

# Curriculum Vitae – Kathryn E. F. Shamberger

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## EDUCATION:

UNIVERSITY OF WASHINGTON, Seattle, WA.

**Ph.D.** in Chemical Oceanography, 2011.

Dissertation title: *Calcification, Organic Production, and Carbon Dioxide on a Hawaiian Coral Reef.*

Advisor: Dr. Richard A Feely

UNIVERSITY OF HAWAII-MANOA, Honolulu, HI.

**M.S.** in Chemical Oceanography, 2005.

Thesis title: *Processes Controlling Air-Sea Exchange of CO<sub>2</sub> in Kaneohe Bay, Oahu, Hawaii.*

Advisor: Dr. Fred T Mackenzie

UNIVERSITY OF SAN DIEGO, San Diego, CA.

**B.A.** in Marine Science, emphasis in Chemistry, 2001.

Graduated with honors

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## POSITIONS HELD:

Assistant Professor, Texas A&M University (2014 – present)

Postdoctoral Investigator, Woods Hole Oceanographic Institution (2013)

Postdoctoral Scholar, Woods Hole Oceanographic Institution (2011 – 2013)

Graduate Research Assistant, University of Washington (2005 – 2011)

Graduate Research Assistant, University of Hawaii (2002 – 2005)

Intern, Center for Tropical Research, Mote Marine Laboratory (2001)

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## RESEARCH EXPERIENCE:

Postdoctoral Research, Woods Hole Oceanographic Institution, Woods Hole, MA (08/11 – present)

Advisers: Dr. Anne L. Cohen and Dr. Daniel C. McCorkle

- *Characterization of the spatial and temporal variability of, and the biogeochemical controls on, the seawater CO<sub>2</sub> system of Palauan coral reefs.*
- *Investigation of the relationships between CO<sub>2</sub> and ecosystem calcification rates on Pacific coral reefs with varying CO<sub>2</sub> levels, nutritional status, community composition, and flow regimes.*

Doctoral Research, University of Washington, Seattle, WA (09/05 – 06/11)

Adviser: Dr. Richard A. Feely

Committee Members: Dr. Chris Sabine, Dr. Paul Quay, Dr. Parker MacCready, Dr. Ken Sebens

- *Measured diel time series of the seawater CO<sub>2</sub> system and net ecosystem calcification, organic production, and respiration rates of the barrier coral reef in Kaneohe Bay, Oahu, HI.*
- *Determined the relationship between net ecosystem calcification and pCO<sub>2</sub> on the Kaneohe Bay barrier reef.*
- *Utilized calcification and organic production rates and mooring pCO<sub>2</sub> data to determine the processes controlling CO<sub>2</sub> in Kaneohe Bay on diel, seasonal, and annual time scales.*

Master's Thesis Research, University of Hawaii-Manoa, Honolulu, HI (08/02 – 12/05)

Adviser: Dr. Fred T. Mackenzie

Committee Members: Dr. Marlin Atkinson and Dr. Edward Laws

- *Performed a bi-monthly time series study of the seawater CO<sub>2</sub> system in the lagoon waters of Kaneohe Bay, Oahu, HI.*
- *Determined the processes controlling air-sea CO<sub>2</sub> exchange for the lagoon waters of Kaneohe Bay on seasonal and annual time scales.*

Intern at Mote Marine Laboratory, Center for Tropical Research, Summerland Key, FL (10/01 – 12/01)

Advisers: Dr. Erich Mueller and Dr. Jane Hawkrige

- *Investigated the effects of pesticides on gorgonians by performing laboratory exposure experiments.*
- *Performed coral disease and health surveys and assisted in the collection of Black Band Disease via SCUBA.*
- *Maintained coral aquaculture facilities.*

Undergraduate Research, The School for Field Studies, Turks & Caicos Islands, British West Indies (02/00 - 05/00)

- *Evaluated the health of coral reefs surrounding South Caicos Island by surveying coral, algae, and fish using the Atlantic and Gulf Rapid Reef Assessment protocol.*

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## FUNDED RESEARCH GRANTS:

A. Cohen (PI), S. Lentz (Co-PI), **K. Shamberger** (Co-PI). NSF OCE: Ocean Acidification #1220529. *Toward Predicting the Impact of Ocean Acidification on Net Calcification by a Broad Range of Coral Reef Ecosystems: Identifying Patterns and Underlying Causes*. \$695,322 (2012-2015).

