

CURRICULUM VITAE
Holly Bowers, PhD

Education

University of Kalmar, Sweden	Aquatic Ecology	PhD 2008
Johns Hopkins University	Environmental Science	MS 2000
Salisbury State University	Biology	BS 1995

Professional Experience

Cawthron Institute	Visiting Scientist	2020
Moss Landing Marine Laboratories	Research Faculty	2017-present
Moss Landing Marine Laboratories	Technical Coordinator	2016-2017
Monterey Bay Aquarium Research Inst.	Post-doc Fellow	2012-2016
UMD, Center of Marine Biotechnology	Research Assistant	2007-2011
UMD, Institute of Human Virology	Research Specialist	2003-2006
	Research Assistant	2001-2003
	Research Associate	1998-2001
Johns Hopkins University	Research Assistant	1996-1998
Intervet	Technician II	1995-1996

Publications

Bowers HA, Richlen M, Anderson D, Hill P, Kostel K, Davis T, Ayres D, Fanara T, Hubbard K, Kirkpatrick B, Lansing M, Raymond H and Wichman R. 2020. Insights from the first US HAB Symposium Science Communication Workshop. In: Harmful Algae News No. 66, [Eds: B. Reguera, E. Bresnan].

Bowers HA, Ryan JP, Hayashi K, Woods AL, Marin III R, Smith GJ, Hubbard KA, Doucette GJ, Mikulski CM, Gellene AG, Yanwu Z, Kudela RM, Caron DA, Birch JM and Scholin CA. 2018. Diversity and toxicity in Monterey Bay *Pseudo-nitzschia* species: perspectives from targeted and adaptive sampling. *Harmful Algae* 78:129-141.

Bowers HA, Marin III R, Birch JM and Scholin CA. 2017. Sandwich hybridization probes for the detection of *Pseudo-nitzschia* (Bacillariophyceae) species: an update to existing probes and a description of new probes. *Harmful Algae* 70:37-51.

Bowers HA, Marin R III, Birch JM, Scholin CA and Doucette GJ. 2016. Recovery and identification of *Pseudo-nitzschia* (Bacillariophyceae) frustules from natural samples acquired using the environmental sample processor (ESP). *Journal of Phycology* 52:135-140.

Bowers HA, Messick GA, Hanif A, Jagus R, Carrion L and Schott EJ. 2010. Physicochemical properties of double-stranded RNA used to discover a reo-like virus from blue crab (*Callinectes sapidus*). *Diseases of Aquatic Organisms* 93:17-29.

Bowers HA, Brutemark A, de Carvalho W and Granéli E*. 2010. Combining flow cytometry and real-time PCR methodology to demonstrate phagotrophy in *Prymnesium parvum*. *Journal of the American Water Resources Association* 46:133-143. *all authors contributed equally and are therefore listed in alphabetical order.

Bowers HA, Tomas C, Kempton JW, Lewitus AJ, Tengs T and Oldach DW. 2006. Raphidophyceae [Chadefaud ex Silva] Systematics and Rapid Identification: Sequence Analyses and Real-Time PCR Assays. *Journal of Phycology* 42:1333-1348.

Bowers HA, Trice TM, Magnien R, Goshorn D, Michael B, Schaefer E, Rublee P and Oldach D. 2006. Detection of *Pfiesteria* spp. by PCR in surface sediments collected from Chesapeake Bay tributaries (Maryland). *Harmful Algae* 5: 342-351.

Bowers H, Tengs T, Goto S, Tomas C, Ono C, Yoshimatsu S and D Oldach. 2004. Development of real-time PCR assays for the detection of *Chattonella* species in culture and environmental samples. Proceedings of the Xth International Conference on Harmful Algae. Steidinger, K.A., Landsberg, J. H., Tomas, C. R. & Vargo G. A. [Eds.]. Florida Fish and Wildlife Conservation Commission and Intergovernmental Oceanographic Commission of UNESCO, pp. 231-233.

Bowers H, Tengs T, Glasgow H Jr, Burkholder J, Rublee P and Oldach D. 2000. Development of real-time PCR assays for rapid detection of *Pfiesteria piscicida* and related dinoflagellates. *Appl Environ Microbiol* 66:4641-8. Erratum *Appl. Environ. Microbiol.* 68: 3180.

Bowers H, Tengs T, Herrmann M and Oldach D. 2001. Real-time PCR monitoring of estuarine water samples for *Pfiesteria piscicida*, a dinoflagellate associated with fish kills and human illness. *In: Rapid Cycle Real-Time PCR: Methods and Applications*. Eds. Meuer, Wittwer and Nakagawara. Springer-Verlag, Heidelberg.

Burkholder JM, Hallegraeff GM, Melia G, Cohen A, **Bowers HA**, Oldach DW, Parrow MW, Sullivan MJ, Zimba PV, Allen EH and Mallin MA. 2007. Phytoplankton and bacterial assemblages in ballast water of U.S. military ships as a function of port of origin, voyage time, and ocean exchange practices. *Harmful Algae* 6: 486-518.

