticides in water resources, and provide definitive evidence through replication of water quality monitoring at two wastewater treatment plants in central Kentucky.

2. McAlister, M., S. Evans, and **T.L. Messer**. Building Local Capacity for Detection of Sewage-Related Threats in Eastern Kentucky, UK Center for Appalachian Research in Environmental Sciences (UK-CARES) Community Grants. **$9,922**. 8/1/2021 -3/31/2022. ($2,000 to Messer Program)

   Sewage contamination is a prevalent threat to human health and instream water quality in Eastern Kentucky waterways. The Watershed Watch organization works to help identify waterways impacted by sewage using formal lab assessment of water samples taken by volunteer samplers. These lab analyses of E. coli produce informative results that help identify potential contamination sources, but sample transport to the lab can be too time-consuming and the cost of analysis limits the number of samples that are possible within the organization's limited budget. The purpose of this project is to establish rural laboratories to alleviate immediate logistical challenges and to explore a new lower-cost approach for E. coli analysis of water samples (Coliglow). These efforts will work toward expanding the tools needed to help identify and address sewage contamination in Kentucky's Appalachian waterbodies.

3. **T. Messer** and W. Ford. Emerging Contaminant Exposure Following WWTP Processes to Surface Waters and Agroecosystems, USGS 104(b). **$10,000.** Recommended for Funding 11/25/2020. ($7,500 to Messer Program).

   Per- and polyfluoroalkyl substances (PFAS) and neonicotinoid insecticides are persistent environmental contaminants that have been recently detected in many environmental compartments including soil, surface water, groundwater, and finished drinking water in Kentucky. Exposure to these emerging contaminants has been associated with human health impacts due to their carcinogenic nature and stressors to ecological food webs and agroecosystems. A potential transport route for these emerging contaminants to surface water is effluent leaving wastewater treatment plants and land applied biosolids. Although numerous benefits are gained from biosolid applications, contaminants occurring in biosolids, such as PFAS, can be introduced to soil and water adjacent to fields with land-applied biosolids after precipitation events. Further, recent findings suggest degraded pesticides have the potential to return to their often more toxic parent form following treatment processes in WWTPs. To date, there is limited information regarding PFAS and neonicotinoid pesticides in aquatic environments and agricultural systems following WWTP processes. Therefore, the ***primary goal of the proposed research is to investigate the occurrence and implications of WWTP end products (biosolids and effluent) for two emerging contaminant classes on Kentucky water resources and agroecosystems***. To accomplish this the proposed project will: 1. Conduct a surface water monitoring campaign to identify concentrations and loadings of PFAS and neonicotinoid insecticides entering and leaving two distinctly different WWTPs operations, 2. Investigate occurrence of PFAS and neonicotinoid insecticides in upstream and downstream stream sediments and finished biosolids, and 3. Train a graduate and undergraduate student in sampling

methodology for these emerging contaminants. Outcomes from the project will include: 1. Improve our overall understanding of the prevalence and downstream contribution of PFAS and neonicotinoid insecticides to surface waters and agroecosystems surrounding WWTPs; 2. Quantify the contributions of PFAS and neonicotinoid insecticides into agroecosystems receiving biosolids, 3. Establish seed data to lead to nationally competitive proposals to assess contributions of PFAS and neonicotinoid insecticides from WWTPs in varying watersheds and identifying potential best management practices (BMPs) upstream and downstream to WWTPs and biosolid applications, 4. Form the foundation for a Master's thesis, 5. Submit a peer reviewed publication based on findings, and 6. Create of a webinar for interested practitioners.

4. **T. Messer** and W. Sanderson. 2021. Early Career Award: Evaluating the Risk of Complex Mixtures of Emerging Contaminants, Heavy Metals, and Nutrient Exposure: Identifying Hot Spots and Hot Times in Surface Water Across Kentucky. UK CARES, **$37,620**, 4/1/2021-3/30/22, Messer: PI ($37,620 to Messer Program)

   Polycyclic aromatic hydrocarbons (PAHs), metals, and nutrients are persistent environmental contaminants that have been recently detected in many environmental compartments including soil, surface water, and groundwater in Appalachian communities. Exposure to PAHs and metals has been associated with human health impacts including elevated cholesterol, altered immune system function, thyroid hormone disruption, reduced fertility, and pregnancy-induced hypertension, as well as various forms of cancer. In contrast low concentrations of nutrients, specifically nitrogen species, mixed with emerging contaminants are leading to concern over the toxicity to human health implications (i.e., pre-term delivery) and autoimmune triggers. To date, there is limited information regarding the potential exposure and introduction of these emerging contaminants entering rural water treatment plants, resulting in a notable and concerning knowledge gap in these regions. We hypothesize higher concentrations of water contaminants (specifically, PAHs and heavy metals) will be present in tap water with source water reservoirs closest to areas with upstream mining practices. To test this hypothesis the following research objectives will be completed: 1. Complete citizen science tap water campaign and in-stream monitoring of source water in three Kentucky River counties for PAHs, metals, and nutrient species; 2. Identify watersheds across Kentucky, specifically within the Big Sandy, Cumberland Valley, and Kentucky River regions, potentially at risk for exposure to emerging contaminants, heavy metals, and nitrogen species maximum contaminant limits (MCLs) in drinking water sources and assess dual exposure using digitally available data for water quality, health, and mining databases in Kentucky. The proposed work will provide important information towards hot-spots and times of water contaminants in Kentucky utilizing citizen science and GIS statistical modeling to connect water quality, mining, and available health data to provide insight to exposure around the Commonwealth, specifically in the Appalachian region.

5. **T. Messer**, S. Comfort, and A. Mittelstet. Surface Water Nutrient Removal in Eutrophic Ponds Using Floating Treatment Wetlands in Nebraska, 2021 Nebraska Environmental Trust, Sponsor amount: **$111,797,** ($0 to Messer Program as would not transfer to UK and was transferred to co-PI Comfort). 5/1/2021-4/30/2022.

   After moving to the University of Kentucky, this award was transferred to Steven Comfort as the primary PI as this is a state specific award and I serve as an external advisor. The project will be implementing 3 full-scale wetlands in Lincoln, NE based on work completed by the Messer research team regarding nutrient remediation treatment practices in eutrophic reservoirs.

6. **T. Messer**. 2019-2022. 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, **$45,800**, 7/1/2019-6/30/2022, Messer: PI ($45,800 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 *meso*Wheels program along with practitioner training and citizen science activities.

Completed

1. **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.

2. **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 *meso*Lab focused on pesticide removal in wetlands for use in Lincoln Public Schools, UNL sponsored high school camps, and an undergraduate wetlands course taught be PI Messer.

3. **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.

4. 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.

5. 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.

6. **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.

7. **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.

Hatch Project

Current

1. 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.

2. 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. 6/1/2017-9/30/2021. Messer:

Co-PI.

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

Current

None

Completed

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.

2. **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.

3. **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

None.

Internal Research Grants In-Review

1. W. Ford and **T. Messer**. Coupled Impacts of Agricultural Runoff and Ethanol Pollution on Dissolved Oxygen in Streams. Southeast Center for Agricultural Health and Injury Prevention Pilot Proposal. **$25,000**. (25% to Messer Program). Submitted 11/4/2021.

