

## CURRICULUM VITAE

### MARK R. PATTERSON

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Born: April 3, 1957; North Tonawanda, New York

#### **I. Education and Employment History**

##### **A. Education**

- 1985 Ph.D (Biology), Department of Organismic and Evolutionary Biology,  
Graduate School of Arts and Sciences, Harvard University, Cambridge, MA  
Co-Advisors: Drs. Kenneth P. Sebens and Thomas A. McMahon (deceased),  
Dissertation Title: “The effects of flow on the biology of passive suspension  
feeders: prey capture, feeding rate, and gas exchange in selected cnidarians.”
- 1982 A.M. (Biology), Department of Organismic and Evolutionary Biology,  
Graduate School of Arts and Sciences, Harvard University, Cambridge, MA
- 1979 A.B. (Biology) *magna cum laude with highest honors in Biology*,  
Harvard College, Cambridge, MA

##### **B. Employment**

- 2013 - present Professor, Marine & Environmental Sciences, and  
Civil & Environmental Engineering  
Associate Dean for Research and Graduate Affairs, College of Science (2018-  
present)  
Chief Technology Officer, Global Resilience Institute (2017-present)  
Core Faculty Member, Coastal Sustainability Institute  
Affiliated Faculty Member, Institute for Experiential Robotics  
Principal Investigator, Field Robotics Laboratory  
Northeastern University
- 2013-2016 Adjunct Professor of Marine Science, Department of Biological Sciences,  
School of Marine Science, Virginia Institute of Marine Science,  
College of William & Mary

- 1992-2013 Associate Professor and Professor, Department of Biological Sciences, School of Marine Science, Virginia Institute of Marine Science, College of William & Mary
- 1995-2005 Co-founder, Chief Technology Officer, and Vice President, Sias Patterson Inc., (manufacturer of Autonomous Underwater Vehicles), Yorktown, VA
- 1991 (Summer) Visiting Assistant Professor, Hawai'i Institute of Marine Biology (Edwin W. Pauley Summer Program in Marine Biology), University of Hawai'i at Mānoa, Course: Diffusion Barriers and Carbon Limitation in Reef Corals (co-taught with P. Jokiel, Univ. Hawai'i; V. Weis, Univ. Southern California; M. Lesser, Univ. New Hampshire).
- 1991 (Spring) Visiting Assistant Professor, East/West Program (currently Three Seas Program), Northeastern University, Course: Biology of Corals and Coral Reefs (co-taught with J. Miles and J. Witman, Northeastern Univ.).
- 1990 (Summer) Visiting Assistant Professor of Biology, University of Washington (Friday Harbor Laboratories summer program), Course: Physical Biology of Marine Organisms (co-taught with T. Daniel, Univ. Washington).
- 1990 (Spring) Visiting Assistant Professor, East/West Program (currently Three Seas Program), Northeastern University, Course: Biomechanics of Coral Reef Organisms - Graduate level (co-taught with K. Sebens, Northeastern Univ.).
- 1986-1993 Assistant and Associate Professor, Division of Environmental Studies, Graduate Group in Ecology, University of California, Davis.
- 1985-1986 Instructor, Department of Biology and East-West Program (currently Three Seas Program), Northeastern University.
- 1980-1985 Resident Tutor in Biology, Kirkland House, Harvard College.
- 1984 Course Instructor, Adaptations in Marine Organisms, Marine Science Center Summer Program, Northeastern University.
- 1983, 1984 Course Instructor, Undergraduate Tutorial, Biomechanics of Plants and Animals, Department of Organismic and Evolutionary Biology, Harvard University.
- 1982 Teaching Fellow, Population Ecology, Harvard University.
- 1981 Head Teaching Fellow, Introductory Biology, Harvard University.

1979, 1980      Teaching Fellow, Introductory Biology, Harvard University.

## **II. Scholarship and Research**

### **A. Publications**

†graduate student; ‡undergraduate co-author; §postdoctoral co-author; \*corresponding author when not first author

#### **a. Refereed articles**

*Google Scholar total times cited = 2,418; h-index = 22; i10 index = 31.*

49. Williams, S.D.†, and **M.R. Patterson**. 2020. Resistance and robustness of the global coral-symbiont network. *Ecology*, <https://doi.org/10.1002/ecy.2990>
48. Relles, N.†, **M. Patterson**, and D. Jones§. 2018. Change detection in a Marine Protected Area (MPA) over three decades on Bonaire, Dutch Caribbean. *Journal of the Marine Biological Association of the United Kingdom* 1-10. doi:10.1017/S0025315418000565
47. Elliott J.A.†, **M.R. Patterson**, C.G. Staub, M. Koonjul, and S.M. Elliott. 2018. Decline in coral cover and flattening of the reefs around Mauritius (1998–2010). *PeerJ* 6:e6014
46. Certner, R.H.†, A.M. Dwyer‡, **M.R. Patterson**, and S.V. Vollmer. 2017. Zooplankton as a potential vector for white band disease transmission in the endangered coral, *Acropora cervicornis*. *PeerJ* 5:e3502 <https://doi.org/10.7717/peerj.3502>.
45. Trembanis, A.C., A. Forrest§, B. Keller†, and **M.R. Patterson**. 2017. Mesophotic coral ecosystems: geoaoustically derived diversity estimation of the leeward shelf of Bonaire, Dutch Caribbean. *Frontiers in Marine Science*, 1 March 2017, <https://doi.org/10.3389/fmars.2017.00051>.
44. Elliott, J.†, **M. Patterson**, N. Summers‡, C. Miterhagen, E. Montocchio, and E. Vitry. 2016. How does the proliferation of the coral-killing sponge *Terpios hoshinata* affect benthic community structure on coral reefs? *Coral Reefs* 35: 1083-1095
43. Edson, E.C.‡, and **M.R. Patterson**. 2015. MantaRay: A novel autonomous sampling instrument for *in situ* measurements of environmental microplastic particle concentrations. OCEANS 2015, Institute of Electrical and Electronics Engineers (IEEE) and the Marine Technology Society (MTS), 19-22 October, Washington, D.C., 6 pp. <https://doi.org/10.23919/OCEANS.2015.7404541>.

42. Elliott, J.<sup>†</sup>, **M. Patterson**, E. Vitry, N. Summers<sup>¥</sup>, and C. Miterique. 2015. Morphological plasticity allows coral to actively overgrow the aggressive sponge *Terpios hoshinota* (Mauritius, Southwestern Indian Ocean). *Marine Biodiversity* 46: 489-493.
41. Rose, C.M., J.M. Adams, E.K. Hinchey, J.A. Nestlerode, and **M.R. Patterson**. 2013. The incredible shrinking cup lab: connecting with ocean and Great Lakes scientists to investigate the effect of depth and water pressure on polystyrene. *Science Activities* 50: 1-7.
40. Sebens, K.P., G. Bernardi, **M.R. Patterson**, and D. Burkepile. 2013. Saturation diving and underwater laboratories: how underwater technology has aided research on coral biology and reef ecology. *RESEARCH AND DISCOVERIES: The Revolution of Science through Scuba, Smithsonian Contributions to the Marine Sciences* 39: 39-52, Smithsonian Institution Scholarly Press, Washington, D.C. (Invited)
39. **Patterson, M.R.**, D.H. Niebuhr, and J.A. Elliott<sup>†</sup>. 2012. A STEM Experiment in Informal Science Education: ROVs and AUVs survey shipwrecks from the American Revolution. *Proceedings of the OCEANS 2012 Marine Technology Society (MTS)/ Institute of Electrical and Electronics Engineers (IEEE) Conference, 14-19 October 2012, Virginia Beach, VA, 8 pp.* <https://doi.org/10.1109/OCEANS.2012.6404865>.
38. **Patterson, M.R.**, D.H. Niebuhr, and J.A. Elliott<sup>†</sup>. 2012. Using unmanned vehicles to investigate a time-sensitive discovery in marine archeology: a STEM experiment in informal science education. *Proceedings of the Association of Unmanned Vehicle Systems International Unmanned Systems 2012 Conference, Las Vegas, NV, 6-9 August 2012, Volume 2*, pages 1002-1016. Curran Associates, Red Hook, NY. ISBN: 978-1-62276-515-7. (Invited)
37. Elliott, J.<sup>†</sup>, **M. Patterson**, and M. Gleiber<sup>†</sup>. 2012. Detecting 'Island Mass Effect' through remote sensing. *Proceedings of the 12th International Coral Reef Symposium* (D. Yellowlees and T.P. Hughes, eds.), Cairns, Australia, 9-13 July 2012, 5 pp., James Cook University, Australia. ISBN: 978-0-9808572-5-2.
36. Mukhopadhyay, S.<sup>†</sup>, C. Wang<sup>†</sup>, S. Bradshaw<sup>†</sup>, V. Bazie, S. Maxon<sup>†</sup>, L. Hicks, **M. Patterson**, and F. Zhang. 2012. Controller performance of marine robots in reminiscent oil surveys. In *Proceeding of the Institute of Electrical and Electronics Engineers (IEEE)/Robotics Society of Japan (RSJ) International Conference on Intelligent Robots and Systems (IROS), Vilamoura, Portugal, 7-12 October 2012*, pages 1766-1771, <https://doi.org/10.1109/IROS.2012.6385947>.
35. **Patterson, M.R.**, and S.J. Patterson. 2011. Breaking the chain: when terrorists are wired for war against ports and harbors. *Proceedings of the Association of Unmanned Vehicle Systems International Unmanned Systems 2011 Conference, 16-19 August, Las Vegas, NV, Volume 2*, pages 801-814. Curran Associates, Red Hook, NY, ISBN: 978-1-61839-348-7 (Invited).

34. **Patterson, M.R.**, and S.J. Patterson. 2011. Unmanned systems: an emerging threat to waterside security. In *Waterside Security Conference (WSS), 2010 International*, Marina di Carrara, Italy, 3-5 November 2010. IEEE/Oceanic Engineering Society. pp. 1-7. <https://doi.org/10.1109/WSSC.2010.5730271>. (Invited)
33. **Patterson, M.R.**, A.Z. Horodysky<sup>†</sup>, B.W. Deffenbaugh, and R.W. Brill. 2010. Using active echo cancellation to minimize stimulus reverberations during hearing studies conducted with the auditory brain response (ABR) technique. *Journal of Biomedical Science and Engineering* 3: 861-867. <https://doi.org/10.4236/jbise.2010.39116>.
32. Carpenter, L.W.<sup>†</sup>, **M.R. Patterson**, and E.S. Bromage<sup>§</sup>. 2010. Water flow influences the spatiotemporal distribution of heat shock protein 70 within colonies of the scleractinian coral *Montastrea annularis* following heat stress (Ellis and Solander, 1786): implications for coral bleaching. *Journal of Experimental Marine Biology and Ecology* 387: 52-59.
31. Bromage, E.<sup>§</sup>, L. Carpenter<sup>†</sup>, S. Kaattari, and **M. Patterson**. 2009. Quantification of coral heat shock proteins from individual coral polyps. *Marine Ecology Progress Series* 376: 123-132.
30. **Patterson, M.R.**, and N.J. Relles<sup>†</sup>. 2008. Autonomous Underwater Vehicles resurvey Bonaire: a new tool for coral reef management. *Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008, Volume 1*, pages 539-543. National Coral Reef Institute, Dania Beach, FL. ISBN: 978-0-98438-714-4.
29. Carpenter, L.W.<sup>†</sup>, and **M.R. Patterson**\*. 2007. Water flow influences the distribution of photosynthetic efficiency within colonies of the scleractinian *Montastrea annularis* (Ellis and Solander 1786): implications for coral bleaching. *Journal of Experimental Marine Biology and Ecology* 351: 10-26.
28. Hayes, D., T. Boyd, and **M.R. Patterson**. 2007. Sensors and instrument requirements for Autonomous Underwater Vehicles. *Proceedings of the Masterclass in AUV Technology for Polar Science at the National Oceanography Centre*, Southampton, 28-30 March 2006, London, Society for Underwater Technology, pp. 39-48. (Invited)
27. Trussell, G.C.<sup>†</sup>, M.P. Lesser, **M.R. Patterson**, and S.J. Genovese. 2006. Depth-specific differences in the growth of the reef sponge *Callyspongia vaginalis*: the role of bottom-up effects. *Marine Ecology Progress Series* 323: 149-158.
26. Grusha, D.S.<sup>†</sup>, and **M.R. Patterson**. 2005. Quantification of drag and lift imposed by pop-up satellite archival tags and estimation of the metabolic cost to cownose rays (*Rhinoptera bonasus*). *Fishery Bulletin* 103: 63-70.

25. **Patterson, M.R.**, S. Haynes, and L. Carpenter<sup>†</sup>. 2004. Activity: Designing an Autonomous Underwater Vehicle (AUV): concepts in lift, drag, thrust, energy, power, mass, and buoyancy. *Journal of Marine Education* 20: 28-35.
24. **Patterson, M.R.**, S. Haynes, and L.W. Carpenter<sup>†</sup>. 2003. A classroom flume to study boundary layers and flow over coral reefs – a lesson plan. *University of South Florida/NOAA CD cooperative publication*. (Invited)
23. **Patterson, M.R.**, J.H. Sias, and D.V. Gouge. 2001. AUVs and scientific diving: a looming conflict? *Journal of the Marine Technology Society* 34: 75-81. (Invited)
22. **Patterson, M.R.**, M.D. Harwell<sup>†</sup>, L.J. Orth<sup>‡</sup>, and R.J. Orth. 2001. Biomechanical properties of the reproductive shoots of eelgrass. *Aquatic Botany* 69: 27-40.
21. Bartol, I.K.<sup>†</sup>, R. Mann, and **M.R. Patterson**. 2001. Aerobic respiratory costs of swimming in the negatively buoyant brief squid *Lolliguncula brevis*. *Journal of Experimental Biology* 204: 3639-3653.
20. Bartol, I.K.<sup>†</sup>, **M.R. Patterson**, and R. Mann. 2001. Swimming mechanics and behavior of the shallow-water brief squid *Lolliguncula brevis*. *Journal of Experimental Biology* 204: 3655-3682.
19. Bartol, I.K.<sup>†</sup>, and **M.R. Patterson**. 2000. Swimming mechanics of squid and its applicability to the design of highly maneuverable autonomous underwater vehicles. *Proceedings of the First International Symposium on Aqua Bio-Mechanisms, Vol. 1, ISAMBEC 2000*, Honolulu, Tokai University, 6 pp.
18. JASON XI Curriculum Team. 1999. (**Patterson, M.R.** edited document, and wrote sections on living underwater, coral reef biology, and underwater robotics). *JASON Foundation for Education Going to Extremes Curriculum*, 248 pp. + 2 prolog videos (1 hour each)(+ co- host of 55 live one-hour TV shows from the Aquarius underwater habitat). (Invited)
17. **Patterson, M.R.**, and J.H. Sias. 1998. Fetch!<sup>®</sup> commercial autonomous underwater vehicle: a modular, platform-independent architecture using desktop personal computer technology. *Ocean Community Conference 1998 Proceedings, Volume 2*, pages 891-897. Marine Technology Society, 16-19 November 1998, Baltimore, MD.
16. **Patterson, M.R.** 1998. A finite state machine approach to layered command and control of autonomous underwater vehicles implemented in G, a graphical programming language. *Ocean Community Conference 1998 Proceedings, Volume 2*, pages 745-751. Marine Technology Society, 16-19 November 1998, Baltimore, MD.

