JASON CONDER, Ph.D.

applied ecotoxicology
ecological and human health risk assessment
environmental toxicology and chemistry

EDUCATION

Ph.D., Environmental Science, University of North Texas, 2004
M.S., Zoology, Oklahoma State University, 2000
B.S., Wildlife and Fisheries Ecology, Oklahoma State University, 1997

REGISTRATIONS AND CERTIFICATIONS

Society of Environmental Toxicology and Chemistry, member (1997-Present)
American Chemical Society, member (2005-Present)
HAZWOPER 40-hour

CAREER SUMMARY

Dr. Jason Conder has more than 15 years of consulting experience in environmental toxicology, ecological and human health risk assessment, environmental chemistry, ecology, and statistics. He has provided technical expertise in ecological risk assessment and environmental toxicology to multinational clients addressing environmental liability and risk issues associated with contaminated sites, including several large, multi-stakeholder contaminated sediment sites in North America, Europe and Asia. In addition, Dr. Conder focuses on evaluations of emerging chemicals of concern such as per- and polyfluoroalkyl substances (PFAS, such as PFOA and PFOS). He has published more than 20 peer-reviewed articles in environmental toxicology and chemistry, presented technical work at numerous international scientific conferences, and has served on and co-chaired several technical workshops.

Technical Project Examples

Human Health Risk and Permitting Issues for PFOS in the Saint Croix River, *Metropolitan Environmental Services, Minneapolis-St. Paul, Minnesota.* Evaluated proposed impairment listing and potential permitting issues related to human health risks due to bioaccumulation of PFOS in fish in the Saint Croix River. Technical work included review of regulatory impairment analyses, PFOS analytical data and statistics, regulatory criteria development and regulatory policy, which culminated in preparation of comments to the Minnesota Pollution Control Agency.

Evaluation of PFAS Ecological and Human Health Risks at an Iron Ore Mine, *Confidential Client, Western Australia.* As part of a multi-consultant team, evaluated the fate and exposure pathways relative to potential human and ecological risks from PFAS associated with the use of

Aqueous Film Forming Foam (AFFF) at various areas in a large iron ore mining complex. Responsibilities also include reviewing and guiding data collection efforts and risk assessment deliverables. The project is challenging due to a number of complex issues, such as complex fate pathways involving mine dewatering, background PFAS sources, and sensitive ecological and human health exposures that may occur far from the AFFF release points at the mines.

PFOA and PFOS Marine Toxicity Evaluation, *US Navy Naval Information Warfare Center, San Diego, California.* Assisted in the interpretation and analysis of acute toxicity test results with PFOA and PFOS for five marine laboratory toxicity test species. Conducted statistical analysis and dose-response evaluations and integrate study results with previous literature. Assisted with writing of a manuscript for submission to peer-reviewed journal. Results helped define screening and risk-based criteria for evaluation of the risks of PFOA and PFOS in marine surface waters.

PFOS Multi-generation Toxicity Evaluation, *Sediment Management Work Group.* Assisted the US Army Corps of Engineers and a technical group organized by Sediment Management Work Group in a multi-year study to evaluate the aquatic toxicity of PFOS to zebrafish (*Danio rerio*). Responsibilities included experimental design and guidance, interpretation and analysis of data, and communication of results to stakeholders. Results helped define screening and risk-based criteria for evaluation of the risks of PFOS in surface waters.