Glibert PM, Alexander J, Trice TM, Michael B, Magnien RE, Lane L, Oldach D and **Bowers H**. 2004. Chronic Urea Nitrogen Loading: A Correlate of *Pfiesteria* spp. in the Chesapeake and Coastal Bays of Maryland, USA. Proceedings of the Xth International Conference on Harmful Algae. Steidinger, K.A., Landsberg, J. H., Tomas, C. R. & Vargo G. A. [Eds.]. Florida Fish and Wildlife Conservation Commission and Intergovernmental Oceanographic Commission of UNESCO, pp. 74-76.

Hall NS, Litaker RW, Fensin E, Adolf JE, **Bowers HA**, Place AR and Paerl HW. 2008. Environmental Factors Contributing to the Development and Demise of a Toxic Dinoflagellate (*Karlodinium veneficum*) Bloom in a Shallow, Eutrophic, Lagoonal Estuary. *Estuaries and Coasts* 31: 402-418.

Hanif AW, Dyson WD, **Bowers HA**, Pitula JS, Messick GA, Jagus R and EJ Schott. 2013. Variation in spatial and temporal incidence of the crustacean pathogen *Hematodinium perezii* in environmental samples from Atlantic Coastal Bays. *Aquatic Biosystems* 9:11.

Jakobsen K, Tengs T, Vatne A, **Bowers H**, Oldach D, Burkholder J, Glasgow HB Jr, Rublee P, and Klaveness D. 2002. Discovery of the toxic dinoflagellate *Pfiesteria* in northern European waters. *Proc R Soc Lond B Biol Sci* 269:211-4.

Morris, Jr. JG, Grattan L, Wilson L, Meyer W, McCarter R, **Bowers H**, Hebel R, Matuszak D and Oldach D. 2006. Occupational exposure to *Pfiesteria* species in estuarine waters is not a risk factor for illness. *Environmental Health Perspectives* 114: 1038–1043.

Oldach D, C Delwiche, K Jakobsen, T Tengs, E Brown, J Kempton, E Schaefer, **H Bowers**, H Glasgow, J Burkholder, K Steidinger and P Rublee. 2000. Heteroduplex mobility assay-guided sequence discovery: elucidation of the small subunit (18S) rDNA sequences of *Pfiesteria piscicida* and related dinoflagellates from complex algal culture and environmental sample DNA pools. *Proc Natl Acad Sci U S A* 97:4303-8.

Riisberg I, RJS Orr, R Kluge, K Shalchian-Tabrizi, **HA Bowers**, V Patil, B Edvardsen and KS Jakobsen. 2009. Seven gene phylogeny of heterokonts. *Protist* 160: 191-204.

Rublee P, J Kempton, E Schaefer, C Allen, J Harris, D Oldach, **H Bowers**, T Tengs, J Burkholder and H Glasgow, Jr. 2001. Use of molecular probes to assess geographic distribution of *Pfiesteria* species. *Environmental Health Perspectives* 109 Suppl 5:765-7.

Ryan JP, Kudela RM, Birch JM, Blum M, **Bowers HA**, Chavez FP, Doucette GJ, Hayashi K, Marin III R, Mikulski CM, Pennington JT, Scholin CA, Smith GJ, Woods A and Zhang Y. Causality of an extreme harmful algal bloom in Monterey Bay, California during the 2014-2016 northeast Pacific warm anomaly. *Geophysical Research Letters* 44(11).

Sellner K, Place A, Williams E, Gao Y, VanDolah E, Paolisso M, **Bowers H** and S Roche. 2015. Hydraulics and barley straw (*Hordeum vulgare*) as effective treatment options for a cyanotoxin-impacted lake. *Marine and Freshwater Harmful Algae 2014*. Proceedings of the 16th International Conference on Harmful Algae. A. Lincoln MacKenzie [Ed.]. Cawthron Institute, Nelson, New Zealand and the International Society for the Study of Harmful Algae (ISSHA), pp. 218-221.

Smith J, Gellene AG, Hubbard KA, **Bowers HA**, Kudela RM, Negrey K and Caron DA. 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* 40:29-45.

Stauffer BA, **Bowers HA**, Buckley E, Davis T, Johengen TH, Kudela RM, McManus MA, Purcell H, Smith GJ, VanderWoude A and M Tamburri. 2020. Best Practices in Harmful Algal Bloom Monitoring: Understanding Observing Technologies and Data Quality. *Frontiers in Marine Science*, 16 July 2019 | <https://doi.org/10.3389/fmars.2019.00399>.

Tango P, Magnien R, Goshorn D, **Bowers H**, Michael B, Karrh R and Oldach D. 2006. Associations between fish health and *Pfiesteria* spp. in Chesapeake Bay and mid-Atlantic estuaries. *Harmful Algae* 5: 352-362.

