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Professional Preparation:

Ph.D. Biology, Georgia Institute of Technology, 2004

B.S. Double Major: Environmental Science and Biology, DePaul University, 1999

Relevant Appointments:

- August 2017 to present: Associate Professor of Biology, Hawaii Pacific University
- August 2016 to present: Associate Dean College of Natural and Computational Sciences, Hawaii Pacific University
- August 2012 to July 2016: Natural Sciences Department Chair, Assistant Professor of Biology, Hawaii Pacific University
- August 2007 to August 2012: Affiliate Assistant Professor of Biology, Hawaii Pacific University
- July 2006 to present: Affiliate Graduate Faculty, University of Hawaii, SOEST
- March 2005 to July 2012: Research Scientist, Oceanic Institute
- October 2004 to March 2005: Postdoctoral Researcher, Georgia Institute of Technology, Advisor: Joseph P. Montoya
- August 2000 to October 2004: Graduate Research Assistant, Georgia Institute of Technology, Advisor: Joseph P. Montoya

Peer-reviewed Publications:

- Downs*, E.E., B.N. Popp and **C.M. Holl**. 2014. *Nitrogen isotope fractionation and amino acid turnover rates in the Pacific white shrimp, Litopenaeus vannamei*. Marine Ecology Progress Series 516: 239-250.
- Holl, C.M.**, C.T. Glazer and S.M. Moss. 2010. Nitrogen stable isotopes in recirculating aquaculture for super-intensive shrimp production: tracing the effects of water filtration on microbial nitrogen cycling. *Aquaculture*
[doi:10.1016/j.aquaculture.2010.11.028](https://doi.org/10.1016/j.aquaculture.2010.11.028)
- Holl, C.M.** and J. P. Montoya. 2008. *Diazotrophic growth of the marine cyanobacterium Trichodesmium IMS 101 in continuous culture: effects of growth rate on N₂-fixation rate, biomass, and C:N:P stoichiometry*. *Journal of Phycology* 44(4): 929-937.
- Holl, C.M.**, A. M. Waite, S. Pesant, P. A. Thompson, and J. P. Montoya. 2007. *Unicellular Diazotrophy as a Source of Nitrogen to Leeuwin Current Coastal Eddies*. *Deep Sea Research II* 54: 1045-1054.
- Holl, C.M.**, T. A. Villareal, C. D. Payne, T. Clayton, and J. P. Montoya. 2007. *Trichodesmium in the Western Gulf of Mexico: ¹⁵N₂-fixation and natural abundance stable isotope evidence*. *Limnology & Oceanography* 52: 2249-2259.

- Waite, A.M., **C.M. Holl**, J.P. Montoya, P.A. Thompson, S. Pesant, L. Beckley, B. Muhling, and J. Strezelecki. 2007. *Food web structure in two counter-rotating eddies based on $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ isotopic analyses*. Deep Sea Research II 54: 1055-1075.
- Waite, A.M., S. Pesant, D. Griffin, P. A. Thompson, **C. M. Holl**. 2007. *Oceanography, primary production and dissolved inorganic nitrogen uptake in two Leeuwin Current eddies*. Deep Sea Research II 54: 981-1002.
- Waite, A.M., S. Pesant, P.A. Thompson, H. Paterson, B. Muhling, J. Strezelecki, L. Beckley, **C.M. Holl**, M. Feng, D. Griffin, D. Gaughan, L. Pender. 2007. *The Leeuwin current and its eddies: An introductory overview* Deep Sea Research II 54: 789-796.
- Holl, C.M.**, and J.P. Montoya. 2005. *Interactions between nitrate uptake and nitrogen fixation in continuous cultures of the marine cyanobacterium, Trichodesmium*. Journal of Phycology 41:1178-1183.
- Montoya, J.P., **C.M. Holl**, J. Zehr, T. Villareal and D. G. Capone. 2004. *High Rates of N_2 -fixation by unicellular diazotrophs in the Oligotrophic Pacific*. Nature 430: 1027-1031.
- McClelland, J. W., **C.M. Holl**, and J. P. Montoya. 2003. *Relating low ^{15}N values of zooplankton to N_2 -fixation in the tropical North Atlantic: insights provided by stable isotope ratios of amino acids*. Deep-Sea Research I 50: 849 – 861.
- Branstrator, D. K. and **C.M. Holl**. 2000. *Planktivory by bluegill (*Lepomis macrochirus*) on *Leptodora kindti* in a small North American Lake*. Hydrobiologia 437: 101-106.

