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Engineering & Scientific Consulting

Alexandra Steele, Ph.D.

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Professional Profile

Dr. Steele is a Senior Scientist in Exponent's Ecological and Biological Sciences practice. She has experience in behavioral ecology, environmental toxicology, causal analysis, and product stewardship.

Through her work, Dr. Steele has experience with the risks associated with numerous environmental pollutants, including biological, chemical, and physical stressors, and has performed evaluations of stressor effects on the physiology, behavior, and health of organisms. She has analyzed multiple behavioral responses of field collected fish and aquatic invertebrates in relation to PFAS and organic herbicide contamination at environmentally relevant concentrations.

Dr. Steele has experience assessing critical environmental toxicity information and reviewing ambient water quality criteria for industrial clients, as well as assessing toxicity test data for NPDES dischargers. She has worked with product manufactures to evaluate relevant environmental toxicology information and risk assessments for product stewardship initiatives and has evaluated literature related to a variety of organic compounds and their effects on the health of agricultural plants and wildlife. She also has experience reviewing environmental permitting requirements (e.g., CWA Sections 404, 401, and 402).

Through her research, Dr. Steele evaluated the hydrodynamics of aquatic systems and effects of anthropogenic contaminants on the physiology and behavior of aquatic organisms. She has applied data collected from these and other sources to Individual Based Modelling techniques in order to expand the understanding of anthropogenic impacts on the scale of individuals through communities. Through this work, Dr. Steele has applied a variety of statistical techniques to data from multiple levels of biological organization using R Statistical Software. Her research has worked to further understand the organismal effects of spatially and temporally dynamic contaminant exposures that occur in fluid systems. By examining exposure in laboratory, mesocosm, field, and modelling environments, Dr. Steele has related physiology and ecologically important behaviors (i.e., personality, foraging, agonistic interactions, predator-prey interactions) to the impact of anthropogenic stressors on overall health of aquatic organisms.

Academic Credentials & Professional Honors

Ph.D., Biological Sciences, Bowling Green State University, 2020

B.S., Biology, Saginaw Valley State University, 2016

Prior Experience

Scientist, Exponent, Inc., 2020-2022

Graduate Research and Teaching Assistant, Bowling Green State University, 2016-2020

Laboratory Technician, Saginaw Bay Environmental Science Institute, 2015-2016

Professional Affiliations

National and Regional chapters of Society of Environmental Toxicology and Chemistry (SETAC)

Environmental Business Council of New England (EBC New England)

Publications

Coy CO, Steele AN, Abdulelah SA, Belanger RM, Crile KG, Stevenson LM, Moore PA. Differing behavioral changes in crayfish and bluegill under short- and long-chain PFAS exposures: field study in northern Michigan, USA. Ecotoxicology and Environmental Safety 2022; 247.

Moore ME, Weighman KK, Steele AN, Cordova B, Moore P. Comparative analysis of the boundary layer filtering of odor signals in the amblypygid (whip spider) species Paraphrynus laevifrons and Phrynus marginemaculatus. Journal of Insect Physiology 2020; 120.

Steele AN, Moore PA. Express yourself: individuals with bold personalities exhibit increased behavioral sensitivity to dynamic herbicide exposure. Ecotoxicology and Environmental Safety 2019; 179: 272-281.

Steele AN, Belanger RM, Moore PA. Exposure through runoff and ground water contamination differentially impact behavior and physiology of crustaceans in fluvial systems. Archives of Environmental Contamination and Toxicology 2018; 75(3): 436-448.

Presentations

*Presenter

Goodfellow WL*, Kulacki KJ, Steele AN. The use of novel tests with non-standard species and methods to resolve toxicity as part of TIEs. Platform presentation, Society of Environmental Toxicology and Chemistry Europe Annual Meeting, Copenhagen, Denmark, 2022.

Kulacki KJ*, Steele AN, Fleming ML, Goodfellow WL. Whole Effluent Toxicity (WET) assessments and experimental considerations for evaluating coagulation agents and polymers for wastewater treatment of coal combustion products. Platform presentation, World of Coal Ash Annual Meeting, Covington, KY, 2022.

