

**MARINE FINFISH AQUACULTURE IN  
THE U.S. AND CALIFORNIA:  
*A STORY OF LOST OPPORTUNITIES FOR  
LEADERSHIP AND ECONOMIC DEVELOPMENT***

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# **Marine Finfish Aquaculture in the U.S. and California: A Story of Lost Opportunities for Leadership and Economic Development**

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The following is an essay adaptation of a presentation given by Jerry R. Schubel at the World Ocean Council's Sustainable Ocean Summit in Rotterdam, Netherlands on December 2, 2016.

## **Abstract**

A United Nations (UN) study indicated the U.S. has the greatest potential to expand offshore aquaculture production, primarily because it has the largest Exclusive Economic Zone (EEZ) of all nations. The current status of marine aquaculture in the U.S. tells a different story. More than 90 percent of all seafood consumed in the U.S. is imported, mostly from Asia, resulting in an annual seafood trade deficit exceeding \$14 billion. In 2014 the U.S. contributed just under 0.5 percent to the global farmed seafood supply. California ranks high among U.S. states, with the greatest potential and the greatest resistance to developing an aquaculture industry. It has the oceanographic conditions, the markets, and the scientific expertise. But it also has some of the strongest opposition from a misinformed public and a permitting process that discourages innovation and investment. Progress at the federal level is little better. Until the U.S. designates a lead federal agency for the permitting process, progress will be slow.



## Introduction

John W. Gardner, Secretary of Health, Education, and Welfare under President Lyndon Johnson and Founder of Common Cause once remarked:

*"We are continually faced with a series of great opportunities brilliantly disguised as insoluble problems."*

Offshore finfish aquaculture in California and the U.S. seems to fall in this category. The opportunity for offshore finfish aquaculture for California and the U.S. is great. Two things must happen if this opportunity is to be seized:

First, the U.S. must designate a lead federal agency to orchestrate the permitting of offshore finfish aquaculture in federal waters. The most appropriate choice is the National Oceanic and Atmospheric Administration (NOAA).

Second, public perceptions of aquaculture must change from seeing it as another step in industrializing the ocean to an opportunity to provide a safe, secure, and stable supply of healthy protein to billions of people with little risk to the ocean and significant potential benefit to the total environment. Aquariums should play a lead role in changing public perception presently based on misinformation. They are a trusted source of information, and many millions of people go to them with a predisposition to care about the ocean and marine life.

## The Opportunity

Seafood is perhaps the healthiest animal protein on the planet. Research has shown that eating more seafood can reduce the risk of heart disease, improve brain development and function, help build muscle and tissues, and may reduce the risk of Alzheimer's

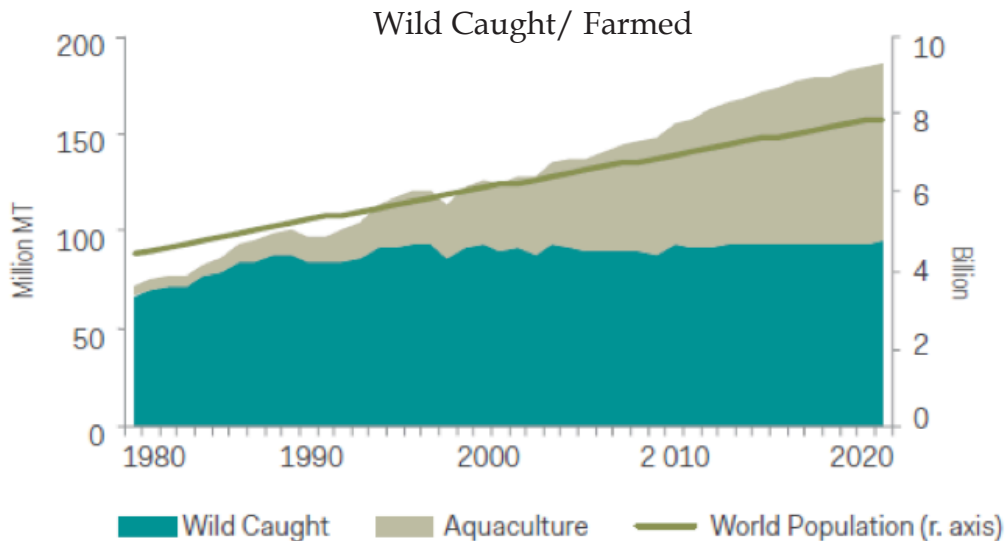
disease. The U.S. government recommends that Americans eat at least 8 ounces of seafood per week.<sup>1</sup> Americans currently eat less than half the recommended amount.

