

Paolo Stefano Segre

Curriculum Vitae

Hopkins Marine Station of Stanford University
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Education

2015 • Ph.D. Zoology, University of British Columbia, Advisor: Douglas Altshuler

2006 • M.Sc. Organismal Biology, University of Montana; Advisor: Ken Dial

2003 • B.Sc. General Biology, University of Illinois, Urbana-Champaign

Professional Appointments

2020 - Present • Lecturer, California State University, Chico

2019 - Present • Researcher, Stanford University

2015 - 2019 • Postdoctoral Researcher, Stanford University

Manuscripts

* denotes shared first-authorship
† denotes undergraduate co-author

2021 • Gough, WT; Smith, HJ; Savoca, MS; Czapanskiy, MF; Fish, FE; Potvin, J; Bierlich, KC; Cade, DE; di Clemente, J; Kennedy, J; Segre, PS et al. **Scaling of oscillatory kinematics and Froude efficiency in baleen whales.** *Journal of Experimental Biology*.

2021 • Segre, PS; Weir, CR; Stanworth, A; Cartwright, S; Friedlaender, AS; and JA Goldbogen. **Biomechanically distinct filter-feeding behaviors distinguish sei whales as a functional intermediate and ecologically flexible species.** *Journal of Experimental Biology*.

2021 • Czapanskiy, MF; Savoca, MS; Gough, WT; Segre, PS; Wisniewska, DM; Cade, DE; and JA Goldbogen. **Modelling short-term energetic costs of sonar disturbance to cetaceans using high-resolution foraging data.** *Journal of Applied Ecology*.

2020 • Caruso, F; Hickmot, L; Warren, JD; Segre, PS; Chiang, G; Bahamonde, P; Español-Jiménez, S; Li, S; and A. Bocconcelli. **Diel differences in blue whale (*Balaenoptera musculus*) dive behavior increases nighttime risk of ship strikes in northern Chilean Patagonia.** *Journal of Integrative Zoology*.

2020 • Dakin, R; Segre, PS; and DL Altshuler. **Individual variability and the biomechanics of maneuvering flight in hummingbirds.** *Journal of Experimental Biology*.

2020 • Kahane-Rapport, SR; Savoca, MS; Cade, DE; Segre, PS; Bierlich, KC; Calambokidis, JA; Dale, J; Friedlaender, AS; Johnston, DW; Werth, AJ; and JA Goldbogen. **Lunge filter feeding biomechanics constrain rorqual foraging ecology across scale.** *Journal of Experimental Biology*.

- 2020 • Segre, PS; Potvin, J; Cade, DE; Calambokidis, J; Di Clemente, J; Fish, FE; Friedlaender, AS; Gough, WT; Kahane-Rapport, SR; Oliveira, C et al. **Energetic and physical limitations on the breaching performance of large whales.** *eLife*.
- 2019 • Goldbogen, JA; Cade, DE; Wisniewska, DM; Potvin, J; Segre, PS; Savoca, MS; Hazen, EL; Czapanskiy, MF; Kahane-Rapport, SR; DeRuiter, SL et al. **Why whales are big but not bigger: physiological drivers and ecological limits in the age of ocean giants.** *Science*.
- 2019 • Friedlaender, AS; Bowers, MT; Cade, DE; Hazen, EL; Stimpert, AK; Allen, AN; Calambokidis, J; Fahlbusch, J; Segre, PS; Visser, F et al. **The advantages of diving deep: fin whales double their energy intake by targeting deep krill patches.** *Functional Ecology*.
- 2019 • Gough, WT; Segre, PS; Bierlich, KC; Cade, DE; Potvin, J; Fish, FE; Dale, J; di Clemente, J; Friedlaender, AS; Johnston, DW et al. **Scaling of swimming performance in the largest animals.** *Journal of Experimental Biology*.
- 2019 • Segre, PS and ED Taylor†. **Large ants do not carry their fair share: maximal load carrying performance of leaf-cutter ants (*Atta cephalotes*).** *Journal of Experimental Biology*.
- 2018 • Segre, PS; Cade, DE; Calambokidis, J; Fish, FE; Friedlaender, AS; Potvin, J; and JA Goldbogen. **Body flexibility enhances maneuverability in the world's largest predator.** *Integrative and Comparative Biology*.
- 2018 • Segre, PS and AI Banet. **The origin of avian flight: finding common ground.** *Biological Journal of the Linnean Society*.
- 2018 • Segre, PS; Bocconcelli, A; Hickmott, LS; Howes, G; Warren, JD; and G Chiang. **Offshore hummingbird sightings in Chilean Patagonia.** *Wilson Journal of Ornithology*.
- 2018 • Dakin, R*, Segre, PS*, Straw, AD; and DL Altshuler. **Morphology, muscle capacity, skill and maneuvering ability in hummingbirds.** *Science*.
- 2017 • Goller, B; Segre, PS; Middleton, KM; Dickinson, MH; and DL Altshuler. **Visual sensory signals dominate tactile cues during docked feeding in hummingbirds.** *Frontiers in Neuroscience*.
- 2017 • Sandler, MR; Bocconcelli, A; Hickmott, LS; Chiang, G; Landea-Briones, R; Bahamonde, PA; Howes, G; Segre, PS; and LS Sayigh. **Characterizing Chilean blue whale vocalizations with DTAGs: a test of using tag accelerometers for caller identification.** *Journal of Experimental Biology*.
- 2017 • Skandalis, DA; Segre, PS; Bahlman, JW; Groom, D; Welch Jr; KC; Witt, CC; McGuire, JA; Dudley, R; Lentink, D; and DL Altshuler. **Individual performance and the biomechanical origin of extreme wing allometry in hummingbirds.** *Nature Communications*.
- 2017 • Goldbogen, JA; Cade, DE; Boersma A; Calambokidis, J; Kahane-Rapport, S; Segre, PS; Stimpert, AS; and AS Friedlander. **Using digital tags with integrated video and inertial sensors to study moving morphology and associated behavior in large aquatic vertebrates.** *Anatomical Review*.
- 2017 • Segre, PS; Seakamela, SM; Meÿer, MA; Findlay, KP; and JA. Goldbogen. **Flapping flippers: evidence for a hydrodynamically active flipper-stroke in humpback whales.** *Current Biology*.
- 2017 • Goldbogen, JA; Cade, DE; Calambokidis, J; Friedlaender, AS; Potvin, J; Segre, PS; and AJ Werth. **How baleen whales feed: the biomechanics of engulfment and filtration.** *Annual Review of Marine Science*.
- 2016 • Segre, PS*, Dakin, R*, Read, TJG, and DL Altshuler. **Mechanical constraints on flight at high elevation decrease maneuvering performance.** *Current Biology*.

