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## **EDUCATION**

2012 Postdoctoral Investigator, Biology Department, mentored by Dr. Donald Anderson, Woods Hole Oceanographic Institution

2010-2012 Postdoctoral Scholar, Biology Department, mentored by Drs. Donald Anderson and Dennis McGillicuddy, Woods Hole Oceanographic Institution

2010 Ph.D., Biological Oceanography, University of Washington, Seattle, WA  
Title: *Ecological investigations of genetic diversity in the diatom genus Pseudo-nitzschia*  
Advisor: E.V. Armbrust

2005 M.S., Biological Oceanography, University of Washington, Seattle, WA  
Title: *Development and use of Automated rRNA Intergenic Spacer Analysis (ARISA) to assess Pseudo-nitzschia diversity in Pacific Northwest waters*  
Advisor: E.V. Armbrust

2002 B.A., Biology, New College of Florida, Sarasota, FL  
Title: *Responses of Lake Michigan phytoplankton to iron and other nutrient additions*  
Advisors: S. Gilchrist/(REU @ U. of Wisconsin, Milwaukee: H. Bootsma)

## **PROFESSIONAL APPOINTMENTS**

2020-present Director, Florida Fish and Wildlife Conservation Commission's Center for Red Tide Research

2016-present Research Scientist and Harmful Algal Blooms Subsection Leader, Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute

2012-2016 Research Scientist, Taxonomy and Molecular Ecology Programs, Harmful Algal Bloom Subsection, Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute

2012-present Guest Investigator, laboratory of Dr. Donald Anderson, Biology Department, Woods Hole Oceanographic Institution

2011-2013 Online Course Scientist for The Ocean System Seminars on Science American Museum of Natural History

2002-2010 Research assistant, Center for Environmental Genomics, mentored by Dr. E. V. Armbrust, University of Washington

2008-2009 Coordinator of Sanger sequencing facility at Center for Environmental Genomics, University of Washington

2002 Instructor, Marine Science Consortium, Wallops Island, VA

2001 Research assistant (Research Experience for Undergraduates), mentored by Dr. Harvey Bootsma, Great Lakes WATER Institute, University of Wisconsin at Milwaukee

1998-2000 Technician, Allyn Museum of Entomology, Sarasota, Florida

## **PUBLICATIONS**

Anderson, D.M., Fensin, E., Gobler, C.J., Hoeglund, A.E., Hubbard, K.A., Kulis, D.M., Landsberg, J.H., Lefebvre, K.A., Provoost, P., Richlen, M.L. and Smith, J.L., 2021. Marine harmful algal blooms (HABs) in the United States: history, current status and future trends. *Harmful Algae*, 102, p.101975.

Djurhuus, A., Closek, C.J., Kelly, R.P., Pitz, K.J., Michisaki, R.P., Starks, H.A., Walz, K.R., Andruszkiewicz, E.A., Olesin, E., Hubbard, K., Montes, E., Otis, D., Muller-Karger, F.E., Chavez, F.P., Boehm, A.B., and Breitbart, M. 2020. Microbes to Mammals: Detecting Community Shifts Through Environmental DNA. *Nature Communications*, 11(1): 1-9.

Villac, M.C., Hoeglund, A., Tilney, C., Garrett, M., Lopez, C., Hubbard, K., Steidinger, K. A., 2020. Ecophysiology and bloom dynamics of *Karenia* with emphasis on *Karenia brevis* in Florida waters. In: Rao, D.V.S. (Ed.), *Dinoflagellates Classification, Evolution, Physiology and Ecological Significance*. Nova Science Publishers, New York, pp. 261–301.

Hollister, A.P., Kerr, M., Malki, K., Muhlbach, E., Robert, M., Tilney, C.L., Breitbart, M., Hubbard, K.A. and Buck, K.N. 2020. Regeneration of macronutrients and trace metals during phytoplankton decay: An experimental study. *Limnology and Oceanography*, 65, no. 8 (2020): 1936-1960.

Anderson, C.R., Berdalet, E., Kudela, R.M., Cusack, C., Silke, J., O'Rourke, E., Dugan, D., McCammon, M., Newton, J.A., Moore, S.K. and Paige, K., Ruberg, S., Morrison, J.R., Kirkpatrick, B., Hubbard, K., and Morell, J. 2019. Scaling up from regional case studies to a global harmful algal bloom observing system. *Frontiers in Marine Science*, 6, article # 250.

