

## Regional Research: Ocean Acidification

### Issue

The Office of National Marine Sanctuaries (ONMS) and broader NOAA groups are developing ocean acidification plans. Many scientists are working within the Monterey Bay National Marine Sanctuary on ocean acidification research, and their studies should be represented within these plans. This profile of ocean acidification experience and capabilities is to help poise the region for optimal contribution to societal needs for this information.

### Collaboration

To address resource management information needs, the MBNMS often relies on regional partners and facilitates collaboration among research groups. In 2011, the MBNMS Research Activity Panel (RAP), a working group of the Sanctuary Advisory Council, determined ocean acidification was a research priority. MBNMS Staff and RAP surveyed regional institutions for those conducting ocean acidification research, and compiled information for the Sanctuary region.



**Figure 1:** Locations of more than 50 marine research institutions and private groups around the Monterey Bay National Marine Sanctuary.

*Table 1. Institutions conducting ocean acidification research in coastal central California.*

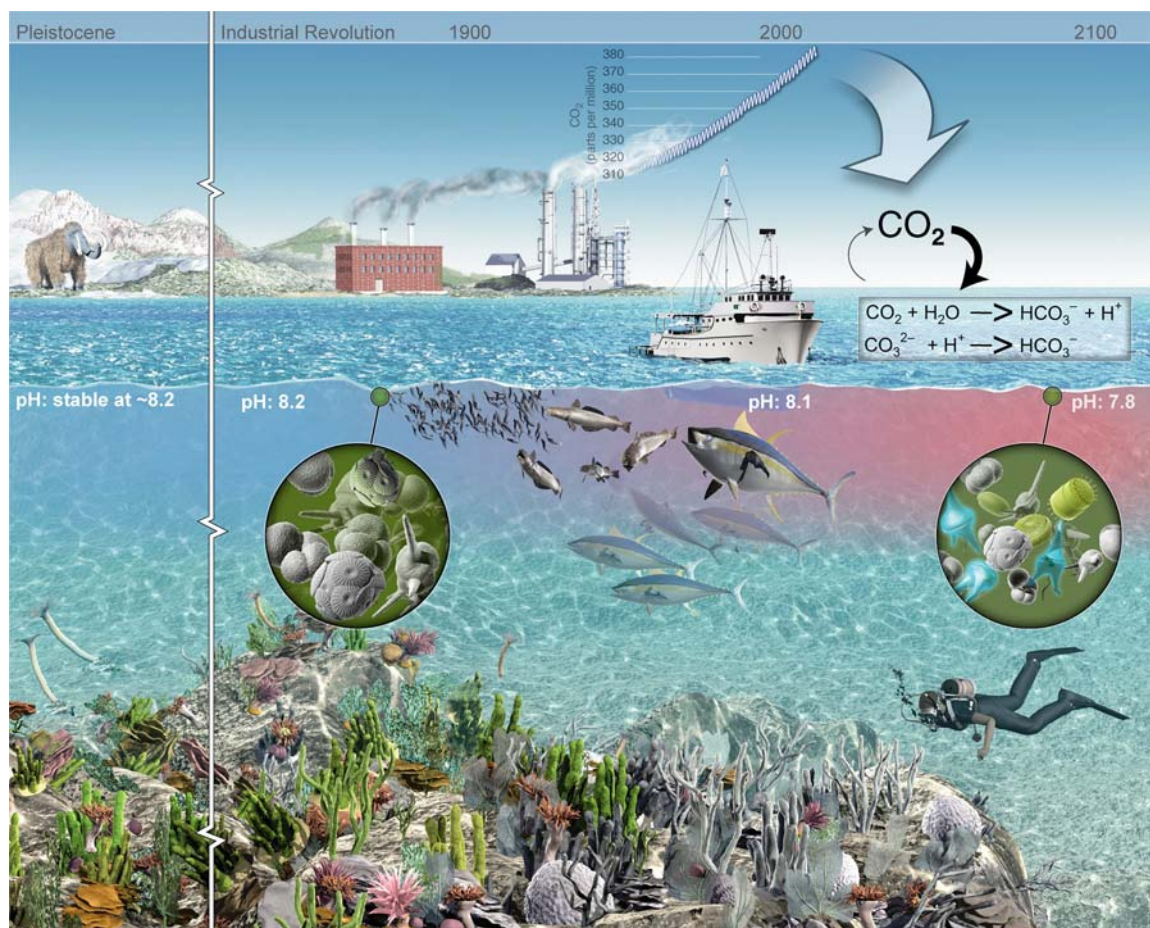
ACRONYM	INSTITUTION
HMS	Hopkins Marine Station
LLNL	Lawrence Livermore National Laboratory
MBA	Monterey Bay Aquarium
MBARI	Monterey Bay Aquarium Research Institute
MLML	Moss Landing Marine Laboratories
NOS	National Ocean Service
NOAA	National Oceanic and Atmospheric Administration
SDSU	San Diego State University
Stanford	Stanford University
UCLA	University of California, Los Angeles
UCSC	University of California, Santa Cruz
UHM	University of Hawaii, Manoa

