

# KELSI M. RUTLEDGE

University of California Los Angeles, LA, CA 90095

Contact: (828) 702-0201, [kelsi.rutledge@gmail.com](mailto:kelsi.rutledge@gmail.com), Twitter: @fishandfreckles

## EDUCATION

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- 2018-2022 **Ph.D. in Ecology and Evolutionary Biology\*** **University of California Los Angeles**  
Thesis: *The Morphology and Fluid Dynamics of Chemical Scent Detection in Stingrays*  
Advisor: Malcolm Gordon  
\**Summa cum laude*
- 2018 **M.Sc. in Ecology and Evolutionary Biology\*** **University of California Los Angeles**  
Thesis: *Guitarfish Systematics, Taxonomy, and Morphology*  
Advisor: Don Buth  
\**Summa cum laude*
- 2016 **B.S. Marine Biology\*** **University of North Carolina Wilmington**  
2016 **B.S. Environmental Science\*** **University of North Carolina Wilmington**  
Honors Thesis: *Fish Use of Created vs. Natural Oyster Reefs (*Crassostrea virginica*)*  
\**Magna cum laude*

## RESEARCH FELLOWSHIPS

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- 2021 Office of Naval Research (ONR) Naval Research Enterprise Internship (**NREIP**: 10 weeks) ~\$11,000  
2020 Department of Defense National Science and Engineering Fellowship (**NDSEG**: 3 years) ~\$120,000

## SCIENTIFIC PUBLICATIONS

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11. **Rutledge, K.M.**, Gordon, M.S., Dabiri, J.O. Morphology-Driven Odor Entrainment in Laminar Flows: Stingray Chemoreception. *In prep.*
10. **Rutledge, K.M.**, Murphy, C.T., Eldredge, J., Gordon, M.S. 2022. The Fluid Dynamics of Chemical Scent Detection in Stingrays and their Relatives. *In prep for the Journal of Experimental Biology.*
9. **Rutledge, K.M.** 2022. New Intermediate Morphotype in Guitarfishes (Batoidea: Rhinobatidae) with implications for Identification and Conservation. *In Revision at the Journal of Ichthyology and Herpetology.*
- <sup>^</sup>8. Ramarapu, R., **Rutledge, K.M.** 2022. A Tail of Two Swimmers: Ontogenetic Growth in Rays (Elasmobranchii: Batoidea) with Robust Tails. *In Revision at the Journal of Morphology.*
7. **Rutledge, K.M.** 2022. Sniffing out Stingray Noses: The Functional Morphology of Batoid Olfaction. *Accepted at the Journal of Integrative and Organismal Biology.*
6. Lin, M., Simons, A. L., Curd, E. E., Harrigan, R. J., Schneider, F. D., Ruiz- Ramos, D. V., Gold, Z., Osborne, M. G., Shirazi, S., Teia, M. Schweizer, T.M., Moore, T.N., Fox, E.A., Turba, R., Garcia-Vedrenne, A. E., Helman, S. **K.M., Rutledge, K.**, Mejia, M. P., Marwayana, O.N., Munguia Ramos, M. N., Meyer, R. S. 2020. Landscape analyses using eDNA metabarcoding and Earth observation predict community biodiversity in California. *Ecological Applications*. 31(6):e02379. <https://10.0.3.234/eap.2379>
5. **Rutledge, K.M.** 2020. First Record of Gorgona Guitarfish (*Pseudobatos prahli*) off the Baja California Peninsula with Updated Key to the Guitarfishes of the Gulf of California. *Journal of Fish Biology*. <https://doi.org/10.1111/jfb.14585>

4. Gordon, M.S., Lauritzen, D.V., Wiktorowicz, A.M., **Rutledge, K.M.** 2020. Aracaniform Swimming: A Swimming Mode used by Deep-Water Boxfishes (Teleostei: Tetraodontiformes: Aracanidae). *Physiological and Biochemical Zoology Special Issue: Biomechanics*, 93(3): 235-242.

<https://doi.org/10.1086/708163>

+3. **Rutledge, K.M.** 2019. A New Guitarfish of the Genus *Pseudobatos* (Batoidea: Rhinobatidae) with Key to the Guitarfishes of the Gulf California. *Ichthyology and Herpetology*, 107 (3): 451-463.

<https://doi.org/10.1643/CI-18-166>

\*2. **Rutledge, K.M.**, Summers, A. P., Kolmann, M.A. 2019. Killing them Softly: Ontogeny of Jaw Mechanics and Stiffness in Mollusk-Feeding Freshwater Stingrays. *Journal of Morphology*, 280: 796-808.

