

Dr. Nina Bednarsek

Senior Scientist

Biogeochemistry Department

Southern California Coastal Water Research Project

Education

Ph.D., biological oceanography, University of East Anglia, Cambridge, UK, 2007-2010

M.Sc., environmental diagnostic, Cranfield University, UK, 2006

B.Sc., interdepartmental study of microbiology University of Ljubljana, Slovenia, 2005

Professional Experience

Senior Scientist, Southern California Coastal Water Research Project Authority. Costa Mesa, CA.
2019-present

Scientist, Southern California Coastal Water Research Project Authority. Costa Mesa, CA.
2017-2019

Senior Research Scientist, Alfred-Wegener-Institut, Germany. 2016-2017

Research Scientist, University of Washington. 2016

Science-Policy Specialist, Washington Ocean Acidification Centre at the University of Washington.
2014-2016

National Research Council Post-Doctoral Fellowship, National Oceanographic and Atmospheric Administration (NOAA), Pacific Marine Environment Laboratory. 2012-2014

Visiting Professor at Angers University, Angers University, France. 2012

Research Associate and Lecturer, University of Nova Gorica, Slovenia. 2011-2013

Visiting Fellow at the Tyndall Centre for Climate Change Research, MARine Ecosystem Model

Intercomparison Project (MAREMIP), University of East Anglia, School of Environmental Sciences.
UK 2011

Marie Curie Early Stage Fellowship, Laboratory for Global Marine and Atmospheric Chemistry,
UK. 2007-2010

Visiting Fellow at Woods Hole Oceanographic Institution, Woods Hole Oceanographic Institution,
Woods Hole, USA. 2008

Zois Fellowship for Talented Early Career Stage Researchers, Cranfield University, UK for M.Sc.
Programme Environmental Diagnostics. 2005-2006

Honors and Awards

Best Oral Scientific Presentation Award, PICES, 2014

National Research Council Fellowship, 2012 (awarded for excellence in research).

Edith Fanta Award for the Most Prominent Young Researcher and the Best Oral Presentation,
2009

Best Oral Presentation Award, British Antarctic Survey Ph.D., 2009

Marie Curie Doctoral Fellowship for Excellence in Science, 2007.

Selected Presentations and Conference Proceedings

Bednaršek, N.: Exposure history determining pteropod vulnerability to ocean acidification (ASLO,
USA, 2016)

Bednaršek, N.: Pteropods in the California Current System: Indicators for ocean acidification
across different upwelling regimes (co-chair of IMBER workshop, also invited talk, Italy, 2015).

Bednaršek, N. The application of pteropod for ocean acidification monitoring in Norwegian Waters
(invited talk by Norwegian Governmental Agency, 2015).

Bednaršek, N., et al. From science to management: using pteropods as indicators for ocean
acidification monitoring, Our Common Future, 2015 (oral presentation).

Bednaršek, N.: Pteropod as indicators from scientific, policy and management perspective (invited

talk at the Pteropod International Workshop, UK, 2015 (oral presentation).

Bednaršek, N.: Pteropod as indicators for ocean acidification (invited talk at Royal Society OA Workshop, UK, 2015).

Bednaršek, N., et al. Pteropod vulnerability to ocean acidification and hypoxia in the California Current System, 2nd International Ocean Research Conference, IOC UNESCO, 2014 (oral presentation).

Bednaršek, N., et al. Loss of calcification and survival scope under current conditions in pteropods in the California Current System, PICES, 2014 (oral talk; selected for the best oral presentation).

Journal Articles

Bednarsek, N., J.A. Newton, M.W. Beck, S.R. Alin, R.A. Feely, N.R. Christman, T. Klinger. 2020. Severe biological effects under present-day estuarine acidification in the seasonally variable Salish Sea. *Science of the Total Environment* DOI:10.1016/j.scitotenv.2020.142689.

Cai, W.J., R.A. Feely, J.M. Testa, M. Li, W. Evans, S.R. Alin, Y.Y. Xu, G. Pelletier, A. Ahmed, D.J. Greeley, J.A. Newton, N. Bednarsek. 2020. Natural and Anthropogenic Drivers of Acidification in Large Estuaries. *Annual Review of Marine Science* DOI:10.1146/annurev-marine-010419-011004.