Ecological and Human Health Risk Assessment of PFAS, *Exxon Mobil, Mobil Adelaide Refinery, Port Stanvac, South Australia.* Evaluated the environmental fate and risk associated with legacy perfluoroalkyl and polyfluoroalkyl substances (PFAS) associated with decades of Aqueous Film Forming Foam (AFFF) uses at a former petrochemical facility located adjacent to a marine beach area in South Australia. Reviewed terrestrial and aquatic ecological data, derived Conceptual Site Models for PFAS exposure, evaluated local regulatory approaches to PFAS, conducted PFAS bioaccumulation and toxicity assessments for ecological risk, modeled human health recreational exposures, and evaluated ecological survey data. Communicated results and approaches to the Australian regulatory auditor and Environmental Protection Authority, as well as their team of risk assessment experts, and produced a human health and ecological risk assessment. Designed and evaluated the results of a targeted ecological study to evaluate the aquatic health of intertidal beach organisms, which demonstrated a health aquatic ecosystem despite the presence of PFAS above regulatory criteria. Results of the risk assessment and study were accepted by the regulator, and the matter was closed without additional study or active PFAS management at the beach area.

Human Health Risk Assessment of PFAS, *Confidential Client, Orange County, CA.* Evaluated the presence and risk associated with legacy PFAS in soil and groundwater at a former military facility planned for residential and commercial development in Orange County, CA. Assisted in sample planning and evaluation of data, including evaluation of human health risks to future residents exposed to PFAS via incidental soil ingestion and ingestion of homegrown garden produce. Advised client on next steps in investigation and communication of results.

Guidance for Assessing the Ecological Risks of Threatened and Endangered Species at Aqueous Film Forming Foam (AFFF)-Impacted Sites, *US Department of Defense.* Developed a guidance that aids the US Department of Defense (DoD) in assessing ecological risks from PFAS to threatened and endangered (T&E) species at AFFF impacted sites. The guidance is summarized in a comprehensive white paper that outlines the necessary components involved in assessing ecological risk to T&E species at AFFF sites, including: identification of potential risk driving T&E species, associated exposure factors and site-specific input parameters necessary for ecological risk models, suitable toxicological values for T&E species. Conducted training seminars on the guidance, and a customizable ecological risk assessment modeling tool (Excel) based on guidance approaches.

Auditor Support for Ecological and Human Health Risk Assessment of PFAS, *Confidential Client, Western Australia.* Supported an auditor review for the ecological risk assessment of PFAS in aquatic habitats in offshore and nearshore beach areas adjacent to an Australian military facility. Reviewed terrestrial and aquatic ecological data, Conceptual Site Models for PFAS exposures, evaluated and applied local regulatory approaches to PFAS, and review of food web and coastal hydrodynamic modeling for ecological risk assessment.

Technical Review and Strategy for PFAS, *Confidential Client.* For a major aerospace company, conducted a state-of-the-science review of environmental fate, toxicity, remediation, and regulatory policy for PFAS. The effort included a focus on PFAS associated with AFFF uses at airports and other industrial facilities, as well as a prospective evaluation of future AFFF best management practices and potential liabilities associated with current PFAS usage. Also evaluated the client's portfolio of industrial sites for local and regional PFAS issues, including water resource issues that could be affected by PFAS.

Site-specific Investigation Strategy for PFAS, *Confidential Client, Washington.* Evaluated concentrations of perfluorinated compounds (PFOA, PFOS, etc.) in AFFF at a fire-fighting training area in comparison to expected concentrations and profiles from AFFF samples reported in the scientific literature. Also calculated and compiled risk-based screening thresholds in soil for protection of groundwater resources.

Frequently Asked Questions (FAQ) Guidance for PFAS, *United States Department of Defense, Environmental Security Technology Certification Program (ESTCP).* Worked as part of an expert team to provide a Frequently Asked Questions guidance document for remedial project managers and other stakeholders. The document provides a concise summary on the state of knowledge regarding PFAS related to the use and release of AFFF at US military sites. Eight commonly-asked questions on PFAS uses, chemistry, risk assessment, and key issues are addressed.

