Blair Roberts Costelloe

Curriculum Vitae
October 14, 2025
She/Her

Max Planck Institute of Animal Behavior
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EDUCATION

2014 Ph.D. Princeton University, Ecology and Evolutionary Biology
Advisor: Dan Rubenstein

2010 M.A. Princeton University, Ecology and Evolutionary Biology

2007 B.A. Washington University in St. Louis
Anthropology major, Spanish minor; *Summa Cum Laude*

ACADEMIC POSITIONS

2023 - present **Project Leader**
Dept. of Collective Behavior, Max Planck Institute of Animal Behavior
Centre for the Advanced Study of Collective Behaviour, University of Konstanz
Dept. of Biology, University of Konstanz

2016 - 2022 **Postdoctoral Fellow**
Dept. of Collective Behavior, Max Planck Institute of Animal Behavior
Centre for the Advanced Study of Collective Behaviour, University of Konstanz
Dept. of Biology, University of Konstanz

2014 - 2016 **Research Associate**
Rubenstein Lab, Dept. of Ecology and Evolutionary Biology, Princeton University

2014 - 2015 **Lecturer**
Department of Ecology and Evolutionary Biology, Princeton University

Employment breaks

Sept 2020 - Dec 2021 – **Maternity leave** (5 months full leave + 10 months part-time work)

GRANTS, AWARDS AND FELLOWSHIPS

2026-2029 European Commission Marie Sklodowska-Curie Doctoral Network Grant €3,716,986
"WildBotics: Autonomous sampling with robotics in the wild for nature conservation" – Author and Co-PI.

2023 Centre for the Advanced Study of Collective Behavior Travel Grant €5400
To present at Animal Behavior Society meeting and International Mammalogical Congress

2023-2026 European Commission Marie Sklodowska-Curie Doctoral Network Grant €3,699,680
"WildDrone: Autonomous drones for nature conservation missions" – Author and Co-PI.

2022 Centre for the Advanced Study of Collective Behavior Small Project Grant €5000
"Documentary Palaces" - funding for a collaborative course with Merz Academy of Fine Arts

2022	Christiane Nüsseln-Volhard Stiftung Awardee Competitive stipend to support excellent early career scientists with children	€4800
2021	Animal Behavior Society Caregiver Award	
2020	Centre for the Advanced Study of Collective Behaviour small project grant "Combining drone-based behavioral observation with long-term data for deeper insights into collective processes" Author and PI. Project delayed due to political conflict in Ethiopia.	€10,000
2017 - 2019	European Commission Marie Sklodowska-Curie Individual Fellowship "Mechanisms of collective predator detection and information transfer in African ungulates" Author and PI	€171,460
2017	University of Konstanz Zukunftskolleg Young Scholars Grant Author and PI	€9973
2017	University of Konstanz Zukunftskolleg Investment Grant Funding to purchase a field vehicle in Kenya. Author and PI	€9375
2017	NVIDIA GPU Hardware Grant	
2014	Animal Behavior Society Warner Clyde Allee Competition Finalist	
2013	Princeton University Deans Fund Summer Travel Grant	
2013	American Society of Mammalogists Student Travel Grant	
2012	Princeton Research Symposium Poster Prize	
2012	Animal Behavior Society Student Research Grant	$1000
2010	Philadelphia Explorers Club Stephen Chapman Schroeder Scholarship	$1000
2010	National Science Foundation Graduate Research Fellowship Honorable Mention	
2009	Princeton University EEB Department Summer Research Grant	

PUBLICATIONS *equal contribution; †student mentee — Google Scholar profile

13. Kline J, Stevens S, Maalouf G, Rondeau Saint-Jean C, Nguyen Ngoc D, Mirmehdi M, Guerin D, Burghardt T, Pastucha E, **Costelloe BR**, Watson IM, Richardson TS, Pagh Schultz Lundquist U. 2025. MMLA: Multi-environment, multi-species, low-altitude drone dataset. Paper presented at Conference on Computer Vision and Pattern Recognition (CVPR), Nasvhille, Tennessee, United States.
    This dataset paper present video imagery collected during the 2025 WildDrone Hackathon fieldtrip to Ol Pejeta Conservancy. I planned and led this fieldtrip along with TS Richardson & UPS Lundquist and secured the research permits necessary to collect the data.

