Walter W. Cho

Point Loma Nazarene University
Department of Biology
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EDUCATION

Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program
Cambridge, MA & Woods Hole, MA
Ph.D in Biological Oceanography 2002 – 2008

Thesis: Faunal Biogeography, Community Structure, and Genetic Connectivity of North Atlantic Seamounts
Thesis Committee: Dr. Timothy Shank (advisor), Dr. Les Watling, Dr. Jesús Pineda, Dr. Glenn Flierl, Dr. Dennis McGillicuddy

Harvard University
Cambridge, MA
B.A. *cum laude* in Biology 1996 – 2000

PROFESSIONAL EXPERIENCE

Point Loma Nazarene University
Associate Professor 2016 – Present
Assistant Professor 2012 – 2016
Taught 7 undergraduate courses with associated labs and two graduate courses, including introductory courses in the Biology major, multiple upper-division courses related to the marine sciences within the Biology department, and a non-majors general education course
Further developed the marine biology courses within the Biology Department
Advised students in the Biology and Biology-Chemistry majors
Advised undergraduate research students in the Biology Summer Research Program at PLNU and in independent research projects during the academic year studying the biodiversity and biogeography of deep-sea coral communities.

Gordon College 2011 – 2012
Assistant Professor
Taught 6 undergraduate courses with associated labs including introductory courses, upper-division courses, and two seminar courses within the Biology major
Further developed the Marine Biology concentration within the Biology Department
Advised ten first-year students in the Biology major
Advised an undergraduate research project studying symbiotic relationships in the Gulf of Mexico

Woods Hole Oceanographic Institution 2009 – 2013
Postdoctoral Investigator (Dr. Timothy Shank, Advisor)
Studied the faunal diversity and genetic connectivity of seamount fauna using videographic, population genetic, and phylogenetic methods

Studied the diversity and genetic connectivity of invertebrate associates of deep-sea corals in the Gulf of Mexico and the potential impact of the Deepwater Horizon oil spill on deep-sea coral communities
Studied the distribution and structure of communities found at hardground and seep habitats in the Gulf of Mexico
Studied the population genetics of the deep-sea hydrothermal vent shrimp *Opaepele loihi*
Trained and managed lab volunteers and summer research fellows conducting independent research

Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program 2002 – 2008
Doctoral Student (Dr. Timothy Shank, Advisor)
Characterized previously unknown populations and provided guidance for management of potential deep-sea fishery activities on the Corner Rise and New England seamounts and utilized molecular and videographic methodology to study ecological questions, including developing molecular markers to study the genetic diversity and connectivity of invertebrate seamount populations in the North Atlantic
Trained and managed lab volunteers and summer research fellows conducting independent research

Massachusetts Institute of Technology 2000 – 2002
Research Assistant (Prof. Robert Lees, Advisor)
Cultured novel proteins involved in the mechanisms of atherosclerosis

Harvard University 1997 – 2000
Research Assistant (Prof. Stephen R. Palumbi, Advisor)
Studied the population structure of *Penaeus japonicus* in the western Pacific and Indian Oceans, using mitochondrial molecular markers in comparison with the historical distribution and taxonomy of the genus

TEACHING EXPERIENCE

Point Loma Nazarene University

Ecological and Evolutionary Systems, undergraduate course with Lab	every Fall, 2012 – Present
Marine Vertebrate Zoology, undergraduate course with Lab	Fall 2012
Perspectives on Science, graduate seminar course	2012 – Present
Human Biology and Bioethics, undergraduate course with Lab	every Spring, 2013 – Present
Marine Invertebrate Zoology, undergraduate course with Lab	Spring 2013
Introduction to Oceanography, undergraduate course with Lab	every Fall, 2013 – Present
Marine Biology, undergraduate course with Lab	alternating Spring 2014 – Present
Experimental Marine Ecology, undergraduate course with Lab	alternating Spring 2015 – Present
Marine Biology, graduate course with Lab	Summer 2016

Gordon College

Introduction to Marine Sciences, undergraduate course with Lab	Fall 2011
Biology III: Plants, Ecology, and Evolution, undergraduate course with Lab	Fall 2011
Senior Seminar: Topics in Biology	Fall 2011
Biology II: Animal Biology, undergraduate course with Lab	Spring 2012
Ecology, undergraduate course with Lab	Spring 2012
Introduction to Research in Biology, sophomore seminar	Spring 2012

Northeastern University

Biological Oceanography, guest lecture on the Deep Sea	Spring 2011
New England Fisheries Resources, guest lecture on Impacts of deep-sea fisheries	Spring 2011