Bednarsek, N., G. Pelletier, A. Ahmed, R.A. Feely. 2020. Chemical Exposure Due to Anthropogenic Ocean Acidification Increases Risks for Estuarine Calcifiers in the Salish Sea: Biogeochemical Model Scenarios. *Frontiers in Marine Science* DOI:10.3389/fmars.2020.00580.

Bednarsek, N., R.A. Feely, M.W. Beck, S.R. Alin, S.A. Siedlecki, P. Calosi, E.L. Norton, C. Saenger, J. Strus, D. Greeley, N.P. Nezlin, M. Roethler, J.I. Spicer. 2020. Exoskeleton Dissolution With Mechanoreceptor Damage in Larval Dungeness Crab Related to Severity of Present-day Ocean Acidification Vertical Gradients. *Science of the Total Environment* DOI:10.1016/j.scitotenv.2020.136610.

Leon, P., N. Bednarsek, P. Welsham, K. Cook, S.E. Hartman, D. Wall-Palmer, J. Hindson, K. Mackenzie, L. Webster, E. Bresnan. 2019. Relationship between shell integrity of pelagic gastropods and carbonate chemistry parameters at a Scottish Coastal Observatory monitoring site. *ICES Journal of Marine Science* DOI:10.1093/icesjms/fsz178.

Canonico, G., P.L. Buttigieg, E. Montes, F.E. Muller-Karger, C. Steplen, D. Wright, A. Benson, B. Helmuth, M. Costello, I. Sousa-Pinto, H. Saeedi, J. Newton, W. Appeltabs, N. Bednarsek, L. Bodrossy, B.D. Best, A. Brandt, K.D. Goodwin, K. Iken, A.C. Marques, P. Miloslavich, M. Ostrowski,

W. Turner, E.P. Achterberg, T. Barry, O. Defeo, G. Bigatti, L. Henry, B. Ramiro-Sanchez, P. Duran, T. Morato, J.M. Roberts, A. Garchia-Alegre, M.S. Cuadrado, B. Murton. 2019. Global Observational Needs and Resources for Marine Biodiversity. *Frontiers in Marine Science* 6:1-20.

Baltar, F., B. Bayer, N. Bednarsek, S. Deppeler, R. Escribano, C.E. Gonzalez, R.L. Hansman, R.H. Mishra, M.A. Moran, D.J. Repeta, C. Robinson, E. Sintes, C. Tamburini, L.E. Valentin, G.J. Hemdi. 2019. Towards Integrating Evolution, Metabolism, and Climate Change Studies of Marine Ecosystems. *Trends in Ecology and Evolution* DOI:10.1016/j.tree.2019.07.003.

Bednarsek, N., R.A. Feely, E.L. Howes, B.P.V. Hunt, F. Kessouri, P. Leon, R. Lischka, A.E. Maas, K. McLaughlin, N.P. Nezlin, M. Sutula, S.B. Weisberg. 2019. Systematic Review and Meta-Analysis Toward Synthesis of Thresholds of Ocean Acidification Impacts on Calcifying Pteropods and Interactions With Warming. *Frontiers in Marine Science* 6:227.

Buitenhuis, E.T., C.L. Quere, N. Bednarsek, R. Schiebel. 2019. Large Contribution of Pteropods to Shallow CaCO₃ Export. *Global Biogeochemical Cycles* 33:458-468.

Engstrom-Ost, J., O. Glippa, R.A. Feely, J.E. Keister, S.R. Alin, B.R. Carter, A.K. McLaskey, K.A. Vuori, N. Bednarsek. 2019. Eco-physiological responses of copepods and pteropods to ocean warming and acidification. *Scientific Reports* 9:4748.

Janssen, A.W., S.L. Bush, N. Bednarsek. 2019. The shelled pteropods of the Northeastern Pacific Ocean (Mollusca: Heterobranchia, Pteropoda). *Zoosymposia* 13:305-346.