15. Pile, A.J.†, **M.R. Patterson**, M. Savarese, V.I. Chernykh, and V.A. Fialkov. 1997. Trophic effects of sponge feeding within Lake Baikal's littoral zone: 2. Sponge abundance, diet, feeding efficiency, and carbon flux. *Limnology and Oceanography* 42(1): 178-184.
14. Savarese, M., **M.R. Patterson**, V.I. Chernykh, and V.A. Fialkov. 1997. Trophic effects of sponge feeding within Lake Baikal's littoral zone: 1. *In situ* pumping rates. *Limnology and Oceanography* 42(1): 171-178.
13. Pile, A.J.†, **M.R. Patterson**, and J.D. Witman. 1996. *In situ* grazing on plankton < 10 µm by the boreal sponge *Mycale lingua*. *Marine Ecology Progress Series* 141: 95-102.
12. Shashar, N.†, S. Kinane†, P.L. Jokiel, and **M.R. Patterson**. 1996. Hydromechanical boundary layers over a coral reef. *Journal of Experimental Marine Biology and Ecology* 199(1): 17-28.
11. Lesser, M.P., V.M. Weis, **M.R. Patterson**, and P.L. Jokiel. 1994. Effects of morphology and water motion on carbon delivery and productivity in the reef coral, *Pocillopora damicornis*: diffusion barriers, inorganic carbon limitation, and biochemical plasticity. *Journal of Experimental Marine Biology and Ecology* 178: 153-179.
10. Wing, S.R.†, and **M.R. Patterson**. 1993. Effects of wave-induced lightflecks in the intertidal zone on photosynthetic efficiency in the macroalgae *Postelsia palmaeformis* and *Hedophyllum sessile* (Phaeophyceae). *Marine Biology* 116: 519-525.
9. **Patterson, M.R.** 1992. A mass transfer explanation of metabolic scaling relations in some aquatic invertebrates and algae. *Science* 255: 1421-1423.
8. **Patterson, M.R.** 1992. A chemical engineering view of cnidarian symbioses. *American Zoologist* 32(4): 566-582.
7. **Patterson, M.R.** 1992. Role of the mechanical microenvironment in growth of sunflower (*Helianthus annuus*) seedlings. *Journal of Experimental Botany* 43: 933-939.
6. Sanderson, S.L.§, J.J. Cech, Jr., and **M.R. Patterson**. 1991. Fluid dynamics in suspension-feeding blackfish. *Science* 251: 1346-1348.
5. **Patterson, M.R.** 1991. The effects of flow on polyp-level prey capture in an octocoral, *Alcyonium sidereum*. *The Biological Bulletin* 180: 93-102.
4. **Patterson, M.R.** 1991. Passive suspension feeding by an octocoral in plankton patches: empirical test of a mathematical model. *The Biological Bulletin* 180: 81-92.

3. **Patterson, M.R.**, K.P. Sebens, and R.R. Olson. 1991. *In situ* measurements of flow effects on primary production and dark respiration in reef corals. *Limnology and Oceanography* 36(5): 936-948.
2. **Patterson, M.R.**, and K.P. Sebens. 1989. Forced convection modulates gas exchange in cnidarians. *Proceedings of the National Academy of Sciences of the United State of America* 86: 8833-8836.
1. **Patterson, M.R.** 1984. Patterns of whole colony prey capture in the octocoral *Alcyonium sidereum*. *The Biological Bulletin* 167: 613-629.

#### **b. Patents**

3. Ayers, J., **M.R. Patterson**, J.F. Hajjar, M. Stojanovic, A. Mueller, M.H. Meyer, and S. Sagalow 2017. Robotic aquaculture system and methods. *US Patent Publication No. US2020/0068858 A1*.
2. **Patterson, M.R.**, D.F. Doolittle<sup>†</sup>, Z. Rahman, and R.L. Mann. 2007. System and method for identification and quantification of biological sonar targets in liquid medium. *US Patent 7,221,621*. 20 Claims, 13 Drawing Sheets.
1. **Patterson, M.R.**, and J.H. Sias. 1999. Modular autonomous underwater vehicle system. *U.S. Patent No. 5,995,882*. 8 Claims, 17 Drawing Sheets.

#### **c. Book chapters**

4. Mukhopadhyay, S.<sup>†</sup>, C. Wang<sup>†</sup>, **M. Patterson**, M. Malisoff, and F. Zhang. 2014. Collaborative autonomous surveys in marine environments affected by oil spills. Pages 87-113, in *Cooperative Robots and Sensor Networks (Second Edition)*, (Editors, A. Koubaa and A. Khelil), Special edition in the "Studies in Computational Intelligence" Springer Book Series. (Peer-reviewed invited book chapter.)
3. Relles, N.J.<sup>†</sup>, and **M.R. Patterson\***. 2011. AUVs (ROVs). Pages 71-75 in *Encyclopedia of Modern Coral Reefs* (Editor, D. Hopley), Encyclopedia of Earth Sciences, Springer-Verlag, Heidelberg. (Peer-reviewed invited book chapter.)
2. Witman, J.D., **M.R. Patterson**, and S.J. Genovese. 2004. Benthic-pelagic linkages in subtidal communities: influence of food subsidy by internal waves. Pages 133-153 in *Food Webs at the Landscape Level* Editors G.A. Polis, M.E. Power, and G.R. Huxel), University of Chicago Press, Chicago. (Peer-reviewed invited book chapter.)
1. **Patterson, M.R.** 1980. Hydromechanical adaptations in *Alcyonium sidereum* (Octocorallia).



Pages 183-201 in *Biofluid Mechanics 2* (Editor, D.J. Schneck), Plenum Press, New York. (Peer-reviewed invited book chapter.)

#### **d. Book reviews**

4. **Patterson, M.R.** 2001. The intrinsic variability of nature. Review of: *Chance in Biology: Using Probability to Explore Nature*, by M.W. Denny and S.D. Gaines, Princeton Univ. Press. *American Scientist* 89: 371-372.

3. **Patterson, M.R.** 1999. Benthic Suspension Feeders in Flow, by D. Wildish and D. Kristmanson, *Limnology and Oceanography* 144(8): 2024.

2. **Patterson, M.R.** 1989. Nearshore Biomechanics. Book review of M. Denny, 1988, *Biology and the Mechanics of the Wave-Swept Environment*, Princeton. *Science* 243: 1374.

1. Grosberg, R.K., and **M.R. Patterson**. 1989. Iterated ontogenies reiterated. Book reviews of "The Growth and Form of Modular Organisms" and "Modular Organisms: Case Studies of Growth and Form", 1986 (J. L. Harper, ed.) *Paleobiology* 15(1): 67-73.

#### **e. Professional literature articles**

4. Howard, W.S., A. Gu, M.M. Garcia, **M. Patterson**, and E. Izzo. 2015. *State of the World Report 2015: Water Challenges*. Fédération Internationale Des Ingénieurs-Conseils (FIDIC) (International Federation of Consulting Engineers), Geneva, 46 pp.

3. Cousteau, F., B. Helmuth, and **M. Patterson**. 2014. Mission 31: 20,000 mm under the sea. *The Explorers Journal* 92(3): 12-18.

2. **Patterson, M.**, T. Hiller, and A. Trembanis. 2008. Exploring coral reef sustainability. *Hydro International* 12(7): 10-15.

1. **Patterson, M.R.**, and J.H. Sias. 1998. Turn-key Autonomous Underwater Vehicles: A new option for seabed exploration and imaging. *Hydro International* 2(7), 6 pp.

#### **f. Professional web sites for outreach**

COVID-19 Education in English and Spanish: <https://www.resilience-ed.org>

Microplastics research in my lab: <https://www.youtube.com/watch?v=hMOy47c8BwQ>

Mission 31, with Fabien Cousteau: <http://news.northeastern.edu/tag/mission-31/>

NOAA Bonaire 2008 Exploring Coral Reef Sustainability using Advanced Technology: <http://oceanexplorer.noaa.gov/explorations/08bonaire/welcome.html>

NSF Cornwallis AUV/ROV Explorations of the Last Naval Battle of the American Revolution: <http://www.vims.edu/research/units/legacy/cornwallis/index.php>

## **B. Presentations**

†graduate student co-author; ¥undergraduate co-author; §postdoctoral co-author; if first author, I delivered (or co-delivered) the presentation unless otherwise noted.

### **a. International Conferences and Workshops**

32. Williams<sup>†</sup>, S.D. and **M.R. Patterson** 2019. Resistance and robustness of the global coral-symbiont network. Network Science Society, NetSci19. Burlington, VT.

31. Helmuth, B., **M. Patterson**, N. Al-Mudaffar Fawzi, H. Ali Malik, L. Fernandez, N. Kukshel<sup>¥</sup>, and F. Choi. 2019. A tale of two marshes: challenges of ecosystem restoration and the role of stakeholder engagement. Chinese Academy of Fishery Sciences/Environmental Defense Fund, Shanghai, China.

30. **Patterson, M.R.**, E. Edson, and M. Waters<sup>†</sup>. 2019. Microplastics in waterways impact urban environmental security and sustainability (keynote). 2nd International Workshop on Urban Ecological Security & Sustainability, Fudan University, Shanghai, China.

29. **Patterson, M.R.** 2019. Five barriers to urban ecological resilience (keynote). 2nd International Workshop on Urban Ecological Security & Sustainability, Fudan University, Shanghai, China.

28. **Patterson, M.R.** 2018. Autonomous sensing systems for coastal sustainability (keynote). Ocean Science Conference, King Abdullah University of Science and Technology, Saudi Arabia.

27. **Patterson, M.R.**, B. Helmuth, and L. Fernandez. 2018. Autonomous sensing systems for urban coastal sustainability. First International Workshop on Urban Ecological Security and Sustainability, Fudan University (China) and Suffolk University, Boston, MA.

26. **Patterson, M.R.**, S.D. Williams<sup>†</sup>, E.H. Gladfelter, and L.W. Carpenter<sup>§</sup>. 2016. Electrical network modeling of perforate and imperforate coral performance under environmental stress. 13th International Coral Reef Symposium, Honolulu, HI. <https://www.sgmeet.com/icrs2016/viewabstract.asp?AbstractID=29066>

25. Dwyer, A.D.<sup>†</sup>, and **M.R. Patterson**. 2016. Spatial comparisons of zooplankton abundance on coral reefs in Bocas del Toro, Panama. 13th International Coral Reef Symposium, Honolulu, HI. <https://www.sgmeet.com/icrs2016/viewabstract.asp?AbstractID=29686>
24. Edson, E.C.<sup>‡</sup>, and **M.R. Patterson**. 2015. MantaRay: A novel autonomous sampling instrument for *in situ* measurements of environmental microplastic particle concentrations. OCEANS 2015, Institute of Electrical and Electronics Engineers (IEEE) and the Marine Technology Society (MTS), Baltimore, MD.
23. Elliott, J.<sup>†</sup>, **M. Patterson**, and A. Dwyer<sup>†</sup>. 2015. The role of the cyanobacterial symbiont in the physiology of *Terpios hoshinota* (Porifera). 44th Annual Benthic Ecology Meeting, Québec City, Québec, Canada.
22. Williams, S.D.<sup>†</sup>, **M.R. Patterson**, L.W. Carpenter<sup>§</sup>, and E.H. Gladfelter. 2015. Calculating the time constant of mixing in gastrovascular fluid compartments in perforate and imperforate corals. 44th Annual Benthic Ecology Meeting, Québec City, Québec, Canada.
21. **Patterson, M.R.** 2015. Network models of modular organisms: implications for coping with environmental stress. 2nd Xiamen (China) Symposium on Marine Environmental Sciences.
20. Mukhopadhyay, S.<sup>†</sup>, C. Wang<sup>†</sup>, **M. Patterson**, M. Malisoff, and F. Zhang. 2013. Collaborative autonomous surveys in marine environments affected by oil spills. International Workshop on Cooperative Robots and Sensor Networks (RoboSense). Halifax, Nova Scotia, Canada.
19. Mukhopadhyay, S.<sup>†</sup>, C. Wang<sup>†</sup>, S. Bradshaw<sup>†</sup>, S. Maxon<sup>†</sup>, **M. Patterson**, and F. Zhang. 2012. Controller performance of marine robots in reminiscent oil surveys. Institute of Electrical and Electronics Engineers (IEEE)/Robotics Society of Japan (RSJ) International Conference on Intelligent Robots and Systems (IROS), Vilamoura-Algarve, Portugal.
18. Elliott, J.<sup>†</sup>, **M. Patterson**, and M. Gleiber<sup>†</sup>. 2012. Detecting ‘island mass effect’ through remote sensing. 12th International Coral Reef Symposium (ICRS), Cairns, Australia.
17. **Patterson, M.R.** 2012. Microelectrode measurements to test an electrical network model of coral adaptations to stress. Unisense Microelectrode Workshop (held in conjunction with the International Society for Microbial Ecology (ISME) annual meeting), Aarhus, Denmark.
16. **Patterson, M.R.**, D.H. Niebuhr, and J.A. Elliott<sup>†</sup>. 2012. Using unmanned vehicles to investigate a time-sensitive discovery in marine archeology: a STEM experiment in informal science education. Unmanned Systems 2012, Association of Unmanned Vehicle Systems International (AUVSI), Las Vegas, NV.

