

# DOUGLAS B. RASHER

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## EDUCATION

2012 PhD, Biology Georgia Institute of Technology (Atlanta, GA, USA)  
2005 BS, Zoology Michigan State University (East Lansing, MI, USA)

## PROFESSIONAL APPOINTMENTS

2016- Senior Research Scientist (PI), Bigelow Laboratory for Ocean Sciences  
2016- Research Professor, Colby College  
2013-2016 Postdoctoral Research Associate, School of Marine Sciences, University of Maine  
2012-2013 Teasley Postdoctoral Fellow, School of Biology, Georgia Institute of Technology

## RESEARCH GRANTS AND FELLOWSHIPS

2020-2023 *Linking Physiological Thermal Thresholds to the Distribution of Lobster Settlers and Juveniles.* US National Science Foundation. Co-Principal Investigator. (total: \$872,457; Bigelow: \$266,735)

2019-2024 *EPSCoR RII Track-1: Molecule to Ecosystem: Environmental DNA as a Nexus of Convergent Research for Maine's Coastal Ecosystems.* US National Science Foundation. Project Lead. (total: \$20,000,000; Bigelow: \$2,900,000)

2018-2021 *The Return of Maine's Kelp Forests: Patterns, Drivers, and Implications for Industry.* Maine Sea Grant, National Oceanic and Atmospheric Administration. Principal Investigator. (\$149,980)

2013-2018 *Ocean Acidification: Century Scale Impacts to Ecosystem Structure and Function of Aleutian Kelp Forests.* US National Science Foundation. Project Lead. (\$574,617)

2016 *Effects of Climate Change on Sea Urchin Productivity and Trophic Interactions in the Aleutian Islands: Consequences for Sea Otter Recovery.* US Fish and Wildlife Service. Co-Principal Investigator. (\$100,000)

2011-2012 *Teasley Predoctoral Fellowship.* Teasley Endowment, Georgia Institute of Technology. (\$11,000)

2008 *PhD Research Fellowship.* School of Biology, Georgia Institute of Technology. (\$10,000)

2006-2008 *Integrative Graduate Education and Research Traineeship.* US National Science Foundation. (\$60,000)

## HONORS AND AWARDS

2020 Field Biology Award, Maxwell Hanrahan Foundation  
2014 George Mercer Award, Ecological Society of America  
2013 PhD Thesis Award, Sigma Xi  
2011 Graduate Research Excellence Award, Georgia Institute of Technology  
2010 Graduate Research Excellence Award, Georgia Institute of Technology  
2010 Best Student Paper Award, Science Applications International Corporation

## PUBLICATIONS

### **Peer-reviewed Articles**

**DB Rasher**, RS Steneck, J Halfar, KJ Kroeker, JB Ries, MT Tinker, PTW Chan, J Fietzke, NA Kamenos, BH Konar, JS Lefcheck, CJD Norley, BP Weitzman, IT Westfield, JA Estes. Keystone predators govern the pathway and pace of climate impacts in a subarctic marine ecosystem. *Science* **369**, 1351-1354 (2020).

Outreach: *New York Times, Scientific American Magazine, Yahoo News, Star Tribune, Chicago Tribune, Baltimore Sun, Publico, Inverse Magazine, Swiss Public Radio, National Public Radio (NPR), etc.*

C Pimiento, F Leprieur, D Silvestro, JS Lefcheck, C Albouy, **DB Rasher**, M Davis, J-C Svenning, JN Griffin. Functional diversity of marine megafauna in the Anthropocene. *Science Advances* **6**, eaay7650 (2020).

Outreach: *Newsweek Magazine, Gizmodo Magazine, Science Daily, etc.*

JJ Scott, TC Adam, A Duran, DE Burkepile, **DB Rasher**. Intestinal microbes: an axis of functional diversity among large marine consumers. *Proceedings of the Royal Society B: Biological Sciences* **287**, 20192367 (2020).

Outreach: *Hakai Magazine, Science Daily, Technology Networks, etc.*

LGE Wilkins, M Leray, A O’Dea, B Yuen, R Peixoto, TJ Pereira, HM Bik, DA Coil, JE Duffy, EA Herre, H Lessios, NM Lucey, LC Mejia, **DB Rasher**, K Sharp, EM Sogin, RW Thacker, R Vega Thurber, WT Wcislo, EG Wilbanks, JA Eisen. Host-associated microbiomes drive structure and function of marine ecosystems. *PLoS Biology* **17**, e3000533 (2019).

