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Subcommittee on Insular Affairs, Oceans and Wildlife

<u>Hearing on September 9, 2009</u>

Oversight Hearing on Offshore Aquaculture

<u>Statement of</u>

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Chairwoman Bordallo and Members of the Subcommittee:

Thank you for the opportunity to testify today. I am speaking here as the founding President of the Ocean Stewards Institute, and as the co-Founder and CEO of Kona Blue Water Farms, Inc., – one of the world's leading open ocean mariculture companies, and one of the two pioneering commercial ventures in Hawaii waters. I am also speaking as a recreational SCUBA diver, and a fisherman and a sailor, and a free-diver and surfer. I have taught my son to spearfish – to know the myriad fish species of the coral reef near our home the way a hunter knows the forest and its creatures, and to understand the cycles and rhythms of the sea, and to respect its power, and its bounty … and to take only what we need.

I am trained as a marine biologist, and have always lived and worked in, on, or around the ocean. I have spent my entire professional life working in Hawaii and other Pacific Islands.

My first professional position was as the government marine researcher and fisheries manager for the Cook Islands – 15 small, remote islands in the Central Pacific. The atoll lagoons of the Cooks are microcosms of our planet's ocean, and managing commercial fisheries for giant clams, or pearl oysters or parrotfish was challenging, to the point of being downright discouraging. Very early on, it became clear to me that we needed to change the way that we worked with the ocean. We need to stop thinking of marine creatures solely as extractive resources. We need to give back to the oceans, rather than to just keep on taking. We need to develop a sense of stewardship, and a culture of nurture. We need to move towards mariculture: growing more of our seafood in the ocean.

Last year, Kona Blue produced over 1 million lbs of our trademarked, sashimi-grade Kona Kampachi® from our offshore farm site in the lee of the Big Island. Our farm is located a half-mile off the coast of Kona, Hawaii, in Hawaii State waters, over a 200 ft deep bare sand bottom, in brisk currents. We grow a native, deep-bottom species that - in the wild - is considered a trash fish, yet through culturing we render it into a superb product that has graced the tables of The French Laundry in Napa, Hook in DC, and has even been served to President Obama.

At the same time, our operation has no significant impact on the ocean ecosystem. Indeed, you cannot even detect any impact on water quality – there is no measurable difference in water quality upcurrent of the net pens, compared with downcurrent of the net pens. We monitor the oceanic water quality and the substrate beneath our farm on a regular basis, and make these results available to the public on-line, through our web-site. We feed our fish a sustainable diet that is largely vegetarian, but that also includes fish by-products from sustainably-managed marine fisheries. We work very hard to reduce our footprint on the oceans. We were therefore very gratified when Kona Kampachi® was accorded the honor last year of being ranked by Monterey Bay Aquarium's Seafood Watch Program as a "Good Alternative". This is the first time that any fish grown in the ocean has ever been ranked as anything other than "Red Avoid".

The Ocean Stewards Institute is an open-ocean aquaculture trade association, including corporate partners and individuals, that provides leadership and reasoned advocacy for the best use and management of our open oceans. Our membership includes investor groups; representatives from the insurance industry; grain growers from America's heartland; feed companies; offshore cage designers and manufacturers; open ocean fish farmers; the sustainable seafood trade including leading chefs, restaurateurs, retailers, distributors and wholesalers; as well as academics and non-profits interested in ocean conservation.

We, the Ocean Stewards, assert that increased production of environmentally-sound, healthful, high quality seafood from open ocean waters is an environmental, economic and public health imperative. Yet we also understand and attest that this opportunity must be balanced by a strong sense of protection of the ocean's fragile ecosystems. We recognize that we are operating within the public domain, and we want to see this industry – and other uses of open ocean waters – develop in a way that meets the expectations of the community and the seafood consumer. The Ocean Stewards are the true revolutionaries of the Blue Revolution.

As this is solely an informational hearing, I address below the principles and imperatives of open ocean mariculture. Issues of law and regulation we presume will be resolved another day.