12. Papadopoulou M, Ball M, Bartashevich P, Burns ALJ, Chiara V, Clark MA, **Costelloe BR**, Fele M, French F, Hauert S, Heinrich MK, Herbert-Read JE, Hoitt J, Ioannou CC, Landgraf T, Matchette SR, Polverino G, Sankey D, Scott D, Sridhar VH, Strömbom D, Trianni V, Vo-Doan TT, King AJ. 2025. Active interactions between animals and technology: biohybrid approaches for animal behaviour research. *Animal Behaviour* 224: 123160.
    I was an invited plenary speaker at the Workshop on Biohybrid Systems in Animal Behavior, which was sponsored by the Association for the Study of Animal Behaviour. I led and particpated in the workshop discussions that led to this publication and contributed along with all other authors to the writing and revision of the manuscript.

11. Koger B†, Hurme E, **Costelloe BR**, O'Mara MT, Wikelski M, Kays R, and Dechmann DKN. 2023. An automated approach for counting groups of flying animals applied to one of the world's largest bat colonies. *Ecosphere* 14: e4590.
    I mentored the first author and contributed to fieldwork and data collection, data processing, and writing and editing of manuscript.

- In the top 10% of most-read papers in *Ecosphere*

10. Chen J*, Hu M*, Coker DJ, Berumen ML, **Costelloe BR**, Beery S, Rohrbach A, and Elhoseiny M. 2023. MammalNet: A large-scale benchmark for mammal recognition and behavior understanding. *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*: 13052-13061.
    I provided domain expertise in animal behavior and ecology. I ensured the project aligned with the needs of behavioral and wildlife researchers and contributed to writing and revising the manuscript. Only 25% of submitted papers were accepted to this conference.

9. Koger B†, Deshpande A, Kerby JT, Graving JM, **Costelloe BR***, and Couzin ID*. 2023. Quantifying the movement, behavior, and environmental context of group-living animals using drones and computer vision. *Journal of Animal Ecology.* 92: 1357-1371.
    Co-senior author. I defined the scientific motivation for this method and led the collaboration to develop it. I collected the field data and partially funded the project. I mentored the first author and provided iterative feedback on the functionality of the method and ensured that it aligned with the needs of behavioral ecologists and addressed the targeted methodological gaps. Along with the first author, I processed the data, refined the method and wrote and revised the manuscript.
    - Cover article - July 2023 issue
    - Interview on RegioTV (in German)
    - Report on 3Sat NANO (in German)
    - One of the most-read & top-cited articles in *Journal of Animal Ecology*

8. Tuia D*, Kellenberger B*, Beery S*, **Costelloe BR***, Zuffi S, Risse B, Mathis A, Mathis M, Van Langevelde F, Burghardt T, Kays R, Klinck H, Wikelski M, Couzin ID, van Horn G, Crofoot M, Stewart C, and Berger-Wolf T. 2022. Perspectives in machine learning for wildlife conservation. *Nature Communications* 13: 792.
    As the only lead author from the ecology domain, I provided much of the ecological perspective in this piece. I created the figures and, along with the other lead authors, contributed equally to the writing and revision of the manuscript.
    - Top 25 Life and Biological Sciences Papers of 2022
    - Article in Bionieuws magazine (in Dutch)
    - Prompted a new EU Horizon Europe funding call

7. Graving JM, Chae D, Naik H, Li L, Koger B†, **Costelloe BR**, and Couzin ID. 2019. DeepPoseKit, a software toolkit for fast and robust animal pose estimation using deep learning. *eLife* 8: e47994.
    I provided the scientific motivation and data necessary to apply DeepPoseKit to drone footage. I mentored the first author and advised on the applications and requirements of posture tracking for field studies. This is the first demonstration of pose estimation from drone imagery.

6. **Costelloe BR** and Rubenstein DI. 2018. Temporal structuring of vigilance behaviour by female Thomson's gazelles with hidden fawns. *Animal Behaviour* 145: 87-97.

