

# Yubin Raut

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## Education

### UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA

- *Ph.D. | Ocean Sciences | 2015 – 2021*
- Cumulative GPA: 4.0/4.0
- Thesis: Biological nitrogen fixation associated with living and decomposing macroalgae
- Advisor: Dr. Douglas G. Capone

### TEXAS A&M UNIVERSITY, COLLEGE STATION, TX

- *Bachelor of Science | 2011 – 2015*
- Major: Biology, Geology | Minor: Oceanography
- Cumulative GPA: 3.63/4.0 | Honors: Cum Laude

## Professional Experience

### UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA

- *Postdoctoral Scholar | Fuhrman Lab | July 2021 – December 2023*

### MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MA

- *Postdoctoral Scholar | Follows Lab | January 2024 – Present*

## Publications

Zakem E.J., McNichol, J.C., Weissman, J.L., **Raut, Y.**, Xu, L., Halewood, E.R., Carlson, C.A., Dutkiewicz, S., Fuhrman, J.A., Levine, N.M. (2024). Predictable functional biogeography of marine microbial heterotrophs. *bioRxiv. In Review – Science*.

Jones-Kellett, A.E., McNichol, J.C., **Raut, Y.**, Cain, K.R., Ribalet, F., Armbrust E.V., Follows, M.J., Fuhrman, J.A. (2024). Amplicon Sequencing with Internal Standards Yields Accurate Picocyanobacteria Cell Abundances as Validated with Flow Cytometry. *ISME Communications*. <https://doi.org/10.1093/ismeco/ycae115>

**Raut, Y.**, Barr, C. R., Paris, E. R., Kapili, B. J., Dekas, A. E., & Capone, D. G. (2024). Autochthonous carbon loading of macroalgae stimulates benthic biological nitrogen fixation rates in shallow coastal marine sediments. *Frontiers in Microbiology*, 14, 1312843.

Fletcher-Hoppe, C., Yeh, Y.C., **Raut, Y.**, Weissman, J.L., Fuhrman, J.A. (2023). Symbiotic UCYN-A strains co-occurred with El Niño, relaxed upwelling, and varied eukaryotes over 10 years off Southern California. *ISME Communications*, 3(1), 63.

**Raut, Y.** and Capone, D.G. (2021). Macroalgal detrital systems: an overlooked ecological niche for heterotrophic nitrogen fixation. *Environmental Microbiology*. doi.org/10.1111/1462-2920.15622.

Navarrete, I.A., Kim, D.Y., Wilcox, C., Reed, D.C., Ginsburg, D.W., Dutton, J.M., Heidelberg, J., **Raut, Y.**, and Wilcox, B.H. (2021). Effects of depth-cycling on nutrient uptake and biomass production in the giant kelp *Macrocystis pyrifera*. *Renewable and Sustainable Energy Reviews*. doi:10.1016/j.rser.2021.110747

**Raut, Y.,** Morando, M., and Capone, D.G. (2018). Diazotrophic macroalgal associations with living and decomposing *Sargassum*. *Frontiers in Microbiology*, 9. doi:10.3389/fmicb.2018.03127

## Manuscripts in Preparation

**Raut, Y.,** McNichol, J.C., Ser-Giacomi, E., Jahn, O., Finkel, Z., Dutkiewicz, S., Follows, M.J., & Fuhrman, J.A. (2024). Restructuring metabarcoding data to explore phytoplankton biogeography with a global ecosystem model in the Pacific Ocean. *In preparation*

Ser-Giacomi, E., McNichol, J.C., **Raut, Y.,** Yeh, Y.C., Ribalet, F., Hassler, C., Rees, A., Tarran G., Gradoville, R., Turk-Kubo, K., Zehr, J.P., Dutkiewicz, S., Follows, M.J., & Fuhrman, J.A. (2024). Estimating absolute microbial abundances by combining metabarcoding and cell-count data. *In preparation*

McNichol, J.C., Williams, N.L.R., **Raut, Y.,** Carlson, C.A., Halewood, E.R., Turk-Kubo, K., Zehr, J.P., Rees, A., Tarran, G., Gradoville, M.R., Metifies, K., Weitz, M., Bienhold, C., Mock, T., Torres-Valdez, S., Eggers, S.L., Jeffrey, W., Moss, J., Berube, P., Biller, S., Bodrossy, L., Van De Kamp, J., Brown, M., Sow, S., Armbrust, G., & Fuhrman, J.A. (2024). Characterizing and comparing distributions of organisms within all 3 domains of life with universal primers from over 1200 samples throughout the global ocean. *In preparation*

