

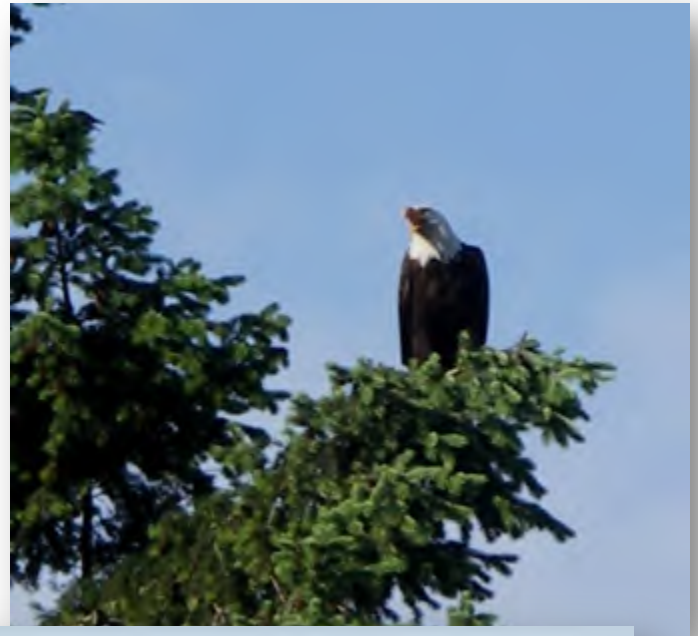


INDUSTRIAL SHELLFISH AQUACULTURE FEEDLOTS

Replacing our Native Species with Monoculture Commodities



Industrial Aquaculture puts Puget Sound Icons at Risk



Geoduck Feedlot

PVC Tubes, Nets, and Rebar stakes

Over 43,000 PVC Tubes per acre!



Totten Inlet

'Predator' Nets

Totten Inlet, July 2007



PVC Shoreline Debris



Totten Inlet Geoduck Feedlot



Geoduck clam

Geoduck Harvest by Excavation



Case Inlet
Aug 2007



Totten Inlet 2006



Henderson Inlet June 2006

Geoduck harvesters 'in the hole'

