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Sent via email and US mail

October 26, 2009

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Re: Draft Integrated Report San Diego Region

This comment letter responds to the San Diego 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 San Diego Region. The Center for Biological Diversity requests that San Diego'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 which will adversely affect 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, San Diego Water Board's 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).

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Recent EPA actions 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). EPA is currently reviewing that information and data on ocean acidification pursuant to the Clean Water Act section 304 to determine whether a revision of water quality criteria is needed to better protect seawater from the threat of ocean acidification. Despite what approach EPA ultimately decides to take on ocean acidification, California has an independent obligation under the Clean Water Act to list its ocean waters as threatened or impaired and establish a total maximum daily load.

Although early predictions about ocean acidification painted it as something of a future problem, the future is here as the impacts are already appearing in our ocean waters. The current rates of atmospheric CO_2 increases are 100 times faster than any recorded in the past 1 million years, rapidly changing the ocean chemistry to levels not experienced in hundreds of millions of years. The oceans have absorbed nearly half of the anthropogenically produced CO_2 during the past century (Talmage 2009). Ocean uptake of fossil fuel CO_2 is now proceeding at about 1 million metric tons of CO_2 per hour, and the accumulated burden of fossil fuel CO_2 in ocean waters is now well over 530 billion tons (Brewer 2009). The ocean chemistry changes projected will exceed the range of natural variability, which is likely to be too rapid for many species to adapt. Ocean acidification will affect marine food webs and lead to substantial changes in commercial fish and seafood stocks, threatening food security for millions of people as well as the multi-billion dollar fishing industry (IAP statement 2009). Some of the most recent science confirms that ocean acidification is already affecting marine life and devastating and irreversible impacts are predicted within a decade for the most vulnerable ecosystems.

Coastal estuaries and temperate nearshore ecosystems are among the most biologically productive and maintain some of the most extensive and measurable ecosystem services (e.g., commercial and recreational fisheries, fish and invertebrate nursery grounds, water purification, flood and storm surge protection, human recreation). Because they are shallower, less saline, and have lower alkalinity, these habitats are more susceptible to changes in pH than the open ocean and will likely experience more acute impacts from elevated CO_2 (Miller et al. 2009). These waters are home to many economically and ecologically important species, such as mussels, oysters, and scallops. Acidification has the most damaging direct consequences for calcium carbonate-synthesizing marine organisms, such as these shellfish species and corals. Increased rates of CO_2 are reported to have had a pronounced negative effect on the survival of shellfish larvae, which in turn dramatically reduces the adult population (Talmage 2009). These species 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. The corrosive effect of ocean acidification on shellfish is well documented. Modern shell weights of foraminifera in the Southern Ocean are 30–35 percent lower than those from preindustrial sediments, which is consistent with reduced calcification induced by ocean acidification (Moy et al. 2009). Aragonite undersaturation in Arctic surface waters is projected to occur within a decade and the shells of mollusks will begin to dissolve more quickly than they can grow (Steinacher et al. 2009).