2016 • Segre, PS; Cade, DE; Fish, FE; Potvin, J; Allen, AN; Calambokidis, J; Friedlaender, AS; and JA Goldbogen. **Hydrodynamic properties of fin whale flippers predict maximum rolling performance.** *J. of Experimental Biology*.

2016 • Read, TJG*, Segre, PS*, Middleton, KM; and DL Altshuler. **Hummingbirds control turning velocity with body orientation and turning radius with asymmetrical wingbeat kinematics.** *J. Royal Soc. Interface*.

2015 • Segre, PS; Dakin, R; Zordan, VB; Dickinson, MH; Straw, AD; and DL Altshuler. **Burst muscle performance predicts the speed, acceleration, and turning performance of hummingbirds.** *eLife*.

2015 • Altshuler, DL; Bahlman, JW; Dakin, R; Gaede, AH; Goller, B; Lentink, D; Segre, PS; and DA Skandalis. **The biophysics of bird flight: functional relationships integrate aerodynamics, morphology, kinematics, muscles and sensors.** *Canadian Journal of Zoology*.

2012 • Pournazeri, S*, Segre, PS*, Princevac, M and DL Altshuler. **Hummingbirds generate bilateral vortex loops during hovering: evidence from flow visualization.** *Experiments in Fluids*.

2012 • Altshuler, DL; Quicazán-Rubio, EM; Segre, PS and KM Middleton. **Wingbeat kinematics and motor control of yaw turns in Anna's hummingbirds (*Calypte anna*).** *J. of Experimental Biology*.

2009 • Jackson, BE; Dial, KP; and PS Segre. **Precocial development of anti-predator locomotor performance in a ground-dwelling bird species (*Alectoris chukar*).** *Proc. Royal Soc. B*.

2008 • Dial, KP; Jackson, BE; and PS Segre. **A fundamental avian wing-stroke provides a new perspective on the evolution of flight.** *Nature*.

Grants

2020 • Dalio Foundation/OceanX • Principal Investigator • Title: *Foraging strategies and energetics of inshore South African Bryde's whales: implications for mitigation against lethal entanglement and prey availability* • Award: \$62,580

2019 • Science Education Exploration Initiative, Sofar Ocean. • Principal Investigator • Title: *Assessing rorqual whale prey fields with a small underwater ROV* • Award: \$1,695

2018 • PADI Foundation Grant for Marine Conservation • Collaborator: contributed to project conceptualization and proposal writing • Title: *Pursuing food and dealing with its cost: a fine-scale study on the foraging ecology of South African inshore Bryde's whales (*Balaenoptera edeni*) using camera-borne tags* • Award: \$5,000