15. **Patterson, M.R.** 2011. Unmanned systems: an emerging threat to waterside security. Canadian Unmanned Vehicle Systems Summit, Ottawa, Canada.
14. **Patterson, M.R.**, and S.J. Patterson. 2011. Breaking the chain: when terrorists are wired for war against ports and harbors. Unmanned Systems 2011, Association of Unmanned Vehicle Systems International (AUVSI), Washington, D.C.
13. **Patterson, M.R.**, and S.J. Patterson. 2010. Unmanned systems: an emerging threat to waterside security. 2nd International Waterside Security Conference, Institute of Electrical and Electronics Engineers (IEEE)/Oceanic Engineering Society (OES), Office of Naval Research (ONR), and ECA Robotics, Marina di Carrara, Italy.
12. Relles, N.J.<sup>†</sup>, and **M.R. Patterson**. 2009. Effective protection of a changing coral reef environment. Aquatic Sciences Meeting, American Society of Limnology and Oceanography (ASLO), Nice, France.
11. **Patterson, M.R.** 2009. Ports and harbors: the good and the bad of autonomous systems. Conference on Analytic Support for Maritime Domain Awareness and Counter-Piracy. Military Operations Research Society (MORS, US Department of Defense) and Defence Research and Development Canada (DRDC), Chateau Cartier, Quebec, Canada.
10. Relles, N.J.<sup>†</sup>, and **M.R. Patterson**. 2008. AUVs explore reef sustainability. 11th International Coral Reef Symposium (ICRS), Fort Lauderdale, FL.
9. **Patterson, M.R.**, and D.A. Demer. 2007. Near-shore side scan sonar surveys of krill (*Euphausia superba*) and water column variables acquired by a Fetch-class Autonomous Underwater Vehicle, Cape Shirref, Livingston Island, South Shetland Islands, Antarctica. Autonomous Underwater Vehicles in Extreme Environments, Scott Polar Research Institute, University of Cambridge, United Kingdom.
8. **Patterson, M.R.** 2007. Cooperative missions between large and small AUVs in extreme environments. Autonomous Underwater Vehicles in Extreme Environments, Scott Polar Research Institute, University of Cambridge, United Kingdom.
7. **Patterson, M.R.** 2006. Navigation and practical considerations for use of Autonomous Underwater Vehicles at high latitudes. Masterclass in AUV Technology for Polar Science, National Oceanography Centre, University of Southampton, United Kingdom.
6. **Patterson, M.R.**, and D.A. Demer. 2006. Assessing krill abundance (*Euphausia superba*) using high frequency side scan sonar and underwater video at Livingston Island, South Shetland Islands, Antarctica. Masterclass in AUV Technology for Polar Science, National Oceanography Centre, University of Southampton, United Kingdom.

5. **Patterson, M.R.**, D. Needham, A. Jenkins, and D.A. Demer (presenter). 2005. Nearshore studies of the Antarctic ecosystem, by AUV. International Council for the Exploration of the Seas (ICES), Working Group (WG) Fisheries Acoustics Science Technology (FAST), Rome, Italy.
4. Doolittle, D.F.†, and **M.R. Patterson**. 2003. Proof of concept: neural network classification of fishes using high frequency side-scan sonar deployed from a Fetch-class AUV. International Council for the Exploration of the Seas (ICES) - Working Group (WG) Fisheries Acoustics Science Technology (FAST), Bergen, Norway.
3. Bartol, I.K.†, and **M.R. Patterson**. 2000. Swimming mechanics of squid and its applicability to the design of highly maneuverable autonomous underwater vehicles. First International Symposium on Aqua-bio Mechanisms, Tokai University and Office of Naval Research, Honolulu, HI.
2. Witman, J.D., **M.R. Patterson**, and S.J. Genovese†. 1998. Internal waves and food webs at an offshore pinnacle. Conference on Spatial Processes and Scaling: Merging Field Data Collection Methods and Modeling, International Congress of Ecology (INTECOL), Florence, Italy.
1. Jokieli, P.L., V. Weis, M. Lesser, and **M. Patterson**. 1991. Inorganic carbon limitation and diffusion barriers in reef corals - a status review. International Symbiosis Congress, Jerusalem, Israel.

#### **b. National Conferences and Workshops**

26. Williams, S.D.†, and **M.R. Patterson**. 2019. Resistance and robustness of the global coral-symbiont network. The Society for Integrative and Comparative Biology (SICB) 2019, Tampa, FL.
25. Dwyer, A.M.†, and **M.R. Patterson**. 2018. Caring about coral reefs: How your actions can make a difference (poster). SciComm 2018, Lincoln, Nebraska.
24. **Patterson, M.R.** 2017. Lessons from a high-tech startup in marine robotics. Schmidt Marine Technology Partners Annual Symposium, Schmidt Foundation, San Francisco, CA.
23. Hudson, K.L.‡, and **M.R. Patterson**. 2017. Alternate methods for observing stratification dynamics using remote sensing technologies on discrete and continuous time scales. Benthic Ecology Meetings, Myrtle Beach, SC.
22. **Patterson, M.R.**, and B.S. Helmuth. 2017. Tide gates and coastal wetlands: creating better decision support tools. Benthic Ecology Meetings, Myrtle Beach, SC.

21. Williams, S.D.†, E.M. Muller, and **M.R. Patterson**. 2016. The effects of black band disease and ocean acidification on the physiological performance of a scleractinian coral. Benthic Ecology Meetings, Portland, ME.
20. Dwyer, A.M.†, and **M.R. Patterson**. 2015. Temporal and spatial comparisons of zooplankton abundance and diversity on two Caribbean coral reefs. Ecological Society of America, Baltimore, MD.
19. Elliott, J.A.†, and **M.R. Patterson**. 2015. *Terpios hoshinota* (Porifera): A black veil of death or an obnoxious neighbor! Ecological Society of America, Baltimore, MD.
18. Elliott, J.A.†, R.M. Pillay, and **M.R. Patterson**. 2014. Can heterotrophy in corals be exploited to improve the stock of coral fragments for transplantation in Mauritius? 43rd Annual Benthic Ecology Meeting, University of North Florida, Jacksonville, FL.
17. **Patterson, M.R.**, L.W. Carpenter§, and E. Gladfelter. 2014. Perforate and imperforate baupläne in scleractinian corals: implications for coping with environmental stress. 43rd Annual Benthic Ecology Meeting, University of North Florida, Jacksonville, FL.
16. **Patterson, M.R.**, D.H. Niebuhr, and J.A. Elliott†. 2012. A STEM experiment in informal science education: ROVs and AUVs survey shipwrecks from the American Revolution. OCEANS 2012, Institute of Electrical and Electronics Engineers (IEEE) and the Marine Technology Society(MTS), Virginia Beach, VA.
15. **Patterson, M.R.** 2008. Science at Aquarius: scaling of metabolism from polyps to reefs (Invited). Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), Orlando, FL.
14. Petrone, C. J., K.L. Brodie†, A.C. Foxgrove†, L.M. Kraatz†, S.J. Lake†, N.J. Relles†, C. Rodríguez-Calderón†, T. Shen†, C.R. Spier†, S.K. Sturdivant†, P. Renaud, and **M.R. Patterson**. 2008. Lessons from Project SeaCAMEL: integrating science education and Ocean Observing System (OOS) technology. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the America Geophysical Union (AGU), Orlando, FL.
13. **Patterson, M.R.** 2005. Autonomous Underwater Vehicle Technology: Advances in Monitoring Aquatic Ecosystems (invited presentation). SensorsGOV Conference, Virginia Beach, VA.
12. Doolittle, D.F.†, and **M.R. Patterson**. 2004. Neural network classification of fishes using high frequency side scan sonar deployed from a Fetch-class underwater vehicle. Ocean Research Conference, American Society of Limnology and Oceanography (ASLO) and the Oceanography Society, Honolulu, HI.

11. Fralick, C., D. Pearson, J. Sias, and **M. Patterson**. 2003. Port security: identification of potential threat from arriving vessels. Institute of Electrical and Electronics Engineers (IEEE) Ocean Engineering Society (OES) Homeland Security Technology Workshop, Warwick, RI.
10. **Patterson, M.R.**, and J.H. Sias. 1998. Fetch!® commercial autonomous underwater vehicle: a modular, platform-independent architecture using desktop personal computer technology. Ocean Community Conference 1998, Marine Technology Society (MTS), Baltimore, MD.
9. **Patterson, M.R.** 1998. A finite state machine approach to layered command and control of autonomous underwater vehicles implemented in G, a graphical programming language. Ocean Community Conference 1998, Marine Technology Society (MTS), Baltimore, MD.
8. **Patterson, M.R.** 1996. Allometry of infaunal burrows: implications for energy expenditure and irrigation. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), San Diego, CA.
7. **Patterson, M.R.**, and J.D. Witman. 1994. Modeling the contribution of internal waves to secondary production at an offshore pinnacle: passive and active suspension feeders. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), San Diego, CA.
6. Savarese, M., **M.R. Patterson**, and V.I. Chernykh. 1994. In situ pumping activity of freshwater symbiotic sponges in Lake Baikal, Siberia, Russia. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), San Diego, CA.
5. Pile, A.J.†, and **M.R. Patterson**. 1994. The use of flow cytometry to determine the effects of suspension feeding sponges on picoplankton in Lake Baikal, Siberia, Russia. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), San Diego, CA.
4. Lesser, M.P., V.M. Weis, **M.R. Patterson**, and P.L. Jokiel. 1992. The effects of water flow and morphology on carbon delivery and productivity in the coral, *Pocillopora damicornis* from Hawaii. Annual Meeting, American Society of Zoologists (ASZ), Vancouver, British Columbia, Canada.
3. **Patterson, M.R.**, and W. Stephen Price†. 1992. Correlation of water motion with rates of intracolony coral bleaching. Aquatic Sciences Meeting, American Society of Limnology and Oceanography (ASLO), Sante Fe, NM.
2. **Patterson, M.R.** 1989. A chemical engineering view of cnidarian symbioses. American Society of Zoologists (ASZ) Centennial Meeting, Boston, MA.

1. **Patterson, M.R.**, and S.L. Miller. 1989. The NOAA Aquarius underwater habitat - a unique tool for marine research. American Society of Zoologists (ASZ) Centennial Meeting, Boston, MA.

### **c. Regional/Local Conferences and Workshops**

20. **Patterson, M.R.** 2019. Climate change and threats to coral reefs. Class of 1979 panel on Environmental Challenges with former US Ambassador to Indonesia Robert Blake, Harvard University.

19. **Patterson, M.R.** 2017. Tide gates management: a strategy for coastal resilience and sustainability. Universities & Coastal Resilience: A Strategic Discussion, Old Dominion University, Norfolk, VA.

18. Hudson, K.L.<sup>‡</sup>, and **M.R. Patterson**. 2017. Alternate methods for observing stratification dynamics using remote sensing technologies on discrete and continuous time scales. Research, Innovation, and Scholarship Expo (RISE), Northeastern University, Boston, MA.

17. Hulver, A.M.<sup>‡</sup>, and **M.R. Patterson**. 2017. Coral reef systems in Bocas del Toro, Panamá show high frequency and magnitude fluctuations of dissolved oxygen and pH directly above the substrate. Research, Innovation, and Scholarship Expo (RISE), Northeastern University, Boston, MA.

16. **Patterson, M.R.**, and L.A. Fernandez. 2014 (poster plus AUV demo). Technology for Outfall Monitoring, Massachusetts Water Resources Authority Outfall Monitoring Science Advisory Panel Meeting, Marine Science Center, Northeastern University.

15. **Patterson, M.R.** 2014. Invited Participant, Draper Laboratories 2-day workshop on Advanced Automation and Sensing Technology (AAST) Workshop for Energy Infrastructure.

14. **Patterson, M.R.** 2013. Autonomous Underwater Vehicles for Civil & Environmental Engineering. Poster at Industry Leadership Night, Department of Civil & Environmental Engineering, Northeastern University.

13. **Patterson, M.R.** 2013. Autonomous Underwater Vehicles: Technology and Methods, Field Robotics Laboratory. Manned booth, poster, and distributed flyers at Massachusetts Technology Leadership Council 2013 Summit on the Future of Robotics, Microsoft NERD Center, Cambridge, MA.

12. **Patterson, M.R.**, D.H. Niebuhr, and J.A. Elliott<sup>†</sup>. 2012. Underwater robotics applied to STEM education: a time-sensitive discovery in marine archeology. Center for Advancement of Informal Science Education (CAISE) National Science Foundation Principal Investigator Conference, Washington, D.C.