Tengs T, **H Bowers**, A Ziman, D Stoecker and D Oldach. 2001. Genetic polymorphism in *Gymnodinium galatheanum* chloroplast DNA sequences and development of a molecular detection assay. *Molecular Ecology* 10:515-524.

Tengs T, **H Bowers**, H Glasgow Jr., J Burkholder, and D Oldach. 2003. Identical Ribosomal DNA sequence data from toxic and non-toxic *Pfiesteria piscicida* (Dinophyta) isolates. *Environmental Research* 93: 88-91.

Thessen AE, **Bowers HA**, and Stoecker DK. 2009. Intra- and inter-species differences in *Pseudo-nitzschia* growth and toxicity while utilizing different nitrogen sources. *Harmful Algae* 8:792-810.

Thessen AE, Clough LM, Whiting A, **Bowers H** and Boyer G. 2012. A recurring toxic marine cyanobacteria bloom above the Arctic Circle. *Harmful Algae News* 46:12-15.

Reports

Alliance for Coastal Technologies. 2017. Report: Sensors for Monitoring of Harmful Algae, Cyanobacteria and their Toxins. **Bowers HA** and Smith GJ, report authors. http://www.act-us.info/Download/Workshops/2017/MLML_Algae_Toxins/

NHABON Implementation Strategy for a National Harmful Algal Bloom Observing Network (NHABON). 2021. http://www.ioosassociation.org/sites/nfra/files/NHABON_StrategyDocWeb_Draft4.pdf

Invited Talks

Bowers H. Advancing portable detection capabilities of HAB species in California waters. California cyanobacteria and Harmful Algal Bloom (CCHAB) Network. October 15, 2020. Virtual meeting.

Bowers H. Chasing Harmful Algal Bloom species using cutting edge technology. Cawthron Institute. February 26, 2020. Nelson, New Zealand.

Bowers H. Chasing Harmful Algal Bloom species using cutting edge technology. Bodega Marine Laboratory Seminar Series. October 23, 2019. Bodega Bay, California.

Bowers H. Beyond the Lab: How to generate high quality qPCR data anywhere. Webinar host: Ubiquitome. October 10, 2019. <https://tinyurl.com/y553t6g5>

Presentations

Adolf JE, **Bowers HA**, Bachvaroff TR, and AR Place. Cryptophytes in Chesapeake Bay and their potential relationship to mixotrophic harmful algal blooms. Fourth Symposium on Harmful Algae in the U.S. Woods Hole, Massachusetts. October 29 - November 1, 2007 (oral).

Bowers H, Ryan J, Hayashi K, Woods A, Marin III R, Smith GJ, Hubbard K, Doucette G, Mikulski C, Gellene A, Zhang Y, Kudela R, Caron D, Birch J, and C Scholin. Diversity and toxicity of *Pseudo-nitzschia* species in Monterey Bay (USA): Perspectives from targeted and adaptive sampling. The 18th International Conference on Harmful Algae. Nantes, France. October 21 - 26, 2018 (oral).

Bowers H. Molecular approaches and mobile sampling platforms unravel diversity of *Pseudo-nitzschia* in Monterey Bay. Moss Landing Marine Labs Seminar Series. Moss Landing, California. March 23, 2017 (oral).

Bowers H, Woods A, Ryan J, Marin R III, Smith GJ, Mikulski C, Doucette G, Hubbard K, Negrey K, Kudela R, Birch J and C Scholin. Unraveling diversity in *Pseudo-nitzschia* species throughout a toxic event in Monterey Bay, California. Eighth Symposium on Harmful Algae in the U.S. Long Beach, California. November 14 – 19, 2015 (oral).

Bowers HA, Ryan JP, Zhang Z, Hubbard K, Smith GJ, Woods A, Negrey K, Kudela R, Birch J and CA Scholin. Characterizing phytoplankton distributions using targeted sampling by an autonomous underwater vehicle. The 16th International Conference on Harmful Algae. Wellington, New Zealand. October 27 - 31, 2014 (oral).

Bowers H, Marin R III, Ryan JP, Smith GJ, Kudela R, Mikulski CM, Doucette GJ and CA Scholin. 2013. Assessing pre-bloom, sub-surface populations of *Pseudo-nitzschia* in the San Pedro Shelf region of southern California. Seventh Symposium on Harmful Algae in the U.S. Sarasota, Florida. October 27 - 31, 2013 (speed talk and poster).

Bowers H, Williams E, Lidie K, Jagus R and A Place. Diel transcript variation in *Karlodinium veneficum*. 14th International Conference on Harmful Algae. Hersonissos-Crete, Greece. November 1 – 5, 2010 (poster).