AWARDS

2011 Excellence in Partnering Award with the LOPHELIA II Project from the National Oceanographic Partnership Program	2012
ASLO Early Career Travel Award	2011
WHOI Research Fellowship	2002 – 2008
WHOI Ocean Life Institute Student Fellowship	2004 – 2005
Harvard College Scholarship, Dean's List	1996 – 2000

PROFESSIONAL AFFILIATIONS

American Society of Limnology and Oceanography (ASLO)	2010 – Present

PUBLICATIONS

Mills, S., Leduc, D., Drazen, J. C., Yancey, P., Jamieson, A. J., Clark, M. R., Rowden, A. A., Mayor, D. J., Piertney, S., Heyl, T., Bartlett, D., Bourque, J., **Cho, W.**, Demopoulos, A., Fryer, P., Gerringer, M., Grammatopoulou, E., Herrera, S., Ichino, M., Lecroq, B., Linley, T. D., Meyer, K., Nunnally, C., Ruhl, H., Wallace, G., Young, C. and Shank, T. M. (2016). 10,000 m under the sea: an overview of the HADES expedition to Kermadec Trench. In B. Golder and A. Connell (Eds.) Proceedings of Kermadec – Discoveries and Connections. Paper presented at Kermadec – Discoveries and Connections, Wellington, New Zealand (pp. 36–38). The Pew Charitable Trusts.

Pineda, J., **Cho, W.**, Starczak, V., Govindarajan, A. F., Guzman, H. M., Girdhar, Y., Holleman, R. C., Churchill, J., Singh, H., and Ralston, D. K. (2016) A crab swarm at an ecological hotspot: patchiness and population density from AUV observations at a coastal, tropical seamount. PeerJ 4:e1770.

Girdhar, Y., **Cho, W.**, Campbell, M., Pineda, J., Clarke, E., and Singh, H. (2016) Anomaly detection in unstructured environments using Bayesian nonparametric scene modeling. *2016 IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, 2016, pp. 2651-2656.

Koreitem, K., Girdhar, Y., **Cho, W.**, Singh, H., Pineda, J., and Dudek, G. (2016) Subsea fauna enumeration using vision-based marine robots. Conference on Computer and Robot Vision (CRV).

Morrison, C. L., Baco, A. R., Nizinski, M. S., Coykendall, D. K., Demopoulos, A. W. J., **Cho, W.**, and Shank, T. (2015) Population Connectivity of Deep-Sea Corals. In: Hourigan TF, Etnoyer PJ, Cairns SD, Tsao C-F (eds) The State of Deep-Sea Coral and Sponge Ecosystems of the United States: 2015. NOAA Technical Memorandum X. NOAA, Silver Spring, p 12-1 – 12-30.

Thresher, R., Althaus, F., Adkins, J., Gowlett-Holmes, K., Alderslade, P., Dowdney, J., **Cho, W.**, Gagnon, A., Staples, D., McEnnulty, F., and Williams, A. (2014) Strong Depth-Related Zonation of Megabenthos on a Rocky Continental Margin (~700–4000 m) off Southern Tasmania, Australia. PLoS ONE 9(1): e85872. doi:10.1371/journal.pone.0085872

White, H.K., Hsing, P., **Cho, W.**, Shank, T. M., Cordes, E. E., Quattrini, A. M., Nelson, R. K., Camilli, R., Demopoulos, A., German, C. R., Brooks, J. M., Roberts, H. H., Shedd, W., Reddy, C. M., and Fisher, C. R. (2012), Multiple lines of evidence link deepwater coral damage to Deepwater Horizon oil spill. Proceedings of the National Academy of Sciences 109:(40): E2648.

White, H.K., Hsing, P., **Cho, W.**, Shank, T. M., Cordes, E. E., Quattrini, A. M., Nelson, R. K., Camilli, R., Demopoulos, A., German, C. R., Brooks, J. M., Roberts, H. H., Shedd, W., Reddy, C. M., and Fisher, C. R. (2012), Impact of the Deepwater Horizon oil spill on a deep-water coral community in the Gulf of Mexico. Proceedings of the National Academy of Sciences 109 (50): 20303-20308.

Shank, T. M., Herrera, S., **Cho, W.**, Roman, C. N., and Bell, K. L. C. (2011), Exploration of the Anaximander Mud Volcanoes. Oceanography, 24(1), supplement: 22-23.

Cho, W. and Shank, T. M. (2010), Incongruent patterns of genetic connectivity among four ophiuroid species with differing coral host specificity on North Atlantic seamounts. Marine Ecology, 31(s1): 121–143.