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## PUBLICATIONS:

*\*Shamberger previously published as Fagan.*

**Shamberger, K. E. F.**, Feely, R. A., Sabine C. L., Massaro, R. F. S., Drupp, P. S., De Carlo, E. H., Mackenzie, F. T., Atkinson, M. J. *in prep*. Controls on Diel and Seasonal Aragonite Saturation State Variability in a Hawaiian Coral Reef Ecosystem.

Barkley, H.C., Cohen, A.L., Golbuu, Y., Starczak, V.R., DeCarlo, T.M., and **Shamberger, K.E.F.** 2015. Changes in coral reef communities across a natural gradient in seawater pH. *Science Advances*, 1, e1500328.

DeCarlo, T.M., A.L. Cohen, H.C. Barkley, **K. Shamberger**, Q. Cobban, C. Young, R. Brainard, Y. Golbuu. 2015. Coral bioerosion is accelerated by ocean acidification and nutrients. *Geology*, 10.1130/G36147.1.

**Shamberger, K. E. F.**, Cohen, A. L., Golbuu, Y., McCorkle, D. C., Lentz, S. J., Barkley, H. C. 2014. Diverse Coral Communities in Naturally Acidified Waters of a Western Pacific Reef. *Geophysical Research Letters*, 41, 10.1002/2013GL058489.

Drupp, P. S., De Carlo, E. H., Mackenzie, F. T., Sabine, C. L., Feely, R. A., **Shamberger K. E. F.** 2013. Comparison of CO<sub>2</sub> Dynamics and Air-Sea Gas Exchange in Differing Tropical Reef Environments. *Aquatic Geochemistry*, 10.1007/s10498-013-9214-7.

Massaro, R. F. S., De Carlo, E. H., Drupp, P. S., Mackenzie, F. T., Maenner-Jones, S., **Shamberger, K. E.**, Sabine, C. L., Feely, R. A. 2012. Multiple Factors driving Variability of CO<sub>2</sub> Exchange Between the Ocean and Atmosphere in a Tropical Coral Reef Environment. *Aquatic Geochemistry*, 18(4), 357-386, 10.1007/s10498-012-9170-7.

**Shamberger, K. E. F.**, Feely, R. A., Sabine, C. L., Atkinson, M. J., DeCarlo, E. H., Mackenzie, F. T., Drupp, P. S., Butterfield, D. A. 2011. Calcification and Organic Production on a Hawaiian Coral Reef. *Marine Chemistry*, 127(1-4), 64-75, 10.1016/j.marchem.2011.08.003.

**Fagan, K. E.** and Mackenzie, F. T. 2007. Air-sea CO<sub>2</sub> exchange in a subtropical estuarine-coral reef system, Kaneohe Bay, Oahu, Hawaii. *Marine Chemistry*, 106(1-2): 174-191. doi:10.1016/j.marchem.2007.01016

E. Gaidos, B. Deschenes, L. Dundon, **K. Fagan**, C. Mcnaughton, L. Menviel-Hessler, N.Moskovitz, and M. Workman. 2005. Beyond the Principle of Plenitude: A Review of Terrestrial Planet Habitability. *Astrobiology*, 5(2): 100-126.

## SCHOLARSHIPS AND HONORS:

Woods Hole Oceanographic Institution Postdoctoral Scholarship Award. (2011 – 2013)

Best poster award, Surface Ocean Lower Atmosphere Study (SOLAS) Summer School.  
(2007)

Anderson Scholarship for internship with Mote Marine Laboratory, Center for Tropical Research.  
(Fall 2001)

Graduated from University of San Diego with honors. (2001)

Member of Mortar Board Senior Honors Society, Alcala chapter, University of San Diego.  
(2000 – 2001)

Alcala Leadership Program, University of San Diego. (1999)

University of San Diego Honors Program. (1997 – 2001)

Trustee Scholarship (academic scholarship), University of San Diego. (1997 – 2001)

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## TEACHING EXPERIENCE:

Assistant Professor, Texas A&M University, College Station, TX (current)

- *Introduction to Oceanography (OCNG 251)*: Undergraduate introduction to the field of oceanography for non-science majors.
- *Communicating Ocean Sciences (OCNG 603)*: Graduate course that provides instruction and practice with presenting scientific information on the ocean to science and non-science audiences.

