

Matthew E. Behum

Senior Scientist



Education and Credentials

M.S., Marine Science, University of South Carolina, Columbia, South Carolina, 2004

B.A., Environmental Biology (with Honors), Colgate University, Hamilton, New York, 2002

Certified Senior Ecologist, Ecological Society of America (2015)

Continuing Education and Training

SafeStart Certified Instructor (2019)

OSHA 10-Hour General Safety Training (2020)

Hazardous Waste Operations and Emergency Response 40-Hour Certification (2005; refresher 2020)

Hazardous Waste Operations Management and Supervisor 8-Hour Certification (2014)

Delaware Valley Safety Council Basic Orientation Plus Safety Certification (2015)

First Aid, CPR, and AED Certified (2020)

Risk-Based Corrective Action at Petroleum Release Sites (2005)

Professional Affiliations

Ecological Society of America

Society for Environmental Toxicology and Chemistry, Chesapeake-Potomac Regional Chapter

American Society of Safety Engineers

Achievements and Awards

Aqua Survey, Inc. Blue Peter Award for Environmental Remediation Leadership (2018)

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Professional Profile

Mr. Matthew Behum is an ecologist with 15 years of experience in the field supporting multimedia ecological and human health risk assessments at Superfund sites and private industrial facilities. He has also performed environmental compliance audits with Maryland Vehicle Administration testing facilities. In addition to his risk assessment experience, Mr. Behum has sampled plants, benthic invertebrates, and aquatic vertebrates in both marine and freshwater systems and has identified juvenile invertebrates using molecular techniques. He has experience in ecological theory, database management, and general biostatistical analyses. He also has field management experience on a variety of projects, including coordination of a million-dollar, multiphase field effort involving biotic and abiotic sampling at a New Jersey Superfund site, as well as leading a data collection investigation of perfluoroalkyl substances (PFAS) in water systems on behalf of an East Coast chemical manufacturer. Mr. Behum is the office manager for Integral's Annapolis, Maryland, location, and is the company corporate health and safety manager.

Relevant Experience

Corporate Health and Safety Management

Prepared comprehensive revision of company health and safety program plan and coordinated its production. Regularly review all site health and safety plans prior to field operations. Manage health and safety credentials for all staff (e.g., Hazardous Waste Operations and Emergency Response, first aid, physicals, drug and alcohol testing, project-specific safety training). Utilize ISNet, Avetta, and BROWZ platforms for client-specific health and safety questionnaires, insurance updates, and project safety training coordination. Responsible for field safety updates, including job hazard analysis use, subcontractor prequalification questionnaires, and field auditing. Conduct company-wide presentations on safety topics and company safety updates. Also instituted the SafeStart safety program for all employees and currently manages that program for Integral.

Database Management and Statistical Analysis

Experience includes parametric and nonparametric statistical analyses. Project work has involved linear and multilinear

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regression investigations. Analytical platforms include Excel, Statistica, R, ProUCL, and GPOWER. Project experience includes working with relational databases using Access.

Environmental Auditing

Motor Vehicle Administration Sites, Maryland—Assisted with and led comprehensive voluntary audits of motor vehicle administration facilities to ensure compliance with multiple federal criteria including Clean Air Act, Clean Water Act, FIFRA, RCRA, and TSCA. Completed federal compliance checklists and drafted facility reports for client review. In addition, reviewed relevant state permitting policies, including whether relevant motor vehicle administration facilities were compliant for discharges from small municipal separate storm sewer systems (MS4s) within NPDES.

Environmental and Biological Sampling

Chemical Manufacturer, East Coast—Overseeing a multiphase data collection program to evaluate the presence of PFAS adjacent to a New Jersey chemical manufacturer. Managed subcontractors, budget, and the development of a work plan and field sampling plan. Initiated a data collection program, including seasonal public water supply sampling of various municipalities, private well sampling (including community outreach), temporary groundwater well sampling, onsite and offsite groundwater well sampling, surface water and sediment sampling of the Delaware and Schuylkill rivers, and onsite soil sampling.

