



513 Broadway, Suite 314 | Newport, RI 02840



## ANNA E. MURPHY | Senior Scientist

### Education

**Ph.D.** Marine Science, College of William & Mary, Virginia Institute of Marine Science, 2016

**B.S.** Biology, Fairfield University, 2007

### Areas of Specialization

Coastal Ecology

Sediment Biogeochemistry

Microbial Ecology and Bioinformatics

Aquaculture

### Professional Memberships

Coastal and Estuarine Research Federation (CERF)

Association for the Sciences of Limnology and Oceanography (ASLO)

National Shellfisheries Association (NSA)

### Employment History

**2019-present** – Senior Scientist, INSPIRE Environmental, LLC, Newport, RI

**2018-2019** – Project Scientist, INSPIRE Environmental, LLC, Newport, RI

**2016-2019** – Postdoctoral Researcher, Marine Science Center, Northeastern University, Nahant, MA

**2010-2016** – Virginia Sea Grant Graduate Research Fellow, College of William & Mary

**2007-2010** – Research Technician, Battelle Memorial Institute, Duxbury, MA

**2005-2010** – Research Staff, Martha's Vineyard Shellfish Group, Vineyard Haven, MA

### EXPERIENCE SUMMARY

Dr. Annie Murphy is a marine scientist with expertise in benthic biogeochemistry, microbial ecology, aquaculture research, and marine environmental change. Her expertise lies at the interface between benthic community ecology and biogeochemistry with a specific interest in the response of aquatic ecosystems to anthropogenic disturbances. She has investigated the ecological effects of shellfish cultivation in coastal waters from the Chesapeake Bay, VA to the Sacca di Goro, Italy, the influence of nutrient enrichment on microbial communities in New England salt marshes and shifts in salt marsh community dynamics along an urbanization gradient in the greater Boston, MA area. More recently she has been involved in projects assessing the benthic environments within the context of dredged material disposal sites as well as offshore wind energy leased areas.

### PROFESSIONAL EXPERIENCE

#### *Benthic Habitat Assessments for Offshore Wind Development*

Dr. Murphy is involved in data generation, analyses, interpretation, and reporting for several offshore wind projects. She is experienced in analyzing sediment profile images to assess the benthic environment within the context of offshore wind development. With these analyses she utilizes the national habitat classification standard, the Coastal and Marine Ecological Classification Standard (CMECS), recommended by BOEM for benthic habitat assessments. Specific projects include Orsted's planned South Fork, Skipjack, Revolution, Ocean Wind, and Sunrise Wind Farms. She has lead authorship of benthic and shellfish resources sections of construction and operations plans (COP) for several wind projects including describing potential impacts. She has also authored several site-specific benthic characterization reports, typically included as appendices to the COP.

#### *Developing Benthic Monitoring Plans for Offshore Wind*

Dr. Murphy has developed, drafted, and presented benthic monitoring plans aimed at assessing baseline conditions and post-construction

conditions to document effects associated with offshore wind infrastructure. The benthic monitoring plans are required by state and federal agencies to document changes to the benthic habitat resulting from the construction and operations of offshore wind facilities. The development of these monitoring plans requires close coordination with project developers, regulators, and various stakeholders. These benthic monitoring plans are scientifically defensible survey designs aimed at documented anticipated and unexpected changes to the benthic environment associated with the construction and operations of offshore wind farms, including monitoring the epifaunal community on introduced structures, the shifts in benthic function of the seafloor surrounding these structures, and benthic responses to seabed preparation such as boulder relocation.

### ***Assessing Shifts in Benthic Biogeochemical Cycling in Response to Large Scale Aquaculture Operations***

Dr. Murphy has extensive experience measuring rates of benthic biogeochemical processes including sediment oxygen demand, remineralization rates, denitrification, and dissimilatory nitrate reduction to ammonium (DNRA) at a variety of coastal environments. She led research investigating the interactions of commercial scale clam and oyster aquaculture operations with the coastal environment with a focus on carbon and nitrogen biogeochemical cycling. Using isotope tracer approaches, including isotope pairing technique, Dr. Murphy determined how rates of nitrogen removal and nitrogen recycling pathways are affected by clam cultivation in the shallow waters of Chesapeake Bay and within lagoonal waters of the Sacca di Goro, Italy.