5. **Costelloe BR**. 2018. Participation by a male Grant's gazelle in the defense of a fawn. *African Journal of Ecology* 56: 378-380.

4. **Costelloe BR** and Rubenstein DI. 2015. Coping with transition: offspring risk and maternal behavioral changes at the end of the hiding phase. *Animal Behaviour* 109: 217-225.

3. **Roberts BA** and Rubenstein DI. 2014. Maternal tactics for mitigating offspring risk during the postpartum period in Thomson's gazelle. *Behaviour* 151: 1229-1248.

2. **Roberts BA**. 2012. An attack by a warthog, *Phacochoerus africanus*, on a newborn Thomson's gazelle, *Gazella thomsonii*. *African Journal of Ecology* 50: 507-508.

1. **Roberts BA**. 2012. Perinatal behavior of a Grevy's zebra (*Equus grevyi*) mare and foal. *Journal of Ethology* 30: 205-209.

Preprints and papers in progress - manuscripts available upon request

Submitted

Bennitt E*, **Costelloe BR***, Koger B, Wielgus E, Masunga G, and Caron A. Combining artificial and human intelligence to document the largest ever-counted Cape buffalo mega-herd. *In revision*.

I developed the quantitative methods for this paper, including computer vision methods for detecting and tracking buffalo in the video footage and procedures for manual validation of the output. I analyzed the data, wrote the code (link), curated the dataset and, along with the other authors, wrote and revised the manuscript.

Meier K, Rolland EGA, Iannino E†, Simpson M, Maalouf G, Njoroge W, Mutisya S, Watson M, **Costelloe BR**, Richards A, Richardson T, Schultz U. Simulated and field-based error characterisation of animal geolocalization and relative positioning via commercial drones. *In revision*.

Lundquist UPS, Afridi S, Berthelot C, Bullock S, Burghardt T, Cawthorne D, Christensen A, **Costelloe BR**, Damen M, Nguyen ND, Flack A, Hlebowicz K, Jensen K, Iannino E†, Laporte-Devylder L, Maalouf G, May G, Meier K, Midtiby HS, Molina Catricheo CA, Remondino F, Risse B, Richardson T, Rolland E, Rondeau Saint-Jean C, Shukla V, Tuia D, Wahlberg M, Watson M, Pastucha E. WildDrone: Autonomous drone technology for monitoring wildlife populations. *In review.*

In Preparation

Tuia D, Beery S, **Costelloe BR**, Oliver R. Editorial to the special issue Conservation, Ecology and Artificial Intelligence – Advances and Symbiotic Solutions. *Submission expected Oct 2025.*

Al Abbar F, Eikelboom JAJ, Fiori L, Visser F, Grundlehner A, Lodder A, **Costelloe BR**, Aarts G*, van Langevelde F*. Automatic quantification of dolphins' group coehsion in UAV video-recordings: a case study of swim-with-dolphin field experimental set-up. *Submission expected Oct 2025.*

Iannino E†, Graving JM, Mutisya S, Waigwa C, Wikelski M, **Costelloe BR**. Drones as a monitoring tool for lion (*Panthera leo*) populations: disturbance responses, pride counts, and individual identification. *Submission expected Oct 2025.*

PRESENTATIONS

Invited talks

2026 Workshop on Robotics for Environmental Assessment and Climate Action. IEEE International Conference on Robotics and Automation. *Invited for June 2026.*

Workshop on Multi-Modal Robotics for Sustainable Environmental Sensing. IEEE International Conferences on Robotics and Automation. *Invited for June 2026.*

Introductory Drone Workshop for Wildlife Research and Applications. Department of Wildlife and National Parks, Botswana. Gabarone, Botswana.

2025 Biodiversity and Robotics panel – Climate Robotics Summit. Online. Panel recording.

Department seminar – Department of Ecology and Evolution, Stony Brook University, Stony Brook, NY, USA.

2024 Plenary – Workshop on Computer Vision for Ecology. European Conference on Computer Vision. Milan, Italy. Workshop recording.