Berry's Creek Superfund Site, Meadowlands, New Jersey—Completed multiple field surveys of Berry's Creek and surrounding tributaries of the Hackensack River, including water quality analyses of candidate reference sites to Berry's Creek and aquatic fauna surveys of the creek, in support of an RI/FS. Responsible for data syntheses of reference site surveys. Participated in marsh sediment sampling along floodplain transects and collected terrestrial and aquatic insects in surficial marsh sediment and *Phragmites* leaf litter for qualitative identification. Coordinated, managed, and participated in field sampling plans from 2010 to present for a variety of taxa in Berry's Creek and surrounding tributaries. Effort included oversight of budget, coordination with field staff (colleagues and teaming partners), along with refinement updates to standard operating procedures, field sampling plans, and work plan addenda. Recent field efforts include mercury air monitoring (including light intensity and temperature readings), fish residue biomonitoring collection, and marsh insect collection for residue analysis using various techniques, as well as benthic residue collection of annelids and fiddler crabs.

Curtis Bay Site, Curtis Bay, Maryland—Performed biota reconnaissance of nearshore sediment onsite at a former agricultural chemical production facility. Sediment samples were sieved and analyzed for invertebrate presence and species composition.

Portland Harbor Superfund Site, Portland, Oregon—Conducted crayfish sampling and sculpin longlining and electrofishing in Portland Harbor in support of multiclient remedial investigation.

Field Sampling, Central New York and Coastal South Carolina—Collected stream macroinvertebrates to assess community dynamics in response to changing riparian cover.



Collected fiddler crab juveniles and larvae in a salt marsh system to assess settlement patterns of two species.

Risk Assessment

Portland Harbor Superfund Site, Portland, Oregon—Analyzed sediment and fish data usability regarding N-qualified PCB and DDx data; performed syntheses of exploratory statistics addressing data usability concerns. Also performed multiple reviews of fish, plant, and amphibian baseline ecological risk assessments spanning multiple lines of evidence (e.g., tissue concentrations, surface water concentrations, and modeled effects). Performed exploratory biota-sediment accumulation factor calculations for whole-body smallmouth bass samples to compare with proposed findings of proposed Gobas model.

Yerington Mine Site, Yerington, Nevada—Developed mitigation plan for avian deterrence from site pumpback and evaporation ponds. Researched avian deterrence measures, consulted with experts, and helped to finalize a three-tiered approach involving amplified distress/predatory calls, pyrotechnics, and nonlethal projectiles. Managed wildlife observation database of the former Yerington mine site. Prepared quarterly reports. Monitoring was conducted to evaluate wildlife use at the site in support of ecological risk assessment.

Groundwater to Surface Water Interaction, Patrick Bayou, Texas—Managed groundwater, sediment, and ecotoxicological data to support weight-of-evidence evaluations of the impact of groundwater discharge to benthic communities. Also extensively researched Texas state ecological risk regulations.

Ecological and Human Risk Assessments, Formerly Used Defense Sites, Northeast U.S.—Participated in preparing screening level ecological and human health risk assessments of various media for multiple receptors at numerous formerly used defense sites. Conducted research of federal and secondary benchmarks for use in the screening-level risk assessments and proposed alternative screening values for ecological screening based on equilibrium partitioning theory.

Berry's Creek Superfund Site, New Jersey—As part of a proposal effort, evaluated food web dynamics of representative biota and plants exposed to mercury contamination in the Hackensack Meadowlands. Assisted in development of multi-tiered conceptual site model across various media in the creek. Also served as lead in a Phase 1 screening-level ecological risk assessment using published screening values for sediment, surface water, and wildlife tissue.

Curtis Bay Site, Curtis Bay, Maryland—Performed screening-level risk assessment of porewater exposures of volatile and semivolatile organic compounds to benthic invertebrates using ambient water quality criteria developed via secondary chronic values. Applied EPA methodology and narcosis theory based on bioavailability.

Greens Bayou, ISK Pond, Houston, Texas—Performed thorough research of appropriate literature for use in developing alternative benchmarks that were accepted by Trustees to support site



closure. Prepared a habitat equivalency analysis of sediment contamination as part of a natural resource damage assessment.

Upper Columbia River RI/FS, Washington—Prepared air data statistical summaries of beach dust monitoring in support of a remedial investigation. Used Statistica and ProUCL platform applications.

Regional Risk Assessment of a River Estuary, Delaware—Composed summaries of physical, chemical, and biological stressors affecting tidal stretch of Delaware estuary, which were then used for regional risk assessment. Managed junior staff investigating stressor identification. Updated reference database for project.

Exxon Valdez Oil Spill, Prince William Sound, Alaska—Assisted in researching and compiling literature related to natural resource injury associated with the 1989 *Exxon Valdez* oil spill.

Risk Assessment of West Nile Virus Incidence and Control, Suffolk County, New York—Conducted statistical analyses of air concentrations for various pesticides and synergist chemicals portraying statistical results for use in the risk assessment. Assisted in the evaluation of ecological risks associated with mosquito-control activities.