Case Inlet 8/14/2007



Sediment plume

Geoduck Harvest Aftermath

Case Inlet, 2007



Tractor Contouring the Beach Geoduck Seed Plastic Tubs



Hartstene Island, July 4, 2008

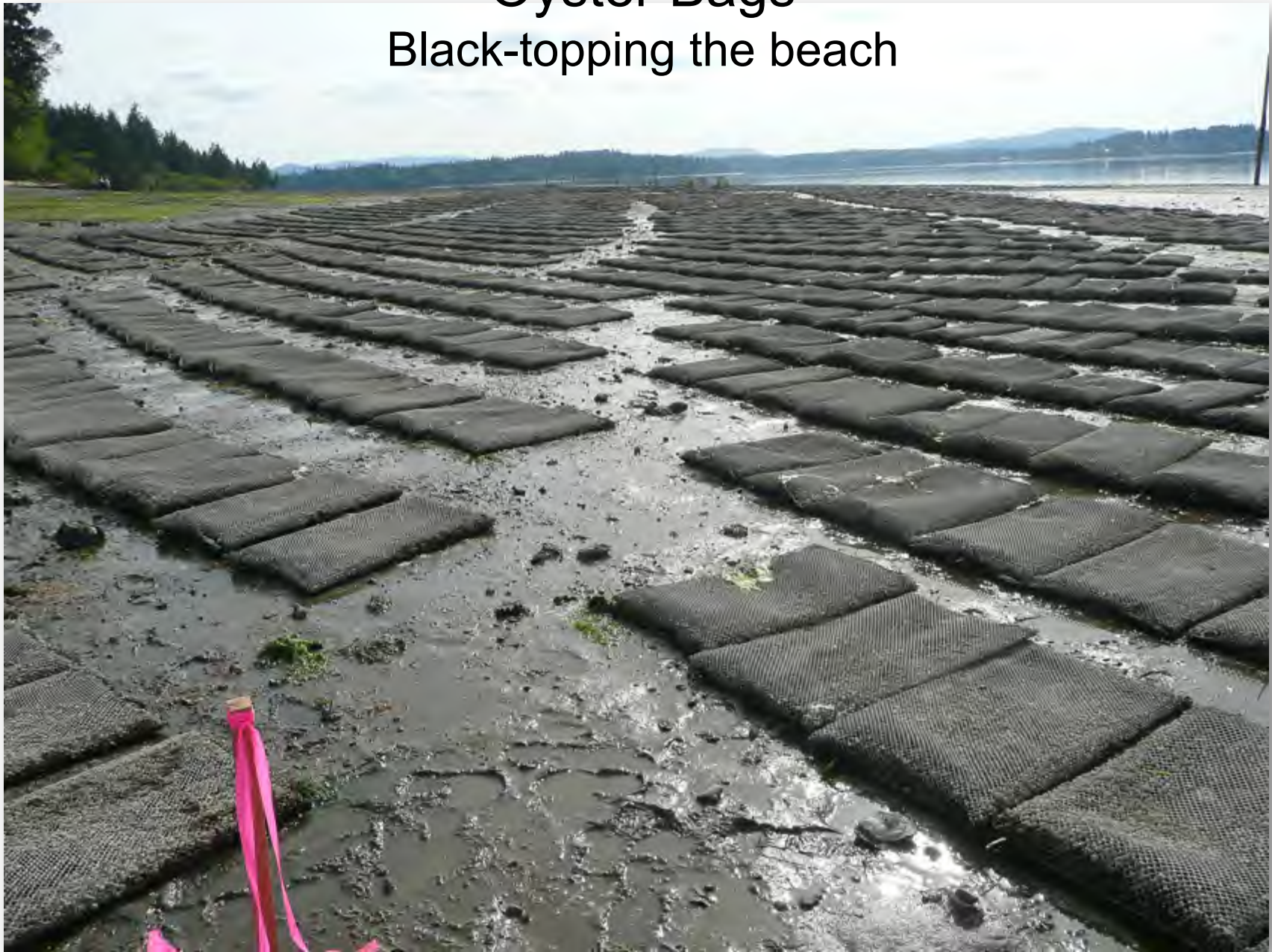
Industrial Aquaculture Covering Nearshore with Geoduck Feedlot and Oyster Bags



Totten Inlet - 2008

Oyster Bags

Black-topping the beach



Totten Inlet 2008

Industrial Aquaculture Covering Nearshore
with clam netting, oyster bags and geoduck feedlot



Mussel Barges, Totten Inlet



Totten Inlet, 2008 Scraping the Nearshore

Taylor Shellfish



Taylor Shellfish scraping Eld Inlet shoreline of native species and vegetation

March 2010



Industry Clearing Vegetation Essential for Spawning, Rearing and Habitat for Forage Fish and Salmon



North Bay July 2004

Pest Management Strategic Plan for Bivalves in Oregon and Washington - Draft

I. Major Pests

Invertebrate Pests:

- Bamboo worm
- Barnacle
- Burrowing shrimp
- Cockles
- Crabs
- Flatworms
- Horse clams
- Moon snails
- Oyster drills
- Sand dollars
- Sea Stars

Weeds:

- Algae
- Cordgrass
- Japanese eelgrass
- Native eelgrass

Vertebrate Pests:

- Perch
- Shorebirds and
- Waterfowl

II. Diseases

- Bonamiasis
- Denman Island disease
- Hemic neoplasia
- MSX
- Nocardiosis
- Oyster velar virus disease (OVVD)
- Vibriosis

III. Sporadic and Minor Pests:

Invertebrate Pests:

- Crepidula
- Mussels (Musculista and native blue)
- Polydora
- Tunicates
- Other Parasites

Vertebrate Pests:

- Coyote
- Flatfish and Sculpins
- Raccoon
- River Otter

The shellfish industry is using a taxpayer grant to fund habitat removal/destruction under the guise of this pest management plan. They should be prohibited from purging native life as the alteration of Nearshore ecological function is not consistent with efforts of salmon recovery and a healthy Puget Sound.

