



Ann Michelle Morrison, Sc.D.

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Professional Profile

Dr. Morrison has over 29 years of experience evaluating the relationship between anthropogenic activities and health effects to natural resources and humans. Dr. Morrison specializes in natural resource damage assessment (NRDA), environmental causal analysis, risk evaluations, net environmental benefit analysis, and assessments of water quality conditions.

Dr. Morrison has provided scientific consultation regarding the design of field studies for NRDA, and she has worked closely with legal counsel during scientific assessments and settlement negotiations with state and federal parties. Dr. Morrison has performed detailed technical assessments of risk and injuries to natural resources, including vegetation, benthic infauna, fishes, shellfishes, corals, birds, and wildlife. She has also developed site-specific sediment toxicity thresholds based on the empirical relationships of chemical concentrations to biological effects and evaluated the impacts of climate change events to ecological populations. Dr. Morrison has provided scientific consultation on carbon offset credit projects, carbon sequestration in natural working lands, and on life cycle assessment inputs for industrial processes. She has offered expert testimony concerning potential injury to natural resources, environmental impacts associated with development projects, net environmental benefits of remediation alternatives, and biofouling of marine assets.

Projects Dr. Morrison has been involved with have concerned oil spills, sewage releases, heavy metal contamination, polychlorinated biphenyls, coal ash, phosphate mining, harmful algal blooms, water rights, carbon footprints, and various industrial and municipal facilities that have generated complex releases to the environment. Dr. Morrison uses her broad knowledge of biology, ecology, toxicology, chemistry, statistics, and human health to assess risk and injury, evaluate sustainability, weigh net environmental benefits, analyze causation, evaluate climate impacts, and support decision making.

Academic Credentials & Professional Honors

Sc.D., Environmental Health, Harvard University, 2004

M.S., Environmental Health, Harvard University, 2001

B.S., Biology, Rhodes College, 1997

Prior Experience

Senior Scientist, Sole Proprietor, Morrison Environmental Data Services, 2004-2007

Data Analyst, ETI Professionals, 2005

Scientist, NIH Toxicology Training Grant, Harvard School of Public Health, 2000-2004

Guest Student, Woods Hole Oceanographic Institution, Stegeman Lab, 2001-2004

Science Intern, Massachusetts Water Resources Authority, 03-05/2000, 10/2000-10/2001

Research technician, Bermuda Biological Station for Research, Inc., Benthic Ecology Research Program (BERP), Bermuda, 01/1998-09/1999, 06-08/2000

Research Intern, Bermuda Biological Station for Research, Inc., Benthic Ecology Research Program (BERP), Bermuda, 05/1997-12/1997

NSF Research Experience for Undergraduates Fellowship, Bermuda Biological Station for Research, Inc., Benthic Ecology Research Program (BERP), Bermuda, 08-11/1996

Professional Affiliations

American Chemical Society—ACS

Society for Risk Analysis—SRA

Society of Environmental Toxicology and Chemistry—SETAC North Atlantic Chapter of SETAC

American Society for Testing and Materials—ASTM

Publications

Wechsung A, Buehler C, James J, Morrison AM, Stern M. 2022. Carbonomics: Introduction to Carbon Pricing, Regulations, and Frameworks. American Institute of Chemical Engineers. CEP. September 2022.

Mearns AJ, Morrison AM, Arthur C, Rutherford N, Bissell M, Rempel-Hester MA. Effects of pollution on marine organisms. *Water Environment Research* 2020; 92(10): 1510-1532.

Mearns AJ, Bissell M, Morrison AM, Rempel-Hester MA, Arthur C, Rutherford N. Effects of pollution on marine organisms. *Water Environment Research* 2019; 91(10):1229-1252.

Mearns AJ, Reish, DJ, Oshida PS, Morrison AM, Rempel-Hester MA, Arthur C, Rutherford N, Pryor R. Effects of pollution on marine organisms. *Water Environment Research* 2017; 89(10):1704-1798.

Morrison AM, Edwards M, Buonagurio J, Cook L, Murray K, Boehm P. Assessing the representativeness and sufficiency of water samples collected during an oil spill. *Proceedings, 2017 International Oil Spill Conference*, Vol 2017, No 1.

Mearns AJ, Reish DJ, Oshida PS, Morrison AM, Rempel-Hester MA, Arthur C, Rutherford N, Pryor R. Effects of pollution on marine organisms. *Water Environment Research* 2016; 88(10), pp.1693-1807.