Plenary – RUNE Workshop: Robots for Understanding Natural Ecosystems. IEEE Conference on Robotics and Automation. Yokohama, Japan.

Department seminar – Department of Biology, University of Washington. Seattle, WA.

2023 Plenary – Workshop on Biohybrid Systems in Animal Behavior. Association for the Study of Animal Behavior & the Office of Naval Research. Swansea, Wales.

Symposium – The Relative Contributions of Social Bonds to the Movement of Ungulate Herds.

13th International Mammalogical Conference. Anchorage, AK, USA.

Workshop – Using Drones and Computer Vision to Study Animal Movement and Behavior in the Wild. Animal Behavior Society Annual Meeting. Portland, OR, USA.

Department seminar – Centre for Biodiversity and Environment Research, University College London. London, UK.

Department seminar – Department of Ecology, Evolution and Behavior, University of Minnesota – Twin Cities. St. Paul, MN, USA.

2022 Department seminar – Department of Biological Sciences, East Tennessee State University, Johnson City, TN, USA.

2021 Symposium – Weaving the Future of Animal Behavior: Technological Advances to Reveal the Secret Lives of Animals. Animal Behavior Society Annual Meeting. Online.

2020 Thematic session – Capturing Ecology Across Scales Using New Technology. British Ecological Society Annual Meeting. Online.

2019 Workshop – Machine Learning in the Behavioral Sciences. Association for the Study of Animal Behaviour Summer Meeting. Konstanz, Germany.

Seminar – Linking Individual Behavior to Community Responses in Changing Landscapes. Max Planck-Yale Center for Biodiversity Movement and Global Change. New Haven, CT, USA.

Department seminar – Department of Biology, Dartmouth College. Hanover, NH, USA.

2018 Seminar – Wildlife Tracking from Unmanned Aerial Vehicles with Machine Learning. Wageningen University. Wageningen, Netherlands.

2014 Symposium – Allee Symposium for Graduate Research. Animal Behavior Society Annual Meeting. Princeton, NJ, USA.

Department seminar – Department of Biology, University of Pennsylvania. Philadelphia, PA, USA.

Contributed talks

2020 Animal Behavior Society Annual Meeting. Online.

2019 Behavior 2019. Chicago, IL.

Association for the Study of Animal Behaviour Summer Meeting. Konstanz, Germany.

2018 Animal Behavior Society Annual Meeting. Milwaukee, WI.

2015 Animal Behavior Society Annual Meeting. Anchorage, AK.

2013 Animal Behavior Society Annual Meeting. Boulder, CO.

American Society of Mammalogists Annual Meeting. Philadelphia, PA.

Posters

2019 Gordon Research Conference on Movement Ecology of Animals. Barga, Italy.

2018 International Society of Behavioral Ecology Conference. Minneapolis, MN.

2017 Behaviour 2017. Estoril, Portugal.

2012 Princeton Research Symposium. Princeton, NJ. *Poster prize winner.*

TEACHING EXPERIENCE

Instructor of Record

Integrative Dynamics of Animal Behavior – Undergraduate course, Princeton University (Fall 2014)

Evolution and Behavior of the Sexes – Undergraduate course, Princeton University (Spring 2014)

Co-Instructor

WildDrone Summer School – Graduate Course, Max Planck Inst. of Animal Behavior (Fall 2025)

I organized one-week intensive course for 31 PhD students from research institutions around the world. The course unified wildlife ecology and conservation, computer vision, and drone robotics and consisted of lectures by international experts in these fields, hands-on tutorials, interactive workshops, and networking events.

WildDrone Hackathon – Graduate Field Course, Max Planck Inst. of Animal Behavior (Winter 2025)

Along with other WildDrone project leaders, I led a group of 16 graduate students on a two-week field course to Ol Pejeta Conservancy in Kenya. The course unified wildlife ecology and conservation, computer vision, and drone robotics and focused on building skills in fieldwork, drone operation, and data analysis through collaborative projects.

Collective Animal Behaviour – Masters course, University of Konstanz (Fall 2018, 2019, 2022, 2024)

Along with other Department members, I delivered lectures and designed and supervised small-group research projects for a 6-week intensive Masters course on collective animal behavior.