Bowers H, Carrion L, Messick G, Zmora O and E Schott. A fatal reovirus associated with mortalities of blue crab (*Callinectes sapidus*) in aquaculture and soft-shell production facilities. 9th International Marine Biotechnology Conference. Qingdao, China 8-12 October 2010 (oral).

Bowers HA, Messick GA, Hanif A, Jagus R and EJ Schott. Molecular discovery of crustacean RNA viruses. SCOR Virology Meeting. Newark, Delaware, May 14-16, 2009 (poster).

Bowers HA, Place AR and EJ Schott. The contribution of molecular techniques in understanding the Bay: we're just scratching the surface. Ecosystem Based Management: the Chesapeake and Other Systems. Baltimore, Maryland. March 22- 25, 2009 (oral).

Bowers HA, Hanif A, Messick G, Donaldson J, Pitula J and EJ Schott (presenter). Application of DNA-based detection methodology to monitor *Hematodinium* sp., a parasite of blue crab (*Callinectes sapidus*). 101st Annual Meeting of the National Shellfisheries Association. Savannah, Georgia. March 22-26, 2009.

Bowers HA, Hanif A, Messick G and EJ Schott (presenter). Molecular characterization of a *Callinectes sapidus* reovirus and development of tools to monitor its presence in wild and in captive crabs. 101st Annual Meeting of the National Shellfisheries Association. Savannah, Georgia. March 22-26, 2009.

Bowers HA, Coats DW, Bachvaroff TR, Adolf JE, and AR Place. Using Real-time PCR to demonstrate co-occurrence of *Karlodinium veneficum* and the parasitic dinoflagellate *Amoebophyra* sp. ex. *Karlodinium veneficum*. Fourth Symposium on Harmful Algae in the U.S. Woods Hole, Massachusetts. October 29 - November 1, 2007 (poster).

Bowers HA, Thessen A, Oldach DW and Stoecker DK. Genetic Characterization of *Pseudo-nitzschia* species isolated from the Chesapeake Bay, Maryland USA. 12th International Conference on Harmful Algae. Copenhagen, Denmark. September 4-8, 2006 (poster).

Bowers HA, and Oldach DW. Methods for Detecting HAB Species and their Toxins in the Chesapeake Bay: an Overview. The 18th Biennial Conference of the Estuarine Research Federation. Norfolk, Virginia October 17-21, 2005 (oral).

Oldach DW, **Bowers HA** (presenter), and Morris, Jr. JG. Use of Molecular Probes in Assessing Human Health Events Linked to HAB Species. The 18th Biennial Conference of the Estuarine Research Federation. Norfolk, Virginia October 17-21, 2005 (oral).

Bowers HA, Oduori M, Tango P, Karrh R, Tomas C and Oldach DW. Detecting Raphidophyte Species Throughout Chesapeake and Coastal Bays (Maryland) Using Real-time PCR Assays. The Third Symposium on Harmful Algae in the U.S. Monterey, California October 2-7, 2005 (poster).

Bowers H, C Tomas, J Kempton, F Diaz-Mendez, S Goto, A Lewitus and D Oldach. Raphidophyte systematics and rapid identification: sequence analyses and real-time PCR assays. Global Ecology and Oceanography of Harmful Algal Blooms; Open Science Meeting: HAB's and Eutrophication. Baltimore, Maryland 6-10 March 2005 (poster).

Bowers H, F Diaz-Mendez, and D Oldach. Real-time PCR approaches to natural samples (estuarine and sediment). 11th International Conference on Harmful Algae. Cape Town, South Africa 15-19 November 2004 (oral).

Bowers H, C Tomas, J Kempton, F Diaz-Mendez, S Goto, A Lewitus and D Oldach. Raphidophyte systematics and rapid identification: sequence analyses and real-time PCR assays. 11th International Conference on Harmful Algae. Cape Town, South Africa 15-19 November 2004 (poster).

Bowers HA, Kempton JW, Tengs T, Rublee PA, Lewitus AJ and Oldach DW. Real-time PCR Assays for Harmful Algal Bloom Species. HABTech2003. Cawthron Institute, Nelson New Zealand 26-30 November 2003 (poster and demonstration).

Bowers HA, Tengs T, Schaefer E, Jakobsen K, Rublee PA and Oldach DW. Development of Real-Time PCR Assays for the Detection of Harmful Algal Bloom Species in Algal Culture, Environmental Water and Sediment Samples. Molecular Probe Technology for the Detection of Harmful Algae. Martin Ryan Institute, Galway, Ireland 20-24 May 2002 (oral and demonstration).

Bowers H, T Tengs, J Burkholder, P Rublee, R Magnien, D Goshorn and D Oldach. Physical and Biological Factors Associated with Temporal and Spatial Distribution of *Pfiesteria piscicida* in the Chesapeake Bay. 9th International Conference on Harmful Algal Blooms. Tasmania, Australia 7-11 February 2000 (poster).