Morrison AMS, Goldstone JV, Lamb DC, Kubota A, Lemaire B, Stegeman JJ. Identification, modeling and ligand affinity of early deuterostome CYP51s, and functional characterization of recombinant zebrafish sterol 14 α -demethylase. *Biochimica et Biophysica Acta*, 2014; 1840:1825-1836.

Menzie C, Kane Driscoll SB, Kierski M, Morrison AM. Advances in risk assessment in support of sediment risk management. In: *Processes, Assessment and Remediation of Contaminated Sediments*. Reible DD (ed), SERDP ESTCP Environmental Remediation Technology, Vol. 6, pp. 107-130, 2014.

Goldstone JV, Goldstone HMH, Morrison AM, Tarrant AM, Kern SE, Woodin BR, Stegeman JJ. Cytochrome P450 1 genes in early deuterostomes (tunicates and sea urchins) and vertebrates (chicken and frog): Origin and diversification of the CYP1 gene family. *Molecular Biology and Evolution*; 24(12):

2619-2631, 2007..

Morrison AM. Receiver Operating Characteristic (ROC) Curve Analysis of Antecedent Rainfall and the Alewife/Mystic River Receiving Waters. Boston: Massachusetts Water Resources Authority. Report ENQUAD 2005-04, 2005. 26 p.

Morrison AM, Coughlin K. Results of Intensive Monitoring at Boston Harbor Beaches, 1996-2004. Boston, Massachusetts Water Resources Authority, Report ENQUAD 2005-05, 76 pp., 2004.

Morrison AM, Coughlin K, Shine JP, Coull BA, Rex AC. Receiver operating characteristic curve analysis of beach water quality indicator variables. *Applied and Environmental Microbiology*, 2003; 69:6405-6411.

Coughlin K, Stanley AM. Boston Harbor beach study suggests a change in beach management. *Coastlines*, 2001; Issue 11.6.

Coughlin K, Stanley AM. Water quality at four Boston Harbor beaches: Results of intensive monitoring 1996-2000. Boston, Massachusetts Water Resources Authority, Report ENQUAD 2001-18, 46 pp., 2001.

Published Abstracts

Stegeman J, Handley-Goldstone H, Goldstone J, Tarrant A, Morrison AM, Wilson J, Kern S. Pantomic studies in environmental toxicology answers, questions and extrapolation. *Journal of Experimental Zoology Part A-Comparative Experimental Biology*, 2006; 305A:181.

Goldstone JV, Goldstone HMH, Morrison AM, Tarrant A, Kern SE, Woodin BR, Stegeman JJ. Functional evolution of the cytochrome P450I gene family: Evidence of a pre-vertebrate origin. *Marine Environmental Research*, 2006; 62:S47-S47.

Handley HH, Goldstone JV, Morrison AM, Tarrant, Wilson JY, Godard CA, Woodin BR, Stegeman JJ. Abstracts from the 12th International Symposium on Pollutant Responses in Marine Organisms (PRIMO 12)—Receptors and Regulation of Cytochrome P450. *Marine Environmental Research*, 2004; 58:131+.

Morrison AM, Stegeman JJ. Abstracts from the Twelfth International Symposium on Pollutant Responses in Marine Organisms (PRIMO 12)—Cloning, Expression and Characterization of Cytochrome P450 51: An investigation of CYP51 azole sensitivity in aquatic animals. *Marine Environmental Research*, 2004; 58:131+.

Morrison AM, Stegeman JJ. CYP51 azole sensitivity in lower vertebrates and invertebrate. *Drug Metabolism Reviews: Biotransformation and Disposition of Xenobiotics*, 2003; 35(2):179.

Presentations

Deines A, Yu Q, Lilly L, Swann M, Morrison AM. 2025. Anywhere but here: Conditions supporting recruitment of endangered Klamath Basin suckers. American Fisheries Society Annual Meeting, San Antonio, Texas. August 10-14, 2025.

Menzie C, Morrison AM, Kleven M, Deines A, Yu Q, Duncan B. 2024. One Health: Cumulative impact assessment and actions in the context of environmental justice. One Health: A Joint SETAC/ACES Session on the Interface of Ecosystem Toxicology and Services, Austin, TX. December 11, 2024.

Menzie C, Morrison AM, Kleven M, Deines A, Yu Q, Duncan B, Ryan S. 2023. An Integrated Approach to Cumulative Impact Assessment in Support of Projects and Actions within Delineated Environmental Justice Areas. Society of Environmental Toxicology and Chemistry (SETAC) North America 44th Annual Meeting, Louisville, KY. November 12-16, 2023.

Mendoza S, Stern M, Marston B, and Morrison AM. 2021. What to Do With Your Used EV Batteries – © 2026 Exponent, Inc. All Rights Reserved • www.exponent.com • 888.656.EXPO • Page 3

Opportunities to Reuse and Recycle. Exponent Live. December 2, 2021.

