

KRISTINA MARSTRAND CAMMEN

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cammenlab.org

marine mammal science	❖	ecological and evolutionary genomics	❖	ocean health
Duke University , Durham, NC Nicholas School of the Environment Ph.D., Ecology, 2014		University of Cambridge , United Kingdom M.Phil, Zoology, 2008		University of Maryland , College Park, MD B.S., Biology & Psychology, 2007

I. PROFESSIONAL APPOINTMENTS

University of Maine, Orono, ME

Assistant Professor of Marine Mammal Science, School of Marine Sciences – 2017-present

NSF Postdoctoral Research Fellow, School of Biology & Ecology – 2015-2017

Postdoctoral Teaching and Research Associate, School of Marine Sciences – 2014-2015

Faculty affiliations

Ecology and Environmental Sciences Program; Maine Center for Genetics in the Environment;
Mitchell Center for Sustainability Solutions; One Health & the Environment Initiative

II. RESEARCH EXPERIENCE

Active research program that utilizes molecular and analytical approaches to better understand aspects of ecology, evolution, and conservation biology in marine and coastal systems. In collaboration with local, national, and international collaborators, the lab studies how marine species adapt to both natural and anthropogenic stressors, how genetic diversity partitions over time and space in dynamic populations, and how genomics can advance the study of non-model organisms in their natural environment. Contributing to a “one health” framework, the lab focuses primarily on species that are sentinels of ocean health and species of conservation concern.

University of Maine, Orono, ME, 2017-present

Ongoing research projects include:

- Investigating pinniped immunogenomics and the evolution of disease resistance.
- Using eDNA to study impacts of aquatic ecological restoration and non-invasively assess genetic diversity of marine mammals.
- Conducting long-term analyses of marine mammal strandings in the Gulf of Maine.
- Investigating genome to phenome associations in tidal marsh sparrows.

Postdoctoral research associate, 2014-2017

Utilized contemporary genomic and ancient DNA techniques to study the evolutionary ecology and disease ecology of gray and harbor seals in the Northwest Atlantic.

Duke University Marine Lab, Beaufort, NC – PhD student, 2008-2014

Utilized candidate gene and genome-wide approaches to study resistance to harmful algal blooms in populations of bottlenose dolphins in the Gulf of Mexico.

University of Cambridge, Cambridge, United Kingdom – Masters student, 2007-2008

Studied the immunogenetics of gray seals and described differences in selective pressure among colonies that vary in habitat and pathogen presence.

III. TEACHING EXPERIENCE

University of Maine, Orono, ME

Ecology and Conservation of Marine Mammals (INT308), *Instructor*, 2014-2020, 2022

Population Genomics (SMS598), *Co-Instructor*, 2020
Introduction to Integrative Marine Science (SMS2013), *Instructor*, 2020; *Co-Instructor*, 2018
Marine Ecology and Conservation in the Genomics Era (SMS598), *Instructor*, 2019
Ocean Health Issues for Humans, Wildlife & Marine Ecosystems (SMS491), *Co-Instructor*, 2015

Research Supervision - University of Maine, Orono, ME

Co-lead of NSF-funded Research Experience for Undergraduate (REU) program: *Accelerating New Environmental Workskills*, 2019-2022

Center for Undergraduate Research Faculty Fellow, 2018-2019

Advised or Co-advised: 4 PhD students; 3 MS students; 6 undergraduate Honors theses; 12 undergraduate marine sciences Capstone projects; 2 Research Experience for Undergraduate (REU) interns