Technical Review and Site-specific Investigation Strategy for PFAS, *Confidential Client, Australia.* Conducted a review of PFAS present near an airport area containing elevated levels of PFAS in groundwater and soil and assisted in the development of a strategic plan to evaluate and manage risks associated with future construction in the area. The effort included a state-of-the-

science review of environmental fate, toxicity, remediation, and regulatory policy of PFAS associated with AFFF uses at airports and other industrial facilities, a review of PFAS treatment technologies, and preparation of a guidance for PFAS sampling of groundwater, soil, surface water, and sediment. Additionally, the effort included a chemical fingerprinting evaluation of site-specific data with regards to multiple sources of PFAS in groundwater and surface water and an evaluation and critique of water quality guidelines for PFOS, including risk-based criteria for the protection of aquatic life.

Human Health Risk, Fate, and Chemical Liability Assessment of PFOS in the Upper Mississippi River, *Metropolitan Environmental Services, Minneapolis-St. Paul, Minnesota.* Evaluated human health risks due to bioaccumulation of PFOS in benthic and pelagic fish in the Upper Mississippi River adjacent to and downstream of the Minneapolis-St. Paul metropolitan area. Investigated chemical fate and source issues relevant to PFOS in preparation for potential Total Maximum Daily Load (TMDL) assessment, conducted a liability analysis of current and historical PFOS contributions to the aquatic ecosystem, conducted NPDES/303(d) permitting calculations and numerous modeling and empirical data evaluations to characterize PFOS fate in the terrestrial and aquatic environment. Technical work included litigation support and several presentations and reports to state regulators and other stakeholders.

Persistent Organic Pollutant Evaluation of Alternatives to Long-chain Fluorotelomer PFAS, *American Chemistry Council*. Evaluated persistence, bioaccumulation, toxicity, and long-range transport potentials of PFAS proposed as alternatives to long-chain fluorotelomer compounds. Reviewed company reports and peer-reviewed publications, synthesized data, and compared results to chemical registration and product stewardship criteria under Stockholm Annex D and REACH. Review results were summarized in a report for agency submittal.

Food-chain Modeling of PFAS, *DuPont, Canadian Arctic.* As lead technical advisor in ecotoxicology, assessed the global fate and transport of perfluorinated carboxylic acids (PFCAs) to the Canadian Arctic with a multi-disciplinary team of environmental chemists, engineers, and risk assessors. Developed a 5-tier food chain bioaccumulation model. The model integrated biological receptor life history and behavior, toxicokinetics of PFCAs, and environmental fate and transport processes in the Arctic Ocean to predict concentrations of PFCAs in polar bear liver tissue. Key challenges of the project included developing a model that did not rely on octanol-water partition coefficients (K_{OW} values). Model development included Monte Carlo analysis to account for uncertainty and variability associated with model parameters and predictions.

Critical Review of the Bioaccumulative Potential of PFAS, *DuPont.* Performed a survey of environmental monitoring and laboratory data on the bioaccumulation, bioconcentration, and biomagnification of perfluorinated carboxylic acids (PFCAs) and perfluorinated sulfonates (PFSAs). Results were synthesized in a scientific manuscript submitted to a peer-reviewed scientific journal (*Environmental Science and Technology*) summarizing the bioaccumulative

potential of these compounds according to guidance from current US and European chemical regulatory frameworks.

PROFESSIONAL EXPERIENCE

Geosyntec Consultants (Huntington Beach, CA), Principal, 2014 – present
ENVIRON International Corporation (Irvine, CA), Senior Manager, 2004 – 2014

REPRESENTATIVE PUBLICATIONS

Hayman, N.T., Rosen, G., Colvin, M.A., Conder, J., Arblaster, J.A. 2021. Aquatic toxicity evaluations of PFOS and PFOA for five standard marine endpoints. Chemosphere 273: 129699.

Conder, J., Zodrow, J., Arblaster, J., Kelly, B., Gobas, F., Suski, J., Osborn, E., Frenchmeyer, M., Divine, C., Leeson, A. 2021. Strategic Resources for Assessing PFAS Ecological Risks at AFFF Sites. Integr. Environ. Assess. Manag. 17: 746-752.

