

April 17, 2010

The Honorable Maria Cantwell, Chair  
The Honorable Olympia Snowe, Ranking Member  
Committee on Commerce, Science, and Transportation  
Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard  
United States Senate  
Washington, DC 20510

Dear Madam Chairwoman and Ranking Member Snowe:

As shellfish growers, commercial fishing and seafood industry representatives from all over the United States, we are very concerned about ocean acidification. Together with scientists whose research has been instrumental in bringing to light the urgent threat that ocean acidification poses to fisheries and marine ecosystems, we respectfully request help from policy makers to mitigate the causes and reduce the economic harm resulting from ocean acidification.

It has been proven that ocean acidification results from an excess of CO<sub>2</sub> dissolving into the ocean from the atmosphere. This CO<sub>2</sub> is primarily from the burning of fossil fuels followed by deforestation, cement manufacture, and other human activities.

Acidification from fossil fuel emissions is compounded by the effects of local acidifying factors, such as river runoff containing high loads of nitrogen and carbon, greatly accelerating impacts that scientists predicted from ocean acidification. This confluence of global and local acidification poses grave risk (and in some cases outright harm) to the marine food web and commercially important species. Changes exhibited in parts of Alaska, the East Coast and the West Coast raise serious concerns for fisheries in other regions, such as the Gulf of Mexico, where CO<sub>2</sub>-driven acidification may compound the already serious impacts attributed to hypoxia.

A few examples:

1. Clams are dissolving before they can grow beyond their larval stage in parts of many East Coast bays, where impacts of river-borne effluents and eutrophication are aggravated by effects of global CO<sub>2</sub> emissions. This dissolution of young clams now represents a leading cause of mortality for these shellfish in many bays (Green et al). Scientists who documented this mortality say that it offers a preview of conditions that are expected to prevail throughout much of the ocean if CO<sub>2</sub> emissions are not sharply reduced.
2. On the West coast, upwelling of acidified water to a degree not anticipated until 2050 was documented in 2007 in a North American Carbon Program (NCAP) West Coast Cruise that surveyed the length of the west coast from Canada to Baja California (Feely et al 2008). Concurrently, natural oyster beds in the Pacific Northwest have experienced a multi-year recruitment failure, producing no commercially significant oyster sets. Acidification poses a severe threat to hatcheries that supply most of the region's \$100 million+ oyster industry. Because this corrosive seawater kills oyster larvae, one of the region's largest hatcheries (Whiskey Creek Shellfish Hatchery at Netarts Bay) suffered a 70- 80% decline in oyster larval production in 2007 and 2008.
3. Laboratory studies subjecting sea urchins and other shellfish to CO<sub>2</sub>-enriched seawater situations also have demonstrated larval shell deformation, reduced recruitment and settlement (Hofmann et al 2008); the tipping point for purple sea urchins is 540 ppm. In

the 2007 NOAA cruise, Feely et al found surface pCO<sub>2</sub> at about 850 μatm near the shelf break and higher inshore on some transects in northern California. Coincidentally, a 20-year data set of sea urchin larval recruitment in California indicates diminished recruitment in northern California during high upwelling events.

4. Seasonally acute acidification has now been observed in key fishing areas off Alaska, including the Bering Sea and the Gulf of Alaska (Fabry et al 2009), raising concerns for fisheries in a state that produces more than half the U.S. seafood catch. As in severely acidified waters along the West Coast and East Coast, these corrosive conditions are linked to compounding local acidifying influences from upwelling and river borne effluents. Scientists note that rising CO<sub>2</sub> emissions can be expected to make these corrosive conditions more persistent and widespread in the future.

Globally, ocean acidification has been identified as a serious threat to marine life and fisheries, and scientists have issued a series of unusually clear and urgent warnings about this problem. In the Monaco Declaration (2008), 155 scientists from around the world wrote: "Ocean acidification is accelerating and severe damages are imminent." Representatives from more than 70 national academies of science (including the United States, China, India, the U.K., Germany, France, and many others) signed a joint statement that read in part: "Marine food supplies are likely to be reduced with significant implications for food production and security in regions dependent on fish protein, and human health and wellbeing" (Inter-Academy Panel 2009).