Bednarsek, N., R.A. Feely, M. Beck, O. Glippa, M. Kanerva, J. Engstrom-Ost. 2018. El Niño-Related Thermal Stress Coupled With Upwelling-Related Ocean Acidification Negatively Impacts Cellular to Population-Level Responses in Pteropods Along the California Current System With Implications for Increased Bioenergetic Costs. *Frontiers in Marine Science* 5:486.

Wall-Palmer, D., A.K. BurrIDGE, E. Goetze, F.R. Stokvis, A.W. Janssen, L. Mekkes, M. Moreno-Alcántara, N. Bednarsek, T. Schiøtte, M.V. Sørensen, C.W. Smart, K.T.C.A. Peijnenburg. 2018. Biogeography and genetic diversity of the atlantid heteropods. *Progress in Oceanography* 160:1-25.

Feely, R.A., R.R. Okazaki, W.J. Cai, N. Bednarsek, S.R. Alin, R.H. Bryne, A. Fassbender. 2018. The combined effects of acidification and hypoxia on pH and aragonite saturation in the coastal waters of the California current ecosystem and the northern Gulf of Mexico. *Continental Shelf Research* 158:50-60.

Bausch, A.R., M.A. Gallego, J. Harianto, P. Thibodeau, N. Bednarsek, J.N. Havenhand, T. Klinger. 2018. Influence of bacteria on shell dissolution in dead gastropod larvae and adult *Limacina helicina* pteropods under ocean acidification conditions. *Marine Biology* 165:40.

Bednarsek, N., R.A. Feely, N. Tolimieri, A.J. Hermann, S.A. Siedlecki, G.G. Waldbusser, P. McElhany, S.R. Alin, T. Klinger, B. Moore-Maley, H.O. Portner. 2017. [Exposure history determines pteropod vulnerability to ocean acidification along the US West Coast](#). *Scientific Reports* 3:4526.

Bednarsek, N., T. Klinger, C.J. Harvey, S.B. Weisberg, R.M. McCabe, R.A. Feely, J. Newton, N. Tolimieri. 2017. [New ocean, new needs: Application of pteropod shell dissolution as a biological indicator for marine resource management](#). *Ecological Indicators* 76:240-244.

Weisberg, S.B., N. Bednarsek, R.A. Feely, F. Chan, A.B. Boehm, M. Sutula, J.L. Ruesink, B. Hales, J.L. Largier, J.A. Newton. 2016. [Water quality criteria for an acidifying ocean: Challenges and opportunities for improvement](#). *Ocean and Coastal Management* 126:31-41.

Bednaršek, N., Tarling, G. A., Bakker, D. C. E., Fielding, S., Jones, E.M., Venables, H. J., Ward, P., Kuzirian, A., Lézé, B., Feely, R. A. Murphy, E.J. 2012. Extensive dissolution of live pteropods in the Southern Ocean. *Nature Geoscience* 5, 881-885.

Bednaršek, N.; Harvey, C.J., McCabe, R.M., Tolimieri, N., Klinger, T. 2017. New Ocean, New Needs: Application of Pteropod Shell Dissolution as a Biological Indicator for Marine Resource Management, *Ecological Indicators*, 76, 240-244.

Bednaršek, N., Harvey, C.J., Kaplan, I.C., Feely, R.A., Možina, J. 2016. Pteropods on the edge: Cumulative effects of ocean acidification, warming, and deoxygenation. *Progress in Oceanography*, 145, 1-24.

Bednaršek, N., Johnson, J., Feely, R.A. 2016. Vulnerability of pteropod (*Limacina helicina*) to ocean acidification: shell dissolution occurs despite an intact organic layer. *Deep Sea Research Part II: Topical Studies in Oceanography* 127: 53-56.

Bednaršek, N., Ohman, M.D. Changes in pteropod vertical distribution, abundance and species richness in the California Current System due to ocean acidification. 2015. *Marine Ecology Progress Series*, doi: 10.3354/meps11199.