According to the Washington Dept of Fish and Wildlife, "The primary rule is RCW77.12.047(3). This exempts private commercial Aquaculture from just about everything WDFW does.

Aquaculture interferes with natural habitat



Hartstene Island, 2006



Case Inlet Feb 2006

Routine Industry Practices Destroy Native Species



Pile of starfish covered with Lyme



Row of sand dollars left on beach to die

“Sand Dollar beds are uncommon and may be declining in Puget Sound, are a key ecological species controlling local communities, may serve as refuges for young Dungeness crabs, and do not return to beaches once lost.” Dr. Megan N. Dethier, PhD, UW Dept. of Biology, 2007.

High Density Raft Leases Baynes Sound, British Columbia



Baynes Sound, British Columbia

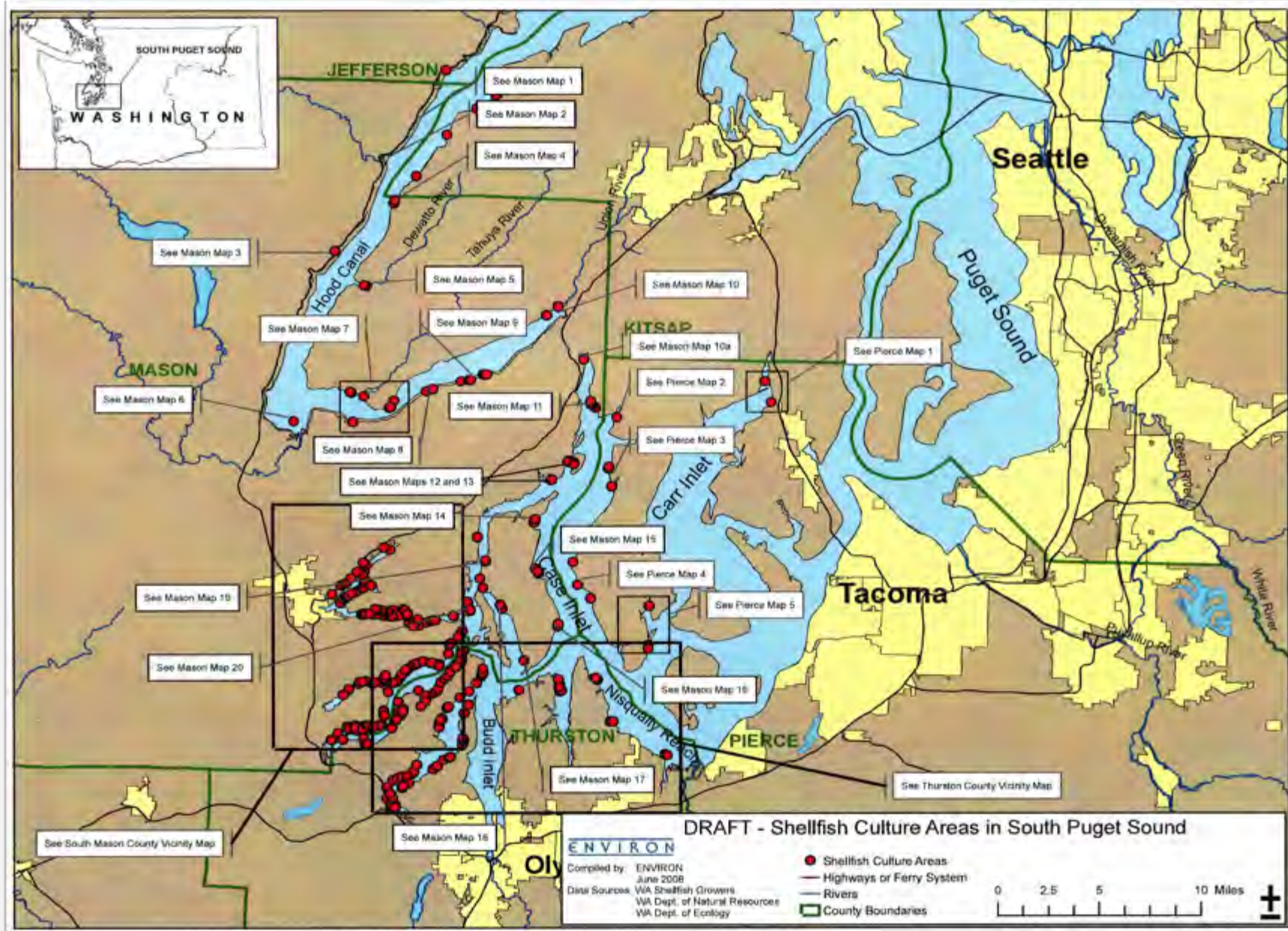
High intensity aquaculture expanding down the Canadian shoreline