Cho, W. and Shank, T. M. Patterns of community structure on the New England and Corner Rise seamounts. (in prep)

Cho, W. and Shank, T. M. Identifying ophiuroids from the North Atlantic seamounts using DNA barcodes. (in prep)

PRESENTATIONS AND POSTERS (asterisks denote undergraduate coauthors)

Abdala, J.*, Marschke, J.*, Sueyoshi, M.*, and **Cho, W.** (2017) A study of the diversity and community structure of fauna at Hannibal Bank based on imagery data. 42nd West Coast Biological Sciences Undergraduate Research Conference. Santa Clara, CA.

Marschke, J.*, Abdala, J.*, Sueyoshi, M.*, and **Cho, W.** (2017) Using DNA barcodes to determine biodiversity at Hannibal Bank. 42nd West Coast Biological Sciences Undergraduate Research Conference. Santa Clara, CA.

Watson, S.* and **Cho, W.** (2016) A study of invertebrate species from the Hannibal Bank: Population structure and genetics. 41st West Coast Biological Sciences Undergraduate Research Conference. San Diego, CA.

Shank, T.M., Drazen, J., Yancey, P., Jamieson, A., Rowden, A., Clark, M., Mayor, D., Piertney S, Heyl, T., Bartlett, D., Bourque, J., **Cho, W.**, Demopoulos, A., Fryer, P., Gerringer, M., Grammatopoulou, E., Herrera, S., Ichino, M., Linley, TD., Luduc, D., Meyer, K., Mills, S., Nunnally, C., Ruhl, H., Young, C. (2015) Hadal Ecosystems Studies 2014: Examining relationships of pressure, food supply, topography, and adaptive evolution in the Kermadec and Mariana Trenches. 14th Deep-sea Biology Symposium. Aveiro, Portugal.

Ulrich, M.*, Watson, S.*, Hunt, S.*, Andres, N.*, and **Cho, W.** (2015) The analysis of cryptic speciation in brittle star A*stroceras elegans* off the coast of New Zealand. 40th West Coast Biological Sciences Undergraduate Research Conference. San Diego, CA.

Powell, L.*, Andres, N.*, French, E.*, and **Cho, W.** (2014) The genetic connectivity of populations of the brittle star *Ophiocreas spinulosus* in the Gulf of Mexico. 39th West Coast Biological Sciences Undergraduate Research Conference. Azusa, CA.

Cho, W., Roush L.*, and Shank, T. (2012) Characterizing the potential impact of the Deepwater Horizon oil spill on invertebrates associated with deep-water coral communities in the Gulf of Mexico. Sigma Xi North Shore Chapter Third Annual Conference. Wenham, MA

Roush, L.* and **Cho, W.** (2012) Community structure of deep-sea coral communities in the Gulf of Mexico. Sigma Xi North Shore Chapter Third Annual Conference. Wenham, MA

Cho, W. and Shank, T. (2011) Assessing the potential impact of the Deepwater Horizon oil spill on invertebrates associated with deep-water coral communities in the Gulf of Mexico. Deepwater Horizon Oil Spill Principal Investigator One Year Update Workshop. National Science and Technology Council's Sub-Committee on Ocean Science and Technology. St. Petersburg, FL.

Cho, W. and Shank, T. (2011) Assessing the impact of the Deepwater Horizon oil spill on invertebrates associated with deep-water coral communities in the Gulf of Mexico. American Society of Limnology and Oceanography. San Juan, Puerto Rico.

Cho, W. (2010) Stepping Stones Across the Atlantic: The Biogeography and Population Connectivity of North Atlantic Seamounts. Exponent. Maynard, MA.

Cho, W. (2010) Stepping Stones Across the Atlantic: The Biogeography and Population Connectivity of North Atlantic Seamounts. Ocean Genome Legacy. Ipswich, MA.

Cho, W. and Shank, T. (2007) Stepping Stones Across the Deep Atlantic: Fauna-Habitat Associations on the New England and Corner Rise Seamounts. Biology Department Seminar. Woods Hole Oceanographic Institution. Woods Hole, MA.

Cho, W. and Shank, T. (2006) Genetic Connectivity of Ophiuroids on North Atlantic Seamounts. 12th International Echinoderm Conference, Durham, NH.

Cho, W. and Shank, T. (2005) Population Genetics of North Atlantic Seamount Fauna: Investigating Pathways, Dispersal and Evolution. 3rd International Symposium on Deep-sea Corals, Miami, FL.

