

Michelle R Shero, PhD

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Education & Training

St. Mary's College of Maryland, B.A. Biology with minor in Environmental Studies

2007–2010. Overall GPA: 3.95, *summa cum laude*, Phi Beta Kappa

Ph.D., Univ. of Alaska Fairbanks (joint with Anchorage campus), Marine Biology

2011–2015. GPA: 4.0, NSF Graduate Research Fellow

Post-Doctoral Researcher, Univ. of Alaska Anchorage, Biological Sciences

2015–2018. Research area: Reproductive Physiology

Post-Doctoral Researcher, Duke University, Nicholas School of the Environment

2018. Research area: Remote Sensing

Professional Appointments

2022–present Associate Scientist, *tenure-track*: Woods Hole Oceanographic Institution, Dept. Biology
2018–2022 Assistant Scientist, *tenure-track*: Woods Hole Oceanographic Institution, Dept. Biology
2018–2023 Affiliate Associate Professor: Univ. of Alaska Anchorage, Dept. of Biological Sciences
2018 Post-Doctoral Researcher: Duke University, Marine Laboratory
2015–2018 Post-Doctoral Researcher: University of Alaska Anchorage, Dept. Biological Sciences
2015–2016 Visiting Researcher: Univ. of Saskatchewan, Western College of Veterinary Medicine
2012–2015 National Science Foundation Graduate Research Fellow
2011–2015 Graduate Research Assistant: University of Alaska Fairbanks, SFOS Marine Biology
2011 Phi Beta Kappa National Honor Society
2009–2010 NSF Research Experience for Undergraduates Intern: Univ. of Alaska Anchorage
2008 Research Assistant: Johns Hopkins School of Medicine

Research Interests

I am a tenure-track Associate Scientist at Woods Hole Oceanographic Institution's Biology Department, with expertise in **physiological ecology of marine mammals**. I study how animals are able to "make a living" at the ends of the earth, and why some animals are more robust than others – i.e., stay in better condition and attain higher reproductive rates. I take an **integrative approach**, using a diverse toolset to assess the processes driving intra- and inter-specific variation in animal life history cycles. I have acquired skills in isotopic dilution and enrichment, endocrinology, ultrasonography, diving and exercise physiology, piloting unoccupied aerial systems, and utilizing biotelemetry tools to track animal behavior. My goals are to elucidate the physiologic and behavioral plasticity that marine mammals have to cope with climate and anthropogenic perturbations and to further understand how these mechanisms translate to the population-level.

I aim to foster the next generation of biologists, and have taught courses in undergraduate/graduate Comparative Physiology, Marine Biology, Polar Biology, and Biotelemetry of Marine Animals. I work to **relay my research** to the scientific community (>50 national/international meeting abstracts and symposia), and to the public (outreach as *TEDx* speaker, through *PolarTREC*, and '*She Maps*' using drones to address gender equality in STEM, and local events).

Academic & Funding - Awards, Honors, and Associations

Fellowships

- 2023 Kaleta A. Doolin Foundation Fellowship, for early career advancement towards gender equality **\$80,000**
- 2012–2015 NSF Graduate Research Fellowship **\$127,500**
- 2009–2010 NSF Research Experience for Undergraduates Internships

Funding

- 2023-2024 ONR. ‘Unmanned Aerial Systems for Research and Education on Marine Mammal Multiple Stressors, Comparative Microbiomes, Body Condition, Energetics and Thermal Detection. N00014-23-1-2502. **Co-PI. \$71,706**
- 2022-2026 NSF. ‘Collaborative Research: The role of maternal iron transfer in the development of heme stores and aerobic diving capacity in grey seal pups’. IOS-2133826. **Co-PI. \$1,291,665.**
- 2020 National Geographic. A Case Study in ‘Weighing a Population’: UAS Imagery as a Tool to Assess Energy Dynamics Across Lactation in Grey Seals. NGS-64226R-19. **Lead PI. \$29,664.**
- 2019-2024 NSF. ‘Collaborative Research: Physiological and Genetic Correlates of Reproductive Success in High- versus Low-Quality Weddell seals.’ ANT-1853377. **Lead PI. \$2,005,681**
- Includes Supplement projects under NSF parent award: ‘Are energetic carryover effects of offspring-rearing realized through tissue-specific insulin sensitivity in Weddell seals?’ awarded in 2020
 - ‘Validating infrared thermography for non-invasive measurements of animal vital rates across a range of exotic wildlife species at the Cincinnati Zoo’ awarded in 2021.
- 2018-2022 WHOI Independent Research & Development. Three different projects as **Lead PI, totaling \$215,359**
- 2018-2022 WHOI Independent Study. Two different projects as **Lead PI, totaling \$144,590**
- 2017 Alaska INBRE Bioinformatics Award. Metabolomics, **Lead PI. \$15,120**
- 2016-2017 Alaska INBRE Bioinformatics Award. Next-Generation Sequencing. **Co-PI \$24,411**
- 2013-2014 LGL Alaska Graduate Ecology Research Award **\$2,800**
- 2014 University of Alaska Fairbanks, Robert and Kathleen Byrd Competition **\$800**
- 2013 University Center in Svalbard Scholarship and Travel Award **\$3,000**
- 2013 ENRI Graduate Student Research Award **\$5,000**
- 2012 Center of Global Change Student Research Grant Competition. **\$9,910**
- 2012-2017 Alaska INBRE travel funding. **\$12,000**
- 2011 Alaska INBRE Graduate Student Funding **\$2,998**

Honors

- 2019 National Geographic Explorer
- 2019 Best contribution (oral presentation), *The 3rd International Symposia on Embryonic Diapause* meeting held in Ascona, Switzerland
- 2017 TEDx Fairbanks Speaker
- 2016 Early career oral presentation award, *Scientific Committee on Antarctic Research* international meeting held in Kuala Lumpur, Malaysia
- 2015 New Phytologist Award, best student poster at *Ecological Society of America* national meeting held in Baltimore, MD

2011	Antarctic Service Medal
2011	<i>Phi Beta Kappa</i> National Honor Society
2008-2011	<i>Beta Beta Beta</i> National Biological Honor Society (<i>President in 2010</i>)
2007-2011	St. Mary's College Academic Achievement Award Scholarship

Associations

American Physiological Society (APS)
 Animal Behavior Society (ABS)
 Ecological Society of America (ESA)
 Society for Experimental Biology (SEB)
 Scientific Committee on Antarctic Research (SCAR)
 Society of Marine Mammalogy (SMM)
 Society of Integrative & Comparative Biology (SICB)

Publications in Refereed Journals and Books

In Preparation

- [3] **Shero, M.R.**, D.P. Costa, J.M. Burns, K.T. Goetz. Breath-hold capacities limit circadian dive rhythmicity in a polar marine mammal: a 'natural experiment' across the year's changing light regimes.
- [2] **Shero, M.R.**, J.M. Burns, G.A. Breed, M. Rivard, D. Lidgard, C. den Heyer, A. Heard. Enhanced iron absorption and incorporation during lactation in grey seal pups determined with dual isotope enrichment.
- [1] McHuron, E., **M.R. Shero**, D. Cade. Approaches to investigating marine mammal bioenergetics. *In Marine Mammal Research in the 21st Century: Emerging Technologies and Applications for the Field and Laboratory*, Eds: J. Kiszka, S. Caballero, M. Srinivasan, M. Heithaus.

