CALIFORNIA COASTKEEPER ALLIANCE

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May 21, 2010

Clean Water Act Section 303(d):
Notice of Call for Public Comment on 303(d) Program and Ocean Acidification
Environmental Protection Agency
1200 Constitution Ave., NW, Mailcode: 4503–T
Washington, DC 20460
VIA ELECTRONIC MAIL

Re: Protect California oceans from acidification under the Clean Water Act (Docket ID No. EPA-HQ-OW-2010-0175)

The California Coastkeeper Alliance (Alliance) represents 12 Waterkeeper groups spanning the coast from the Oregon border to San Diego. The Alliance and its member Waterkeepers work to protect and enhance healthy marine habitats and coastal watersheds throughout the state, for the benefit of Californians and California ecosystems. The latest science indicates that many of the watersheds that the Alliance works to protect—Monterey Bay, Humboldt Bay, San Francisco Bay, Santa Monica Bay, and coastal waters off the San Diego and Orange County Coast—are particularly vulnerable to ocean acidification.[1]

On behalf of the Alliance, we strongly support swift action by the U.S. Environmental Protection Agency (EPA) to address ocean acidification under the Clean Water Act. Specifically, we urge EPA to:

1. Issue guidance on listing waters impaired by ocean acidification.
2. Revise national water quality criteria for pH.

EPA SHOULD ACT PROMPTLY TO ISSUE GUIDANCE ON LISTING WATERS IMPAIRED BY OCEAN ACIDIFICATION.

The ocean and dependent marine life are of critical economic and cultural importance to California. Approximately 85% of California's residents live or work along bay or coastal areas[2] and California's ocean-dependent economy generates an estimated $46 billion per year.[3] The Alliance works daily to protect the viability of California's marine ecosystems from pollution, overfishing, and coastal development. Scientific

[1] Byrne, R. H., S. Mecking, R. A. Feely, and X. Liu (2010), "Direct observations of basin-wide acidification of the North Pacific Ocean," *Geophys. Res. Lett.*, 37, L02601, doi:10.1029/2009GL040999.
[2] Ewing, L., "Considering sea level rise as a coastal hazard," Proceedings of Coastal Zone '07. Portland, OR, July 22-26, 2007.
[3] *See* review of economic assessments of the value of beaches in Pendleton *et al.*, "Estimating the Potential Economic Impacts of Climate Change on Southern California Beaches," (2009) PIER Research Report, CEC-500-2009-033-D, Sacramento, CA: California Energy Commission.

evidence indicates that ocean acidification will significantly alter ocean chemistry and profoundly impact marine ecosystems, threatening to undermine years of marine and coastal protection efforts. It is critical that EPA promptly issue national guidance on listing waters impaired by ocean acidification so that appropriate prevention, mitigation, and adaptation strategies can be developed and implemented.[4]

A. EPA has a legal duty to address waters that are threatened or impaired by ocean acidification through the Clean Water Act 303(d) program.

The ocean absorbs about half of all anthropogenic carbon dioxide emissions, an estimated 22 million tons of carbon dioxide (CO_2) every day.[5] When CO_2 dissolves in seawater it forms carbonic acid, which decreases ocean pH and causes "ocean acidification."[6] Global average surface pH has already decreased by approximately 0.1 units, and is expected to decrease by another 0.3-0.4 units by the end of the century, depending on future levels of atmospheric carbon dioxide.[7]

EPA is charged with national implementation of the Clean Water Act "to restore and maintain the chemical, physical and biological integrity of the Nation's waters."[8] This includes regulation of pH and acidity, which have substantial impacts to water quality. In 1976, EPA established a range within which open ocean water pH should remain, and set a maximum variance from naturally occurring pH changes of 0.2 units.[9]

Section 303(d) of the Clean Water Act, and the associated listing and Total Maximum Daily Load (TMDL) processes, address a wide range of threats and impairments to waterway beneficial uses originating from a variety of sources. EPA already maintains a list of waterways impaired for pH under the 303(d) program, with more than 3,500 waterbodies so listed as of May 2010.[10] Additionally, Section 303(d) of the Clean Water Act has been interpreted by both EPA and states to cover waterways impaired by atmospheric sources of pollution. In March 2007, EPA issued information on listing waters impaired by mercury from atmospheric sources under Section 303(d) of the Clean Water Act.[11] Subsequent to EPA's action, in October 2007, a group