SJ Brandl, **DB Rasher**, IM Côté, JM Casey, ES Darling, JS Lefcheck, JE Duffy. Coral reef ecosystem functioning: eight core processes and the role of biodiversity. *Frontiers in Ecology and the Environment* **17**, 445-454 (2019).

RS Steneck, SA Arnold, R Boenish, R de Leon, PJ Mumby, **DB Rasher**, MW Wilson. Managing recovery resilience in coral reefs against climate-induced bleaching and hurricanes: A 15-year case study from Bonaire, Dutch Caribbean. *Frontiers in Marine Science* **6**, 265 (2019).

JS Lefcheck, BB Hughes, AJ Johnson, BW Pfirrmann, **DB Rasher**, AR Smyth, BL Williams, MW Beck, RJ Orth. Are coastal habitats important nurseries? A meta-analysis. *Conservation Letters* **12**, e12645 (2019).

JS Lefcheck, AA Innes-Gold, SJ Brandl, RS Steneck, RE Torres, **DB Rasher**. Tropical fish diversity enhances coral reef functioning across multiple scales. *Science Advances* **5**, eaav6420 (2019).

Outreach: *Caribbean Beat Magazine, Science and Development Network, Swedish Public Radio, etc.*

ZM Topor, **DB Rasher**, JE Duffy, SJ Brandl. Marine protected areas enhance coral reef functioning by promoting fish biodiversity. *Conservation Letters* **12**, e12638 (2019).

KM Cammen, **DB Rasher**, RS Steneck. Predator recovery, shifting baselines, and the adaptive management challenges they create. *Ecosphere* **10**, e02579 (2019).

RS Steneck, PJ Mumby, C MacDonald, **DB Rasher**, G Stoyle. Attenuating effects of ecosystem management on coral reefs. *Science Advances* **4**, eaao5493 (2018).

CS Clements, **DB Rasher**, AS Hoey, VE Bonito, ME Hay. Spatial and temporal limits of coral–macroalgal competition. *Marine Ecology Progress Series* **586**, 11-20 (2018).

**DB Rasher**, AS Hoey, ME Hay. Cascading predator effects in a Fijian coral reef ecosystem. *Scientific Reports* **7**, 15684 (2017).

Outreach: *Scientific American Magazine, Discover Magazine, Gizmodo Magazine, Science & Avenir News, etc.*

Accolades: One of Top 10 most cited articles for 2017 in *Scientific Reports*

JA Estes, M Heithaus, DJ McCauley, **DB Rasher**, B Worm. Megafaunal impacts on structure and function of ocean ecosystems. *Annual Review of Environment and Resources* **41**, 83-116 (2016).

**DB Rasher**, EP Stout, S Engel, TL Shearer, J Kubanek, ME Hay. Marine and terrestrial herbivores display convergent chemical ecology despite 400 million years of independent evolution. *Proceedings of the National Academy of Sciences USA* **112**, 12110-12115 (2015).

Outreach: AAAS News, Chemical and Engineering News, Hakai Magazine, etc.

**DB Rasher**, ME Hay. Competition induces allelopathy but suppresses growth and anti-herbivore defense in a chemically rich seaweed. *Proceedings of the Royal Society B: Biological Sciences* **281**, 20132615 (2014).

**DB Rasher**, AS Hoey, ME Hay. Consumer diversity interacts with prey defenses to drive ecosystem function. *Ecology* **94**, 1347-1358 (2013).

Outreach: National Science Foundation, Thomson-Reuters News, American Museum of Natural History, Consortium for Ocean Leadership, Coral Reef Alliance, etc.

Accolades: George Mercer Award, Ecological Society of America

TL Shearer, **DB Rasher**, TW Snell, ME Hay. Gene expression patterns of the coral *Acropora millepora* in response to contact with macroalgae. *Coral Reefs* **31**, 1177-1192 (2012).

**DB Rasher**, S Engel, V Bonito, GJ Fraser, JP Montoya, ME Hay. Effects of herbivory, nutrients, and reef protection on algal proliferation and coral growth on a tropical reef. *Oecologia* **169**, 187-198 (2012).

