Kelsey N. Lucas

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Education

Degrees

2019 **Ph.D., Harvard University,** Cambridge, MA, USA
Organismic and Evolutionary Biology, Co-advisors: Peter Girguis & Eric Tytell

2017 **M.A., Harvard University,** Cambridge, MA, USA
Organismic and Evolutionary Biology, Advisor: George Lauder

2012 **B.S. (*Summa cum laude*), Roger Williams University** (RWU), Bristol, RI, USA
Major: Biology, Minor: Mathematics

Certifications

2021 **Diversity, Equity, and Inclusion Certificate**
Center for Research in Learning and Teaching, University of Michigan, Ann Arbor, MI, USA

Professional & Research Experience

2021-present **Assistant Professor,** University of Calgary (UCalgary), Calgary, AB, Canada

2019-2021 **Postdoctoral Fellow,** Advisor: Karen Alofs; School for Environment and Sustainability, University of Michigan (UM), Ann Arbor, MI, USA

2017-2020 **Freelance Science Writer,** Massive (online)

2016-2018 **Learning Lab Fellow,** Derek Bok Center for Teaching and Learning, Cambridge, MA, USA

2015-2020 **Academic Liaison (2019-2020) & Freelance Lesson Writer (2015-2020),** BiteScis (online)

2015 **Online Course Content Developer,** HarvardX, Cambridge, MA, USA

2015 **Lab Instructor,** Harvard Extension School, Cambridge, MA, USA

2013-2019 **PhD Candidate,** Co-advisors: Peter Girguis (Harvard University) & Eric Tytell (Tufts University); Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA

2013 **Research Assistant,** Advisor: John Dabiri; Aeronautics & Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA, USA

2010-2012 **Undergraduate Researcher,** Advisor: Sean Colin; Biology, Marine Biology, & Environmental Science, RWU, Bristol, RI, USA & Marine Biological Laboratory, Woods Hole, MA, USA

2009-2012 **Aquaculture Technician,** Advisor: Andrew Rhyne; Biology, Marine Biology, & Environmental Science, RWU, Bristol, RI, USA

2007-2008 **Student Research Assistant,** Project Oceanology, Groton, CT, USA

Grants & Fellowships

K.N.L. is the sole Principal Investigator for all received funding. All awards given in CAD (=1.3 x USD).

2022 **Canada Foundation for Innovation John R. Evans Leaders Fund** (CFI-JELF), $250,000
Aquatic biomechanics infrastructure for studying the mechanics of underwater movement and its impact on aquatic ecology

2022-2027 **NSERC Discovery Grant,** $145,000
National Sciences and Engineering Research Council of Canada (NSERC)
Biomechanics of how fish cope with environmental flow and how it influences habitat selection

2022	**NSERC Discovery Launch Supplement,** $12,500
2020-2022	**NSF Postdoctoral Research Fellowship in Biology** (PRFB), $140,400 (stipend) + $39,000 (research) US National Science Foundation (NSF) Linking fish morphology, swimming ability, and habitat selection through an integrative approach Note: terminated early in 2021 for UCalgary position
2020	**UM Postdoctoral Association Travel Award** In support of travel to Society for Integrative & Comparative Biology (SICB) 2020 Annual Meeting
2016-2018	**Learning Lab Graduate Fellowship,** Bok Center
2014-2019	**NSF Graduate Research Fellowship** (GRFP)
2012	**Summer Undergraduate Research Fellowship** (SURF) Rhode Island NSF Established Program to Stimulate Competitive Research (RI NSF EPSCoR)
2012	**Provost Fund for Student Research** RWU, in support of travel to SICB 2013 Annual Meeting
2011	**Provost Fund for Student Research** RWU, in support of travel to Ocean Sciences Meeting 2012