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[4] Hauri *et al*. at p. 66.
[5] Feely, R. A., C. L. Sabine, K. Lee, W. Berelson, J. Kleypas, V. J. Fabry, and F. J. Millero. 2004. Impact of anthropogenic CO2 on the CaCO3 system in the oceans. Science 305:362-366.
[6] Orr, J.C. et al. 2009. Research Priorities for Understanding Ocean Acidification, Oceanography, Vol. 22, No. 4. 182.
[7] Hauri, Claudine, Gruber, N, Lachkar, Z., Plattner, G. 2009 Abstract. "Accelerated acidification in eastern boundary current systems." Goldschmidt Conference Abstracts, citing Orr, J.C., V.J. Fabry, O. Aumont, L. Bopp, S.C. Doney, R.A. Feely, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, and others. 2005. "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms." *Nature* 437(7059), doi10.1038/nature04095.
[8] 33 U.S.C. Section 1251(a).
[9] Quality Criteria for Water 1976: 342-43.
[10] *See* Environmental Protection Agency Watershed Assessment, Tracking & Environmental Results webpage, Specific State Causes of Impairment That Make up the National pH/Acidity/Caustic Conditions Cause of Impairment, available at http://iaspub.epa.gov/tmdl_waters10/attains_nation_cy.cause_detail_303d?p_cause_group_id=1188.
[11] Hooks, Craig, Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds. Memorandum: Listing Waters Impaired by Atmospheric Mercury Under Clean Water Act Section 303(d): Voluntary Subcategory 5m for States with Comprehensive Reduction Programs (March 8, 2007).

of Northeast states established the Northeast Regional Mercury TMDL, a regional cleanup plan to reduce mercury entering the states' watershed from a range of pollution sources, including atmospheric deposition of mercury.[12]

EPA can and must take similar action with regard to protecting the nation's waters from the impact of absorption of atmospheric carbon dioxide. National guidance that gives clear direction to states with regard to identifying such threats and impairments, and methods for addressing them, is essential to protect the health of sensitive aquatic ecosystems.

B. EPA guidance is needed to prompt state regulation of forecasted ocean acidification impacts to California seawater quality and marine life.

In 2008, an international team of scientists discovered high levels of acidified ocean water within 20 miles of the Pacific coastline, raising concern for the health of California's marine ecosystems.[13] Research indicates that this acidic, corrosive water is being "upwelled" to the surface from deeper waters and may actually be 50 years old.[14] Given that atmospheric levels of carbon dioxide have increased drastically in the last half century, and are likely to increase further, such acidification trends are projected to increase.[15]

The latest ocean acidification science indicates that nearshore areas on the California Current System are particularly vulnerable to ocean acidification. Coastal upwelling causes nearshore waters to be in a saturation state and have generally lower pH. These natural conditions, coupled with oceanic uptake of anthropogenic CO_2, mean that "ocean acidification has already decreased mean surface water pH in the California Current System to a level that was not expected to happen for open-ocean surface waters for several decades."[16] Projections indicate that the Humboldt Current System, another eastern boundary upwelling system that impacts ocean waters off of California, may be subject to the same conditions.[17]

In addition to decreasing ocean pH, ocean acidification decreases the concentration of the carbonate ion, the basic building block of the shells and skeletons of many marine organisms.[18] Several key physiological functions of marine organisms are affected by ocean acidification, including calcification, photosynthesis, respiration, internal acid-base balance, and metabolic rates.[19] Scientists have begun to quantify how this is impacting marine species, and are researching how changing conditions in the California Current System will impact marine life.

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[12] New England Interstate Water Pollution Control Commission, Northeast Regional Mercury Total Maximum Daily Load (October 24, 2007), p. 32. Document available at http://www.neiwpcc.org/mercury/mercurytmdl.asp.
[13] Feely, R. A., C. L. Sabine, J. M. Hernandez-Ayon, D. Ianson, and B. Hales. 2008. "Evidence for upwelling of corrosive "acidified" water onto the continental shelf." *Science* 320:1490-1492. http://www.sciencemag.org/cgi/content/abstract/sci;320/5882/1490. *See also* Hauri et al. at p. 66.
[14] *Id.*
[15] *Id. See also* http://www.sciencedaily.com/releases/2008/05/080522181511.htm.
[16] Hauri *et al*. at p. 69.
[17] *Id.*
[18] *See* Orr *et al*. at p. 182.
[19] Barry, J., Monterey Bay Aquarium Research Institute, Statement: Marine Organisms and Ecosystems in a High CO_2 Ocean and An Overview of Recommendations from the National Committee Report on Development of an Integrated Science Strategy for Oceans Acidification Monitoring, Research, and Impacts Assessment. (April 22, 2010).

Species at all levels of the marine food web will be impacted by lower pH, though biocalcifying species (*i.e.*, which build protective shells) such as plankton and shellfish are particularly vulnerable.[20] Calcifying plankton, including species found off of the California Coast,[21] are expected to be strongly affected by ocean acidification.[22] Shellfish, which are dependent on certain thresholds of pH in order to calcify, are also at risk. Scientists believe that recent plunges in production rates at Pacific Coast oyster hatcheries may be related to acidification.[23]

Preliminary assessments also indicate that two dominant giant kelp species are particularly vulnerable to ocean acidification.[24] This could endanger the giant kelp beds off of Southern California, and the roughly 800 species of marine organisms that depend on the kelp forests at some point in their life.[25] Scientists are also assessing the impact of ocean acidification to fish populations in the California Current System.[26] One recent study estimates that nearly a quarter of the total U.S. West Coast catch is made up of aragonite-calcifying species, which are vulnerable to ocean acidification.[27]

California invests heavily in a healthy ocean, engaging in an exhaustive multi-stakeholder process and spending an estimated $60 million over five years to designate networks of marine protected areas along the California Coast.[28] The State is projected to spend an additional $24 million every year to manage these marine protected areas.[29] These investments are threatened by ocean acidification, particularly if no preparations are made to adjust fisheries and ocean management practices. Despite mounting science on ocean acidification, California has not yet employed a comprehensive assessment and monitoring effort to inform wildlife management or the practices of the recreational and commercial fish and shellfish industry.