Non-Awarded Grant Proposals (Not Included in Total)

1. **T. Messer**, W. Ford, and S. Bartelt-Hunt. Implications of Microplastic Contributions from Fertilizer Application Practices to the Nitrogen Cycle in Agroecosystems. USDA-NIFA Soil Health. **$749,343**. (50% to Messer Program). Submitted 6/10/2021. **Planned resubmission to NSF in Winter 2022 grant cycle based on reviews and recommendations from USDA.**

2. O. Wendroth, M. Sama, H. Poggenbarger, C. Knott, T. Messer, and S. Silvestri. Sustainable Use of Terrestrial Ecosystems for Securing Water Quality and Food Supply. University of Kentucky 2021 Sustainability Challenge Grant. $49,885.95 (10% to Messer Program). Submitted 5/27/2021.

3. O. Wendroth, M. Sama, H. Poggenbarger, C. Knott, **T. Messer**, and S. Silvestri. Towards Sustainable Water and Nitrogen Management in High Crop Production. **$649,683** (10% to Messer Program). Submitted 6/17/2021.

4. **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.** (50% to Messer Program). Submitted 4/8/2020. **— Resubmitted in 2021 grant cycle**

5. 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). Submitted 9/30/2019.

1. 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.

2. **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.

3. **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**). — Resubmitted and Funded in 2021.**

4. **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). **— Resubmitted and Funded in 2021.**

5. J. Keshwani, S. Frerichs, E. Ingram, **T. Messer**, and S. Pitla. Garden Tools: Technology Opportunities in Outdoor Learning Spaces, USDA-AFRI. Submitted 8/2019, **$299,802** (20% Messer).

6. 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).

7. 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).

8. 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).

9. 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).

10. **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. **— Resubmitted and Funded in 2019.**

11. 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)

12. 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).

13. 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).

14. 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).

15. **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).

16. 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

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

Refereed (21 Total)

Published

1. Russell, M., Mittelstet, A.R., **Messer, T.L.**, and Korus, J. 2021. Evolution of three streambanks before and after stabilization and record flooding. *Ecological Engineering.* 170: 106357. https://doi.org/10.1016/j.ecoleng.2021.106357. (Impact Factor: 4.025 / Cite Score: 7.8)

2. **Messer, T.L.,** Moore, T.L., Nelson, N., Ahiablame, L., Bean, E., Boles, C., Hall, S., McMaine, J., and Schlea, D. 2021. Invited: Constructed Treatment Wetlands for Agroecosystems: A Synthesis for Nutrient Removal. *Transactions of American Society of Agricultural and Biological Engineering.* 64(2): 625-639. https://doi: 10.13031/trans.13976. (Impact Factor: 1.188)

3. Abimbola, O.P., Mittelstet, A.R., Messer, T.L., Berry, E.D., and Griensve, A. 2021. Modeling and prioritizing interventions using pollution hotspots for reducing nutrients, atrazine, and *E. coli* concentrations in a watershed. *Sustainability*. 13(1): 103. doi. https://doi.org/10.3390/su13010103. (Impact Factor: 3.251)

4. Satiroff, J.[2], **Messer, T.L.**, Mittelstet, A.R., and Snow, D. 2021. Pesticide occurrence and persistence entering recreational lakes in watersheds of varying land uses. *Environmental Pollution*. 273: 116399. doi. https://doi.org/10.1016/j.envpol.2020.116399 (Impact Factor: 8.071/Cite Score 10.8)

5. Richards, G., Gilmore, T., **Messer, T.L.**, Snow, D. and Mittelstet, A.R. 2021. Nitrate dynamics within the nested watersheds of a gaining headwater agricultural stream, Nebraska, USA. *Agriculture, Ecosystems, and the Environment*, 308: 107223. doi. 10.1016/j.agee.2020.107223. (Impact Factor: 5.567/ Cite Score: 9.0)

6. Borsuah, J.[3], **Messer, T.L.,** Snow, D., Comfort, S., and Mittelstet, A. 2020. Literature Review: Global neonicotinoid occurrence in aquatic environments. *Water,* 12: 3388. doi. 10.3390/w12123388. (Impact Factor: 3.103/ Cite Score: 3.7)

7. 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. *Science of the Total Environment.* 726: 138296. doi. 10.1016/j.scitotenv.2020.138296. (Impact Factor: 7.963/ Cite Score: 10.5)

8. Abimbola, O.P., Mittelstet, A.R., **Messer, T.L.**, Berry, E.D., Bartelt-Hunt, S.L., and Hansen, S.P.[2] 2020. Predicting Escherichia coli loads in cascading dams with machine learning: An integration of hydrometeorology, animal density and grazing pattern. *Science of the Total Environment*, 722: 137894. doi. 10.1016/j.scitotenv.2020.137894. (Impact Factor: 7.963/ Cite Score: 10.5)

9. Hansen, S.[2], **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. *Science of the Total Environment*. 705(25), https://doi.org/10.1016/j.scitotenv.2019.135607. (Impact Factor: 7.963/ Cite Score: 10.5)

10. **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. (Impact Factor: 1.188)

11. Keilhauer, M.[2], **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. (Impact Factor: 1.188)

12. Hansen, S.[2], **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. (Impact Factor: 6.789/ Cite Score: 9.8)

13. **Messer, T.L.**, F. Bírgand, 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. ((mpact Factor: 4.025 / Cite Score: 7.8)

14. 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. (Impact Factor: 5.567/ Cite Score: 9.0)

15. **Messer, T.L.,** M.R. Burchell, and F. Bírgand. 2017. Comparison of Four Nitrate Removal Kinetic Models in Two Distinct Wetland Restoration Mesocosm Systems. *Water*, 9: 517-537. doi. 10.3390/w9070517. (Impact Factor: 3.103/ Cite Score: 3.7)

16. **Messer, T.L.,** M.R. Burchell, F. Bírgand, 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. (Impact Factor: 4.025 / Cite Score: 7.8)

17. **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 ^{15}N Enrichment Tracer Study, *Ecological Engineering*, 106: 597-608. doi. 10.1016/j.ecoleng.2017.06.016. (Impact Factor: 4.025 / Cite Score: 7.8)

18. 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. (Impact factor: 3.202).

19. **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. (Impact Factor: 4.025 / Cite Score: 7.8)

In Press

1. **Messer, T.L.,** Miller, D.N., Little, H., and Oathroat. Nitrate-N Removal Rate Variabilities in Floating Treatment Wetland Mesocosms with Diverse Planting and Carbon Amendment Designs. *Ecological Engineering.* [In Press] (Impact Factor: 4.025 / Cite Score: 7.8)

2. Nottingham, E.[3] and **Messer, T.L.** A literature review of wetland treatment systems used to treat runoff mixtures from urban and agricultural landscapes. *Water*. [In Review for Invited Special Collection on Emerging Contaminants] (Impact Factor: 3.103/ Cite Score: 3.7)

Publications In Review/Prep (Not Included in Total)

1. Zhang, L., Tang, Z., **Messer, T.L.**, Burbach, M., Hayes, M., Yuzhen, Z, and Hu, Q. Integrating Wetland Conservation Efforts into Local Comprehensive Plans: Learned from Nebraska, USA. *Ecosystem Health and Sustainability.* **[**In Review] (Impact Factor: 2.792/ Cite Score: 4.3)

2. Weijia, N.[4], Mittelstet, A., **Messer, T.L.**, and Tang, Y. Impact of Climate and Land Use Change on Economic Development in the Baoxing River Watershed in Giant Panda National Park. *Journal of the American Water Resources Association*. [In Review] (Impact factor: 3.202).

