

Margaret E. McArdle
Senior Scientist

Professional Profile

Ms. Margaret E. McArdle is a Senior Scientist in Exponent's EcoSciences practice. Ms. McArdle has 10 years of experience in evaluating the effects of heavy metals and organic contaminants in aquatic, wetland and terrestrial systems to ecological receptors. She has conducted numerous ecological risk assessments in compliance with state and federal regulatory requirements. Ms. McArdle has worked on Superfund, RCRA, and state-led hazardous waste site projects across the country. She specializes in analysis of toxicity test data and field assessment data as well as developing conceptual models, toxicity reference values for aquatic life and wildlife, and wildlife exposure models for ecological risk assessments. She manages staff for field sampling programs and ecological risk assessments. She also provides technical support and manages tasks for litigation. Ms. McArdle has peer-reviewed manuscripts on ecological risk assessments and aquatic toxicology submitted for publication. Her other areas of expertise include endocrine disruption in aquatic life and the bioavailability of contaminants present in sediments and surface water.

In her graduate research, Ms. McArdle performed chronic laboratory exposures and field studies to assess estrogenic effects (a form of endocrine disruption) and other effects of organic pollutants on fish. She also conducted an extensive literature review of laboratory, field, and field-simulated aquatic exposure studies concerning individual- and population-level effects of organic contaminants on fish.

Ms. McArdle is a member of the Society of Environmental Toxicology and Chemistry (SETAC) and a past board member of the North Atlantic Chapter of SETAC. She is a member and past chairperson of the Education Committee of the Licensed Site Professionals Association (LSPA). She is an active member of the Massachusetts Department of Environmental Protection's Ecological Risk Assessment Workgroup.

Academic Credentials and Professional Honors

M.S., Marine Environmental Sciences, Marine Sciences Research Center, State University of New York, 1999

B.S., Zoology, University of Rhode Island (*with high distinction*), 1996

Recipient of the first Evan Liblit Memorial Scholarship; Phi Beta Kappa Academic Honor Society; Alpha Award for Zoological Research

Licenses and Certifications

OSHA Certified 40-Hours of Training in Hazardous Waste Operations and Emergency Response (2000)

OSHA Certified Eight-Hour HAZWOPER Annual Refresher Training (yearly)

Publications

McArdle ME, Kane Driscoll SB, Booth PN. An ecological risk-based cleanup strategy for contaminated sediments in a freshwater brook. *Int J Soil Sed Water* 2010; 3(2):1–24.

Kane Driscoll SB, McArdle ME, Plumlee MH, Proctor D. Evaluation of hexavalent chromium in sediment pore water of the Hackensack River, New Jersey, USA. *Environ Toxicol Chem* 2010; 29(3):617–620.

Kane Driscoll SB, McArdle ME, Menzie CA, Reiss M, Steevens JA. A framework for using dose as a metric to assess toxicity of fish to PAHs. *Ecotoxicol Environ Saf* 2010; 73:486–490.

McArdle M, Ziccardi L, Lowney Y, Kane Driscoll S. Considerations for interpreting nanomaterial toxicity studies for use in environmental risk assessment. *Proceedings, International Conference on the Environmental Implications and Applications of Nanotechnology*, University of Massachusetts Amherst, pp. 57–60, June 9–11, 2009. <http://scholarworks.umass.edu/tei>.

Menzie CA, Ziccardi LM, Lowney YW, Fairbrother A, Shock SS, Tsuji JS, HaMai D, Proctor D, Henry E, Su SH, Kierski MW, McArdle ME, Yost LJ. Importance of considering the framework principles in risk assessment for metals. *Environ Sci Technol* 2009; 43:8478–8482.

Kane Driscoll SB, Amos BC, McArdle ME, Menzie CA, Coleman A. Predicting sediment toxicity at former manufactured gas plants using equilibrium partitioning benchmarks for PAH mixtures. *Soil Sed Contamin* 2009; 18(3):307–319.

Ziccardi L, McArdle M, Lowney Y. The ecological effects of nanomaterials: A focus on aquatic life. *Special Issue on Applications of Nanotechnologies in Environmental Protection and Pollution, Part 1*. Schulte J, Vaseashta A (eds), *NANO: Brief Reports and Reviews* 2008; 3(4):251–255.

