

# Elizabeth A K Murphy

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## EDUCATION

2018 PhD, Environmental Sciences, **University of Virginia**

Advisor: Matthew Reidenbach, PhD

*Dissertation: Marine Biofluidics in Benthic (and Naval) Systems*

[https://libraetd.lib.virginia.edu/downloads/qv33rx10s?filename=1\\_Murphy\\_Elizabeth\\_2018\\_PHD.pdf](https://libraetd.lib.virginia.edu/downloads/qv33rx10s?filename=1_Murphy_Elizabeth_2018_PHD.pdf)

2009 B.A., Integrative Biology, **University of California, Berkeley**

## RESEARCH APPOINTMENTS

**Postdoctoral Fellow** Stockholm University, Department of Zoology  
2021 – present

Advisor: Valentina Di Santo, PhD

**Postdoctoral Fellow** Umeå University, Department of Ecology and Environmental Science  
2019 – 2021

Advisor: Janne Karlsson, PhD

**Visiting PhD Student** United States Naval Academy, Department of Mechanical Engineering  
2015,16,17

Advisor: Michael Schultz, PhD

**Laboratory Manager** University of Massachusetts Amherst, Department of Biology  
2010 – 11

Advisor: Sheila Patek, PhD

**Research Assistant** UC Berkeley, Department of Integrative Biology  
2007 – 10

Advisors: Mimi Koehl, PhD and Kelly Dorgan, PhD

## PUBLICATIONS

Peer reviewed

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Hogan, S., **E.A.K. Murphy**, M.P. Volaric, M.C.N. Castorani, P. Berg, M.A. Reidenbach. 2021. Quantifying the influence of oyster reefs on infauna and sediment spatial distributions within intertidal mudflats. **Marine Ecology Progress Series**. In press.

**Murphy, E.A.K.**, J.M. Barros, M.P. Schultz, K.A. Flack, C.N. Steppe, M.A. Reidenbach. 2019. Roughness effects of diatomaceous slime fouling on turbulent boundary layer hydrodynamics. **Biofouling**.

**Murphy, E.A.K.**, Barros, J.M., Schultz, M.P., Flack, K.A., Steppe, C.N., Reidenbach, M.A. 2017. The turbulent boundary layer structure over diatomaceous slime fouling. **Tenth International Symposium on Turbulence and Shear Flow Phenomena**. Chicago, IL.

Barros, J.M., **E.A.K. Murphy**, M. P. Schultz. 2016. Particle image velocimetry measurements of the flow over barnacles in a turbulent boundary layer. **Proceedings of the 18th International Symposia on Applications of Laser and Imaging Techniques to Fluid Mechanics**. ISBN 978-989-98777-8-8

**Murphy, E.A.K.** and M.A. Reidenbach 2016. Oxygen transport in periodically ventilated polychaete burrows. **Marine Biology** 163:208. doi:10.1007/s00227-016-2983-y.

\*deVries, M.S., **E.A.K. Murphy**, S.N. Patek. 2012. Strike mechanics of an ambush predator: the spearing mantis shrimp. *Journal of Experimental Biology* 215: 4374-4384.  
 \*featured publication in "Inside JEB." Covered in National Geographic's science blog "Phenomena"

**Murphy, E.A.K.** and K.M. Dorgan. 2011. Burrow extension with a proboscis: Mechanics of burrowing by the glycerid, *Hemipodus simplex*. *Journal of Experimental Biology* 214: 1017-1027.

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Not peer reviewed

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**Murphy, E.A.K.** 2008. Effects of leachates from agriculturally impacted soils on planktonic shrimp. *The biology and geomorphology of tropical islands: student research papers*, Moorea. (Not peer reviewed)  
[http://ib.berkeley.edu/moorea/uploads/6/6/8/3/6683664/murphy\\_pdf\\_paper.pdf](http://ib.berkeley.edu/moorea/uploads/6/6/8/3/6683664/murphy_pdf_paper.pdf)

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Unpublished manuscripts

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**Murphy, E.A.K.**, J.M. Barros, M.P. Schultz, K.A. Flack, C.N. Steppe, M.A. Reidenbach. *In Revision*. Impacts of biofilm patchiness on boundary layer hydrodynamics. *Biofouling*.