Zodrow, J., Arblaster, J., Conder, J. 2021. State of the Science for Risk Assessment of Per- and Polyfluoroalkyl Substances at Contaminated Sites. In: Forever Chemicals: Environmental, Economic, and Social Equity Concerns with PFAS in the Environment, Dave Kempisty, Ed. CRC Press, Boca Raton, FL.

Guelfo, J.L., Korzeniowski, S., Mills, M.A., Anderson, J., Anderson, R.H., Arblaster, J.A., Conder, J.M., Cousins, I.T., Dasuh, J., Henry, B.J., Lee, L.S., Liu, J., McKenzie, E.R., Willey, J. 2021. Environmental sources, chemistry, fate and transport of per- and polyfluoroalkyl substances: state of the science, key knowledge gaps, and recommendations presented at the August 2019 SETAC focus topic meeting. Environ. Toxicol. Chem. 12: 3234-3260.

Esterkin, J., Conder, J. 2021. PFAS reporting – what business needs to know and how to start preparing for the US EPA's new rule. Chemical Watch, November 11, 2021.

Naidu, R., Nadebaum, P., Fang, C., Cousins, I., Pennell, K., Conder, J., Newell, C.J., Longpré, D., Warner, S., Crosbie, N.D., Surapaneni, A., Bekele, D., Spiese, R., Bradshaw, T., Slee, D., Liu, Y., Qi, F., Mallavarapu, M., Duan, L., McLeod, L., Bowman, M., Richmond, B., Srivastava, P., Chadalavada, S., Umeh, A., Biswas, B., Barclay, A., Simon, J., Nathanail, P. 2020. Per- and poly-fluoroalkyl substances (PFAS): Current status and research needs. Environmental Technology & Innovation 19:100915.

Conder, J., Arblaster, J., Larson, E., Brown, J., Higgins, C. 2020. Guidance for Assessing the Ecological Risks of PFAS to Threatened and Endangered Species at Aqueous Film Forming Foam-Impacted Sites. SERDP Project ER18-1614. September. https://www.serdp-estcp.org/content/download/49882/491435/file/ER18-1614%20Guidance%20Document.pdf

Brown, J.B, Conder, J.M., Arblaster, J.A., Higgins, C.P. 2020. Assessing human health risks from per- and polyfluoroalkyl Substance (PFAS)-impacted vegetable consumption: A tiered modeling approach. Environ. Sci. Technol. 54: 15202-15214.

Larson, E.S., Conder, J.M., Arblaster, J.A. 2018. Modeling avian exposures to perfluoroalkyl substances in aquatic habitats impacted by historical aqueous film forming foam releases. Chemosphere 201:335-341.

Field, J., Higgins, C., Deeb, R., Conder, J. 2017. FAQs Regarding PFASs Associated with AFFF Use at U.S. Military Sites. Catalyzing Rapid Information Transfer Among Key Stakeholders on Per- and Polyfluoroalkyl Substances (PFASs) at Contaminated Military Sites, ER-201574-T2, Environmental Security Technology Certification Program (ESTCP).

Buck, R.C., Franklin, J., Berger, U., Conder, J.M., Cousins, I.T., de Voogt, P., Jensen, A.A., Kannan, K., Mabury, S.A., van Leeuwen, S.P.J. 2011. Perfluoroalkyl and polyfluoroalkyl substances (PFASs) in the environment: Terminology, classification, and origins. Integr. Environ. Assess. Manag. 7:513-541.

Magar, V.S., Chadwick, D.B., Bridges, T.S., Fuchsman, P.F., Conder, J.M., Dekker, T.J., Steevens, J.A., Gustavson, K., Mills, M.A. 2009. Monitored Natural Recovery at Contaminated Sediment Sites. U.S. Department of Defense, Environmental Security Testing and Development Program (ESTCP), Project ER-0622.