RS Lasley-Rasher, **DB Rasher**, ZH Marion, RB Taylor, ME Hay. Predation constrains host choice for a marine mesograzer. *Marine Ecology Progress Series* **434**, 91-99 (2011).

**DB Rasher**, EP Stout, S Engel, J Kubanek, ME Hay. Macroalgal terpenes function as allelopathic agents against reef corals. *Proceedings of the National Academy of Sciences USA* **108**, 17726-17731 (2011).

Outreach: National Geographic Magazine, Time Magazine, Wired Magazine, AAAS Science Now! (Science Magazine), NBC News, Chemical and Engineering News, BBC Radio, ABC Radio, Fiji Radio, etc.

Hay ME, **Rasher DB**. Coral reefs in crisis: reversing the biotic death spiral. *F1000 Biology Reports* **2**, 71 (2010).

**DB Rasher**, ME Hay. Seaweed allelopathy degrades the resilience and function of coral reefs. *Communicative and Integrative Biology* **3**, 564-566 (2010).

**DB Rasher**, ME Hay. Chemically rich seaweeds poison corals when not controlled by herbivores. *Proceedings of the National Academy of Sciences USA* **107**, 9683-9688 (2010).

Outreach: National Science Foundation, Discover Magazine, National Geographic Magazine, R&D Magazine, MSNBC News, Yahoo News, Sydney Morning Herald, Times of Malta, Telegraph UK, Fiji Sun, Bionieuws Netherlands, San Diego Times, National Public Radio (NPR), CBC Radio, etc.

Accolades: Best Student Paper Award, Science Applications International Corporation

### Book Chapters

2018 DE Burkepile, **DB Rasher**, TC Adam, AS Hoey, ME Hay. Functional Variation Among Parrotfishes: Are they Complementary or Redundant? in *Biology of Parrotfishes* (AS Hoey and RM Bonaldo, eds.) 1st Edition (CRC Press). Pages 134-160.

### Technical Reports

2015 RS Steneck, SN Arnold, R de Leon, **DB Rasher**. *Status and Trends of Bonaire's Coral Reefs: Slow but Steady Signs of Resilience*. STINAPA Government Report, 93 pages plus Appendices.

- 2013 RS Steneck, SN Arnold, **DB Rasher**. *Status and Trends of Bonaire's Coral Reefs: Causes for Optimism*. STINAPA Government Report, 98 pages plus Appendices.

## **PROFESSIONAL PRESENTATIONS**

### **Departmental Seminars**

- 2020 Gulf of Maine Research Institute (Portland, ME, USA)  
2020 Cornell University (Isle of Shoals, ME, USA)  
2019 NOAA/University of Washington (Seattle, WA, USA)  
2019 University of Florida (Gainesville, FL, USA)  
2019 University of Rhode Island (Kingston, RI, USA)  
2019 Harvard University (Cambridge, MA, USA)  
2018 Northeastern University (Boston, MA, USA)  
2018 University of Massachusetts (Boston, MA, USA)  
2018 University of Maine (Orono, ME, USA)  
2017 Maine Maritime Academy (Castine, ME, USA)  
2017 Maine Department of Marine Resources (Boothbay, ME, USA)  
2017 Florida State University (Tallahassee, FL, USA)  
2016 College of William and Mary / VIMS (Gloucester Point, VA, USA)  
2016 University of California (Santa Barbara, CA, USA)  
2016 Bigelow Laboratory for Ocean Sciences (East Boothbay, ME, USA)  
2015 University of Michigan (Ann Arbor, MI, USA)  
2015 Brown University (Providence, RI, USA)  
2015 University of California (Santa Cruz, CA, USA)  
2014 University of Maine (Orono, ME, USA)  
2013 Darling Marine Center, University of Maine (Walpole, ME, USA)  
2011 University of New South Wales (Sydney, NSW, Australia)  
2009 University of the South Pacific (Suva, Fiji)