Lecturer, Woods Hole Oceanographic Institution, Woods Hole, MA (September 2012)

- *Gave a lecture on ocean acidification to a group of about twenty BP employees who were taking an ocean science short course at WHOI.*

Guest Lecturer, Sea Education Association (SEA), Woods Hole, MA (March 2012)

- *Gave a lecture on ocean acidification and coral reefs to undergraduate students participating in a semester of marine research through the SEA Semester program.*

Guest Speaker, Palau Community College, Korror, Palau (September 2011)

- *Gave a lecture on my research in Hawaii and how it relates to Palauan reefs, emphasizing the effects of ocean acidification and the variability in the seawater CO<sub>2</sub> system of coral reefs.*

Guest Lecturer, Seattle area schools, WA (2006 – 2011)

- *Gave lectures on climate change and ocean acidification to high school, community college, and undergraduate classes at several schools in the Seattle area, WA.*

Teaching Assistant, University of Hawaii-Manoa (2002 – 2003)

- *Taught introduction to oceanography laboratory course. Gave short lectures and ran laboratory, computer, and field trip exercises.*

Tutor, University of San Diego (1998 – 1999)

- *Tutored freshman and sophomore undergraduate students in biology, college algebra, calculus I, and calculus II.*

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## STUDENT ADVISING:

PhD Students: Andrea Kealoha (started Fall 2014)

Graduate Student Committees: Dawei Shi (PhD committee, chair: Terry Wade); Michael Evans (PhD committee, chair: Piers Chapman); Jordan Young (MS committee, chair: Shari Yvon-Lewis); John Schiff (PhD committee, chair: Brendan Roark).

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## PRESENTATIONS:

*\*Shamberger previously presented as Fagan.*

**Shamberger, K. E. F.**, Cohen, A. L., Lentz, S. J., McCorkle, D. C., Golbuu, Y., Barkley H. C. 2014. Processes Driving Natural Acidification and Decline in Net Ecosystem Calcification of Diverse Palauan Coral Reefs. Texas A&M University at Galveston, Galveston, TX, USA. **Invited talk.**

**Shamberger, K. E. F.**, Lentz, S. J., Cohen, A. L., McCorkle, D. C., Golbuu, Y. 2014. Carbonate Chemistry Variability on a Coral Reef with Tidally Driven Flow. Gordon Research Conference Global Ocean Change Biology: Interactive Effects of Multiple Global Change Variables 2014, Waterville Valley, NH, USA. Poster presentation.

**Shamberger, K. E. F.**, Cohen, A. L., Lentz, S. J., McCorkle, D. C., Golbuu, Y., Barkley H. C. 2014. Processes Driving Natural Acidification and Decline in Net Ecosystem Calcification of Diverse Palauan Coral Reefs. Scripps Institution of Oceanography, University of California San Diego, San Diego, CA, USA. **Invited talk.**

**Shamberger, K. E. F.**, Lentz, S. J., Cohen, A. L., McCorkle, D. C., Golbuu, Y., 2014. A Decline in Net Ecosystem Calcification by Coral Reefs of the Palauan Archipelago. Ocean Sciences Meeting 2014, Honolulu, HI, USA. Oral presentation.

**Shamberger, K. E. F.**, Cohen, A. L., Golbuu, Y., McCorkle, D. C., Lentz, S. J., Barkley H. C. 2013. Processes Driving Natural Acidification of Western Pacific Coral Reef Waters. AGU 2013 Fall Meeting, San Francisco, CA, USA. Oral presentation and **session convener**.

Cohen, A. L., Barkley, H. C., DeCarlo, T. M., Drenkard, E. J., **Shamberger, K. E. F.**, McCorkle, D.C., Lentz, S. J. 2013. The Coral Reef Response to Ocean Acidification: Insights from Laboratory Experiments and Field Data. Ocean Acidification Principle Investigators 2013 Meeting, Washington, DC, USA. Poster presentation.

**Shamberger, K. E. F.** 2013. Variable Responses of Coral Reefs to Ocean Acidification: Lessons from the Field. Department of Earth, Ocean, and Atmospheric Science, Florida State University, Tallahassee, FL, USA. **Invited talk**.

