
KIRK SATO

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Ph.D. Candidate - Biological Oceanography
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EDUCATION**Date**

Ph.D. Candidate in Biological Oceanography (Advisor: Dr. Lisa Levin) *09/2011 – Present*
Scripps Institution of Oceanography, University of California, San Diego *GPA: 3.76*
Scheduled date of graduation: June 23, 2016

Climate change implications for deep sea urchins and future fisheries in southern California

This dissertation investigates temporal trends in megafaunal community and species depth distributions from environmental monitoring surveys conducted over the last 20 years. Further in-depth analyses and experiments will determine biomechanical responses of shelf and deep-margin echinoids to multiple environmental stressors in the Southern CA Bight. Finally, the potential for a deep-sea urchin species as a climate-tolerant future fishery will be investigated. These chapter topics emphasize an interdisciplinary approach to climate change biology that includes biogeochemistry, bioengineering, ecology, and fisheries.

M.S. in Marine Biology (Advisor: Dr. Lisa Levin) *12/2013*
Scripps Institution of Oceanography, University of California, San Diego

B.S. in Evolution, Ecology, and Biodiversity (with Honors) *06/2008*
University of California, Davis; Regents Scholar *GPA: 3.61*
University of Stellenbosch, South Africa *Winter 2007*

RESEARCH EXPERIENCE

UC Revelle Program on Climate Science and Policy Student *12/2015 – Present*
United Nations Framework Convention on Climate Change
Conference of the Parties, Paris, France (COP21) and Marrakech, Morocco (COP22)

- Student representative, volunteer photographer, and social outreach contributor.
- Analyzed Paris Agreement text progress (Media platform - <https://parisagreement.org/>).
- Served on and organized science panels and press conferences about marine science
- Contributor to the Ocean Scientists for Informed Policy group (<http://www.oceanscientists.org/>).

Special Studies Participant *07/2013 – Present*
Southern California Coastal Water Research Project (SCCWRP) – Bight '13 Survey

- Analyzed time-series data for shifts in echinoderm species depth distributions.
- Collected echinoderms in the Southern CA Bight with various state water quality agencies.

Special Project Participant *10/2013 – 10/2015*
NOAA Northwest Fisheries Science Center, Fishery Resource Analysis and Monitoring Division

- Collected echinoderms on U.S. West Coast Groundfish Bottom Trawl Surveys in Southern CA.

San Diego Coastal Expedition Student Researcher *07/2012 & 12/2012*
UC Ship Funds Student Cruise - (<http://bit.ly/sdcoastex>)

- Multidisciplinary cruise studying seasonal variation in deep-sea carbonate chemistry and fauna.
- Co-led ROV surveys and the sampling of benthic megafauna with otter trawls.
- Developed a website for the cruise and conducted significant outreach *via* various social media.

Research Scientist *07/2012*
Greenpeace USA, Bering Sea, Alaska

- Conducted one dive in a Deep Worker submersible (Nuytco Inc.) to 300 m in Pribilof Canyon.
- Collected biological samples to be catalogued in the Scripps Benthic Invertebrates Collection.

Graduate Student Course – Ocean Acidification *07/2011 – 08/2011*
Friday Harbor Laboratories, University of Washington

- Proficient knowledge of the carbonate chemistry master variables (DIC, TA, pH).

- Led a team of interdisciplinary graduate students to quantify the spatial and temporal variability of the carbonate chemistry in the San Juan Archipelago, WA.

Deep Sea Research Cruise Volunteer 08/2011 – 09/2011
R/V *Atlantis*, Dr. Lisa Levin, Scripps Institution of Oceanography

Research Assistant for Drs. Eric Sanford & Brian Gaylord 10/2008 – 10/2010
UC Davis Bodega Marine Laboratory, UC Natural Reserve System

- Assisted with studies on Local Adaptation in populations of F1 generation intertidal gastropods.
- Assisted with design and maintenance of Ocean Acidification experiments on mollusk larvae.

Research Assistant for PhD Candidate, Morgan Kelly (Professor at Louisiana State) 03/2008 – 06/2008
Richard K. Grosberg Lab, UC Davis, CA

- Sexed, counted, and handled populations of *Tigriopus californicus* copepods.
- Tested thermal tolerance thresholds of populations across species latitudinal range.

