



Executive Summary

Ocean Acidification and Alaska Fisheries:

Views and Voices of Alaska's Fishermen, Marine Industries and Coastal Residents

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In winter 2011-2012 the Alaska Marine Conservation Council (AMCC) sponsored community roundtable discussions on ocean acidification and Alaska fisheries in the fisheries-dependent communities of Homer, Kodiak and Dillingham in southern Alaska.



The roundtables were designed to engage coastal Alaskans and members of the Alaska seafood industry whose lives and local economies will be affected by changes linked to ocean acidification (OA). Specifically, the roundtables were intended to accomplish three inter-related goals: 1) bring together the efforts and expertise of scientists, subsistence harvesters, commercial fishermen, natural resources managers and coastal residents to better assess and address the impacts of OA on local fisheries and livelihoods; 2) develop ideas and advance dialogue concerning the needs and potential contributions of fishermen and fishing communities in responding to the threat posed by OA; and 3) provide insight into how the fishing industry might engage in policy action related to OA in the future.

Each roundtable discussion was set into motion with a presentation given by a leading scientist in the field. In Homer and Dillingham, the presentation was given by Dr. Jeremy Mathis, a chemical oceanographer and director of the Ocean Acidification Research Center (OARC) at the University of Alaska Fairbanks. In Kodiak, roundtable participants listened to a presentation by Dr. Robert Foy, director of NOAA's Alaska Fisheries Science Center Kodiak Laboratory. The discussion which flowed from scientific presentations included key topics: research priorities; economic and ecological concerns and constraints; rural energy (in)efficiencies and upgrades; local-level engagement and OA adaptive strategies; and contributions to OA science and policy from the coast and fishing industry. In total, 55 people participated in the community roundtables. Key findings are listed below and elaborated on more fully in the following pages. These findings reflect the views, vulnerabilities and interests of the fishermen, marine industry stakeholders and community members who attended the roundtables.

Key Findings

- The science about ocean acidification is a clear reason for concern for the health and productivity of the oceans coastal Alaskans depend on.
- The economic value of Alaska's commercial fisheries approaches \$4 billion (first wholesale value), but it is not known how ocean acidification will affect specific fisheries and what the cost will be to the seafood industry and fishery-dependent communities.
- Fishermen and shellfish farmers want to participate in scientific monitoring of ocean pH. Fishermen aboard vessels can collect water samples and shellfish growers are skilled observers of local conditions.
- In addition to quantifiable economic impact, coastal Alaskans are concerned about damaging traditional uses of marine resources and harm that will come to the ecosystem that supports those resources.

- Because of uncertainty about what the exact impacts of ocean acidification on fisheries will be, concerns about the future tend to be eclipsed by more immediate and tangible issues facing fishermen and fishing communities. One exception was the shellfish growers who are already experiencing the loss of oyster spat due to corrosive waters in the Pacific Northwest.
- Despite acknowledgement that ocean acidification is inevitable and the exact consequences are unknown at this time, doom and gloom attitudes did not permeate the discussion. Roundtable participants explored ways to address the root cause of ocean acidification in order to mitigate its effect, including reducing carbon emissions as individuals, industries, communities and nationally. They recognized the economic benefits of clean energy, especially in rural Alaska where the cost of living soars with fuel prices.

Cultures and Economies

From the average citizen to commercial fishermen to political leaders and policy makers everyone wants to know: What is OA going to cost Alaska? The short answer is: We don't know. There are estimates and economic models but there are not definitive answers for Alaska fisheries. That said, the economic importance of commercial fishing to a state that has more coastline than the entire continental United States combined is impressive. The seafood industry is the largest private sector employer in the state. The value of Alaska's commercial fisheries was \$3.8 billion in 2010 (first wholesale value). . With all that in mind, the threat of OA extends beyond the context of the commercial economy.

For example, during our time in Dillingham we expected to talk plenty about what OA means for Bristol Bay's iconic sockeye salmon. And we did. For many, it is impossible to "imagine this community without salmon, a day when we didn't have salmon." But community concern was not limited to salmon. There was keen local interest in the fate of razor clams and cockles in a nearby bay. The clams and cockles in Kalukuk Bay are not commercially harvested but after the third person mentioned them in conversation we followed up to find out more about them. This is what we were told:

There used to be a village there. We have one elder who is 88 years old here in Dillingham who grew up in Kalukuk. She lives for the spring time, when she gets clams from her grandson who goes over there.