Stern M, Morrison AM, Barry DA, and Ehrich DR. 2021. Your Emissions are Going Public! How New Publicly Available Technologies and Tools Could Impact Corporate Risk from Emissions. Exponent Live in partnership with The Product Liability Advisory Council. September 16, 2021.

Cruden J, Helminiak R, and Morrison AM. 2021. Environmental Law & Policy Under the Biden Administration: From Climate Change to Environmental Justice. DRI. April 27, 2021.

Lewis E and Morrison AM. 2021. Environmental Law in the Biden Administration. PLAC. April 15, 2021.

Palmquist KR, Ma J, Kierski M, Morrison AM. Proactive Assessment of Relative Ecological Risk in Wildfire Prone Areas. EPRI Environmental Aspects of Transmission and Distribution International Workshop. London, England. March 12–13, 2019.

Morrison AM, Ma J, Gard N, Palmquist K, Lin C, Deines A. Ecosystem services accounting in support of corporate environmental stewardship in a changing climate. Society of Environmental Toxicology and Chemistry (SETAC) North America 39th Annual Meeting, Sacramento, CA. November 5–8, 2018.

Pietari J, Morrison AM, Kashuba R, Boehm PD. Incorporating a framework for risk assessment, risk management, and risk mitigation of extreme weather events at Superfund sites. Society of Environmental Toxicology and Chemistry (SETAC) North America 39th Annual Meeting, Sacramento, CA. November 5–8, 2018.

Deines AM, Palmquist K, Morrison AM. Global Status and Risk of Non-Native Fish Aquaculture. 148th Annual Meeting of the American Fisheries Society, Atlantic City, NJ. August 19–23, 2018.

Morrison AM, Palmquist K, Kashuba R. Baseline in the Open-Access and “Big Data” Era. Law Seminars International. Washington, D.C. March 1, 2018.

Palmquist K, Morrison AM, Edwards ME. Addressing white hat bias: Lessons from environmental litigation. Society of Environmental Toxicology and Chemistry (SETAC) North America 38th Annual Meeting, Minneapolis, MN. November 12–16, 2017.

Palmquist KR, Ginn TC, Morrison AM, Boehm PD. Addressing Spatial Data Gaps in Deep-sea Benthic Sediment Sampling Following a Large-Scale Oil Spill. Battelle Sediment Conference in New Orleans, LA.

Deines AM, Morrison AM, Menzie CA. Environmental Flows: Evaluating Long-Term Baselines for Hydrological Regime Change in the Southern United States. American Geophysical Union Fall Meeting, San Francisco, CA. December 12-16, 2016.

Kashuba R, Morrison A, Palmquist K. Framework for environmental causal analysis that accounts for uncertainty in data quality. Presented at the Session: Integrated Risk Assessment and Emerging Lines of Evidence to Address Uncertainty, at the Society for Risk Analysis (SRA) 2016 Annual Meeting, San Diego, CA, December 12, 2016.

Yozzo KL, Hauri J, Kane Driscoll S, McArdle ME, Morrison AM. Review of current literature of cardiotoxicity of oil to early life stages of fish for use in natural resource damage assessments. 37th Annual Society of Environmental Toxicology and Chemistry (SETAC) North America Meeting, Orlando FL, November 6-10, 2016.

Kane Driscoll SB, Hauri J, Kulaki K, Morrison AM, McArdle ME, Schierz P, Yozzo KL, Edwards ME. The influence of mixing energy on the concentration and composition of oil in laboratory toxicity tests. 37th Annual Society of Environmental Toxicology and Chemistry (SETAC) North America Meeting, Orlando FL, November 6-10, 2016.

Morrison AM. The Science. Natural Resource Damages 101. Law Seminars International. Washington, D.C. March 9, 2016.

Morrison AM, Murray KJ, Cook LC, Boehm PD. Spatial and Temporal Extent of PAHs Associated with Surface Oil Distributions (Anomalies). Gulf of Mexico Research Initiative Conference. Tampa, FL. February 1–4, 2016.

Boehm PD, Morrison AM. The Interplay of Data Needs and Data Analysis Frameworks to Optimize the Collection and Use of Data from Oil Spills. Gulf of Mexico Research Initiative Conference. Tampa, FL. February 1–4, 2016.

Whaley JE, Morrison AM, Savery LC. Using the Causal Analysis Framework to Investigate Marine Mammal Unusual Mortality Events (poster). Society of Marine Mammalogy Biennial Conference, San Francisco, CA. December 2015.