<https://doi.org/10.1002/jmor.20984>

1. **Rutledge, K. M.**, Alphin, T. & Posey, M. 2018. Fish Utilization of Created vs. Natural Oyster Reefs (*Crassostrea virginica*). *Estuaries and Coasts*, 41 (8): 2426-2432.

<https://doi.org/10.1007/s12237-018-0433-4>

\*Top 10% downloaded paper for that year in the respective journal

+Altmetric: 435, Journal name changed in 2020 from *Copeia* to *Ichthyology and Herpetology*

^Mentored student

## PRESENTATION AWARDS

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2022	<b>1<sup>st</sup> place:</b> Graduate Marine Biology Poster Award, Annual Biology Research Symposium, UCLA	
2022	<b>1<sup>st</sup> place:</b> UCLA "Grad Slam" Graduate Student Thesis Presentation Competition, UCLA	<b>\$5,000</b>
2021	<b>1<sup>st</sup> place:</b> Graduate Marine Biology Poster Award, Annual Biology Research Symposium, UCLA	
2020	<b>1<sup>st</sup> place:</b> Graduate Marine Biology Poster Award, Annual Biology Research Symposium, UCLA	
2019	<b>1<sup>st</sup> place:</b> Best Graduate Student Poster Award, Annual Biology Research Symposium, UCLA	
2018	<b>1<sup>st</sup> place:</b> Best Graduate Student Poster Award, Annual Biology Research Symposium, UCLA	
2017	<b>3<sup>rd</sup> place:</b> Best Graduate Student Poster Award, Annual Biology Research Symposium, UCLA	
2017	<b>1<sup>st</sup> place:</b> AIFRB Best Poster Award, Southern California Academy of Sciences Annual Conference	
2016	Honorable Mention: Poster Award, Student Research and Creativity CSURF Showcase, UNCW	

## GRANTS AWARDED TO K.M.R.

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2022	University of California Additional Support	<b>\$7,500</b>
2020	University of California Additional Support	<b>\$7,500</b>
2020	University of California Research Grant	<b>\$1,500</b>
2019	Sigma Xi Grant in Aid of Research	<b>\$1,000</b>
2019	Grant in Aid of Research (GIAR) Society for Integrative and Comparative Biology	<b>\$1,000</b>
2019	University of California Los Angeles Travel Grant	<b>\$2,300</b>
2019	University of California Los Angeles Research Grant	<b>\$1,000</b>
2018	Friday Harbor Laboratories Wainwright Fellowship	<b>\$2,700</b>
2018	University of California Los Angeles Research Grant	<b>\$2,000</b>
2018	Society for Integrative and Comparative Biology Housing and Travel Grant	<b>\$600</b>
2017	University of California Los Angeles Fellowship	<b>\$750</b>
2017	American Society of Ichthyologists and Herpetologists Travel Grant	<b>\$600</b>

## RESEARCH AWARDS

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2020	Life Science Excellence Award Winner for Research Paper	<b>\$500</b>
2020	Lasiewski Award in Recognition of Outstanding Research in Organismal Biology	<b>\$250</b>

2019 UCLA Faculty Women's Club Scholarship and Departmental Nominee

**\$3,000****TEACHING AWARD**

2021 Schechtman Award in Recognition of Outstanding Service as a Teaching Associate

**PRESENTATIONS****+INVITED SPEAKER      \*\*AWARD GIVEN**

2022	NDSEG Fellowship Awardee National Conference	Boston, MA
2022	Association for the Sciences of Limnology and Oceanography	Virtual due to COVID-19
2022	UC Campus Wide Grad Slam Thesis Competition <sup>+</sup>	San Francisco, CA
2022	UCLA Grad Slam Thesis Competition**	Los Angeles, CA
2022	Association for Sciences of Limnology and Ocean Sciences	Virtual due to COVID-19
2022	Society for Comparative and Integrative Biology	Phoenix, AZ
2021	UCLA Annual Biology Research Symposium**	Virtual due to COVID-19
2020	UCLA Annual Biology Research Symposium**	Virtual due to COVID-19
2020	Society for Comparative and Integrative Biology	Austin, TX
2019	International Congress of Vertebrate Morphology	Prague, Czech Republic
2019	UCLA Annual Biology Research Symposium**	Los Angeles, CA
2019	Southern California Academy of Sciences Annual Conference	Los Angeles, CA
2019	SICB DVM Dwight Davis Award Competition	Tampa, FL
2018	FHL Fish Biomechanics Research Project	Friday Harbor Labs, San Juan Island
2018	UCLA Annual Biology Research Symposium**	UCLA
2017	Southern California District Board AIFRB Annual Meeting+	Los Angeles, CA
2017	Joint Meeting of Ichthyologists and Herpetologists	Austin, TX
2017	UCLA Annual Biology Research Symposium**	UCLA
2017	Southern California Academy of Sciences Annual Conference**	Los Angeles, CA
2016	Student Research and Creativity CSURF Showcase**	UNC-Wilmington