Bednaršek, N., Feely, R.A., Peterson, W., Reum, J., Alin S.R., Hales, B. 2014. *Limacina helicina* shell dissolution as an indicator of declining habitat suitability owing to ocean acidification in the California Current Ecosystem. *Proceedings to the Royal Society B*, 281, 1785.

Bednaršek, N., Tarling, G. A., Bakker, D. C. E., Fielding, S., Feely, R.A. 2014. Dissolution Dominating Calcification Process in Polar Pteropods Close to the Point of Aragonite Undersaturation. *PloS one*, 9(10), e109183.

Bednaršek, N., Možina, J., Vogt, M., O'Brien, C., Tarling, G.A. 2012. The global distribution of pteropods and their contribution to carbonate and carbon biomass in the modern ocean. *Earth Syst. Sci. Data*, 4, 167-186.

- Bednaršek, N., Tarling, G. A., Bakker, D. C., Fielding, S., Cohen, A., Kuzirian, A., McCorkle, D., Lézé, B. and Montagna, R. 2012. Description and quantification of pteropod shell dissolution: a sensitive bioindicator of ocean acidification. *Global Change Biology*, 18, 2378–2388.
- Bednaršek, N., Tarling G., Bakker D., Fielding, S. 2012. Population dynamics and biogeochemical significance of *Limacina helicina* ant. in the Scotia Sea (Southern Ocean). *Deep Sea Research II*, 59-60, 105-116.
- Feely, R., Alin, S., Carter, B., Bednaršek, N. 2016: Chemical and biological impact of ocean acidification off the West Coast of North America. *Estuarine, Coastal and Shelf Science*.
- Weisberg, S., Bednaršek, N., Feely, R., Chan, F., Boehm, A., Sutula, M., Ruesink, J., Hales, B., Largier, J., Newton, J. 2016. Water quality criteria for an acidifying ocean: Challenges and opportunities for improvement. *Ocean & Coastal Management*, 126, 31-41.
- Reum, J. C., Alin, S. R., Harvey, C. J., Bednaršek, N., Evans, W., Feely, R. A., Sabine, C. L. 2015. Interpretation and design of ocean acidification experiments in upwelling systems in the context of carbonate chemistry co-variation with temperature and oxygen. *ICES Journal of Marine Science: Journal du Conseil*
- Andersson, A.J, Kline, D.I, Edmunds, P.J, Archer, S.D, Bednaršek, N., Carpenter, R.C. et al. 2015. Understanding ocean acidification impacts on organismal to ecological scales. *Oceanography*. 28(2).
- Alin, S.R., Brainard, R.E, Price, N.N, Newton, J.A, Cohen, A.L, Peterson, W.T, Bednaršek, N. et al. 2015. Characterizing the natural system: toward sustained, integrated coastal ocean acidification observing networks to facilitate resource management and decision support. *Oceanography*. 28(2).
- Howes, E. L., Bednaršek N., et al. 2014. Sink and swim, a status review of thecosome pteropod culture techniques. *Journal of Plankton Research*, doi: 10.1093/plankt/fbu002.
- Buitenhuis E. T., Vogt M., Moriarty R., Swan C., Bednaršek N. et al. 2013. MAREDAT: Towards a world ocean atlas of marine ecosystem data, *Earth System Science Data Discussions*, 5, 1077-1106.
- Hunt, B., Strugnell, J., Bednaršek, N. et al. 2010. Poles Apart: The “Bipolar” Pteropod species *Limacina helicina* is genetically distinct between the Arctic and Antarctic Oceans. *PLoS ONE* 5,3, e9835.

Technical Reports

Aminzadeh, S., M. Armsby, N. Bednarsek, J. Bishop, A. Boehm, C. Braby, F. Chan, R. Dunbar, R. Feely, B. Gaylord, L. Jewett, C. Krembs, K. Kroeker, R. Labiosa, T. Maloney, J. Phillips, B. Rappoli, M. Sakashita, D. Sivas, G. Somero, M. Sutula, D. Thomas, G. Waldbusser, S.B. Weisberg. 2016. Ocean Acidification: Setting Water Quality Goals. Technical Report 961. Stanford University. Stanford, CA.