**Shamberger, K. E. F.**, Feely, R. A., Sabine, C. L., Atkinson, M. J., DeCarlo, E. H., Mackenzie, F. T., Drupp, P. S., Butterfield, D. A. 2013. Calcification, Organic Production, and Carbon Dioxide on a Hawaiian Coral Reef. Department of Oceanography, Texas A&M University, College Station, TX, USA. **Invited talk**.

**Shamberger, K. E. F.** 2013. Coral Reef Responses to Ocean Acidification: Lessons from the Field. Department of Oceanography, Texas A&M University, College Station, TX, USA. **Invited talk**.

**Shamberger, K. E. F.**, Cohen, A. L., McCorkle, D. C., Golbuu, Y., Lentz, S. J. 2012. Natural Acidification of Coral Reef Communities in the Western Pacific Warm Pool. 12<sup>th</sup> International Coral Reef Symposium, Cairns, Queensland, Australia. Oral presentation.

Cohen, A. L., Brainard, R., Young, C., Cantin, N., Feely, R. A., **Shamberger, K. E. F.**, McLeod, E., McCorkle, D. C. 2012. Nutrient modulation of the coral calcification response to a natural gradient in ocean acidification. 12<sup>th</sup> International Coral Reef Symposium, Cairns, Queensland, Australia. Oral presentation.

**Shamberger, K. E. F.**, Feely, R. A., Sabine, C. L., Atkinson, M. J., DeCarlo, E. H., Mackenzie, F. T., Drupp, P. S., Butterfield, D. A. 2012. One size does not fit all: Coral reef responses to ocean acidification in the Hawaiian Islands. University of Massachusetts Boston, May 2012, Boston, MA, USA. **Invited talk**.

**Shamberger, K. E. F.**, Drupp, P., Feely, R. A., Sabine, C. L., Solomon, R. F., De Carlo, E. H., Mackenzie, F. T., Atkinson, M. J. 2011. Controls on Diel and Seasonal Aragonite Saturation State and Carbon Dioxide Variability in a Hawaiian Coral Reef Ecosystem. AGU 2011 Fall Meeting, San Francisco, CA, USA. Oral presentation.

Cohen, A. L., Brainard, R. E., Young, C., **Shamberger, K. E.**, McCorkle, D. C., Feely, R. A., McLeod, E., Cantin, N., Rose, K., Lohmann, G. P. 2011. Coral Calcification Across a Natural Gradient in Ocean Acidification. AGU 2011 Fall Meeting, San Francisco, CA, USA. Oral presentation.

Drupp, P. S., De Carlo, E. H., Mackenzie, F. T., **Shamberger, K. E.**, Musielewicz, S. B., Maenner-Jones, S., Sabine, C. L., Feely, R. A. 2011. Comparison of CO<sub>2</sub> Dynamics and Air-Sea Exchange in Contrasting Tropical Reef Environments. AGU 2011 Fall Meeting, San Francisco, CA, USA. Poster presentation.

Drupp, P. S., Solomon-Massaró, R., De Carlo, E. H., Mackenzie, F. T., **Shamberger, K.**, Musielewicz, S., Maenner-Jones, S., Sabine, C. L., Feely, R. A. 2011. Ocean Acidification, Biogeochemical Processes, and pCO<sub>2</sub> of Seawater in Reefs of Oahu, Hawaii. EPOCA Annual Meeting 2011, Brussels, Belgium. Poster presentation.

**Shamberger, K. E. F.**, Feely, R. A., Sabine, C. L., Atkinson, M. J., DeCarlo, E. H., Mackenzie, F. T., Drupp, P. S., Butterfield, D. A. 2011. Calcification, Production, and CO<sub>2</sub> on a Hawaiian Coral Reef. Ocean Sciences Meeting 2011, San Juan, Puerto Rico. Oral presentation.

De Carlo, E. H., Drupp, P. S., Mackenzie, F. T., **Shamberger, K.**, Maenner-Jones, S., Musielewicz, S., Sabine, C. L., Feely, R. A. 2011. Ocean-Atmosphere Exchange of CO<sub>2</sub> on Coral Reefs of Oahu, Hawaii. Ocean Sciences Meeting 2011, San Juan, Puerto Rico. Oral presentation.