**RESEARCH EXPERIENCE**

August 2021- Present	<b>Visiting Researcher at Caltech</b> Description: Conducting experimental fluid dynamic and flow visualization experiments (particle image velocimetry) on chemical scent detection in stingrays <u>Mentored by: Dr. John Dabiri</u>	Pasadena, CA
May 2021- August 2021	<b>Naval Bioinspired Research and Development Lab Intern</b> Description: At Naval Undersea Warfare Center assisting with the development of classified research projects, obtained "Secret" clearance, fluid dynamics experiments, 3D printing <u>Mentored by: Dr. Christin Murphy,</u>	Newport, RI
2018-Present	<b>Ichthyology Research Assistant</b> Description: Maintained and managed fish museum collection, research with fish specimens, assisting with loans	UCLA Ichthyology Museum Collection, CA
July 2018- August 2018	<b>Fish Biomechanics Intern</b> Description: Research course designed to teach the fundamentals of fish biomechanics and fluid dynamics while students research an independent project. My project resulted in publication #2 on this CV. <u>Mentored by: Dr. Adam Summers</u>	Friday Harbor Labs, San Juan Island, WA

- June 2013-2016     **Research Technician**, Benthic Ecology Lab     Center for Marine Science, Wilmington, NC  
 Description: Worked on a variety of lab projects: impacts of grain size and porosity for beach renourishment, benthic infaunal assessment and analysis, oyster reef restoration and artificial reef building (USACE), fish communities around oyster reefs, oyster population health assessment, NOAA Poplar Island Restored Marsh Analysis; Cape Fear River Environmental Monitoring
- 2015-2016     **Honors Thesis Research Project**     Center for Marine Science, Wilmington, NC  
 Description: Undergraduate research thesis comparing fish utilization of artificial oyster reefs to natural oyster reefs; deploy breder traps and seine net to catch resident and transient nekton; resulted in publication #1.  
Mentored by: Dr. Martin Posey
- 2015-2016     **St. James Coastal Erosion Intern**     St. James Plantation, Southport, NC  
 Description: Build and manage a bagged oyster reef as a “living shoreline” to prevent wetland erosion on the intracoastal waterway; monthly sampling of bagged reef to determine nekton utilization and infaunal assessment; deploy and retrieve cultch bags for monthly analysis, measuring growth of *Spartina*, seine and sweep net along reef to determine community
- 2014-2016     **Ichthyology Lab Intern**     Center of Marine Science, Wilmington, NC  
 Description: Sediment sorting, identifying invertebrates, fish identification, gill net, seine net, assist with the process of fish preservation for university museum

## TEACHING EXPERIENCE

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12 quarters, 2 semesters, 22 sections of teaching experience  
 Teaching evaluations overall mean score: 8.5/10 (+/- 0.4 SD)

### Guest Lecture, UCLA

1 hr 15 minute lecture on sensory biology and biomechanics of fishes

### Teaching Associate, UCLA

Spring 2020     Introduction to Marine Science Lab 109L  
 Winter 2020     Animal Physiology Lab 170  
 Fall 2019     Introduction to Marine Science 109  
 Winter 2019     Animal Physiology Lab 170  
 Winter 2018     Vertebrate Morphology and Biomechanics Lab 110  
 Spring 2018     Systematics 130

### Teaching Assistant, UCLA

Fall 2017     Introduction to Marine Science Lab 109L  
 Summer 2017 Session C Ecology, Evolution and Biodiversity LS1  
 Summer 2017 Session A Ecology, Evolution and Biodiversity LS1  
 Spring 2017     Introduction to the Oceans 25  
 Winter 2017     Ecology, Evolution and Biodiversity LS1  
 Fall 2016     Introduction to Marine Science 109

### Undergraduate Teaching Assistant, UNC-Wilmington

Spring 2016     Ichthyology Lab  
 Fall/Spring 2016 Ichthyology Lab

## OUTREACH AND MENTORSHIP

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### Students directly mentored:

*Raneesh Ramarapu* (2020-Present): direct mentor for undergraduate honors thesis

*Elva Garcia Vela* (2019-2020): independent research project

*Melissa Vasquez* (2016-2019): introduction to lab work (morphometrics, collections) and coding (R)

### 2019-Present **Outreach Associate for the Journal of Integrative and Organismal Biology (IOB)**

Description: Writing inclusive blog posts to summarize recently published journal articles

[\(Link\)](#)