Responsible Open Ocean Mariculture is where the future of seafood lies. If the US does not embrace, endorse and encourage these much-needed innovations, and if we do not lead this industry forward, then we are doing our seafood economy a disservice; and we are also abrogating our responsibility as a steward of our oceans and a citizen of the planet. If we do not pursue responsible open ocean mariculture here in the US, then rest assured, it will happen elsewhere … in waters that are adjacent to ours, or perhaps not. The location is immaterial, because the world's waters are truly interconnected in the same way that our atmosphere is interconnected, and any insult that is visited on the ocean in one part of the planet or other, sooner or later washes up on our shores.

Three imperatives compel us to establish sustainable open ocean mariculture

There are three imperatives that should drive your thinking in how and when the US becomes involved in open ocean mariculture. The development of open ocean mariculture is an ecological imperative, it should be a public health priority, and it is a matter of accepting responsibility as a nation.

An ecological imperative

The ecological imperative should be abundantly clear to all on this Sub-Committee – and indeed anyone who reads a newspaper or watches television: we cannot just keep taking more and more and more from the oceans. We need to learn to give back. Wild stock fisheries worldwide cannot sustain any greater fishing pressure. Wild fish production has been flat for at least the last decade, despite increasing subsidies, greater horsepower and electronic wizardry that compounds fishing power. The oceans now give about all that they can bear.

Recent studies suggest that 90% of the ocean's top-end predators are gone from the seas. Around 25% of fish stocks globally have 'collapsed', which means that they are less than 10% of their original biomass. But now that these stocks are largely depleted, the fishing power that rendered them so has not simply gone away. It has moved on to the 75% of the stocks remaining. And with new technologies and new efficiencies, the wild fishing industry can always continue to fish harder and deeper and longer.

The ecological imperative is not just about numbers, it is about fragile ecosystems in waters that are already under pressure from nutrient pollution or sedimentation run-off or acidification. It is about lessening the indignities that we visit upon the ocean through destructive fishing practices such as dredging and bottom-trawling. It is about working with the ocean, and investing in stewardship and long-term ecosystem health.

A public health priority

There is almost universal agreement that Americans need to be eating more seafood, yet consumers are themselves consumed with fears of mercury and PCBs in their farmed seafood. Yet the definitive meta-analysis of seafood health impacts by Mozaffarian and Rimm (Journal of the American Medical Association, 2006), from the Harvard School of Public Health, found that a modest increase in seafood consumption, to the point of two meals of oily fish per week, would result in a 35% decrease in heart disease, and an overall 17% decrease in adult mortality.

A more recent assessment of the risks and benefits of seafood consumption by the FDA (2009) found that a 50% increase in seafood consumption could save up to 19,000 American lives per annum.

These are compelling numbers. We need to eat more seafood, not less. If the seafood is simply not there, then our nation's health will suffer.

An issue of national responsibility

Yet if we are to eat more seafood, from whence must it come? Do we eat other people's share? Or do we urge our fishermen to increase their efforts? Or … do we begin to accept responsibility as a nation for what we eat?

The $8 billion seafood trade deficit is often cited. Over 80% of US seafood consumption comes from imported products, and over 50% of these are farmed. However, we believe that our dependency on seafood imports represents something more important. It reflects the fact that we, as a nation, are exporting our ecological footprint overseas. We are asking others on this planet to bear the burden of ecological impacts to sustain our seafood demands. While ever America relies largely on imported seafood, we have virtually no input into the foreign farm practices, no input into the environmental standards under which it is farmed, and no input into the food safety standards or public health risks to which producers or consumers are subject. We also have diminished moral standing in any discussions of ocean conservation.

Rather than exporting our ecological footprint, American should begin to grow our own seafood in our own waters. We need to do this both to alleviate the pressure on other country's resources, but also to meet the growing demand for locally-grown products, to reduce the carbon footprint of air-freighting fresh seafood products to the US, to develop innovative methods for offshore aquaculture, and to pioneer for the rest of the world the most sustainable technologies, and to engage in the market incentive program of sustainability certification … not just as a market, but as a producer. We need to accept responsibility for what we eat.