Non peer-reviewed publications:

- Holl, C.M.**, C.A. Otoshi, and C.R. Unabia. 2011. *Nitrifying biofilms critical for water quality in intensive shrimp RAS*. Global Aquaculture Advocate 14(1) 38-39.
- Otoshi, C.A., L.R. Tang, D.R. Moss, S.M. Arce, **C.M. Holl**, and S.M. Moss. 2009. *Performance of Pacific white shrimp, *Penaeus (Litopenaeus) vannamei* cultured in super-intensive, biosecure, recirculating aquaculture systems*. In: C.L. Browdy and D.E. Jory, (Eds.). The Rising Tide, Proceedings of the Special Session on Sustainable Shrimp Farming, World Aquaculture Society. The World Aquaculture Society, Baton Rouge, Louisiana, USA, pp. 244-254
- Holl, C.M.**, C. J. Tallamy and S. M. Moss. 2006. *Varied microbes Important to Recirculating Aquaculture Systems*. Global Aquaculture Advocate 9(3) 38-39.
- Otoshi, C.A., **C. M. Holl**, D. R. Moss, S. M. Arce and S. M. Moss. *Super intensive RAS trial yields encouraging shrimp harvest at Oceanic Institute*. Global Aquaculture Advocate: August 2006.
- Otoshi, C.A., L. R. Tang, D. V. Dagdagan, **C. M. Holl**, C. J. Tallamy, D. R. Moss, S. M. Arce and S. M. Moss. *Super-Intensive growout of the pacific white shrimp, *Litopenaeus vannamei*: Recent advances at the Oceanic Institute*. Proceedings for the 6th International Conference on Recirculating Aquaculture, Roanoke, Virginia. 2006.

Publications submitted or in press:

Otoshi, C. A., Z. Y. Ju, B. N. Popp, P. M. Ahina, S. M. Moss, and C. M. Holl.
Characterization, Nutrient flow, and Growth Effect of Water from a Controlled Culture Environment for the Pacific White Shrimp, Litopenaeus vannamei.
(Submitted to Aquaculture Research)

*Denotes Hawaii Pacific University student publications and presentations

Funded Projects:

- 2016 College of Natural and Computational Sciences Scholarly Endeavors Program
2009 – 2013 (NCE 2012-2013) NOAA CAMEO, Co-PIs B. Popp and J. Drazen, UH Manoa, M. Landry, Scripps Institute of Oceanography and R. Olson, Inter-American Tropical Tuna Commission. “*A novel tool for validating trophic position estimates in ecosystem-based fisheries models*”
2009 - 2012 Hawaii BioEnergy. “Developing microalgae culture techniques for the production of biofuels”
2009 - 2011 NOAA Hawaii SeaGrant, Co-PIs M. McManus, B. Glazer, and K. Ruttenger, UH Manoa. “*The Role of Bottom Sediments in Nutrient Cycling in He’eia Fishpond*”
2009 Hawaii Technology Development Venture, Co-PI A. Kuehnle, Kuehnle AgroSystems Inc. “*Algae Biomass to Oil Transition using Hawaiian Greenwater*”
2008-2009 HPU Trustees’ Scholarly Endeavors Program, Co-PI S. Carstenn, HPU, “*Linking Watershed-scale Conservation, Restoration, and Land Use Practices to Biogeochemical Processes in Nearshore Marine Environments*”
2008-2009 HPU Trustees’ Scholarly Endeavors Program, Co-PI C. Unabia, HPU, “*Development of a Complex Microbial Community in Shrimp Aquaculture: Role in the Health and Sustainability of Recirculating Systems*”
2006-2008 Hawaii EPSCoR, Co-PI B. Popp, UH Manoa, “*Analysis of Crustacean Physiology and Protein Metabolism during Temperature-Stressed Growth Using Isotope Enrichment Experiments*”