In Print

- [24] Smith, A.B., M. Kissling, M. Rasmussen, Y. Kolbeinsson, A. Capuano, I. Fischer McMorrow, S. Lewis, **M.R. Shero**, T.A. Mooney. 2023. Acoustic Sensory Ecology of Diving Alcid Seabirds and Potential Noise Impacts. *In The Effects of Noise on Aquatic Life*, Springer Nature. DOI: 10.1007/978-3-031-10417-6_153-1
- [23] Smith, A.B., I. Fischer-McMorrow, Y. Kolbeinsson, M.H. Rasmussen, **M.R. Shero**, J.N. McElwaine, T.A. Mooney. *In Revision*. Acoustic ecology of a deep-diving seabird: Sensitive aerial hearing and noisy nesting soundscapes in the common murre (*Uria aalge*). *Marine Ecology Progress Series*.
- [22] Butkovic, A., S. Kraberger, Z. Smeele, D. Martin, K. Schmidlin, R.S. Fontenele, **M.R. Shero**, R.S. Beltran, A.L. Kirkham, M. Aleamotu'a, J.M. Burns, E.V. Koonin, A. Varsani, M. Krupovic. *Accepted*. Evolution of anelloviruses from a circovirus-like ancestor through gradual augmentation of the jelly-roll capsid protein. *Virus Evolution*.
- [21] Rzczudlo, C.L.*, E. Curry, **M.R. Shero**. 2023. Non-invasive measurements of respiration and heart rate across wildlife species using Eulerian Video Magnification of infrared thermal imagery. *BMC Biology*. 21:61, Doi: 10.1186/s12915-023-01555-9. * = *PhD student in my lab*
- [20] Arostegui, M.C., **M.R. Shero**, L.R. Frank, R. Berquist, C.D. Braun. 2023. An enigmatic pelagic fish with internalized red muscle: A future regional endotherm or forever an ectotherm?. *Journal of Fish Biology*. 1-16. Doi: 10.1111/jfb.15375
- [19] Bierlich, K.C., J. Hewitt, R.S. Schick, L. Pallin, J. Dale, A.S. Friedlaender, F. Christiansen, K.R. Sprogis, A.H. Dawn, C.N. Bird, G.D. Larsen, R. Nichols, **M.R. Shero**, J. Goldbogen, A.J. Read,

- D.W. Johnston. 2023. Seasonal gain in body condition of foraging humpback whales along the Western Antarctic Peninsula. Frontiers in Marine Science. 9:1036860. Doi: 10.3389/fmars.2022.1036860.
- [18] Goetz, K.T., M.S. Dinniman, L.A. Hückstädt, P.W. Robinson, **M.R. Shero**, J.M. Burns, E.E. Hofmann, S.E. Stammerjohn, E.L. Hazen, D.G. Ainley, D.P. Costa. 2023. Seasonal habitat preference and foraging behaviour of post-moult Weddell seals in the western Ross Sea. Royal Society Open Science. 10(1). Doi: 10.1098/rsos.220500.
- [17] **Shero, M.R.**, A.L. Kirkham, D.P. Costa, and J.M. Burns. 2022. Iron mobilization during lactation reduces oxygen stores in a diving mammal. Nature Communications. DOI: 10.1038/s41467-022-31863-7.
- [16] **Shero, M.R.** and J.M. Burns. 2022. The Weddell seal: Eco-physiological adaptations to a high-latitude, seasonal environment. In D.P. Costa and E. McHuron, editors. Ethology and Behavioral Ecology of Phocids. Springer-Verlag, Heidelberg, Germany.
- [15] **Shero, M.R.**, J. Dale, A.C. Seymour, M.O. Hammill, A. Mosnier, S. Mongrain, D.W. Johnston. 2021. Tracking wildlife energy dynamics with unoccupied aircraft systems and 3-dimensional photogrammetry. Methods in Ecology and Evolution. Doi: 10.1111/2014-210X.13719.
- [14] Harcourt, R., M.A. Hindell, C.R. McMahon, K.T. Goetz, K. Heerah, R.R. Holser, J-B. Charrassin, I.D. Jonsen, X. Hoenner, **M.R. Shero**, R. Foster, B. Lenting, E. Tarszisz, M.H. Pinkerton. 2021. Regional variation in winter foraging strategies by Weddell seals in Eastern Antarctica and the Ross Sea. Frontiers in Marine Science. Doi: 10.3389/fmars.2021.720335.
- [13] Patterson, Q., S. Kraberger, D.P. Marin, **M.R. Shero**, R.S. Beltran, A.L. Kirkham, M. Aleamotu'a, D.G. Ainley, S. Kim, J.M. Burns, A. Varsani. 2021. Circoviruses and cycloviruses identified in Weddell seal fecal samples from McMurdo Sound, Antarctica. Infection, Genetics, and Evolution. (95) 105070.
- [12] **Shero, M.R.**, P.J. Reiser, L. Simonitis*, and J.M. Burns. 2019. Links between muscle phenotype and life history: differentiation of myosin heavy chain composition and muscle biochemistry in precocial and altricial pinniped pups. Journal of Comparative Physiology B. 189(6): 717-734.
*REU student mentored at previous institution
- [11] **Shero, M.R.**, K.T. Goetz, D.P. Costa, and J.M. Burns. 2018. Temporal changes in Weddell seal dive behavior over winter: Are females increasing foraging effort to support gestation? Ecology & Evolution. 8: 11857-11874. <https://doi.org/10.1002/ece3.4643>.
- [10] Smeele, Z.E., J.M. Burns, K. Van Doorsaler, R.S. Fontenele, K. Waits, D. Stainton, **M.R. Shero**, R.S. Beltran, A.L. Kirkham, R. Bergartt, S. Kraberger, A. Varsani. 2018. Diverse papillomaviruses identified in Weddell seals. Journal of General Virology. 99(4): 549-557.
- [9] **Shero, M.R.**, D. Bergfelt, J.W. Testa, and G.P. Adams. 2018. Pairing ultrasonography with endocrinology to elucidate underlying mechanisms of successful pregnancy in the northern fur seal (*Callorhinus ursinus*). General and Comparative Endocrinology. 255: 78-89. Doi: 10.1016/j.ygcen.2017.10.007.
- [8] Fahsbender, E., J.M. Burns, S. Kim, S. Kraberger, A. Eilers, **M. Shero**, R. Beltran, A. Kirkham, R. McCorkell, R. Bergartt, M.F. Male, K. Rosario, G. Ballard, D.G. Ainley, M. Breitbart, A. Varsani. 2017. Diverse and highly recombinant anelloviruses associated with Weddell seals in Antarctica. Virus Evolution 3(1): vex017. Doi: 10.1093/ve/vex017.
- [7] Goetz, K.T., J.M. Burns, L. Hückstädt, **M.R. Shero**, and D.P. Costa. 2016. Temporal variation in isotopic composition and diet of Weddell seals in the western Ross Sea. Deep Sea Research II, doi: 10.1016/j.dsr2.2016.05.017.
- [6] **Shero, M.R.**, G.P. Adams, and J.M. Burns. 2015. Field use of ultrasonography to characterize the reproductive tract and early pregnancy in a phocid, the Weddell seal (*Leptonychotes weddellii*). Anatomical Record 298(12): 1970-1977.