Scholarly Activity

Publications

**Indicates students I mentored during my training, [1]Indicates co-first authorship*

1. Jimenez YE[1], **Lucas KN[1]**, Long, Jr, JH, and Tytell ED. (2023) Flexibility is a hidden axis of biomechanical diversity in fishes. *J Exp Biol* 266 (Suppl_1): jeb245308 [Link]
2. Costello JH, Colin SP, Dabiri JO, Gemmell BJ, **Lucas KN**, and Sutherland KR. (2021) The hydrodynamics of jellyfish swimming. *Annu Rev Mar Sci* 13: 375-396 [Link]
3. Dabiri JO, Colin SP, Gemmell BJ, **Lucas KN**, Leftwich MC, and Costello JH. (2020) Jellyfish and fish solve the challenges of turning similarly to achieve high maneuverability. *Fluids* 5(3): 106 [Link]
4. **Lucas KN**, Lauder GV, and Tytell ED. (2020) Airfoil-like mechanics generate thrust on the anterior body of swimming fishes. *Proc Natl Acad Sci.* 117(19): 10585–10592 [Link]
5. Jaspers C, Costello JH, Sutherland K, Gemmell B, **Lucas KN**, Tackett J, Dodge K, and Colin SP. (2018) Resilience in moving water: Effects of turbulence on the predatory impact of the lobate ctenophore *Mnemiopsis leidyi*. *Limnol Oceanogr.* 63: 445–458 [Link]
6. **Lucas KN**, Dabiri JO, and Lauder GV. (2017) A pressure-based force and torque prediction technique for the study of fish-like swimming. *PLoS ONE.* 12(12): e0189225 [Link]
7. Rosic MLN*, Thornycroft PJM, Feilich KL, **Lucas KN**, and Lauder GV. (2017) Performance variation due to stiffness in a tuna-inspired flexible foil model. *Bioinspir Biomimetics*. 12: 016011 [Link]
8. **Lucas KN**, Thornycroft PJM, Gemmell BJ, Colin SP, Costello JH, and Lauder GV. (2015) Effects of non-uniform stiffness on swimming performance of a passively-flexing, fish-like foil model. *Bioinspir Biomimetics*. 10: 056019 [Link]
9. **Lucas KN**, Johnson N, Beaulieu WT, Cathcart E, Tirrell G, Colin SP, Gemmell BJ, Dabiri JO, and Costello JH. (2014) Bending rules for animal propulsion. *Nat Commun*. 5:3293 [Link]
10. **Lucas K**, Colin SP, Costello JH, Katija K, and Klos E. (2013) Fluid interactions that enable stealth predation by the upstream foraging hydromedusae *Craspedacusta sowerbyi*. *Biol Bull*. 225: 60-70 [Link]

Note: 5 additional manuscripts in preparation

Invited Talks & Seminars

2023	Office of the Chief Scientist Seminar Series, Alberta Environment and Protected Areas (online)
2022	Human Performance Laboratory Seminar Series, Faculty of Kinesiology, UCalgary (Virtual due to COVID-19)
2022	SICB+ Science Communication Workshop training session (Virtual due to COVID-19)
2017	School of Biology Seminar, Georgia Institute of Technology, Atlanta, GA, USA
2017	Marine and Natural Sciences Seminar, RWU, Bristol, RI, USA

Conference Presentations by KNL

**Indicates presentations given by a co-author. Presentations given by mentored students are in the following section.*

2024	SICB, Seattle, WA, USA
2023	American Fisheries Society (AFS), Grand Rapids, MI, USA*
2023	Canadian Society of Zoologists, Saskatoon, SK, Canada
2022	SICB, Virtual Meeting (due to COVID-19)
2020	AFS, Virtual Meeting (due to COVID-19)
2020	Ocean Sciences Meeting, San Diego, CA, USA
2020	SICB, Austin, TX, USA (2x)
2019	SICB, Tampa, FL, USA
2018	American Physical Society Division of Fluid Dynamics (APS DFD) Meeting, Atlanta, GA, USA*
2018	Ocean Sciences Meeting, Portland, OR, USA (1x by KNL, 1x by co-author*)
2018	SICB, San Francisco, CA, USA
2017	SICB, New Orleans, LA, USA
2016	SICB, Portland, OR, USA
2015	APS DFD, Boston, MA, USA
2015	SICB, West Palm Beach, FL, USA
2014	APS DFD, San Francisco, CA, USA*
2013	SICB, San Francisco, CA, USA
2012	Ocean Sciences Meeting, Salt Lake City, UT, USA (1x by KNL, 1x by co-author*)