IV. PEER-REVIEWED PUBLICATIONS

^aundergraduate co-author; ^bgraduate student co-author

21. Haverkamp H^b, Chang HY^b, Newcomb E^a, Doughty L, Walk D, Todd S, Seton R, Jones L, **Cammen KM** (2022) A retrospective socio-ecological analysis of harp, harbor and gray seal strandings in the Gulf of Maine. *Marine Mammal Science*.
20. Gigliotti AK^b, Bowen WD, Hammill MO, Puryear WB, Runstadler J, Wenzel FW, **Cammen KM**. (2022) Sequence diversity and differences at the highly duplicated MHC-I gene reflect viral susceptibility in sympatric pinniped species. *Journal of Heredity*.
19. Liu X, Schjøtt SR, Granquist SM, Rosing-Asvid A, Dietz R, Teilmann J, Galatius A, **Cammen KM**, O’Corry-Crowe G, Harding K, Härkönen T, Hall A, Carroll E, Kobayashi Y, Hammill M, Stenson G, Frie AK, Lydersen C, Kovacs KM, Andersen LW, Vieira FG, Heller R, Moltke I, Olsen MT (2022) Origin and expansion of the world’s most widespread pinniped: range-wide population genomics of the harbour seal (*Phoca vitulina*). *Molecular Ecology*. **31**: 1682-1699.
18. Leach L^b, Simpson M, Stevens JR, **Cammen KM** (2022) Examining the impacts of pinnipeds on Atlantic salmon: The effects of river restoration on predator-prey interactions. *Aquatic Conservation*. **32**: 645-657.
17. Newcomb E^a, Walk D, Haverkamp H^b, Doughty L, Todd S, Seton R, Jones L, Cammen KM (2021) Breaking down “harassment” to characterize trends in human interaction cases in Maine’s pinnipeds. *Conservation Science and Practice*. **3**: e518.
16. **Cammen KM**, Marafino G^b, Burton S^a, Dow J^a, Dullaert E^a, Jorge M^a, Macolini K^a, McGarry L, Tremblay C, Jansujwicz J, Johnson T, Ross L, Zydlewski G (2021) Integrating disciplinary approaches to see through turbulent systems. *Oceanography*. **34**: 254-265.
15. Pugliares-Bonner K, LaSpina K^a, Rose K, Travis S, Cammen KM (2021) Strandings provide insight into variable social group structure of Atlantic white-sided dolphins. *Marine Mammal Science*. **37**: 901-918.
14. Homola JJ^b, Loftin CS, **Cammen KM**, Helbing CC, Birol I, Schultz TF, Kinnison MT (2019) Replicated landscape genomics identifies evidence of local adaptation to urbanization in a pool-breeding amphibian. *Journal of Heredity*. **110**: 707-719.
13. **Cammen KM**, Rasher DB, Steneck RS (2019) Predator recovery, shifting baselines, and the adaptive management challenges they create. *Ecosphere*. **10**: e02579.
12. **Cammen KM**, Bowen WD, Hammill MO, Puryear WB, Runstadler J, Wenzel FW, Wood SA, Frasier TR, Kinnison M (2018) Genomic signatures of population bottleneck, recovery, and expansion in Northwest Atlantic pinnipeds. *Ecology and Evolution*. **8**: 6599-6614.
11. Osterberg J, **Cammen KM**, Schultz T, Clark B, Di Giulio R (2018) Genome-wide scan reveals signatures of selection related to pollution adaptation in non-model estuarine Atlantic killifish (*Fundulus heteroclitus*). *Aquatic Toxicology*. **200**:73-82.
10. **Cammen KM**, Vincze S^a, Heller S^b, McLeod BA, Wood SA, Bowen WD, Hammill MO, Puryear WB, Runstadler J, Wenzel FW, Kinnison M, Frasier TR (2018) Genetic diversity from bottleneck to

recovery in two sympatric pinniped species in the Northwest Atlantic. *Conservation Genetics*. **19**: 555-569.

9. Jayasundara N, Fernando PW, Osterberg JS, **Cammen KM**, Schultz TF, Di Giulio RT (2017) Cost of tolerance: fitness consequences of contemporary evolution to an anthropogenic stressor in teleost fish. *Environmental Science & Technology*. **51**:8763–8772.
8. **Cammen KM**, Andrews KR, Carroll EL, Foote AD, Humble E, Khudyakov JI, Louis M, McGowen MR, Olsen MT, Van Cise AM (2016) Genomic methods take the plunge: recent advances in high-throughput sequencing of marine mammals. *Journal of Heredity*. **107**:481-495.
7. Greenberg R, **Cammen KM**, Wilson AG, Olsen BJ, Ballentine B, Rotzel N, Fleischer R (2016) Geographic population structure and subspecific boundaries in a tidal marsh sparrow. *Conservation Genetics* **7**: 603-613
6. **Cammen KM**, Schultz TS, Rosel PE, Wells RS, Read AJ (2015) Genome-wide investigation of adaptation to harmful algal blooms in bottlenose dolphins. *Molecular Ecology* **24**: 4697-4710.
5. **Cammen KM**, Wilcox LA, Rosel PE, Wells RS, Read AJ (2015) From genome-wide to candidate gene: An investigation of variation at the major histocompatibility complex in bottlenose dolphins exposed to red tides. *Immunogenetics* **67**:125-133.
4. **Cammen KM**, Rosel PE, Wells RS, Read AJ (2014) Lack of variation in voltage-gated sodium channels of common bottlenose dolphins exposed to neurotoxic algal blooms. *Aquatic Toxicology* **157**:150-158.
3. Soulen BK*, **Cammen KM***, Schultz TF, Johnston DW (2013) Factors affecting harp seal (*Pagophilus groenlandicus*) strandings in the Northwest Atlantic. *PLoS ONE* **8**:e68779.
*authors contributed equally to this manuscript
2. **Cammen KM**, Hoffman JI, Knapp LA, Harwood J, Amos W (2011) Geographic variation of the major histocompatibility complex in Eastern Atlantic grey seals. *Molecular Ecology* **20**:740-752.
1. Bossart G, Peden-Adams M, Romano T, Rice C, Fair P, Goldstein J, **Cammen K**, Reif J (2008) Hematological, biochemical and immunological findings in Atlantic bottlenose dolphins (*Tursiops truncatus*) with orogenital papillomas. *Aquatic Mammals* **34**:166-177.