- [5] **Shero, M.R.**, D.P. Costa, and J.M. Burns. 2015. Scaling matters: Incorporating body composition into Weddell seal seasonal oxygen store comparisons reveals maintenance of aerobic capacities. Journal of Comparative Physiology B 185(7): 811-824.
- [4] **Shero, M.R.**, R.T. Krotz, D.P. Costa, J.P. Avery, and J.M. Burns. 2015. How do overwinter changes in body condition and hormone profiles influence Weddell seal reproductive success? Functional Ecology 29(10): 1278-1291.
- [3] **Shero, M.R.**, L.E. Pearson, D.P. Costa, and J.M. Burns. 2014. Improving the precision of our ecosystem calipers: A modified morphometric technique for estimating marine mammal mass and body composition. PLoS ONE 9(3): e91233.
- [2] **Shero, M.R.**, R.D. Andrews, K.C. Lestyk, and J.M. Burns. 2012. Development of the aerobic dive limit and muscular efficiency in northern fur seals (*Callorhinus ursinus*). Journal of Comparative Physiology B 182(3): 425-436.
- [1] Sun, H., A. Swaim, J.E. Herrera, D. Becker, L. Becker, K. Srivastava, L.E. Thompson, **M.R. Shero**, A. Perez-Tamayo, B. Suktitpat, R. Mathias, A. Contractor, N. Faraday and C.N. Morrell. 2009. Platelet kainate receptor signaling promotes thrombosis by stimulating cyclooxygenase activation. Circulation Research 105: 595-603.

Professional Activities

Woods Hole Oceanographic Institution

- 2023 **Committee member:** member of Academic Program's MIT-WHOI Joint Committee for Biological Oceanography
- 2020-2022 **Co-Organizer of Biology Department Seminar Series**
- 2020, 2023 **Committee member:** ad-hoc member of Biology Department Hiring Committee
- 2019-2022 **Committee member:** WHOI/MIT Joint Program Admissions Committee

Outside WHOI

- 2023-present **Committee Member**, Graduate student thesis committee for Caroline Branan at Texas Tech University
- 2023 **Member**, Pinnipeds Genomics Network international group, providing physiological context for functional significance of genes under selective pressure in pinnipeds
- 2021 **Abstract Reviews**, 7th International Biologging Science Symposium
- 2020 **Scientific Consultant** for producer at Wall to Wall Warner Brothers, Inc. working on a National Geographic video series on 'Growing Up Animal'. Provided ultrasound imagery and edited scientific material to inform their episode on the Steller sea lion.
- 2017 **Session Convener, Scientific Committee on Antarctic Research International Meeting**, Co-convener for session "Adaptation and processes in top predators" for biennial biology symposium for the Scientific Committee on Antarctic Research, held July 2017 in Leuven, Belgium. – Reviewed abstracts, organizing oral and poster sessions, chairing sessions.
- 2016 **Session Convener, Scientific Committee on Antarctic Research International Meeting**, Co-convener for session "Physiological adaptations, plasticity, and the stress response in Antarctic organisms" for biennial open science meeting for the Scientific Committee on Antarctic Research, in Kuala Lumpur, Malaysia. – Developed session goals, reviewed abstracts, organized oral and poster sessions, chaired sessions, and judged presentations.
- 2013 **Chair, Scientific Committee on Antarctic Research Biology Symposium, Barcelona, Spain.** Integrated perspectives on Antarctic Marine Ecosystems session.
- 2010 **President, Beta Beta Beta National Biological Honors Society**, St. Mary's College of Maryland chapter

Reviewer: National Science Foundation; North Pacific Research Board Core Program RFP; Italian Scientific Commission for the Antarctic; Ecology and Evolution; Canadian Journal of Zoology; PlosOne; Global Change Biology; Anatomical Record; Marine Ecology Progress Series; Australian Journal of Zoology; Environmental Research; Estuarine, Coastal and Shelf Science; CRC Press; Conservation Physiology, Bioscientifica Reports; American Journal of Physiology.

Participation in Education Programs & Pedagogy Training

Teaching & Mentoring Experience at WHOI

- 2022 **Co-Instructor, Graduate Level *Polar Ecology* course, WHOI/MIT Joint Program**, Designed syllabus and curriculum – incorporating primary literature and popular media, designed classroom discussions. With co-instructor Kirstin Meyer-Kaiser.
- 2021 **Co-Instructor, Graduate Level *Biotelemetry in Marine Animals* course, WHOI/MIT Joint Program**, Designed syllabus and curriculum – incorporating primary literature and popular media, designed classroom discussions and hands-on projects. With co-instructor Aran Mooney.
- 2019 **Guest Lecturer, Woods Hole Oceanographic Institution, Biology Department**, Graduate-level Physiology course, “Embryonic Diapause in Pinnipeds”

Teaching & Mentoring Experience Outside WHOI

- 2022-2023 **Mentorship in Field work.** Responsible for graduate students from multiple institutions: Caroline Rzucidlo (WHOI/MIT), Amy Klink (U. Nevada Las Vegas), Kaitlin Allen (U. California Berkeley), Greg Merrill (Duke U.), EmmaLi Tsai (Texas Tech U). Provided oversight and mentorship in Antarctic field work and marine mammal physiological sampling for 4-months at McMurdo Station, Antarctica.
- 2021 **External Examiner** for graduate student thesis at the University of Canterbury, New Zealand.
- 2017 **Lead Instructor, Undergraduate Upper-Level Marine Biology Lecture, University of Alaska Anchorage, Department of Biological Sciences**, lecture for the upper level semester course in Marine Biology for ~20 students. Designed syllabus and curriculum – incorporating primary literature and popular media, guiding students to evaluate literature and communicate marine science to the public – particularly with human impacts on our marine environment in Alaska.
- 2016 **Co-Instructor, Undergraduate/Graduate Level Comparative Animal Physiology Lecture, University of Alaska Anchorage, Department of Biological Sciences**, lectures for the 415/615 upper level semester course. Designed syllabus and curriculum – incorporating primary literature and popular media, developed quizzes and exams, designed classroom discussions and hands-on activities.
- 2015 **Guest Lecturer, University of Alaska Anchorage, Department of Biological Sciences**, Undergraduate lower-division Principles of Biology, “Action Potentials- Nerves to Muscles”
- 2013 **Guest Lecturer, University of Alaska Anchorage, Department of Biological Sciences**, Lectured for upper-level undergraduate marine biology course, “Oceanography and Climate Change”
- 2012 **Biology Teaching Assistant, University of Alaska Anchorage, Department of Biological Sciences**, Undergraduate Introductory Biology Laboratory