And the footprint of open ocean mariculture, if done right, is miniscule. Our current lease area in Kona is around 0.14 square miles. Most of this lease area is empty ocean, occupied solely by mooring lines. The net pens themselves are located in the central 9 acres, or in an area around 0.014 square miles. The United States' exclusive economic zone, however, is the largest in the world, covering around 4.4 million

square miles. The minute percentage of EEZ ocean space that our lease represents underscores the 'blue horizon' opportunity of open ocean mariculture.

Moving 'Beyond Salmon'

We understand and appreciate that there is a lot of emotion that swirls around the issues of fish farming.

However, most of the emotion about fish farming – we would contend - comes from farmed salmon. This is not necessarily the salmon farmers' fault. Certainly, some thirty years ago, when salmon farming was first developing, the science was very poorly understood and the methods were rustic. But there have been tremendous advances in feed science and fish physiology and ocean engineering since then. It took man some 10,000 years to domesticate cattle, and to figure out that the best way – for the environment and for the cow – is to ranch on the open range. In 30 years, we have brought fish farming from fragile pens tucked in the back of Norwegian fjords, to robust net pens that can withstand the furies of the North Sea. We are now ready for the ocean's open range.

I would posit that most of the emotion about farmed salmon is linked not to the methods used by the farms, but rather to the emotional and ecological significance of salmon. The fisheries biologist in me recognizes that salmon are phenomenal fish, with fantastic life-histories, that migrate by mechanisms that we can barely comprehend, with discrete genetics in adjacent watersheds. These species are ecological cornerstones upon which pivot the entire Pacific Northwest. They are cultural touchstones that connect native peoples to their natural and spiritual world, and that perpetuate traditions of food and fishing and life. And salmon are commercially important to fishing fleets all along the Pacific Coast from San Francisco Bay to the Yukon – they are the economic lifeblood of many communities.

Yet salmon farming has now transformed these fish into a commodity that is available year round, and it nearly brought salmon fishermen to the brink of broke. Salmon's life history also renders them acutely vulnerable to perturbances in watersheds from pesticide or herbicide run-off, from logging, or siltation or dredging or dams. Many of these salmon runs are fast disappearing, but is salmon farming solely to blame? The nearest salmon farm to the Sacramento River delta – now almost completely devoid of Chinook for the past two years – is some 800 miles away, in the Straits of Juan de Fuca.

So I do not want to focus on salmon farming. It is not just emotionally loaded, but it is not a valid model for what we propose with mariculture in the open ocean. In the open ocean, farming marine fish, we are working with high-value species that are either not commercially targeted, or that have been reduced to scarcity by commercial fishing. Marine fish species are usually broadcast spawners, often with large spawning aggregations, and so they have no discrete genetic differentiation on any fine scale. Marine fish do not have the vulnerable migration patterns through rivers and estuaries, and are not subject to fragile freshwater ecosystem health. Marine fish are a world away from salmon.

A better model for sustainable open ocean mariculture might instead be the Mediterranean seabass and sea bream industries. These operations produce around 150,000 tons of fish annually, across the coastlines of Spain, France, Italy, Greece and Turkey. There is very little emotion attendant to these operations, and very few objections from environmentalists or local communities. The reasons are threefold: (1) these are marine fish that are well adapted to culture in the ocean (2) these products meet the tremendous market demand for high-value marine fish, and (3) commercial fisheries have pretty much wiped out the wild seabass and sea bream stocks, so there is no alternative.

The debate that rages in the US about fish farming is very *Salmo*-centric. But we need to think B.S. … we need to think "Beyond Salmon". There are over 20,000 other marine species of fish out there, and while they may not all be suitable for commercial culture, there is a bounty and a diversity that should surely allow us to produce seafood in a way that does not impact wild stocks.

