

Sources to Seafood: Mercury Pollution in the Marine Environment
Background on Presenting Scientists

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Dr. Celia Chen is an aquatic ecologist whose research over the last 18 years has focused on the fate and effects of metal contaminants in aquatic food webs both in freshwater and estuarine ecosystems. She has studied the bioavailability and bioaccumulation of mercury and other metals (arsenic, cadmium, lead, zinc) in plankton and benthic invertebrates and trophic transfer to fish. She has conducted metal bioavailability studies in the laboratory using freshwater and estuarine crustaceans and fish, and has also investigated metal bioaccumulation and trophic transfer in field studies in lakes, streams, and estuaries in the Northeast US. Her research questions focus on the chemical and ecological factors that influence metal uptake, including salinity, natural organic matter, feeding strategy, and food web structure. In addition, she has also conducted research on the combined effects of multiple stressors on aquatic organisms. She has used multivariate and regression-based approaches to examine the non-linear and interactive effects of contaminants (pesticides, metals, sodium-dodecylsulfate) and natural environmental factors including pH, temperature and food availability. She has compared empirical results to simple comparative, additive, and multiplicative effects models as well as used novel experimental and modeling approaches, including adaptive design and isobologram models.

In recent mercury research, Dr. Chen has been studying the relationship of methylmercury in estuarine sediments and surface waters to bioaccumulation in intertidal food webs. She has focused primarily on lower trophic levels both in the water column and in sediments where methylmercury enters the food web. She has investigated both pristine and contaminated sites from Maine to New Jersey. She has also been conducting research at three Superfund sites: the Berlin mercury site (NH) and two other mercury contaminated sites in tidal systems, Mill Creek NJ, and Portsmouth Harbor, NH.

Dr. Chen has also initiated and participated in numerous panels and committees to bring science to inform policy. In 2003, she participated on a scientific panel for the *Hubbard Brook Research Foundation*, which was titled "*Science Links Project*"; the panel produced synthesis documents and a paper in *Bioscience* on mercury fate in the Northeast US to inform decision-makers and the public. As a Co-Leader of the project on aquatic mercury fate for the Dartmouth Superfund Research Program, she co-chaired an NIEHS funded workshop in 2006 entitled, "Fate and Bioavailability of Mercury in the Aquatic Ecosystems and Effects on Human Exposure." the goal was to synthesize and summarize the state of

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knowledge of mercury in marine ecosystems. Both mercury scientists and stakeholders participated in the workshop, and she and co-authors produced an *Environmental Health Perspectives* workshop report (Chen et al. 2008) and a special mercury issue in *Ecohealth*. More recently, as the Leader of the Dartmouth SRP Research Translation Core, she chaired a second NIEHS funded workshop entitled “Coastal Marine Mercury Ecosystem Research Collaborative (C-MERC),” which included scientists and policy stakeholders and was structured around stakeholder needs for policy relevant science. C-MERC has recently produced 11 peer-reviewed papers, two of which appeared in the June 2012 issue of the journal *Environmental Health Perspectives* and nine in a special issue of *Environmental Research*. Dr. Chen also served on a USEPA Science Advisory Board Panel on mercury and contributed her scientific expertise to inform EPA’s decision on the risk assessment for the mercury Rule.



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Dr. Charles T. Driscoll is the University Professor of Environmental Systems Engineering at Syracuse University. Dr. Driscoll received his B.S. degree in Civil Engineering from the University of Maine in 1974, and his M.S. in 1976 and Ph.D. in 1980 in Environmental Engineering from Cornell University. Dr. Driscoll's teaching and research interests are in the areas of environmental engineering, environmental chemistry, biogeochemistry, soil chemistry and environmental quality modeling.