Bates, S.S., N. Lundholm, K.A. Hubbard, M. Montresor, and C.P. Leaw. 2019. Toxic and harmful marine diatoms, p. 389–434. In: J. Seckbach and R. Gordon (eds.) *Diatoms: fundamentals and applications* [Volume 1 in the series: *Diatoms: Biology & Applications*]. Wiley-Scrivener Beverly, MA, USA.

Tilney, C.L., Shankar, S., Hubbard, K.A. and Corcoran, A.A. 2019. Is *Karenia brevis* really a low-light-adapted species? *Harmful Algae*, 90, p.101709.

Cannizzaro, J.P., Barnes, B.B., Hu, C., Corcoran, A.A., Hubbard, K.A., Muhlbach, E., Sharp, W.C., Brand, L.E. and Kelble, C.R. 2019. Remote detection of cyanobacteria blooms in an optically shallow subtropical lagoonal estuary using MODIS data. *Remote Sensing of Environment*, 231, 111227.

Weisberg, R. H., Liu, Y., Lembke, C., Hu, C., Hubbard, K., & Garrett, M. 2019. The coastal ocean circulation influence on the 2018 West Florida Shelf *K. brevis* red tide bloom. *Journal of Geophysical Research: Oceans*, 124. <https://doi.org/10.1029/2018JC014887>

Sawaya, N. A., Djurhuus, A., Closek, C.J., Hepner, M., Olesin, E., Visser, L., Kelble, C., Hubbard, K.A., Breitbart, M. 2019. Assessing Eukaryotic Biodiversity in the Florida Keys National Marine Sanctuary Through Environmental DNA Metabarcoding. *Ecology and Evolution*, 9:1029–1040. <https://doi.org/10.1002/ece3.4742>

Bates S.S., Hubbard, K.A., Lundholm, N., Montresor, M., and Leaw, C.P. 2018. Domoic acid in *Pseudo-nitzschia*, *Nitzschia*, and the food web: new research since 2011. *Harmful Algae*, 79: 3-43.

Bowers, H.A., Ryan, J.P., Hayashi, K., Woods, A.L., Marin R., Smith, G.J., Hubbard, K.A., Doucette, G.J., Mikulski C.M., Gellene, A.G., Zhang Y., Kudela, R.M., Caron, D.A., Birch, J.M., Scholin, C.A. 2018. Diversity and toxicity of *Pseudo-nitzschia* species in Monterey Bay: perspectives from targeted and adaptive sampling. *Harmful Algae*, 78:129-141.

Smith, J., Gellene, A.G., Hubbard, K.A., Bowers, H.A., Kudela, R.M., Hayashi, K., and Caron, D.A. 2018. *Pseudo-nitzschia* species composition varies concurrently with domoic acid concentrations during two different bloom events in the Southern California Bight. *Journal of Plankton Research*, Volume 40, Issue 1: 29–45.

Liu, Y., Weisberg, R.H., Lenes, J.M., Zheng, L., Hubbard, K.A., and Walsh, J.J. 2016. Offshore forcing on the “pressure point” of the West Florida Shelf: Anomalous upwelling and its influence on harmful algal blooms, *Journal of Geophysical Research Oceans*, 121: 5501–5515, doi:[10.1002/2016JC011938](https://doi.org/10.1002/2016JC011938).

Hubbard, K.A., Olson, C.E., Armbrust, E.V. 2014. Molecular characterization of *Pseudo-nitzschia* community structure and species ecology in a hydrographically complex estuarine system (Puget Sound, Washington, USA). *Marine Ecology Progress Series* 507:39-55.

Fernandes, L.F.\*, Hubbard, K.A.\*, Richlen, M., Smith, J., Bates, S. S., Ehrmann, J., Leger, C., Mafra, L., Kulis, D., Quilliam, M., Libera, K., McCauley, L., Anderson, D.M. 2014. Diversity and toxicity of the diatom *Pseudo-nitzschia* Peragallo in the Gulf of Maine, Northwestern Atlantic. *Deep-Sea Research Part II*, special edition.

\*The first and second authors contributed equally to this project.

Ribalet, F., Marchetti, A., Hubbard, K.A., Brown, K., Durkin, C.A., Morales, R. Robert, M., Swalwell, J., Tortell, P.D., van den Engh, G., Armbrust, E.V. 2010. Unveiling a phytoplankton hotspot at a narrow boundary between coastal and offshore waters. *Proceedings of the National Academy of Science* 107:16571-6.