3. Lindgren, J.K.[2], **Messer, T.L.**, Miller, D.N., Snow, D.D., and Franti, T. Neonicotinoid Pesticide Contamination Does Not Affect Nitrate Removal in Floating Treatment Wetlands. *Science of the Total Environment*. [In Prep with Planned Submission December 2021]. (Impact Factor: 7.963/ Cite Score: 10.5)

4. McKercher, L.J.[2], **Messer, T.L.,** Mittelstet, A.R., and Comfort, S.D. A Biological and Chemical Approach to Restoring Water Quality: A Case Study in an Urban Eutrophic Pond. *Science of the Total Environment*. [Planned Submission Spring 2022]. (Impact Factor: 7.963/ Cite Score: 10.5)

5. Trejo, B.[2], **Messer, T.L.**, Bartelt-Hunt, and Snow, D. Fate and transport of pharmaceutical antibiotics adjacent to feedlot. *Environmental Pollution*. [In Prep with Planned Submission awaiting data analysis delayed by COVID19 pandemic Spring 2022]. (Impact Factor: 8.071/Cite Score 10.8)
6. **Messer, T.L.**, Russell, M.[3], Bartelt-Hunt, S., Snow, D.D., Smith, R.L., Repert, D.A., and Reed, A.P. Influence of Antibiotics and Nitrification Inhibitors on Treatment Wetland Nitrogen Transformation. *Science of the Total Environment.* [In Prep with Planned Submission Spring 2022] (Impact Factor: 7.963/ Cite Score: 10.5)

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 ^{15}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 ^{15}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 (8 Total)

1. **Messer, T.L.** 2021. *mesoWheels Outreach Program: Floating Treatment Wetland,* Nebraska Extension and 4-H.

2. **Messer, T.L.** 2021. *mesoWheels Outreach Program: Wetland in a Pan Experiment,* Nebraska Extension and 4-H.

3. **Messer, T.L.** 2021. *mesoWheels Outreach Program: What is a River?,* Nebraska Extension and 4-H.

4. **Messer, T.L.** 2021. *mesoWheels Outreach Program: What Lives in a Wetland?,* Nebraska Extension and 4-H.

5. **Messer, T.L.** 2021. *mesoWheels Outreach Program: Water Cycle,* Nebraska Extension and 4-H.

6. **Messer, T.L.** 2021. *mesoWheels Outreach Program: Aquifers Clean Our Water,* Nebraska Extension and 4-H.

7. **Messer, T.L.** 2020. *Case Study: Floating Wetlands.* H_2O Today Smithsonian Traveling Exhibit.

8. **Messer, T. L.** 2019. NRES/BSEN 468/868: Wetlands. University of Nebraska Digital Commons. Lincoln, NE. Peer Review of Teaching Project.

Presentations

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

Invited Speaker and Keynote Presentations (6 Total)

1. **Messer, T.L.** Implications of Emerging Contaminants on Nitrogen Removal Processes in Treatment Wetlands. 11th INTECOL International Wetlands Conference. Virtual conference. 12 October 2021.

2. **Messer, T.L.** Wetland Ecosystem Resiliency: Current and Future Considerations as Influent Water Chemistry Evolves. Distinguished Lecture Series. American Society of Agricultural and Biological Engineers 2021. Virtual Conference. 13 July 2021.

3. **Messer, T.L.**, Water Quality and Conservation: A Global Perspective. Glenwood, IA, 2018 Iowa Women Gaining Ground Conference. 10 March 2018.

4. **Messer, T.L.**, Constructed Wetlands for Onsite Wastewater Treatment. Grand Island, NE, 2018 Onsite Wastewater Management Conference. 14 February 2018.

5. **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.

6. **Messer, T.L.**, Completing the puzzle of nitrogen cycling in restored wetlands. Big Sky, MT. 7th International Symposium for Wetland Systems for Water Pollution Control (WETPOL). 23 August 2017. (Invited Mini-Keynote Speaker)

Conference Presentations (70 Total)

1. Nottingham, E. R. and **Messer, T. L.** 2021. A systematic literature review of wetland treatment systems used to treat runoff mixtures from urban and agricultural landscapes, *Integrated Food Energy and Water Systems Symposium,* Lexington, Ky.

2. Borsuah, J.F.[3], **Messer, T.L.,** Snow, D, and Mittelstet, A. Using Soil & Water Assessment Tool (SWAT) to Model Neonicotinoid Loading into Urban and Agricultural Watersheds. American Society of Agricultural and Biological Engineers 2021 Conference. July 12-16, 2021.

3. Russell, M.[3], **Messer, T.L.**, Bartelt-Hunt, S., Snow, D, Smith, R., Repert, D., Reed, A. Influence of Common Veterinary Antibiotics on Treatment Wetland Ecosystem Services at the Mesocosm Scale. American Society of Agricultural and Biological Engineers 2021 Conference. July 12-16, 2021.

4. **Messer, T.L.,** Bartelt-Hunt, S., Russell, M.[3], Lindgren, J.[2], Sutton, M. Implications of Emerging Contaminants on Treatment Wetlands. American Society of Agricultural and Biological Engineers 2021 Conference. July 12-16, 2021.

5. Yuan, Y., Book, R., Douglas-Mankin, K., Koropeckyj-Cox, L., Christianson, L., **Messer, T.,** Christianson, R. Performance Effectiveness and Cost Effectiveness of Agricultural Conservation Practices in Reducing Nutrient Losses. American Society of Agricultural and Biological Engineers 2021 Conference. July 12-16, 2021.

6. Russell, M.[3], **Messer, T.L.**, Bartelt-Hunt, S., Snow, D, Smith, R., Repert, D., Reed, A. Influence of Common Veterinary Antibiotics on Treatment Wetland Ecosystem Services at the Mesocosm Scale. American Ecological Engineering Society 2021 Conference. 25-26 May 2021.

7. Caniglia, J., Snow, D., **Messer, T.L.**, Bartelt-Hunt, S. Extraction and Elution for Per- and Polyfluoroalkyl Substances. American Ecological Engineering Society 2021 Conference. 25-26 May 2021. Poster.

8. Russell, M.[3], **Messer, T.L.**, Bartelt-Hunt, S., Snow, D. Assessing Nutrients Removal Rates in Floating Treatment Wetlands Introduced to Common-Use Agricultural Antibiotics. SETAC. 16-18 November 2020.

9. Hildebrand, PJ[1], **Messer, T.L**., McKercher, L.[2], and Russell, M.[3] Evaluating Water Quality Data of Nebraska Lakes for Eutrophication and Treatment. UNL UCARE Virtual Conference. 8 July 2020.

10. Stover, J.[1], **Messer, T.L**., McKercher, L.[2], and Russell, M.[3] Floating Treatment Wetland Placement in Nebraska Lakes. UNL UCARE Virtual Conference. 8 July 2020.

11. Lindgren, J.[2] and **Messer, T.L**. Neonicotinoid Pesticide and Nutrient Removal in Floating Treatment Wetland Mesocosms. American Society of Agricultural and Biological Engineers 2020 Virtual Conference. 12-16 July 2020.

12. Borsuah, J. [3] 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. 12-16 July 2020. Poster.

13. McKercher, L. [2], **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. 12-16 July 2020.

14. **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. 12-16 July 2020.

15. **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. 12-16 July 2020.

16. Lindgren, J.[2], **T.L. Messer**, and Jessica Satiroff[2]. Neonicotinoid Pesticide and Nutrient Removal in Floating Treatment Wetland Mesocosms. American Ecological Engineering Society 2020 Virtual Poster Symposium, 1-5 June 2020.