Kashuba R, Morrison AM, Menzie C. The Application and Misapplication of Directed Acyclic Graphs for Causal Inference in Ecology. Society of Environmental Toxicology and Chemistry (SETAC) North America 36th Annual Meeting, Salt Lake City, UT. November 1–5, 2015.

Kierski M, Morrison AM, Kane Driscoll S, Menzie C. A Refined Multi-Site Model to Estimate the Toxicity of PAH-Contaminated Sediments at MGP Sites. Society of Environmental Toxicology and Chemistry (SETAC) North America 36th Annual Meeting, Salt Lake City, UT. November 1–5, 2015.

Morrison AM, McArdle M, Menzie C. A Tiered Approach to Causal Analysis in Natural Resource Damage Assessment. 35th Annual Society of Environmental Toxicology and Chemistry (SETAC) Meeting, Vancouver, BC, Canada. November 9–13, 2014.

Morrison AM, Kane Driscoll S, McArdle M, Menzie C. Integrated environmental benefit analysis of sediment remediation thresholds. 32nd Annual Society of Environmental Toxicology and Chemistry (SETAC) Meeting, Boston, MA. November 14–17, 2011.

Kierski M, Morrison AM, Kane Driscoll S, Menzie C. A multi-site model to estimate the toxicity of PAH contaminated sediments at MGP sites. 32nd Annual Society of Environmental Toxicology and Chemistry (SETAC) Meeting, Boston, MA. November 14–17, 2011.

Kierski M, Morrison AM, Kane Driscoll S, Menzie C. Use of receiver operating characteristic curve analysis to estimate ecological risk zones as part of an ecological risk assessment. 31st Annual Society of Environmental Toxicology and Chemistry (SETAC) Meeting, Portland, OR. November 7–11, 2010.

Morrison AM, Coughlin K, Rex A. Bayesian network predictions of *Enterococcus* exceedances at four Boston Harbor beaches. Water Resources Conference 2008, Amherst, MA. April 8, 2008.

Stegeman J, Handley-Goldstone H, Goldstone J, Tarrant A, Morrison AM, Wilson J, Kern S. Pantomic studies in environmental toxicology answers, questions and extrapolation. 15th International Congress of Comparative Endocrinology, Boston, MA. 2005.

Goldstone JV, Goldstone HMH, Morrison AM, Tarrant A, Kern SE, Woodin BR, Stegeman JJ. Functional evolution of the cytochrome P450I gene family: Evidence of a pre-vertebrate origin. 13th International Symposium on Pollutant Responses in Marine Organisms (PRIMO 13), Alessandria, Italy, June 2005.

Morrison AM, Stegeman JJ. CYP51 azole sensitivity in lower vertebrates and invertebrate. 12th North American Meeting of the International Society for the Study of Xenobiotics, Providence, RI. October 12–16, 2003.

Morrison AM, Stegeman JJ. Cloning, expression and characterization of Cytochrome P450 51: An investigation of CYP51 azole sensitivity in aquatic animals. 12th International Symposium, Pollutant

Responses in Marine Organisms, Tampa, FL. May 2003.

Handley HH, Goldstone JV, Morrison AM, Tarrant AM, Wilson JY, Godard CA, Woodin BR, Stegeman JJ. 12th International Symposium, Pollutant Responses in Marine Organisms, Tampa, FL. May 2003.

Morrison AM, Coughlin KA, Shine JP, Coull BA, Rex AC. Receiver operating characteristic curve analysis of beach water quality indicator variables. Pathogens, Bacterial Indicators, and Watersheds: Treatment, Analysis, Source Tracking, and Phase II Stormwater Issues. New England Watershed Association, Milford, MA. May 14, 2003.

Stanley AM, Coughlin KA, Shine JP, Coull BA, Rex AC. Receiver operating characteristic analysis is a simple and effective tool for using rainfall data to predict bathing beach bacterial water quality. 102nd General Meeting, American Society for Microbiology, Salt Lake City, UT. May 2002.

Coughlin K, Stanley AM. Five years of intensive monitoring at Boston harbor beaches: Overview of beach water quality and use of the Enterococcus standard to predict water quality. Massachusetts Coastal Zone Marine Monitoring Symposium, Boston, MA. May 2001.

Smith SR, Grayston LM, Stanley AM, Webster G, McKenna SA. CARICOMP coral reef monitoring: A comparison of continuous intercept chain and video transect techniques. Scientific Aspects of Coral Reef Assessment, Monitoring and Management, National Coral Reef Institute (NCRI), Nova Southeastern University, Ft. Lauderdale, FL. 1999.