It takes a lot of effort and work to get those Kalukuk clams. You go over there with a snow machine, and you take a ladder. You have to take a ladder because we still have winter [conditions this time of year], so they take a ladder to use to get down onto the beach from the ice edge. But for an elder here in our community who loves those clams, she gets a twinkle in her eye she is so happy when she gets them. So to me, I don't know what value you give to it and I don't think you can quantify it but it's something that we do here in rural Alaska. And that, to me, would be such a tragic loss, to lose those clams.

This story captures nicely the somewhat hidden ways in which OA will potentially harm families and communities in Alaska coastal communities. It further works to remind us of how

understanding the impacts of OA in purely economic terms is at best a partial understanding, and one which can obscure a very real loss in people's lives and localities.

Priorities Amidst Uncertainties

Roundtable participants identified increasing and investing more in OA monitoring in Alaska waters as a priority. "We need basic research, stressed a Kachemak Bay shellfish farmer, because right now I don't think anybody has a clue about what's going on here in the bay." This research priority shines critical light on the need for the continuation and expansion of OA monitoring and research in Alaska waters. "You can't manage what you don't monitor," explained another roundtable participant. As well, the sentiments expressed here by a Kodiak fisherman are emblematic of a broader outlook encountered in communities: "I think the threat is real, but I just don't know enough about it in terms of how it's truly going to affect fishing. I want to know more. But it has me concerned."

Because there remains uncertainty surrounding the impacts of OA, and because the threat of OA remains largely unrecognized in the daily lives and livelihoods of Alaska's fishermen and communities, there exists a tendency for the threat of OA to be eclipsed by more tangible threats to local waters and ways of life. The exception here is shellfish growers in Kachemak Bay near Homer who rely on hatcheries in the Pacific Northwest to supply their oyster larvae and are therefore directly impacted by the recent upwelling of acidic waters along Washington and Oregon coastline. "[Shellfish farmers here] are probably the best informed [on ocean acidification] because it affects us directly. I think everybody in the state got hit by that spat shortage. I know I did. Severely. I know [ocean acidification is] right on the tip of everybody's tongue right now, as far as what's happening." More broadly however, the perceived threat of ocean acidification is ancillary to other more tangible threats which frequently found their way in and out of conversations attuned to local-level concerns for Alaska waters and ways of life. Three dominant examples include 1) bycatch; 2) the potential development of Pebble Mine in the Bristol Bay region; and 3) access rights to fisheries; notably the move toward catch share programs in the Gulf of Alaska. We highlight them here because even as Dr. Mathis stresses point blankly to roundtable participants that "we are past the tipping point for carbon dioxide in our oceans," these are the issues that tend to demand center stage. Their impacts on fisheries and the communities that depend on them are perceived as both more tangible and more immediate, and community members invest their limited resources (e.g. time, energy, capital) accordingly.

All of this works to inadvertently push the issue of OA further down the line in the local hierarchy of worry and resistance. It is a push that may be exacerbated by a sense of inevitability as captured in the following comments. "I get the sense that we can't do anything about [OA]." "Is there an alternative [to OA]? Not that we're going to let [the ocean] go, but what can we do?"

This is not to say that doom, gloom and "oh well" attitudes permeated community roundtable discussions. In fact, it was through collectively reckoning with the inevitability and unknown consequences of ocean acidification that participants moved forward on the front of how to address ocean acidification, and reduce carbon emissions, as individuals, industries, communities and countries.

Carbon, Costs and Community Concerns

This high cost of living in coastal Alaska, and in Dillingham especially, was discussed as a critical threat to the viability and vitality of Alaska's coastal communities. Soaring energy costs in recent years have spurred community-level action and state energy programs dedicated to reducing energy costs and improving efficiency both within the fishing industry and wider community. Programs include investing in renewable energy projects, retrofitting fishing vessels and energy efficient upgrades for housing. Although these programs weren't implemented with ocean acidification in mind, the benefits of renewable energy in Alaska, and particularly in Alaska's coastal communities, are wide-ranging and inclusive of both economic and environmental concerns. Referencing both environmental and economic thresholds, one participant imagined his community serving as a beacon to others. Explaining how coastal Alaska will be changed by climate change and ocean acidification first and more intensely than many other places on the planet, he went onto to stress the importance of facilitating the transition to an "environmentally-based economy" for his children and grand children.