Independent Student Research 06/2007 – 08/2007
Summer Course, Bodega Marine Laboratory, UC Davis

Research Assistant 01/2005 – 06/2005
Arnold Bloom Lab, Department of Vegetable Crops, UC Davis, CA

TEACHING/MENTORING EXPERIENCE

Graduate Student Mentor:

- Daniel Jio (UCSD Undergraduate Regents Scholar; Biology) Fall 2013, 02/2016 – Present
- David Anderson (SIO Masters of Advanced Studies) 09/2015 – 06/2016
- Katy Kelsoe (UCSD Undergraduate; Marine Biology) 06/2015 – 12/2015
- Marissa Mangelli (UCSD Undergraduate; Marine Biology) 06/2015 – 12/2015
- Jackson Powell (CSU Los Angeles; Summer REU student) Summer 2015
- Stephanie Luong (UCSD Undergraduate; Biochemistry & Cell Biology) 01/2014 – 03/2015
- Allison Prange (SIO Masters of Advanced Studies) 08/2013 – 12/2015
- Kieu Tran (Unity College; Summer REU student) Summer 2014
- Yuzo Yanagitsuru (UCSD Undergraduate; Earth Sciences) 08/2012 – 06/2014

Teaching Assistant:

- UCSD, Life in the Oceans (SIO3) Winter Quarter 2017
- UCSD, Introduction to Biological Oceanography (SIO134) Winter Quarter 2015
- UCSD, Life and Climate on Earth (SIO40) Fall Quarter 2013, 2014
- UCSD/CMBC, Marine Biodiversity, Conservation & Global Change Summer 2013

Outdoor Lead Instructor, Camp Galileo, Grades K-5 Summer 2008

PUBLICATIONS

(* indicates undergraduate student)

Sato, KN, J Powell*, D Rudie, and LA Levin. *In Prep*. Considering a climate change-tolerant fishery for the deep pink fragile urchin (*Strongylocentrotus fragilis*).

Sato, KN, K Schiff, and LA Levin. *In Press*. Habitat compression and expansion of sea urchins in response to changing climate conditions on the California continental shelf and slope (1994-2013). *Deep Sea Research II*. <http://dx.doi.org/10.1016/j.dsr2.2016.08.012>.

Levin, LA, K Mengerink, KM Gjerde, AA Rowden, CL Van Dover, MR Clark, E Ramirez-Llodra, B Currie, CR Smith, **KN Sato**, and N Gallo. 2016. Defining “serious harm” to the marine environment in the context of deep-seabed mining. *Marine Policy*. 74: 245-259. <http://dx.doi.org/10.1016/j.marpol.2016.09.032>.

- Frank MB, SE Naleway, TS Wirth*, J-Y Jung, CL Cheung*, FB Loera*, S Medina*, **KN Sato**, JRA Taylor, J McKittrick. 2016. A Protocol for Bioinspired Design: A Ground Sampler Based on Sea Urchin Jaws. *Journal of Visualized Experiments*. 110: e53554. <http://dx.doi.org/10.3791/53554>.
- Hettinger, A, E Sanford, TM Hill, AD Russell, **KN Sato**, J Huey*, M Forsch*, H Page* and B Gaylord. 2012. Persistent carry-over effects of planktonic exposure to ocean acidification in the Olympia oyster. *Ecology*. 93:2758–2768. <http://dx.doi.org/10.1890/12-0567.1>.
- Bagulayan, A, JN Bartlett, AC Carter, B Inman, E Keen, EC Orenstein, N Patin, **KN Sato**, et al. 2012. Journey to the Center of the Gyre: A Lagrangian perspective on the fate of the Tohoku tsunami debris field. *Oceanography*. 25: 200–207. <http://dx.doi.org/10.5670/oceanog.2012.55>.
- Gaylord, B, TM Hill, E Sanford, EA Lenz, LA Jacobs, **KN Sato**, AD Russell, A Hettinger. 2011. Functional impacts of ocean acidification in an ecologically critical foundation species. *Journal of Experimental Biology*. 214: 2586-2594. <http://dx.doi.org/10.1242/jeb.055939>.

PRESENTATIONS

(First author indicates presenter)