### **PEER-REVIEWED PUBLICATIONS**

- M.L. Guarinello, S.K. Sturdivant, **A.E. Murphy**, L. Brown, J.A. Godbold, M. Solan, D.A. Carey, J.D. Germano. (accepted). Evidence of rapid functional benthic recovery following the Deepwater Horizon oil spill. *Nature Communications*
- J.L. Bowen, A.E. Giblin, **A.E. Murphy**, A. Bulseco, L. Deegan, D. Johnson, J. Nelson, T. Mozdzer, H. Sullivan. (2020). Not all nitrogen is created equal: Differential effects of nitrate versus ammonium enrichment in coastal wetlands. *BioScience*
- Murphy, A.E.**, A. Bulseco-McKim, R. Ackerman, and J.L. Bowen. (2020). Sulfide addition favors respiratory ammonification (DNRA) over denitrification and alters the active microbial community in salt marsh sediments. *Environmental Microbiology*
- Bulseco-McKim, A., J. Vineis, **A.E. Murphy**, A.C. Spivak, A.E. Giblin, J. Tucker, and J.L. Bowen. (2019). Metagenomics coupled with biogeochemical rates measurements provide evidence that nitrate addition stimulates respiration in salt marsh sediments. *Limnology and Oceanography*
- Murphy, A.E.**, R. Kolkmeier, B. Song, I.C. Anderson, and J.L. Bowen. (2019). The bioreactivity and microbiome of biodeposits from filter feeding bivalves. *Microbial Ecology*
- Bulseco-McKim, A., A.E. Giblin, J. Tucker, **A.E. Murphy**, K. Hiller, and J.L. Bowen. (2019). Nitrate addition stimulates microbial decomposition of organic matter in salt marsh sediments. *Global Change Biology*
- Murphy, A.E.**, D. Nizzoli, M. Bartoli, A.R. Smyth, G. Castaldelli, I.C. Anderson. 2018. Variation in benthic metabolism and nitrogen cycling across clam aquaculture sites. *Marine Pollution Bulletin* 127: 524-535. DOI 10.1016/j.marpolbul.2017.12.003
- Smyth A.R., **A.E. Murphy**, I.C. Anderson, B. Song. 2017. Differential effects of bivalves on sediment nitrogen cycling in a shallow coastal bay. *Estuaries and Coasts*. DOI 10.1007/s12237-017-0344-9
- Murphy, A.E.**, I.C. Anderson, A.R. Smyth, M.W. Luckenbach, B. Song. 2016. Dissimilatory nitrate reduction to ammonium (DNRA) exceeds denitrification in hard clam cultivation sediments. *Limnology and Oceanography* 61: 1589-1604. DOI 10.1002/lno.10305
- Murphy, A.E.**, K.A. Emery, I.C. Anderson, M.L. Pace, M.J. Brush, J.E. Rheuban. 2016. Quantifying the effects of commercial clam aquaculture on carbon and nitrogen cycling: An integrated ecosystem approach. *Estuaries and Coasts* 39: 1746. DOI 10.1007/s12237-016-0106-0
- Murphy, A.E.**, I.C. Anderson, and M.W. Luckenbach. 2015. Enhanced nutrient regeneration at commercial hard clam (*Mercenaria mercenaria*) beds and the role of macroalgae. *Marine Ecology Progress Series* 530: 135-151. DOI 10.3354/meps11301
- D.J. Brousseau, **A.E. Murphy**, N.P. Enriquez, K. Gibbons. 2008. Foraging by two estuarine fishes, *Fundulus heteroclitus* and *Fundulus majalis*, on Juvenile Asian Shore Crabs (*Hemigrapsus sanguineus*) in Western Long Island Sound. *Estuaries and Coasts* 31: 144-151. DOI 10.1007/s12237-007-9006-7