Total: 11 oral presentations & 5 posters given by KNL

Co-authored Conference Presentations Given by Trainees

2024	D. Kennedy, SICB, Seattle, WA, USA
2023	D. Kennedy, SICB, Austin, TX, USA

Teaching Experience

Instructor/Co-instructor, UCalgary

Course	*Term*	*Duties*	*Enrollment*
ZOOL 403 Comparative Vertebrate Zoology	F23	9 lectures	101
	F22	9 lectures	95
ZOOL 461 Animal Physiology I	F23	8 lectures	166
	F22	8 lectures	173
ZOOL 463 Animal Physiology II	W24	12 lectures	TBD
	W23	12 lectures	106
ZOOL 515 Comparative Vertebrate Anatomy	W24	12 lectures	TBD

Project Course Instructor/Co-instructor, UCalgary

Course	*Term*	*Role*	*Enrollment*
BIOL 530 Honors Undergraduate Research	F23-W24	Secondary co-supervisor	1
ECOL 528 Independent Undergraduate Research	F23-W24	Supervisor	1
ZOOL 507 Independent Undergraduate Research	F23	Supervisor	1
	W23	Supervisor	1
BIOL 607 Independent Graduate Course in Oceanography	F22	Instructor	1
MDSC 755 Independent Graduate Course in Biomechanics	F22	Co-instructor (split 50-50)	1

Workshop Instructor

Sole instructor for 2-hour sessions, unless otherwise noted

Workshop title or subject	*Year(s)*	*Institution/Context*
Communicating Science (1.5 hours)	2022	UCalgary, for K. Lucas and H. Jamniczky labs
Teaching with Objects (15 min)	2022	Invited training session as part of SICB+ 2022 Science Communication workshop
Marine Biology Volunteering Training (1 hour)	2016-2018	Harvard Museum of Natural History (HMNH)
Communicating Science	2018	Bok Center, Co-instructor (split 50-50)
Scicomm in Teaching and Learning (1 week)	2017	Bok Center
Making a Concept Video	2017	Bok Center
Teaching with Objects	2017	Bok Center
Methods in Aquatic Field Ecology (2 days)	2015	Harvard Life Sciences Outreach, member of instructional team of ~6
Marine Invertebrate Zoology Volunteer Training	2014	HMNH

Teaching Assistant/Lab Instructor

Note: semester names have been modified to match UCalgary's terminology

Course	*Term*	*Institution*
OEB 130 Biology of Fishes	W16	Harvard University
E65C Human Anatomy & Physiology I	F15	Harvard Extension School
E65D Human Anatomy & Physiology II	W15	Harvard Extension School
LS2 Evolutionary Human Physiology & Anatomy	F14	Harvard University

Guest Lecturer

Course & Topic (No. lectures per term)	*Term*	*Instructor, Department, & University*
ZOOL 515 Comparative Vertebrate Anatomy Advanced Muscle Anatomy (4)	W22	J. Theodor, Biological Sciences, UCalgary
EAS 409/ENV 409/EEB 487 Ecology of Fishes Predator-Prey Interactions (1)	W21, W20	K. Alofs, School for Environment and Sustainability, UM
ENVIRON 424: Stream Restoration Water Quality Factors for Stream Fishes (1)	F22	A. Cotel, Civil and Environmental Engineering, UM