Seafood is the primary source of protein for more than 3 billion people on the planet. A desire for seafood, coupled with growing and more affluent global populations, has created a dramatic increase in seafood demand. Wild-capture fishery harvests have remained essentially flat since the late 1980s and cannot meet this growing demand. Aquaculture has supplemented the wild-capture supply to meet the demand for almost thirty years and will play a substantial role in meeting society's need for increasing food supplies into the future.

Today, aquaculture is the fastest-growing food production sector in the world. Farmed seafood accounts for more than half of our seafood supply, and production of farmed seafood by weight recently surpassed that of beef. Most farm-raised seafood, almost—90 percent—comes from China and other parts of Asia where incomes are rising and residents can afford more of the seafood they produce, leaving less available for export to major importing nations like the U.S. and members of the European Union. Meanwhile, major seafood importing countries with extensive EEZs, like the U.S. and France, produce only a fraction of a percent of the world's aquaculture supply.

A heavy reliance on imports may increase the risk of consuming farmed seafood from sources with less oversight to ensure environmental, human health, and social safeguards relative to countries with strong environmental, health, and human welfare regulations, such as the U.S., Canada, and countries in the EU.

<sup>1</sup> USDA (2015): Dietary Guidelines for Americans: 2015-2020. Washington DC, 144 p.



Source: FAO; OECD-FAO; World Bank, Íslandsbanki Research, 2015

Seafood is the world’s most traded food commodity. The EU is the world’s largest seafood importer with a trade deficit of € 17.8 billion (about \$20 billion). The U.S. seafood trade deficit has grown to nearly \$14 billion annually, up from \$9 billion only five years ago.

By reducing their reliance on imports, countries like the U.S. and members of the EU would reduce their carbon footprint associated with flying seafood half way around the world. Reducing our reliance on imports would also support and supplement well-managed wild-capture fisheries and help maintain working waterfronts.

According to the UN Food and Agriculture Organization (FAO), there is great potential to expand environmentally responsible marine aquaculture production around the world.<sup>2</sup> The U.S. has perhaps the greatest opportunity, since it has the largest EEZ of any nation on earth. Indeed, the U.S. has more real estate below sea level than above sea level. Much of this expansive seascape has oceanographic conditions favorable for offshore finfish aquaculture.

The small marine aquaculture industry that

currently operates in the U.S. is located in state waters. While some expansion in state waters may be possible, competition for the use of coastal space is increasing. Expansion of the marine aquaculture industry into federal waters is crucial to significantly expand U.S. seafood production. Such growth of the industry must, of course, be done sustainably, without unacceptable effects on coastal communities and ocean ecosystems.

It is widely accepted among U.S. resource managers and seafood industry stakeholders that marine aquaculture will and should be expanded in the U.S. to ensure a safe, secure, and sustainable domestic seafood supply. But, it’s easier said than done. Securing permits for sites in federal waters is difficult and time consuming because the regulatory framework for permitting offshore aquaculture in federal waters is complex and lacks leadership. No federal agency has been designated to lead the permitting process in federal waters. NOAA is highly qualified to fill this role. It has the experience, expertise, tools, and willingness to facilitate the growth of an economically viable and environmentally responsible marine aquaculture sector while ensuring that environmental safeguards are followed to maintain healthy oceans. The agency needs

<sup>2</sup> FAO (2013): A Global Assessment of Offshore Mariculture Potential from a Spatial Perspective. Rome, 202p.

the legislative mandate.

The idea of designating NOAA as the lead agency is not new. It has been proposed in two bills: the National Offshore Aquaculture Act of 2007 and the National Sustainable Aquaculture Act of 2011. Neither bill moved passed the committee stage. We expect one will be introduced again in early 2017.

Despite these setbacks, NOAA plays an important role in developing and implementing policies to enable marine aquaculture and works to ensure that aquaculture complies with federal laws and regulations that the agency enforces under its marine stewardship mission. In 2016 NOAA implemented the nation's first comprehensive regulatory program for aquaculture in federal waters under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) in conjunction with an interagency agreement that created a coordinated permitting system for the Gulf of Mexico.

Currently NOAA has no permitting authority under MSA unless the species in production is a federally managed species. Unfortunately, the species best suited for culture in places like California may be species managed by state instead of federal agencies. In this case, a permit applicant for a site in federal waters off California will need permits from the U.S. Army Corps of Engineers and Environmental Protection Agency, but not from NOAA. NOAA would still be consulted for endangered species, essential fish habitat, and marine mammal issues.