**Kathryn E. F. Shamberger.** 2010. Calcification and Production on a Hawaiian Coral Reef. Woods Hole Oceanographic Institute, November 2010, Woods Hole, MA. **Invited talk.**

**Shamberger, K. E. F.**, Feely, R. A., Sabine, C. L., Drupp, P. S., De Carlo, E. H., Mackenzie, F. T., Atkinson, M. J., Butterfield, D.A. 2010. Ocean Acidification and Calcification on a Hawaiian Coral Reef. Ocean Sciences Meeting 2010, Portland, OR. Poster presentation.

**Kathryn E. F. Shamberger.** 2010. Ocean Acidification and Coral Calcification on a Hawaiian Reef. Hawaii Institute of Marine Biology, University of Hawaii, February 2010, Kaneohe, Hawaii. **Invited talk.**

**Kathryn E. Fagan,** Richard A. Feely, and Christopher L. Sabine. 2008. Ocean Acidification: How We Have Changed the Chemistry of the World's Oceans and Implications for Calcifying Organisms. GSA Joint Annual Meeting, October 2008, Houston, Texas. **Invited talk.**

**Fagan, K. E.**, Solomon, R. F., Sabine, C. L., Feely, R. A., De Carlo, E. H., Mackenzie, F. T. 2008. Variability in the Surface Water Inorganic Carbon Parameters of a Hawaiian Coral Reef System and Implications for Calcification Rates. Ocean Sciences Meeting 2008, Orlando, Florida. Poster presentation.

Solomon, R. F., Ostrander, C. O., **Fagan, K. E.**, De Carlo, E. H., Mackenzie, F. T., McManus, M. A., Sabine, C. L., Feely, R. A., 2008. The Effects of Local Climatic

Forcing on Nutrient Delivery, Phytoplankton Productivity, and Air-Sea Exchange of CO<sub>2</sub> in Southern Kaneohe Bay, Hawaii. Ocean Sciences Meeting 2008, Orlando, Florida. Oral presentation.

**Kathryn E. Fagan**, Feely, R. A., Sabine C. L., Solomon, De Carlo, E. H., Mackenzie, F. T., Musielewicz, S. 2007. Inorganic Carbon Variability in a Hawaiian Coral Reef System and Implications for Field Based Calcification Rate Studies. SOLAS Summer School, October 2007, Corsica, France. Oral and poster presentations.

**Kathryn E. Fagan**. 2007. Biogeochemistry and Climate. Graduate Climate Conference, October 2007, University of Washington Center for Sustainable Forestry at Pack Forest, WA. Oral presentation and **session chair**.

Solomon, R. F., C. E. Ostrander, M. F. Chung, F. S. Paquay, L. E. DeGelleke, M. Akiba, **K. E. Fagan**, E. H. De Carlo, F. T. Mackenzie, M. A. McManus, C. Sabine, R. A. Feely. 2006. The Effects of Storm Events on CO<sub>2</sub> Exchange in Southern Kaneohe Bay, Hawaii. Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract OS21A-1566. Poster presentation.

**Kathryn E. Fagan**, Francois Paquay, Daniel E. Lockett IV, and Fred T. Mackenzie. 2005. Processes controlling air-sea exchange of CO<sub>2</sub> in subtropical Pacific estuaries. Ocean Sciences Meeting 2005 Meeting, Salt Lake City, UT. Oral presentation.

**Kathryn E. Fagan**, Fred T. Mackenzie, and Andreas J. Andersson. 2004, Processes controlling air-sea exchange of carbon dioxide in a subtropical Pacific estuary, *EOS Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract, OS13A-0521. Poster presentation.

**Kathryn E. Fagan**, Fred T. Mackenzie, Daniel W. Sadler, and Justin Dilg. 2004. Processes controlling air-sea exchange of carbon dioxide, Kaneohe Bay, Oahu, Hawaii. PICES 13 Fall 2004 Meeting, Honolulu, HI. Oral presentation.

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## WORKSHOPS:

Ocean Acidification Principle Investigators Workshop, Woods Hole Oceanographic Institution, Woods Hole, MA, June 2015

ADVANCE Center Roadmap for a Successful Academic Career Workshop, Texas A&M University, College Station, TX, April 2014

Coral Reef Ocean Acidification Monitoring Portfolio Workshop, NOAA and Nova Southeastern University Oceanographic Center, Ft. Lauderdale, FL, August 2012

Anthropogenic Stresses on Ocean Ecosystems Workshop, University of Washington, Seattle, WA, June 2008.