17. Trejo, B.[2], **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, 29 May 2020.

18. **Messer**, **T.L.,** D. Snow, and A. Mittelstet. Treating the Water Quality Cocktail Entering Recreational and Agricultural Lakes. Nebraska Water Conference, Norfolk, NE, 10 October 2019.

19. Bartelt-Hunt, S.L., N.N. Beni[3], B. Trejo[2], 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, 21-24 July 2019.

20. **Messer**, **T.L.,** M. Keilhauer[2], D. Snow, and A. Mittelstet. 2019. Pesticide exposure in recreation lakes. 2019 American Society of Agricultural Engineering International Meeting, Boston, MA, 7-10 July 2019.

21. Trejo, B.[2], N.N. Beni[3], 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, 7-10 July 2019.

22. Satiroff, J.[2], **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, 7-10 July 2019.

23. 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, 7-10 July 2019.

24. 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, 7-10 July 2019.

25. 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, 7-10 July 2019.

26. **Messer**, **T.L.,** M. Keilhauer[2], D. Snow, and A. Mittelstet. 2019. Pesticide accumulation in recreation lakes. 2019 American Society of Ecological Engineers Annual Meeting, Asheville, NC, 5 June 2019.

27. Johnson, M.[1] and **T.L. Messer.** 2019. Ecotoxicology Assessment of Carbon Amendment to Floating Treatment Wetlands. 2019 UCARE Poster Showcase, Lincoln, NE, 15 April 2019.

28. **Messer, T.L.** and M. Keilhauer[2]. 2019. Nutrient Removal Utilizing Floating Treatment Wetlands. 2019 Daughterly Water for Food Showcase, Lincoln, NE, 4 April 2019. Poster presentation.

29. 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, 4 April 2019. Poster presentation.

30. Satiroff, J.[2], **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.

31. Hansen, S.P.[2], **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.

32. Keilhauer, M.[2] 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.

33. **Messer, T.L.,** Challenging Discipline Perceptions in Ecological Engineering Using Interdisciplinary Team Design Projects. 2018 International ASABE Meeting, 31 July 2018. Detroit, MI.

34. **Messer, T.L.,** S. Hansen[2], and A. Mittelstet. Mitigating the Risk of Atrazine in Surface Waters Across Nebraska. 2018 International ASABE Meeting, 31 July 2018. Detroit, MI.

35. Keilhauer, M[2] and **T. Messer**. Nutrient Treatment Potential of Floating Treatment Wetlands. 2018 American Society of Ecological Engineering Conference. 14 June 2018. Houston, TX.

36. Hansen, S.[2] 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.

37. **Messer, T.L.,** L. Ferguson, and M. Doyle. Photodegradation of Imidacloprid in Southeastern Rivers. 2017 International ASABE Meeting. 18 July 2017. Spokane, WA.

38. Keilhauer, M.[2] and **T.L. Messer**. Nutrient Removal Capacity of Floating Treatment Wetlands. Society of Wetland Scientists Conference. 30 May 2018. Denver, CO.

39. Nguyem, A[1], **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).

40. 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 3rd Annual Meeting of IANR ARD and US MARC on Enhanced Research Collaborations, US Meat Animal Research Center, Clay Center, NE, 29 November 2017

41. Keilhauer, M [2] and **T.L. Messer**. Nutrient Removal Capacity of Floating Treatment Wetlands. Nebraska Water Symposium. 26 October 2017. Lincoln, NE. (Poster Contest: 3rd Place).

42. Hansen, S.P.[2], **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.

43. 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.

44. **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.

45. **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.

46. **Messer, T.L**. and M.R. Burchell. A ^{15}N tracer evaluation of the impact of nitrate load and soil type on nitrogen cycling in restored wetlands. 2015 International ASABE Meeting. 29 July 2015. New Orleans, LA.

47. **Messer, T.L**., M.R. Burchell, and F. Birgand. An evaluation of the reliability of for nitrate reduction models. 2015 International ASABE Meeting. 28 July 2015. New Orleans, LA.

48. **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.

49. **Messer, T.L.,** and M.R. Burchell. Where is nitrate going in restored wetlands? A ^{15}N Tracer Evaluation on Nitrogen Cycling in Restored Wetlands. NCSU Graduate Research Symposium. 25 March 2015. Raleigh, NC. (Poster Contest: 3rd Place in Ag and Life Sciences Division).

50. **Messer, T.L**. and M.R. Burchell. Where is nitrate going in restored wetlands? A ^{15}N Tracer Evaluation on Nitrogen Cycling in Restored Wetlands. Purdue Future Faculty Workshop. 2 March 2015. West Lafayette, IN. (Poster).

51. **Messer, T.L**. and M.R. Burchell. Where is nitrate going in restored wetlands: A Mesocosm ^{15}N Tracer Study. 58th Annual Meeting of the Soil Science Society of North Carolina. 21 January 2015. Raleigh, NC.

52. **Messer, T.L**. and M.R. Burchell. Tracing the Fate of Nitrate through Restored Wetlands: A mesocosm ^{15}N Tracer Study. 2014 International ASABE Meeting. 15 July 2014. Montreal, Canada.

53. **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. 16 July 2014. Montreal, Canada.

54. **Messer, T.L**. and M.R. Burchell. Tracking the NO_3^- Fate through Restored Wetlands: A^{15}N Tracer Study. 2014 AEES Conference. 10 June 2014. Charleston, SC.

55. 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.

56. **Messer, T.L**. and M.R. Burchell. Tracing the Fate of NO_3^- through Restored Wetlands: A Mesocosm ^{15}N Tracer Study. 2014 Water Resource Research Institute Annual Conference. 20 March 2014. Raleigh, NC.

57. **Messer, T.L**. and M.R. Burchell. Methods for Tracing the Fate of NO_3^- through Restored Wetlands: A Mesocosm ^{15}N Tracer Study. North Carolina State University Graduate Research Symposium. 26 March 2014. Raleigh, NC. (Poster).

58. **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.

59. **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.

60. Burchell, M.B., **T. L. Messer**, and F. Birgand. Determining Ideal Nitrogen Loads for Two Distinct Restored Wetland Soils – An Experimental and Modeling Approach. WRRI 2013 Annual Conference. 20-21 March 2013. Raleigh, NC.

61. **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).

62. 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.

63. **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).

64. **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.

65. **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.

66. **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).

67. **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.

68. **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).

69. 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).

70. **Messer, T**. Effectiveness of Nitrate Reduction in Differing Riparian Buffer Widths. 2009 International ASABE Meeting. 23 June 2009. Reno, NV. (Poster).

Seminars (8 Total)

1. **Messer, T.L.** Pesticide Occurrence and Persistence Entering Recreational Lakes Residing in Watersheds of Various Land Uses. Lincoln, NE, 2021. Teledyne Technologies. 15 November 2021. (15 people)

2. **Messer, T.L.**, Influence Pesticides and Antibiotics on Floating Treatment Wetland Ecosystem Services. Lexington, KY, 2020. University of Kentucky Plant and Soil Science Departmental Seminar. 23 October 2020. (12 people)

3. **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)

4. **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)

5. **Messer, T.L.** Instructional Improvement Plan. Lincoln, NE. Department of Biological Systems Engineering Teaching Workshop, 8 May, 2019. (40 people)

6. **Messer, T.L.** Evaluating Treatment Wetlands Using Mesocosms. Lincoln, NE. Department of Biochemistry. 22 February 2019. (15 people)

7. **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)

8. **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)

Interviews/News/Press Releases (9 Total)

1. Well, H. UK Assistant professor recognized for low-cost water treatment project. ABC WTVQ 36 Lexington, 2021.

2. Pratt, K. UK's Messer Studying Low-cost Water Treatment Options with NSF Award News CAFÉ UK and features on UKNow, 2021.