Bowers H, T Tengs, A Ziman, P Tango, D Goshorn, R Magnien, R Karrh and D Oldach. Temporal and spatial distribution of *Pfiesteria piscicida* in Chesapeake Bay waters, 1999-2000. CDC National Conference on *Pfiesteria*: From Biology to Public Health. Stone Mountain, Georgia 18-20 October 2000 (poster).

Bowers H, T Tengs, H Glasgow Jr., J Burkholder, P Rublee and D Oldach. Development of real-time PCR assays for rapid detection of *Pfiesteria piscicida* and related dinoflagellates. CDC National Conference on *Pfiesteria*: From Biology to Public Health. Stone Mountain, Georgia 18-20 October 2000 (poster).

Bowers H, T Tengs, H Glasgow, Jr., J Burkholder, P Rublee and D Oldach. Development of real-time PCR assays for rapid detection of *Pfiesteria piscicida* and related dinoflagellates. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts 4-9 December 2000 (poster).

Bowers H, T Tengs, A Ziman, P Tango, D Goshorn, R Magnien, R Karrh and D Oldach. Temporal and spatial distribution of *Pfiesteria piscicida* in Chesapeake Bay waters, 1999-2000. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts 4-9 December 2000 (poster).

Bowers H, E Schaefer, P Rublee, T Tengs, A Arnold, G Brush and D Oldach. Extraction of dinoflagellate DNA from sediment cores and analysis of community structure based on 18S sequences. *Coastal Monitoring Through Partnerships*. April 2001 EMAP Symposium, Pensacola Beach Florida (poster).

Bowers H, E Schaefer, P Rublee, T Tengs, A Arnold, G Brush and D Oldach. Extraction of dinoflagellate DNA from sediment cores and analysis of community structure based on 18S sequences. *Mycotoxins and Phycotoxins*. June 2001 Gordon Research Conferences. Williams College. Williamstown Massachusetts (poster).

Burkholder JM, GM Hallegraeff, G Melia, A Cohen, D Oldach, **H Bowers**, MW Parrow and M Mallin. Phytoplankton assemblages in ballast water of US military ships considering port of origin, voyage time and ocean exchange practices. 12th International Conference on Harmful Algae. Copenhagen, Denmark. September 4-8, 2006 (poster).

DeMattio KA, **Bowers HA**, Wilde SB and Brock LM. Preliminary Studies on a Possible New Raphidophyte Species in South Carolina's Coastal Waters. The Southeastern Estuarine Research Society Meeting, Charleston, South Carolina. March 13-14, 2008.

Donaldson JR, Hanif A, **Bowers HA**, Pitula J, Messick GA and Schott EJ. Evidence for the blue crab parasite, *Hematodinium* sp. In coastal bay benthos. 101st Annual Meeting of the National Shellfisheries Association. Savannah, Georgia. March 22-26, 2009 (poster).

Dyson WE, **Bowers H**, Schott EJ, Hanif A, Messick G and Pitula JS. A PCR_based assay for detection of *Hematodinium* sp. in sediment from the Maryland Coastal Bays. 9th International Marine Biotechnology Conference. Qingdao, China 8-12 October 2010 (poster).

Flowers EM, Simmonds K, Aquilar R, **Bowers HA**, Zmora O and Schott EJ. A fatal reovirus of the blue crab, *Callinectes sapidus*, has potential to impact the host throughout its entire geographic region. 10th International Marine Biotechnology Conference. Brisbane, Australia 11-15 November 2013 (poster).

Goodwin K, Raabe J, Muller-Karger F, Leinen M, Smith J, **Bowers H**, Canonico G, Egan K and Stauffer BA. The future of eDNA sample collection: insights from virtual workshops. 4eDTEW, 4th Annual eDNA Technical Exchange Workshop. *Online*, 4-6 November 2020 (oral).

Goshorn D, R Magnien, P Tango, B Michael, D Oldach and **H Bowers**. Associations between the presence of ulcerated menhaden and *Pfiesteria* in Maryland. Estuarine Research Conference, Florida 2001 (poster).

Hall N, Litaker W, Fensin E, Adolf J, **Bowers H**, Place A and H Paerl. Environmental Factors Modulating an Ichthyotoxic Dinoflagellate (*Karlodinium veneficum*) Bloom in the Neuse River Estuary, NC. Estuarine Research Federation Conference, Science and Management Observations/Syntheses/Solutions. Providence, Rhode Island. November 4-8, 2007 (oral).

Kempton JW, Monroe EA, Williams PR, **Bowers HA**, Oldach DW and Lewitus AJ. Real-time PCR Detection of Selected Dinophyceae and Raphidophyceae Species from South Carolina Tidal Creeks and Brackish Retention Ponds. Estuaries on the Edge, Convergence of Ocean, Land and Culture. Washington State Convention Center, Seattle, Washington 14-18 September 2003 (poster).