### **California**

California has great potential to support environmentally responsible offshore marine aquaculture. It has one of the most thoroughly studied coastal oceans anywhere in the world, and much of it has oceanographic

conditions favorable for aquaculture: deep water close to shore, vigorous mixing and renewal of its coastal waters, and relatively few tropical storms. The state has working waterfronts, proximity to large markets, and significant scientific and technical expertise in the appropriate fields. It also has a strong ocean ethic that would strengthen the brands of companies operating in its waters.

In spite of these advantages, offshore finfish aquaculture in California has yet to be developed. Uncertainties in the permitting process and the lack of any successful role models have inhibited proposals for new projects. Moreover, the lack of experience and monitoring data that come with successful projects continues to be a major impediment in the development of marine aquaculture.

### **Challenges are Not Unique to the U.S.**

The challenges posed by complex permitting systems and public perception are not unique to the U.S., Canada, and countries in the EU are also major seafood importers and are experiencing similar obstacles for the development of marine aquaculture.

The trilateral Galway Agreement was established between the U.S., EU, and Canada to better understand the Atlantic Ocean and promote the sustainable management of its resources. Among its objectives is to enable and develop marine aquaculture. A working group to address public perception regarding marine aquaculture is in the works to facilitate successful implementation of this objective.

### **Public Perception and Marine Aquaculture Development**

Perceptions can and do influence permitting decisions. It is essential that the public has access to the best available information on the science, best management practices,

and technologies used in modern marine aquaculture when deciding whether to support its growth and expansion in the U.S.

Reluctance to embrace and support the growth and expansion of marine aquaculture has resulted in a great loss of opportunity for domestic food security, conservation, and economic support for communities and working waterfronts.

### **The Global Context**

Humans' production and consumption of energy and animal protein take a toll on natural resources globally. Increasing wealth and urbanization throughout the world drive the demand for more energy and food, increasing pressure on limited resources like land and fresh water. With the world population expected to exceed 10 billion by 2050, the FAO estimates that food production will have to increase by 70 percent to meet the growing demand while adapting to climate change and combating global hunger and poverty.<sup>3</sup>

To feed the current global population of 7.5 billion people, more than half of Earth's ice-free land is used for agriculture production, including livestock. These activities consume 70 percent of all developed freshwater resources.

The ocean covers more than 70 percent of Earth's surface, yet capture fisheries and the existing marine aquaculture sector produce only 2 percent of the global food supply. One way to meet growing seafood demand, with little impact on the marine environment, is through the expansion of sustainable marine aquaculture.

Marine aquaculture offers many environmental benefits relative to other forms of animal protein production. It typically

generates fewer greenhouse gas emissions, has a smaller carbon footprint, uses less land and freshwater, and is more efficient in converting feed into edible protein than beef, pork, and poultry. It also has the potential to reduce pressure on wild fisheries while increasing the availability of safe, secure seafood products.

Farming species like mussels, oysters, and seaweed provide additional benefits by cleaning the water column, providing habitat for other sea life, and helping protect shorelines from storm surges. Recent studies suggest that farming seaweed can remove some of the excess carbon emissions that contribute to climate change.

Aquaculture production in the offshore marine environment is not without its challenges. Fish raised in an open system can have deleterious consequences for ocean ecosystems if farms are not sited, designed, and managed properly. There have been numerous examples of poor aquaculture practices that have impacted the surrounding environment. These include disease transmission, the release of excess nutrients, escapes that result in the introduction of non-native species, and using wild fish to feed farmed fish.

While these are all relevant concerns, research has shown that the combination of proper siting and husbandry practices, best management practices, and the use of appropriate technologies and tools result in greater productivity while greatly reducing and even eliminating some of these stressors altogether.

If you put marine aquaculture in the context of the global food supply—and factor in the progress that has been made in terms of the best practices for marine aquaculture production—marine aquaculture can be

<sup>3</sup> FAO (2013): The State of the World's Land and Water Resources for Food and Agriculture: Managing Systems at Risk. Rome, 50 p.



an important conservation tool and an opportunity to reduce the environmental impacts associated with our increasing demand for animal protein.

### **Back to the U.S.**

While the U.S. has a robust and well-managed wild-capture fisheries sector, it is not enough to meet demand. The U.S. government recommends that Americans eat at least two servings of about 4 ounces of seafood per week, which adds up to about 26 pounds of uncooked seafood per person per year. To satisfy this recommendation for the entire U.S. population, Americans would require 7.2 billion pounds of processed seafood, or roughly 14.5 billion pounds of whole fish based on a 50 percent average yield.

Wild-capture harvests in the U.S. produce about two-thirds of that amount. Some 9.7 billion pounds of edible seafood were landed in U.S. ports in 2015. That same year, U.S.

aquaculture contributed just over half a billion pounds, bringing the total to just over 10 billion pounds. So even if we kept all of the seafood produced domestically, the U.S. will still fall almost 5 billion pounds short of the amount necessary to meet the recommended seafood consumption. Of the two sources, only farmed seafood has the potential for significant growth.