**Table 2.** Ocean acidification research within the Monterey Bay National Marine Sanctuary.

Project Title	Institutions	PI or point of contact
Benthic Biology and Ecology	MBARI	Barry, James (barry@mbari.org)
Natural intrusions of hypoxic, low pH water into nearshore marine environments on the California coast	HMS, MBA, MLML, NOAA, UCLA	Booth, Ashley (jatbooth@gmail.com)
Ocean Chemistry of the Greenhouse Gases	MBARI	Brewer, Peter (brpe@mbari.org)
Creation of an Ocean Acidification Research Site (OARS) at the Kelp Forest Observatory within Lovers Point State Marine Reserve	MBARI, HMS, Stanford	Brewer, Peter (brpe@mbari.org)
Take up and translocation of CO <sub>2</sub> in giant kelp	UCSC	Carr, Mark (carr@ucsc.edu)
pCO <sub>2</sub> (and pH) MBARI time series program	MBARI	Chavez, Francisco (chfr@mbari.org)
Effects of ocean acidification on intertidal organisms	MBARI, UHM, UCSC	Chavez, Francisco (chfr@mbari.org)
Field experiments to investigate community and ecosystem responses and adaptation over long scales	UCSC	Crook, Elizabeth (ederse@ucsc.edu)
Developing new proxies boron and boron isotope in marine barite	UCSC	Crystal, Abbey (achrysta@ucsc.edu)
Climate change and kelp forests: assessing the roles of photosynthesis, respiration and biodiversity in regulating carbon budgets	SDSU	Edwards, Matt (edwards@sciences.sdsu.edu)
The effect of pH on strobilation and statocyst formation in <i>Chrysoara colorata</i>	MLML	Knowles, Thomas (tknowles@mbayaq.org)
Monitoring of carbon system parameters in Monterey Bay kelp forests	Stanford	Koseff, Jeffrey (koseff@stanford.edu)
Reconstruction of natural changes in pH and carbonate saturation in coastal California over the past 20,000 years	UCSC	Krupinski, Nadine (nadine@pmc.ucsc.edu)
Deployment of pCO <sub>2</sub> sensors at the Santa Cruz Wharf	UCSC	Kudela, Raphael (kudela@ucsc.edu)
Strain-specific response of picocyanobacteria to increased pCO <sub>2</sub>	UCSC	Mackey, Kate (kmackey@stanford.edu)
The effect of ocean acidification on marine invertebrates	HMS	Micheli, Fiorenza (micheli@stanford.edu)
Center for Ocean Solutions Working Group on Coastal Hypoxia in the California Current Large Marine Ecosystem	HMS, MBARI, MLML, UCSC, NOAA, NOS, MBA, and others	Micheli, Fiorenza (micheli@stanford.edu)
Impacts of ocean acidification on calcification in the California orange cup coral	UCSC	Paytan, Adina (apaytan@ucsc.edu)
Decade-scale change and connectivity through phytoplankton: Monterey Bay looks into the Pacific	MBARI	Pennington, Tim (peti@mbari.org)
Impacts of ocean acidification on competition between invasive and native snails	UCSC	Potts, Don (potts@ucsc.edu)
Impacts of ocean acidification and temperature on the physiology and development of <i>Euphausia pacifica</i>	UCSC	Potts, Don (potts@ucsc.edu)
OMEGAS - Ocean Marine Ecosystems Group for Acidification Studies	UCSC	Raimondi, Pete (raimondi@ucsc.edu)

**Table 2 (continued).** Ocean acidification research within the Monterey Bay National Marine Sanctuary.

CO2 mitigation via capture and chemical conversion in seawater	UCSC, LLNL	Rau, Greg (rau4@llnl.gov)
West coast conservation science in response to ocean acidification	UCSC, LLNL	Rau, Greg (rau4@llnl.gov)
Large and small volume natural assemblages ocean acidification incubations	UCSC	Tozzi, Sasha (stozzi@ucsc.edu)
Proxy calibration: extending the B/Ca proxy into deeper time	UCSC	Zachos, James (jzachos@pmc.ucsc.edu)
Reconstructing paleo-[CO3 2-] across the PETM, a period of time when our oceans were acidified	UCSC	Zachos, James (jzachos@pmc.ucsc.edu)



**Figure 2:** Illustration of the effects of increasing atmospheric carbon dioxide in the ocean.  
 Credit: David Fierstein © 2007 MBARI.

### Informing Resource Managers

The list of regional ocean acidification studies will be shared with ONMS and broader NOAA groups developing management plans to address ocean acidification.

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