Kudela R, Anderson C, Birch J, **Bowers H**, Caron D, Chao Y, Doucette G, Farrara J, Gellene A, Negrey K, Howard M, Ryan J, Scholin C, Smith GJ, Smith J and Sukhatme G. Harmful algal bloom hotspots really are hot: A case study from Monterey Bay, California. AGU Fall Meeting. San Francisco, California, 14-18 December 2015 (oral).

Lewitus AJ, **Bowers HA**, Burkholder JM, DeMattio KA, Glasgow HB Jr., Hayes KC, Kempton JW, Keppler CJ, Monroe EA, Ringwood AH, Wilde SB and Williams PR. Ecology of *Pfiesteria* spp. and Raphidophyte blooms in South Carolina. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts, 8-13 December 2003 (oral). Abstract in: *Harmful Algae* 3:226-227, 2004.

Lovko VJ, Lohrenz SE, **Bowers HA** and Place AR. Characterization and bloom-forming potential of the toxic, fish killing dinoflagellate *Karlodinium veneficum* in the northern Gulf of Mexico. 2010 Northern Gulf Institute Annual Conference. Mobile, Alabama 18-20 May 2010 (poster).

Magnien R, D Goshorn, D Oldach, **H Bowers** and T Tengs. Approaches to the investigation and interpretation of possible *Pfiesteria*-related events in Maryland. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts 4-9 December 2000 (oral).

Magnien R, B Michael, P Tango, D Goshorn, R Karrh, M Trice, D Oldach and **H Bowers**. Associations between *Pfiesteria* and environmental variables in Chesapeake Bay. Estuarine Research Conference, Florida 2001 (poster).

Marin R III, Ryan J, **Bowers HA**, Demir-Hilton E, Preston C, Ussler W, Doucette G, Mikulski CM, Birch J and CA Scholin. Rise and fall of toxigenic *Pseudo-nitzschia* populations and domoic acid observation by Environmental Sample Processor (ESP) networks along the California Coast. The 16th International Conference on Harmful Algae. Wellington, New Zealand. October 27 - 31, 2014 (oral).

Nishimura T, Murray JS, Balci M, **Bowers H**, Smith KF, Harwood DT, Thompson L, Stuart J, Challenger S, Bui T, Moisan C, and LL Rhodes. Genetic diversity and toxin production of *Pseudo-nitzschia* isolates from Aotearoa/New Zealand coastal waters. The 40th Japanese Society of Diatomology Annual Meeting. Online, Japan. 5-6 December 2020. (Invited talk, in Japanese).

Oldach D, P Rublee, C Delwiche, H Glasgow, Jr., K Jakobsen, T Tengs, **H Bowers**, E Brown, J Kempton and J Burkholder. Molecular detection methods for identification of *Pfiesteria piscicida* and other estuarine

toxin-producing dinoflagellates in field samples and algal cultures. Gordon Research Conference on Mycotoxins and Phycotoxins. Plymouth, New Hampshire 20-25 June 1999 (oral).

Oldach D, P Rublee, C Delwiche, H Glasgow, K Jakobsen, T Tengs, **H Bowers**, E Brown, J Kempton and J Burkholder. Development of molecular detection methods for *Pfiesteria piscicida* and other estuarine toxin-producing dinoflagellates guided by Heteroduplex Mobility Assay assisted sequence discovery. 9th International Conference on Harmful Algal Blooms. Tasmania, Australia 7-11 February 2000 (oral).

Rublee P, E Schaefer, C Allen, J Harris, **H Bowers**, T Tengs and D Oldach. Distribution of *Pfiesteria* species: comparison of results from water and sediment samples across multiple scales, 1998-2000. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts 4-9 December 2000 (oral).

Ryan JP, JBJ Harvey, Y Zhang, **HA Bowers**, CM Mikulski, GJ Doucette and CA Scholin. 2013. Planktonic layer phenomena in the ecology of toxigenic *Pseudo-nitzschia*: examples from coastal California. Seventh Symposium on Harmful Algae in the U.S. Sarasota, Florida. October 27 - 31, 2013 (oral).

Ryan J, Birch J, **Bowers H**, Caron D, Doucette G, Gellene A, Hubbard K, Kudela R, Marin R III, Mikulski C, Negrey K, Scholin C, Smith GJ, Smith J and Woods A. Ecological dynamics in California HAB hotspots: eddy incubation, retention, and subsurface refugia. Eighth Symposium on Harmful Algae in the U.S. Long Beach, California. November 14 – 19, 2015 (oral).

San Miguel RA, Epperson Z, Woods A, **Bowers HA** and GJ Smith. 2014. Population genetic structure of *Pseudo-nitzschia fraudulenta* using ISSR markers. Joint Aquatic Sciences Meeting. Portland, Oregon. 18-23 May 2014 (poster).