11. **Patterson, M.R.** 2010. Autonomous Underwater Vehicles: national security in ports and harbors. Federal Reserve Bank of Richmond.
10. **Patterson, M.R.**, and L.W. Carpenter<sup>†</sup>. 2007. Unexpected gradients of dissolved oxygen concentration in a "well-mixed" coral reef environment. Benthic Ecology Meeting, Atlanta, GA.
9. **Patterson, M.R.**, and L.W. Carpenter<sup>†</sup>. 2007. Water flow influences the spatiotemporal distribution of photosynthetic efficiency within colonies of the scleractinian *Montastrea annularis*: implications for coral bleaching. Benthic Ecology Meeting, Atlanta, GA.
8. **Patterson, M.R.**, D.F. Doolittle<sup>†</sup>, Z. Rahman, and R.L. Mann. 2004. Neural network classification of fishes using high frequency side scan sonar deployed from an Autonomous Underwater Vehicle. National Oceanic and Atmospheric Administration (NOAA) National Sea Grant Technology Review, Williamsburg, VA.
7. **Patterson, M.R.**, and J.H. Sias. 2004. Biomimetic design principles applied to commercial-grade Autonomous Underwater Vehicles. Hampton Roads Technology Council, Sensors Expo, Williamsburg, VA.
6. **Patterson, M.R.**, and J.H. Sias. 2003. Recent advances in AUV technology. American Society of Mechanical Engineers, Eastern Virginia Section, Newport News, VA.
5. **Patterson, M.R.**, D.F. Doolittle<sup>†</sup>, Z. Rahman, and R.L. Mann. 2003. Neural network method for classifying fishes in benthic environments from a Fetch-class Autonomous Underwater Vehicle (AUV): sensor fusion for delineating essential fish habitat. Benthic Ecology Meeting, Groton, CT.
4. **Patterson, M.R.** 2002. Aquarius: going to extremes with STEM education during JASON XI. Mid-Atlantic Marine Education Association (MAMEA) Annual Conference, Gloucester Point, VA.
3. **Patterson, M.R.** 2002. Embedded computing underwater: Autonomous Underwater Vehicles. Association of Information Technology Professionals, Richmond Chapter, Richmond, VA.
2. **Patterson, M.R.** 2001. Using Autonomous Underwater Vehicles to census fishes. Sloan Foundation Workshop on the Census of Marine Life, Woods Hole, MA.
1. **Patterson, M.R.**, and J.D. Witman. 1995. Internal waves influence feeding and respiration in benthos at an offshore pinnacle: a simulation model. Benthic Ecology Meetings, Rutgers University.

**d. Student presentations** (for those below, the student was the presenter, even if I was the co-author)

21. Hudson, K.L.<sup>¥</sup>, and **M.R. Patterson**. 2017. Alternate methods for observing stratification dynamics using remote sensing technologies on discrete and continuous time scales. Benthic Ecology Meetings, Myrtle Beach, SC.

20. Hudson, K.L.<sup>¥</sup>, and **M.R. Patterson**. 2017. Alternate methods for observing stratification dynamics using remote sensing technologies on discrete and continuous time scales. Research, Innovation, and Scholarship Expo (RISE), Northeastern University.

19. Hulver, A.M.<sup>¥</sup>, and **M.R. Patterson**. 2017. Coral reef systems in Bocas del Toro, Panamá show high frequency and high magnitude fluctuations of dissolved oxygen and pH directly above the substrate. Research, Innovation, and Scholarship Expo (RISE), Northeastern University.

18. Dwyer, A.D.<sup>†</sup>, and **M.R. Patterson**. 2016. Spatial comparisons of zooplankton abundance on coral reefs in Bocas del Toro, Panama. 13th International Coral Reef Symposium, Honolulu, HI. <https://www.sgmeet.com/icrs2016/viewabstract.asp?AbstractID=29686>

17. Williams, S.D.<sup>†</sup>, E.M. Muller, and **M.R. Patterson**. 2016. The effects of black band disease and ocean acidification on the physiological performance of a scleractinian coral. Benthic Ecology Meetings, Portland, ME. [http://www.bemsociety.org/uploads/4/2/1/5/42158527/oral\\_abstracts\\_for\\_web.pdf](http://www.bemsociety.org/uploads/4/2/1/5/42158527/oral_abstracts_for_web.pdf)

16. Dwyer, A.M.<sup>†</sup>, and **M.R. Patterson**. 2015. Temporal and spatial comparisons of zooplankton abundance and diversity on two Caribbean coral reefs. Ecological Society of America, Baltimore, MD.

15. Elliott, J.A.<sup>†</sup>, and **M.R. Patterson**. 2015. *Terpios hoshinota* (Porifera): A black veil of death or an obnoxious neighbor! Ecological Society of America, Baltimore, MD.

14. Edson, E.C.<sup>¥</sup> 2015. Research and design of an oceanographic microplastic sampling instrument. Research, Innovation, and Scholarship Expo (RISE), Northeastern University, Boston, MA. (2015 Undergraduate Prize Winner in Engineering and Technology).

13. Williams, S.D.<sup>¥</sup> 2013. Calculating the time constant of mixing in gastrovascular fluid compartments and using an electrical network model to simulate gas flux in perforate and imperforate corals. Senior honors thesis defense, Department of Physics, College of William & Mary.

12. Elliott, J.<sup>†</sup>, and **M. Patterson**. 2013. Preserving the coral reefs of Mauritius: academia & NGO partner with the hotel industry. Sustaining Coastal Cities Conference, Northeastern

University.

11. Elliott, J.†, **M. Patterson**, and M. Gleiber†. 2012. Detecting ‘island mass effect’ through remote sensing. 12th International Coral Reef Symposium (ICRS), Cairns, Australia.
10. Relles, N.J.†, and D.O.B. Jones§. 2011. Coral cover change detection to identify potential areas of management concern on Bonaire, Netherlands Antilles. Aquatic Sciences Meeting, Association for the Science of Limnology and Oceanography (ASLO), San Juan, Puerto Rico.
9. Relles, N.J.†, and M.R. Dudley. 2010. A cost-benefit analysis of establishing an additional marine reserve in the Bonaire National Marine Park. Ocean Sciences Meeting, Association for the Science of Limnology and Oceanography (ASLO), the Oceanography Society (TOS), and the American Geophysical Union (AGU), Portland, Oregon.
8. Relles, N.J.†, and **M.R. Patterson**. 2009. Effective protection of a changing coral reef environment. Aquatic Sciences Meeting, American Society of Limnology and Oceanography (ASLO), Nice, France.
7. Petrone, C. J., K.L. Brodie†, A.C. Foxgrove†, L.M. Kraatz†, S.J. Lake†, N.J. Relles†, C. Rodríguez-Calderón†, T. Shen†, C.R. Spier†, S.K. Sturdivant†, P. Renaud, and **M.R. Patterson**. 2008. Lessons from Project SeaCAMEL: integrating science education and Ocean Observing System (OOS) technology. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the America Geophysical Union (AGU), Orlando, FL.
6. Relles, N.J.†, and **M.R. Patterson**. 2008. AUVs explore reef sustainability. 11th International Coral Reef Symposium (ICRS), Fort Lauderdale, FL.
5. Doolittle, D.F.†, and **M.R. Patterson**. 2004. Neural network classification of fishes using high frequency side scan sonar deployed from a Fetch-class underwater vehicle. Ocean Research Conference, American Society of Limnology and Oceanography (ASLO) and the Oceanography Society (TOS), Honolulu, HI.
4. Doolittle, D.F.†, and **M.R. Patterson**. 2003. Proof of concept: neural network classification of fishes using high frequency side-scan sonar deployed from a Fetch-class AUV. International Council for the Exploration of the Seas (ICES) - Working Group (WG) Fisheries Acoustics Science Technology (FAST), Bergen, Norway.
3. Doolittle, D.F.†, **M.R. Patterson**, Z. Rahman, and R.L. Mann. 2002. Decreasing habitat disturbance by improving fish stock assessments: a new method of remote species identification and quantification. Symposium on Effects of Fishing Activities on Benthic Habitats: Linking Geology, Biology, Socioeconomics, and Management, Sponsored by the US Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), the Ecological Society of America (ESA), and the American Fisheries Society (AFS), Tampa, FL.

2. Bartol, I.K.†, and **M.R. Patterson**. 2000. Swimming mechanics of squid and its applicability to the design of highly maneuverable autonomous underwater vehicles. First International Symposium on Aqua-bio Mechanisms, Tokai University and Office of Naval Research, Honolulu, HI.

1. Pile, A.J.†, and **M.R. Patterson**. 1994. The use of flow cytometry to determine the effects of suspension feeding sponges on picoplankton in Lake Baikal, Siberia, Russia. Ocean Sciences Meeting, American Society of Limnology and Oceanography (ASLO), and the American Geophysical Union (AGU), San Diego, CA.

#### **e. Invited Seminars and Symposia**

56. College of Science Scholars' Luncheon. "Environmental Sustainability: Robotics, Sensors, and Machine Learning." 2020.

55. College of Science Lunch and Learn. "20,000 mm under the sea: how underwater robots and living underwater gave us new understanding of global changes on coral reefs". 2018.

54. Invited Speaker, Global Resilience Institute, Northeastern University. "Marine robotics and coastal sustainability". 2018.

53. Invited Speaker, "COMMON GROUND: The Living Ocean...Exploring and Conserving our Primal Home", a public event of the Western NY Episcopal Diocese, Buffalo, NY. 2018.

52. Invited Panelist, News Deeply conversation on "Disaster Response & Digital Resilience: Keeping Communities Connected" at the United Nations Foundation, Washington DC. 2018.

51. Keynote Speaker, Boston High Schools Marine Science Symposium "20,000 mm under the sea: middle school misbehavior leads to living underwater with robots". 2018.

50. Invited Speaker, "Autonomous technology for surveying and managing coral reef health.", Schmidt Ocean Institute, San Francisco, CA, 30 October 2017.

49. "Tide gates and decision support tools for managing wetlands." Boston Water Group, Tufts University, 15 November 2016.

48. "Research spotlight: AUVs and estuary research." Boston Harbor Habitat Coalition, New England Aquarium, 2016.

47. **Patterson, M.R.**, and A.C. Trembanis. 2016. "Unmanned at Sea: Using UUVs to Explore the Ocean Floor." Association of Unmanned Vehicle Systems International (AUVSI) Webinar Speaker Series, 2016. (AUVSI is the world's largest non-profit devoted to the development of

unmanned systems with over 7,500 members from government organizations, industry and academia. These international presentations occur several times/year from high profile leaders in the field.)

46. Invited Speaker/Panelist, DC Comics Aquaman panel, Comic-Con San Diego, “20,000 mm under the Sea: the world of Aquaman”. 2015.

45. Invited Speaker, Department of Biology, Bowdoin College. “Perforate and imperforate body plans in scleractinian corals: implications for coping with environmental stress”. 2015.

44. Invited Speaker. College of Science TED-style talk hosted by College of Science Dean Murray Gibson at Northeastern University. “What lights my fire? The fire of life.” 2014.

43. Invited Speaker. Ocean Genome Legacy Board Meeting. “Biodiversity of a fourth kind of hydrothermal vent found only in Iceland.” 2014.

42. Invited Speaker, Lifelong Learning Society, Christopher Newport University. “Robots and Underwater Habitats: Connections to Environmental and National Security”. 2013.

41. Invited Speaker, “Aquarius 2013 and Beyond”, Ocean Life Lecture Series, School of Environment, Arts, and Society, Florida International University (held in Key Largo). 2012.

40. Seminar Series, Department of Civil and Environmental Engineering, Northeastern University. 2012.

39. Seminar Series, Department of Biological Sciences, School of Marine Science, College of William & Mary. 2011.

38. Seminar Series, Department of Biological Sciences, School of Marine Science, College of William & Mary. 2010.

37. Seminar Series, Department of Ecology and Evolutionary Biology, Brown University. 2009.

36. Seminar Series, Department of Biological Sciences, School of Marine Science, College of William & Mary. 2009.

35. Invited Speaker, “Autonomous Underwater Vehicles for Port and Harbor Security”, Hampton Roads Technology Council Sensor Science and Technology Forum for Robotic and Unmanned Systems, Virginia Modeling Analysis and Simulation Center, Suffolk, VA. 2009.

34. Seminar Series, National Institute of Aerospace, Hampton, VA. 2009.

33. Seminar Series, Department of Biological Sciences, Old Dominion University. 2009.

32. Invited Speaker, Association of Unmanned Vehicle Systems International (AUVSI) Hampton Roads Chapter Meeting. 2007
31. Distinguished Speaker, “Decisions and dilemmas: how Autonomous Underwater Vehicles changed the way I do science”, Biology Senior Seminar Lecture Series, Swarthmore College. 2007.
30. Seminar Series, Department of Biology, Northeastern University. 2007.
29. Seminar Series, Department of Biological Sciences and the Marine Science Program. University of South Carolina, Columbia. 2006.
28. Distinguished Speaker, “Autonomous sensors: protecting the environment and the homeland”, Environmental Protection Agency Distinguished Speaker Series – Region 9, San Francisco. 2005.
27. Seminar Series, School of Engineering and Technology, Hampton University. 2005.
26. Seminar Series, Department of Computer Sciences, Old Dominion University. 2004.
25. Seminar Series, School of Marine Science, College of William & Mary. 1998.
24. Seminar Series, Center for Coastal Physical Oceanography, Old Dominion University. 1998.
23. Seminar Series, Department of Computer Science, College of William & Mary. 1997.
22. Seminar Series, School of Marine Science, College of William & Mary. 1996.
21. Seminar Series (2 talks), Department of Biology, California State University, Northridge. 1996.
20. Seminar Series, Horn Point Environmental Laboratory, University of Maryland. 1996. 19. Seminar Series, Center for Environmental and Estuarine Studies, University of Maryland, College Park. 1995.
18. Seminar Series (2 talks), Program in Evolution, Ecology, and Behavior, University at Buffalo, State University of New York. 1994.
17. Seminar Series (2 talks), Department of Biology, and the Marine Science Center, Northeastern University. 1994.
16. Seminar Series (2 talks), School of Marine Science, College of William & Mary. 1994.

15. Distinguished Speaker, “Living and working underwater: coral reef science from Hydrolab and Aquarius”, National Youth Science Camp, Smithsonian Institution. 1993.
14. Seminar Series, Department of Biology, College of William & Mary. 1992.
13. Seminar Series (2 talks), Department of Geological Sciences, University of Indiana, Bloomington. 1991.
12. Seminar Series (2 talks), Graduate Group in Ecology, University of California, Davis. 1991.
11. Seminar Series, Discovery Bay Marine Laboratory, University of the West Indies, Jamaica. 1990.
10. Distinguished Speaker in Marine Biology, “20,000 mm under the sea: saturation diving and coral ecophysiology”, University of New Hampshire. 1989.
9. Seminar Series, Bodega Marine Laboratory, University of California, Davis. 1989.
8. Seminar Series, Bioengineering Graduate Group, University of California, Davis. 1989.
7. Seminar Series, Virgin Islands Ecological Research Station, St. John, US Virgin Islands. 1988.
6. Distinguished Speaker, National Undersea Research Center, Fairleigh Dickinson University, St. Croix, US Virgin Islands. 1988.
5. Seminar Series, Hopkins Marine Station, Stanford University. 1988.
4. Seminar Series, Department of Integrative Biology, University of California, Berkeley. 1987.
3. Invited Speaker, National Undersea Research Center, Fairleigh Dickinson University, St. Croix, US Virgin Islands. 1987.
2. Seminar Series, Australian Institute of Marine Science, Queensland. 1986.
1. Seminar Series, School of Marine and Tropical Ecology, James Cook University. 1986.