Instructional Design

Context	*Year(s)*	*Tasks*
Assistant Professor, UCalgary	2024	Development of instructional materials for a 500-level Biomechanics course
Postdoctoral Fellow, UM	2020	Lecture calendar & instructional strategies for an upper level undergraduate Biomechanics course
Learning Lab Fellow, Bok Center	2016-2018	Drawing to Learn lab for OEB 130 Biology of Fishes Multimedia assignment for MCB 80 Neurobiology of Behavior Instructional best practices & aids for: Course-based reading of scientific papers Curation & object-based learning in classroom settings OEB 52 Biology of Plants creative final assignments
TA, Harvard University	2016	Summative assessment for New England Aquarium lab
Freelance Lesson Writer, BiteScis	2015-2020	STEM lessons meeting US high school curriculum standards
Content Developer, HarvardX	2015	Visual aids & stop motion animations for MCB80x: Fundamentals of Neuroscience [Link]
Volunteer, HMNH	2013-2019	Interactive activity development & teacher guides

Non-Traditional Teaching

Position	*Year(s)*	*Tasks*
Learning Lab Fellow, Bok Center	2016-2018	Trainer for multimedia sessions & on-camera performance
Volunteer, HMNH	2013-2019	Gallery-based education in biology & evolution

Supervisory Activities

Graduate Students

Angelina Hajji[1]	2022-present	S, MSc	Impact of anthropogenic stressors on fishes
Duncan Kennedy[1]	2022-present	S, MSc	Chimaera fin functional morphology
Michael Chung[2]	2022-present	CS, MSc	Cold exposure, fish development, and swimming
Femila Antomagesh	2022-present	CM, PhD	Skeletal muscle metabolism in zebrafish
Zachary Shvartsburd	2022-present	CM, MSc	Cortisol receptors & thermal stress in zebrafish
Julia Bebout	2021-2023	CM, MSc	Thermal acclimation & population dynamics

Undergraduate Students

Emily Duan	2023-present	RA	Morphology & ecology of pelagic vs benthic fishes
Shreya Pillai	2023-present	V	Morphology & competition in freshwater sunfishes
Julie Siemens	2023-present	S/507	Cold exposure and swimming performance
Mohibullah Sherbaz	2023-present	S/528	Comparative kinematics of chimaera fins
Davis Dickson[3]	2023-present	CS/530	Sucrose diet and osteoarthritis
Christinne Falguera	2023	S/507	Fish swimming morphology, diet, & habitat
Angelina Hajji	2022	RA	Climate warming impacts on fishes

S – primary supervisor, CS – secondary co-supervisor, CM – committee member, 507 – one semester independent research, 528 – two semesters independent research, 530 – two semesters Honors research, RA – paid research assistant, V – volunteer

Co-supervised by [1]S. Rogers, [2]H. Jamniczky, [3]W. Herzog

External Evaluations

Student	*Advisor*	*Year*	*Examination type, Department, University*
Meng Li	W. Herzog	2023	MSc defense, Kinesiology, UCalgary
Shuyue Liu	W. Herzog	2022	PhD candidacy, Kinesiology, UCalgary
Ashna Subramanium	B. Nigg	2022	PhD candidacy, Kinesiology, UCalgary
Keegan Lutek	E. Standen	2022	PhD defense, Biology, University of Ottawa

Awards and Recognitions

2013, 2016	Robert A. Chapman Memorial Award, Harvard University
2013	James Mill Peirce Fellowship, Harvard University
2013	Outstanding Senior Award (Biology), RWU

Affiliations & Service

Professional Society Affiliations

Canadian Society of Zoologists, Society for Integrative and Comparative Biology, American Fisheries Society

Peer Review, in the last 5 years

Alberta Conservation Association, Communications Biology, Journal of Experimental Biology, Journal of Fish Biology, Physics of Fluids, Proceedings B (2 grants, 8 manuscripts)

Research Facility Management

2023-present Manager, Shared Aquatics Facility, Biological Sciences, UCalgary

Committee Memberships

2023-present Biological Sciences Program Committee, Biological Sciences, UCalgary
2023-present Capstone/Research Working Group (a Curriculum Review Action Plan committee), Biological Sciences, UCalgary
2022-2023 Hiring Committee (Environmental Physiology), Biological Sciences, UCalgary
2016-2017 Impact Assessment Committee, HMNH