Conder, J.M., Hoke, R.A., de Wolf, W., Russell, M.H., Buck, R.C. 2008. Are PFCAs bioaccumulative? – A critical review and comparison with persistent lipophilic compounds. Environ. Sci. Technol. 42:995-1003.

RECENT PRESENTATIONS

Gust, K., Vinas, N., Wilbanks, M., Mylroie, E., Cox, C., Kimble, A., Conder, J., Moore, D. 2022. Investigation of Multi-Generational Perfluorooctane Sulfonate (PFOS) Exposures in Zebrafish (*Danio rerio*). Society of Toxicology Annual Meeting, San Diego, CA, March.

Conder, J.M. 2021. A Review of Tools for Site-Specific PFAS Risk Assessments. Invited speaker at REMTEC Summit, Online, March.

Conder, J.M., Arblaster, J., Zodrow, J. 2021. Assessing Site-specific PFAS Ecological Risks at AFFF Sites. Society of Environmental Toxicology and Chemistry (SETAC) Southern California Chapter Annual Meeting, Online, April.

Conder, J.M. 2021. Reaching Site-specific Closure for a PFAS Ecological Risk Assessment – A Case Study in Avoiding Snailpocalypse. Invited panel speaker, Australasian Land & Groundwater Association (ALGA) PFAS – Management into the Future, Online/Sydney, Australia, April.

Conder, J.M., Arblaster, J. 2021. Zebrafish Toxicity Thresholds for PFOS and Implications for the Protection of Aquatic Life. Invited plenary speaker, What's in Our Water Symposium / Society of Environmental Toxicology and Chemistry (SETAC) Australasia Chapter Annual Meeting, Online, August.

Conder, J.M. 2021. PFAS – Coming Soon to a Sediment Site Near You! Invited presentation for Western Dredging Association Webinar Series, October.

Conder, J.M., Arblaster, J., Bridges, K. 2020. Assessing the Ecological Risks of Per and Polyfluoroalkyl Substances (PFAS) at Aqueous Film Forming Foam Sites. Workshop presented at the Emerging Contaminants Summit, Denver, CO, March.

Conder, J.M. 2020. Assessing the Ecological Risks of Per and Polyfluoroalkyl Substances (PFAS) at Aqueous Film Forming Foam Sites. Invited Webinar: US State Risk Assessors Group, July.

Conder, J.M., Arblaster, J., Higgins, C. 2020. Assessing the Ecological Risks of Per and Polyfluoroalkyl Substances (PFAS) at Aqueous Film Forming Foam Sites. Workshop presented at the Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Online, November.

Conder, J.M. 2020. Sediment Site Characterization for Hydrophobic Organic Contaminants: Passive Sampling Techniques and Novel Sensors. Invited Webinar: SiREM Presentation Series, December.

Conder, J.M., Arblaster, J., Larson, E. 2019. Classification and Grouping of PFAS for Environmental Risk Assessment. Invited presentation at the Society of Environmental Toxicology and Chemistry (SETAC) Focused Meeting on PFAS, Durham, NC, August.

Conder, J.M., Arblaster, J., Larson, E., Brown, J., Higgins, C. 2019. Guidance for Assessing the Ecological Risks of Threatened and Endangered Species at Aqueous Film Forming Foam (AFFF)-Impacted Sites. Society of Environmental Toxicology and Chemistry (SETAC) Focused Meeting on PFAS, Durham, NC, August.

Arblaster, J., Conder, J.M., Larson, E., Brown, J., Higgins, C. 2019. Framework for Assessing Risks to Threatened and Endangered Aquatic Life at PFAS Impacted Sites. Society of Environmental Toxicology and Chemistry (SETAC) Focused Meeting on PFAS, Durham, NC, August.

Conder, J.M., Arblaster, J.A., Larson, E. 2019. Toxicology, Risk Assessment, and Risk Management of PFAS: State of the Science. Invited keynote presentation, International Cleanup Conference, Adelaide, SA, Australia, September.