- 2011,2013,2014 **Undergraduate Mentor**, Trained *NSF Research Experience for Undergraduate* intern in lab techniques, data analysis, and preparation of presentations. Invited speaker to present research at REU meetings to help students prepare their own oral presentations.
- *Students*: Jessica Espinosa; “The impacts of reproductive status on Weddell seal condition and aerobic capacity across the austral summer”
 - Lauren Simonitis; “Difference in muscle fiber types in harp and hooded seals of different age classes”; Student is co-author on publication.
 - Katie Robbins; “Hematological development in young Arctic Ground Squirrels: A model for natural resistance to iron deficiency?”
- 2008 **Biology Teaching Assistant**, *St. Mary’s College of Maryland, Biology Department*, Teaching Assistant for undergraduate Principles of Biology Laboratory

Curriculum Development & Training

- 2016 **Course Participant, Mentor Training Program**, *National Research Mentoring Network*
 Research mentor training course covering: effective communication, promoting professional development, establishing expectations, assessing understanding, exploring cultural awareness, fostering independence, addressing diversity, cultivating ethical behavior, promoting mentee research self-efficacy
- 2016 **Course Participant**, *University of Alaska Anchorage, Center for Advancing Faculty Excellence*
- Creating an Inclusive Classroom Workshop
 - Team Based Learning (Flipped Classroom) Workshop
- 2015 **Course/Curriculum Development Course Participant**, *University of Alaska Fairbanks, Science Teaching and Outreach Program, Course in Instructional Design*. Class end goal of developing a course and syllabus for an upper-level Comparative Animal Physiology class.
- 2012 **Course/Curriculum Development Course Participant**, *University of Alaska Anchorage, Department of Biological Sciences*. Developed undergraduate class lectures as the main focus of Adv. Vertebrate Endocrinology graduate coursework, with Dr. Loren Buck, Ph.D.

Supervision at WHOI

- 2021-2022 **Sponsor, Guest Investigator**. Dr. Greg Breed (sabbatical from U. Alaska Fairbanks)
 2020-present **Advisor, for MIT-WHOI Joint PhD Program**. Student: Caroline Rzucidlo.

Fieldwork and Expeditions

- [22] Oct 2022-Feb 2023. Eighteen-week field season at McMurdo Station, Antarctica. Lead PI. *Physiological and genetic correlates of reproductive success in high- versus low-quality Weddell seals.*
- [21] Dec 2021-Jan 2022. Four-week field season at Sable Island, Nova Scotia. Researcher with collaborators Jennifer Burns (Texas Tech U), Greg Breed (U Alaska Fairbanks), and Nell den Heyer (Canada DFO). *The role of maternal iron transfer in the development of heme stores and aerobic diving capacity in grey seal pups.*
- [20] Jul 2021. One-week trip conducting research with animals at the Cincinnati Zoo. Lead PI with collaborator Erin Curry (CREW). *Validating infrared thermography for non-invasive measurements of animal vital rates across a range of exotic wildlife species*

- [19] May-Jun 2021. Two-week field season in Latrabjarg, Iceland with Aran Mooney (WHOI). *Auditory thresholds in a deep-diving seabird (Common murre), and links with physiologic stress*
- [18] Jan 2020. Three-week field season in Nova Scotia, Canada. Lead PI with collaborators: Mike Hammill (Canada DFO) and Dave Johnston (Duke U). *Using Unmanned Aerial Survey for 3-dimensional photogrammetry of grey seal colonies*
- [17] Oct 2019. Two-week research cruise in the Gulf of Alaska on the R/V Island C. Researcher with collaborators Michael Rehberg and Mandy Keogh (Alaska Dept of Fish & Game) *Pregnancy Detection in the Endangered Steller sea lion*
- [16] Feb-Mar 2019. Six-week deployment to Scott Base, Antarctica with the New Zealand Antarctic Program. Researcher with collaborators: Kimberly Goetz (NIWA), Robert Harcourt (U Macquarie) *Ross Sea Research and Monitoring Programme: is the world's largest MPA Effective?*
- [15] Jan 2019. Three-week field season in Nova Scotia, Canada. Lead PI with collaborators: Mike Hammill and Dave Johnston. *Using Unmanned Aerial Survey for 3-dimensional photogrammetry of grey seal colonies*
- [14] Nov 2018. Two-week research cruise in Prince William Sound, Alaska on the M/V Dream Catcher. Researcher with collaborators Michael Rehberg and Mandy Keogh (Alaska Dept of Fish & Game) *Pregnancy Detection in the Endangered Steller sea lion*
- [13] May 2018. Four-week research cruise from Punta Arenas, Chile to Palmer Station and the Western Antarctic Peninsula, aboard the R/V Laurence M. Gould. Post-Doctoral Researcher. *Late-season summer condition of Humpback whales along the Western Antarctic Peninsula*
- [12] Jan-Feb 2017. Six-week deployment to McMurdo Station, Antarctica. Post-Doctoral Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [11] Nov-Dec 2016. Six-week deployment to McMurdo Station, Antarctica. Post-Doctoral Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [10] Jan-Feb 2016. Six-week deployment to McMurdo Station, Antarctica. Post-Doctoral Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [9] Jan-Feb 2015. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [8] Nov-Dec 2014. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [7] July 2014. Two-week research cruise in the Gulf of Alaska, aboard the R/V Norseman. Field Assistant (PI's Jo-Ann Mellish and Markus Horning). *Reproduction, survival and depredation of Steller sea lions from the declining western Aleutian Islands in relation to the stable eastern Gulf of Alaska region: LHX-2*
- [6] Jan-Feb 2014. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher. *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [5] Nov-Dec 2013. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher (PI Jennifer Burns, reproductive physiology training provided by Gregg Adams). *The cost of a new fur coat: Interactions between molt and reproduction in Weddell seals*
- [4] Oct-Nov 2012. Four-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher. *Weddell seals as autonomous sensors of the winter oceanography of the Ross Sea*
- [3] July 2012. Three-week field season at St. George Island, Alaska. Field Assistant for the NOAA National Marine Mammal Laboratory (PI J. Ward Testa). *Northern fur seal population study.*
- [2] Oct-Nov 2011. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher. *Weddell seals as autonomous sensors of the winter oceanography of the Ross Sea*
- [1] Jan-Feb 2011. Six-week deployment to McMurdo Station, Antarctica. Graduate Student Researcher (PI's Jennifer Burns and Daniel Costa). *Weddell seals as autonomous sensors of the winter oceanography of the Ross Sea*

Total: 'Ice time' at Antarctic stations: 82 weeks | Ship time: 10 weeks | Other locations: 16 weeks

Specialized Field and Laboratory Skills

- **Unoccupied aerial system (i.e., drones) photogrammetry:** Federal Aviation Administration (FAA) Part 107 Remote Pilot's license; Canadian Civil Aviation (CCA) Remote Pilot's license; U.S. and New Zealand Antarctic Program Concept of Operations permitting
- **Trained by veterinarians in theriogenology and reproductive ultrasonography:** early pregnancy detection with embryos < 3 mm, pregnancy viability, determination of ovarian status; with exposure to Assistive Reproductive Technologies (ART) including in-vitro fertilization, artificial insemination, follicle aspiration, ovarian synchronization and superstimulation.
- **Radioisotope authorized user:** Labeled water (radio-)isotope dilution techniques and morphometric modeling for measures of body composition and blubber/lipid stores
- **Endocrinology:** Validation of radio- and enzyme linked- immunoassays for hormone quantification in non-model organisms.
- **Aerobic capacities and exercise physiology:** dye dilution techniques for blood volume measurements; Muscle, blubber, and skin tissue biopsy; Blood draws for hematology, hormone, metabolites, and protein quantification
- **Bio-logging:** Use of dive recorders and satellite-linked relay loggers to pair foraging behaviors with physiologic dive capacities

Licenses: Drug Enforcement Agency Controlled Substances for Research License; Massachusetts State Controlled Substances License; NMFS Marine Mammal Protection Act Permits; US Fish & Wildlife Migratory Bird Permits; USDA Veterinary Permits; Institutional IACUCs; U.S. Federal Aviation Administration Part 107 (& also Canadian equivalent) Remote Pilot License

Invited Presentations

TED

TEDx Fairbanks Event. What the southernmost mammal can tell us about living through change. Presented April 2017, <https://www.youtube.com/watch?v=I3hZcOhBx2Q>.