Hubbard, K. A., Rocap, G. & Armbrust, E. V. 2008. Inter- and intraspecific community structure within the diatom genus *Pseudo-nitzschia* (Bacillariophyceae). *Journal of Phycology* 44:637–649.

Marchetti, A., Lundholm, N., Kotaki, Y., Hubbard, K., Harrison, P. J. & Armbrust, E.V. 2008. Identification and assessment of domoic acid production in oceanic *Pseudo-nitzschia* (Bacillariophyceae) from iron-limited waters in the northeast subarctic Pacific. *Journal of Phycology* 44:650-661.

Erdner, D.L., Dyble, J., Parsons, M.L., Stevens, R.C., Hubbard, K.A., Wrabel, M.L., Moore, S.K., Lefebvre, K.A., Anderson, D.M., Bienfang, P., Bidigare, R.R., Parker, M.S., Moeller, P., Brand, L.E., and Trainer, V.L. 2008. Centers for Oceans and Human Health: a unified approach to the challenge of harmful algal blooms. *Environmental Health* 7:S2.

## PROFESSIONAL ACTIVITIES

- ❖ Board of Directors, Gulf of Mexico Coastal Ocean Observing System, (begins September 2021)
- ❖ University of Florida Center for Coastal Solutions Advisory Board, 2021-present
- ❖ Maine eDNA EPSCoR External Advisory Committee member, 2020-2024
- ❖ Florida Red Tide Mitigation and Technology Development Initiative, Technical

- Advisory Council Member, 2019-present
- ❖ Thesis committee member for Suzi Clark (WHOI; dissertation; 2018-2021); Dana Nieuwkerk (USF; dissertation; 2016-present); Adrienne Hollister (USF; Master's; 2018-present)
- ❖ National Harmful Algal Bloom Committee, appointment 2017 to 2023
- ❖ Public Health and Safety Task Team, Gulf of Mexico Coastal Ocean Observing System, 2016 to present
- ❖ State Lead for Florida, Gulf of Mexico Alliance Water Resources Team, 2016 to present
- ❖ Completed the 11<sup>th</sup> Advanced Phytoplankton Taxonomy Course, Naples, Italy (October 2015)
- ❖ Member of Steering Committee for US HAB Symposium, Long Beach, California, 2015
- ❖ Served on Student Award Committee for US HAB Symposium, Sarasota, FL, 2013, and for 16<sup>th</sup> International Conference on Harmful Algae, Wellington, New Zealand
- ❖ Assistant in coordination of student symposium at NOAA Oceans and Human Health Initiative PI meeting, Seattle, WA, 2009; assisted with planning of similar symposia in 2011 and 2013
- ❖ Coordinated 1<sup>st</sup> Annual Student Symposium at US HAB Symposium, Ocean Shores, WA, 2009
- ❖ Conducted outreach, including presentations on phytoplankton, HABs, Puget Sound circulation, microscopy, and molecular techniques in oceanography to local high school and college students, and to traditionally under-represented groups including the Korean Women's Association, Multicultural Initiative in the Marine Sciences: Undergraduate Participation (MIMSUP), and Making Connections (2006-2009)
- ❖ Reviewer: *Journal of Phycology*; *Phycologia*; *Estuarine, Coastal and Shelf Science*; *Harmful Algae*; *FEMS Microbiology Ecology*; *International Journal of Environmental Research and Public Health*, *Progress in Oceanography*; *Oregon Sea Grant*; *Marine Ecology Progress Series*; *Asian Fisheries Science Journal*; and others

#### **FUNDED GRANTS (as of July 2021, does not include unfunded collaborations)**

2018-2021 PhytO-ARM, an open-source platform for real-time phytoplankton monitoring, data sharing, and automated aquaculture management, NOAA Sea Grant, \$24,123

2018-2023 Woods Hole Center for Oceans and Human Health 3, NSF/NIEHS, \$310,604

2019-2024 An adaptive network of in situ sensors for real-time HAB monitoring in the Gulf of Maine, NOAA, \$87,120

2019-2024 Life and Death of *Karenia brevis* Blooms in the Eastern Gulf of Mexico, NOAA ECOHAB, \$324,789

2019-2022 Southeast Coastal Ocean Observing Regional Association (SECOORA), \$400,000