Meetings and Presentations (first author unless noted):

- April 2016, undergraduate student first author(s), *Beal, R., et al., American Society Microbiology Hawaii Branch, Poster Title: *Bacteria in a University Setting: Isolations from Both Common and Personal Spaces*
- April 2016, undergraduate student first author(s), *Crumpler, J., et al., American Society Microbiology Hawaii Branch, Poster Title: *Microbial Community Changes during the Establishment of Biofilms in Recirculating Shrimp Aquaculture*
- May 2014, undergraduate student first author(s), *Baltimore, C., et al., American Society Microbiology Hawaii Branch, Poster Title: *Community Assessment of Microbial Biofilms in High Density Recirculating Aquaculture*
- May 2014, undergraduate student first author(s), *Higa, K., et al., American Society Microbiology Hawaii Branch, Poster Title: *Nitrifying Biofilms in High Density Recirculating Aquaculture.*

- February 2014, Ocean Sciences, Honolulu, Poster Title: *Natural Productivity in Recirculating Aquaculture as Supplemental Nutrition*
- March 2012, graduate student first author, *Downs, E.E., American Society of Limnology and Oceanography, New Orleans, Talk Title: *Nitrogen isotope fractionation and amino acid turnover rates in the Pacific white shrimp, *Litopenaeus vannamei*.*
- March 2011, Aquaculture America, New Orleans, Talk Title: *Effects of RAS water vs. clear seawater on the growth of *Litopenaeus vannamei**
- July 2009, Invited Talk, Hawaii Aquaculture Association, Honolulu, Talk Title: *Microbial Ecology of Recirculating Aquaculture: flocs and films*
- August 2008, Applications of Stable Isotopes to Ecological Studies, Honolulu, Talk title: *Stable Isotopes as Tracers of N and C Cycling in Recirculating Shrimp Aquaculture*
- June 2008, American Society of Microbiology, Boston, Poster title: *Microbial Community Ammonium Uptake and Oxidation in Recirculating Marine Aquaculture*
- February 2007, American Society of Limnology and Oceanography (ASLO) Annual Meeting, Santa Fe, Talk title: *Microbial community nitrogen cycling in recirculating aquaculture*
- June 2006, ASLO Annual Meeting, Victoria, Talk title: *Stable isotopes and microbial remineralization processes in recirculating aquaculture*
- May 2006, World Aquaculture Society, Florence, Talk title: *Carbon and nitrogen elemental budgets in high-intensity, recirculating shrimp aquaculture*
- February 2006, ASLO Annual Meeting, Honolulu, Poster presentation: *Unicellular diazotrophy in Leeuwin Current Eddies*
- May 2005, Dissertation Symposium on Chemical Oceanography invited participant.
- February 2005, ASLO Annual Meeting, Salt Lake City, Talk title: *Characterization of a bloom of the diazotrophic marine cyanobacterium, *Trichodesmium*, in the Gulf of Mexico*
- October 2004, Southeast Ecology and Evolution Conference, Atlanta, Talk title: *N₂-fixation by *Trichodesmium*: implications for N and C cycling in the Gulf of Mexico*
- June 2004, Australian Marine Science Association, Tasmania, Poster presentation: *Nutrient uptake in natural phytoplankton assemblages from cyclonic and anticyclonic eddies*
- June 2004, Australian Marine Science Association, Tasmania, Talk title: *Nitrogen fixation in cyclonic vs. anticyclonic Leeuwin current eddies.*
- February 2003, ASLO Annual Meeting, Salt Lake City, Talk title: *Interactions between nitrate uptake and nitrogen fixation in continuous cultures of the marine cyanobacterium, *Trichodesmium**
- February 2002, ASLO Annual Meeting, Honolulu, Poster presentation: *Characterization of a continuous culture of the marine diazotroph, *Trichodesmium erythraeum* (IMS101)*