Invited Symposia, Academic Institutions, and Seminar Series

Rare Pinniped Conservation Network (RAPCON, supported by the Marine Mammal Commission). Mar 2023. *Invited speaker, attended in-person* in Hämeenlinna, Finland. “Use of remote sensing tools for physiological measurements in pinnipeds”

Scripps Polar Biology seminar. May 2022. (*virtual*) ‘From cells to behavior of marine mammal life history: Finding ‘tipping points’ in a changing world’

WHOI Biology Department seminar. May 2022 (*in-person*). ‘Eco-physiology of pinniped life history: How to balance tradeoffs in a changing world’.

Drones in the Coastal Zone Workshop (Integrated Ocean Observing System), virtual workshop, 2020.

University of Maine, Biology Department Seminar Series, virtual seminar. Sept 2020.

- NOAA Image Processing Workshop**, attended remotely. “Novel use of UAS for 3-D photogrammetry in marine mammals” 2019
- The 3rd International Symposium on Embryonic Diapause, Plenary Speaker**, in Ascona, Switzerland. “If all pinniped species are supposed to have embryonic diapause, then why might not this one?” 2019
- Duke University, Ecology Program seminar series**, in *Durham, NC*. “Navigating energy ‘bottlenecks’ in a changing world: An integrative view of marine mammal life history” 2018
- Antarctic Remotely Piloted Aircraft Systems Workshop**, attended remotely to the University of Canterbury. “Ross Sea Research and Monitoring Program (RAMP): Using UAS technologies to monitor late-summer energy dynamics in Weddell seals” 2018
- Woods Hole Oceanographic Institution**, Woods Hole, MA. “From cells to behavior of marine mammal life history: Finding ‘tipping points’ in a changing world.” 2018
- The 18th International Congress on Animal Reproduction**, in *Tours, France*. “Ultrasonography reveals a pinniped that may not have an embryonic diapause” 2016
- The Smithsonian Conservation Biology Institute, Center for Species Survival**, in *Front Royal, VA*. “Reproductive ecology of Weddell seals in McMurdo Sound, Antarctica.” 2015
- University of Saskatchewan’s One Reproductive Health seminar series**, in *Saskatoon, Canada*. “Reproductive biology of Weddell seals in Antarctica.” 2015
- The 52nd Annual Conference of the Animal Behavior Society, Symposium Speaker**, in Anchorage, AK. “Weddell seal overwinter dive behavior in the Ross Sea: Do foraging efforts increase to support gestation?” 2015

Peer-Reviewed Conference Abstracts

National & International Meetings

Submitted for Upcoming Meetings

- [3] **Shero, M.**, J. Burns, G. Breed, C. den Heyer, D. Lidgard, M. Rivard, A. Heard. ‘Selective pressures for diving drive high iron absorption and incorporation rates in pinniped pups’ *Accepted for oral presentation*, for the Society for Integrative and Comparative Biology meeting in Seattle, WA Jan 2024.
- [2] Rzucidlo, C.*, R. Beltran, P. Robinson, E. Curry, A. Klink, A. Hindle, **M. Shero**. ‘Novel application of infrared thermography coupled with Eulerian Video Magnification to monitor health and vital signs in wild pinnipeds’. *Accepted for oral presentation*, for the Ocean Sciences meeting in New Orleans, LA in Feb 2024.
 *= *PhD student in my lab*
- [1] **Shero, M.**, D.P. Costa, J.M. Burns, K. Goetz. ‘Breath-hold capacities limit circadian dive rhythmicity in a polar marine mammal: a ‘natural experiment’ across the year’s changing light regimes’. *Accepted for oral presentation*, for the Ocean Sciences meeting in New Orleans, LA in Feb 2024.

Oral Presentations

- [29] **Shero, M.R.**, J. Dale, A. Seymour, M. Hammill, A. Mosnier, S. Mongrain, D. Johnston. Intra- and inter-annual variation in grey seal maternal-offspring energy transfer captured using a novel UAS 3-dimensional photogrammetry method. *Society for Marine Mammalogy biennial International Meeting, Aug 2022 in West Palm, Florida*.
- [28] Rzucidlo, C.*, A. Kirkham, J. Burns, **M.R. Shero**. Balancing lipid and lean store use during reproduction in Weddell seals: Implications for investments in current versus future offspring.

Society for Marine Mammalogy biennial International Meeting, Aug 2022 in West Palm, Florida.

*PhD student in my lab.