3. Pratt, K. UK Researcher studying impacts of nanopesticides on Nitrogen. News CAFÉ UK and features on UKNow, 2021.

4. Richter-Ryerson. Researchers testing ability of floating wetlands to survive winter. Nebraska Today, 2020.

5. Fedderson, T. Daugherty's global focus flows into statewide impacts. Nebraska Today, 2020.

6. KHGI, Open Jan. 26, "H20 Today" highlights the global trends to conserve water. Nebraska TV ABC, 14 January 2020.

7. Kenworthy, C. The Impact of climate change on Nebraska water: Too much and too little. Lincoln Journal Star Newspaper, 2020.

8. **Messer, T. L**. How is it Growing? Lincoln, NE. KZUM radio. 4 December, 2019

9. Garbacz, M. and E. Frenzen**.** Improving Water Quality and Quantity for Everyone. Strategic Discussions for Nebraska. 2018.

Extension Presentations (18 Total)

1. **Messer, T.L.** Floating Treatment Wetlands. Lexington, KY. Florida Wedgworth Leadership Institute. 11 October 2021. (35 people)

2. **Messer, T.L.** E. coli and Emerging Pathogens. Norfolk, NE. Natural Resource Conservation Service Training Event. 20 November 2019. (50 people)

3. **Messer, T.L.** E. coli and Emerging Pathogens. North Platte, NE. Natural Resource Conservation Service Training Event. 6 November 2019. (50 people)

4. **Messer, T.L.** Water Quality Lessons for Preschoolers for Extension Educators Webex. Lincoln, NE. UNL Extension Service. 29 October 2019. (10 people)

5. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. North Hills Homeowners Association. 9 October 2019. (30 people)

6. **Messer, T.L.** Pesticide accumulation in recreation lakes Webex. Tennessee Department of Environmental Quality, Knoxville, TN, 23 August 2019. (15 people)

7. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Lincoln Parks and Recreation. 21 August 2019. (15 people)

8. **Messer, T.L.** Monitoring Floating Treatment Wetlands. Lincoln, NE. Teledyne ISCO. 12 August 2019. (10 people)

9. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Department of Environment and Energy. 18 April 2019. (20 people)

10. **Messer, T.L.** E. coli Fate and Transport in Agricultural Systems. Lincoln, NE. Department of Environment and Energy. 22 May 2019. (40 people)

11. **Messer, T.L.** Floating Treatment Wetlands. Lincoln, NE. Wilderness Hills Golf Course. 17 May 2019. (3 people)

12. **Messer, T.L.** Treatment Wetlands. Lincoln, NE. Nebraska Department of Transportation. 3 March 2019. (15 people)

13. **Messer, T.L.** What are wetlands? Lincoln, NE. Dimensions Education Eat and Explore. 7 February 2019. (200 people)

14. **Messer, T.L.** Lincoln Public Schools STEM Share – Presented *meso*Wheels Program for Lincoln Public Schools curriculum, March 15 2019. (200 people)

15. **Messer, T.L.** Kure Beach Sand Dune Infiltration System Extension Workshop, North Carolina State University, Kure Beach, NC. 2012. (40 people)

16. **Messer, T.L.** Best Management Practices Extension Workshop, North Carolina State University, Raleigh, NC. 2011. (60 people)

17. **Messer, T.L.** Wetland Mesocosm Laboratory Professional Tour, North Carolina State University, Raleigh, NC. 2012-2014. (15 people)

18. **Messer, T.L.** Composting Extension Workshop, University of Kentucky, Lexington, KY. 2004. (30 people)

Teaching and Advising

Courses Taught

*** Note: University Means Not Available from UNL**

[1]***BAE 538: GIS for Water Resources, University of Kentucky***

Semester	Number of Students	Course Quality	Teaching Quality
[1]Fall 2021	15	In Progress	In Progress

[1]Developed Course.

[1]***BAE 750: Stormwater Engineering Management, University of Kentucky***

Semester	Number of Students	Course Quality	Teaching Quality
[1]Fall 2021	1	In Progress	In Progress

[1]Developed Course.

[1]***BSEN/AGEN 350: Water Resources Engineering, University of Nebraska-Lincoln***

Semester	Number of Students	Course Quality	Teaching Quality
[1,3,4]Fall 2020	18	4.10	4.20

[1]Developed Course.
[3]Scale: 1 to 5.
[4]During COVID19 Pandemic

[1]***BSEN/NRES 468/868: Wetlands, University of Nebraska-Lincoln***

Semester	Number of Students	Course Quality	Teaching Quality
[2]Spring 2018	28	3.27	3.46
[2]Spring 2019	21	3.46	3.60
[3,4]Spring 2020	23	4.44	4.44

[1]Developed Course.
[2]Scale: 1 to 4.
[3]Scale: 1 to 5.
[4]During COVID19 Pandemic

[1]***AGEN 112: Computer Aided Problem Solving (Co-Taught), University of Nebraska-Lincoln***

Semester	Number of Students	Course Quality	Teaching Quality
[2]Spring 2019	78	2.78	3.19
[3,4]Spring 2020	82	4.29	4.29

[1]Developed Course.
[2]Scale: 1 to 4.
[3]Scale: 1 to 5.
[4]During COVID19 Pandemic

[1]***BSEN/AGEN 889: Graduate Seminar, University of Nebraska-Lincoln***

Semester	Number of Students	Course Quality	Teaching Quality
[2]Fall 2017	20	3.33	3.68
[2]Fall 2018	24	3.42	3.71
[3]Fall 2019	20	4.74	4.74
[3,4]Summer 2020	6	4.95	4.95

[1]Developed Course.
[2]Scale: 1 to 4.
[3]Scale: 1 to 5.
[4]During COVID19 Pandemic

[1,4]***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	Not Evaluated	Not Evaluated

[1]Developed Course.
[4]During COVID19 Pandemic

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

Semester	Number of Students	Course Quality	Teaching Quality
[2]Spring 2018	20	3.00	3.17

[2]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[1]: Basic Principles of Surveying (Laboratory Instructor), University of Kentucky

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

[1]Developed Course.

Guest Lectures

1. BAE 570 (Engineering Controls for Agricultural Safety and Health Hazards), UK. Presented 11/12/21.
2. BAE 437 (Land and Water Resources Engineering), UK. Presented 4/27/21
3. BAE 437 (Land and Water Resources Engineering), UK. Presented 4/29/21.
4. ENVR 189H (Environmental Justice Honors), UNL. Presented on 9/24/20.
5. MSYM 354 (Soil Conservation), UNL. Presented on 11/21/19.
6. NRES 101 (Introduction to Natural Resources), UNL. Presented on 10/16/19.
7. NRES 101 (Introduction to Natural Resources), UNL. Presented on 10/17/19.
8. BSEN 100 (Introduction to Biological Systems Engineering), UNL. Presented on 9/24/19.
9. ENVR 189H (Environmental Justice Honors), UNL. Presented on 9/24/19.
10. BSEN 355 (Introduction to Ecological Engineering), UNL. Presented on 3/12/19.
11. NRES 101 (Introduction to Natural Resources), UNL. Presented on 10/11/18.
12. BSEN 100 (Introduction to Biological Systems Engineering), UNL. Presented on 9/18/18.
13. MSYM 354 (Soil Conservation), UNL. Presented on 9/20/18.
14. BSEN 455 (Nonpoint Source Pollution), UNL. Presented on 11/17/17
15. MSYM 354 (Soil Conservation), UNL. Presenting on 11/16/17.
16. BSEN 355 (Introduction to Ecological Engineering). UNL. Presented on 3/16/17.
17. BSEN 355 (Introduction to Ecological Engineering), UNL. Presented on 3/9/17.