2017 • Society for Marine Mammalogy • Collaborator: contributed to project conceptualization and proposal writing • Title: *Pursuing food and dealing with its cost: a fine-scale study on the foraging ecology of South African inshore Bryde's whales (*Balaenoptera edeni*) using camera-borne tags* • Award: \$2,000

2017 • NSF Division of Integrative Organismal Systems Grant • Collaborator: contributed to project conceptualization and proposal writing • Title: *Scaling of unsteady locomotor performance and maneuverability* • Award: \$322,907

2012 • University of British Columbia • Hesse Research Award in Ornithology • Principal Investigator • Title: *The constraints of morphology and reserve power capacities on maneuvering performance in hummingbirds* • Award: \$1,485

2009 • Valentine Eastern Sierra Reserve Graduate Student Grant • Principal Investigator • Title: *The effect of altitudinal gradients on hummingbird performance in two species of hummingbirds* • Award: \$2,500

2009 • White Mountain Research Station Minigrant • Principal Investigator • Title: *The effects of elevation on maneuverability in two species of hummingbirds* • Award: \$2,000

2009 • NSF Division of Integrative Organismal Systems Grant • Collaborator: contributed to project conceptualization and proposal writing • Title: *Computational analysis of maneuvering flight* • Award: \$163,173

Awards

2015 • Pacific Ecology and Evolution Conference • Best short talk award, runner up

2013 • Cooper Ornithological Society • Katma Award for unconventional and innovative ideas in ornithology

2011, 2012 • University of British Columbia • Department of Zoology Graduate Fellowship

2008 • University of California, Riverside • Chancellor Distinguished Fellowship

Teaching Experience

Introduction to living systems • California State University, Chico • 4 semesters • lecturer

Research Experience for U.S. Underrepresented Minority Students in Costa Rica • Organization for Tropical Studies, LSAMP, and NSF • 1 summer • research mentor and lecturer

Bio-logging and bio-telemetry • Stanford University • 2 semesters • co-instructor

Marine megafauna • Stanford University • 1 semester • co-instructor

Ecology lab • University of British Columbia • 6 semesters • teaching assistant

Introductory biology lab • University of California, Riverside • 2 quarters • teaching assistant

Comparative vertebrate anatomy • University of California, Riverside • 1 quarter • teaching assistant

Introductory biology lab • University of Montana • 1 semester • teaching assistant

Ecology lab • University of Montana • 1 semester • teaching assistant

Parasitology lab • University of Montana • 2 semesters • teaching assistant

Student Supervision

2018 • Ebony Taylor. NSF-LSAMP REU student. **Maximal load carrying performance of Leaf-Cutter Ants (*Atta cephalotes*)**. Organization for Tropical Studies, Costa Rica

2018 • Gabriel Martinez. NSF-LSAMP REU student. **Aerial maneuverability of the Social flycatcher during aerial sallies**. Organization for Tropical Studies, Costa Rica

2015 • Tyson Read. M.Sc. **Hummingbirds use banking to achieve faster turns and asymmetrical wingstrokes to achieve tighter turns**. University of British Columbia

2012 • James Whale. B.Sc. Honors Thesis. **Kinematics of bar-headed geese in hypoxia.** University of British Columbia

2010 • Lev Darkhovsky. CNAS Dean's Summer Research Fellowship. **Morphology and maneuverability in tropical hummingbirds.** University of California, Riverside

2010 • Adam Behroozian. B.Sc. Honors Project. **Competitive interactions between male Anna's hummingbirds (*Calypte anna*): understanding the roles of morphology, power margins, and behavior in predicting dominance.** University of California, Riverside

Field Expeditions

Mar 2019 • Sei whale foraging ecology and biomechanics. Falkland Islands

Jun 2018 • NSF LSAMP REU program. La Selva Biological Station, Costa Rica

Apr 2018 • Bryde's whale foraging ecology and biomechanics. Plettenberg Bay, South Africa

Sep 2017 • Subarctic whale ecology and biomechanics. Greenland Institute of Natural Resources, Greenland

Aug 2017, Aug 2018 • Rorqual whale maneuverability. Channel Islands and Monterey Bay, California

Feb 2016, Feb 2017 • Patagonia blue whale ecology and biomechanics. Fundacion MERI, Chile

Sep 2016 • Arctic blue whale ecology and biomechanics. Norwegian Polar Institute, Svalbard

Jun 2013 • High elevation Andean hummingbird maneuverability. Hacienda Guaytara, Ecuador

Feb 2012 • High and low elevation tropical hummingbird maneuverability. La Selva Biological Station and Cerro De La Muerte, Costa Rica

Jul 2010 • Amazonian hummingbird maneuverability. Los Amigos Field Station, Peru

May 2009 • High elevation hummingbird maneuverability. Valentine Eastern Sierra Reserve and White Mountain Research Station, California