Our Kona Kampachi®, for example, known as *Seriola rivoliana*, is found throughout the warm waters of the world. It is usually located in deep water … in the same depth profile as the valuable deep water snapper fisheries for opakapaka, ehu, onaga and gindai. These stocks have been severely depleted by both recreational and commercial fishing pressure. However, *S. rivoliana* is considered a trash fish in the wild, as they are subject to internal parasites in the flesh, and they frequently accumulate ciguatoxins from the reef algae *Gambierdiscus*. In the wild, the fish also only has around a 4% body-fat content. By culturing this species, however, we are able to render it into a safe, sustainable, delicious sushi-grade fish, with no internal parasites, no risk of ciguatera, and over 30% body fat. Because our land-based hatchery is able to rear the fingerlings, then we do not need to catch fish from the wild to stock our net pens. This is very important to us for our claims of sustainability, but it also affords us the highest possible measure of quality assurance – we know what our fish eat, all the way from hatch-to-harvest.

Other marine species slated for culture in US waters – cod, cobia, moi (Pacific Threadfin) – usually share such attributes. They are vastly different from salmon in their life histories and commercial fishing stocks. And we are proposing to culture them in a way that is vastly different – in terms of location and potential for environmental impact – from the negative images that emotional activists conjure up from the past.

A historical analogy

US investors stand ready to commit capital, within a clear regulatory framework, to companies with secure tenure and sound plans for seafood growth. The US fishing waterfront is hungry for work. And there are hundreds of researchers and entrepreneurs across the country that are tinkering, and dreaming of ways to do this better. There is an opportunity here that can mesh perfectly with President Obama's exhortation for us to create clean, green industries, here at home. But if America does not take action, or does not encourage action, then we risk losing the technological edge to other countries. The key here is that we must create a regulatory environment that not only allows this industry to grow, but that gives investors and pioneers some encouragement for this growth – within reasonable frameworks.

The situation is perhaps analogous to the US aviation industry in around 1919. One wonders where our economy, our airlines and our travel industries would be now if, in 1919, Congress had said "OK, you can build an airline industry, but only if every aircraft is 100% safe, and there are no negative environmental impacts, and you cannot use any farmland for airports, and you cannot unfairly compete with the railroad industry." All of the innovation and investment would have left the US for overseas, and you would have to catch a train to Canada or Mexico to connect to a flight, and we would have no input into international air traffic safety standards or passengers' Bill of Rights, because Congress would have effectively said "We do not want it here", even as they wrote so-called enabling legislation.

If we then want a responsible open ocean mariculture industry to develop in the US, we will need to create legislation that not only permits it to operate, but that encourages innovation and investment, and that creates an environment where this industry can grow, and succeed, and fulfill its potential.

We must ensure that we are not overly prescriptive in legislation or regulations, to the point that we limit innovation and creativity. Let us define our goals, clarify where there are concerns, and then allow American entrepreneurship to find the solutions.

An integrated National Ocean Policy

As a fisheries biologist, I heartily embrace and applaud the steps taken by the Obama Administration to move towards an integrated National Ocean Policy. We can no longer let freedom reign over the seas, any more than we can manage our terrestrial resources without zoning and regulation.

We would assert that any National Ocean Policy must include four fundamental tenets for marine resources management:

1. We need to establish an extensive network of Marine Protected Areas (MPAs),
2. We need to set up universal Individual Fishing Quotas (IFQs) for commercial fisheries,
3. We need to encourage fisheries that target the base of the marine food chain, and
4. We need to create a regulatory climate that is conducive to building a responsible open ocean mariculture industry.

The first three points are widely accepted. The fourth point, however, is a direct corollary and consequence of the first three points.

MPAs are as equally essential to our marine environment health as National Parks and State Forestry Reserves are to land conservation efforts. There need to be extensive areas that are set aside for either complete protection from all human impacts, or that permit only restricted fishing or other productive uses, within clearly defined frameworks.

Individual Fishing Quotas are the only rational way to manage commercial fisheries in the face of the reality of increasing fishing power, inherent incentives to overcapitalize, and the dangers and disincentives in derby-style fisheries. Garrett Hardin's famous 'Tragedy of the Commons' essay made this clear a generation ago: rational management of any common-property resource can only be effected if there are private interests harnessed to this end.