Cape Horn – Full of Aquaculture



Aquaculture Sites in South Puget Sound – June 2008





Environmental and Social Impacts of Industrial Aquaculture

Puget Sound forage fish, salmon and whale populations are continuing to decline as these impacts expand in South Puget Sound which is considered "the nursery" by scientists. Beaches are being covered from a +7 tide to a -4 tide with clam nets, oyster bags and geoduck feedlots.

- 1. NATIVE SPECIES HABITAT** – Limited native species habitat (coves, bays, pocket estuaries) converted to perpetual aquaculture on a permanent basis with no expansion limits in any of the shoreline designations, including natural areas.
- 2. FORAGE FISH HABITAT** - Alteration and disturbance of essential forage fish spawning and rearing habitat. While the Puget Sound Partnership goals include protecting coastal feeder bluffs and forage fish spawning sites, industry prefers these sites for expansion: "Beaches that accumulate sand in bars and flats from the erosion of coastal bluffs are often the best sites for geoduck culture." WDNR-Joth Davis-Baywater 2004
- 3. FOOD WEB DEPLETION** - Food web effects: Competition with other filter feeders for phytoplankton and zooplankton (Ecological carrying capacity), increasing recycling speed of nutrients, removal of eggs and larvae of fish and benthic organisms that are consumed by planted bivalves.
4. Planted densities that are significantly greater than natural shellfish densities in expansion areas that create unnatural competition for space with wild benthic organisms.
5. Extensive use of invasive species as defined by the scientific community, such as Pacific oysters and Gallo mussels that threaten natural ecological functions.
6. Industrial or intensive scale techniques that are replacing more traditional sustainable practices.
7. Clearing methods of nearshore rocks, wood and vegetation that are essential fish habitat.
8. Dredging, liquefying, dragging of nearshore tidelands and thus altering natural ecological functions.
9. Removal of wild populations of targeted species (clams, geoducks) to prepare the aquaculture site for commodities resulting in a single monoculture.
10. Elimination of Puget Sound native species such as Dungeness crabs, red rock crabs, starfish, moon snails and various fish that are considered to be predators.
11. Increased suspension of sediments, release of nutrients resulting in turbidity/siltation that adversely impacts fish and other native species.
12. Elimination, alteration and disruption of aquatic organisms that are essential food for salmon on the endangered species list as well as for other aquatic life.