Documentary Palaces – Undergraduate course, Merz Academy of Fine Arts (Summer 2022)

I collaborated with Merz Academy faculty to deliver a course on story-telling with scientific data. Students drew on my research to produce original projects using diverse media, including print-making, textiles, and virtual reality. I delivered lectures on my research, consulted individually with students, and provided feedback during project development.

Environmental Science – Princeton Prison Teaching Initiative (Spring 2014)

The Princeton Prison Teaching Initiative is a volunteer program to provide educational opportunities to incarcerated people. Along with two other instructors, I designed and delivered a high school-level course on Environmental Science. Each class meeting featured a mini-lecture that reviewed an assigned textbook reading, and a group activity (e.g. role playing scenarios) designed to reinforce core concepts through active learning.

Assistant Instructor

Animal Behavior – Undergraduate course, Princeton University (Spring 2012, 2013)

Junior Writing Tutorial – Undergraduate course, Princeton University (Fall 2010)

Evolution and Behavior of the Sexes – Undergraduate course, Princeton University (Spring 2009)

Guest Instructor/Invited Speaker

Animal Behaviour – Undergraduate course, University of Konstanz (Summer 2018-2020, 2024, 2025)

Guest lecture – Diploma course, Wildlife Research and Training Insitute, Kenya (Winter 2025)

CV4Ecology Workshop – Graduate course, Caltech Resnick Sustainability Institute (Winter 2025)

AniMove Summer School – Graduate course, Max Planck Institute of Animal Behavior (Fall 2022)

MENTORING AND SUPERVISION

PhD students

Elena Iannino, University of Konstanz
Co-supervised with Martin Wikelski
Project: "Scouting drones to prevent human wildlife conflict in livestock grazing systems"
Expected degree completion in 2027

2022 **Benjamin Koger**, IMPRS – Quantitative Behaviour, Ecology & Evolution, University of Konstanz
Co-supervised with Iain Couzin
Dissertation title: "Using computer vision to study animal behavior in natural environments"
Current position: Assistant Professor, University of Wyoming

Masters students

2019 **Felicitas Oehler**, University of Konstanz
Thesis title: “Structure and associations within plains and Grevy’s zebra herds during a disturbance”
Current position: Postdoc, Wildlife Research Unit of Baden-Württemberg & University of Vienna

2019 **Sven Lauke**, University of Konstanz
Thesis title: “Behavioral responses to UAVs by wild ungulate herds”
Current position: Project Manager, iTerra Energy

Undergraduate students

2023 **Andreas Bachmann**, University of Konstanz
Thesis title: “‘Exploring the alignment of the Grevy’s zebra with earth’s magnetic field: A drone-based observational approach”

2016 **Jennifer Zhao**, Princeton University - Fieldwork supervision
Thesis title: “Horsing around: quantifying the resilience of the social networks of *Equus caballus*”

2012 **Youngin Lim**, Princeton University - Fieldwork supervision
Thesis title: “Collective vigilance and risk management: anti-predator vigilance behavior in Thomson’s gazelle (*Eudorcas thomsonii*)”

2010 **Sully Carmona**, Princeton University - Fieldwork supervision
Thesis title: “The effects of predation risk on maternal behavior of the Thomson’s gazelle”

2009 **Zackory Burns**, Princeton University - Fieldwork supervision
Thesis title: “The interaction of leadership, risk assessment and information exchange in plains zebra (*Equus burchelli*)”

Dissertation committees
Kasper Hlebowicz, Wageningen University. Defense expected in 2027
Felicitas Oehler, University of Vienna. Defended May 2025
Jeroen Hoekendijk, Wageningen University. Defended January 2024

SERVICE AND LEADERSHIP

Editorial

2023 - 2025 Co-editor, Special Issue “Conservation, ecology and artificial intelligence: advances and symbiotic solutions” – *Methods in Ecology and Evolution*

Grant Management and Administration

2023 - 2026 Conservation Exploitation Manager - WildDrone Project
I communicate the findings and technological developments of the project to practitioners in the wildlife conservation sphere in order to encourage uptake of our results and maximize the impact of the WildDrone project.