## COMPETITIVE FUNDING and AWARDS

Office of Naval Research N00014-15-1-2560: **Interactions between biofilms and boundary layer flows**, \$125,915. Co- author (PI: M. Reidenbach) 2015-2018

NSF GROW (Graduate Research Opportunities Worldwide): **Influence of an invasive polychaete on contaminant transport in the Gulf of Bothnia**. \$5,000 2017-2018

Moore Research Award, Department of Environmental Sciences, University of Virginia: **Marine biofluidics in benthic and naval systems**. \$4,460 2016

Graduate Hydrology Award for the outstanding graduate student in hydrology 2016

Raven Society (Honor Society, University of Virginia) 2016

NSF GRIP (Graduate Research Internship Program). \$5,000; \$5,000; \$5,000 2015, 16, 17  
 Sponsored by the Office of Naval Research: Navy Undersea Research Program.

Ellison-Edmonson Award for Outstanding Interdisciplinary Research, Department of Environmental Sciences, University of Virginia 2014

NSF Graduate Research Fellowship. \$138,000 2014-2017

UVa outreach mini- grant: **Training Young Environmental Scientists Through Research Mentoring**. \$1,965; \$1,500. Co-author. 2013, 14

Exploratory Research Award, UVa Department of Environmental Sciences: **Developing a transparent analog for muddy marine sediment**. \$1,500. 2013

PreSens VisiSens Competition Finalist: **Carbon dioxide dynamics in bioirrigated sediments**. 2013  
 use of oxygen and carbon dioxide imaging systems (~\$1,390).

National Geographic Explorers Grant # 8966-11: **Rumbling in the benthos**: 2011-2012

**acoustics and human impacts in mantis shrimp.** \$20,000. Co-author (PI: S. Patek).

## **PRESENTATIONS**

\* indicates student (high school or undergrad) author

### *Seminars*

Murphy, E.A.K. Marine biofluidics in benthic (and Naval) systems. University of Virginia Dept. of Environmental Sciences. April 2017

Murphy, E.A.K. and K.M. Dorgan. Long thin slimy ones, short fat juicy ones: Exploring how worms with varying body morphologies burrow. UC Berkeley Biomechanics Seminar. October 2009

### *Conference presentations*

Reidenbach, M.A., Murphy E.A.K., Stocking J., Hydrodynamics of algal biofilms. Society of Integrative and Comparative Biology, San Francisco, CA, January 2018 (presented by first author).

Murphy, E.A.K., M.A. Reidenbach, M.P. Schultz. Interaction between biofilms and boundary layer flows. ONR Navy Undersea Research Program Review. Arlington, VA, June 6- 8, 2017 (oral presentation).

Murphy, E.A.K., J.M. Barros, M.P. Schultz, K.A. Flack, C.N. Steppe, M.A. Reidenbach. Effects of algal biofilm patchiness on boundary layer hydrodynamics. Association for the Sciences of Limnology and Oceanography Meeting, Honolulu, Hawaii, March 2017 (oral presentation).

Koehl, M.A.R., E.A.K. Murphy, M. Hadfield. Effects of algal overgrowth on water flow into and out of coral reefs. Society of Integrative and Comparative Biology. New Orleans, LA, January 4- 8, 2017 (presented by first author).

Murphy, E.A.K., M.P. Schultz, M.A. Reidenbach. Interaction between biofilms and boundary layer flows. Office of Naval Research Biofilms/ Coatings Program Review. Washington, DC, December 5- 7, 2016 (oral presentation).

Murphy, E.A.K., J.M. Barros, M.P. Schultz, K.A. Flack, C.N. Steppe, M.A. Reidenbach. The effects of an algal biofilm on the turbulent boundary layer at high Reynolds number. Bulletin of the American Physical Society 61. 69th Annual Meeting of the APS Division of Fluid Dynamics. Portland, OR, November 20- 22, 2016 (oral presentation).

Koehl, M.A.R., E.A.K. Murphy, M. Hadfield. Effects of algal overgrowth on water flow into and out of coral reefs. 13th International Coral Reef Symposium. Honolulu, HI, June 19- 24, 2016 (presented by first author).

Murphy, E.A.K., J.M. Barros, M.P. Schultz, M.A. Reidenbach. Characteristics of turbulent boundary layer flow over algal biofilm. ONR Navy Undersea Research Program Review. Seattle, WA, June 7- 9, 2016 (oral presentation).

Murphy, E.A.K., J.M. Barros, M.P. Schultz, M.A. Reidenbach. Characteristics of turbulent boundary layer flow over algal biofilm. Department of Environmental Sciences Graduate Research Symposium, February 26, 2016 (poster).