Conferences and Workshops

2020 • Society Integrative and Comparative Biology: talk presented

2018 • NSF-LSAMP Diversity and mentoring workshop, Organization for Tropical Studies

2018 • Teaching workshop for Postdoctoral Scholars, Stanford University

2018 • Society Integrative and Comparative Biology: talk presented

2017 • Inertial Sensing Workshop, Kerteminde Denmark

2017 • Bio-logging Symposium: poster presented

2016 • Society Integrative and Comparative Biology: talk presented

- 2015 • Pacific Ecology and Evolution Conference: talk presented
- 2012 • Society for Integrative and Comparative Biology: symposium talk co-author
- 2008 • Desert Tortoise Research Council
- 2006 • Society Integrative and Comparative Biology: poster presented
- 2005 • American Ornithologists Union

Invited talks

- Mar 2019 • Falkland Conservation Seminar Series, invited speaker
- Sep 2018 • Monterey Birding Festival, invited speaker
- Mar 2016 • Chico State, biology seminar series
- Oct 2006 • Illinois Institute of Technology, biology colloquium series

Work Experience

- Feb 2008 • Field Crew Leader, Great Basin Institute: Mojave desert tortoise line distance survey, Nevada
- Aug 2007 • Field Technician, Australian Wildlife Conservancy: Purple crowned fairy wren distribution and genetic survey, Mornington Wildlife Research Station, Australia
- Mar 2007 • Field Technician, Montana Cooperative Wildlife Research Unit and the University of Montana: long term research of life history variation in tropical birds, Yacumbu, Venezuela
- Apr 2004 • Field Technician, United States Geological Survey and University of California at Davis: spotted owl survey in Yosemite National Park
- Jan 2004 • Field Intern, Minnesota Department of Natural Resources: Winter population ecology of white tailed deer and gray wolves
- Aug 2003 • Field Intern, United States Geological Survey, Hawaii: Biocomplexity of avian disease
- May 2003 • Field and Lab Technician, University of Illinois- Smithsonian Institute for Tropical Studies- Barro Colorado Island, Panama: tropical forest soil dynamics
- May 2002 • Undergraduate Research Assistant, Illinois Institute of Technology – Biophysics Collaborative Access Team, Argonne National Laboratory: drosophila flight muscle structure

Professional Qualifications

- 2017 - Present • Remote pilot certification • Federal Aviation Administration
- 2009 - 2017 • Federal Bird Banding subpermittee • United States Geological Survey

2006 • Desert Tortoise handling permittee • United States Fish and Wildlife Service

Popular Press

- 2021 • Inside JEB: *Versatile sei whales both lunge and skim to feed*; Kathryn Knight
- 2020 • eLife Insights: *Whale breaching says it loud and clear*; Alexander J. Werth and Charles L. Lemon
- 2019 • Science Perspective: *The biology of big*; Terrie M. Williams
- 2019 • Audubon Magazine: *Hummingbird hackers*; Jessica Leber
- 2018 • Science Perspective: *How hummingbirds stay nimble on the wing*; Peter C. Wainwright
- 2018 • Science: *High-speed cameras reveal how hummingbirds can turn on a dime*; Elizabeth Pennisi
- 2018 • Seeker: *The secrets of hummingbird agility revealed*; Jen Viegas
- 2017 • National Geographic: *Rare video captures never-before-seen whale behavior*; Carrie Arnold
- 2017 • Scientific American Podcast: *Humpback whale flippers do more than maneuver*; Emily Schwing
- 2017 • Science News For Students: *Humpbacks flap their flippers like underwater birds*; Sharon Oosthoek
- 2017 • Sermitsiaq: *Forskere: Hvor sulten er en hval i Tasiilaq? (Translation; How hungry are whales in Tasiilaq?)*; Jorgen Schultz-Nielsen
- 2017 • Half Moon Bay Review: *Whales taking flight*; Sara Hayden
- 2015 • Serious Science: *Hummingbird agility depends on raw muscle power*; Paolo Segre and Roslyn Dakin
- 2010 • PBS Documentary: *Hummingbirds: Magic in the Air*
- 2008 • BBC Science News: *Secrets of bird flight revealed*; Rebecca Morelle

Service as a Reviewer

Journal of Experimental Biology

Functional Ecology

Journal of the Royal Society, Interface

eLife

Scientific Reports

Frontiers in Bioengineering and Biotechnology

Endangered Species Research

Behavioral Ecology and Sociobiology

Wilson Journal of Ornithology

Marine Mammal Science

Journal of Zoology

Professional Development

2017 • Center for Integrated Research Teaching and Learning online course: Introduction to evidence-based undergraduate STEM teaching

2010 • Elementary school science education program for remote Amazonian communities near the Los Amigos Research Station, Peru