KIRK SATO

Ph.D. Candidate - Biological Oceanography

knsato@ucsd.edu (925) 381-8098

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
Advanced to Candidacy: May 30, 2014

Response of Echinoids to Shoaling Hypoxia and Low pH in the Southern CA Bight

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 an economically viable 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)

- Scripps Institution of Oceanography student representative, volunteer photographer, and social outreach contributor.
- Analyzed Paris Agreement text progress in collaboration with the Tropical Rainforest Group (Media platform - https://parisagreement.org/).
- Contributor to the Ocean Scientists for Informed Policy group (http://www.oceanscientists.org/).

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

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

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.

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) *06/2015 – 08/2015*
- 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, 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

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 Review*. 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*.

Frank MB, Naleway SE, Wirth TS, Jung J-Y, Cheung CL, Loera FB, Medina S, **Sato KN**, Taylor JRA, McKittrick J. 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 listed indicates presenter.

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**.

GRANTS AND AWARDS

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

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