Murphy, E.A.K., J.M. Barros, M.P. Schultz, C.N. Steppe, K.A. Flack, M.A. Reidenbach. Characteristics of turbulent boundary layer flow over algal biofilm. Bulletin of the American Physical Society 60. 68th Annual Meeting of the APS Division of Fluid Dynamics. Boston, MA. November 22- 24, 2015 (oral presentation).

Barros, J.M., E.A.K. Murphy, M. P. Schultz. Particle image velocimetry measurements of the flow around barnacles immersed in a turbulent boundary layer. 11th International Symposium on Particle Image Velocimetry. Santa Barbara, CA. September 14- 16, 2015 (presented by first author).

Murphy, E.A.K. The Virginia Coast Reserve: Dynamic ecosystems in a changing landscape. Long Term Ecological Research All Scientists Meeting. Estes Park, CO, August 30- September 2, 2015 (oral presentation).

Murphy, E.A.K., M.A. Reidenbach, M.P. Schultz. Hydrodynamic consequences of biofilm fouling. ONR Navy Undersea Research Program Review. Arlington, VA, June 2- 4, 2015 (oral presentation).

Murphy, E.A.K. and M.A. Reidenbach. Oxygen transport in periodically ventilated polychaete burrows. Department of Environmental Sciences Graduate Research Symposium, February 27, 2015 (poster).

\*Pike, D.M., E.A.K. Murphy, M.A. Reidenbach. Using natural abundances of three stable isotopes to investigate the diets of polychaetes. Department of Environmental Sciences Graduate Research Symposium, January 20, 2014 (poster).

Murphy, E.A.K. and M.A. Reidenbach. Effects of temperature on ventilation patterns in polychaete burrows. Society of Integrative and Comparative Biology Conference. Austin, TX, January 3-7, 2013 (oral presentation).

Murphy, E.A.K. and K.M. Dorgan. Not so stuck in the mud: Worms with diverse body morphologies burrow by crack propagation. Department of Environmental Sciences 29<sup>th</sup> Graduate Research Symposium, January 9, 2013 (oral presentation).

Patek, S.N., M.S. deVries, E.A.K. Murphy. What is fast? Society of Integrative and Comparative Biology Annual Meeting. San Francisco, CA, January 3-7, 2013 (presented by first author).

Murphy, E.A.K. and S. N. Patek. Kinematics of a “spearing” mantis shrimp: A spring- loaded or muscle powered spear? Northeast Regional Division of Vertebrate Morphology and Comparative Biomechanics Joint Meeting. Kingston, RI, November 5, 2011 (oral presentation).

Murphy, E.A.K. and K.M. Dorgan. Long thin slimy ones, short fat juicy ones: Exploring how worms with varying body morphologies burrow. Ocean Sciences Meeting. Portland, OR, February 22-26, 2010 (poster).

Murphy, E.A.K. Using a terrestrial model ecosystem to examine the effects on planktonic shrimp of leachates and runoff from terrestrial sites impacted by pesticide use in Moorea, French Polynesia. Moorea Field Biology Class Symposium, December 11, 2008 (oral presentation).

## TEACHING

University of Virginia, Charlottesville, VA

Grader, An Inconvenient Truce: Climate, You and CO2	2015, 16
Grader, Biomechanics of Organisms	2015
Guest Lecture, Biomechanics of Organisms	2015
Teaching Assistant, Biomechanics of Organisms (I helped develop laboratories for this course)	2013
Teaching Assistant, Physical Hydrology Laboratory	2012-13

## SKILLS

### Marine research skills

AAUS scientific diving certified by the University of Washington (currently inactive). PADI Nitrox, Drysuit and Rescue Diver certifications, NAUI Ice Diving certification. DAN first aid, CPR, Oxygen Administration and AED certification for

professional divers. Small boat handling. Aquarium diving; surface supplied air; full face mask. Underwater videography and acoustics.

**Computer skills:**

Data collection and analysis using Matlab, Labview and ImageJ. Image processing and graphic design in Adobe Photoshop and Illustrator. Website design using Dreamweaver and Wordpress. Some experience programming in Python.

**Laboratory skills**

Particle Image Velocimetry (PIV). Laser Doppler Velocimetry (LDV). Oxygen microsensor. High speed videography. Marine invertebrate and fish husbandry. Fluorescent microscopy.