Thought Leadership

Kytömaa H, Dyson C, Morrison AM, Parker S, Wechsung A, James J, and A Filie. IMO Sets New Emissions Targets for Global Shipping Industry. May 7, 2025.

Kytömaa H, Hilbert B, Wechsung A, Morrison AM, and Saba T. EPA Finalizes Rules to Reduce Power Plant Emissions. May 8, 2024.

Robrock K, Goodfellow W, Jr., Saba T, Morrison AM, Rackl S, Paulsen S, and Pitts B. EPA Designates Two PFAS as CERCLA Hazardous Substances. Exponent. April 24, 2024.

Deines A, Lilly L, Morrison, AM, Gard N, and Wang C. Navigating Shifts in Marine Biodiversity. Exponent. March 6, 2024.

Wechsung A and Morrison AM. EPA Proposes New Power Plant GHG Rules. Exponent. June 14, 2023

Wechsung A, Morrison AM, and Vargas J. EPA Proposes New Air Pollution Rules. Exponent. May 11, 2023.

Jaffé R, Gard N, Moore P, Morrison AM, Castillo Nelis L. Are mining companies ready to assess and manage biodiversity-related risks? April 27, 2023.

Jaffé R, Morrison AM and Gard N. Nearly 200 Countries Adopt a New Global Framework to Preserve Biodiversity. Exponent. January 2, 2023.

Wechsung A., Buehler C, James J., Morrison AM, and Stern M. Carbonomics: Introduction to Carbon Pricing, Regulations & Frameworks. Exponent. November 1, 2022.

Stern M, Morrison AM, Gard N, Jaffé R, and Ryan S. Takeaways from the IPCC Working Group III Report. The available carbon budget to avoid 1.5°C is quickly closing, but certain mitigation measures are gaining traction. Exponent. April 18, 2022.

Desautels C, Stern M, and Morrison AM. Expanding Fenceline Monitoring Challenges and opportunities
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in the expanded use of fenceline monitoring for hazardous air pollutants at industrial facilities. Exponent. April 7, 2022.

Folcik AM, Steele AN, Petrovich M, and Morrison AM. New York State Proposes ESG Requirements for the Fashion Industry. The "Fashion Sustainability and Social Accountability Act" would require fashion companies to disclose environmental, social, and governance measures. Exponent. April 5, 2022.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Part 6. Time-based sustainability goals identify a target date for completion that is both attainable and relevant. March 18, 2022.

Pape P, Ryan SF, and Morrison AM. New Public Geospatial Data Tools Promote Focus on Environmental Justice EJSCREEN 2.0 and CEJST support geographical evaluation of environmental and climate burdens. Exponent. March 17, 2022.

Morrison AM and Menzie CA. EPA Examining Cumulative Impact Assessments. Recent white paper identifies data gaps and recommends research to support use of cumulative impact assessment in regulatory decisions. Exponent. March 15, 2022.

Stern M, James J, and Morrison AM. Life Cycle Assessments Do Have Limitations. A candid look at the limitations of life cycle assessments for improving efficiency and sustainability operations. Exponent. January 6, 2022.

Jaffé R, Gard N, Deines A, and Morrison AM. New Guidelines Issued on Nature-Based Solutions for Flood Risk Management. U.S. Army of Corps of Engineers and international partners identify critical components of successful projects. Exponent. November 1, 2021.

Morrison AM, Palmquist K, James J, and Stern M. Are Your Forest Carbon Offsets Going Up in Smoke? Re-evaluating forest carbon offsets in the face of growing wildfire risks due to climate change. Exponent. October 21, 2021.

Stern M, Morrison AM, Wechsung A. Buyer Beware! Sustainability Technologies Are Still Evolving. Life cycle assessments are providing conflicting results for some technologies based on differing assumptions. Exponent. October 7, 2021.

Jaffé R, Gard N, and Morrison AM. Biodiversity Disclosures May Be Coming. Is your business prepared to measure and report material impacts to biodiversity? Exponent. October 7, 2021.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Part 5. Relevant sustainability goals use innovative strategies and technologies to achieve multiple business objectives simultaneously. Exponent. October 5, 2021.

Stern M and Morrison AM. SEC Issues Warning Letters on Climate Disclosures. Letters identify specific areas of interest to the Securities and Exchange Commission. Exponent. October 4, 2021.

Morrison AM, Menzie CA, Goodfellow W, and Reiss R. EPA Re-developing Guidance for Cumulative Risk Assessments. Updates to address environmental justice, multiple chemical exposures, and multiple exposure pathways. Exponent. September 27, 2021.