*Denotes Hawaii Pacific University student publications and presentations

M.S. Thesis Advisor for the Following Students:

- Eileen Downs, Hawaii Pacific University. M.S. completed 2013. Thesis title “*The use of compound-specific isotope analysis to elucidate dietary nitrogen sources and trophic position in Hawaiian bobtail squid (E. scolopes) and Pacific white shrimp (L. vannamei)*”

M.S. Thesis Committee Member for the Following Students:

- Danielle Hull, University of Hawaii Manoa. PhD in progress. Working dissertation title “*Nutrient Limitation and Organic Phosphorus Use in Coastal Marine Phytoplankton*”
- Gabriella Runko, Hawaii Pacific University, M.S. thesis in progress. Working Title “*Developing a Sensitive Method for the Analysis of Dipicolinic Acid and Quantifying Bacterial Endospores in Deep Marine Subsurface Sediment*”
- Emma Forbes, Hawaii Pacific University. M.S. thesis completed 2016. Thesis title “*Examination of the effects of bacteria and probiotics on survival through first feeding of cultured Yellow Tang (Zebrasoma flavescens)*”
- Julia Smith, Hawaii Pacific University, M.S. thesis completed 2016. Thesis title “*Mercury in the Environment and in Bottlenose Dolphins: How Stable Isotopes Can Be Used to Address Mercury Biomagnification in Food Webs*”
- Toby Matthews, Hawaii Pacific University. M.S. thesis completed 2014. Thesis title “*Understand the effects of artificial breaching on O’ahu’s stream-mouth estuary ecosystems*”
- Matthew Speilman, Hawaii Pacific University. M.S. completed 2009. Thesis title “*Benthic Community Structure of Hawaiian Seagrass Habitats*”
- Goncalo Murta, Instituto Canario de Ciencias Marinas. M.S. completed 2007. Thesis title “*Efficacy of commercially available probiotics on microbial community function in high-intensity, recirculating shrimp aquaculture.*”

Undergraduate Research Advisor for the Following Students:

- Tarah Pearson, Hawaii Pacific University. Undergraduate research “*The Use of Fluorescent in situ Hybridization to identify nitrifying bacteria in recirculating aquaculture.*”

Teaching Experience:

Hawaii Pacific University			
Fall 2007	BIOL2051	General Biology Laboratory	72 students
Fall 2007	BIOL3040	General Microbiology Lecture	30 students
Spring 2008	BIOL2053	General Biology Laboratory	48 students
Spring 2008	BIOL3040	General Microbiology Lecture	32 students
Fall 2008	BIOL2051	General Biology Laboratory	24 students
Fall 2008	BIOL3040	General Microbiology Lecture	28 students
Spring 2009	BIOL2053	General Biology Laboratory	24 students