Our seafood diet should be mostly anchovies and sardines, or their equivalents. Marine scientists all agree: the most significant way to lessen mankind's footprint on the oceans is if we would eat lower on the marine food chain. However, not everyone likes to eat anchovies. I'll eat more than my fair share, but few will join me. It is a quandary for both public health and marine resource efficiencies.

If we are going to implement these first three steps towards rational management of our marine resources, then we also must absolutely implement the fourth: responsible open ocean mariculture. Setting up MPAs and IFQs will, by necessity, involve reductions in overall fish harvests. With reduced supplies, we will need to find some way to replace these fish. There are almost no other underexploited or unexploited stocks out there … we need to start to grow our own.

Responsible open ocean mariculture – if it is done right - can even safely be inside the Marine Protected Areas. Our Kona Blue operation, for example, is located within the Hawaii Islands Humpback Whale National Marine Sanctuary. Over almost five years, there has been no evidence of any impact – negative or attractive – of our operation on whale abundance or movements. Offshore mariculture sites provide productivity and structure to otherwise barren ocean space; Fish Aggregating Device, or FAD effects from farms might enhance an area's value for stock protection or replenishment. And the presence of farms can provide added security for vast areas that may be difficult to police. Around Palawan, in the Philippines, where I once worked, the few patches of remaining pristine reefs were all directly underneath the pearl farm rafts. The reef there is accorded the pro-bono protection from dynamite fishing, due to the presence every night of pearl farm guards.

And if we are to also eat lower on the ocean's trophic web, one deliciously palatable way to do this is to efficiently convert anchovies, sardines, and the like into great-tasting sashimi like Kona Kampachi®, or other sustainably-maricultured fish. If we can do this at an ecologically efficient conversion rate of one to one (i.e. a Fish-in : Fish-out ratio of 1:1), then it makes no difference – from a global perspective – whether the consumer eats anchovies or Kona Kampachi®.

Open ocean mariculture up to 60 times more efficient use of marine resources

Critics may well say that we are just "feeding fish to grow fish". The truth is that sustainably maricultured fish represent perhaps more than 60 times greater use of the ocean's limited resources than targeting the top of the wild food chain for species such as swordfish, or Chilean Seabass. How is this possible? There are three main factors: trophic efficiencies, life-cycle efficiencies, and by-catch efficiencies.

Trophic efficiencies: Our 'carnivorous' maricultured species are far more efficient at utilizing the ocean's food resources than wild fish. Sustainably maricultured fish are primarily vegetarians, with the bulk of the diet coming from sustainable agricultural oils and proteins, such as soy, canola, wheat and corn (which underscores what a tremendous opportunity we have to connect America's heartland with the US EEZ). In controlled tank trials, our Kona Kampachi® can yield around one pound of great-tasting sashimi for every one pound of Peruvian anchovies – a fish-in : fish-out ratio of 1:1. This makes eating our fish the trophic equivalent of eating Peruvian anchovies. Wild fish, however, can only generate around 10% transfer efficiency through each step up the food chain. If there are two trophic steps up the food chain, then these inefficiencies compound to around 1% (10% of 10%).

Life-cycle efficiencies: Sustainably maricultured fish are reared in a hatchery, raised in protective net pens, and harvested at the optimum size for meat yield. Wild fish, however, have to migrate long distances, they expend resources in spawning, they have to hunt and avoid being eaten, and they are harvested at some large, inefficient size.

By-catch efficiencies: Some wild catch fisheries have by-catch ratios of around 11:1; i.e. 11 pounds of fish thrown away as either undersize, over-quota, or unsaleable, for every one pound of marketable fish that is retained. Shrimp fisheries have by-catch ratios of around 5:1. Globally, estimates of by-catch hover around 30%. Yet responsible open ocean mariculture has no by-catch whatsoever.

And while some may liken open ocean mariculture to "growing tigers of the sea", then the analogy should – in all fairness – be extended: commercial fishing might then perhaps be considered like hunting tigers for food. If you need to eat tigers to stay healthy, then you should surely prefer that they be sustainably farmed on a largely vegetarian diet, rather than simply hunted from the wild.