## FIELD/ MARINE LABORATORY EXPERIENCE

Gump South Pacific Research Station, Moorea, French Polynesia

Friday Harbor Marine Laboratories, University of Washington, Friday Harbor, WA

Tropical Dry Forest Research Center, Guanacaste, Costa Rica

Tanque Loma, Santa Elena, Ecuador

Gulf Coast Research Laboratory, University of Southern Mississippi, Ocean Springs, MS

Marine Biological Laboratory, Woods Hole, MA

Anheuser- Busch Coastal Research Center, Oyster, VA

## SCIENTIFIC OUTREACH

**Stakeholder engagement** Navy Undersea Research Program 2015, 16

- I communicate the results of my GRIP internship research to an audience of academic and Navy scientists as well as a board of visitors.

**Mentor** Department of Environmental Sciences, University of Virginia, Charlottesville, VA 2014-15

- I supervised an undergraduate investigating the impacts of oyster reefs on mudflat polychaete communities

**Science Outreach** University of Virginia, Charlottesville, VA 2012-15

- Social media manager for the VCR LTER
- Chair of the 2015 Environmental Sciences Student Research Symposium  
This involved managing a budget of several thousand dollars as well as an advertising effort to engage the public, and recruiting a keynote speaker.
- I mentored high school students on research projects related to a community garden
- I taught science classes in a local Title 1 elementary school to provide hands-on, supplementary science education to 1<sup>st</sup> and 2<sup>nd</sup> graders.
- I developed and taught two, one-hour science classes on 1) animal adaptations to the deep sea and 2) plankton for a 5<sup>th</sup> grade class. I created lecture materials and hands-on activities and experiments for the classes.

**Mentor** Virginia Coastal Reserve LTER 2013

- Summer REU program
- Summer REHS program
- I supervised an undergraduate investigating the bioirrigation behavior of polychaetes and a high school student investigating intertidal mudflat food webs.

**Public Policy** University of Virginia, Virginia General Assembly, Washington, DC 2013

- I attended a workshop on communicating science to policymakers and the media in Washington, DC. I then met with the offices of Virginia representatives and a senator on Capitol Hill to advocate for sustained, consistent funding for ecosystem science.
- I assisted with an event with state legislators showcasing our research at the VCR LTER.

**Show diver** California Academy of Sciences, San Francisco, CA 2012

- I talked to the public about coral reef ecology, fish biology and ocean acidification- while underwater

**Mentor** University of Massachusetts, Amherst, MA 2010-12

- Biology Undergraduate Research Program (BURA)
- I supervised a total of three undergraduate researchers working on the kinematics of spearing mantis shrimp strikes and animal husbandry and aquarium maintenance.

## SERVICE

**VCR LTER Graduate Representative** VCR LTER, Oyster, VA 2013 - 2017

**Reviewer for:** Journal of Experimental Biology, Marine Ecology Progress Series, Advances in Water Resources, Southeastern Naturalist

**Outreach Chair** Department of Environmental Sciences, University of Virginia 2014 - 15

**Social Chair** Department of Environmental Sciences, University of Virginia 2013 -14

**Recruitment Coordinator** Department of Environmental Sciences, University of Virginia 2013

## PUBLISHED DATASETS

Murphy, EAK, Barros, JM, Schultz, MP, Flack, KA, Steppe, CN, & Reidenbach, MA. (2021). PIV vector fields from: Boundary layer hydrodynamics of patchy biofilms [Data set]. Zenodo.  
<https://doi.org/10.5281/zenodo.5644626>

Murphy, E.A.K. and M.P. Volaric. (2021). Benthic invertebrates from intertidal mudflats at the on the coast of Virginia, 2016 ver 1. Environmental Data Initiative.  
<https://doi.org/10.6073/pasta/7deadc96ff337c3a30a82df0bb39ae3b>

Murphy, EAK, Barros, JM, Schultz, MP, Flack, KA, Steppe, CN, & Reidenbach, MA. (2018). Biofilm flow data from: Roughness effects of diatomaceous slime fouling on turbulent boundary layer hydrodynamics [Data set]. Zenodo. <http://doi.org/10.5281/zenodo.1175014>

deVries MS, Murphy EAK, Patek SN (2012) Data from: Strike mechanics of an ambush predator: the spearing mantis shrimp. Dryad Digital Repository. doi:10.5061/dryad.d83g1