**Raut, Y.,** Paris, E. R., Kapili, B. J., Dekas, A. E., Hutchins, D.A., & Capone, D. G. (2024). Elucidating the role of biological nitrogen fixation during pelagic *Sargassum* bloom formation and decomposition in the Atlantic Ocean. *In preparation*

## Fellowships and Awards

- Katrina J. Edwards Memorial Dissertation Award | University of Southern California | 2022
- William E. Trusten Award | Most Accomplished Graduate Student in Biological Sciences | University of Southern California | 2020/2021
- Provost's Research Enhancement Fellowship | University of Southern California | 2020/2021
- Wrigley Institute Graduate Summer Fellowship | University of Southern California Wrigley Institute for Environmental Studies | 2018, 2019, 2020
- Victoria J. Bertics Graduate Summer Fellowship | University of Southern California Wrigley Institute for Environmental Studies | 2016, 2017

## Conference Presentations

**Raut, Y., et al.,** Dutkiewicz, S., Follows, M.J., Fuhrman, J.A. A robust inter-basin, latitudinal succession of pico-phytoplankton revealed using 3-domain universal primers. Abstract presented at the 19<sup>th</sup> International Society for Microbial Ecology (ISME) Meeting, Cape Town, South Africa, 18 – 23 August 2024. (Poster Presentation)

**Raut, Y., et al.,** Dutkiewicz, S., Follows, M.J., Fuhrman, J.A. Using global rRNA metabarcoding datasets to assess a trait-based ecosystem model reveals the importance of missing and under-surveyed phytoplankton. Abstract presented at 2024 Ocean Sciences Meeting, New Orleans, LA, 18 – 23 February 2024. (Oral Presentation)

Williams, N., **Raut, Y.,** McNichol, J., et al., Fuhrman, J.A. Characterizing and comparing distributions of organisms within all 3-domains of life with universal primers from 1577 samples throughout the global ocean. Abstract presented at 2024 Ocean Sciences Meeting, New Orleans, LA, 18 – 23 February 2024. (Oral Presentation)

Jones-Kellett, A.E., McNichol, J., **Raut, Y.,** Fuhrman, J.A., Follows M.J. The fluid dynamical structuring of microbial communities along an eastern north Pacific transect. Abstract presented at 2024 Ocean Sciences Meeting, New Orleans, LA, 18 – 23 February 2024. (Poster Presentation)

**Raut, Y.,** J. McNichol, E. Ser-Giacomi, P. Berube, S. Biller, C. Carlson, E. Halewood, Z. Finkel, S. Dutkiewicz, M. Follows, and J. Fuhrman. Comparing Global Phytoplankton Community Structure Using 3-Domain (16S & 18S) Primers and Trait-based Ecosystem Models. Abstract presented at the 18<sup>th</sup> International Society for Microbial Ecology (ISME) Meeting, Lausanne, Switzerland, 14 – 19 August 2022. (Poster Presentation)

**Raut, Y.** and D.G. Capone. Remineralization of macroalgal organic matter stimulates diazotrophic activity in coastal ecosystems. Abstract presented at 2022 Ocean Sciences Meeting, Online, 24 Feb. – 4 Mar. (Oral)

**Raut, Y.** and D.G. Capone. Increased Nitrogen Fixation Observed With Degrading *Sargassum* Communities. Abstract presented at 2020 Ocean Sciences Meeting, San Diego, CA, 16 Feb.-21 Feb. (Oral Presentation)

**Raut, Y.,** M. Morando, and D.G. Capone. Shifts in microbial community composition associated with decomposing macroalgae and the role of nitrogen fixation in these detrital coastal systems. Abstract presented at 2019 Aquatic Sciences Meeting, San Juan, Puerto Rico, 23 Feb.-2 Mar. (Oral Presentation)

**Raut, Y.,** S. Matzke, C. Vieira, and D.G. Capone. Nitrogen fixation associated with *Sargassum horneri* and *Sargassum palmeri*. Abstract presented at 2017 Aquatic Sciences Meeting, Honolulu, HI, 26 Feb.-3 Mar. (Oral)

Ortiz, S., **Y. Raut,** D.G. Capone. The Effect of Decomposition on Nitrogen Fixation Associated with *Codium fragile* off the Coast of Santa Catalina Island. Abstract presented at 2019 SACNAS – The National Diversity in STEM Conference, Honolulu, HI, 31 Oct.-2 Nov. (Poster Presentation – *by Undergraduate Mentee*)

Dillon, T.N., **Y. Raut,** and D.G. Capone. Nitrogen fixation by sulfate-reducing diazotrophs associated with the decomposition of macroalgae. Abstract [ED34A-2394(B)] presented at 2018 Ocean Sciences Meeting, Portland, OR, 12-16 Feb. (Poster Presentation – *by Undergraduate Mentee*)

