

Dispelling the Myths of “The Benefits of Shellfish Aquaculture”

As the world’s human population has increased and wild populations of marine food resources have declined from mismanagement (e.g., overharvest, habitat loss and degradation), the demand for cultivated seafood has been encouraged and is increasing. However, aquaculture requires the use of public waters and the conversion of natural systems to produce marketable foods. Science-based information and assessments of the full suite of adverse impacts resulting from aquaculture are lacking, and while the aquaculture industry is reluctant to admit adverse effects, they have created a polished misinformation campaign, which suggests that shellfish aquaculture is "beneficial", and any adverse effects are mitigated by such "benefits". They also make unsubstantiated claims regarding the economic and societal benefits of shellfish aquaculture and environmental responsibility and stewardship, while, at the same time, exhibiting practices (e.g., habitat alteration, misinformation, lobbying, eradication of "nuisance species", use of herbicides and pesticides and plastics) that have direct and indirect effects on marine ecosystem health and integrity, and result in poor management decisions. Although the shellfish industry makes a number of claims that shellfish aquaculture provides beneficial "ecosystem services", many of these services are unfounded in fact, and do not account for the broader range of ecosystem services provided by healthy ecosystems. According to the National Research Council, "in no instance should the value of a single ecosystem service be confused with the value of the entire ecosystem. Economic valuation of changes in ecosystem services should be based on the comprehensive definition embodied in the total economic value framework; both use and nonuse values should be included (NRC 2004)¹.

The purpose of this brief document is to help dispel the myths, so the public, managers, and policy makers are able to make informed decisions regarding how public waterways should be utilized and properly managed to achieve long-term benefits to society and healthy marine ecosystems.

Myth 1: "Shellfish will clean up our waterways"

There are no studies in Washington State that verify this statement. Although research on the effectiveness of nutrient removal by natural oyster reefs has been done in Chesapeake Bay and other eastern waterways, the results suggest that native east coast oysters may be used to supplement nutrient removal if they are in high enough density in small waterways, but that pollution needs to be stopped or removed at the source.^{2,3} Regarding the transfer of this information to Puget Sound, Doug Myers, Senior Scientist with the Chesapeake Bay Foundation states that: "I would consider it inappropriate to translate any of these numbers to Puget Sound. Simply growing oysters does not in any significant way reduce upland sources of pollution." In addition, natural oyster reefs do not occur in Puget Sound, and the expansion of the non-native Japanese “Pacific” oyster used for most oyster production (in addition to the other cultivated native and non-native bivalves) modifies habitat, imposes unnatural disturbances, changes species composition, and results in changes to ecosystem processes, structure and functions. Dr. Christopher

Konrad, USGS, confirmed that “The water quality effect of bivalves are not understood in much of Puget Sound” at the December 2014 Shellfish Conference in Lacey, Washington, sponsored by Washington Sea Grant.⁴

Myth 2: "Shellfish aquaculture creates beneficial/improved habitat and species diversity"

Shellfish aquaculture (e.g., ground or rack oyster culture, mussel racks/rafts, oyster bags, clam beds with anti-predator netting, geoduck PVC tubes etc.) introduce degrading marine plastic artificial structures into the marine environment. Any observer of marine systems knows that marine organisms will settle out on and use any structure placed into marine waters. However, placement of artificial structures results in a conversion of soft-bottom beaches and tidal flats, which naturally support a different suite of organisms. It is possible that such a conversion could result in increased species diversity, but not the natural diversity that occurred there prior to the conversion. Jetties, bulkheads, overwater structures, marinas, breakwaters, and other anthropogenic structures will grow marine organisms, and these conversions have typically been required to mitigate for such conversions/loss of the natural community (or have been prohibited). No so for aquaculture. In addition, according to the shellfish industry's own "pest management practices", many native species are considered pests, and are intentionally excluded or killed. Furthermore, the fate of most attached organisms is death when the shellfish are harvested, or gear is removed or maintained to remove "biofouling" organisms. So, which is it, nuisance, biofouling organisms, or beneficial habitat, and who defines what "beneficial" means and which species are allowed to reside there, or be killed? Historically and ecologically, the natural conditions in which our marine communities evolved has been considered the best and most beneficial. Marine plastic debris experts, Charles Moore and the 5 Gyres Institute, have examined the harm from aquaculture plastics in the marine environment and have stated that only 100% environmentally benign materials are acceptable, not the plastic gear used now.^{5,6,7}

Myth 3: "Cultivated geoduck is important for our economy"

Considering that over 90 percent of geoduck cultivated in Washington State is sent overseas, and that the state receives very little revenue, it appears that "our economy" can only refer to that of the shellfish industry. Any statements made regarding the economic importance of a particular industry or product should be supported by an economic analysis. Such an analysis would be remiss if it did not include both costs and benefits to the ecosystem and society. This statement is not substantiated by any valid economic analysis that has been published.