Graduate Student Major Advising

Awaiting Full Membership of Graduate Faculty at UK
Full Member of the Graduate Faculty since 1/1/17 at UNL

Completed (6)

1. ***Levi McKercher***, MS, Natural Resources, UNL. July 2021. A Combined Biological-Chemical Approach to Removing Nutrients from Eutrophic Waters. August 2019 - July 2021. Co-Advisor.
2. ***Julia Lindgren***, (M.S.), Environmental Engineering, UNL. December 2020. Floating Treatment Wetland Potential to Remove Neonicotinoid Pesticides. August 2019 - December 2020. Advisor. Current Position: Water Resources Engineer at NRCS-Idaho (Boise, ID).
3. ***Jessica Satiroff***, (M.S.), Environmental Engineering, UNL. May 2020. Fate and Transport of Neonicotinoids Entering Recreational Lakes. August 2018- August 2020. Co-Advisor. Current Position: Staff Engineer at Infrastructure Design Group, Inc. (Sioux Falls, SD).
4. ***Brittany Trejo***, (M.S.), Environmental Engineering, UNL. May 2020. Occurrence and Persistence of Antibiotics Administered to Cattle in a Newly Established Feedlot. August 2018-May 2020. Co-Advisor. Current Position: Structural Engineer at Los Alamos National Laboratory (Los Alamos, NM).
5. ***Mary Keilhauer***, M.S., Natural Resources, UNL. 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).
6. ***Samuel Hansen***, M.S. Biological Systems Engineering, UNL. 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).

In-Progress (7)

1. ***Dayana Rodriquez Jimenez***, MS, Biosystems and Agricultural Engineering, UK. Anticipated Completion: May 2022. Fate and Transport of PFAS and Pesticides from WWTP. August 2019- Present. Advisor.
2. ***Jake Richardson***, MS, Biosystems and Agricultural Engineering, UK. Anticipated Completion: December 2023. Nanopesticide Implications on N Cycling in Agroecosystems and Downstream Best Management Practices. January 2021 – Present.

3. ***Matthew Russell***, Ph.D., Biosystems and Agricultural Engineering, UK. Anticipated Completion: May 2024. Implications of Antibiotics on Floating Treatment Wetlands. May 2019-Present. Advisor.
4. **Emily Nottingham**, PhD. Biosystems and Agricultural Engineering, UK. Anticipated Completion: May 2024., Implications of antibiotics and pesticides on N removal in Wetlands. June 2021 – Present.
5. **Josephus Borsuah**, Ph.D., Natural Resources, UNL. Anticipated Completion: May 2022. Fate and Transport of Neonicotinoid Pesticides. August 2019-Present. Advisor.
6. **Kyra Sigler**, MS, Biosystems and Agricultural Engineering, UK. Anticipated Completion: May 2023, Evaluating the Risk of complex Mixtures of Emerging Contaminants, Heavy Metals, and Nutrient Exposure: Identifying Hot Spots and Hot Times in Surface Water Across Kentucky. August 2021- Present.
7. **William Rud,** MS, Biosystems and Agricultural Engineering, UK. Anticipated Completion: May 2023, Evaluating the Implications of Nanopesticides to N Cycling in Wetland Environments. August 2021- Present

Graduate Student Advisory Committee Member

Completed (11)

1. **Justin Caniglia**, M.S. Natural Resources UNL, 2021. Extraction and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Wastewater Matrices to Determine Environmental Loading in the Midwest. Advisor: Daniel Snow (originally Tiffany Messer, but reassigned following departure from UNL)
2. **Mikaela Cherry**, Ph.D. Natural Resources UNL. 2021. Assessment and Visualization of Controls on Groundwater Transport and Nitrate Contamination. Advisor: Troy Gilmore
3. **Gina DeGraves**, M.S. Biosystems and Agricultural Engineering, UK. 2021. Sediment Nitrogen Dynamics in Backwater Wetland Confluences of a Regulated River. Advisor: William Ford
4. **Cory Radcliff**, M.S. Biosystems and Agricultural Engineering, UK. 2021. Quantifying the Source and Pathway of Dissolved Reactive Phosphate in Karst Drainage of the Inner-Bluegrass. Advisor: William Ford
5. **Brandi Brown**, Ph.D. Biological Systems Engineering, UNL. 2021. Efficient Polyhydroxyalkanoate Production by *Rhodopseudomonas palustris* from Lignocellulosic Biomass. Advisor: Mark Wilkins
6. **Bo Smith**, M.S. Biosystems and Agricultural Engineering, UK. Modeling Energy Flows in Floating In-Pond Raceways Utilizing Solar Power Back-up. 2021, Advisor: Joe Dvorak.
7. **Galen Richards**, M.S. Natural Resources, UNL. Nitrate Dynamics and Source within Nested Watersheds of an Agricultural Stream, Nebraska, USA. 2020. Advisor: Troy Gilmore
8. **Matthew Russell**, M.S. Natural Resources, UNL. Impact of Streambank Stabilization on Sediment Deposition and Erosion in Central Nebraska Streams. 2018- 2020. Advisor: Aaron Mittelstet
9. **Mara Zelt**, M.S. Biological Systems Engineering, UNL. 2019. Persistence and Mitigation of Antibiotic Resistance in Manure and Manure-Amended Soils. January 2017- December 2019.Advisor: Amy Schmidt.
10. **Femi Abimbola**, Ph.D. Biological Systems Engineering, UNL. Modeling Streambed Vertical Hydraulic Conductivity, Water Quality Pollutants, and Best Management Practices Using Machine Learning and the Soil and Water Assessment Tool. 2019. Advisor: Aaron Mittelstet.
11. **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. Advisor: Amy Schmidt.