Marine aquaculture provides economic opportunity for coastal communities and working waterfronts by supplementing well-managed wild-capture fisheries and reducing reliance on imports.

According to the FAO, the U.S. could produce in its EEZ an amount of seafood equal to the annual global wild catch in an area about the size of the state of Vermont.<sup>4</sup>

It is widely accepted among resource managers and seafood industry stakeholders in the U.S. that marine aquaculture will and

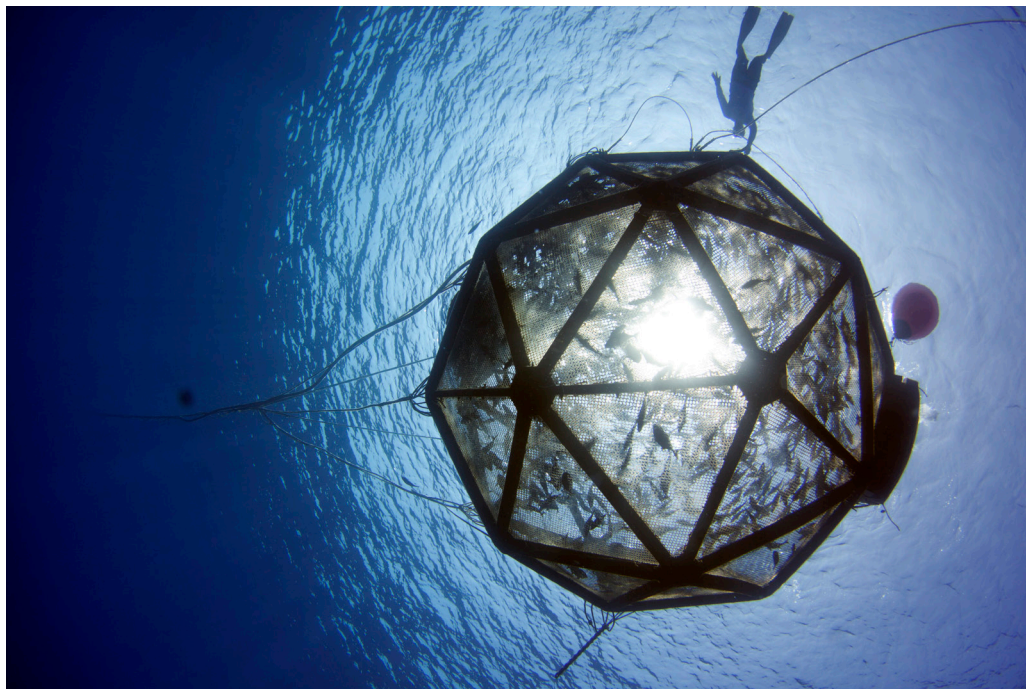


Image courtesy of Kampachi Farms, LLC

<sup>4</sup> FAO (2013): A Global Assessment of Offshore Mariculture Potential from a Spatial Perspective. Rome, 202p.

should be expanded to ensure a safe, secure, and sustainable domestic seafood supply. In fact, the National Aquaculture Act of 1980 declares that it is in the:

*“...national interest and national policy to encourage aquaculture development in the United States.”*

Despite all this, the U.S. lags behind the rest of the world in marine aquaculture production. In fact, U.S. marine aquaculture accounts for just 6 percent of the total domestic food supply and ranks seventeenth in the world for aquaculture production. It is clear that marine aquaculture provides opportunities for conservation, food security, and economic support for our working waterfronts. It is also clear that the U.S. has the resources and suitable areas to grow and expand marine aquaculture responsibly. So why haven't we embraced marine aquaculture in the U.S.?

## **Conclusion**

Marine aquaculture will grow and expand. Major importing countries like the U.S. must produce more seafood to ensure environmental and economic sustainability for the domestic seafood industry and for domestic food security. The only way to meet the growing demand for seafood without compromising the health of U.S. wild-capture fisheries and ocean ecosystems is to produce more seafood through marine aquaculture.

A strong foundation of science, technology, best management practices, and entrepreneurial interest for marine aquaculture exists in the U.S., but the lack of a designated federal lead agency for marine aquaculture projects in federal waters and a lack of public support results in gridlock.

The inefficiencies and costs of present policies and practices discourage potential investors,

who often end up taking their aquaculture projects outside of the U.S. The best hope for the growth and expansion of a domestic marine aquaculture industry is a legislative designation of NOAA as the federal lead agency for permitting and funding and resources designated to address public perceptions that are based on misinformation about marine aquaculture.