Myth 4: "The shellfish industry provides a critical source of jobs"

Any business or industry has the ability to provide jobs. What makes the shellfish industry a "critical source of jobs"? When compared to other businesses or industries, their job numbers are relatively small and are not providing high paying jobs. There are no studies that provide an analysis of relative importance of the shellfish industry, contribution to the economy, or, and most importantly, a cost-benefit analysis of the

benefits gained by the industry relative to the costs to ecosystems and society that come from ecosystem conversion and industrialization of aquatic environments. The loss of natural capital is a critical element that needs to be factored into any economic analysis.

Myth 5: "Shellfish cultivation is a sustainable use of our aquatic environment"

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment.⁸ The three pillars of sustainability are environment, society and economy. The shellfish industry has redefined the term sustainable by only focusing on what is in their best economic interest and what will sustain their industry, with little regard for what is best for the environment and society now and for future generations.

Myth 6: "The shellfish industry provides good stewardship of the aquatic environment"

Again, the shellfish industry appears to have its own interpretation of the definition for stewardship. While they do advocate for clean water, which is of direct benefit to their operations and ability to market their products, their reluctance to admit adverse impacts and provision of adequate compensatory mitigation for impacts from their operations, lack of transparency and truthfulness regarding educational information, misrepresentation of science, and other biases exhibit only self interest and a disregard for the health and integrity of public resources. Here is an industry, unlike any other, that has been allowed to modify aquatic habitat, apply herbicides and pesticides directly into waterways, kill and exclude native species, effectively lobby to weaken laws and environmental oversight to the detriment of the natural environment, while claiming that they are good stewards. This is analogous to saying that a fox exhibits good stewardship over the hen house.

Myth 7: "Research shows that there are no or minimal impacts associated with shellfish aquaculture"

There are numerous studies that have shown a broad range of adverse impacts in Washington State, as well as worldwide. Aquaculture is recognized as threat to ecosystem health and integrity by a number of authoritative science organizations and by individual scientists. For example, in their review of drivers of change and threats to coastal ecosystems, the Millennium Ecosystem Assessment (MA clearly identified aquaculture as a major threat: *"The greatest threat to coastal systems is the development-related conversion of coastal habitats...through coastal urban sprawl, resort and port development, aquaculture, and industrialization"* (emphasis added). Regarding aquaculture, the MA recommended *"Establishment of appropriate regulatory systems to reduce the detrimental environmental impacts of aquaculture"*.⁹ Dr. Megan Dethier, in her 2006 technical report on native shellfish as a Valued Ecosystem Component, states that "aquaculture operations for native or introduced shellfish species can constitute a stressor for natural shellfish populations in the nearshore....and that "commercial aquaculture of non-native shellfish in Puget Sound has some direct negative effects on native shellfish".¹⁰ Dr. Leah Bendell, a well known Canadian scientist, has recently

published studies that also document a multitude of impacts of shellfish aquaculture that should be considered.^{11,12,13,14} The South Puget Sound Salmon Recovery Group Chinook and Bull Trout Recovery approach includes shellfish aquaculture as a stressor to salmon resources.¹⁵ Shellfish aquaculture impacts were further studied as “these results bring into question the long-held notion that molluscan production is favourable under all conditions and intensity of culture for eutrophication control because of the natural water cleaning properties of these organisms (Shumway et al 2003). Rather, in intensive production, molluscs can become point sources of regenerated nutrients.”¹⁶

New research documents that plastic particles are being found in shellfish that have been tested which raises concerns for aquatic health and human health.^{17,18}

Myth 8: "There is no evidence that geoduck aquaculture is causing fundamental shifts in ecosystem-scale structure or function in Puget Sound.”¹⁹

Such statements are over-reaching and misleading. There are no studies of the ecosystem-scale effects of geoduck aquaculture (or any other form of aquaculture), much less of the full suite of impacts associated with the complete beach clearing-to-harvest cycle (or multiple cycles) of individual or multiple geoduck operations. Studies that have evaluated impacts are, by design, focused narrowly on specific activity-associated impacts at specific sites, and fall far short of representing the broad range of ecological functions that may be altered by intensive aquaculture practices at other sites, or throughout the Puget Sound ecosystem.

What You Can Do to Help Protect Your Natural Resources

This brief synopsis of some of the many myths and misinformation promoted by the shellfish industry is just the tip of the iceberg. You are encouraged to:

- Read the available scientific and technical literature
- Don't be afraid to ask questions and think critically about information produced by industry and their advocates (including some government agencies).
- In addition to educating yourself on these issues, help educate others
- Contact your local, state, and federal decision makers, and tell them of your concerns and desire to protect and restore the natural environment. Also encourage them to support more critically needed research for addressing uncertainties and to fill data gaps prior to allowing unchecked expansion of aquaculture.

This information has been based on consultations with various scientists and the following references. We welcome any independent research or reports that should be considered.

<http://coalitiontoprotectpugetsoundhabitat.org/>

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