In-Progress (3)

1. **Ligang Zhang**, Ph.D. Natural Resources UNL. Anticipated Completion: December 2021. Advisor: Zhenghong Tang
2. **Nasrin Bendi**, Ph.D. Civil Engineering UNL. Anticipated Completion: May 2022. Advisor: Shannon Bartelt-Hunt
3. **Yaser Kishawi**, Ph.D. Natural Resources UNL. Anticipated Completion: June 2022. Advisor: Aaron Mittelstet

International Interns

1. **Weijia Ni**, (Ph.D.) Sichuana 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 (17)

1. Abbey Osbourne, 2021-present, UK Biosystems Engineering, Advisor
2. Erin Remley, 2021- present, UK Biosystems Engineering, Advisor
3. Kaitlyn Duncan, 2021, UK Engineering Summer Undergraduate Research Fellowship Recipient ($1,958), UK Biosystems Engineering, Advisor
4. Vanessa Spring, 2021, UK Biosystems Engineering, Advisor
5. Rachel Rohrer, 2021, UK Biosystems Engineering, Advisor
6. Benjamin Wordens, 2019-2020, UNL First Year Research Experience Scholar, Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
7. Samantha Perez, 2019, NSF Research Experiences for Undergraduates Scholar, Environmental Science Undergraduate at Saint Mary's University, Advisor
8. Helen Little, 2018-2021, UNL Undergraduate Creative Activities and Research Experience Scholar, UNL Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
9. Ken Oathoat, 2018 – 2021, Research Assistant, UNL Biological Systems Engineering Undergraduate, Graduated 2021, Field Engineer Natural Resources Conservation Service York, NE, Advisor
10. Garrett Isom, Summer 2019, Research Assistant, UNL Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
11. Trevor Kaslon, Summer 2019, Research Assistant, UNL Biological Systems Engineering Undergraduate, Expected Graduation 2022, Advisor
12. Maddie Johnson, 2018-2019, UNL Undergraduate Creative Activities and Research Experience Scholar, Water Resources Engineering at Kiewit, Kansas City, MO, Advisor
13. Rob Schroeder, Undergraduate Cabela's Apprenticeship, Summer 2018, Advisor
14. Brody Zabel, Summer 2018, UNL Mechanical Engineering Undergraduate, Expected Graduation 2021, Advisor
15. Alexa Davis, 2017-2018, UNL Undergraduate Creative Activities and Research Experience Scholar, UNL School of Natural Resources Master's Student, Natural Resource Program Specialist at Nebraska Department of Energy, Lincoln, NE, Advisor
16. Autumn Dunn, 2017-2018, UNL Undergraduate Creative Activities and Research Experience Scholar, Master's Student in Nicholas School of Environment Duke University, Durham, NC, Expected Graduation 2021, Advisor
17. Bailey Monroe, 2017-2018, UNL Undergraduate Creative Activities and Research Experience Scholar, Water Resource Engineer at NRCS-Iowa, Des Moines, Iowa, Advisor

Senior Design (8 Groups)

1. BAE 402/403: Senior Design. Elizabethtown BMP Project. Fall 2020 and Spring 2021. 4 students. Advisor
2. BSEN 470/480: Senior Design. Pine Lake Reservoir Restoration. Fall 2019 and Spring 2020. 5 Students. Advisor.

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

Average number of undergraduate students advised per year (42)
2021 – 0
2020 - 10
2019 - 10
2018 – 14
2017 – 8

Honors and Awards

National and International Research Awards and Recognition

1. NSF CAREER Award, University of Kentucky (2021)
2. ASABE Superior Paper Award (2020)
3. ASABE Associate Editor Recognition (2020)
4. USDA AFRI NIFA ELI Post Doc Fellowship, Duke University (2016)
5. EPA STAR Fellowship, North Carolina State University (2013)

Regional and Local Research Awards and Recognition

1. UK Center for Appalachian Research in Environmental Sciences (UK CARES) Fellow, University of Kentucky (2021 – present)
2. Daugherty Global Institute Water for Food Fellow, University of Nebraska (2017-2021)

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

1. American Society of Agricultural and Biological Engineers (ASABE), 2004-present
2. 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)
3. American Ecological Engineering Society (AEES), 2012-present
4. American Ecological Engineering Society (AEES) Committees, Diversity Equity Inclusion and Justice (DEIJ) (2021 – present)
5. Alpha Epsilon Honors Society, 2007

Professional Development

Research Professional Development

1. Responsible Conduct of Community Engaged Research Training, 1 August 2021, UK CARES, https://www.youtube.com/watch?v=KGWUMj3C4r8.
2. AQ400 Training, Seal Analytical Training, 26-29 April 2021
3. Environmental Mass Spectrometry for Sustainability Training, Waters Analytical, 14 April 2021
4. University of Kentucky, CAFE Conversation: Kentucky Waterways, 23 March 2021
5. University of Kentucky, CAFE Conversation: Black Agriculture, 24 February 2021
6. USDA SARE Funding Workshop, 1 August 2019
7. University of Nebraska-Lincoln College of Engineering Promotion and Tenure Training, 24 July 2019
8. Department of Energy, Demystifying the U.S. Department of Energy Workshop, December 2018
9. University of Nebraska-Lincoln Write Winning Grant Proposals, March 2017
10. University of Nebraska-Lincoln NSF CAREER Workshop, March 2017
11. University of Nebraska-Lincoln Treatment Wetland Training Workshop, August 2017
12. Purdue Future Faculty Workshop. 1-3 March 2015. West Lafayette, IN.
13. Virginia Tech Future Faculty Program. 11-14 2015. Blacksburg, VA.
14. Navigating the Dangerous Waters of Plagiarism Workshop. North Carolina State University, 2012
15. How to Handle a Phone Interview Workshop. North Carolina State University, 2012
16. How Business Ideas are Born Workshop. North Carolina State University, 2012
17. Writing Federal Research Proposal Workshop. North Carolina State University, 2012
18. 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.
19. 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.”
20. 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.
21. 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.
22. 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 Kentucky, Diversifying Syllabi and Curriculum in CAFE, 6 April 2021
2. University of Kentucky, Critical Compassion in CAFE, 9 February 2021
3. University of Nebraska-Lincoln, Annual Undergraduate Curriculum Workshop, May 2020
4. University of Nebraska-Lincoln, Keep Teaching Seminar April 2020
5. University of Nebraska-Lincoln Safe Spaces Training, October 2019
6. University of Nebraska-Lincoln IANR Fall Faculty Training, 28 August 2019
7. University of Nebraska-Lincoln School of Natural Resources Fall Faculty Training, 23 August 2019
8. University of Nebraska-Lincoln Peer Review of Teaching Project Training, 7 May 2019
9. University of Nebraska-Lincoln Creating Rubrics, BSE CIPA Brown Bag, 17 April 2019
10. University of Nebraska-Lincoln Peer Review of Teaching Project Training, 13 April 2019
11. University of Nebraska-Lincoln IANR Water Conference, 14 March 2019

12. University of Nebraska-Lincoln Instruction Design Techniques in the Flipped, Blended, and Traditional Classroom Workshop, August 2018
13. University of Nebraska-Lincoln Undergraduate Curriculum Workshop, May 2017, May 2018, May 2019
14. University of Nebraska-Lincoln CASNR Winter Interim Teaching and Learning Workshop, 2018, 2019, 2020
15. University of Nebraska-Lincoln Training for Suicide Prevention: Question, Persuade, Refer, January 2018
16. Writing Learning Outcomes: North Carolina State University, 18-21 September 2013.
17. Learning Styles. North Carolina State University. January 14-18, 2013.
18. Managing Disruptive Classroom Behavior. North Carolina State University. 22-26 October 2012.
19. Establishing Credibility in the Classroom. North Carolina State University. 23-27 July 2012.
20. Motivational Teaching Strategies. North Carolina State University. 6 July 2012.
21. Effective Questioning Techniques. North Carolina State University. 25 June 2012.