Kane Driscoll SB, Amos CB, McArdle ME, Southworth B, Menzie CA, Coleman A. Use of Equilibrium Partitioning Sediment Benchmarks (ESBs) to predict toxicity of PAH contaminated sediments. Electric Power Research Institute (EPRI), Palo Alto, CA, 1010371, 2005.

Kane Driscoll SB, Amos CB, McArdle ME, Southworth B, Menzie CA, Coleman A. Sediment biotoxicity at former MGP and coking sites. Electric Power Research Institute (EPRI), Palo Alto, CA; New York State Electric & Gas Corporation, Binghamton, NY; Central Hudson, Poughkeepsie, NY; and PSEG Services, LLC, Newark, NJ, 1011168, 2004.

McArdle ME, McElroy AE, Elskus AA. Enzymatic and estrogenic responses in fish exposed to organic pollutants in the New York-New Jersey (USA) Harbor complex. *Environ Toxicol Chem* 2004; 23(4):953–959.

Cura JJ, Bridges TS, McArdle ME. Comparative risk assessment methods and their applicability to dredged material management decision-making. *Hum Ecol Risk Assess* 2004; 10:485–503.

Kane Driscoll SB, McArdle ME, Menzie CA, Thompson T, Mortensen L, Fitzpatrick A. Using Polycyclic Aromatic Hydrocarbons in sediments for judging toxicity to aquatic life: Volume I and II, EPRI Final Report. Electric Power Research Institute (EPRI), Palo Alto, CA, 1005280, 2003.

Menzie CA, Cura JJ, Kane-Driscoll SB, Lacey R, McArdle M. Assessing ecological risks of PAH-contaminated sediments. *Proceedings, International Conference on Remediation of Contaminated Sediments, Venice, Italy, October 10–12, 2001.*

McArdle ME, Elskus AA, McElroy AE, Larsen BK, Benson WH, Schlenk D. Estrogen and CYP1A response of mummichogs and sunshine bass to sewage effluent. *Mar Environ Res* 2000; 50(1–5):175–179.

Specker JL, Schreiber AM, McArdle ME, Poholek A, Henderson J, Bengtson DA. Metamorphosis in summer flounder: effects of acclimation to low and high salinities. *Aquaculture* 1999; 176:145–154.

Book Chapters

Cura JJ, Kane Driscoll SB, Lacey R, McArdle M, Menzie CA. Assessing ecological risks of PAH-contaminated sediments. In: *Sediments Guidance Compendium 2001*. Electric Power Research Institute (EPRI), Palo Alto, CA.

Presentations

Kane Driscoll SB, McArdle ME, Montgomery C. Case studies of MassDEP findings on environmental risk characterizations. Co-presented a credited, 8-hour short course to Massachusetts Licensed Site Professionals Association, Westford, MA, April 27, 2010.

Kane Driscoll SB, McArdle ME, Montgomery C. Improve your understanding of ecological risk assessments to write a better RAO. Co-presented a credited, 4-hour short course to Massachusetts Licensed Site Professionals Association, Westford, MA, February 26, 2009.

McArdle ME, Booth PB, Kane Driscoll SB. Benefits of using site-specific measurements and innovative approaches in an ecological risk assessment. Presented at the Annual International Conference on Contaminated Soils, Sediments, and Water, Amherst, MA, October 20–23, 2008.

Booth PB, McArdle ME, Kane Driscoll SB. Application of ecological risk-based approach to the remediation of a former manufacturing plant site. Presented at the Annual International Conference on Contaminated Soils, Sediments, and Water, Amherst, MA, October 20–23, 2008.

Ziccardi L, McArdle ME, Lowney Y. The ecological effects of nanomaterials: are new stressors associated with new technologies? Presented at the International Symposium on Nanotechnology in Environmental Protection and Pollution (ISNEPP) 2007, Fort Lauderdale, FL, December 11–13, 2007.

McArdle ME, Menzie CA, Kane-Driscoll S. Experience in applying the weight-of-evidence approach to aquatic sites contaminated with heavy metals. Presented at the 13th Annual Meeting of the North Atlantic Chapter of Society of Environmental Toxicology and Chemistry (SETAC), Bristol, RI, June 13–15, 2007.