### 2018-2020 **Building Engineers and Mentors (BEAM)**

Los Angeles, CA

Description: Weekly visits to underrepresented elementary student's classroom to teach fun science and engineering-based activities

### 2017-2018 **Minds Matter Mentor**

Los Angeles, CA

Description: Mentor a low-income high school student as they transition to a university

### November 4<sup>th</sup> 2018, 2019 **Exploring Your Universe with BNC**

Los Angeles, CA

Description: Largest UCLA Science Festival open to the public, catered towards elementary and middle school kids, run and design EEB Booth

### April 9<sup>th</sup> 2018 **iDigBio UCLA Representative**

Los Angeles, CA

Description: NSF funded "Broadening Diversity Workshop" with the goal of introducing undergraduate students, especially those in underrepresented populations, to museum and biodiversity science careers

### 2014-2016 **Coastal Erosion Outreach Intern**

Wilmington, NC

Description: Inform the public and local benefactors of coastal erosion issues and marsh ecosystem services; lead citizen scientists on oyster reef building event

### 2013-2014 **Aquarium Education Volunteer**

Fort Fisher Aquarium, Fort Fisher, NC

Description: Supervise select exhibits and basic marine life care; teach guests about marine life throughout the aquarium

## PROFESSIONAL SOCIETIES

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American Physical Society (APS) Division of Fluid Dynamics (DFD)

Society of Comparative and Integrative Biology (SICB)

Southern California Academy of Sciences (SCAS)

American Society of Ichthyology and Herpetology (ASIH)

American Elasmobranch Society (AES)

Association for the Sciences of Limnology and Oceanography (ASLO)

## SKILLS

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8 years working in a formal scientific lab setting, leading and managing projects, mentoring students

**Programming Languages:** R (advanced), MATLAB (novice)

**Certifications:** CPR/First Aid adult and child certified, Padi Open Water Dive Certified

**Government Security Clearance:** "Secret" Navy Contractor Clearance, 2021

**Software:** COMSOL, 3D Slicer, AutoCAD, Meshmixer, Solidworks, Fiji, Adobe Illustrator, Microsoft products

**Museum and Collections Experience:** Maintaining UCLA research and teaching ichthyology collection, collaboration with LACM, Scripps, Bell Museum, Harvard Museum

**Technologies:** CT and uCT scanning, 3D Printing, Arduino, fluorometer, sediment grabber, particle sizer

**Lab Skills:** Experimental fluid dynamics methods, dye visualization, PIV, laser safety training

**Field Skills:** Fish sampling techniques: seining/gill netting/trawling, familiar with dissecting and identifying coastal fishes, benthic assessment and live history (i.e. spat racks, quadrats), oyster reef restoration: metrics and condition indices, building and maintaining created oyster reefs, identification of oyster reef and surf zone associated invertebrate fauna, water quality monitoring TSS and chl-a, comfortable on/driving a boat

## MEDIA ATTENTION (click for links)

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### **Nerdist Magazine**

[\*“NOPE’S Science Consultant Reveals The Name And Inspiration For The Movie’s Alien”\*](#)

### **WLOS News 13 Feature**

[\*“NC Local Catches the Attention of Hollywood”\*](#)

### **Science Friday Podcast Interview**

[\*“The Surprising Animal Science Behind Jordan Peele’s NOPE”\*](#)

### **UCLA College Magazine**

[\*“Marine scientist Kelsi Rutledge explores new possibilities for bioinspired design”\*](#)

### **UCLA Newsroom**

[\*“The Fluid Dynamics of Smell: A Stingray’s Perspective\), Kelsi Rutledge wins 1st Place”\*](#)

### **Forbes**

[\*“Stingrays Eat Food that is Harder than their own Jaws”\*](#)

### **Spectrum 1 News**

[\*“Graduate Student Discovers Species Lurking Inside a Museum”\*](#)

### **Forbes**

[\*“Say Hello to a New Relative of Sharks”\*](#)

### **Smithsonian Magazine**

[\*“Scientist Lampoons Birth Announcements With Discovery of New ‘Spadenose’ Ray”\*](#)

### **American Scientist**

[\*“Welcome to the World Pseudobatos buthi”\*](#)

## REFERENCES

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Malcolm Gordon  
Professor Emeritus  
Ecology and Evolutionary Biology Department  
University of California Los Angeles  
323-646-4037  
*PhD Advisor*

John Dabiri  
Centennial Chair Professor  
Graduate Aerospace Laboratories (GALCIT) and Mechanical Engineering Department  
California Institute of Technology  
626-395-4450  
*Mentor at Caltech*

Adam Summers  
Professor of Biology  
School of Aquatic and Fishery Science  
Friday Harbor Labs, University of Washington  
310-864-141  
*Mentor for Fish Biomechanics Course*