Stern M and Morrison AM. Newly Released GHG Emissions Database Goes Public. Climate TRACE aims to hold governments and private industries accountable for emissions. Exponent. September 24, 2021.

Morrison AM and Stern AM. Regulatory and Investor Scrutiny is Challenging Company Sustainability Commitments. A wide range of food and consumer product companies are being challenged to demonstrate their offerings meet their sustainability claims. Exponent. August 19, 2021.

Stern M and Morrison AM. The 2021 UN Climate Report: Takeaways for Sustainability Directors and
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Corporate Counsel. IPCC report strengthens attribution of fires, extreme weather, and climate change to GHG emissions and urges immediate reductions. Exponent. August 12, 2021.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Part 4. Attainable sustainability goals include actions that you have sufficient control, resources, and technology to perform. Exponent. August 9, 2021.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Part 3. Measurable sustainability goals define the scope of the target, produce valid and credible data, include industry-specific metrics, and anticipate future data requirements. Exponent. June 1, 2021.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Part 2. Specific sustainability goals focus on business objectives, use quantitative targets, identify opportunities, and account for uncertainties. Exponent. May 4, 2021.

Stern M, Gilman L, Morrison AM, Ryan SF, Desautels C, Popovic J. Smile! You're on Carbon Camera! How satellites are making carbon and methane emissions public and what companies need to know. Exponent. April 26, 2021.

Morrison AM and Stern M. Are Your Sustainability Goals SMART? Add capital value and reduce risk through Specific, Measurable, Attainable, Relevant, Time-based sustainability goals. Exponent. April 21, 2021.

Morrison AM, Gard N, and Boehm P. Department of Justice Withdraws Restrictions on Supplemental Environmental Projects. Recent executive orders create opportunities for industry to favorably resolve environmental violations and mitigate climate impacts. Exponent. February 19, 2021.

Morrison AM, Kashuba R, Menzie CA. Evaluating alternative causes of environmental change. Environmental Perspectives 2016; 1.

Boehm PD, Morrison AM, Semenova S, Kashuba R, Ahnell A, Monti C. Comprehensive oil spill liability estimation. Environmental Perspectives 2016; 1.

Boehm PD, Morrison AM. Oil spill liability modeling: helping to manage existential risks. Oil & Gas Insight, 2016; 4.

Morrison AM. EPA Continues to Tighten Environmental Regulations for Coal-Fired Power Plants. Exponent. October 12, 2015.

Mudge S, Morrison AM. Tracking sources of sewage in the environment. Environmental Forensic Notes, 2010; 9.

Pietari J, Bigham G, Morrison AM. Source tracking for identification of microbial pollution sources. Environmental Forensic Notes, 2009; 6.

Project Experience

Dr. Morrison has been involved in numerous complex projects relating to environmental contamination, causation, and potential risk to humans and biological resources in the affected environment.

Risk Assessment, Natural Resource Assessment, and Environmental Causal Analysis

Expert witness concerning potential natural resource injury from hypothetical accidental petroleum release in New Haven Harbor, Connecticut. Conservation Law Foundation v. Shell Oil Company, Equilon

Enterprises LLC D/B/A Shell Oil Products US, Shell Petroleum, Inc., Triton Terminaling LLC, and Motiva Enterprises LLC. Case 3:21-cv-00933-SALM. In the United States District Court of Connecticut. Submitted expert report. Testified at deposition.

Expert witness concerning natural resource injury at a chemical manufacturing site in New Jersey. New Jersey Department of Environmental Protection, the Commissioner of the New Jersey Department of Environmental Protection, and the Administrator of the New Jersey Spill Compensation Fund v. E.I. du Pont de Nemours and Company, the Chemours Company, the Chemours Company FC, LLC., The 3M Company, DuPont Specialty Products USA, LLC, Corteva, Inc., DuPont de Nemours, Inc., et al. Case No. 1:19-cv-14766-RMB-JS. In the United States District Court District of New Jersey. Testified at deposition.

Expert witness concerning age of marine organisms on underwater debris. Leeman v. Indian Creek Village, Indian Creek Country Club, Inc., Miami-Dade County, Southeast Marine Construction, Inc., Florida Dept. of Financial Services, Florida Fish and Wildlife Conservation Commission, U.S. Army Corp of Engineers and Florida Inland Navigation District. Case No. 1:2023cv24887. In the U.S. District Court for the Southern District of Florida. Submitted expert report. Case settled.

Expert witness concerning natural resource injury in the Cape Fear watershed. State of North Carolina v. E.I. du Pont de Nemours and Company, the Chemours Company, the Chemours Company FC, LLC., Corteva, Inc., DuPont de Nemours, Inc., et al. Case No. 2020CVS5612. In the General Court of Justice Superior Court Division. Submitted expert report.

