Sent via electronic and certified mail

June 13, 2009

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Re: 2008 Integrated Report

This comment letter responds to the Los Angeles Regional Water Quality Control Board's request for public input and comments on the draft Clean Water Act §§ 305(b) and 303(d) Integrated Report for the Los Angeles Region. The Center for Biological Diversity requests that Los Angeles region's ocean water segments be added to the Clean Water Act § 303(d) list of impaired water bodies due to impairment resulting from ocean acidification.

On February 27, 2007, the Center for Biological Diversity submitted scientific information supporting the inclusion of ocean waters on California's 303(d) List to each of the coastal regional water boards. Since then, it has only become more apparent that ocean acidification poses a serious threat to seawater quality with adverse effects on marine life. On February 4, 2009, the Center for Biological Diversity submitted additional scientific information concerning the latest findings on ocean acidification to the Regional Board and State Water Resources Control Board. Nonetheless, the Los Angles draft Integrated Report failed to list ocean waters as impaired from ocean acidification or even discuss how this serious water quality problem will be addressed by the Board.

Section 303(d) of the Clean Water Act requires states to establish a list of impaired water bodies within their boundaries for which existing pollution controls "are not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. § 1313(d). EPA regulations mandate that a state's list shall be approved only if it meets the requirements that existing pollution control requirements are stringent enough to ensure waters meet all water quality standards. 40 C.F.R. § 130.7(b)(1) & (d)(2).

Recent actions of EPA underscore the authority that states have to address ocean acidification pursuant to the Clean Water Act. EPA announced that it will review the aquatic life criterion for marine pH under the Clean Water Act to determine if a revision is necessary to protect designated uses from the threat of ocean acidification (EPA 2009). On April 15, 2009, EPA issued a notice of data availability in the Federal Register that calls for information and data on ocean acidification that the agency will use to evaluate water-quality criteria under the Clean Water Act. In the notice, EPA acknowledged the threat that ocean acidification poses to marine ecosystems:

> Preliminary projections indicate that oceans will become more acidic over time and overall, the net effect is likely to disrupt the normal functioning of many marine and coastal ecosystems.

(EPA 2009: 17485). Thus, EPA is soliciting information and data on ocean acidification pursuant to the Clean Water Act section 304. Despite what approach EPA ultimately decides to take on ocean acidification, California has an independent obligation under the Clean Water Act to list is ocean waters as impaired and establish a total maximum daily load.

Although early predictions about ocean acidification painted it as something of the future, the future is here with the impacts already appearing in our ocean waters. The concentration of calcium carbonate in seawater decreases with depth. The aragonite concentration horizon (defined as the depth at which seawater becomes undersaturated with respect to aragonite, $\Omega = 1$) has decreased by as much as 200m as a direct consequence of the uptake of anthropogenic carbon dioxide (Feely et al. 2008). This indicates that the effects of ocean acidification are becoming more widespread throughout the water column. The northeastern Pacific Ocean has a particularly shallow aragonite concentration horizon. This fact, combined with the strong seasonal upwelling, means that the Pacific coast is extremely sensitive to the documented changes in the aragonite concentration horizon. A recent study along several transects off of the Oregon-California border showed that the entire water column became undersaturated with respect to aragonite during periods of upwelling (Feely et al. 2008). As a result, marine organisms in surface waters, in the water column, and on the sea floor along the Pacific Coast are already being exposed to corrosive water during the upwelling season. This situation was not predicted to occur in open-ocean surface waters until 2050.

Similarly, a high-resolution multi-year dataset collected off the coast of Washington state showed a rate of pH decline almost an order of magnitude higher than that previously predicted by models (Wootton et al. 2008). California Current System is particularly sensitive to ocean acidification with the pH of surface waters comparatively low and change in pH for a given uptake of anthropogenic $CO2$ is particularly high (Hauri et al. 2009). Already the aragonite saturation horizon has shoaled by ~100 m and now reaches the euphotic zone in a few eddies and in near-shore environments during upwelling along the Pacific Coast (Hauri et al. 2009). Additionally, modeling specific to the California Current System predicts rapid changes in pH and aragonite saturation (Hauri et al. 2009).

Moreover, it has also recently come to my attention that there have been detectable measurements of declining pH due to ocean acidification in the Monterey Bay area. According to a presentation by Dr. Francisco Chavez, who presented at the International Marine Conservation Congress in May 2009, declining pH has been documented in the Monterey Bay and that pH is changing at a faster rate than atmospheric carbon dioxide is increasing. As this information is highly relevant to the impact of ocean acidification on California's coastal waters, I would encourage the Los Angeles Regional Water Quality Control Board and the State Water Resources Control Board to consider this closely. These studies underscore the urgency of the situation and demonstrate that rapid changes in seawater chemistry that are already underway (Feely et al. 2008).

The effect of ocean acidification on Pacific coast ecosystems has also been the subject of recent studies. Changes in saturation state may cause substantial changes in overall calcification rates for many species of marine calcifiers, which includes those that are major food source for local juvenile salmon (Feely et al. 2008). Additionally, many species of juvenile fish and shellfish of economic importance (including but not limited to mussels, clams, and oysters) are highly sensitive to increases in the concentration of carbon dioxide (Feely et al. 2008) and may be affected by even intermittent exposure to the corrosive waters noted throughout the water column in recent field measurements. Shell-forming marine life off the coast of Washington is adversely affected by even seasonal exposure to corrosive water. Such species exhibited increased probabilities of replacement by other species and decreasing probabilities of displacing other species as pH decreased (Wootton et al. 2008). Noncalcerous animals showed an opposite response, indicating a shift in the delicate ocean ecosystem (Wootton et al. 2008). California mussel beds are a dominant coastal habitat in the northeastern Pacific and provide an important food resource for humans. The California mussel is among the species adversely impacted by seasonal exposures to undersaturated water (Wootton et al. 2008). As mussel beds tend to be robust ecosystems, the sensitivity of these animals to decreasing saturation values may indicate much broader-scale impacts to less hardy ecosystems (Wootton 2008).