### **III. Grants**

#### **A. External**

##### **a. Funded**

- 2019-2020 National Science Foundation Environmental Sustainability, “Tide gate modulation of wetland function: decision support through engineering best practices - REU Supplement.”, \$15,000. **M. Patterson**, L. Fernandez, and B. Helmuth.
- 2019-2022 National Oceanic and Atmospheric Administration, Office of Ocean Exploration, “Bioprospecting for industrial enzymes and drug lead compounds in an ancient submarine forest.” \$737,000. D. Distel, **M. Patterson**, and B. Helmuth.
- 2017-2021 National Science Foundation Environmental Sustainability, “Tide gate modulation of wetland function: decision support through engineering best practices”, \$299,314. **M. Patterson**, L. Fernandez, and B. Helmuth.
- 2017-2018 Northeastern University Tier 1 Research Award, “A temperature sensor network to study public health and community resilience impacts of heat waves at micro-spatial levels in the town of Brookline”, \$50,000. A. Shrivastava, J. Stephens, D. O'Brien A. Ganguly, B. Helmuth, and **M. Patterson**
- 2016-2018 Private donors including Lisa and Gary Foster, “MantaRay microplastics sampler”; \$30,000. **M. Patterson**.
- 2016-2019 Schmidt Family Foundation/Schmidt Marine Technology Partners, “MantaRay microplastics sampler”, \$318,750. **M. Patterson**.
- 2015-2016 Florida Protect our Reefs, “The effects of black band disease and ocean acidification on the physiological performance of a scleractinian coral”, \$11,632; E. Muller, S. Williams, and **M. Patterson**, co-PIs
- 2014-2015 Northeastern University Tier 1 Research Award, “Autonomous Sensors and Smart Analytics for Wetlands in Urban Areas, ” \$50,000. **M.R. Patterson** and B.S.T. Helmuth, co-PIs.
- 2012-2016 NSF, Integrative Organismal Systems, “How does the gastrovascular system in perforate and imperforate corals affect physiological response to environmental stress?”. \$552,806. **M.R. Patterson** (Sole PI).
- 2012 NOAA, Aquarius Reef Base - University of North Carolina, Wilmington, “Celebrating 50 years of living beneath the sea”. \$10,000 plus 8 days habitat support (\$100,000). **M.R. Patterson** (Sole PI).
- 2011-2013 NSF, Informal Science Education, “RAPID: Underwater robotics applied to STEM education: a time-sensitive discovery in marine archeology”. \$199,927. **M.R. Patterson** (Sole PI).



- 2010-2011 NSF, Electrical, Communications, and Cyber Systems, “Collaborative Research: RAPID: Autonomous control and sensing algorithms for surveying the impacts of oil spills on coastal environments”. \$49,558, Subcontract to deploy two Autonomous Surface Vehicles during a field campaign. \$10,000. M. Malisoff, Louisiana State University (PI), **M.R. Patterson** (subawardee).
- 2009-2011 NOAA, Aquarius Reef Base - University of North Carolina, Wilmington, “Landscape level habitat assessment at Conch Reef: high frequency side scan sonar and video survey from an Autonomous Underwater Vehicle”. \$100,433. **M.R. Patterson** (Sole PI).
- 2009 Myriax, Inc., “eonFusion Data Visualization Software Student License Award”. \$7,000. **M.R. Patterson** (Sole PI).
- 2009 Fetch LLC, “Fetch AUV technology donation to William & Mary”. This private donation included four AUVs, a pressure-vessel testing system, a machine shop, an electronics shop, and all intellectual property including US Patent 5,995,882, and the AUV ToolKit, a LabVIEW software package. The donation had a street value of \$1,200,000 (evaluated for tax purposes at \$469,000). **M.R. Patterson** (Sole PI).
- 2007-2009 NOAA, Office of Ocean Exploration, “Protecting a shifting baseline: shallow to deep reefs at Bonaire”. **M.R. Patterson** (PI - \$322,775). A.C Trembanis, University of Delaware (subcontractor - \$107,225), M.D. Stokes and J.J. Leichter, Scripps Institution of Oceanography (subcontractors - \$100,000). Total award \$530,000.
- 2007-2008 Khaled bin Sultan Living Oceans Foundation, “Aquarius as an Ocean Observing System node: a VIMS graduate education expedition”. \$70,000. **M.R. Patterson** (Sole PI).
- 2007-2008 National Oceanography Centre, University of Southampton, United Kingdom, “Young investigator bursary, Autonomous Underwater Vehicle technology”. This award funded Dr. Daniel Jones to visit my laboratory to conduct collaborative research using my Fetch-class AUVs. £10,000 = \$15,978. D.O.B. Jones (PI), **M.R. Patterson** (host).
- 2006 Prizm Advanced Communications Equipment, Inc., “Fetch1 Autonomous Underwater Vehicle donation to the VIMS Autonomous Systems Laboratory”. \$275,000 Fair Market Value. **M.R. Patterson** (Sole PI).

- 2005 Sias Patterson, Inc., “Scholarship for Lawrence W. Carpenter, Ph.D. candidate, School of Marine Science, College of William & Mary”. \$4,500. **M.R. Patterson** (Sole PI).
- 2004 Sias Patterson, Inc., “Development contract for Fetch AUV support activities”. \$4,400. **M.R. Patterson** (Sole PI).
- 2004 NOAA, Southeast National Undersea Research Center - University of North Carolina, Wilmington, “Flow-modulated metabolism: connection with coral bleaching and reef oxygen crises? \$76,994 + plus 20 days habitat time (\$250,000 systems support). **M.R. Patterson** (Sole PI).
- 2002-2003 Northrop Grumman Newport News Shipbuilding, “Biomimetic wake detection system using neural network implementation. \$29,500. **M.R. Patterson** (Sole PI).
- 2002-2003 NOAA, Mid-Atlantic Bight National Undersea Research Center - Rutgers University, “Neural network classification of side scan sonar images”. \$4,000. **M.R. Patterson** (Sole PI).
- 2001-2003 NOAA, National Sea Grant Technology Program, “Development of image processing algorithms for identification and quantification of biological targets detected by side scan sonar: application to fisheries stock assessment from robotic platforms”. \$134,512. **M.R. Patterson** (Lead PI), R.L. Mann and Z. Rahman (Co-PIs).
- 2001 Tenneco Newport News Shipbuilding, “Analysis of deep sea environment for deep-water autonomous cable-laying vehicle system”. \$5,000. **M.R. Patterson** (Sole PI).
- 1998-2000 Tenneco Newport News Shipbuilding, “Hydrodynamics and micro-flow characteristics of shark scales”. \$109,873. **M.R. Patterson** (Lead PI), J. Musick (Co-PI)
- 1997-1999 NOAA, Southeast National Undersea Research Center - University of North Carolina, Wilmington, “Habitat-specific differences in sponge growth: the role of scope for growth and phenotypic plasticity”. \$55,143 (science support) plus 25 days habitat time and 36 days Nitrox SCUBA (\$252,136 systems support) in Florida Keys. G.C. Trussell, **M.R. Patterson** (Co-PIs).
- 1995 NSF, Oceans Sciences, Panel on Biological Oceanography, “Research Experiences for Undergraduates (REU): supplemental award”. \$5,000. **M.R. Patterson** (Sole PI).

- 1995 NOAA, National Undersea Research Center - Caribbean Marine Research Center, “The role of resuspended beach sediments on coral reef stress: implications for management of coral reef ecosystems”. \$1,000. D.H. Niebuhr, **M.R. Patterson** (Co-PIs).
- 1994-1996 NOAA, Southeast National Undersea Research Center - University of North Carolina, Wilmington, “The effects of sponges on water column processes: implications for the management of coral reefs”. \$28,885 (science support) plus ten days habitat time and six days Nitrox SCUBA (\$126,068 systems support) in Florida Keys. A.J. Pile (Co-PI), **M.R. Patterson** (Lead PI).
- 1994-1996 NSF, Environmental Biology, Panel on Ecology, “Dissertation Improvement Award: The balance between heterotrophy and autotrophy in freshwater and marine sponges: effects of sponge morphology and flow regime”. \$8,900. A.J. Pile, **M.R. Patterson** (Co-PIs).
- 1994-1996 NSF, Environmental Biology, Panel on Population Biology, “Dissertation Improvement Award: Genetic and environmental influences on shell and foot form in an intertidal snail”. \$9,000. G.C. Trussell, **M.R. Patterson** (Co-PIs).
- 1993-1997 NSF, Ocean Sciences, Panel on Biological Oceanography, “Internal waves in the rocky subtidal zone: effects of pulsed food and larval supply”. \$195,000. **M.R. Patterson** (Sole PI - collaborative award to J.W. Witman - Brown University).
- 1993-1997 Office of Naval Research, “Biological mediation of material fluxes across the sediment-water interface in estuaries and coastal systems”. \$1,050,000. L. Schaffner, L.D. Wright, R. Dickhut, J.Maa, S. Kuehl, **M.R. Patterson** (Co-PIs).
- 1993-1994 NSF, Division of Biological Infrastructure, “A Nitrox SCUBA facility for the Bodega Marine Laboratory and Reserve”. \$48,617. P. Connors (Co-PI), **M.R. Patterson** (Lead PI). I wrote the proposal. (Lead PI later changed to H. Spero, as award occurred as I was leaving UC Davis for William & Mary.)
- 1993-1994 NOAA, Northeast National Undersea Research Center - University of Connecticut, Avery Point, “Impact of sponge heterotrophy and autotrophy on water column processes of Lake Baikal's littoral zone”. \$91,792. **M.R. Patterson** (Sole PI).
- 1993-1994 NOAA, Northeast National Undersea Research Center - University of Connecticut, Avery Point, “Simultaneous pumping for larval supply at replicate sites: an experiment in benthic-pelagic coupling by internal waves. \$10,446. **M.R. Patterson** (Sole PI).

- 1991-1992 Achievement Awards for College Scientists Foundation, San Francisco, “Aquatic ecology at UC Davis: excellence in freshwater and marine science”. Funded one graduate student fellowship in aquatic ecology. \$5,000. C.R. Goldman, **M.R. Patterson** (Co-PIs).
- 1991-1992 NOAA, Southeast National Undersea Research Center - University of North Carolina, Wilmington, “Diffusional and light scattering constraints on productivity in scleractinian reef corals”. \$15,410 (science support) plus eight days ship time (\$30,309) in support of Nitrox SCUBA diving in Florida Keys. **M.R. Patterson** (Sole PI).
- 1987-1990 NSF, Ocean Sciences, Panel on Biological Oceanography (GLOBEC Initiative), “Physical forcing of spatially distributed, meroplanktonic populations”. GLOBEC Initiative. L. Botsford, A. Hastings, T. Powell, J. Largier, **M.R. Patterson** (Co-PIs). \$390,577.
- 1988-1990 NOAA, National Undersea Research Center - Fairleigh Dickson University, “Diffusional and light scattering constraints on productivity in scleractinian reef corals”. \$14,029 (science support) for development of equipment for a 14 day mission underwater in Aquarius. **M.R. Patterson** (Sole PI).
- 1987-1990 NSF, Ocean Sciences, Panel on Biological Oceanography, “Forced convection effects on gas flux in benthic cnidarians”. \$64,531. **M.R. Patterson** (Sole PI).

#### **IV. Fellowships, Scholarships, Honors, and Awards**

- 2018 Outstanding Innovation Award, Northeastern University.  
Member of the Global Resilience Institute team that launched the Global Resilience Research Network, a global network of partners. The award recognizes GRI efforts to “accelerate discovery exponentially through the power of networks.”
- 2014 Explorer’s Club Flag Award for Mission 31 to the Aquarius Underwater Laboratory. Awarded to Fabien Cousteau, Brian Helmuth, and Mark Patterson.
- 2014 Service Award, Association of Unmanned Vehicle Systems International (AUVSI). For work during my tenure on the Board of Directors.
- 2011 Member of the Year Award, Association of Unmanned Vehicle Systems International (AUVSI). Inaugural recipient of a new award to recognize contributions to the promotion of AUVSI’s charter, which is the commercialization, research, and development of unmanned systems.