Environmental and Social Impacts of Industrial Aquaculture (cont'd)

13. Alteration of the hydrodynamic regime (current speed, turbulence).
14. Feces and pseudo feces from high densities of shellfish in low current areas overwhelming the natural functions in the sediments.
15. Nitrification and depletion of oxygen below and down current of rafts from dense hanging mussels and scallop lines in low flushing embayments.
16. Use of nets that restrict feeding of native species, entangle aquatic life and serve as a matrix for fouling organisms that interfere with natural processes.
17. Destruction of eelgrass beds and impairment of expansion of existing beds.
18. Disturbance of native and migratory bird feeding, rearing and breeding areas.
19. Cleaning of nets/gear, use of chemicals that destroy natural algae, fish eggs and other marine matter that would normally be attached to natural beach substrate and debris.
20. Introduction of tremendous amounts of PVC plastics that are not designed for exposure to wind, waves and UV, and that are known to leech dioxins over time as they wear down.
21. Use of pesticides and herbicides applied to control burrowing shrimp, "pests" and Spartina grass. Industry applies up to **3 tons of carbaryl pesticide** annually to Willapa Bay tidelands. Utilizing unemployed citizens to hand dig the Spartina would be financially and environmentally responsible.
22. Unnatural densities in shellfish feedlots increase chance of parasites and disease.
23. Increased levels of noise that disturbs native species, birds and adjacent residents.
24. Increased light that disturbs native species, birds and adjacent residents.
25. Recognition of the economic value of Puget Sound natural resources for all of the various Puget Sound stakeholders.
26. Commercial privatization of shorelines and waterways protected by the Public Trust Doctrine and the Shoreline Management Act.



Public Trust Doctrine Citizens Must Assert Their Rights Summary

1. The Public Trust Doctrine protects public ownership in uses of navigable waters and underlying lands
2. In all States, the Public Trust Doctrine assures the public some right of lateral access along shore lands between the ordinary high and low water lines.
3. State waters are a public resource owned by and available to all citizens equally for navigation, commerce, fishing, and recreation.
4. This trust is not invalidated by private ownership of the underlying land.
5. The Public Trust Doctrine is applicable whenever navigable waters or the lands beneath are altered, developed, conveyed, managed or preserved. It applies whether the trust lands are publicly or privately owned.

Public Trust Doctrine Citizens Must Assert Their Rights

“Simply stated, the public trust doctrine provides protection of public ownership interests in certain uses of navigable waters and underlying lands, including navigation, commerce, fisheries, recreation and environmental quality. While tideland's may be sold into private ownership through conveyance of the jus privatum, the public trust doctrine reserves a public property interest, the jus publicum, in these lands and waters flowing over them.”
Page 1.

“The Public Trust Doctrine is a legal principle derived from English Common Law. The essence of the doctrine is that the waters of the state are a public resource owned by and available to all citizens equally for the purposes of navigation, conducting commerce, fishing, recreation and similar uses and that this trust is not invalidated by private ownership of the underlying land. The doctrine limits public and private use of tideland and other shore lands to protect the public's right to use the waters of the state.”

http://www.ecy.wa.gov/programs/sea/sma/laws_rules/public_trust.html

Public Trust Doctrine Citizens Must Assert Their Rights

“Recognized public uses of trust lands today include fishing, bathing, sunbathing, swimming, strolling, pushing a baby stroller, hunting, fowling, both recreational and commercial navigation, environmental protection, preservation of scenic beauty, and perhaps the most basic use, just being there.” P xxi

“In all States, the Public Trust Doctrine assures the public some right of lateral access along shore lands between the ordinary high and low water lines. For the most part, the public’s lateral access includes recreational use of the shore lands.” P xxvii