Professional Service, Working Groups, & Engagement Sessions

2023 Expert Advisor, Trilobite Biogeography and Ecology PaleoSynthesis Working Group, Friedrich Alexander University, Erlangen, Germany
2023 Stakeholder (Academic Research), Fisheries and Oceans Canada's Global Biodiversity Framework Engagement Session
2023 Collections Representative, Multidisciplinary Science Hub Planning & User Engagement Session
2023 Researcher/Participant, Lakes Working Group, Oil Sands Monitoring Program, Alberta
2023 Speaker, Office of the Chief Scientist Seminar Series, Alberta Environment and Protected Areas
2022 Judge, Biological Graduate Students Association Symposium, UCalgary
2021-2022 Aquatics Representative, ISIC/LSRC Building Planning & User Engagement Sessions, UCalgary

Learning Communities

2022-present Member, Biological Sciences Instructors' Teaching & Learning Group, UCalgary
2023 Member, Biological Sciences Instructors' Summer Journal Club, UCalgary
2016-2017 Organizer, Curation & Object-Based Learning Reading Group, Bok Center

Outreach, Writing, & Media

Public Outreach

2021 YouTube Video Presenter & Writer, HMNH [Link]
2019-2020 Festival Activity Designer & Host, UM Museum of Natural History
2013-2019 Museum-Based Education, HMNH

Science Writing

By KNL (>16,000 unique pageviews). Published by Massive *unless otherwise stated.*

2019 Meet Émilie du Châtelet, the French socialite who helped lay the foundations of modern physics
Peer review is a rigorous process, but it should leave trainees feeling valued and not bullied
2018 The Graduate Research Fellowship Program favors elite schools – again
What fish can teach us about how humans move
2017 How this beautiful, invasive jellyfish adapts to dominate foreign ecosystems
How stressed-out fish are teaching us about human heart disease
Scientists are gluing teeth to power saws to learn how sharks eat
2016 Enigmatic Tully monster finds a home on the tree of life Science in the News.

Media coverage

2023 ECR Spotlight – Yordano Jimenez and Kelsey Lucas Journal of Experimental Biology
2014 Following in Nature's footsteps Amy Dunkle, The Current (RI NSF EPSCoR news)
Riding SURF to graduate school Amy Dunkle, The Current
Video: The Secret of Jellyfish John Bohannon, Science News

Wing and fin motions share universal principles Philip Ball, Nature News
Quest for jellyfish robot leads to discovery of design similarity across wide range of natural propulsors Diana Kenney, UChicago News
Whether whale or moth, animals that swim or fly use universal rules Amina Khan, LA Times
Wings, tails, fins: Study looks at how animals propel themselves Science Daily

Commitment to Diversity in STEM Fields

2021 **Broadening Participation Mentor**, SICB
Peer & near-peer mentoring program associated with the SICB Annual Meeting, supporting early career scientists from underrepresented backgrounds

2020 **New Horizons in Conservation Poster Judge (UG)**
Conference in support of undergraduates from backgrounds underrepresented in conservation (cancelled due to COVID-19)

2019-2020 **Doris Duke Conservation Scholars Program Mentor,** UM
8-week summer research program for students from underrepresented backgrounds (2020 mentoring cancelled due to COVID-19)

Service to K-12 Students & Teachers

2021-present **Ad Hoc Science Consultant** for a Toronto-area K-6 teacher

2022 **Guest Scientist,** Anatomy, Behavior, and Evolution in Fishes (HS summer course), Summer@Brown University

2021 **Panelist,** Great Lakes Bowl hosted by Michigan Sea Grant, a regional event in the National Ocean Sciences Bowl (HS academic quiz-bowl competition)
Spoke on a panel about science research and career paths during opening ceremonies

2015-2020 **Lesson Writer (HS level),** BiteScis

2015 **Engaging Teachers in Ecology-Based Investigations** (Professional Development Workshop), Harvard Life Sciences Outreach, Concord Field Station, Bedford, MA

2010-2015 **Lab Ambassador (K-12)**, Harvard University, Caltech, & RWU
Hosted lab tours and discussed the daily life of a scientist with local K-12 students