Expert witness concerning natural resources in East St. Louis, Illinois. City of East St. Louis v. Monsanto Company, Solutia Inc., Pharmacia LLC. No. 3:21-cv-00232-DWD n the United States District Court Southern District of Illinois. Testified at deposition.

Expert witness concerning natural resource injury in the Upper Columbia River, Washington. Joseph A. Pakootas, Donald R. Michel, the Confederated Tribes of the Colville Reservation, and the State of Washington v. Teck Cominco Metals Ltd. No. 2:04-CV-00256-SAB In United States District Court Eastern District of Washington. Testified at deposition.

Expert witness concerning PCB exposure of natural resources in the St. Lawrence River area. Back et al. v. Bayer Crop Science, LP, Monsanto Company, Solutia, Inc., Pharmacia, LLC, Pfizer, Inc. In Missouri Circuit Court Twenty-first Judicial Circuit, Saint Louis County. Cause No.: 18SL-CC03530. Testified at deposition.

Expert witness concerning likely causes of marine biofouling. Wicked Salty I, LLC v. Great American Insurance Company. In the United States District Court for the Southern District of Florida. Case No. 9:20-CV-82033-RQR. Submitted expert report. Case settled.

Expert witness concerning net environmental benefits from coal ash closure alternatives at two coal ash plants in North Carolina. Roanoke River Basin Association v. Duke Energy Progress, LLC, United States District Court, Middle District of North Carolina, Case No. 1:16-cv-607 and Roanoke River Basin Association v. Duke Energy Progress, LLC, United States District Court, Middle District of North Carolina, Case No. No. 1:17-cv-452. Testified at deposition.

Expert witness concerning potential damages to terrestrial and aquatic resources, including coral reefs, endangered sea turtles, fish and shellfish, and seagrass beds, resulting from a coastal development project on the Caribbean Island of Nevis. Anne Hendricks Bass vs. Director of Physical Planning, Development Advisory Committee, and Caribbean Development Consultant Limited. Eastern Caribbean Supreme Court, in the High Court of Justice Saint Christopher and Nevis, Nevis Circuit, Civil Case No. NEVHCV2016/0014. Testified at trial.

Expert witness concerning potential impacts to California fishery populations from the Refugio oil spill. Andrews et al. v. Plains All American Pipeline, L.P. et al. United States District Court, Central District of California, Western Division, Case No. 2:15-cv-04113-PSG-JEM. Testified at deposition

Expert witness for natural resource damage assessment concerning alleged injuries to aquatic resources from disposal of bauxite ore processing wastes for the case Commissioner of the Department of Planning and Natural Resources, Alicia V. Barnes, et al. v. Virgin Islands Alumina Company et al. District Court of the Virgin Islands, Division of St. Croix, Civil Case No. 2005-0062. Testified at deposition.

Conducted environmental causal analyses of alleged injury to ecological populations in relation to the presence of per- and polyfluoroalkyl substances (PFAS) in water, sediment, and soil.

Conducted environmental causal analyses of alleged injury to ecological populations in relation to the presence of chlorinated hydrocarbons in rivers, bays, and harbors affected by decades to a century of complex anthropogenic activities, including historical engineering changes to the waterbodies, municipal sewage releases, and industrial discharges.

Developed natural resource damage claim for toxicity injury to aquatic resources from a fuel oil spill in the Indian Ocean.

Provided scientific technical review and public comments on Trustee developed work plans for the Lower Passaic River natural resource damage assessment.

Provided scientific support for assessing remediation alternatives and potential natural resource damage claims following a sediment contamination event in a freshwater cave in Guam.

Examined the potential for impacts to aquatic resources, including sea turtle populations, from deep sea mineral extraction.

Provided scientific support for natural resource damage assessment of injuries to wildlife, forest, and wetlands associated with a fuel oil release in the White Mountains National Forest.

Provided scientific support for natural resource damage assessment of injuries to water column resources and marine mammals in the Gulf of Mexico following release of oil from a subsea pipeline.

Evaluated the likelihood of municipal sewage discharges contributing to red tide occurrences in coastal Florida.

Provided scientific support for natural resource damage assessment of injuries to benthic and aquatic resources in coastal Louisiana affected by industrial chemical exposure.

Provided scientific support for natural resource damage assessment of injuries to aquatic resources in a Massachusetts river following sulfuric acid release.

Provided analysis and technical support in Florida v. Georgia United States Supreme Court water rights case that considered questions of causation relative to alleged adverse ecological changes in downstream river and bay populations.