- [27] Burns, J.M., **Shero, M.R.**, C. Clark, C. den Heyer, D. Lidgard, and G.A. Breed. Rolling in the deep – does red pelage coloration in grey seal females (*Halichoerus grypus*) reflect diet or foraging habitat? *Society for Marine Mammalogy biennial International Meeting, Aug 2022 in West Palm, Florida.*
- [26] Smith, AB, ML Kissling, A Capuano, I Fischer-McMorrow, Y Kolbeinsson, S Lewis, **M Shero**, M Rasmussen, JN McElwaine, TA Mooney. The acoustic ecology of diving Alcid seabirds: Aerial hearing and nesting soundscapes of the common murre (*Uria aalge*) and marbled murrelet (*Brachyramphus marmoratus*). *The Effects of Noise on Aquatic Life Conference*. July 2022, Berlin, Germany.
- [25] **Shero, M.R.**, A. Seymour, M. Hammill, S. Mongrain, J. Dale, and D. Johnston. A novel use of unoccupied aerial systems for 3-dimensional photogrammetry: Tracking grey seal maternal-offspring energy dynamics across lactation. *World Marine Mammal Conference, Dec 2019 in Barcelona, Spain.*
- [24] Kirkham, A.L., **M.R. Shero**, G.P. Adams, R.B. McCorkell, D. Thompson, S. Atkinson, and J.M. Burns. Hormones reflect impacts of reproductive rest on subsequent pregnancies in Weddell seals. *World Marine Mammal Conference, Dec 2019 in Barcelona, Spain.*
- [23] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, K.T. Goetz, D.P. Costa, and J.M. Burns. From “-omics” to behavior of reproduction in a top Antarctic predator. *Polar 2018 conference (Scientific Committee on Antarctic Research/Arctic Summit dual meeting) in Davos, Switzerland.*
- [22] Costa, D.P., L. Hückstädt, K.T. Goetz, **M.R. Shero**, and J.M. Burns. Dive behavior and stable isotopes: index of foraging specialization in seals. *Polar 2018 conference (Scientific Committee on Antarctic Research/Arctic Summit dual meeting) in Davos, Switzerland.*
- [21] **Shero, M.R.**, A.L. Kirkham, D.P. Costa, and J.M. Burns. 2018. Iron mobilization during lactation draws from aerobic dive capacities in Weddell seals: A previously unexplored cost to a capital-breeding system. *Society for Integrative and Comparative Biology, in San Francisco, California.*
- [20] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2017. Minimally-invasive ultrasonography reveals a pinniped that may not have an embryonic diapause. *Society for Marine Mammalogy Biennial Meeting, in Halifax, Nova Scotia.*
- [19] Burns, J.M., **M.R. Shero**, and R.S. Beltran. 2017. Maternal constraints on the timing of weaning in Weddell seals. *Society for Marine Mammalogy Biennial Meeting, in Halifax, Nova Scotia.*
- [18] Kirkham, A.L., **M.R. Shero**, G.P. Adams, R.B. McCorkell, R.S. Beltran, D.L. Thompson Jr. and J.M. Burns. 2017. Serum prolactin concentrations in an Antarctic phocid: sharp declines in midsummer and links to reproduction and molt. *Society for Marine Mammalogy Biennial Meeting, in Halifax, Nova Scotia.*
- [17] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2017. Weddell seal reproductive phenology challenges the notion that all pinnipeds have embryonic diapause. *XIIth Scientific Committee on Antarctic Research Biology Symposium, in Leuven, Belgium.*
- [16] Burns, J.M., **M.R. Shero**, R.S. Beltran. 2017. Maternal constraints on the timing of weaning in Weddell seals. *XIIth Scientific Committee on Antarctic Research Biology Symposium, in Leuven, Belgium.*
- [15] Kirkham, A.L., J. Avery, **M.R. Shero**, R.S. Beltran, J.M. Burns. 2017. Endocrine regulation of body stores varies with reproductive status in female Weddell seals. *XIIth Scientific Committee on Antarctic Research Biology Symposium, in Leuven, Belgium.*
- [14] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2016. Do Weddell seals “freeze” pregnancy? Intra-specific variation in gestation of a top Antarctic predator. *XXXIV Scientific Committee on Antarctic Research Open Science Conference, in Kuala Lumpur, Malaysia (best early career oral presentation award).*
- [13] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2015. Timing is everything: Minimally-invasive ultrasonographic techniques shows intra-specific variation in the initiation and probability of pregnancy in the Weddell seal. *The 21st Biennial Conference on the Biology of Marine Mammals, in San Francisco, California.*

- [12] Beltran, R.S., **M.R. Shero**, A.L. Kirkham, J.W. Testa, and J.M. Burns. 2015. Diving deeper into the over-summer foraging behavior of a top polar predator, the Weddell seal. *The 52nd Annual Conference of the Animal Behavior Society, in Anchorage, Alaska.*
- [11] **Shero, M.R.**, G.P. Adams, A.L. Kirkham, and J.M. Burns. 2014. Breaking Diapause: Successful use of ultrasonography shows intra-specific variation in the probability and timing of embryo implantation in Weddell seals. *American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology, in San Diego, California.*
- [10] Burns, J., J. Prewitt, **M. Shero**, D. Freistroffer, S. Karpovich, and G. Blundell. 2014. Size matters: The impact of body mass on biochemical and structural properties in harbor seal muscles. *American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology, in San Diego, California.*
- [9] Goetz, K., P. Robinson, **M. Shero**, J. Burns, and D. Costa. 2014. Seasonal habitat preference and foraging behavior of a top Antarctic predator, the Weddell seal. *The 5th International Bio-logging Science Symposium, in Strasbourg, France.*
- [8] Goetz, K., P. Robinson, **M. Shero**, J. Burns, and D. Costa. 2014. Location, location, location: Seasonal movement patterns and foraging behavior of Weddell seals in the Ross Sea, Antarctica. *XXXIII Scientific Committee on Antarctic Research Biennial Meeting, in Auckland, New Zealand.*
- [7] **Shero, M.R.**, K.T. Goetz, L.E. Pearson, P.W. Robinson, L.A. Hückstädt, D.P. Costa, and J. M. Burns. 2013. Aerobic capacities and seasonal differences in diving behavior of Weddell seals. *The Society for Experimental Biology Annual Main Meeting, in Valencia, Spain.*
- [6] **Shero, M.R.**, L.E. Pearson, K.T. Goetz, P.W. Robinson, L.A. Hückstädt, D.P. Costa, and J. M. Burns. 2013. How Weddell seals stay in shape: using morphometric and isotopic dilution techniques to assess seasonal changes in body condition. *Annual Conference of the Society for Integrative and Comparative Biology, in San Francisco, California.*
- [5] Goetz, K., P. Robinson, **M. Shero**, J. Burns, and D. Costa. 2012. O'seal where art thou? Overwinter movement, habitat, and navigation of Weddell seals in the Ross Sea. *The Scientific Committee on Antarctic Research Conference, in Portland, Oregon.*
- [4] Burns, J., K. Goetz, **M. Shero**, D. Costa, and J.W. Testa. 2012. Does twenty years make a difference? Weddell seal diving behavior in the Ross Sea, 1990 vs 2010. *The Scientific Committee on Antarctic Research Conference, in Portland, Oregon.*
- [3] Burns, J.M., M.O. Hammill, **M.R. Shero**, K.C. Lestyk, J.P. Richmond, and S. Geiseler. 2012. Physiological development of juvenile marine mammals: implications for the transition to independent foraging. *The Society of Experimental Biology Annual Meeting, in Salzburg, Austria.*
- [2] **Shero, M.R.**, L.E. Pearson, K.T. Goetz, P.W. Robinson, L.A. Hückstädt, D.P. Costa, and J.M. Burns. 2011. What makes a year-round athlete?: seasonal changes in Weddell seal (*Leptonychotes weddellii*) physiological condition and links with diving behavior. *The Society of Marine Mammalogy's (SMM) 19th Biennial Conference, in Tampa, Florida.*
- [1] **Shero, M.R.**, K.C. Lestyk, R.D. Andrews, and J.M. Burns. 2010. Development of oxygen stores and muscle in Northern fur seals (*Callorhinus ursinus*): limits on juvenile foraging ability? *Annual Conference of the Society for Integrative and Comparative Biology, in Seattle, Washington.*

Poster Presentations

- [22] Klink, A, **M Shero**, J. Burns, B. Briggs, A. Hindle. 2023. Genetic impact on reproductive output in Antarctic Weddell seals (*Leptonychotes weddellii*) in the Erebus Bay population. *Presented at the 13th International Mammalogical Conference – July 2023 in Anchorage, AK.*
- [21] Rzucidlo, C*, E Curry, **M Shero**. *In-person Poster presentation.* Validation of infrared thermography for non-invasive assessment of animal vital rates across wildlife species. *ICES PICES Early Career Scientist Conference - July 2022.* Newfoundland, Canada. *PhD student in my lab.
- [20] **Shero, M.R.**, A.L. Kirkham, G.P. Adams, R.B. McCorkell, and J.M. Burns. 2018. Metabolomics profiles reveal that upregulation of protein degradation and nicotinamide pathways are linked with