Manuscripts in Progress

Szekely D^b, Cammen KM, Olsen MT (in review) Needles in an ocean haystack: Using environmental DNA to study marine mammals in the North Atlantic. Invited submission to special issue in *NAMMCO Scientific Publications*.

V. SELECT FUNDING

NOAA John H. Prescott Marine Mammal Rescue Assistance Grant Program - Investigating pinniped susceptibility to viral disease outbreaks through diagnostic analysis and post-unusual mortality event monitoring; PI (\$99,988)

US Department of the Interior Geological Survey - Beyond Recovery: Enhancing Agency Preparedness for Ecological and Societal Challenges with Increasing Protected Species Populations; Senior Personnel (\$707,099)

American Association of Zoo Veterinarians (AAZV) Zoological Medicine and Wildlife Health Research Grant - Impacts of environmental contaminants on Northwest Atlantic gray seal disease susceptibility; PI (\$7,450)

Maine Outdoor Heritage Fund (MOHF) – Applying environmental DNA to the monitoring and management of anadromous fish; PI (\$19,847)

NSF Research Traineeship - NSF NRT: One Health and the Environment; Senior Personnel (\$2,999,054)

NSF EPSCoR Research Infrastructure Improvement Program: Track-1 - Molecule to Ecosystem: Environmental DNA as a Nexus of Coastal Ecosystem Sustainability for Maine (Maine-eDNA); Senior Personnel (\$20,000,000)

NSF Research Experiences for Undergraduates Site - REU Site: Accelerating New Environmental Workskills; Co-PI (\$371,786)

UMS Research Reinvestment Fund (RRF) Interdisciplinary Undergraduate Research Collaborative Award, 2018 – Western Passage Student Research Collaborative; PI (\$30,000)

NSF EPSCoR Research Infrastructure Improvement Program: Track-2 - Genome-Phenome Relationships in Dynamic Environments: A Systems-based Research and Training Program; Co-PI (\$3,998,680)

NOAA John H. Prescott Marine Mammal Rescue Assistance Grant Program - Retrospective analysis of marine mammal strandings in a region of socio-ecological and environmental change; PI (\$64,396)

UMaine Research in STEM Education (RiSE) Center Faculty Course Modification Incentive Grant-Maine Learning Assistant Program (FIG-MLA); PI (\$5,000)

Maine Outdoor Heritage Fund (MOHF) - Assessing predator risk to diadromous fish conservation in the Penobscot River Estuary; PI (\$17,834)

Senator George J. Mitchell Center for Sustainability Solutions - Integrating community and expert-driven environmental assessment to support social and ecological resilience in the context of marine renewable energy; Co-PI (\$24,958)

UMS Research Reinvestment Fund (RRF) Interdisciplinary Undergraduate Research Collaborative Award, 2018 – Coastal Ecosystem Science for Maine’s Marine Economy & Coastal Communities; Co-PI (\$30,000)

UMS RRF Planning Grant Program, 2017 – Advancing the Emerging Research Program in One Health to Support Maine’s Economy; Co-PI (\$5,000)

UMS Collaborative Program Support: Program Innovation Fund, 2017 – Developing Online Undergrad and Grad Health Programs (DOUGH); Co-PI (\$65,000)

NSF Postdoctoral Fellowship in Biology, 2015 – Evolutionary ecology of population decline and rebound in sympatric pinniped species in the northwest Atlantic; PI (\$138,000)