2020-2024 PCMHAB20: Implementing *Karenia brevis* Respiratory Risk Forecast System in the Gulf of Mexico Coastal Waters, NOAA, \$219,746

2020-2025 Developing a quantitative model for trophic transfer and impacts of *Pseudo-nitzschia* and *Alexandrium* species' HAB toxins in Arctic and Subarctic food webs with health assessment and behavioral observations for marine mammals and fish, NOAA ECOHAB, \$503,219

2021-2022 Grazing of Pyrodinium by bivalves, Tampa Bay Estuary Program, \$50,000

2021-2025 Application of Clay Flocculation for Removal of *Karenia brevis* Cells and Toxins in Southwest Florida Coastal Waters, NOAA PCMHAB, \$287,980

### **FIELD EXPERIENCE**

- 2015 Chief scientist on 5-day survey as part of Woods Hole Oceanographic Institution's Center for Oceans and Human Health rapid response cruise to investigate toxic *Pseudo-nitzschia* blooms in eastern ME (R/V *Tioga*)
- 2014 Conducted 3-day bloom mapping survey to investigate *Karenia* spp. bloom (genetic diversity and toxin concentrations) in northeastern Gulf of Mexico (R/V *Bellows*)
- 2014 Chief scientist on 4-day survey as part of Woods Hole Oceanographic Institution's Center for Oceans and Human Health rapid response cruise to investigate toxic *Pseudo-nitzschia* blooms in eastern ME (R/V *Tioga*)
- 2013 Chief scientist on 4-day survey as part of Woods Hole Oceanographic Institution's Center for Oceans and Human Health rapid response cruise to investigate toxic *Pseudo-nitzschia* blooms in eastern ME (R/V *Tioga*)
- 2012 Chief scientist on 2-day survey as part of NOAA-NSCOR funded Amnesic Shellfish Poisoning emergency response cruise to investigate toxic *Pseudo-nitzschia* bloom in the Schoodic Peninsula, ME region (R/V *Tioga*)  
  
Conducted 4-day survey and several day surveys mapping blooms of *Karenia* spp. in the eastern Gulf of Mexico (R/V *Eugenie Clarke*)
- 2011 Conducted 3-day survey of phytoplankton diversity in the Gulf of Maine (off the coast of New Hampshire) during deployment and recovery of the Environmental Sample Processor moored platforms (R/V *Connecticut*)  
  
Conducted 2-day emergency response sampling during unusual marine mammal mortality event for harmful algal bloom species in New Hampshire and Massachusetts coastal waters (R/V *Gulf Challenger*)  
  
Conducted 12-day survey of *Pseudo-nitzschia* and *Prorocentrum micans* distribution patterns in Gulf of Maine and the Bay of Fundy during October-November (R/V *Oceanus*)

- 2009 Conducted 3-day survey of *Pseudo-nitzschia* distribution patterns in Puget Sound as part of Oceans and Human Health cruise (R/V *Thompson*)
- 2008 Conducted 7-day survey of *Pseudo-nitzschia* distribution patterns in the Bay of Fundy and Gulf of Maine as part of GOMTOX, and assisted with standard sampling for *Alexandrium fundyense* (R/V *Endeavor*)
- 2008 Conducted 7-week time series of *Pseudo-nitzschia* distribution patterns in the English Channel and Penzé Estuary, FR (*Mysis*)
- 2006 Conducted 4-day survey of *Pseudo-nitzschia* distribution and hydrographic properties in Puget Sound as part of the Puget Sound Regional Synthesis Model semi-annual cruise (R/V *Thompson*)
- 2005 Conducted multiple shore-based samplings of *Pseudo-nitzschia* distributions in Puget Sound and the Strait of Juan de Fuca during two toxic blooms (wetsuit)
- 2005 Conducted 7-day survey of *Pseudo-nitzschia* distributions in Vancouver Island coastal waters and filtered for DOM analysis (R/V *Barnes*)
- 2004 Conducted 1-day survey of *Pseudo-nitzschia* distribution patterns in Puget Sound as part of Oceans and Human Health cruise (R/V *Thompson*)
- 2004 Assisted with CTD operations on 14-day Pacific Northwest ECOHAB cruise (R/V *Wecoma*).
- 2004 Assisted with piston and box coring of marine sediment from Vancouver Island waters (R/V *Barnes*).
- 2001 Conducted chlorophyll *a* sampling and analysis during 7-day survey of southern Lake Michigan (R/V *Neeskay*)