Goodfellow WL*, Gard NW*, Steele AN*. The PFAS challenge: understanding the risk and potential impact on ecosystems. Exponent Live Webinar, 2021.

Steele AN*. Ecological and human health risk assessment training workshop; special topic: PFAS. Virtual workshop webinar. Society of Environmental Toxicology and Chemistry Africa Biennial Conference, 2021.

Steele AN*, Edwards DD, Moore PA. Behavioral consequences of per- and poly-fluorinated alkyl substances (PFAS) for crayfish species located at contaminated field sites. Platform presentation, Society of Environmental Toxicology and Chemistry North America Annual Meeting, Toronto, ON, Canada, 2019.

Steele AN*, Moore PA. Is shyness strength? Dynamic exposure affects personalities exhibited by aquatic organisms in predator-prey interactions. Platform Presentation, Society of Environmental Toxicology and Chemistry Young Environmental Scientists Annual Meeting, Ghent, Belgium, 2019.

Steele AN*, Moore PA. Defining exposure: Contribution of exposure paradigm characteristics to

impairment of aquatic organisms. Platform presentation, Society for Integrative and Comparative Biology Annual Meeting, Tampa, FL, 2019.

Steele AN*, Belanger RM, Moore PA. Ground water or surface flow: Which polluted water causes more detrimental effects in crustaceans placed in stream mesocosms? Platform presentation, Society for Integrative and Comparative Biology Annual Meeting, New Orleans, LA, 2018.

Steele AN*, Martin AL. Can Crayfish Distinguish Between Variable Oxygen Concentrations? Poster presentation, Society for Integrative and Comparative Biology Annual Meeting, Portland, OR, 2016.

Project Experience

Analyzed multiple behavioral responses of field collected crayfish and compared to PFAS contamination levels found at field collection sites to investigate potential varying sensitivities to long- and short-chain PFAS compounds.

Investigated several behavioral and physiological effects of atrazine exposure in artificial stream systems. Studied enzymatic responses, personality, and agonism displayed by exposed crayfish. Utilized data from bioassays within an Individual Based Model framework to predict possible population impacts of atrazine exposure.

Evaluated the bioaccumulation and environmental toxicity of industrial chemicals as part of product stewardship initiatives for a client. Data on selected chemicals were gathered from publicly available platforms (e.g., the European Chemicals Agency (ECHA), US EPA, and OECD) and were evaluated for potential harm to the environment.

Assessed potential uptake and ecological effects of an environmental release of hydrocarbons, with consideration of agricultural crops, wildlife, and domestic animal receptors.

Evaluated project documents and correspondence to assess dispute claims on matters related to environmental permitting for transportation projects, of which included CWA Sections 404, 401, and 402 permits and certifications.

Assessed and provided technical comments on draft Environmental Assessment documentation and aesthetics analysis for proposed public transportation project.

Researched national freshwater criteria, regional freshwater screening levels, and information on bioaccumulation potential in aquatic organisms for a subset of elements of interest to utility industries. Information was presented in an interactive tool to aid in the assessment of environmental impact of these utilities.

Conducted state of the science review related to the use of pesticides and pollinator protection using relevant environmental risk assessment documents from multiple countries.

Assessed potential sensitivity of dung and soil fauna to a class of veterinary pharmaceutical products using ecological data from relevant environmental risk assessment documents and literature to provide comment on product registration.

Evaluated toxicological data (acute and chronic toxicity tests) of facility wastewaters and provided recommendations to ensure long-term regulatory compliance for Whole Effluent Toxicity (WET) testing and National Pollutant Discharge Elimination System (NPDES) permits.

Performed a literature review on the state of research regarding PCBs and health of wildlife.

Evaluated literature on anthropogenic alteration of habitat (e.g., dam construction, habitat loss, dredging, invasive species introduction) and its effects on aquatic biota and wildlife for causal analysis assessments.

Peer Reviews

Marine and Freshwater Behaviour and Physiology