- successful pregnancy in Weddell seals. *American Physiological Society Intersociety meeting in New Orleans, LA*.
- [19] Kirkham, A.L., R.S. Beltran, S.M. Walcott, **M.R. Shero**, D. Thompson, J. Avery, and J.M. Burns. 2018. How do hormones and the skin transcriptome influence molt in a polar pinniped? *Polar 2018 conference (Scientific Committee on Antarctic Research/Arctic Summit dual meeting) in Davos, Switzerland*.
- [18] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2016. Probing for answers in Weddell seals: Ultrasonography reveals a pinniped that may not have an embryonic diapause. The 18th International Congress of Animal Reproduction, in *Tours, France*.
- [17] Kirkham, A.L., **M.R. Shero**, G.P. Adams, R.B. McCorkell, S. Atkinson, and J.M. Burns. 2016. Circulating concentrations of progesterone and estrogen in Weddell seals during the breeding period and early pregnancy. Experimental Biology Conference, *San Diego, California*.
- [16] Kirkham, A.L., **M.R. Shero**, R.S. Beltran, R.B. McCorkell, G.P. Adams, and J.M. Burns. 2015. Female Weddell seals prioritize protein deposition while recovering from lactation and beginning molt and gestation. The 21st Biennial Conference on the Biology of Marine Mammals, in *San Francisco, California*.
- [15] Goetz, K.T., L.A. Hückstädt, **M.R. Shero**, J.M. Burns, and D.P. Costa. 2015. The foraging ecology and diet of Weddell seals in the western Ross Sea, Antarctica. The 21st Biennial Conference on the Biology of Marine Mammals, in *San Francisco, California*.
- [14] **Shero, M.R.**, G.P. Adams, R.B. McCorkell, A.L. Kirkham, and J.M. Burns. 2015. Breaking diapause: Using minimally-invasive ultrasonographic techniques reveals intra-specific variation in the probability and timing of pregnancy in Weddell seals. The 100th Ecological Society of America Annual Meeting, in *Baltimore, Maryland* (winner of New Phytologist Award for best student poster in Physiological Ecology).
- [13] **Shero, M.R.**, R.T. Krotz, D.P. Costa, J.P. Richmond, and J.M. Burns. 2014. Overwinter changes in Weddell seal body condition and hormone profiles: Implications for pregnancy? American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology, in *San Diego, California*.
- [12] Kirkham, A.L., R.S. Beltran, **M.R. Shero**, and J.M. Burns. 2014. Opposite trends in over-summer mass change: post-parturient Weddell seals gain weight while non-reproductive females lose mass and condition. American Physiological Society Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology, in *San Diego, California*.
- [11] **Shero, M.R.**, K.T. Goetz, D.P. Costa, and J.M. Burns. 2014. Weddell seal overwinter dive behavior in the Ross Sea: Are animals approaching physiological limits to support gestation? The 5th International Bio-logging Science Symposium, in *Strasbourg, France*.
- [10] Beltran, R.S., A.L. Kirkham, **M.R. Shero**, K.T. Goetz, D.P. Costa, J.W. Testa, and J.M. Burns. 2014. Using simple biologging metrics to inform dynamic bioenergetics models: a case study with Weddell seals. The 5th International Bio-logging Science Symposium, in *Strasbourg, France*.
- [9] Goetz, K., P. Robinson, **M. Shero**, J. Burns, and D. Costa. 2014. Assessing the accuracy of animal-borne CTD tags under laboratory and in situ conditions. The 5th International Bio-logging Science Symposium, in *Strasbourg, France*.
- [8] Krotz, R.T., **M.R. Shero**, D.P. Costa, J.M. Burns, and J.P. Richmond. 2014. Linking metabolic hormones to nutritional status in Weddell seals (*Leptonychotes weddellii*). Annual conference of the Society for Integrative and Comparative Biology, in *Dallas, Texas*.
- [7] Goetz, K., L. Hückstädt, P. Robinson, **M. Shero**, L. Pearson, J. Burns, and D. Costa. 2013. Eat, prey, assimilate: stable isotopes and tracking data reveal the foraging ecology of Weddell seals in the Ross Sea, Antarctica. The Society of Marine Mammalogy's (SMM) 20th Biennial Conference, in *Dunedin, New Zealand*.
- [6] **Shero, M.R.**, L.E. Pearson, K.T. Goetz, P.W. Robinson, L.A. Hückstädt, D.P. Costa, and J. M. Burns. 2013. Seasonal changes in Weddell seal body condition: links with diving behavior. Scientific Committee on Antarctic Research Biology Symposium, in *Barcelona, Spain*.

- [5] Burns, J.M., **M.R. Shero**, J.W. Testa, and J.J. Rotella. 2013. Interactions between reproduction and molt in Weddell seals in Erebus Bay, Antarctica. Scientific Committee on Antarctic Research Biology Symposium, in *Barcelona, Spain*.
- [4] Goetz, K.T., L.A. Hückstädt, P.W. Robinson, **M.R. Shero**, L.E. Pearson, J.M. Burns, and D.P. Costa. 2013. Combining movement and diving behavior with stable isotopes to examine the foraging ecology of a top predator in the Ross Sea, Antarctica. Scientific Committee on Antarctic Research Biology Symposium, in *Barcelona, Spain*.
- [3] **Shero, M.**, L. Pearson, K. Goetz, P. Robinson, L. Hückstädt, D. Costa, and J. Burns. 2012. How a Weddell seal “PQs” [physically qualifies]: resistance to physiological wasting after prolonged inactivity. The Scientific Committee on Antarctic Research Conference, in *Portland, Oregon*.
- [2] Robbins, K.A.*, **M.R. Shero**, T. Stevenson, K. Duddlestone, C.L. Buck, and J.M. Burns. 2012. Hematological development in young arctic ground squirrels: a model for natural resistance to iron deficiency. Annual Conference of the Society of Integrative and Comparative Biology, in *Charleston, South Carolina*. * = REU undergraduate student mentored
- [1] **Shero, M.**, L. Pearson, K. Goetz, P. Robinson, D. Costa, and J. Burns. 2010. Post-molt condition of Weddell seals and links with overwinter diving behavior. American Physiological Society Meeting: Global Change and Global Science: Comparative Physiology in a Changing World, in *Westminster, Colorado*.