Spring 2009	BIOL3040	General Microbiology Lecture	60 students
Fall 2009	BIOL2051	General Biology Laboratory	24 students
Fall 2009	BIOL3040	General Microbiology Lecture	32 students
Spring 2010	BIOL2053	General Biology Laboratory	24 students
Spring 2010	BIOL3040	General Microbiology Lecture	62 students
Fall 2010	BIOL2051	General Biology Laboratory	24 students
Fall 2010	BIOL3040	General Microbiology Lecture	31 students
Spring 2011	BIOL2053	General Biology Laboratory	24 students
Spring 2011	BIOL4041	Environmental Microbiology Lab	21 students
Spring 2011	BIOL3040	General Microbiology Lecture	62 students
Fall 2011	BIOL2051	General Biology Laboratory	22 students
Fall 2011	BIOL3040	General Microbiology Lecture	31 students
Spring 2012	BIOL2053	General Biology Laboratory	24 students
Spring 2012	BIOL4041	Environmental Microbiology Lab	8 students
Spring 2012	BIOL3040	General Microbiology Lecture	60 students
Summer 2012	BIOL2051	General Biology Laboratory	20 students
Summer 2012	BIOL3040	Microbiology Lecture ONLINE	22 students
Fall 2012	BIOL2051	General Biology Laboratory	24 students
Fall 2012	BIOL3040	General Microbiology Lecture	30 students
Spring 2013	BIOL3040	General Microbiology Lecture	45 students
Summer 2013	BIOL3040	Microbiology Lecture ONLINE	25 students
Fall 2013	BIOL3040	General Microbiology Lecture	20 students
Fall 2013	BIOL2040	Microbes & Human Health ONLINE	32 students
Spring 2014	BIOL3040	General Microbiology Lecture	15 students
Spring 2014	BIOL4041	Environmental Microbiology Lab	12 students
Summer 2014	MARS2110	SEA-Ocean Environment Pacific	13 students
Fall 2014	BIOL3040	General Microbiology Lecture	35 students
Fall 2014	BIOL3041	General Microbiology Lab	23 students
Spring 2015	BIOL4040	Environmental Microbiology Lec	13 students
Spring 2015	BIOL4041	Environmental Microbiology Lab	10 students
Summer 2015	MARS2110	SEA-Ocean Environment Pacific	18 students

Oceanographic Research Cruise Experience:

Sargasso Sea	R/V Seward Johnson	April-May 2000
Gulf of Mexico	R/V Longhorn	July 2000
Sargasso Sea	R/V Seward Johnson	April-May 2001
Gulf of Mexico	R/V Seward Johnson/Johnson Sea Link	July 2001
ETNP	R/V Melville	June-July 2002
HOT and ETNP	R/V Kilo Moana	July 2002
Indian Ocean	R/V Southern Surveyor	May-June 2003
HOT and ETNP	R/V Kilo Moana	July 2004
ETNP	R/V Kilo Moana	May 2012
SEA Semester	Robert C. Seamans	June 2014, June 2015

Honors:

DePaul University Dean's List 1995 to 1999
Golden Key National Honor Society 1996 to 1999
Phi Kappa Phi National Honor Society 1996 to 1999
Invited student speaker: Environmental Science & Technology building dedication, 1998
Environmental Science Program departmental honor student, 1999
Invited student speaker, DePaul University's 100th anniversary convocation, 1999
Elected President GA Tech School of Biology, graduate student association, 2000

Professional Memberships:

- Phycological Society of America
- American Society of Limnology and Oceanography
- Australian Marine Science Association
- American Association for the Advancement of Science
- American Society of Microbiology
- World Aquaculture Society

Advisors and Collaborators:

Joseph P. Montoya, Georgia Institute of Technology (dissertation advisor), *Douglas G. Capone*, University of Southern California (committee member), *Samantha Joye*, University of Georgia (committee member), *Patricia A. Sobecky*, Georgia Institute of Technology (committee member), *Thomas DiChristina*, Georgia Institute of Technology (committee member), *Christopher Klausmeier*, University of Michigan (committee member), *Anya M. Waite*, University of Western Australia, *Peter A. Thompson*, CSIRO Hobart, Australia, *Tracy A. Villareal*, University of Texas, *Farooq Azam*, Scripps Institute of Oceanography, *Shaun Moss*, Oceanic Institute, *Donn K. Branstrator*, University of Minnesota (undergraduate research advisor), *Brian Popp*, University of Hawaii, *Catherine Unabia*, Hawaii Pacific University, *Bethany A. Jenkins*, University of Rhode Island, *Susan Carstenn*, Hawaii Pacific University, *Heidi Kuehnle*, Kuehnle AgroSystems, *Paul Zorner*, formerly with Hawaii BioEnergy, *Karen Arthur*, formerly with University of Hawaii

Reviewer for:

Limnology and Oceanography, Deep Sea Research, Journal of Phycology, Global Biogeochemical Cycles, Journal of Aquaculture, Bioremediation Journal, USDA CSREES North Central Regional Aquaculture Center, National Science Foundation (Biological Oceanography and Chemical Oceanography), National Institutes of Health.