### **Public Forums and Stakeholder Workshops**

- 2020 Café Scientifique, Bigelow Laboratory for Ocean Sciences (East Boothbay, ME, USA)  
2018 Moore Foundation Workshop, Smithsonian Tropical Research Institute (Bocas del Toro, Panama)  
2018 Café Scientifique, Bigelow Laboratory for Ocean Sciences (East Boothbay, ME, USA)  
2018 Smithsonian MarineGEO Education Workshop (Corpus Christi, TX, USA)  
2017 Innovation and Leadership Series, The Music Hall (Portsmouth, NH, USA)  
2017 Café Scientifique, Bigelow Laboratory for Ocean Sciences (East Boothbay, ME, USA)  
2017 The Biology Colloquium, Florida State University (Tallahassee, FL, USA)  
2013 EU Global Climate Change Alliance Workshop (Koror, Palau)  
2012 Teasley Symposium, Georgia Institute of Technology (Atlanta, GA, USA)

### **Conference Presentations**

- 2019 Gulf of Maine 2050 International Symposium (Portland, ME, USA)  
2019 149th American Fisheries Society Meeting (Reno, NV, USA)  
2018 4th World Conference on Marine Biodiversity (Montreal, QC, Canada)  
2016 97th Western Society of Naturalists Meeting (Monterey, CA, USA)  
2016 Gordon Research Conference on Ocean Global Change Biology (Waterville Valley, NH, USA)  
2016 45th Benthic Ecology Meeting (Portland, ME, USA)  
2014 95th Western Society of Naturalists Meeting (Tacoma, WA, USA)  
2012 12th International Coral Reef Symposium (Cairns, QLD, Australia)  
2012 41st Benthic Ecology Meeting (Norfolk, VA, USA)  
2011 92nd Western Society of Naturalists Meeting (Vancouver, WA, USA)  
2010 95th Ecological Society of America Meeting (Pittsburgh, PA, USA)  
2010 39th Benthic Ecology Meeting (Wilmington, NC, USA)

### **Guest Lectures – University Courses**

- 2020 Marine Biology Graduate Seminar (SMS 500), University of Maine (Orono, ME, USA)  
2019 Invertebrate Zoology (BIO 351), University of Southern Maine (Portland, ME, USA)

- 2019 Marine Communities (ES 244), Colby College (Waterville, ME, USA)
- 2019 Water and Human Rights (GS 198), Colby College (Waterville, ME, USA)
- 2018 Coral Reef Methods (ES 371f), Colby College (Waterville, ME, USA)
- 2018 Marine Communities (ES 244), Colby College (Waterville, ME, USA)
- 2017 Chemical Ecology (CRN 23499), University of California (Davis, CA, USA)
- 2017 Marine Communities (ES 244), Colby College (Waterville, ME, USA)
- 2016 The Changing Arctic (INT 500), University of Maine (Orono, ME, USA)
- 2014 Introduction to Ocean Sciences (NFA 117), University of Maine (Walpole, ME, USA)
- 2013 Coral Reefs (SMS 531), University of Maine (Walpole, ME, USA)
- 2012 Chemical Ecology (BIOL 6620), Georgia Institute of Technology (Atlanta, GA, USA)
- 2011 The Pacific Program, Georgia Institute of Technology (Heron Island, QLD, Australia)
- 2009 Marine Ecology (BIOL 4417), Georgia Institute of Technology (Atlanta, GA, USA)

## **TEACHING EXPERIENCE**

### **Colby College**

- 2020 Instructor of Record, *Seafood Forensics: Uncovering Fraud in Ocean Food Systems* (ES 234, Fall)
- 2020 Instructor of Record, *Seafood Forensics: Uncovering Fraud in Ocean Food Systems* (ES 239, Spring)
- 2019 Instructor of Record, *Seafood Forensics: Uncovering Fraud in Ocean Food Systems* (ES 298, Spring)
- 2019 Co-Instructor of Record, *Coral Reef Ecosystems* (ES 297, January Term)

### **University of Maine**

- 2013 Teaching Assistant, *Introduction to Research Diving* (SMS 491)

### **Georgia Institute of Technology**

- 2011 Teaching Assistant, *Organismal Biology Laboratory* (BIOL 1520)
- 2011 Teaching Assistant, *Ecology and Evolution - An Australian Perspective* (BIOL 3100)

### **Michigan State University**

- 2005 Teaching Assistant, *Organismal Biology Laboratory* (LBS 144)
- 2004 Teaching Assistant, *Organismal Biology Laboratory* (LBS 144)