Outreach, Media, & Volunteer Work

Outreach

- 2022, 2023 **Speaker, University of California Berkeley**, spoke to an undergraduate/ graduate-level Marine Mammal Biology class (presented remotely).
- 2021 **Speaker, University of California Berkeley**, spoke to a graduate-level Energetics, Physiology, and Biomechanics course (presented remotely). ~30 students.
- 2020 **Speaker, University of Maine**, spoke to an undergraduate Marine Mammal Biology class (presented remotely). ~70 students.
- 2019 **Speaker, Florida Southern College**, spoke to an undergraduate Marine Mammal Biology class (presented remotely). ~30 students
- 2019 **Speaker, Roger Williams University** visit to WHOI, as part of an NSF funded initiative to increase participation of students from lower financial means in the STEM sciences. ~15 students.
- 2018 **She Maps Instructor**. Organized an instructor training workshop that brought Dr. Karen Joyce to Duke University to train local school teachers, graduate students, and post-doctoral researchers in effective outreach methods. The *She Maps* program (<https://shemaps.com>) uses drones as a platform to address gender equality in STEM, while simultaneously building leadership skills and exposing students to science and engineering technologies.
- 2018 **Panelist, Girls Exploring Science and Technology event**. Outreach event to inspire excitement for fields in which women are under-represented. ~200 middle school girls from North Carolina attended.
- 2017 **Speaker, STEM Day** at University of Alaska Anchorage, College of Arts and Sciences. (~100 students)
- 2017 **Volunteer, Alaska Native Science and Engineering Program**. Performed northern sea otter necropsies with Alaska native 6-8th grade students, and taught them about marine mammal physiology. (~50 students)
- 2017 **Speaker at the University of Alaska Anchorage’s Kids-2-College event**. Presentation encouraged 5th and 6th graders from low-income areas in Anchorage to pursue higher education. (Spoke to ~150 students).

- 2016 **Speaker McMurdo Science Lecture Series**, presented “The Cost of a New Fur Coat: Interactions between Molt and Reproduction in Weddell seals.”
- 2015 **Speaker at Matanuska-Susitna College wildlife lecture series**, to all age groups. “Fur seals and Weddell seals: From Open Oceans to Icy Shores.”
- 2014,2016 **Speaker, Live-Connect PolarTREC event**, from McMurdo Station, Antarctica. Relayed current research to ~8,000 K-12 participants.
- 2012,2014,2016 **Editor**. Checked and added scientific content to PolarTREC education & outreach journals entitled “Weddell seals in the Ross Sea” project, in collaboration with Ms. Alex Eilers from the Pink Palace Museum in Tennessee See:
 – <https://www.polartrec.com/expeditions/weddell-seals-in-the-ross-sea-2016/journals/2016-01-26>
 – <http://www.polartrec.com/expeditions/weddell-seals-in-the-ross-sea-2014>
 – <http://www.polartrec.com/expeditions/weddell-seals-in-the-ross-sea/journals>
- 2014 **Speaker at Opportunities for Lifelong Education program** in Anchorage, Alaska. Presented on-going research on Northern fur seals and Weddell seals, to an adult education group.
- 2013 **Speaker, K-12 Teacher workshop on “real world” mathematical applications**. Presented “Weddell seal morphometrics” activity for a teacher workshop focusing on “real-word” mathematical examples in collaboration with Ms. Lynn Reed, Einstein Fellow in NSF Polar Programs.
- 2012 **Speaker**, “Weddell seal research in McMurdo Sound, Antarctica,” Lecture for Pribilof Marine Science Camp children, St. George Island, Alaska. (~20 students)
- 2012 **Speaker** “How do Weddell seals dive and stay warm in the Antarctic?”. Workshop for Women of Science & Technology Day, Anchorage, Alaska (~100 students)
- 2010 **High School Science Fair Judge**, Volunteered as judge at the Sherwood High School (Montgomery County, MD) science fair.

Volunteer Work

- 2012 **International Wolf Center Pup Care Volunteer**, Provided care and animal conditioning for two wolf pups. Assisted with public lectures.
- 2007-2010 **Worked with Equine Veterinarian, Dr. Peter Radue, D.V.M. (over 300 hours)**. Assisted with vaccinations, ultrasounds, x-rays, diagnostic tests, blood draws. Handled animals undergoing medical procedures
- 2008 **Volunteer at Washington Animal Rescue League Veterinary Clinic**. Assisted with veterinary check-ups for animals in the shelter, provided general animal care, handled animals undergoing medical procedures, and observed surgical procedures
- 2008 **Medical Mission to Honduras**. Participated in medical mission with volunteer physicians to medically-underserved areas in Honduras.

Media

Science. 2023 “Antarctic Meltdown: U.S. cancels or curtails half of its Antarctic research projects”. <https://www.science.org/content/article/u-s-cancels-or-curtaills-half-its-antarctic-research-projects>. Featured news article in issue: Science Vol 381, No 6663, 1148-1151

Press Release: WHOI, Phys.org. “Exploring new ways to study heart rate, respiration in wild animal populations”. Mar 2023. <https://phys.org/news/2023-03-exploring-ways-heart-respiration-wild.html?fbclid=IwAR0ZOYA0nwuuKFPjcQ0Mw2hRbzXQG18-J80AUzp7-d6lEsAYdNAKct6Pd2Q>

The Atlantic. “Pregnancy shouldn’t work like this: Some mammals pause their pregnancies for nearly a

year, like a DIY version of freezing your embryos". Mar 2023.

<https://www.theatlantic.com/science/archive/2023/03/animal-pregnancy-freeze-embryonic-diapause/673272/>

The Antarctic Sun (NSF U.S. Antarctic Program). "Weddell seal moms sacrifice diving capacity to help pups grow". Nov 2022. <https://antarcticsun.usap.gov/science/4739/>

National Science Foundation Discovery Files. "Antarctica's Weddell seal". Oct 2022. <https://sites.libsyn.com/424817/antarcticas-weddell-seal>

National Science Foundation Discovery Files. "Sacrificing for the next generation". Aug 2022. https://www.youtube.com/watch?v=BPm6RY0qP_U

Press Release: WHOI, Phys.org, The Wildlife Society. "Weddell seal moms sacrifice their diving capacity to provide iron to their pups". Aug 2022. <https://www.whoi.edu/press-room/news-release/weddell-seal-moms-sacrifice-their-diving-capacity-to-provide-iron-to-their-pups/?fbclid=IwAR1ffLLeKhzX4yDwHXNCSRLzo1aZIo0HkJRNq6BbhMzfxTTBQdKr5yRqYAs>

WHOI Featured Project. "Seal Spy – Drones help WHOI scientist to measure the body mass of mother and pup seals during lactation" By Evan Lubofsky. May 2019. <https://www.whoi.edu/news-insights/content/seal-spy/>

Featured, WNCT9 News. Duke Marine Lab Drone Research. https://www.wnct.com/news/local-news/duke-marine-lab-drone-research_20180412214501/1119330591

Featured, Fairbanks News-Miner. "TEDx Fairbanks introduces its next series of speakers"

"Success Story" feature for the NSF BIO Research Experience for Undergraduates program website. <http://bioreu.org/content/success-story?sid=581>

Featured, Green & Gold news, University of Alaska Anchorage, "UAA graduate student Michelle Shero awarded National Science Foundation fellowship for 3-year study of Weddell seals". http://greenandgold.uaa.alaska.edu/blog/9386/uaa_graduate_student_michelle_shero_awarded_national_scienc_foundation_fellowship_for_3year_study_of_weddell_seals/?option=com_content&view=article&id=9386.

Featured, University of Saskatchewan WCVN Today, "Ultrasound sheds light on seal reproduction"