Matzke, S., **Y. Raut,** C. Vieira, and D. G. Capone. Nitrogen fixation rates associated with anatomical features of *Sargassum horneri* surrounding Catalina Island, CA. Abstract presented at 2017 Aquatic Sciences Meeting, Honolulu, HI, 26 Feb.-3 Mar. (Oral Presentation – *by Undergraduate Mentee*)

## Teaching Experience

### Graduate Teaching Assistant | University of Southern California | August 2015 - 2020

- *BISC 457, Methods in Marine Biology and Biological Oceanography* | *Spring Maymester 2020*
  - Co-developed a field and lab work intensive course for an online platform due to Covid-19 restrictions.
  - Overall Rating: 3.67/4.0 | *Spring 2020*
- *BISC 483, Geobiology and Astrobiology* | *Spring 2017, Spring 2019*
  - Overall Rating: 4.53/5.0 | *Spring 2017*
  - **Outstanding TA Award** | *Spring 2017, Spring 2019*
- *BISC 102, Humans and Their Environment* | *Fall 2015, Spring 2016, Fall 2019*
  - Overall Rating: 4.82/5.0, 4.94/5.0, 3.47/4.0 | *Fall 2015, Spring 2016, Fall 2019*

### Adjunct Professor | Mount Saint Mary's University | Fall 2019

- *BIO\_003L, General Microbiology Lab* | *Fall 2019*
  - Plan lectures, assignments, experiments, quizzes, and exams for two lab sections.
  - Overall Rating: 6.78/7.0 | *Fall 2019*

### Supplemental Instruction Leader | Texas A&M University | January 2013 – May 2015

- Lead tutoring sessions for introductory courses: e.g., Geology 101, Biology 107, and Political Science 207.

## Mentoring Experience

### **Undergraduate Thesis Advisor | Barnard College | Fall 2019 – Spring 2021**

- *Sarah Ortiz* | The Effect of Decomposition on Nitrogen Fixation Associated With Green Macroalgae off the Coast of Santa Catalina Island

### **Undergraduate Thesis Advisor | University of Southern California | Fall 2020 – Spring 2021**

- *Elizabeth Vasi* | Trends in Long Term Monitoring of Temperature, Nutrients, Chlorophyll, and Dissolved Oxygen at the San Pedro Ocean Time Series | (Student Opportunities for Academic Research – SOAR; Climate Science Fellowship)

### **Summer Research Experiences for Undergraduates Mentor | University of Southern California | Summer 2016 – 2019**

- *Shannon Matzke, Camille Vieira, Taylor Dillon, Calyn Crawford, Sarah Ortiz* | Summer 2016, 2017, 2018, 2019

### **Undergraduate Mentor | University of Southern California | August 2016 – December 2018**

- *Suriya Tanjasiri* (Student Opportunities for Academic Research – SOAR; Summer Undergraduate Research Fund – SURF), *Weimin Deng* | August 2016 – December 2018

### **ASPIRE (Aggie Scholars Promoting Incentive, Resources, and Encouragement) | Texas A&M University | Finance Chair, Mentor | August 2012 – May 2015**

## Outreach and Professional Service

### **Smithsonian Ocean Portal | Marine Microbe Series | A Kelp's Slime | July 8, 2019**

– <https://www.youtube.com/watch?v=U9kzj11IwTQ>

**Ad Hoc Reviewer** – *Limnology and Oceanography*, 2020 | BG Copernicus, 2021 | *Environmental Microbiology*, 2023

### **Invited Talk | NSF Hispanic Servicing Institution, Improving Undergrad STEM Education | PaCES (Pathways and Career Exploration in STEM) | April 15, 2022**

### **Postdoctoral Representative of Diversity, Equity, and Inclusion (DEI) Committee – Marine and Environmental Biology | University of Southern California | 2022 – 2023**

## Research Cruises

### **San Pedro Ocean Time-series (SPOT) | University of Southern California | Wrigley Institute for Environmental Studies | R/V Yellowfin | July 2015 – December 2023**

- Participated in monthly SPOT cruises with the New Approaches to New Production project (NSF-OCE-1437458).
- Participated in monthly SPOT cruises with Microbial Observatory project (NSF-OCE-1737409).

### **Tricolim Cruise | University of Southern California | R/V Atlantis | February 2018 – March 2018**

- Participated in this transatlantic (N. and S. Atlantic) cruise with the Iron and phosphorus balanced limitation of nitrogen fixation in the oligotrophic ocean project (NSF-OCE-1657757).