## **MENTORSHIP**

### **Undergraduate Students**

- 2020 Zaie Nurse, Undergraduate Independent Study (Colby College)
- 2020 Ajay Patel, NSF REU Fellowship (University of Florida)
- 2019 Carlin Schildge, NSF REU Fellowship (Colby College)
- 2019 Shane Farrell, Our World Underwater/AAUS Scholarship (Lawrence University)
- 2018 Colleen George, Undergraduate Independent Study (Colby College)
- 2018 Sydney Greenlee, Undergraduate Independent Study (Colby College)
- 2018 Courtney Stuart, NSF REU Fellowship (Stony Brook University)
- 2018 Shane Farrell, Our World Underwater/AAUS Scholarship (Lawrence University)
- 2017 Anne Innes-Gold, NSF REU Fellowship (Vassar College)
- 2017 Nicole Roberts, Senior Honors Thesis (Amherst College)
- 2016 Grant Dickey, Capstone Thesis (University of Maine)
- 2016 Eliza Lehner, Work Term Internship (Bennington College)

### **Graduate Students**

- 2020-2024 Rene Francolini, PhD Mentee (University of Maine, Orono, ME, USA)
- 2020-2024 Dara Yiu, PhD Mentee (University of Maine, Orono, ME, USA)
- 2020-2024 Shane Farrell, PhD Mentee (University of Maine, Orono, ME, USA)
- 2020-2024 Emily Pierce, PhD Mentee (University of Maine, Orono, ME, USA)
- 2019-2021 Ariella Danziger, MSc Thesis Committee (University of New England, Biddeford, ME, USA)
- 2018-2022 Lauren Bell, PhD Thesis Committee (University of California, Santa Cruz, CA, USA)
- 2017-2020 Bryce Risley, MSc Thesis Committee (University of Maine, Orono, ME, USA)
- 2014-2016 Ruleo Camacho, MSc Thesis Committee (University of Maine, Orono, ME, USA)
- 2015 Chico Birrell, External PhD Examiner (University of Queensland, Brisbane, QLD, Australia)

## **EXTERNAL SERVICE**

### **Peer Review**

- 2010-present     **Reviewer:** *Biological Conservation, Biology Letters, Bioscience, Coral Reefs, Current Biology, Ecology, Ecological Applications, Ecosphere, Ecology Letters, Ecology and Evolution, Frontiers in Ecology and the Environment, Frontiers in Ecology and Evolution, Functional Ecology, Global Change Biology, Journal of Animal Ecology, Journal of Ecology, Journal of Experimental Marine Biology and Ecology, Journal of Fish Biology, Journal of Phycology, Limnology and Oceanography, Marine Biology, Marine Ecology Progress Series, Marine Environmental Research, Methods in Ecology and Evolution, Nature, Nature Climate Change, Nature Ecology and Evolution, Oecologia, Oikos, PLoS One, Proceedings of the National Academy of Sciences, Proceedings of the Royal Society B: Biological Sciences, Restoration Ecology, Science Advances, Scientific Reports, Trends in Ecology and Evolution*
- 2014-present     **Reviewer (Grant Proposals):** Australian Museum, National Geographic Society, NOAA Coral Reef Conservation Program, US National Science Foundation (Biological Oceanography), North Pacific Research Board, Schmidt Ocean Institute
- 2019                Participant, Technical Review Panel, Alaska Sea Grant (NOAA)
- 2017-2020        Editorial Board Member, *Journal of Experimental Marine Biology and Ecology*

### **Disciplinary Societal Service**

- 2016     Session Co-organizer, 13th International Coral Reef Symposium
- *Functional management of multispecies reef fisheries*
- 2012     Session Co-organizer, 12th International Coral Reef Symposium
- *Ecological dynamics, resilience & phase shifts*

## **INSTITUTIONAL SERVICE**

### **Bigelow Laboratory for Ocean Sciences**

- 2019-     Chair, Education Committee
- 2018-     Member, IACUC Committee
- 2016-     Member, Dive Control Board
- Past     Representative to the Board, Alternate (2019-2020)
- Past     Coordinator, Postdoctoral Training Program (2017-2019)
- Past     Member, Education Committee (2016-2019)
- Past     Member, Safety Committee (2016-2018)

### **Georgia Institute of Technology**

- 2010     Treasurer, Biology Graduate Student Association
- 2009     Treasurer, Biology Graduate Student Association
- 2008     President, Biology Graduate Student Association
- 2007     President, Biology Graduate Student Association
- 2007     Seminar Series Chair, NSF IGERT Program