Schott EJ, **H Bowers**, A Hanif, GA Messick, D McIntosh, JS Pitula and R Jagus. 2010. Development and testing of a molecular tool for environmental monitoring of *Hematodinium* sp., a lethal parasite of blue crab *Callinectes sapidus*. Aquaculture 2010, meeting of the World Aquaculture Society. San Diego, California 1-5 March 2010 (oral).

Sellner K, Certner R, Cho H, Gibbons A, Kim C, Liu T, Miller H, Parikh N, Savranskaya N, Sun A, Wooten M, Throwe T, **Bowers H**, Place A and C Wazniak. Clay flocculation of *Microcystis aeruginosa* in the Chesapeake: Preliminary laboratory and socio-economic assessment results. 14th International Conference on Harmful Algae. Hersonissos-Crete, Greece. November 1 – 5, 2010 (poster).

Seigel AM, CL Wilson, GJ Smith and **HA Bowers**. Using handheld qPCR technology for on-site detection of HAB species. Tenth Symposium on Harmful Algae in the U.S. Orange Beach, Alabama. November 3-8, 2019 (poster).

Smith GJ, TJ Savage, R Kudela, K Hayashi and **HA Bowers**. Transcriptome analysis of the diatom *Pseudo-nitzschia australis* reveals pathways associated with domoic acid biosynthesis. Seventh Symposium on Harmful Algae in the U.S. Sarasota, Florida. October 27 - 31, 2013 (speed talk and poster).

Smith GJ, TJ Savage, R Kudela, K Hayashi and **HA Bowers**. Transcriptome analysis of *Pseudo-nitzschia australis* yields insights on nitrogen assimilation and domoic acid biosynthesis in this toxigenic diatom. Joint Aquatic Sciences Meeting. Portland, Oregon. 18-23 May 2014 (poster).

Smith GJ, **Bowers HA**, Epperson Z, Woods A, Sobrunho BF and San Miguel RA. Application of ISSR PCR to assess intraspecific genetic diversity in local populations of *Pseudo-nitzschia* and relevance to toxigenicity patterns. Eighth Symposium on Harmful Algae in the U.S. Long Beach, California. November 14 – 19, 2015 (poster).

Smith GJ, Savage TJ, Kudela R, Negrey K, Woods A, **Bowers HA** and Robertson D. Transcriptome analysis of *Pseudo-nitzschia australis* yields insights on nitrogen, isoprene and domoic acid metabolism in this toxigenic diatom. EMBO/EMBL Symposia: A new age of discovery for aquatic microeukaryotes. Heidelberg, Germany. January 26 – 29, 2016 (poster).

Tango PJ, B Michael, D Goshorn, R Magnien, C Heyer, TM Trice, W Butler, C Wazniak, R Karrh, S Bowen, R Lacouture, **H Bowers**, D Oldach, C Lockett, C Poukish, D Matuzsak, J Ryan, H Lynch, C Brown, R Hood, T Gross and D Ramers. History of HAB monitoring in Maryland tidewaters: Monitoring, response, nowcasting and forecasting. Global Ecology and Oceanography of Harmful Algal Blooms; Open Science Meeting: HAB's and Eutrophication. Baltimore, Maryland 6-10 March 2005 (poster).

Tengs T, **H Bowers**, A Ziman, D Stoecker and D Oldach. High evolutionary rates in *Gymnodinium galatheanum* chloroplast DNA sequences and development of a molecular detection assay. Symposium on Harmful Marine Algae in the US. Woods Hole, Massachusetts 4-9 December 2000 (oral).

Thessen AE, **Bowers HA**, Stoecker DK and Oldach DW. *Pseudo-nitzschia* spp. and domoic acid in Maryland and Virginia waters. 12th International Conference on Harmful Algae. Copenhagen, Denmark. September 4-8, 2006 (poster).

Thessen AE, **Bowers HA** and DK Stoecker. Intra- and Interspecies differences in *Pseudo-nitzschia* ecophysiology, genetics and toxicity. Phycological Society of America Annual Meeting. Providence, Rhode Island, 5-10 August 2007 (poster).

Wyse D, McPhee-Shaw E, Bellingham J, Sudek S and **Bowers H**. Plankton in Monterey Bay: Optimization of optical sensor data from AUVs with applications in plankton community composition. Ocean Sciences Meeting. Honolulu, Hawaii, 23-28 February 2014 (poster).

Theses

Bowers H. 2000. Development of a real-time PCR assay for detection and quantification of *Pfiesteria piscicida* organisms in environmental estuarine water samples. MS Thesis, Environmental Science Program, Johns Hopkins University. 73 pp.

Bowers H. 2008. Development and application of real-time PCR assays for the study of harmful algal bloom (HAB) species. PhD Thesis, Aquatic Ecology Program, University of Kalmar, Sweden.