- 2010 Outstanding Faculty Award, State Council of Higher Education for Virginia (SCHEV) & Dominion Power. Awarded by the Governor of Virginia, this is Virginia's highest award for public and private college professors.
- 2008 Lockheed Martin Award for Excellence in Ocean Science & Engineering. The Marine Technology Society (MTS) presents the award annually at the international OCEANS meeting to a recipient with the highest degree of technical accomplishment in the field of marine science, engineering or technology. I received the award for developing two classes of Autonomous Underwater Vehicles and developing new ways to use them.
- 2008 Research Sabbatical Leave, College of William & Mary, to the University of Iceland
- 2006 Antarctic Service Medal, National Science Foundation
- 2003 US International Council for the Exploration of the Sea (ICES) Delegate - Fisheries Acoustics Science Technology (FAST) Working Group (WG) meeting in Bergen, Norway
- 1996 Phi Beta Kappa Award for the Advancement of Scholarship, Alpha Chapter
- 1990-1991 Yolo County Grand Juror (nominated by California Superior Court judge), oversight of schools, environment, police, and fire
- 1982 Best Paper Award, Invertebrate Zoology, American Society of Zoologists
- 1979-1984 Harvard University grant-in-aid award, tuition plus stipend
- 1979-1982 NSF Graduate Fellowship in Ecology
- 1979 Bowdoin Prize, Harvard College, Essays in the Natural Sciences - Among the highest commendations bestowed at Harvard since 1790. Previous winners include Ralph Waldo Emerson, Edward Everett Hale, Horatio Alger, Jr., and John Updike.
- 1975-1979 Harvard College Scholarship
- 1975-1979 National Merit Scholarship
- 1975 Delegate (State of New York) to West Virginia's National Youth Science Camp

1972 Public Service Award, American Radio Relay League, for work coordinating communications during the landfall of Hurricane Agnes, as reported in the pages of its journal, QST

## **V. Teaching and Advising**

### **A. Awards**

1987 Magnar Ronning Award for Teaching Excellence, University of California, Davis

1982 Certificate of Distinction-in-Teaching, Danforth Center for Teaching and Learning, Harvard University

### **B. Courses**

#### **a. Courses taught at Northeastern University**

2020 (Spring) ENVR 3600, *Oceanography*

2019 (Summer II) ENVR 3201/3202, *Coastal Sustainability in Southeast Asia and the Gulf of Maine* (Dialogues of Civilization with the University of Hong Kong with participation in Malaysia by undergraduates from the University of Science, Malaysia)

2018 (Summer I) PPUA 5976, *Serious Games and Social Networks: How to Improve Communications Resilience during Disasters*

2017 (Fall) CIVE 5260, *Environmental Fluid Mechanics*

2015 (Fall) CIVE 5699, *Environmental Fluid Mechanics*

2015, 2018 (Spr.) ENVR 3120, *Physical Biology of Marine Organisms*

2014 (Summer II) BIOL 8507, *Marine Biology Co-op Tutorial*

2014 (Fall),

2015 (Summer II)

2014, 2015 (Fall), EEMB 5516/7, *Oceanography and Lab*, Co-instructor with Dr. Justin Ries;

2016 (Spring), sole instructor for the above

2018 (Fall) sole instructor for the above

2014 (Spring) EEMB 5518, *Ocean and Coastal Processes* (Three Seas Panama semester), Co-instructor with Dr. James Leichter, Scripps Institution of Oceanography, UC San Diego or Dr. Brian Helmuth (Northeastern University)

2015 (Spring)

2016 (Spring, Fall)

2017 (Spring, Fall)

2018 (Spring)

2016 (Spring) EEMB 8982, *Readings class on coral ecophysiology*

2014 (Spring) EEMB 8982, *Readings class on zooplankton ecology*

2016, 2018 (Fall) ENVR 4971, *Senior Honors Project*  
2013-2017 (Fall) ENVR 1000, *Introduction to Marine and Environmental Sciences, annual lecture*

#### **b. Courses taught at William & Mary**

2013 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with K. Tang), 70 students  
2012 (Fall) MSCI 577, *Biomechanics of Marine Organisms*, 5 students  
MSCI 391, *Marine Science Mash-up* (co-taught), 25 students  
MSCI 697, *Coral Ecophysiology*, 1 student  
2012 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with D. Bronk), 70 students  
2011 (Fall) MSCI 578, *Ocean Observing Systems*, 2 students  
2011 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with K. Tang), 70 students  
2010 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with D. Bronk), 50 students  
2009 (Spring) MSCI 698, *ROV/AUV Technology*, 8 students  
2008 (Summer) MSCI 548, *Technical and Continuing Education for Marine Science* (high school teacher STEM continuing education) (co-taught), 25 students  
2007 (Fall) MSCI 578, *Ocean Observing Systems* (included a 2 week field expedition to the NOAA Aquarius underwater habitat) (co-taught), 12 students  
2007 (Summer) MSCI 548, *Technical and Continuing Education for Marine Science* (high school teacher STEM continuing education) (co-taught), 25 students  
2007 (Spring) MSCI 577, *Biomechanics of Marine Organisms*, 3 students  
2006 (Fall) MSCI 330, *Introduction to Marine Science* (co-taught with J. Bauer), 50 students  
2006 (Summer) MSCI 548, *Technical and Continuing Education for Marine Science* (high school teacher STEM continuing education) (co-taught), 25 students  
2006 (Spring) MSCI 698, *Allometry: Scaling in Biology*, 3 students  
2005 (Fall) MSCI 578, *Ocean Observing Systems*, 7 students  
2005 (Spring) MSCI 577, *Biomechanics of Marine Organisms*, 2 students  
2004 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with J. Bauer), 50 students  
2003 (Summer) MSCI 548, *Technical and Continuing Education for Marine Science* (high school teacher STEM continuing education) (co-taught), 25 students  
2003 (Spring) MSCI 698, *The Unified Neutral Theory of Biogeography and Biodiversity* (co-taught with J.E. Duffy), 8 students  
2002 (Spring) MSCI 698, *Introduction to LabVIEW*, 4 students  
MSCI 698, *Introduction to Mathematica*, 1 student

2001 (Spring) MSCI 330, *Introduction to Marine Science* (co-taught with J. Bauer), 50 students  
 MSCI 698, *Introduction to Electronics*, 5 students  
 200 (Fall) MSCI 548, *Technical and Continuing Education for Marine Science* (high school teacher STEM continuing education) (co-taught), 25 students  
 MSCI 577, *Biomechanics of Marine Organisms*, 7 students  
 1994-1999 (Fall) MSCI 501, *Fundamentals of Marine Science* (co-taught with J. Bauer, S. Kuehl, and J. Brubaker; I was lead instructor), 20-25 students/year  
 1998 (Spring) MSCI 697, *Unsteady Aquatic Locomotion*, 1 student  
 1994, 1995, 1997 (Spring) MSCI 577, *Biomechanics of Marine Organisms*, 5-10 students/year

### **c. Courses taught at the University of California, Davis**

EST 129, *Physiological Ecology*, 25 students/years  
 EST 129L, *Physiological Ecology Laboratory*, 25 students/year  
 ECOL 203, *Current Approaches in Ecophysiology* (co-taught, I was lead instructor), 8 students/year  
 ECOL 205, *Graduate Seminar: Mathematica for Biologists*, 6 students  
 ECOL 205, *Graduate Seminar: Coral Reef Ecology*, 4 students  
 ECOL 205, *Graduate Seminar: Biomechanics of Plants and Animals*, 6 students

## **C. Postdoctoral and Student Supervision**

### **a. Postdoctoral Fellows**

*Northeastern University:*

2019-2021 Lianne Allen-Jacobson, Ph.D.

*College of William & Mary:*

2012-2015 Lawrence W. Carpenter, Ph.D.

2007-2008 Daniel O.B. Jones, Ph.D.

### **b. Ph.D. students**

*Northeastern University:*

Sara D. Williams, (Ph.D. student, Fall 2015, *National Science Foundation Graduate Research Fellow*).



Dissertation: “Network analysis of coral connectivity: implications for coral stress response”

This student received the following funding with my mentorship:

National Science Foundation Graduate Research Fellowship, Marine Science Center Travel Award (2 x \$300), College of Science Dean’s Office Travel Award (2 x \$300), NU Dissertation Completion Fellowship

Amanda M. Dwyer (Ph.D. 2019, Fall 2013, *Stephen Director Fellow in Marine Science*).

Dissertation: “Zooplankton on coral reefs: implications for coral ecophysiology and reef health”.

This student received the following funding with my mentorship:

Marine Science Center Travel Award (3 x \$300), College of Science Dean’s Office Travel Award (2 x \$300), Office for Graduate Studies Award for Community Service (\$1,000), NU Dissertation Completion Fellowship, NOAA Sea Grant John A. Knauss Marine Policy Fellowship Program (2020)

Jennifer A. Elliott (Ph.D. 2016), *Hall-Bonner Program for Minority Doctoral Scholars Fellow, NSF GK12 Graduate Fellow*).

Dissertation: “Coral reef status in Mauritius: historic trends and recent perturbations”.

This student received the following funding with my mentorship:

NU Dissertation Completion Award, Student Travel Grant (2014, 2015) – Northeastern University (\$300 per year), Private funds (2013 – 2015) – Attitude Resorts (\$8,000), Exploration Fund Grant (2013) – The Explorers Club (\$2,000), Lerner-Gray For Marine Research Fellowship (2012) – American Museum of Natural History (\$2,000), Craig Smith Scholarship (2012) – VIMS (\$1,500), Sigma Xi Grant (2013) – Sigma Xi, The Scientific Research Society (\$450) Student travel grant (2013) – VIMS, Associate Dean – Academic Studies Office (\$300), Student Research Grant (2012) – VIMS (\$1,200) Student travel grant (2012) – VIMS, Associate Dean – Academic Studies Office (\$500), Student travel grant (2012) – VIMS, Graduate Student Association (\$200) Conference Fund (2012) – National Science Foundation GK-12 Program (\$700) Student Research Grant (2011) – VIMS (\$1,000)

*College of William & Mary:*

Noelle J. Relles (Ph.D., 2012, *Hall-Bonner Program for Minority Doctoral Scholars Fellow, NSF GK12 Graduate Fellow*).

Dissertation: “A case study in the effectiveness of Marine Protected Areas (MPAs): the islands of Bonaire and Curacao, Dutch Caribbean”.

Lawrence W. Carpenter (Ph.D., 2006).

Dissertation: “Physiological consequences of high water flow on the coral *Montastraea annularis* (Ellis and Solander, 1786)”.

Ian K. Bartol (Ph.D., 1999).

Dissertation: “Distribution, swimming, physiology, and swimming mechanics of brief squid, *Lolliguncula brevis*”. (co-advised with Dr. Roger Mann)

David H. Niebuhr (Ph.D., 1999). Dissertation: “Environmental stress in hard coral: evaluating lipid as an indicator of sub-lethal stress on short time scales”. (co-advised with Dr. John Boon)

Geoffrey C. Trussell (Ph.D., 1998).

Dissertation: “Phenotypic clines in the intertidal snail *Littorina obtusata*: the role of water temperature and predator effluent as inducers of phenotypic plasticity and associated trade-offs in shell form”.

This student received the following funding with my mentorship:  
NSF Doctoral Dissertation Improvement Award.

Rochelle M. Seitz (Ph.D., 1997).

Dissertation: “The role of epibenthic predators in structuring marine soft-bottom communities along an estuarine gradient”.

Adele J. Pile (Ph.D., 1996,).

Dissertation: “The role of microbial food webs in benthic-pelagic coupling in freshwater and marine ecosystems”.

This student received the following funding with my mentorship:  
NSF Doctoral Dissertation Improvement Award.

*University of California, Davis*

W. Stephen Price (Ph.D., 2000).

Dissertation: “The influence of tentacle shape, soft-tissue polyp, and corallite morphology, on microscale currents over corals, and implications for particle feeding: a physical model approach”.

Kim H. Driver (Ph.D., 1998; deceased, 2018).

Dissertation: “Hydrodynamic properties and ecomorphology of the hammerhead shark (family Sphyrnidae) cephalofoil”.

Shani Kleinhaus (Ph.D., 1994).

Dissertation: “Ecophysiology of mutualism in a unique stream symbiosis between a polymorphic cyanobacterium, *Nostoc parmeliodes*, and the larvae of the midge, *Cricotopus nostocicola*”.

Stephen R. Wing (Ph.D., 1993).

Dissertation: “Physical-biological coupling mechanisms in the near-shore ocean”.

Carolyn H. Declerck (Ph.D., 1991).

Dissertation: "Evolution and comparative functional morphology in suspension feeding in prosobranch gastropods". (co-advised with Dr. Ric Grosberg).

### **c. M.S. students**

Molly Waters (M.S. Marine Biology 2017, Three Seas Program), "Microplastics effects on *Mytilus edulis* from the Gulf of Maine".

Teegan Innis (M.S. Marine Biology 2015, Three Seas Program), "Spatial variability of *Symbiodinium* clade and *Montipora capitata* color across Kāneʻohe Bay, Oʻahu, Hawaiʻi".

Emily Duwan (M.S. Marine Biology 2016, Three Seas Program), "Educational outreach for best practices in tide gate management in Massachusetts".

Rebecca Jaffe (M.S. Marine Biology 2015, Three Seas Program), "To what extent does participation in the LiMPETS program improve positive environmental attitudes?".

Scott Kilcoyne, (M.S. Engineering 2015; Gordon Engineering Leadership Program), "Small slender underwater vehicle dynamic control".

### *College of William & Mary*

Daniel F. Doolittle (M.Sc., 2003). "Automated fish species classification using artificial neural networks and autonomous underwater vehicles".