Hawaii as a model

We believe that there are good models out there that could form the basis for workable legislation that finds the right balance between conservation and incentive, and between law and rule and the marketplace.

Hawaii's ocean leasing legislation, over the past ten years, has allowed two companies to move forward with offshore operations, yet has seen at least four other proposals that were vetted through departmental and public hearing processes and were either disapproved or withdrawn. There is ample opportunity for public input, on all aspects of a proposal. Permit applications require an Environmental Assessment, or where significant impacts are anticipated, an Environmental Impact Statement. The

permitting process is complex, and convoluted. As well as a State permit and State lease, projects also require a Department of the Army Section 10 Permit (Army Corps of Engineers, ensuring compliance with all other applicable Federal rules and regulations), an NPDES Permit from the State Department of Health with Federal EPA oversight, and a Coastal Zone Management review from the Office of State Planning that ensures compliance with all other Federal and State laws. The process could stand some simplification. Nevertheless, it has resulted in nothing like the "gold-rush land-grab" that some predicted a decade ago.

Once approved, however, the 20 year lease term allows for entrepreneurs to recoup their investment, and hopefully make a profit, while working within the assimilative limits of the ecosystem. Any shorter lease term would probably encourage less of a sense of stewardship. This tenure period has enabled us to attract investors to our business that share our vision of a sustainable, stable, productive industry, rather than those investors that might instead just be seeking short-term gains, without heed to attendant triple-bottom-line costs.

Each mariculture operation in Hawaii is required to have a Management Plan that provides for ongoing environmental monitoring, extensive reporting, and adaptive responses to contingencies. All of Kona Blue's monitoring is conducted by third parties. Kona Blue makes our water quality and benthic monitoring reports available both at the local harbor, and on our web site.

Farms in Hawaii are only allowed to stock native species. While selective breeding is not precluded, Kona Blue has chosen to not engage in this practice, and to only use broodstock that are no more than two generations removed from the wild, to ensure that there is no significant genetic difference between fish inside the cage and those outside the cage.

Kona Blue has pursued a relentless drive for greater feed efficiency. This has not been mandated by any legislation or regulation, but instead reflects the market forces that are at work in the seafood sector. It was through our close working relationship with Environmental Defense Fund and Monterey Bay Aquarium that we were able to craft more sustainable feedstuff solutions. Over the last five years, the inclusion rate of Peruvian anchovies in our feed has dropped from around 80%, through a 50% formulation, to a current level of around 29%. We use meal and oil from trimmings from other commercial fisheries, as well as other sustainable agricultural proteins and lipids. We are currently testing two diets that include no Peruvian anchovies or other forage fish whatsoever. These diets would then rate as zero on the FIFO (Fish-in : Fish-out) index. We believe that this exemplifies the ample market incentives that should be allowed to drive solutions about sustainability. Government's role should be to support research in these areas, and to provide incentives for re-use of trimmings from commercial fisheries such as pollock and salmon.

<u>An invitation …</u>

This hearing is a most welcome start to the discussion that must now ensue, to ensure that we find the right balance of regulation, oversight and entrepreneurial empowerment. However, in our experience, nothing helps illuminate these issues better than coming face-to-face with our fish, out in the deep blue of the open ocean. Allow me therefore, please, to invite each of you, and your staff, to come to Kona, so that we might host you on our open ocean mariculture operation. We want to walk you through our hatchery where we first rear the fish. We want to show you the harbor where Kona's commercial fishermen once worked, landing yellowfin tuna and onaga that are now only found far offshore. And we want to then take you offshore with a mask and snorkel, so that you can immerse yourself in the reality of this opportunity. We want you to see our fish in their environment, in the open ocean. You will see

the clarity of the water, and the swirl of life that is drawn to our site, and the way that we can indeed work within our ecosystem's assimilative capacities. You will see for yourself the future …. the way that the world should see seafood.

Sustainable. Healthful. Delicious. We look forward to your visit.

Thank you, and aloha.