A principal focus of Dr. Driscoll's research has been the effects of disturbance on forest, aquatic and coastal ecosystems, including air pollution (acid rain, mercury), land-use change, climate change and elevated inputs of nutrients and trace metals. Dr. Driscoll has authored or co-authored more than 370 peer-reviewed articles, and has been acknowledged by the Institute for Scientific Information (ISI) as one of the most highly cited researchers in both engineering and environmental science. He has received external funding for more than 90 research projects, mostly obtained from competitive research programs such as the National Science Foundation and the Environmental Protection Agency. He has been a principal investigator of the National Science Foundation's Long-Term Ecological Research project at the Hubbard Brook Experimental Forest, New Hampshire since 1987. In 1984, the National Science Foundation designated Dr. Driscoll as a Presidential Young Investigator. In 2007 he was elected to the National Academy of Engineering. He has provided expert testimony to U.S. Congressional and State committees. Dr. Driscoll has served on many local, national and international committees, including the National Research Council and U.S. Environmental Protection Agency committees.



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Dr. Mason's major interests include the biogeochemistry of mercury in the ocean and marine boundary layer, the biogeochemical cycling of metals and metalloids, and the role of the atmosphere in their global transport. Dr. Mason is also interested in examining the exchange of mercury and other trace elements at the sediment-water interface, and their accumulation into aquatic organisms. His research has both a fundamental research focus as well as delving into topics related to the impact of trace elements on organisms. He has been a professor in the Department of Marine Sciences, with a joint appointment in Chemistry at the University of Connecticut since 2005. Prior to that he was at the Chesapeake Biological Laboratory, part of the University of Maryland Center for Environmental Science for 11 years. He received his post-doc at MIT in the Parsons Lab from 1992-1994 and obtained his PhD in 1991 from the University of Connecticut. Dr. Mason has been involved in many research cruises over the 25 years since he started his PhD, but has also been involved in coastal and atmospheric studies. Dr. Mason has published over 100 peer-reviewed papers, and 17 book chapters. He is currently completing a book titled "Trace Metals in Aquatic Systems" which covers fresh and marine waters, and includes metals and metalloids. Dr. Mason has graduated eight PhD and seven MS students with the majority (80%) being women and/or minority students. He currently has four PhD and one MS student.

Dr. Mason is interested in promoting STEM education and the involvement of minorities in marine chemistry. He is also interested in the interaction between science and policy and has made presentations to federal agencies and on the hill related to mercury emissions and anthropogenic impacts. He has just completed two years as a Program Officer in the Chemical Oceanography Program at NSF which has given him a perspective of the research funding and the broadness and exciting nature of our discipline. He has served on international scientific organizations involved with the fate and transport of mercury such as those under the United Nations Environmental Program on Mercury, the GESAMP (Group of Experts on Scientific Aspects of Marine Environmental Protection) Mercury Workgroup and also the Hemispheric Transport of Air Pollutants (HTAP) Workgroup. Dr. Mason is a member of AGU, ASLO, American Chemical Society, Geological Society of America and American Society of Microbiology. He has been the guest editor of three special issues (2 in Marine Chemistry, one in Deep Sea Research II). Dr. Mason is on the organizing committee of the International Estuarine Biogeochemistry Symposium and hosted the meeting in 2005 and is a member of the International Conference on Heavy Metals in the Environment.



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Dr. Elsie Sunderland is the Mark and Catherine Winkler Assistant Professor of Aquatic Science in the Department of Environmental Health of Harvard's School of Public Health. Dr. Sunderland's research combines field studies with modeling tools to study how the fate, transport, and bioaccumulation of chemicals affect human exposures and risks. Her research connects two areas: biogeochemical processes affecting water quality, and studies in public health that characterize toxicity mechanisms and dose-response relationships of environmental exposures. Over the past several years, her research has focused on the biogeochemical cycling of mercury and impacts of anthropogenic emissions on human health. Dr. Sunderland received her bachelor of science degree from McGill University in environmental sciences with a specialization in aquatic sciences and her PhD in environmental toxicology from Simon Fraser University. She then held several positions at the headquarters for the U.S. Environmental Protection Agency, where she worked on regulatory impact assessments and the development and application of models to inform regulatory decisions. Dr. Sunderland has received the EPA's Highest Level Scientific and Technological Achievement Award and the EPA Gold Medal for Exceptional Service. She was the conference and technical co-chair for the 10th International Conference on Mercury as a Global Pollutant in 2011.