Pacific Coast hatcheries are already experiencing difficulties associated with increasing ocean acidification. Two of the largest hatcheries report production rates down by as much as 80% (Miller et al. 2009). In July of 2008, upwelling of waters affected by acidification was the likely cause of a huge mortality event at the Whiskey Creek Shellfish Hatchery in Tillamook, Oregon (Barton et al. 2009). The die-off affected larvae of Pacific and Kumamoto oysters, Manila clams, and Mediterranean mussels, foreshadowing the widespread effects that increased upwelling events of corrosive waters will have on the fishing industry. Problems with oyster hatcheries are not isolated in Oregon, but have been reported along the West Coast. Assuming business as usual projections for carbon emissions and a corresponding decline in ocean pH and mollusk harvests, the Pacific coast fishing industry could experience economic losses of up to $600 million by 2060 (Cooley et al. 2009).

The Los Angeles Regional Board is urged to add ocean waters to its impaired waters list. The Board is encouraged to consider the new information on ocean acidification enclosed here as well as the other supporting information previously submitted by the Center for Biological Diversity in support of listing.

The peer-reviewed scientific literature submitted to the Water Quality Control Board concerning ocean acidification meets data quality standards. The peer-reviewed scientific information previously submitted and enclosed herein supporting this request meets all data assurances and data quality objectives. The data and information is of high quality and credibility using methods and parameters to control for errors. The regulations governing implementation of the Clean Water Act's section 303(d) *require* that California "evaluate all existing and readily available water quality-related data and information to develop the list." 40 C.F.R. § 130.7(b)(5); *see also Sierra Club v. Leavitt*, 488 F.3d 904 (11th Cir. 2007)

Moreover, EPA's guidance states that the "[l]ack of a State-approved QAPP should not, however, be used as the basis for summarily rejecting data and information submitted by such organizations, or assuming it is of low quality, regardless of the actual QA/QC protocols employed during the gathering, storage, and analysis of these data" (EPA 2006: 33).

EPA's guidance for listing of impaired waters emphasizes that states should evaluate all data, and that listings may be based on small data sets, data other than site specific monitoring, and data from the public (EPA, Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act at 33-35, 38 (2005) ("EPA 2006")(EPA advised states to use the 2006 Guidance for their 2008 303(d) listings. See Memo from Diane Regas: Information Concerning 2008 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions (Oct. 12, 2006))). Here, the absence of site specific monitoring should not obviate the need to list California's ocean waters as impaired, rather it demonstrates a need for additional coastal monitoring. Recognizing the limited monitoring data available, EPA encourages states to consider a more expansive versus cautious approach to monitoring data (EPA 2006). Site-specific monitoring data is not required for impaired water listing. EPA regulations require that "reports from dilution calculations and predictive modeling" be included in the data and information that a state considers in its assessment process for section 303(d) listing purposes. 40 CFR 130.7(b)(5)(ii)). EPA guides states to consider even very small sample sets to ascertain the attainment status of waters. Moreover, states should use information about observed effects, predictive modeling, and knowledge about pollutant sources and loadings when making its listing determinations (EPA 2006).

Furthermore, EPA regulations and guidance require states to seek public participation in the impaired waters listing process. EPA regulations require that states actively solicit data and information from organizations and individuals, including conservation organizations. 40 C.F.R. 130.7(b)(5)(iii); EPA 2006. Here, the Center for Biological Diversity presents well-documented and highly credible scientific evidence that California's ocean waters are impaired from ocean acidification.

Sincerely,

/s/ Miyoko Sakashita
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enclosed

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.

Cooley, Sarah R., and S.C. Doney. 2009. Anticipating ocean acidification's economic consequences for commercial fisheries. Environmental Research Letters 4: 024007.

Cudd, Sue letter to Dr. Timothy Wootton. Nov. 26, 2008. Ocean Acidification and affect on larval oysters. (Included with permission.)

Current Journal of Marine Education. 2009. Special Issue: Ocean Acidification—From ecological impacts to policy opportunities 25:1.

Environmental Protection Agency. 2009. Ocean Acidification and Marine pH Water Quality Criteria. Federal Register 74: 17484.

Feely, R.A., Sabine, C.L., Hernandez-Ayon, J.M., Ianson, D., Hales, B. 2008. Evidence for Upwelling of Corrosive "Acidified" Water onto the Continental Shelf. Science 320:1490-92.

Hauri, Claudine, Gruber, N, Lachkar, Z., Plattner, G. 2009 Abstract. Accelerated acidification in eastern boundary current systems. Goldschmidt Conference Abstracts.

Moy, A.D., Howard, W.R., Bray, S.G., Trull, T.W. 2009. Reduced calcification in modern Southern Ocean planktonic foraminifera. Nature Geoscience.

Silverman, J., Lazar, B., Cao, L., Caldeira, K., Erez, J. 2009. Coral reefs may start dissolving when atmospheric CO2 doubles. Geophysical Research Letters 36: L05606.

Steinacher, M., F. Joos, T. L. Frölicher, G.-K. Plattner, and S. C. Doney. 2009. Imminent ocean acidification in the Arctic projected with the NCAR global coupled carbon cycle-climate model. Biogeosciences 6: 515–533.

Wootton, T.J., Catherine A. Pfister, and James D. Forester. 2008. Dynamic patterns and ecological impacts of declining ocean pH in a high-resolution multi-year dataset. Proceedings of the National Academy of Sciences. 105:48 18848-18853.