We're at a place now where a shift is necessary. And our generation can either be the clutch or that shift is going to happen without a clutch. It's our job to find ways to enhance that transition. I don't know if you drive a vehicle with a standard transmission but if you try to make a shift without a clutch you're going to have some problems.

Inspiring? Yes. But even the optimism of this participant was tempered by the size and scale of the problem. He continued, "It seems to me that the [carbon] pollution happens in such a magnitude coming from all over the globe that it's just a lot easier to point to China or some place else and say, 'Well that's where the problem is.' Somebody that's got a wind farm in Alaska is not even a drop in the bucket I guess. I get stuck there in trying to understand what the stimulus is [for global solutions]."

This is the fundamental question which arose at each roundtable. What can *we* do? A wind farm in Alaska isn't going to have an impact on the greater global picture. At the same time, Alaska is going to have to deal with the consequences of what is a global problem. Roundtable participants grappled with the tension between knowing that "we have to lead from the bottom" in efforts to address OA, and the reality that grassroots-level efforts and "volunteering to reduce emissions is not going to get us where we need to be." The way forward, stressed a Kodiak participant, has to include "a coordinated effort between individuals, industry, government and community to make it work. Individuals can't make it work in the long run if you want to make it cost effective."

Contributions from the Coast

In each roundtable, participants emphasized the importance of operating on a dual track system; that is, working at both the personal level and the political level. Members of the fishing industry were identified as well-situated for contributing to OA science and informing policy. Several participants proposed establishing partnerships between industry and science as a means to monitor ocean conditions and mitigate the impacts of OA. Sectors of the industry could quite literally provide the vessels of opportunity to aid in collecting water samples on their way to and from fishing grounds. Although technical challenges remain, including managing samples and

chain of custody, these protocols were perceived to be hurdles rather than stalemates in such efforts.

Speaking with shellfish growers reveals a different set of strengths in the Alaska seafood industry's contribution to OA science. Whereas fishing vessels provide snapshots of their working environment at certain times of year, the nature of mariculture entails everyday observations of the surrounding environment. Shellfish growers are uniquely positioned to observe changes in the local marine environment. Monitoring is, in a sense, built into the art of raising oysters. The shellfish growers spoke of observing such things as a clear spot in the water where there shouldn't be, more plankton than usual and smaller jellyfish. In short, it's not just oysters that shellfish growers pay attention to; it's the color of water, the size of kelp and the number of barnacles. Shellfish growers take into account what is thriving and what is dying in their working environment on a daily basis. In this way, they serve as powerful witnesses to change. The role of Alaska's seafood industry in collecting data and informing OA science can better tell us how to manage, mitigate and adapt to a changing environment.

Much of the dialogue during roundtable discussions revolved around two key points: 1) the consequences of ocean acidification are largely unknown; and 2) uncertainty does not validate inaction. What we do know, stressed a participant, is that "ocean acidification is changing habitat, and that is problematic for a place like Alaska. We have a pristine environment and ocean acidification is changing that." So while we can't definitively say what the impact will be of increasing levels of anthropogenic CO₂ on king crab in the Bering Sea, we have an unsettling indication of what changing ocean chemistry means for the tiny copepod. A Homer participant put it aptly:

So when you have these little animals that we can barely see with the naked eye that the fish need to eat, to survive... that's when I got really concerned about this. Because man, if it hits those small guys, [and the] food chain. We can't see it, but it's there... [I]t's like a helicopter that you can see the fuselage, you can see the rotor, but it's the little tiny cotter pins that are holding that all together. If you take that cotter pin, if some of them shake loose, it will shake the whole thing apart. And I think that's what OA is doing.... and I don't think we need that.

To read the full report go to (cut and paste if link does not work):

<http://www.akmarine.org/publications/ocean-acidification-alaskas-fisheries-final-full-report-spring-2012>