PADI Foundation, 2015 – Conservation genomics of protected species recovery: A case study of gray seal population growth in the Northwest Atlantic; PI (\$5,000)

American Genetic Association, 2013 – Special Event Award to host workshop entitled, Marine mammal genomics: Applications to ecology, evolution, and conservation; PI (\$11,000)

VI. SELECT AWARDS & HONORS

University of Maine Faculty Mentor Impact Award, 2021

VII. SELECT PRESENTATIONS (*Invited)

- *Cammen KM (2022) Out of our depth: Interdisciplinary science for marine mammal conservation. Senator George J. Mitchell Center for Sustainability Solutions Seminar Series, Orono, ME.
- *Cammen KM, Newcomb E (2022) Breaking down “harassment” to characterize trends in human interaction cases in Maine’s pinnipeds. Society for Conservation Biology Emerging Issues in Conservation Seminar Series. Virtual webinar.
- Cammen KM (2021) Flipping flipper: Combining synchronous and asynchronous teaching styles in a marine mammal science course. Lessons Learned During the Pandemic: A Faculty Teaching Showcase. University of Maine. Virtual conference.
- Cammen KM, Stoll J, Leslie H (2020) Exploring multidimensional approaches to understanding historical ecology and contemporary recovery of pinnipeds in the Gulf of Maine. RARGOM (Regional Association for Research on the Gulf of Maine) Annual Science Meeting. Virtual Conference.
- *Cammen KM (2019) Molecular perspectives on marine mammal health: Investigating adaptation to coastal ocean stressors. Greater Atlantic Regional Stranding Conference, Freeport, ME. Invited keynote.
- *Cammen KM (2019) From marine mammals to molecules: Genomic perspectives on pinniped recovery in the Gulf of Maine. Bigelow Laboratory Research Seminar Series, Boothbay Harbor, ME.
- Cammen KM, Vincze S, Heller AS, McLeod BA, Schultz TF, Wood SA, Bowen WD, Hammill MO, Puryear WB, Runstadler J, Wenzel FW, Kinnison M, Frasier TR (2018) Genomic approaches to historical ecology and shifting baselines for pinniped populations in the Gulf of Maine. RARGOM (Regional Association for Research on the Gulf of Maine) Annual Science Meeting. Portland, ME