Surface Ocean Lower Atmosphere (SOLAS) Summer School, Corsica, France, October 2007.

Ocean Acidification Workshop, Scripps Institution of Oceanography, La Jolla, CA, October 2007.

Workshop on the Impacts of Increasing CO<sub>2</sub> on Coral Reefs and Other Marine Calcifiers, St. Petersburg, FL, April 2005.

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## RESEARCH CRUISE EXPERIENCE:

Many months of time on small boats investigating coral reef biogeochemical cycling in Hawaii, American Samoa, Palau, the Great Barrier Reef in Australia, Taiwan, and the Gulf of Mexico.

One month research cruise onboard the NOAA R/V Hi 'ialakai to investigate the seawater CO<sub>2</sub> system in the coral reef systems of the islands of American Samoa (02/06 – 03/06)

One day research cruise onboard the R/V Thomas G. Thompson to do repeat water sampling in the Puget Sound, WA (Winter 2004)

One day research cruise to characterize the benthic and phytoplankton community off the coast of San Diego, CA (Fall 2000)

One day research cruise onboard the R/V *Sea Watch* to investigate the morphology, geology, and water chemistry of the California Continental Borderland off the coast of Long Beach, CA (Fall 1999)

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## PROFESSIONAL ACTIVITIES AND OUTREACH:

Ad hoc proposal reviewer for NSF and NOAA and manuscript reviews for Aquatic Geochemistry, Biogeosciences, Coral Reefs, Geophysical Research Letters, Global Biogeochemical Cycles, ICES Journal of Marine Science, Journal of Geophysical Research-Oceans, and Oceanography.

Postdoctoral Association, Secretary, Woods Hole Oceanographic Institution, 2012-2013.

Co-organizer and session chair for the Graduate Climate Conference at the University of Washington, WA, October 2007.

Member of ASLO since 2005.

Member of AGU since 2004.

Invited Earth Day speaker for New Hampton School, a boarding high school in New Hampshire. Gave a talk to the entire student body and faculty entitled “Climate Change, Double Trouble for Tropical Coral Reefs: Warming and Acidification.”

Participated in the Synergy project, a collaboration between artists and MIT/Woods Hole Oceanographic Institution scientists that produced an exhibition at the Boston Museum of Science that let viewers explore oceanography through art:  
<http://www.whoi.edu/website/synergy/about-synergy>.

Participated in Woods Hole Oceanographic Institution’s Public Ocean Acidification Event by running a table with information and activities on coral reef ocean acidification field research.

Worked with high school students in Bellevue, WA via the Educurious website on science projects as part of an interactive Ecological Impacts of Climate Change course.

Gave overview of effects of ocean acidification to science educators during Centers for Ocean Science Education Excellence - Ocean Learning Communities event.

Volunteered for National Ocean Science Bowl several times in Honolulu, HI and Seattle, WA.

Judged high school science fairs in Honolulu, HI and Seattle, WA areas.

Gave outreach talks on climate change and ocean acidification at the Woods Hole Oceanographic Institution, University of Washington, Seattle, WA; NOAA Pacific Marine Environmental Laboratory, Seattle, WA; Ballard High School, Seattle, WA; and Garfield High School, Seattle, WA.

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## CERTIFICATIONS AND PROFICIENCIES:

Analytical Techniques: *Total alkalinity (TA) using an open cell potentiometric titration and dissolved inorganic carbon (DIC) using semi-automated coulometry coupled with a Single Operator Multi-parameter Metabolic Analyzer (SOMMA). I have analyzed TA and DIC separately and also simultaneously using a VINDTA 3C. Dissolved oxygen using Winkler Titration.*

In-situ instrumentation: *Moored Autonomous pCO<sub>2</sub> (MAPCO<sub>2</sub>) system, Remote Access Sampler (RAS) produced by McLane Research Laboratories Inc., SAMI-pH, Sea-Bird SBE 16 conductivity and temperature sensor, RBR XR-620 CTD, YSI multparameter probe.*

Computer Language: Matlab.

U.S. Coast Guard approved Boat U.S. Foundation General Boating certification.

Scientific diver, advanced, wreck, and stress rescue SCUBA diving certifications.

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*Updated 1 July 2015*