Ecology and Conservation Theme Coordinator - WildDrone Project
I coordinate PhD student recruitment and research projects, mentor 5 PhD students in wildlife ecology, and manage applications for wildlife research permits in Kenya.

Diversity, Equity and Inclusion

2022 - 2023 Co-Chair – Max Planck Institute of Animal Behavior Diversity, Equity and Inclusion Working Group

2014 - 2016 Leader and founding member – Princeton EEB Women in Science Partnership

Grant and Peer Review

2016 - present Grant Review College member – British Ecological Society

2015 - present Student Grant reviewer – Animal Behavior Society

Peer review: African Journal of Ecology, The American Naturalist, Animal Behaviour, Animal Cognition, Behavioral Ecology, Behavioral Processes, Biology Letters, Communications Biology, Current Zoology, Ecosphere, International Journal of Biodiversity and Conservation, ISPRS Journal of Photogrammetry and Remote Sensing, Journal of Ethology, Journal of Neuroscience Methods, Methods in Ecology and Evolution, Oikos, PeerJ, Scientific Reports

Societies and Conferences

2023 Workshop leader - "Using Drones and Computer Vision to Study Animal Movement and Behavior in the Wild." – Animal Behavior Society Annual Meeting. Portland, OR.

2019 Organizing Committee member – Association for the Study of Animal Behavior (ASAB) Summer Conference

Workshop leader - "Machine Learning in the Behavioral Sciences" – ASAB Summer Conference

Session moderator – ASAB Summer Conference

2015 Session moderator – Animal Behavior Society Annual Meeting

2016 - 2017 Mammal Biodiversity Committee – American Society of Mammalogists

2011 - 2017 Informatics Committee – American Society of Mammalogists

PROFESSIONAL DEVELOPMENT, SKILLS AND CERTIFICATIONS

Certifications

Certified Remote Pilot (A1/A3) – European Aviation Safety Agency

Certified Remote Pilot – United States Federal Aviation Administration

Workshops

2022 A.I. for Science Bootcamp, Max Planck Computing and Data Facility

2018 Social Networking Analysis Workshop, Max Planck Institute for Ornithology

2016 Data and Modeling in Collective Behavior Workshop, New Jersey Institute of Technology

2014 NextProf Science Diversity Workshop, University of Michigan

Professional Skills Development

2020 Negotiation and Conflict Management, Max Planck Society Training Seminar

2017 SenseFly Drone Operator Training

2013 Talking About Your Teaching, McGraw Center for Teaching and Learning, Princeton University

Classroom Observation and Feedback, McGraw Center, Princeton University

Understanding How Students Learn, McGraw Center, Princeton University

2012 Designing a Course, McGraw Center, Princeton University

Graduate Student Writing in the Sciences, McGraw Center, Princeton University

2008 Assistant Instructor Training, McGraw Center, Princeton University

Technical Skills

Software:	Microsoft Office, Pix4D, Adobe Suite, project management software (Asana, Notion), Git, BORIS, QGIS, Overleaf
Programming:	Python, R
Fieldwork:	Behavioral observation, off-road driving, drone piloting (fixed-wing and multi-copter), safety & logistics, camera trapping, project organization, team leadership, field-based teaching

SOCIETY MEMBERSHIP

International Society of Behavioral Ecology (since 2018)

Association for the Study of Animal Behaviour (since 2017)

International Bio-Logging Society (since 2017)

British Ecological Society (since 2015)

Animal Behavior Society (since 2009)

American Society of Mammalogists (2009 to 2018)

OUTREACH

2017 - 2022	Curator, Animal behavior YouTube channel (>41,000 subscribers)
2016 - 2022	Manager of department Twitter account (@CollectiveBehav)
2019	Guest curator – @RealScientists Twitter account
2018	Public research lecture – Max Planck Day
2016	Guest curator – @BioTweeps Twitter account Presenter – “A Day in Digitopolis” Public Science Day, Arts Council of Princeton
2015	Visiting scientist – Monmouth Junction Elementary School Science Fair