McArdle ME, Wickwire TW, Menzie CA, Kierski M, Bailey E, Murray D. Applying risk based solutions to target efficient Brownfields redevelopment. Presented at the Brownfields 2006 Conference, Boston, MA, November 12–15, 2006.

Menzie CA, McArdle ME. Applying weight-of-evidence approaches for management of sediments contaminated with metals. Presented at the 27th Annual Meeting of SETAC North America, Montreal, Canada, November 5–9, 2006.

Kane Driscoll SB, McArdle ME, Burmistrov D, Reiss M, Steevens JA. A methodology for deriving a tissue concentration of cyclodiene pesticides that is protective of fish. Presented at the 27th Annual Meeting of SETAC North America, Montreal, Canada, November 5–9, 2006.

Kane Driscoll SB, McArdle ME, Burmistrov D, Reiss M, Steevens JA. A methodology for deriving a dietary dose of total polynuclear aromatic hydrocarbons that is protective of fish. Presented at the 27th Annual Meeting of SETAC North America, Montreal, Canada, November 5–9, 2006.

Menzie CA, Fogarty K, McArdle ME. Risk-based environmental solutions for Brownfields: 2 Case Studies. Presented at the Brownfields 2005 Conference, Denver, CO, November 2–4, 2005.

Kane Driscoll SB, McArdle ME, Menzie CA, Thompson TA, Coleman A. An examination of the bioavailability and toxicity of sediment-associated PAHs at manufactured gas plants. Presented at the 24th Annual Meeting of SETAC North America, Austin, TX, November 9–13, 2003.

McArdle ME, Kane Driscoll SB, Lacey R, Menzie CA, Thompson ME. The use of goose feces as a measure of exposure to lead contaminated sediments in an ecological risk assessment. Presented at the 26th Annual Meeting of the New England Association of Environmental Biologists, Newport, RI, March 13–15, 2002.

Kane Driscoll SB, McArdle ME, Menzie CA, Coleman A. Application of sediment quality guidelines of PAHs to manufactured gas plant sites. Presented at the 23rd Annual Meeting of SETAC North America, Salt Lake City, UT, November 16–20, 2002.

Bridges T, Cura JJ, Kane Driscoll SB, McArdle M, Nelson M. A review of comparative risk assessment methods and their applicability to dredged material management decisions. Presented at the 23rd Annual Meeting of SETAC North America, Salt Lake City, UT, November 16–20, 2002.

Kane-Driscoll SB, McArdle ME, Lacey R, Thompson ME, Menzie CA. Using feces and eggs to assess waterfowl exposures to lead in an ecological risk assessment. Presented at the 22nd Annual Meeting of SETAC North America, Baltimore, MD, November 11–15, 2001.

McArdle ME, McElroy AE, Elskus AA. Effects of organic contaminants in New York-New Jersey Harbor on fish steroid and xenobiotic biotransformation systems. Presented at the 20th Annual Meeting of SETAC North America, Philadelphia, PA, November 14–18, 1999.

McArdle ME, Elskus AA, McElroy AE, Larsen B, Benson W, Schlenk D. Differences in estrogenic response in two species, *Fundulus heteroclitus* and *Morone saxatilis*. Presented at the 10th Annual Meeting of Pollutant Responses in Marine Organisms, Williamsburg, VA, April 25–29, 1999.

McArdle ME, McElroy AE, Elskus AA. Estrogenic potential of organic contaminants in New York Harbor. Presentation of the Tibor T. Polgar Fellowship Program.

McArdle ME, McElroy AE, Elskus AA. The estrogenic potential of organic contaminants in the New York-New Jersey Harbor Complex sediments. Presented at the 19th Annual Meeting of SETAC North America, Charlotte, NC, November 15–19, 1998.

Prior Experience

Senior Scientist, Menzie-Cura & Associates, Inc., 1999–2006

Graduate Research Assistant and Teaching Assistant, State University of New York, 1997–1999

Project Experience

Developed a scope of work and sampling and analysis plan to support a site-specific human health and ecological risk assessment of contaminants associated with historic fuel oil release in upland, wetland, and aquatic habitats.