Provided scientific support and mediation testimony for natural resource damage assessment of injuries to fish, benthic invertebrates, wetlands, and upland habitats in New Jersey.

Conducted a comprehensive review of an environmental impact assessment of potential impacts to coral reefs from a proposed dairy farm development in Hawaii.

Provided scientific support for the natural resource damage assessment following the Deepwater Horizon oil spill in the Gulf of Mexico.

Developed a cooperative natural resource damage assessment field study in the offshore waters of the Gulf of Mexico to collect sediment samples for analysis of chemistry, toxicology, and benthic infauna.

Developed decision management products for beach water quality stakeholders using statistical data analysis tools such as receiver operating characteristic (ROC) curves and Bayesian networks to improve public beach advisories related to elevated fecal bacteria.

Developed net environmental benefit analysis (NEBA) for a lead contaminated river. This analysis used site-specific data to evaluate the costs and benefits of two different remediation options that were being considered. The NEBA was successfully used by the client to negotiate a higher remediation goal than originally proposed by the state's department of environmental protection.

Performed ROC curve analyses of site-specific polycyclic aromatic hydrocarbon (PAH) toxicity data to assess the relationship between PAH concentration and toxicity at three ecological risk assessment projects in Wisconsin. The curves were used to identify site-specific toxicity thresholds for PAH concentrations in sediment that indicated various zones of toxicity (no toxicity, low toxicity, and high toxicity), with very limited misidentification of sediments.

Provided research support to calculate site-specific no-observed-adverse-effect level (NOAEL) and lowest-observed-adverse-effect level (LOAEL) concentrations for mammals and birds for use in a baseline ecological risk assessment in Wisconsin.

Performed ROC curve analysis of national mercury toxicity data to assess the relationship between mercury concentration and toxicity. The curves were also used to identify a threshold mercury concentration for sediment that indicates likely toxicity, with limited misidentification of sediments that are not toxic.

Assembled and analyzed data and reviewed remedial investigations to conduct a screening-level ecological risk assessment for sediment, surface water, and groundwater for a site in Connecticut. The chemicals considered were total petroleum hydrocarbons (TPH), metals, and PAHs.

Reviewed species lists and created summary descriptions of organisms that could be potentially impacted by dam construction on a high-altitude river in the Caribbean. This information was used to develop the risk assessment for dam construction.

Researched the toxicity of malathion to fish to support a technical review of the National Marine Fisheries biological opinion for the registration of pesticides containing malathion.

Ecological and Toxicity Studies

Conducted surveys to assess the health of coral reefs, seagrass beds, and mangrove swamps in the nearshore environment of Bermuda. Projects included area-wide habitat surveys as well as surveys of targeted sites potentially impacted by a heavy metals dump, hot water effluent from an incinerator, sedimentation from cruise ship traffic, and chronic release of raw sewage. Water quality was assessed through measurements of trace metals in water, sediment, and coral tissue.

Surveyed juvenile coral recruitment in the Florida Keys to evaluate whether marine protected areas (MPAs) provide a benefit to coral recruitment.

Studied cytochrome P450 family enzymes, including CYP51 and CYP1, examining their sensitivity to environmental chemicals and their evolution through molecular biology and biochemistry approaches.

Environmental Forensics Projects

Performed document review, information management, and technical writing for numerous complex projects that dealt with historical petroleum contamination and multiple site owners in several types of environmental media.

Reviewed documents, assembled data, and researched metal concentrations associated with crude oil and railroads in support of a Superfund project in Oklahoma.

Examined the correlation of multiple contaminants (PAHs, metals) with PCB congeners at a historically contaminated site in Alabama to identify the likely origins of the PCB contamination.

Performed statistical analysis to determine source contribution in a chemical fingerprinting case at a Superfund site in Washington that involved hydrocarbons in water, sediment, and groundwater.

Human Health Projects

Organized, managed, and simplified a complex database of field sampling reports for a litigation case in Louisiana regarding human air exposure to PAHs.

Performed data analysis and document review for a Superfund site in Oklahoma

Researched and compiled screening-level human health inhalation toxicity values for refinery- related gases for an overseas project.

Developed a questionnaire and related database for industrial hygiene surveys to support regulatory compliance for a highly specialized industry.

Sustainability and Environmental, Social, and Governance (ESG)

Supported life cycle assessment of aerospace vehicle production and launch.

Examined carbon sequestration in natural and working lands, including changes in carbon sequestration over time and following wildfire

Supported review of life cycle assessment inputs for pig iron manufacturing process Supported review of comparative life cycle assessment for nylon precursor products Advised on carbon offset market issues