While some organisms are likely to be more adaptive than others in a high-CO<sub>2</sub> ocean, seafood producers and consumers cannot afford to "whistle in the dark" about these changes. The U.S. seafood industry generates approximately \$70 billion annually, fueling jobs and businesses that sustain many thousands of families along the Gulf, Atlantic, the Pacific and Alaskan coasts. Even for fisheries where no direct harm from acidification has yet been documented, the disturbing signs of trouble on the "front lines" reveal a compelling case to prevent the impacts from spreading and growing more severe.

## **POLICY RESPONSES**

If seafood production is to be sustained and the oceans protected for future generations, federal political action is required now:

- **Adequate funding is urgently needed** to develop monitoring and research systems to track biological and ocean-chemistry changes in key areas, including estuaries. By utilizing and building on currently available studies we can create baseline data. From this we will have an accurate characterization of current water conditions thus enabling us to recognize "early warning" signs that may appear in the future. Data, current and future, should be coordinated with existing monitoring effort, such as NOAA's Integrated Ocean Observing System [IOOS] and the regional partners. Only by knowing what's coming at us can we hope to protect the resources that provide our food and livelihood.

- **Develop shellfish hatchery techniques and other methods of protecting important finfish and shellfish resources** from acute impacts of acidification. Small-scale experiments have shown that shellfish hatcheries, for example, can dodge some harm by halting production during periods when corrosive water is present and by maximizing production during "good water" periods. Within shellfish hatchery systems, certain water treatments show promise to reduce mortality of larval oysters. Brood stock programs have identified strains of shellfish that appear better able to survive in acidified seawater. Research and development is also needed

to create methods of protecting other fish stocks during vulnerable early life stages. If hatchery techniques can shelter juvenile animals (including finfish if in a hatchery situation) when they are most vulnerable, it may be possible to sustain seafood production while solutions to the global carbon problem are developed.

• **Finance energy efficiency and other measures where needed to reduce carbon emissions within the seafood industry, and encourage private investment that improves carbon efficiency in the sector.** The seafood industry is a small source of carbon emissions, but seafood enterprises recognize the need do their part. Many of the necessary investments to curtail emissions will be initially costly but ultimately cost-effective. For example, to repower with more efficient engines and equipment, or to switch to lower-carbon fuels will require capital that vessel operators, producers, and seafood vendors may not be able to obtain on their own. Programs will need to be in place to encourage these upgrades. The seafood industry also should be encouraged to consider and permitted to improve its carbon and energy efficiency through reforms in fishery management. For example, in many cases rebuilding fish stocks can result in more energy-efficient harvesting. In some cases significant emissions reductions may be obtained by enabling vessel replacement, fleet renewal, downsizing overbuilt fleets, or implementing other management reforms. These changes are not “a one size fits all solution” and can have complex socio-economic effects. Not all communities and segments of the industry will choose them nor should the changes be implemented without regional industry involvement.

Critically important, the United States must lead in the search for global solutions, including:

• **Research in and support of alternative energy initiatives**

• **Cut emissions of carbon dioxide** in order to minimize future harm to fishery resources from ocean acidification. Research on “tipping points” for marine ecosystems and organisms shows that preventing irreversible harm will require limiting maximum atmospheric concentration of CO<sub>2</sub> at no higher than 450 ppm, and then reducing this concentration significantly in the decades ahead. This will require bold steps to place the United States in a position to lead (not lag) in solving this problem globally. To protect fishery resources, as well as future life on this planet, it will be necessary to:

- 1) cap emissions throughout the U.S. economy,
- 2) improve energy efficiency,
- 3) enhance low-carbon energy sources, and
- 4) negotiate a commensurate international agreement to control emissions throughout the global economy.

In closing, the undersigned shellfish growers and commercial fishing representatives and scientists respectfully request your help to address the urgent threat of ocean acidification.

Sincerely,

*(Names are for identification only, do not represent or imply official endorsement from our employers.)*

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