### **d. Graduate Student Committees**

#### *Ph.D. student committees: Marine and Environmental Sciences, Northeastern University*

Louise Cameron (Ph.D. 2020)

Jessica Torossian (Ph.D. 2020)

Rebecca Certner (Ph.D. 2017)

Nicholas Colvard (Ph.D. 2016)

Christian Conroy (Ph.D. 2017)

Allison Matzelle (Ph.D. 2018)

*Marine Science, College of William & Mary*

Solomon Chak (Ph.D., 2016)

Grace Cartwright (Ph.D., 2013)

Gabrielle Saluta (M.Sc., 2012)

Catarina Lima (M.Sc., 2012)

Katherine Brodie (Ph.D., 2010)  
Andrij Horodysky (Ph.D., 2009)  
Jennifer Miselis (Ph.D., 2008)  
Katherine Mansfield (Ph.D., 2006)  
David Kerstetter (Ph.D., 2005)  
Rubén Ríos González (Ph.D., 2003)  
Joanna Gascoigne (Ph.D., 2003)  
David Kerstetter (M.Sc., 2002)  
William Seufzer (Ph.D., 2001)  
Rebecca Green (M.Sc., 2001)  
William Stockhausen, Jr. (Ph.D., 2001)  
Aaron Bartholomew (Ph.D., 2001)  
Malcolm Scully (M.Sc., Ph.D. 2001)  
Juliana Harding (Ph.D., 2000)  
Michelle Neubauer (Ph.D., 2000)  
Alessandra Sagasti (Ph.D., 2000)  
Guan-hong Lee (Ph.D., 2000)  
Monica Lara (Ph.D., 1999)  
Steven Goodbred, Jr. (Ph.D., 1999)  
Peter Countway (M.Sc., 1999)  
William Coles (Ph.D., 1999)  
Kevin Hovel (Ph.D., 1999)  
Sarah Rennie (Ph.D., 1998)  
Amanda Maxemchuk-Daly (M.Sc., 1998)  
Siddhartha Mitra (Ph.D., 1997)  
G. Randy Cutter, Jr. (M.Sc., 1997)  
Katherine Farnsworth (M.Sc., 1997)  
Renee Pardieck (M.A., 1996)  
Janet Nestlerode (M.A., 1996)  
Patrick Lay (Ph.D., 1996)  
Donald Gibbs, III (M.A., 1996)  
Kurt Gustafson (Ph.D., 1996)  
Sandra Brooke (M.A. 1996)  
Elizabeth Shea (M.A., 1995)  
Elizabeth LaPointe (M.A., 1995)  
Bohyun Bang (Ph.D., 1994)  
Christopher Collumb (M.A., 1994)  
William Seufzer (M.A., 1994)

*University of California, Davis*

Todd Hopkins (Ph.D., 1993)  
Yan Song (M.Sc., 1990)

Michael Brody (Ph.D., 1990)

### **e. Undergraduate and Postgraduate Students**

#### *Northeastern University*

Jade Lin, (NSF REU Co-op, Fall 2019)

Joseph Pascucci (Volunteer, Coral Husbandry, Spring 2020)

Nicole Suzuki (Volunteer, Coral Allometry, Spring 2020)

Cynthia Fowler (Volunteer, Coral Allometry, Spring 2020)

Timothy Briggs (Provost Research and Creative Endeavors Award, Spring 2019)

Natalie Kukshel (MSC Donor Scholar, Summer 2018)

Arthur Kautz (NSF intern, Summer 2018)

Lydia Sylla (REU Undergraduate Research Assistant - Northeastern University Provost Exchange Program with Harvey Mudd College; Summer 2016)

Katherine Hudson (Muckenhoupt Scholar, Provost Research and Creative Endeavors Award, 2016-2017)

Ann Marie Hulver (MSC Donor Scholar, Summer 2016; Provost Research and Creative Endeavors Award, 2015-2016)

Samantha Cook (MSC Donor Scholar, Summer 2017)

Angela Fan (Volunteer, 2017; MSC Donor Scholar, Summer 2018)

#### *College of William & Mary*

Sara Williams (College of William & Mary, NSF REU Undergraduate Research Assistant, Winter and Spring 2012; Volunteer Research Intern, Summer 2011).

Dylan Drake (College of William & Mary, NSF REU Undergraduate Research Assistant, Summer 2012).

David Godschalk (College of William & Mary, NSF REU Undergraduate Research Assistant, Spring and Summer 2012; Volunteer Research Intern, Summer 2011).

Molly Martin (Massachusetts Institute of Technology, NSF REU Undergraduate Research Assistant, Summer 2010).

Haley Garrison (College of William & Mary, NSF REU Undergraduate Research Assistant, Summer 2010).

David James (Norfolk State University (HBCU), NSF REU Undergraduate Research Assistant, Summer 2006).

Kennda Lynch (University of Illinois, NSF REU Undergraduate Research Assistant, Summer 1995, Summer 1996).

Siri Hakala (University of Minnesota, Morris, NSF REU Undergraduate Research Assistant, Summer 1995, Summer 1996).

Pamela Bradley (University of Virginia, NSF REU Undergraduate Research Assistant, Summer 1994, Summer 1995, Summer 1996, Technician 1996-1997).

David Fugate (College of William & Mary, 1995, Computer Programmer on ONR Grant).

Katie Parrish (Randolph Macon College, NSF REU Undergraduate Research Assistant, Summer 1995, Summer 1996).

Jeffrey Bennett (College of William & Mary, NSF REU Undergraduate Research Assistant, Summer 1994, Summer 1995, Summer 1996).

#### **f. Senior Thesis Research Students**

##### *Northeastern University*

Ethan Edson, Environmental Sciences, Class of 2015, won the RISE 2015 undergraduate award in Engineering Technology, presented by the President and Provost of Northeastern University. Ethan also was awarded a Provost's Research Award (\$1,800) that I supervised, that allowed construction of a prototype autonomous instrument for sampling microplastics.

Ann Marie Hulver, Marine Biology, Class of 2017, awarded an MSC Summer Research internship. Ann Marie is conducting Senior Honors research in my lab and has developed an underwater instrument to profile pH, dissolved oxygen, and temperature as a function of depth.

Katherine Hudson, Marine Biology, Class of 2017, awarded a Tri Beta Scholarship of \$2,000, and a Provost Research and Creative Endeavors Award for her Senior Honors project on "Alternative methods for studying stratification dynamics on discrete and continuous time scales". Presented at RISE 2017, and the 2017 Benthic Ecology Meetings in Myrtle Beach, SC.

Natalie Kukshel, Marine Biology, Class of 2018, Senior Honors Thesis awarded Honors in the Discipline, "Monitoring the effects of tide gates on saltmarsh water quality using a remotely operated vehicle".

Benjamin Moran, Marine Biology, Class of 2019, awarded a Provost Research and Creative Endeavors Award for his Senior Honors project on the role of the invasive alga *Siphonia japonica* in structuring macroalgal beds grazed by the sea urchin, *Strongylocentrotus droebachiensis* in the Gulf of Maine. (Because of diving accident, Ben later changed his thesis work to a project he had developed in R for estimating genetic diversity in fish populations.)

##### *College of William & Mary*

Sara Williams (2012-2013). "Using an Electrical Network Model to Simulate Gas Flux in Perforate and Imperforate Corals: Calculating the Time Constant of Mixing in Gastrovascular Fluid Compartments".

Jeffrey Bennett (1996-1997). "Ecophysiology of the sea anemone, *Aiptasia sp.*".

#### **g. External Student Committees**

Bryan Keller (M.Sc., 2011, University of Delaware, Committee Member).  
Angela Woolard (M.Sc., 2008, Old Dominion University, Committee Member).  
Isabel Jimenez-Denness (Ph.D., 2009, University of Technology, Sydney, External Reviewer).  
Eric Basillais (Ph.D., 1998, University of Marseilles, External Reviewer).  
Jan Witting (Ph.D., 1998, Northeastern University, Committee Member).  
Salvatore Genovese (Ph.D., 1996, Northeastern University, Committee Member).  
Avigdor Abelson (Ph.D., 1993, Tel Aviv University, External Reviewer).  
Brian Helmuth (M.Sc., 1991, Northeastern University, Committee Member).  
Swarthmore College, Department of Biology, External Honors Examiner (1 student - 2007; 2 students - 2009).

#### **h. High School Interns**

Nicholas Migneault (Spring 2017)  
Brian Whitlow (2010-2011 academic year).  
Nicholas Grigorian (2010-2011 academic year).  
Todd Phillips (Summer 2009).  
Elena Procopi (Spring 2009).  
Michael Crockett (Summer 2006, 2006-2007 academic year).

#### **i. Undergraduate Advising**

##### *Northeastern University*

2014-2018 Faculty Advisor, Marine Biology major and minor

2014-2018 University Scholar Mentor to Rachel Crowley and Benjamin Moran

2104-2018 Faculty Head, Three Seas Program. Three Seas is a year-long immersion in marine science with beginning graduate level coursework at the Marine Science Center, Northeastern; the Smithsonian Tropical Research Institute in Bocas del Toro, and Coiba, Panamá; and the Friday Harbor Laboratories, University of Washington. Students also become certified as scientific divers under training requirements set by the American Academy of Underwater Sciences.

##### *College of William & Mary*

2010-2012 Undergraduate advisor to 8 students/year, prior to their selection of a major by the end of their sophomore year.

##### *University of California, Davis*

1986-1992 Academic advisor to 4-8 students/year for two majors: Environmental Science and Environmental Policy.

## **VI. SERVICE and PROFESSIONAL DEVELOPMENT**

### **A. Service to the University**

#### *Northeastern University*

- 2015-2018 Faculty Senate, College of Science delegate
- 2018 Provost's University Advisory Committee for Tenure and Promotion
- 2017 Participant, day-long visit by senior technology leadership of Northrop Grumman
- 2013-present Member, Sustainable Cities Lab
- 2014-2018 College of Science College Council, Co-Chair (2015-2017)
- 2016 Made video tribute and gave a farewell address for Dr. Stephen Director, outgoing Provost at Senior Leadership/Board of Trustees farewell reception
- 2016 Interview on marine robotics for Northeastern Alumni Magazine that ended up on cover
- 2016 Invited to and attended the Camille and Henry Dreyfus Teacher/Scholar Symposium and reception in New York City where I networked with Board of Advisors and Board of Trustees, and educated them about Northeastern's expertise in environmental chemistry (2 days)
- 2016 2016 Traveled overnight to Washington, DC, to brief members of Congress, Executive Branch, and NOAA, on the Urban Coastal Sustainability Initiative (April)
- 2013-present Call >20-30 prospective students during various phases of the University Phone-athon, including prospective University Scholars
- 2015 Talk to Alumni Group at Kostas Center, Burlington about Mission 31 at behest of NU Alumni Relations  
Talk to Alumni Group in Falmouth about Mission 31 at behest of NU Alumni Relations



- 2014-2016 Attended University Scholars Program recruitment dinner and next-day luncheon representing MES and CEE
- 2015 Briefing to Department of Homeland Security on Northeastern's capabilities in Resilient Infrastructure and Social Media
- 2014 Worked with Media Relations Office to develop a print ad for the NY Times profiling my work
- 2014-2016 Worked with Government Relations Office to develop language for the NOAA Omnibus spending bill to fund a center for Urban Coastal Sustainability; helped host a luncheon with Senator Ed Markey (MA) and briefed other members of Congress, and NOAA senior leadership
- 2014 Board of Trustees presentation on Field Robotics
- 2014 Presentation to Dr. Larry Schuette, Director of Innovation, Office of Naval Research
- 2013-2014 University Undergraduate Curriculum Committee
- 2013-present College of Science Admitted Students recruiting
- 2014 Empower fundraising campaign hard launch, Faculty Presenter (2 days)
- 2013 Host and Organizer to Fabien Cousteau, Burba Lecturer
- 2013 Presentation on Urban Coastal Sustainability Initiative to Board of Corporation
- 2013 Presentation on Urban Coastal Sustainability Initiative to Board of Trustees
- 2013 Empower fundraising campaign soft launch, Faculty Presenter
- 2013-2016 Parents Weekend, College of Science, Marine & Environmental Sciences Faculty Representative (2 events)

*College of William & Mary*

- 2010-2012 Outstanding Faculty Award Committee, Chair (2011) (appointed).
- 2010 Presenter, Provost's Conversations about Learning (invited).

- 2006-2013 Faculty Compensation Board, Alternate (2006), Member (2007-2012), Chair (2012-2013) (elected).
- 2011 Vice President for Strategic Initiatives 3-year Review Committee (appointed).
- 2002-2013 Virginia Institute of Marine Science Industry Partnership Group (appointed).
- 2004-2007 Marine Science Minor Evaluation Committee (appointed).
- 1995-1997 Task Force on the Allocation of Overhead (appointed).
- 1995-1997 Environmental Science and Policy Feasibility Committee (appointed). 1995-1996
- 1995-1997 Environmental Science Major Review Committee (appointed).
- 1995-1996 Faculty Assembly delegate (alternate) (elected).
- 1994-1996 International Studies Committee (including Study Abroad Subcommittee) (appointed).
- 1993-1994 Self-Study Committee on Graduate Education (appointed).
- 1992-1993 Provost Search Committee (appointed).
- 1992-2013 Briefings and tours of the Autonomous Systems Laboratory for visiting leaders from the Department of Defense leaders, Department of Homeland Security, National Science Foundation, Office of Naval Research, Defense Advanced Research Projects Administration, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, Ambassadors, US Congressmen, US Senators, VA Delegates and Senators, and major donors.

**B. Service to the Departments**

*Northeastern University*

*Marine & Environmental Sciences*

- 2014-present Diving Control Board; Chair (2015-2018)
- 2013-2017 Graduate Committee; Ecology, Evolution, and Marine Biology Ph.D. program
- 2013-2018 Undergraduate Curriculum Committee

2013-present Tenure & Promotion Committee, Marine & Environmental Sciences

2013-2017 Marine Science Center Open House, Faculty Presenter (2 talks); four exhibits

*Civil & Environmental Engineering*

2013-2017 Search Committees (3), Urban Coastal Sustainability position, Depts. of Marine & Environmental Sciences, and Civil & Environmental Engineering

2013-present Environmental Engineering Committee

2013-2017 Faculty Host, Annual Industry Leadership Night

*College of William & Mary*

2011, Awards Committee, Virginia Institute of Marine Science (elected).  
1998-2003

2010-2013 Academic Council, Biological Sciences Representative, School of Marine Science (Alternate) (elected).

2010-2011 Admissions Committee, School of Marine Science (elected).

2008-2013, Educational Policy Committee, School of Marine Science (elected).  
1993-1999

2006-2013 Faculty Council. Virginia Institute of Marine Science (Faculty Secretary, 2007-2008, Vice Chair, 2011) (elected).

2005-2006 Academic Status & Degrees Committee, School of Marine Science (elected).

1999-2000 Geological Oceanography Search Committee, School of Marine Science (appointed).

1999 Education Program Planning Subcommittee, Biological Sciences Fall Retreat (appointed).

1998-2001 Development Committee, Virginia Institute of Marine Science (appointed).

1998-1999 Named Professorship Committee, School of Marine Science (Chair, appointed).

1997-2006 Faculty Status & Tenure Review, School of Marine Science (Chair, 2003-2005) (elected).

- 1996-1997 Information Technology & Networking Services Search Committee, Virginia Institute of Marine Science (appointed).
- 1996 Physical Oceanography Search Committee, School of Marine Science (appointed).
- 1994-2000 International Visiting Scientist Committee, School of Marine Science (appointed).
- 1993-2013 Diving Control Board, Virginia Institute of Marine Science (Chair, 1998-2005) (appointed).
- 1993-2000 Exam Committee, School of Marine Science (elected).
- 1992-1994 Minor Research Grants Committee (Chair), School of Marine Science (elected).
- 1993-1994 Academic Council, Biological Sciences Representative, School of Marine Science (elected)
- 1992-1993 Plankton Biology Search Committee (2 positions), School of Marine Science (appointed).