Cho, W. and Shank, T. (2004) Molecular Systematics and Population Connectivity of Seamount Faunal Populations on the New England and Corner Rise Seamounts. Fisheries, Oceanography and Society: Deep-sea Fisheries: Ecology, Economics and Conservation, Woods Hole, MA.

RESEARCH EXPEDITIONS

AL150302 Hannibal Hotpot *MV Alucia* and *AUV Seabed* and submersibles *Deep Rover 2* and *Nadir*	2015
TN309 HADES-K Research cruise to the Kermadec Trench *RV Thomas G. Thompson* and *HROV Nereus*	2014
GALREX 2011 Galápagos Rift Expedition *RV Okeanos Explorer* and *ROV Little Hercules*	2011
M2-11-01 AUV Reconnaissance Survey of Hard-Ground Megafaunal Communities in the Vicinity of the Deepwater Horizon Spill Site *RV McArthur II* and *AUV Sentry* and *TowCam*	2011
Camera Recovery Cruise to the Gulf of Mexico *HOS Sweet water* and *ROV Triton*	2011
AT18-3 NSF Rapid Response cruise to the Gulf of Mexico *RV Atlantis* and *DSV Alvin* and *AUV Sentry*	2010
Lophelia II 2010: Oil seeps and deep reefs *RV Ronald H. Brown* and *ROV Jason 2*	2010
Telepresence cruise to the Anaximander seamounts *EV Nautilus* and *ROV Hercules*	2010
TN228 Research cruise to the Tasmanian seamounts *RV Thomas G. Thompson* and *ROV Jason 2*	2008 – 2009
NOAA Ocean Exploration Deep Atlantic Stepping Stones *RV Ronald H. Brown* and *ROV Hercules*	2005
Return to the Galápagos Rift *RV Atlantis* and *DSV Alvin*	2005
PIRATES III Cruise to the East Pacific Rise, 9°N *RV Atlantis* and *DSV Alvin*	2005
PIRATES II Cruise to the East Pacific Rise, 9°N *RV Atlantis* and *DSV Alvin*	2004

EDUCATION AND OUTREACH

Early Childhood Learning Center	
Interactive lab presentation of marine organisms to pre-school students	Summer 2017
UC San Diego Interfaces Graduate Training Program 2017 Research Symposium Career Panel Discussion Member	Summer 2017
Point Loma Nazarene University Biology Summer Research program	
Mentored Jonathan Abdala, Sebastian Elsenbroek, Hannah Lee and Misa Sueyoshi	Summer 2017
Mentored Jonathan Abdala, Jack Marschke, Kelsey Miller and Misa Sueyoshi	Summer 2016

Mentored Jack Marschke, Kelsey Miller, Maddie Ulrich, and Stefanie Watson — Summer 2015
Mentored Nolan Andres, Shane Hunt, Maddie Ulrich, and Stefanie Watson — Summer 2014
Mentored Nolan Andres, Mere French, and Lindsay Powell — Summer 2013

Point Loma Nazarene University Graduate Program in Biology – M.S. Thesis Committee member
Doug Doulter — 2016
Marin Silva — 2014
Josh White — 2013

San Diego Unified STEAM Leadership Series: "Humans & the Sea" — Spring 2016
Panel Discussion Speaker about "The Deep Ocean"

Point Loma Nazarene University Senior Honors Project Mentor
Stefanie Watson — 2015-2016

Point Loma Nazarene University Senior Honors Project Committee member
Taylor Davis (PLNU) — 2013-2014

Presentation to Ms. Carolyn Sheild's 6th Grade Class — Fall 2011
Jonas Clarke Middle School

Population Genetics Discussion Group at WHOI — Spring 2010
Led a discussion group with graduate students

Joint Universities Teaching Laboratory (JUSTL) program
Mentored Stella Chan (Chinese University of Hong Kong) — Summer 2011
Mentored Sharon Tsz-Huen Wu (Chinese University of Hong Kong) — Summer 2009
Mentored Ling Ming Tsang (Chinese University of Hong Kong) — Summer 2008

WHOI Summer Student Fellow Program
Mentored Catriona Munro (University College London) — Summer 2011
Mentored Elizabeth Sibert (UCSD) — Summer 2010
Mentored Eleanor Bors (Oberlin College) — Summer 2009
Mentored Sarah L'Heureux (University of Delaware) — Summer 2005

WHOI Volunteer Program
Mentored Catriona Munro (University College London) — Summer 2010
Mentored Alex Sull (Taejon Christian International School) — Summer and Fall 2004