Conducted an ecological risk assessment and provided technical support to the feasibility study of former army base, which included four upland areas of concern and one containing marine sediments. Characterized risk to aquatic organisms, fish, and wildlife through a combination of empirical investigation and modeling. Developed cleanup numbers in sediment and soil for polychlorinated biphenyls (PCBs), DDT, dieldrin, and lead that would be protective of ecological receptors at the former army base.

Managed an ecological risk characterization for a boat yard in southeastern Massachusetts. The assessment evaluated exposures of ecological receptors to metals, PCBs and tributyltin (TBT) in sediment and the food chain. The work included collection of representative aquatic organisms, sediment toxicity tests, exposure pathway analysis, selection of contaminants of concern, fate and transport analysis, and the identification of toxicological endpoints, and combining these elements in a risk characterization.

Managed a human health and ecological risk assessment for a property along the Mystic River near Boston, Massachusetts. The assessment evaluated exposures of ecological receptors to arsenic, lead, polynuclear aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPH) and PCBs in groundwater, soil and sediment. Considered future uses of property in human health risk assessment.

Conducted an ecological risk assessment for a Brownfields site, which abuts the Chelsea River in Chelsea, Massachusetts. The property was a lithographic facility that produced wrappers and labels and is being redeveloped for residential and retail use. Conducted an exposure pathway analysis, selection of contaminants of concern, fate and transport analysis, and the identification of toxicological endpoints and a risk characterization.

Conducted an ecological risk assessment for a large, eutrophic water body with metal contaminated sediments in Massachusetts. Characterized risks to benthic invertebrates, planktonic invertebrates, fish and wildlife using site-specific information on the water body and three reference areas. Site-specific data included body burdens of metals in fish, submerged aquatic vegetation, and freshwater clams; sediment and water column bioassays; benthic and planktonic invertebrate community assessments over two seasons; synoptic survey of fish communities; field observations of wildlife; and food chain modeling to wildlife.

Conducted an ecological risk assessment for a site containing wetlands in Gloucester, Massachusetts. Evaluated the potential risk from metals and PAHs in the sediment and wetland soil to the environment based on a comparison to background levels and evaluations for aquatic life and wildlife based on site-specific information (e.g., toxicity test bioassays, bioaccumulation tests, and food chain modeling). Developed cleanup numbers in sediment and soil for chromium that would be protective of ecological receptors at the site.

Managed a human health and ecological risk assessment for a former incinerator facility in northeast Massachusetts. Dioxins, furans, PAHs and certain metals were found in soils and sediments above background levels. Potential risks from these chemicals to a recreational fisher, trespasser, utility work, construction work and parking lot landscaper were evaluated. The environmental characterization, which was conducted for a nearby pond, evaluated risk to aquatic organisms and semi-aquatic wildlife based on body burdens of contaminants in fish and benthic invertebrates, and on estimated exposure to contaminated sediment and prey.

Collected and evaluated data on metal concentrations in fish tissues to estimate the potential for risk to human health and ecological receptors (e.g., fish and wildlife) that may use a large lake at a former army base in Alabama.

Conducted an extensive review of the available information on the toxicity of dioxin-like compounds to birds. Compiled a database of dose-response relationships that was used to develop a species sensitivity distribution for effects to avian species.

Co-authored a literature review of scientific studies on the ecological effects of engineered nanomaterials.

Reviewed literature on the effects of cyclodiene pesticides on fish and relationships between fish tissue residue levels and effects to support the development of tissue residue levels that are protective of fish.

Reviewed literature on the evaluation and consideration of the effects of non-chemical stressors in dredging projects for preparation of a manuscript with US Army Corps of Engineers on applying risk assessment approaches to non-chemical stressors related to dredging.

Conducted an environmental evaluation of a proposed water desalination plant adjacent to the Mediterranean Sea. Described the potential impacts of the desalination plant processes (e.g., wastewater discharge) on the surrounding marine environment based on a review of the ambient conditions. Described the potential impacts from the surrounding Mediterranean environment (e.g., nuisance algal blooms) to the proposed desalination plant. Provided recommendations for mitigating those potential impacts to the water desalination plant and the surrounding aquatic environment.

Professional Affiliations

- Society of Environmental Toxicology and Chemistry—SETAC
- North Atlantic Chapter of SETAC
- Licensed Site Professionals Association (Massachusetts)