**C. Service to the Discipline**

**a. National Meetings**

- 2013 4th Annual Workshop (2 days) on Intelligence and National Security: The Reapers Come Home: Unmanned Systems, Domestic Surveillance, and the Constitution, held at the Center for American Studies, Christopher Newport University, Local Planning and Host Committee.
- 2010 Department of Homeland Security, Small Business Administration Conference on Port and Harbor Security, Portsmouth, VA, Planning Committee, Exhibitor, Discussion Leader, and Session Chair (2 day event).
- 2007 Benthic Ecology Meeting, Georgia Institute of Technology, Session Chair.
- 2005 Benthic Ecology Meeting, College of William & Mary, Local Host Committee.
- 1998 Ocean Community Conference, Marine Technology Society, Session Chair.
- 1982 Benthic Ecology Meeting, Harvard University, Local Host Committee, Session Chair.

## **b. International Meetings**

- 2013-2014 Conference Program Committee, and Technical Review Subcommittee, Unmanned Systems 2014, Association of Unmanned Vehicle Systems International (AUVSI) meeting, Orlando, FL ( > 8,000 prospective attendees and 550 prospective exhibitors).
- 2011-2012 Chair, Marine Autonomy Session; Technical Program Committee - Autonomous Systems; OCEANS 2012, Marine Technology Society (MTS)/ Institute of Electrical and Electronics Engineers (IEEE) Conference, Virginia Beach, VA.
- 2012 RoboBoat Competition, Office of Naval Research (ONR), and Association of Unmanned Vehicle Systems International (AUVSI), 4th International Unmanned Surface Vehicle Competition, Virginia Beach, VA. Local Host and Logistics Coordinator (4-day event: college-level teams from the US and abroad).
- 2011-2012 Technical Chair, Unmanned Systems 2012, Association of Unmanned Vehicle Systems International (AUVSI) meeting, Las Vegas, NV ( > 8,000 attendees and > 500 exhibitors).
- 2011 RoboBoat Competition, Office of Naval Research (ONR), and Association of Unmanned Vehicle Systems International (AUVSI), 4th International Unmanned Surface Vehicle Competition, Virginia Beach, VA. Local Host and Logistics Coordinator (4-day event: college-level teams from the US and abroad).
- 2010-2011 Technical Chair, Technical Review Subcommittee, and Conference Program Committee Unmanned Systems 2011, Association of Unmanned Vehicle Systems International (AUVSI) meeting, Washington, DC (> 7,000 attendees and > 500 exhibitors).
- 2010 Session Chair, 2nd International Waterside Security Conference, Institute of Electrical and Electronics Engineers (IEEE)/Oceanic Engineering Society (OES), Office of Naval Research (ONR), and ECA Robotics, Marina di Carrara, Italy.
- 2010 RoboBoat Competition, Office of Naval Research (ONR), and Association of Unmanned Vehicle Systems International (AUVSI), 4th International Unmanned Surface Vehicle Competition, Virginia Beach, VA, Local Host and Logistics Coordinator (4-day event: college-level teams from the US and abroad).
- 2009 Discussion leader, Conference on Analytic Support for Maritime Domain Awareness and Counter-Piracy. Military Operations Research Society (MORS,

US Department of Defense) and Defence Research and Development Canada (DRDC), Chateau Cartier, Quebec, Canada.

- 2009 RoboBoat Competition, Office of Naval Research (ONR), and Association of Unmanned Vehicle Systems International (AUVSI), 4th International Unmanned Surface Vehicle Competition, Virginia Beach, VA, Local Host and Logistics Coordinator (4 day event - college level teams from US and abroad).
- 2009 Invited Participant, Living Oceans Foundation, Planning Workshop on LOF's Global Coral Reef Expedition, Bermuda Institute of Ocean Sciences.
- 2003 US Delegate, International Council for the Exploration of the Seas (ICES) Fisheries Advanced Science and Technology (FAST) Working Group (WG) - Bergen, Norway.

#### **d. Review Panels**

- 2020 Reviewer, Seed Grant Program, University of Maine/Northeastern University
- 2018 External Assessor, Hong Kong University Graduate Programs in Biological Sciences
- 2016, 2017 Member, National Science Foundation, Field Robotics Panel, National Robotics Initiative
- 2014 Member, National Oceanic and Atmospheric Administration, Ocean Exploration and Research, Silver Spring, MD (24 proposals, presenter for 5 proposals)
- 2012 Member, National Oceanic and Atmospheric Administration, Ocean Exploration and Research (OER) Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) Review Panel
- 2003 Member, National Science Foundation, Ocean Sciences, Biological Oceanography Panel
- 2003 Member, National Oceanic and Atmospheric Administration, National Undersea Research Program, Peer Review Panel
- 1995 Member, National Science Foundation, Ocean Sciences, Biological Oceanography Panel
- 1993 Member, National Oceanic and Atmospheric Administration, National Undersea Research Program, Peer Review Panel

- 1992-1996 Ecological Society of America Eminent Ecologist and Distinguished Service Award Committee
- 1988 Member, National Oceanic and Atmospheric Administration, National Undersea Research Program, Peer Review Panel

**e. Board of Directors and Working Groups**

- 2020-present Board of Advisors, Ocean Diagnostics LLC, Victoria, British Columbia, Canada Manufacturer of microplastics sensing solutions
- 2018-present Outfall Monitoring Science Advisory Panel. Advise the US Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MADEP) on scientific and technical matters related to the Massachusetts Water Resources Authority's Boston outfall and any potential impacts of the discharge on its receiving waters.\
- 2018-present Science Advisor to Fabien Cousteau Ocean Learning Center, Project Proteus (new underwater habitat)
- 2017-2019 Science Advisory Panel to Board of Directors, Fabien Cousteau Ocean Learning Center
- 2012-2017 Board of Directors, Aquarius Reef Base Foundation - a 501c(3) organization devoted to promoting and supporting cutting edge research from the world's only saturation diving laboratory, Aquarius, located in the Florida Keys National Marine Sanctuary.
- 2011-2016 SAE International Unmanned Systems Terminology Working Group, based on the Autonomy Levels for Unmanned Systems (ALFUS) Framework, sponsored by the National Institute of Standards and Technology, and the Department of Homeland Security.
- 2011-2014 Board of Directors, Association of Unmanned Vehicle Systems International (AUVSI) - a 501c(6) organization devoted to the research and commercialization of unmanned systems. Elected from 7,000+ members. Co-Chair, Maritime Advisory Committee.
- 2011-2013 State Council of Higher Education for Virginia (SCHEV) Outstanding Faculty Award Reviewer for the Office of the Governor

2007-2013 Robotics Cluster for Port and Harbor Security (InnovateHR!), an initiative of the Hampton Roads Partnership.

1993-1994 US Department of State Coral Reefs Initiative Working Group

#### **f. Manuscript and Grant Reviewing**

2015-present Topic Editor, *Coral Reefs*

2014-2015 Editorial Board, *Coral Reefs*

Journals (number in parens = last three years)

*American Naturalist*

*American Scientist*

*Annual Review of Ecology and Systematics Annual Review of Marine Science*

*Aquatic Botany*

*Biological Bulletin*

*Bulletin of Marine Science*

*Canadian Journal of Fisheries and Aquatic Sciences Ecology*

*Ecological Monographs*

*Estuarine, Coastal and Shelf Science (1)*

*Coral Reefs (8)*

*Deep Sea Research Part I (1)*

*Fishery Bulletin*

*Functional Ecology*

*Hydrobiologia*

*IEEE Journal of Oceanic Engineering*

*Journal of Experimental Biology (1)*

*Journal of Experimental Marine Biology and Ecology (1)*

*Journal of Fluid Mechanics*

*Journal of Geophysical Research (3)*

*Journal of the Marine Biological Association (UK)*

*Journal of Paleontology*

*Journal of Physical Oceanography*

*Journal of Theoretical Biology*

*Limnology & Oceanography (1)*

*Limnology & Oceanography: Fluids & Environments (1) Limnology and Oceanography:*

*Methods*

*Marine Ecology Progress Series (2)*

*Marine Technology Society Journal (1)*

*Nature*

*Oceanography (1)*



*Oecologia*  
*Palaios*  
*PLOS ONE* (1)  
*Proceedings of the Royal Society*  
*Proceedings of the National Academy of Sciences (USA)* (3)  
*Science*  
*Trends in Ecology and Evolution*

Grant Agencies and Foundations (39 reviews in 2013; 31 in 2014; 5 in 2015, 18 in 2017, 16 in 2017, 8 in 2018, 4 in 2019):

Association of Unmanned Vehicle Systems International 2014 meeting (31)  
Israeli National Science Foundation (2)  
Marine Science & Technology Foundation (1)  
National Environmental Research Council (UK)  
National Geographic Society (2)  
National Science Foundation panels on Biological Oceanography (8)  
    Integrative Organismal Systems (2)  
    Ocean Technology and Interdisciplinary Coordination (1)  
    Ocean Acidification (3)  
National Sciences and Engineering Research Council (Canada) (1)  
NOAA Sea Grant (California, Delaware, Maryland, Virginia) (1)  
NOAA Office of Ocean Exploration and Research (26)  
Scripps Institution of Oceanography, University of California, San Diego - promotion review (1)  
University of Delaware - promotion review (1)  
Duke University - promotion review (1)

#### **g. Professional Societies**

Marine Technology Society  
IEEE Oceanic Engineering Society  
International Society for Reef Studies  
American Radio Relay League

#### **D. Service to the Community and Public**

2020	Solve It for Kids! STEM podcast, on using underwater robots to survey an ice age underwater forest
2019	Online presentation to the non-profit STEM organization, Future Frogmen, on the future of the ocean

- 2019 Presentation to marine science students (9-12 grade) at Norfolk County Agricultural High School, Walpole, MA
- 2017 Climate change presentation to North Shore Episcopal Church environmental coalition; organized lecture series as well
- 2017 Skype-in-the-Classroom talk to Johnson Elementary School, Nahant, MA
- 2016 Advised defense contractor working for the Department of Homeland Security on drug smuggling issue
- 2016-present Lower North Shore Local Governance Committee (LGC) for Salem Sound Coastwatch and the MassBays National Estuary Program
- 2016, 2017 Hosted visits to my lab by Girls Inc., Lynn, and Lynn Beach Sisters
- 2016 Hosted visit to lab and Rumney Marsh by journalism class at Emerson College taught by a Pulitzer-prize winning journalist
- 2016 Interview to Revere (MA) Journal about issues surrounding tide gates
- 2015 Advised Museum of Science, Boston, on planetarium movie presentation on undersea life
- 2015 Advised AUVSI member on an issue relating to homeland security and underwater robotics
- 2015-present Volunteer, My Brother's Table, Lynn
- 2015 Internet talk to Charter School, Alexandria, Virginia about marine robotics
- 2015 Presentation to the Sip and Sea group, Johnson School, Nahant
- 2014-present Boston Harbor Coalition Member
- 2014-present Tuft's University Water Group monthly dinner meeting
- 2013-2014 Science advisor to Fabien Cousteau during Mission 31, a 31-day mission led by Cousteau inside the underwater laboratory Aquarius.
- 2013 Briefed the Vice Consul, US Embassy, Mauritius on issues pertaining to reef conservation in that country. Vice Consul then briefed the Ambassador on my

work with the Non-Governmental Organization Reef Conservation, and Attitude Hotel Group

2013 Technical advisor to National Geographic Society sponsored expedition to Icelandic underwater caves

2011-present Science Advisory Panel, Science Museum of Virginia appointed by Secretary of Education, Office of the Governor of Virginia, to improve the state's flagship science museum in Richmond.

2011 FIRST Robotics Mentor, NASA Knights high school team

### **E. Public Outreach and Media**

Interviews and media on the launch of Project Proteus Fabien Cousteau's Underwater Habitat, with Washington Post, Forbes, Popular Mechanics, News @ Northeastern

In partnership with the Brian Helmuth lab, my group engaged in a full program of science during the latter half of Cousteau's Mission 31, with significant public outreach events. 500 million persons worldwide were reached according to Pitch Publicity, and significant fraction of news stories mentioned Northeastern and the UCSI during the second half of the mission. In addition to NSF funding, I expended some startup funds to allow my graduate students and technician to participate in two weeks of field work on site. I arranged for Liz Magee, our Diving Safety Officer and Threes Seas Program Coordinator to serve as part of the aquanaut team with Cousteau, which was a significant professional development opportunity for her. Liz proved herself an adept science communicator, appearing on podcasts for the Museum of Science and on television with WGBH. Dr. Dan Distel, Chris Marks, Dr. Loretta Fernandez, Val Perini, and Dr. Isaac Westfield made substantial contributions to the four live outreach events held at the Museum of Science. My technician Sara Williams, and grad student Amanda Dwyer, each conducted significant outreach events with the Museum of Science, and other outlets, another significant professional development activity involving young women in science.

I gave major interviews to the NSF's 360 Radio, WGBH NPR (2x), Boston Magazine, Northeastern magazine and the Northeastern media relations (multiple stories), TheBenshi blog, the Miami Herald, the Washington Post, Agence Presse (EU media outlet), and Al Jazeera TV

Interviewed by Ben Hellwarth for article on my Autonomous Underwater Vehicles that appeared in Men's Journal

Interviewed by Virginia Gazette, Hampton Roads, Virginia for article on my NSF research on using marine robotics to help advance STEM education

Taught a lesson on sidescan sonar interpretation to a Montessori School 8th grade class

Interviewed in French by Le Mauricien (newspaper) and Côte Nord (glossy magazine) about work on coral reef conservation in Mauritius

Interviewed by Discovery Canada about the Aquarius habitat program

Interviewed by the BBC about the Aquarius habitat program

Northeastern University inSolution blog article about AUV research

Northeastern University Twitter chat about Mission 31 for the College of Science

Northeastern University news articles about Men's Journal piece, Mission 31 support (2 articles), and environmental sensing underwater