- Frank, MB, SE Naleway, **KN Sato**, W. Gao, J-Y Jung, et al. Mechanical and Microstructural Properties of Sea Urchin Teeth at Various Ocean Depths. Mar. 29, 2016. *Material Research Society*. Phoenix, AZ, USA. **Poster**.
- Sato, K**, LA Levin, and J-Y Jung. Nano- and Macroscale responses of deep-sea urchins to multiple stressors associated with the Oxygen Minimum Zone. Feb. 26, 2016. *Ocean Sciences*. New Orleans, LA, USA. **Oral talk**.
- Frank, MB, SE Naleway, J-Y Jung, TS Wirth, **KN Sato**, JRA Taylor, JM McKittrick. Mars Urchin: A bioinspired sediment sampler based on the mouthpiece of a sea urchin. Dec. 7, 2015. *International Conference on Mechanics of Biomaterials and Tissues*. Waikoloa, HI. **Poster**.
- Powell, J, **KN Sato**, and LA Levin. Testing the feasibility of *S. fragilis* as a potential, climate change tolerant fishery through measurement of gonad color and texture characteristics. Nov. 6, 2015. *Western Society of Naturalists Meeting*. Sacramento, CA. **Poster**.
- Mangelli, M, **KN Sato**, and LA Levin. Predicting food availability in the deep sea from sea urchin morphology. Nov. 6, 2015. *Western Society of Naturalists Meeting*. Sacramento, CA. **Poster**.
- Sato, K**, K Schiff, K Tran, and LA Levin. Response of dominant echinoids to multiple climate-change variables in the Southern California Bight. Sept. 1, 2015. *Deep Sea Biology Symposium*. Aveiro, Portugal. **Oral talk**.
- Tran, K, **KN Sato**, and LA Levin. Using a Geographic Information System (GIS) to assess bathymetric shifts and species density of echinoid (sea urchin) species along the coast of San Diego, CA. Feb. 22, 2015. *ASLO Aquatic Sciences Meeting*. Granada, Spain. **Poster**.
- Tran, K, **KN Sato**, and LA Levin. Using a Geographic Information System (GIS) to assess bathymetric shifts and species density of echinoid (sea urchin) species along the coast of San Diego, CA. Oct. 17, 2014. *National Conference for the Society for Advancement of Chicanos/Hispanics and Native Americans in Science*. Los Angeles, CA. ***Awarded Best Student Poster**.
- Sato, K**, M Navarro, S Nam, Y Takeshita, J Ballard, et al. Temporal responses of echinoids in persistent hypoxic and hypercapnic environments along San Diego's continental margin. November 5, 2013. *Coastal and Estuarine Research Federation Meeting*. San Diego, CA. **Poster**.
- Sato, KN**, B Grupe, S Nam, Y Takeshita, M Navarro, et al. The San Diego Coastal Expedition: A student-led exploration of local seeps and low oxygen/low pH ecosystems. Nov. 9, 2012. *Western Society of Naturalists Meeting*. Monterey, CA. **Poster**.
- Sato, KN**, L Levin, and J Hocevar. Biological and Cultural Conservation: Protecting Bering Sea Canyons with Submersible Science. September 20, 2012. *Center for Marine Biodiversity and Conservation Brown Bag Lunch seminar*. **Oral talk**.

Page, HN, A Hettinger, B Gaylord, E Sanford, TM Hill, AD Russell, M Forsch, **K Sato**. Effect of ocean acidification on metabolism and growth of Olympia oyster (*Ostrea lurida*) larvae. 2010. *Benthic Ecology Meeting*. Wilmington, NC. **Poster**.

Page, HN, A Hettinger, B Gaylord, E Sanford, TM Hill, AD Russell, M Forsch, **K Sato**. Effect of ocean acidification on metabolism and growth of Olympia oyster (*Ostrea lurida*) larvae. 2009. *Western Society of Naturalists*. Monterey, CA. ***Awarded Best Student Poster**

GRANTS AND AWARDS

Edna Bailey Sussman Foundation Internship. Summer 2016. Host Institution: Southern CA Coastal Water Research Project. \$7,350 USD.

CA Sea Grant 2015 Core Award. “Developing a Climate Change-Tolerant Urchin Fishery”. \$25,000. Grant No. NA14OAR4170075. January 2015 - January 2016).

Co-contributor, California Current Ecosystem (CCE) – Long Term Ecological Research Program, “Surface NPZD Cycling and Benthic Micronutrient Sources off Pt. Conception”, 6 days at sea on the R/V Oceanus (July 28 – Aug. 2, 2015).

Co-contributor, UC Ship Funds, “The State of the California Current Ecosystem One Year After the Onset of A Warm Water Anomaly”, 7 days at sea on the R/V RG Sproul (June 11 – 17, 2015).

Co-contributor, CCE – Long Term Ecological Research Program, “Nearshore CCE trophic and physical investigation”, 6 days at sea on the R/V New Horizon (July 26 – 31, 2014).

Co-contributor, UC Ship Funds, “San Diego Coastal Expedition”, 17 days at sea on the R/V Melville (June 30 – July 10, 2012; Dec. 8 – 15, 2012).

Mia J. Tegner Fellowship. Awarded April 2012. \$7,243.

Ford Foundation Fellowship Program, Honorable Mention - 2012

NSF-Graduate Research Fellowship Program, Honorable Mention – 2011, 2012

PERSONAL REFERENCES

Lisa A. Levin, PhD

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Distinguished Professor, Scripps Institution of Oceanography, UC San Diego
Director, Center for Marine Biodiversity and Conservation at Scripps
Current Relationship: PhD Advisor

Kathryn Mengerink, PhD, JD

MENGERINK@ELI.ORG

Executive Director, Waitt Institute
Previous Relationship: Course Assistant at the Center for Marine Biodiversity and Conservation

Eric D. Sanford, PhD

EDSANFORD@UCDAVIS.EDU

Associate Professor, Bodega Marine Laboratory, University of California, Davis
Previous Relationship: Field and Lab Supervisor

Annaliese Hettinger, PhD

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Post-Doc Researcher, Hatfield Marine Science Center, Oregon State University
Previous Relationship: PhD Candidate at the Bodega Marine Lab