Websites featuring my work

- **VISITING SCIENTIST:** <https://biosecurity-toolbox.nz.webeasy.slightlydifferent.co.nz/2020/09/22/better-ways-to-capture-edna-erna-from-water-collaboration-with-dr-holly-bowers-from-moss-landing-marine-labs/>
- **WEBINAR:** 'Beyond the Lab: How to generate high quality qPCR data anywhere': <https://insights.ubiquitomebio.com/beyond-the-lab-webinar-recording>
- https://www.genomeweb.com/pcr/ubiquitome-targets-bench-field-researchers-newest-portable-qpcr-platform#.XAnA_yd7mgQ
- <https://ioos.noaa.gov/news/act-evaluates-new-portable-hab-sensors/>
- <http://www.ubiquitomebio.com/news/freedom-for-you-grants-program-finalist-profiles-holly-bowers>
- <http://subseaworldnews.com/2014/05/29/ecohab-data-now-being-analyzed/>
- <http://www.sciencedaily.com/releases/2008/05/080527211502.htm>
- <http://www.mdsg.umd.edu/CQ/V06N1/main3/>

Training

- Microbial Genomics & Metagenomics Workshop at JGI, Walnut Creek CA, February 2014.
- 3rd International qPCR Symposium, London UK, April 2005.
- Lightcycler qPCR Training Course, Salt Lake City UT, November 1998.

Peer Reviewer Activity

2020	Reviewers for <i>CSU's COAST Grant Development Program</i>
2020	Reviewer for <i>Croatian Science Foundation</i>
2001, 2006, 2010	Reviewer for <i>Aquatic Microbial Ecology</i>
2004	Reviewer for <i>Journal of Phycology</i>
2005, 2009, 2016, 2019	Reviewer for <i>Harmful Algae</i>
2006	Co-Reviewer for SBIR phase II proposals – NOAA, National Ocean Service, Center for Coastal Ocean Research, Coastal Ocean Program
2006	Reviewer for <i>Environmental Research</i>
2006	Reviewer for Copenhagen Meeting Proceedings
2006, 2011	Reviewer for <i>Microbial Ecology</i>
2006, 2007, 2008, 2010	Reviewer for <i>Applied and Environmental Microbiology</i>
2007, 2009, 2011, 2013	Reviewer for <i>Journal of Clinical Microbiology</i>
2007	Reviewer for <i>Aquatic Biology</i>
2008, 2011, 2018	Reviewer for <i>Journal of Plankton Research</i>
2008	Reviewer for <i>Molecular Ecology Notes</i>
2008	Reviewer for <i>Deep-Sea Research Part II</i>
2009	Reviewer for <i>Marine Biology</i>
2010	Reviewer for <i>Marine Ecology Progress Series</i>
2010	Reviewer for <i>European Journal of Phycology</i>
2014	Reviewer for <i>Estuarine, Coastal and Shelf Science</i>
2015	Reviewer for <i>Environmental Science & Technology</i>
2015	Reviewer for <i>Algal Research</i>

2017, 2018	Reviewer for <i>Marine Pollution Bulletin</i>
2018	Reviewer for <i>Journal of Applied Phycology</i>
2019	Reviewer for <i>Trends in Biotechnology</i>
2019	Reviewer for <i>Scientific Reports, a Nature Research Journal</i>

Synergistic Activities

- ASM Microbe Organizing Committee (Applied Environmental Science track) August 2019 – present
- *Harmful Algae*, Subject Editor September 2018 – present
- National HAB Committee (NHC); co-chair July 2018 – present
- Society for Women in Marine Science, mentor December 2018 – present
- National HAB Committee (NHC); member July 2016 – June 2018
- MBARI Staff Council March 2013 – March 2015
- Santa Cruz Wharf Outreach Network, member April 2013 – June 2016
- US HAB meeting 2015, local organizing committee October 2013 – November 2015
- NOAA PCM Panel Participant Feb 2011
- NOAA NCCOS CSCOR external reviewer Dec 2011
- NOAA OHHI Panel Participant May 2010

Cruise Experience

- R/V Rachel Carson, San Pedro Shelf, Southern California Spring 2013 (6 days)
- R/V Rachel Carson, Monterey Bay, California Fall 2013 (5 days)
- R/V Rachel Carson, San Pedro Shelf, Southern California Spring 2014 (6 days)

Volunteer Activities

- Bayview Toastmasters, Vice President of Public Relations 2020 – present
- Bayview Toastmasters, Bayview Chapter Member 2019 – present
- Community Cat Allies, Board Member 2018 – present
- ReLove Animals, Inc., Vice President 2011 – 2015
- Peace of Mind Dog Rescue, transporter 2012 – 'present'
- Community Cats of Maryland, clinic volunteer coordinator 2009 – 2012
- Howard County Cat Club, fostering and adoption listings 2009 – 2012
- Junior League of Annapolis 2003 – 2005
- Towson Jaycees 1996 – 2001
- Salisbury Jaycees 1994 – 1996