“...although much trust land is privately owned, these private rights in trust land are for the great part subject to the dominant rights of the public to use these same lands for a wide variety of recognized uses.” “The Public Trust Doctrine is applicable whenever navigable waters or the lands beneath are altered, developed, conveyed, or otherwise managed or preserved. It applies whether the trust lands are publicly or privately owned.” P xxxii

http://www.ecy.wa.gov/programs/sea/sma/laws_rules/public_trust.html

The Use of PVC Plastics for Aquaculture in Puget Sound

The geoduck aquaculture industry embeds approximately 8 miles of PVC pipe per acre in pristine intertidal habitat areas of Puget Sound, mostly in South Sound. Based on the approximate weight per acre calculations provided by the geoduck industry, 4-inch schedule 10 PVC tubes, the smallest size used, weigh about 32,000 pounds, or 16 tons per acre of PVC. The best current estimate according to the Shellfish Aquaculture Regulatory Commission, as of June 1, 2010, suggests there are currently 364 acres of active geoduck farms in Puget Sound. This represents nearly 3 thousand miles, 12 million pounds or 6 thousand tons of PVC in Puget Sound from geoduck aquaculture. If one assumes that at any given time only one-third of all geoduck farms have PVC tubes installed in the tidelands, then this would yield about 1 thousand miles, 4 million pounds or 2 thousand tons of PVC.

It is known that the geoduck industry uses and reuses the PVC tubes until they are unusable. In other words, until they are worn or chipped away so much that they can no longer hold water. PVC was not designed for outdoor use in the marine environment, where it is exposed to temperature fluctuations, UV light, and wave and sand erosion and the effects of scouring.

PVC is the most common of all chlorinated plastics. It is made up of about 43 percent petroleum and 57 percent chlorine from rock salt. Vinyl chloride, the main chemical in PVC, is a known human carcinogen according to the World Health Organization.

PVC is one of the most environmentally hazardous consumer materials ever produced. The PVC lifecycle presents one opportunity after another for the formation and environmental discharge of organochlorines and other hazardous substances. When its entire lifecycle is considered, it becomes apparent that this seemingly innocuous plastic is one of the most environmentally hazardous consumer materials produced, creating large quantities of persistent, toxic organochlorines and releasing them into the environment. PVC has contributed a significant portion of the world's burden of persistent organic pollutants and endocrine-disrupting chemicals—including dioxins and phthalates—that are now present universally in the environment and the bodies of the human population. Beyond doubt, vinyl has caused considerable occupational disease and contamination of local environments as well.



Shellfish Consumer Health Risks Summary

1. **Industry** calls shellfish “Nature’s Cleaning Service” as they filter the surrounding water. Consumers should be aware of the health risks, especially those with diabetes, liver disease, cancer, AIDS, etc.
2. **Illness** from pathogens in raw oysters (Norovirus and Vibrio, same family as cholera).
3. **Chemicals** sprayed directly on tidelands in estuaries and on mudflats:
 - Carbaryl (Sevin insecticide) to kill ghost shrimp.
 - Glyphosate to kill Spartina
 - Imazapyr to kill Spartina
4. **Cadmium** – a toxic heavy metal found naturally in the soil, air, and water and in shellfish along the Pacific Northwest. Concern to human health is its long life (20 – 30 years) and accumulation in soft tissues (liver and kidneys) leading to kidney dysfunction.
5. **Consumers should be warned of the risk of consuming raw oysters at point of sale markets and restaurants.**

Shellfish

Consumer Health Risks - Details

Industry has called their shellfish “Nature’s Cleaning Service” as they filter the surrounding water. Consumers should be aware of the following health risks, especially those with diabetes, liver disease, cancer, AIDS and other chronic conditions. At a minimum, consumers should be warned of the risk of consuming raw oysters at point of sale markets and restaurants.