Service

Manuscript Editorship

1. Associate Editor, Transactions of American Society of Agricultural and Biological Engineering, September 2018 - 2021

Manuscript Review

1. Journal of Ecological Engineering (2 reviews - 2016, 4 reviews -2017, 3 review – 2018; 1 review – 2020; 1 review 2021)
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; 1 review - 2021)
6. Geoderma (1 review – 2018)
7. Desalination and Water Treatment (1 review -2018)
8. Science of the Total Environment (1 review -2020)

Proposal Reviews

1. NSF Environmental Engineering 1440 Review Panel (April 2021)
2. Water Advance Research and Innovation (WARI) Fellowship Panel (October 2019)
3. 104(g) Review Panel (April 2019, April 2021)
4. USDA SBIR NIFA Review Panel (January 2018; February 2019; January 2021)
5. The National Academies of Sciences, Engineering, and Medicine Cycle 19 of the U.S. Egypt Science and Technology Joint Fund (March 2018)
6. North Carolina Sea Grant Review Panel (April 2017)

Departmental

Leadership positions on Department Committees

1. Student Recruitment Committee, UK-BAE, Chair, (2020 – present)
2. Student Success Committee, UNL, Co-Chair (2019- 2020)
3. North Carolina State University Biological and Agricultural Engineering GSA President (2009-2010)
4. University of Kentucky Biosystems and Agricultural Engineering Student President (2007-2008)

Membership positions on Department Committees

1. Social Committee, UK, Member (2021 – current)
2. Undergraduate Curriculum Committee, UK, Member (2021 – current)
3. Stream and Watershed Science Graduate Certificate Committee (2021-current)
4. Search Committee, BAE Electronics Engineer, member (2021)
5. Search Committee, BAE Research Facilities Manager, member (2021)
6. Safety Committee, BAE UK, Member (2020 – 2021)
7. Awards Committee, BAE UK, Member (2020 – 2021)
8. External Relations Committee, UNL, Member (2019 – 2020)
9. Soil/Water Committee, UNL, Member (2017 – 2020)
10. Environmental Science Committee, UNL, Member (2017 – 2020)
11. Facilities Committee, UNL, Member (2018 – 2020)
12. Undergraduate Curriculum and ABET Committee, UNL, Member (2018-2020)
13. Colloquium Committee, UNL, Member, (2018-2019)
14. North Carolina State University Biological and Agricultural Engineering Recruitment Weekend, Assistant, (2009-2014)
15. North Carolina State University Biological and Agricultural Engineering High School Summer Camp, Assistant (2009-2014)

College

1. UK College of Engineering and Society of Women Engineers Women Engineering (Wie) Day, UK, panelist (2021)
2. Healthy Agricultural Systems, UNL, Member (2019 – 2020)
3. IANR Science Literacy Initiative Advisory Board, UNL, Member (2018 – 2020)
4. College of Engineering Undergraduate Scholars Program, UNL, Member (2018 – 2020)
5. Nebraska Water Center Advisory Board, UNL, Member (2018 – 2020)
6. North Carolina State Graduate Student Association Assistant Representative, Member (2010-2012)
7. North Carolina State University Engineering Leadership Weekend (2009-2012)
8. University of Kentucky Engineering Ambassador (2005-2008)
9. University of Kentucky Ag Student Council Senior Representative (2007-2008)
10. 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. 2017-2020 Nebraska 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. Secretary, American Ecological Engineering Society (AEES), 2021 – 2023 term
2. Nominating Committee, American Society of Agricultural and Biological Engineers (ASABE), member, 2022-2024 cycle
3. NRES-25, American Society of Agricultural and Biological Engineers (ASABE), Streams, Wetlands, and Reservoirs Group, Vice Chair, 2020-present
4. ASABE E 05/03, American Society of Agricultural and Biological Engineers (ASABE), Vice Chair, 2020-present
5. Justice, Equity, Diversity, and Inclusion (JEDI) Committee, American Society of Ecological Engineers (ASEE), 2021- present
6. P-120, ASABE, Student Scholarships Judge, 2019- 2021
7. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Outgoing Chair, 2019-2020
8. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Chair, 2018-2019
9. NRES-28, American Society of Agricultural and Biological Engineers (ASABE), Ecological Engineering Group, Vice-Chair, 2017-2018
10. NRES-25, ASABE, Streams, Reservoirs, and Wetland Group, Standards Chair, 2015-2018
11. NRES, ASABE, Student Poster Competition Judge, 2017-present
12. ASABE Speed Networking Volunteer, 2016- present
13. American Society of Ecological Engineers, Student Poster Competition Judge, 2017-present

Technical Session Moderator

1. Section Moderator, Special Session: Wetlands, 2021 American Society of Agricultural and Biological Engineering International Meeting, virtual, 2021.
2. Section Moderator, Waterborne Pathogens and Emerging Contaminants, 2020 American Society of Agricultural and Biological Engineering International Meeting, virtual, 2020.
3. Section Moderator, Waterborne Pathogens and Emerging Contaminants, 2019 American Society of Agricultural and Biological Engineering International Meeting, Boston, MA, July 7-10, 2019.

4. Section Moderator, Treatment Wetlands, 2019 American Ecological Engineering Society Meeting, Ashville, NC, June 4, 2019.
5. Section Moderator, Nutrient, Removal, and Recycle Part 2, Detroit, MI, July 30, 2018.
6. Section Moderator, Stormwater Management I, American Society of Ecological Engineering, Houston, TX, June 12, 2018.
7. Section Moderator, Nitrogen Removal in Wetlands, WETPOL Conference, Big Sky, MT, August 23, 2017.

Other Service

University Service Events

1. 7/1/2020 H_2O 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. Institute for Future Agriculture Leaders (IFAL) host, 6/22/2021
2. UK Engineering Day Video, January 2021
3. E2 Day Session Presenter (20 high school students), 2018, 2019, 2020
4. Strategic Discussion for Nebraska Presenter, 2018
5. ENGR 10 Video Presenter, 2018
6. Eureka! Girls Inc. Demo, 2018
7. UNL Spring Research Fair Graduate Poster Competition Judge, 2017

Unit Service Events

1. Senior Design Virtual Poster Session, 3/5/2021
2. Engineering Day Robotic Car Judge, 12/3/2019
3. Fall Environmental Studies Showcase Judge, 12/1/2019
4. Student recruitment meetings
    a. 3/7/2019 - Malayna Wingert
    b. 4/22/2019 - Drake Spohr

c. 8/5/2019 - Caleb Lohrberg

5. Engineering Day Robotic Car Judge, 2018, 2019
6. 2017 Lego League Recruitment Activity: Storm the Drain Presentation/Activity
7. Faculty Flip, 22 February 2017
8. Engineering Day Edible Car Judge, 2017

Unit Community Development

1. 3/15/2021 –Establisher and organizer of the Chalk Talk Group, which is comprised of five multidisciplinary research teams that meet bi-weekly throughout the year to discuss academic and industry career planning techniques at UK
2. 5/15/2019 Led establishment of Mother's Room in Biological Systems Engineering Department at UNL
3. 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 at UNL

Community and Non-professional Service

1. Dimensions Education Nature Explore, Pre-K Board, Lincoln, NE (2019-2020)
2. Fred Olds Elementary Science Fair: Judged fourth and fifth science fair projects Raleigh, NC (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, Durham, NC (2011-2013).
5. English as a Second Language: Offered childcare services for students, Durham, NC (2012).
6. Make a Wish Foundation: Ran ½ marathon to support foundation, Durham, NC (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, Lexington, KY (2004 – 2009)

Licensure and Certification

1. Peer Review of Teaching Certificate, University of Nebraska – Lincoln, May 2019
2. Watershed Assessment and Restoration Certificate, North Carolina State University, August 2015
3. Certificate of Accomplishment in Teaching, North Carolina State University, May 2014
4. Engineer-In-Training, Commonwealth of Kentucky, May 2008 to present.

Technical Skills

- Analytical chemistry equipment: Seal AQ300/400, 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.