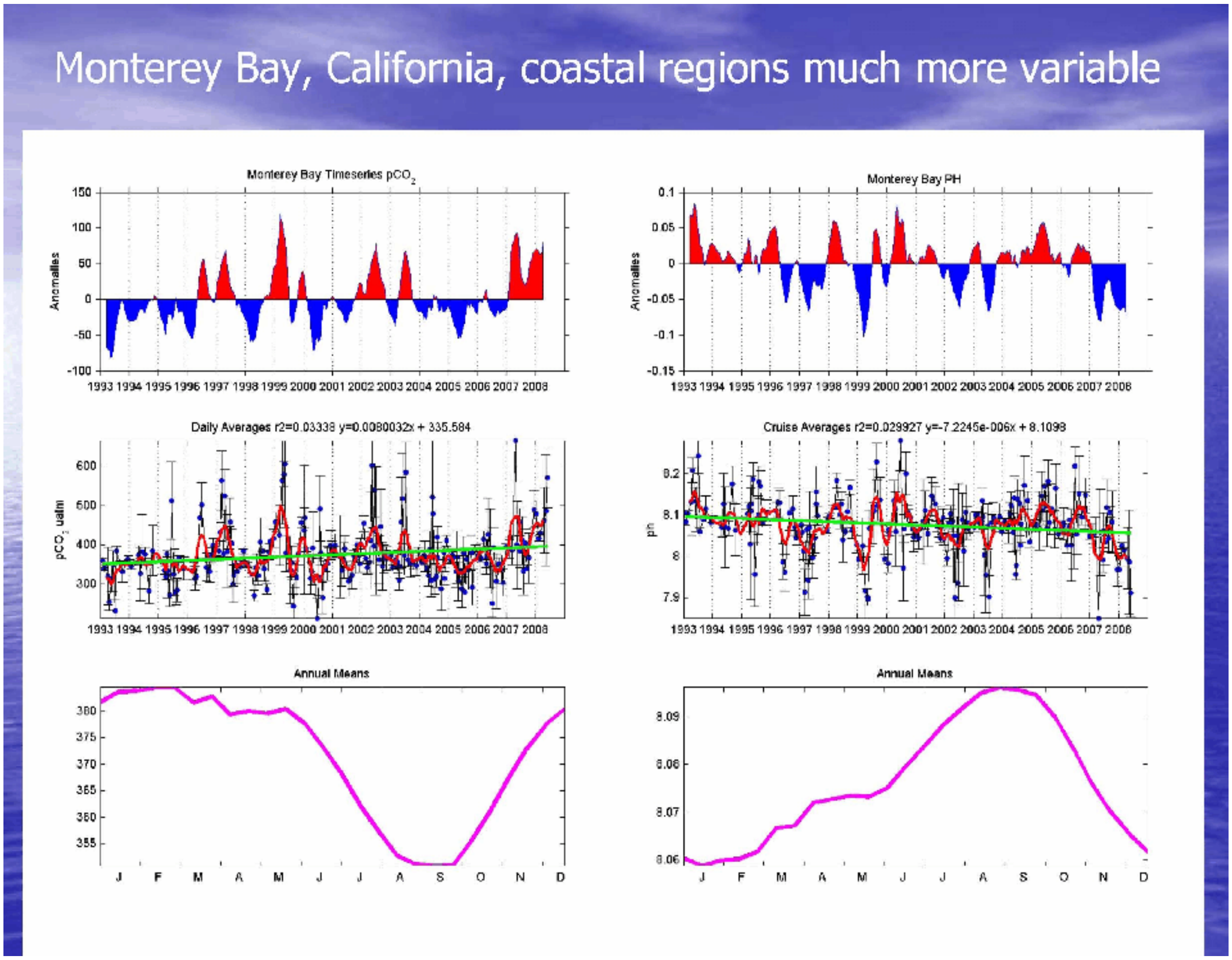
Shell-forming marine life off the coast of Washington has already been documented as being adversely affected, even by seasonal exposure to corrosive water. Documented shellfish species exhibited increased probabilities of replacement by other species and decreasing probabilities of displacing other 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). Ocean acidification is the likely cause of oyster production problems on the West Coast. Oyster farmers in Washington State have watched over the past four years as corrosive waters have almost completely depleted the oyster stock by drastically altering the development of baby oysters (Welch 2009). This has spread to Oregon hatcheries as well. 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, foreshadows the widespread affects 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). 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).

The consequences for coral reefs arouse concern as well because lowered carbonate ion concentration directly affects the ability of organisms to precipitate aragonite, which is the basic building block of coral reefs (Brewer 2009). Coral will be more brittle, which will cause its habitat to deteriorate and severely impair the reef building process. Although California does not have coral reefs, scientific findings on the impact of ocean acidification on corals is instructive to impacts on other calcifying organisms. Additionally, cold-water corals such as those found off the coast of California are even more susceptible to ocean acidification because they already inhabit waters less saturated with calcium carbonate.

Changes in ocean acidification are also likely to have impacts on a range of biological processes in addition to calcification, including impacts on photosynthesis, oxygen exchange and reproduction (Vernon 2009). Increased ocean acidification will also cause marine species to reach their physiological limits sooner. The consequences will be dramatic and will vary depending on the marine ecosystem. The most extreme result would be a total die off off all species. For instance, colder deep waters, in which pH and carbonate ion have already been much reduced by the addition of respiratory CO_2, have a far less buffer capacity than surface waters. Thus the changes in both p CO_2 and pH created at depth as the CO_2 invasion moves into abyssal waters will far exceed the surface changes now widely discussed in the ocean acidification literature. There is already clear evidence of expansion of the low oxygen regions of the oceans, and when these are combined with rising CO_2 levels we will likely see true dead zones created (Brewer 2009).

Impacts in California waters are not too far behind as such impacts will grow more widespread as atmospheric carbon dioxide pollution continues to grow. Most significant for California is the Feely et al. cruise that found corrosive waters already affected by ocean acidification upwelling onto the continental shelf along the entire coast of California (Feely et al. 2008). Similarly, a high-resolution multi-year dataset collected off the coast of Washington state showed a rate of pH decline of a 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 CO_2 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). 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).

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 San Diego 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 are already underway (Feely et al. 2008).



The San Diego 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 the 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 affects, 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,

Miyoko Sakashita

enclosure

Enclosed on compact disc

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