Research

Chesapeake Bay Environmental Issues—Conduct regular research of environmental and policy issues facing Chesapeake Bay and involving all states that are part of its watershed. Provide updated information to colleagues on an ongoing basis.

Water Quality Criteria Research—Engage in extensive research of federal and secondary benchmark development from a variety of sources. Focus on understanding how benchmarks are developed using both conventional and equilibrium partitioning approaches. Have obtained extensive knowledge of ambient water quality criteria data requirements.

Macroinvertebrate Survey along a Stream Continuum, Central New York—Conducted field sampling of macroinvertebrates and identified them to functional feeding group and genera to analyze shifting feeding groups in response to dynamic stream canopies. Collected fine and coarse particulate organic matter samples along with chlorophyll *a* concentrations at all sampling locations. Results presented for honors degree in environmental biology.

Postlarval Settlement Patterns of Fiddler Crabs across Salt Marsh Habitats, Winyah Bay Estuary Marshes, South Carolina—Conducted field sampling of juvenile and larval fiddler crabs, identifying them to species using restriction fragment length polymorphism molecular techniques. Oversaw undergraduate interns assisting in laboratory and fieldwork. Also analyzed surface sediment temperature and moisture. Results documented and presented at 2004 Benthic Ecology Meeting and published in *Marine Ecology Progress Series*.



Wind Power Business Development—Led initiatives to incorporate population-level risk assessment techniques, including GIS encounter modeling with bird and bat strikes, probabilistic risk assessment, and preferred bird and bat habitat analyses with wind power development.

Publications

Behum, M.E., R.J. Brodie, and J.L. Staton. 2005. Distribution of juvenile *Uca pugnax* and *U. pugilator* across habitats in a South Carolina estuary, assessed by molecular techniques. *Mar. Ecol. Prog. Ser.* 288:211–220.

Brodie, R.J., M.E. Behum, E. Monroe, N. Glenn, and J.L. Staton. 2005. Recruitment to adult habitats following marine planktonic development in the fiddler crabs, *Uca pugilator*, *U. pugnax*, and *U. minax*. *Mar. Biol.* 147:105–111.

Presentations/Posters

Behum, M. 2018. Challenges presented by new, temporary, and young employees. Platform presentation, Retia Safety Forum Invitational, Nashville, TN. September 18–19.

Behum, M. 2017. Safety metrics, best practices, and lessons learned: Safety culture in a small firm. Platform presentation, Retia Safety Forum Invitational, Nashville, TN. September 20–21.

Behum, M. 2016. Safety metrics, best practices, and lessons learned: Office safety. Platform presentation, Retia Safety Forum Invitational, Nashville, TN. September 14–15.

Behum, M., J. Durda, D. Himmelheber, and P. Brussock. 2015. Camera surveys to document human use in an isolated urban estuary: Update and analysis. Poster presentation, Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA. January 12–15.

Behum, M., J. Lape, J. Durda, P. de Haven, and J. Wollenberg. 2015. Air monitoring in a mercury-contaminated estuary: Support for risk assessment and risk management. Poster presentation, Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA. January 12–15.

Durda, J., M. Behum, P. de Haven, and J. Wollenberg. 2015. Physical and ecological conditions in marshes: Exposure pathways, assessment, and implications for risk management. Platform presentation, Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA. January 12–15.

Behum, M., J.L. Durda, and J. Samuelian. 2013. Marsh invertebrate community surveys to support ecological risk assessment in a New Jersey estuary. Poster presentation, Seventh International Conference on Remediation of Contaminated Sediments, Dallas, TX. February 4–7.



Pastorok, R.A., D.V. Preziosi, and M.E. Behum. 2012. The role of population modeling in risk assessment at wind energy facilities. Poster presentation, National Wind Coordinating Collaborative Wind Wildlife Research Meeting, Broomfield, CO. November 27–30.

Behum, M.E. 2010. Unique approach to assessing wildlife population risk from wind turbine development. Platform presentation, Chesapeake-Potomac Regional Chapter Meeting of the Society of Ecotoxicology and Chemistry, Towson, MD. April 19.

Behum, M.E. 2009. Fostering career development and mentoring. Platform presentation, Integral Consulting Inc. company retreat, Stevenson, WA. May 16.

Behum, M.E. 2004. Postlarval settlement patterns of fiddler crabs across salt marsh habitats. Platform presentation, 33rd Annual Marine Benthic Ecology Meeting, Mobile, AL. March 25–28.