The Alliance respectfully requests that U.S. EPA act promptly to issue national guidance on listing and restoring to health those waters that are threatened or impaired by ocean acidification. This guidance should, among other things, encourage states to use the best available science on ocean acidification, science that also should be used to re-examine national pH water quality criteria**.**

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[20] Balch, William, Utgoff, Paul. 2009. "Potential Interactions Among Ocean Acidification, Coccolithophores and the Optical Properties of Seawater." *Oceanography* 22: 4, 146-161, 147.
[21] Coccolithophorids, foraminfera.
[22] Balch *et al*. at p. 47; *See also* Guinotte, J.M., Fabry, V.J. 2008. "Ocean acidification and its potential effects on marine ecosystems." *Ann. N.Y. Acad. Sci*. 1134: 320–342. Moy, A.D., Howard, W.R., Bray, S.G., Trull, T.W. 2009. "Reduced calcification in modern Southern Ocean planktonic foraminifera. Nature Geoscience. Riebesell, U, et al. 2000. Reduced Calcification of Marine Plankton in Response to Increased Atmospheric CO2," *Nature* 407:364-367; Ruttimann, J. 2006. "Sick Seas," *Nature News Feature* 978-980.
[23] Barton, Alan, Cudd, S., and M. Weigardt. 2009. Update on Hatchery Research and Use of State Funds to improve Larval Performance at Whiskey Creek Shellfish Hatchery; Gazeau, F., *et al*. 2007.
[24] Hauri *et al*. at p. 66.
[25] *See* http://www.cacoastkeeper.org/programs/healthy-marine-habitats/kelp-restoration.
[26] McKinnell, S. 2008. "Salmon pHishing in the northeast Pacific: an archaeological dig in the North Pacific survey data (1956-1964)," abstract at *The Ocean in a High-CO2 World*, Monaco, October 2008.
[27] Hauri *et al*. at p. 68.
[28] California Department of Fish and Game, "Estimated Long-Term Costs to Implement the California MLPA Master Plan Appendices," (January 2008) Appendix L., Page L-1, available at http://www.dfg.ca.gov/mlpa/pdfs/revisedmp0108l.pdf.
[29] *Id.*

NEW SCIENTIFIC INFORMATION ABOUT OCEAN ACIDIFICATION WARRANTS REVISION OF NATIONAL WATER QUALITY CRITERIA FOR PH.

In the three decades since EPA's establishment of water quality criteria for pH, anthropogenic carbon dioxide emissions have increased dramatically, as has our understanding of how seawater is impacted by absorbing atmospheric carbon dioxide. One prominent scientist recently noted that "the general characteristics of future chemical changes that will occur in the ocean as a result of increasing atmospheric CO_2 are highly predictable."[30] In June 2006, scientists from the National Oceanic and Atmospheric Administration and other U.S. agencies released a detailed joint report on the impacts of ocean acidification, expressing "mounting concern that rising atmospheric carbon dioxide (CO_2) concentrations ... will affect some of the most fundamental biological and geochemical processes of the sea."[31]

Despite growing scientific information on ocean acidification impacts, EPA has failed to update national water quality criteria for pH in decades. This has substantial implications for California seawater quality, since national water quality criteria provide the foundation for state water quality standards and pollution controls.[32] Under Section 304 of the Clean Water Act, EPA has a legal duty to revise water quality criteria "accurately reflecting the latest scientific knowledge."[33] Additionally, water quality criteria must reflect the latest scientific knowledge on how pollutants impact "plankton, fish, shellfish, wildlife, plant life…."[34] As described above, there is an immense amount of data emerging about the impacts of low pH levels on marine organisms.

Accordingly, the Alliance respectfully requests that U.S. EPA revise national water quality criteria on pH to reflect the significant body of scientific research and literature on ocean acidification impacts to seawater quality.

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On behalf of the Alliance, thank you for the opportunity to provide these comments on ocean acidification, an issue of critical importance for California's ocean and its dependent coastal economies and communities.

Regards,

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[30] Orr *et al.* at p. 189.
[31] Kleypas, J.A., R.A. Feely, V.J. Fabry, C. Langdon, C.L. Sabine, and L.L. Robbins, 2006. Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers: A Guide for Future Research, report of a workshop held 18–20 April 2005, St. Petersburg, FL, sponsored by NSF, NOAA, and the U.S. Geological Survey, 88 pp.
[32] *See generally* Center for Biological Diversity, Petition for Revised pH Water Quality Criteria under Section 304 of the Clean Water Act, 33 U.S.C. Section 1314 to Address Ocean Acidification (December 18, 2007).
[33] Under Section 304 of the Clean Water Act, Congress mandates that the EPA "shall" develop and publish and "from time to time thereafter revise" water quality criteria "accurately reflecting the latest scientific knowledge."
[34] 33 U.S.C. Section 1314(a)(1).