1. Norovirus and Vibrio – Oysters

Rank #4 in the Top Ten Foods - 132 outbreaks involving 3409 reported cases of illness." Illnesses from oysters occur primarily from two sources: Norovirus and Vibrio. The most dangerous of the two pathogens found in oysters is Vibrio."Raw oysters may contain a number of different harmful bacteria, and have been linked to serious illness and death. As such, food safety experts and public health agencies have consistently warned of the serious potential risk created by these mollusks, when consumed uncooked." "The harmful bacterium most commonly associated with the consumption of raw oysters is Vibrio vulnificus. It is a bacterium in the same family as those that cause cholera. It normally lives in warm seawater and is part of a group of Vibrios that are called "halophilic" because they require salt. It is found in all of the coastal waters of the United States."Food Safety News--Oysters-A Simple Food with a Complicated History

<http://www.foodsafetynews.com/2010/02/oysters-a-simple-food-with-a-complicated-history/>

2. Chemicals Applied to Shellfish Areas - Shellfish Pesticide/Herbicide Residue Tolerances

“Carbaryl (Sevin insecticide) is sprayed by shellfish growers in Washington State (Willapa Bay) directly in estuaries and on mudflats to kill ghost shrimp. As a result, EPA allows oysters containing up to 0.25 parts per million (ppm) of carbaryl to be consumed by the public.”

“Glyphosate is sprayed by shellfish growers in Washington State directly in estuaries and on mudflats to kill Spartina, a form of cord grass. As a result, EPA allows shellfish containing up to 3.0 ppm of Glyphosate and fish containing up to 0.25 ppm to be consumed by the public.”

“Imazapyr is sprayed by shellfish growers in Washington State directly in estuaries and on mudflats to kill Spartina, because Glyphosate was not doing the job. EPA allows fish to contain up to 1.00 ppm and shellfish 0.10 ppm of Imazapyr. Milk has an Imazapyr tolerance of 0.01 ppm!

Shellfish Consumer Health Risks - Details (cont'd)

3. Cadmium - Cadmium is a toxic heavy metal found naturally in the soil, air, and water and in shellfish along the Pacific Northwest including Canada, Washington, Oregon, Alaska, and California. "It is of particular concern to human health due to its long biological half-life and ability to accumulate in soft tissues, primarily the liver and kidneys leading to kidney dysfunction at high enough concentrations. "Cadmium is known to accumulate in the human kidney for a relatively long time, from 20-30 years." Health Canada is the only agency that issued Oyster Consumption Guidelines (February 2002) and scientist's recent studies find these guidelines are not adequate.

- Adult-- About 12 oysters per month
- Child-- About 1 1/2 oysters per month

For more details, see Human Health Concerns - section 13, pages 36-38.

http://www.coalitiontoprotectpugetsoundhabitat.com/uploads/Aqua_Sum-12-Dec-R04.pdf



The Sierra Club Supports Sustainable Communities and Sustainable Aquaculture

A sustainable community continues to thrive from generation to generation because it represents:

1. A healthy and diverse ecological system that continually performs life sustaining functions and provides resources for humans and other species
2. A social foundation that provides for the health of all community members, respects cultural diversity, is equitable in its actions, and considers the needs of future generations
3. A healthy and diverse economy that adapts to change, provides long-term security to residents, and recognizes social and ecological limits
4. Sustainable agriculture - a way of raising food that is healthy for consumers and animals, does not harm the environment, is humane for workers, respects animals, provides a fair wage to the farmer, and supports and enhances rural communities.

Truly sustainable shellfish aquaculture would not include the use of the following expansion methods being used by large corporations that eliminate native species and creates a monoculture of commodities by:

1. Applying pesticides to increase shellfish production that kills other native species and poisons our marine waters
2. Destroying treasured beach life such as starfish, crabs, moonsnails and other species that industry sees as predators.
3. Harassing and/or killing aquatic birds and ducks
4. Using canopy nets along the shorelines that restricts feeding of native species
5. Placing thousands of grow bags on tidelands that smothers native organisms
6. Introducing 8 miles of household PVC pipe per acre into marine waters that is known to leech toxins and is harmful to aquatic life
7. Demanding other stakeholders to improve water quality at their expense so industry can expand into those non-commercial communities. As a result, their native species are destroyed and social conflicts arise as restrictions on recreation, navigation and fishing increase.

Henderson Bay Wildlife Gathering during Forage Fish Run (2007)

Aquaculture would put these native species at risk



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