- Cammen KM, Vincze S^a, Heller S, McLeod B, Wood S, Bowen WD, Hammill MO, Puryear WB, Runstadler JR, Wenzel F, Kinnison M, Frasier TF (2018) Genetic diversity from pre-bottleneck to recovery in sympatric pinnipeds in the Northwest Atlantic. Northwest Atlantic Seal Research Consortium Meeting, New Bedford, MA. ^aUndergraduate student presenter
- *Cammen KM (2018) Genomic perspectives on protected species recovery: a case of two pinnipeds in the Northwest Atlantic. University of New Hampshire Biological Sciences Seminar Series, Durham, NH.
- *Cammen KM (2018) Molecular perspectives on conservation success: a tale of two seals in the Northwest Atlantic. Mystic Aquarium Ridgway Seminar Series, Mystic CT.
- *Cammen KM (2017) Molecular perspectives on conservation success: a tale of two seals in the Northwest Atlantic. Maine Maritime Academy Marine Sciences Seminar Series, Castine, ME.
- *Cammen K (2017) Genomic perspectives on protected species recovery: a case of two pinnipeds in the Northwest Atlantic. University of New Brunswick, Biological Sciences Seminar Series, St. John, NS, Canada.
- Cammen KM, Vincze S, Heller S, McLeod BA, Wood SA, Bowen WD, Hammill MO, Puryear WB, Runstadler J, Wenzel FW, Kinnison M, Frasier TR (2017) Genetic diversity from pre-bottleneck to recovery in sympatric pinnipeds in the Northwest Atlantic. 22nd Biennial Conference on the Biology of Marine Mammals. Halifax, NS, Canada.
- *Cammen K (2017) Molecular perspectives on conservation success: a tale of two seals in the Northwest Atlantic. Maine Maritime Academy, Ocean Studies Seminar Series, Castine, ME.
- Cammen K, Bowen W, Hammill M, Puryear W, Runstadler J, Wenzel F, Wood S, Frasier T, Kinnison M (2017) Genomic signature of population expansion and species recovery in Northwest Atlantic pinnipeds. Gordon Research Conference on Ecological and Evolutionary Genomics. Biddeford, ME.
- *Cammen K (2017) Seal populations on Maine's coasts. Downeast Audubon, Ellsworth, ME.
- *Cammen K (2016) Insights from genome-enabled marine mammal science. Dalhousie University, Biology Seminar Series, Halifax, Nova Scotia, Canada.
- *Cammen K (2016) From genome-wide to candidate gene: investigating marine mammal adaptation to coastal ocean stressors. University of New England, Marine Science Seminar Series, Biddeford, ME.
- *Cammen K (2016) Molecular perspectives on marine mammal health: understanding evolutionary adaptation to coastal ocean stressors. University of Maine, School of Marine Sciences Seminar Series, Orono, ME.
- Cammen K (2015) From genome-wide to candidate gene: Investigating adaptation in bottlenose dolphins. Workshop on Marine Mammal Genomics II. 21st Biennial Conference on the Biology of Marine Mammals. San Francisco, CA.
- *Cammen K (2015) From genome-wide to candidate gene: evolutionary adaptation in marine mammals. Bates College Department of Biology, Lewiston, ME.
- *Cammen K (2015) Dolphins (and seals), DNA, and disease. Coastal Studies for Girls, Freeport, ME.
- *Cammen K (2014) Genome-wide investigation of adaptation to harmful algal blooms in bottlenose dolphins. University of Maine, School of Marine Sciences Seminar Series, Orono, ME.
- Cammen K (2014) Genome-wide investigation of adaptation to harmful algal blooms in bottlenose dolphins. Duke University Marine Lab Seminar Series, thesis presentation, Beaufort, NC.
- Cammen K, Rosel P, Schultz T, Wells R, Read A (2013) Genome-wide investigation of adaptation to harmful algal blooms in bottlenose dolphins. 20th Biennial Conference on the Biology of Marine Mammals, Dunedin, New Zealand.
- *Cammen K (2013) DNA, dolphins, and disease. Duke University Alumni Association, Beaufort, NC.
- *Cammen K (2011) Evolution of solutions to natural problems facing marine mammals. Elizabeth City State University, Environmental Studies Guest Lecture, Elizabeth City, NC; Hampton University, Marine Biology Guest Lecture, Hampton, VA.
- *Cammen K (2011) Threats to Marine Mammals: A case study of red tides & dolphins. Meredith College, Environmental Studies Guest Lecture, Raleigh, NC.

- Cammen K, Rosel P, Wells R, Read A (2011) The influence of variation in voltage-gated sodium channel genes on susceptibility of bottlenose dolphins to harmful algal blooms. 19th Biennial Conference on the Biology of Marine Mammals, Tampa, FL.
- Cammen K (2009) Genetic variation at the MHC in grey seals. 18th Biennial Conference on the Biology of Marine Mammals, Quebec City, Canada; Southeast and Mid-Atlantic Marine Mammal Symposium, Wilmington, NC.

VIII. SERVICE TO ACADEMIC, RESEARCH, AND PUBLIC COMMUNITIES

University of Maine

Faculty Senator (2019-2022)

Member of Faculty Senate Committee of Diversity, Equity, and Inclusion (2020-2022)

Member of Faculty Senate Committee of University Environment (2019-2022)

Member of School of Marine Sciences Undergraduate Curriculum Committee (2017-present)

Co-organizer of School of Marine Sciences Seminar Series (2021)

Board member of Marine Mammals of Maine, a local non-profit organization that is authorized to respond to sick and stranded marine mammals. As a board member, duties include providing grant writing assistance, advising research program, and helping with data management.

Co-chair of the Northwest Atlantic Seal Research Consortium (NASRC) working group on pinniped health (co-chair: since 2017, member: since 2015). NASRC is a multi-stakeholder consortium of academic and government scientists, managers and policymakers, and industry stakeholders dedicated to studying seals as sentinels of ecosystem health.

Lead organizer of international workshops entitled, “2nd Workshop on Marine Mammal eDNA” (2022), “Marine Mammal eDNA” (2019), “Marine Mammal Genomics: Applications to ecology, evolution, and conservation” (2013) and “Marine Mammal Genomics II” (2015); facilitated competition for associated student travel grants supported by competitively acquired American Genetic Association Special Event Award.

Reviewer for Marine Mammal Science, Marine Biology, Evolutionary Applications, Aquatic Conservation, Journal of Heredity, Nature Scientific Reports, Science Advances, Environmental DNA, Marine Ecology Progress Series, Molecular Biology & Evolution, Molecular Ecology, Molecular Ecology Resources, Oceanography