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PACIFIC NORTHWEST CONSORTIUM ON PLASTICS: CONVERGENCE ON MICRO- AND NANOPLASTICS IN AQUATIC ENVIRONMENTS

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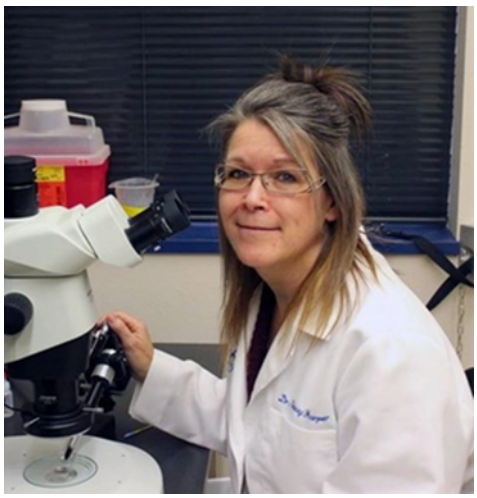

Abstract Aquatic ecosystems are polluted with plastic waste on a global scale. As plastics degrade in the environment, they inevitably pass through the size range in which they would be considered microplastics (< 5mm) and nanoplastics (1-1000 nm). Micro- and nanoplastics can be ingested by numerous aquatic and terrestrial organisms, including humans. Furthermore, it is well-documented that nanoscale-sized particles can be directly taken up into cells, and that ingested particles <150 micron can cross the epithelial lining of the digestive tract into other tissues. Ingestion or uptake can induce oxidative stress and damage tissues in fish and other aquatic organisms critical to the food web, and can alter growth and reproduction causing an increase in neonate malformations and potential decrease in population size. In order to inform risk assessments and policy, and to establish knowledge for micro- and nanoplastics remediation, there is a need to establish foundational data on the fate and effects of these small plastics in aquatic environments as well as what factors influence their deposition and effects.

In response to these gaps in our knowledge, the Pacific Northwest Consortium on Plastics: Convergence on Micro- and Nanoplastics in Aquatic Environments was recently sponsored by the National Science Foundation under their Growing Convergence Research Big Idea program. The research arm of our work focuses on micro and nanoplastic transport, fate, uptake and impacts in aquatic systems – ranging from freshwater to marine systems. The overarching goal of this convergent research is to provide foundational information about what plastics' features (e.g., composition, size, shape) and environmental components (e.g. salinity, primary and secondary producer characteristics, lipid content) are determinative of risk. The Consortium arm of the project brings together regional scientists, regulators, and community coalitions in the Pacific Northwest to compile data on plastics occurrence, transport through the environment, breakdown, and

consequential effects on organisms and ecosystems in effort to support risk decision-makers. Data on the occurrence and toxicity are being used to establish a plastic-specific, multi-stressor risk assessment model to aid decision makers. We work with Consortium partners to identify data rich areas that would serve as good case studies based on broad criteria (adequate data sets, important location, cooperative and collaborative stakeholders, and a site that appreciates the adaptive management model). The social and environmental problem of plastics in the environment is of critical concern, so the Consortium also offers a mechanism to educate the public on the hazards of, and research directed on, plastics

***Bio*:** Dr. Stacey Harper is a Professor at Oregon State University in the Department of Environmental and Molecular Toxicology and the School of Chemical, Biological and Environmental Engineering and is a Signature Researcher of the Oregon Nanoscience and Microtechnologies Institute. In her research, she utilizes novel, multidisciplinary approaches and state-of-the-art technology to address important questions arising from human and environmental exposures to nanoscale materials. A recent focus of her research program is on the transport, fate and effects of micro and nanoscale plastics. Her research group spans disciplines such as toxicology, environmental engineering, biology, and bioresources research. Dr. Harper is actively engaged in the national and international standards for nanotechnology environmental, health and safety, serves as a representative on the ANSI-accredited U.S. Technological Advisory Group for ISO/TC 229 Nanotechnologies, and is past chair of the ASTM International Committee E56 on Nanotechnology. She is an active faculty member in the Environmental Health Sciences Center, is a member of the NIEHS Toxicology Training program at OSU, and is a Co-leader of the Superfund Research Center Research and Experiential Training Coordination Core