Conder, J.M., Arblaster, J., Larson, E., Brown, J., Higgins, C. 2019. Guidance for Assessing the Ecological Risks of Threatened and Endangered Species at Aqueous Film Forming Foam

(AFFF)-Impacted Sites. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Toronto, ON, Canada, November.

Larson, E., Arblaster, J., Conder, J.M., Brown, J., Higgins, C. 2019. Selection of Toxicity Reference Values (TRVs) for Use in Ecological Risk Assessment of Threatened and Endangered Species at AFFF Impacted Sites. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Toronto, ON, Canada, November.

Larson, E., Conder, J.M., Arblaster, J., Brown, J., Higgins, C. 2019. Selection of Bioaccumulation Metrics for Use in Empirical PFAS Food Web Modeling for Threatened and Endangered Wildlife Species. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Toronto, ON, Canada, November.

Arblaster, J., Conder, J.M., Larson, E., Brown, J., Higgins, C. 2019. Framework for Assessing Risks to Threatened and Endangered Aquatic Life at PFAS Impacted Sites. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Toronto, ON, Canada, November.

Conder, J.M., Larson, E. 2019. Ecological Risks of Per and Polyfluoroalkyl Substances (PFAS). 1-hour webinar, Australasian Land & Groundwater Association (ALGA) eLearning Webinar, November.

Conder, J.M., Larson, E., Arblaster, J. 2018. Prioritizing Data Needs for Assessing the Ecological Risks of PFASs in Habitats Impacted by Aqueous Film Forming Foam Releases. Emerging Contaminants Summit, Westminster, CO, February.

Deeb, R., Conder, J., Jorstad, L. 2018. Technical and Regulatory Issues Resulting from the Use of PFASs at Military and Industrial Facilities. CRC CARE Workshops in Sydney, Australia and Melbourne, Australia, August.

Conder, J.M. 2018. Ecotoxicity and Ecological Risk Assessment of PFAS. Petroleum Environmental Research Forum (PERF) Fall Meeting, Houston, TX, October.

Conder, J.M. 2018. Per- and polyfluoroalkyl substances (PFAS) - Overview of Technical and Regulatory Issues Resulting from AFFF Use at Military and Industrial Facilities. SAM Forum, San Diego, CA, October.

Conder, J.M., et al. 2018. Managing Per- and Polyfluoroalkyls (PFAS) At Your Sites. Interstate Technology Regulatory Council (ITRC) Short Courses in Palm Springs, CA (March) and Sacramento, CA (November).

Conder, J.M., Arblaster, J., Larson, E., Brown, J., Higgins, C. 2018. Guidance for Assessing the Ecological Risks of Threatened and Endangered Species at Aqueous Film Forming Foam (AFFF)-Impacted Sites. ESTCP-SERDP Partners Meeting, November.

Conder, J.M. 2017. Fate, toxicology, and risk management of perfluoroalkyl and polyfluoroalkyl substances. Invited Keynote Speaker Presentation, REMTEC Summit, Denver, CO, March.

Deeb, R., Higgins, C., Conder, J.M., Field, J. 2017. ESTCP Tech Transfer: Frequently Asked Questions on Per- and Polyfluoroalkyl Substances (PFASs). REMTEC Summit, Denver, CO, March.

Larson, E.S., Conder, J.M., Arblaster, J.A. 2017. Prioritizing Data Needs For Assessing the Ecological Risks of PFASs in Habitats Impacted by Aqueous Film Forming Foam Releases. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Minneapolis, MN, November.

Arblaster, J., Conder, J.M., Reynolds, D., Monaghan, P. 2017. Selection of Aquatic Toxicity Data for Species Sensitivity Distributions for PFOS and the Effect on Aquatic Life Protection Criteria. Society of Environmental Toxicology and Chemistry (SETAC) North America Annual Meeting, Minneapolis, MN, November.