

## **Testimony related to Geoduck Culture and its association with shoreline development.**

**Wayne Daley, January 31, 2011.**

This testimony is in relation to the proposed intensive geoduck shellfish culture project on the beach of Key Peninsula near Longbranch. The site is adjacent to Drayton Passage in South Puget Sound. The project is under the name of Longbranch Shellfish Project.

As defined on the web page for the Fisheries-Oceanography Library of the University of Washington:

“Aquaculture is the cultivation of aquatic organisms. Aquaculture can also be described as aquafarming and implies the cultivation of aquatic organisms under controlled conditions.”

Aquaculture: the cultivation of the natural produce of water, as fish or shellfish. (Webster’s Dictionary On-Line)

Aquaculture: A means of crop-production, growth of plants in water. The systematic exploitation of the sea, marine husbandry or aquaculture. (Oxford English Dictionary O-Line)

In the world of fisheries and aquaculture it is well known and understood that aquaculture is an industry that utilizes the organisms of the ocean and freshwater bodies for the purpose of growing and harvesting those organisms for profit or for enhancement of a species that has been introduced into a foreign body of water. In order to accomplish this there is an implied and a researched methodology of development at a site that allows the organism to be cultured “grown” in an intensive manner that will produce a significantly greater biomass of that organism than would be possible under the conditions that are found in the process of harvesting naturally occurring organisms (commonly referred to as a wild product).

This implies and underscores the issue that there is a specific activity of development of the natural habitat for the explicit purpose of supporting a commercial industry. The existing conditions in the case of geoduck culture do not provide the increased harvest capacity along a given shoreline without the development of an intensive aquaculture activity. The process clearly identifies a technology that utilizes manmade material, together with the living organism, in a manner that will result in a density of animals that is in most cases more than 100 times greater than a wild population.

The process involves the use of mechanical equipment on the shoreline for the construction of the rearing habitat where the clams will be planted (stocked) and held until mature and the product is ready for harvest. In all cases of aquaculture there is a process of construction of structures (development) that are used for the entire life cycle. Some of the structures may be at a remote site away from the water or shoreline; however there will be a significant additional component that will be installed at the waters edge that will protect the intensive culture operation throughout the growth period until harvest occurs. At the time of harvest there will be temporary onsite activities that will be placed along the shoreline to facilitate the removal of the animals from the water. In all of this activity and throughout the growth period the entire area around the production site is limited to the activities of the firm that has developed the site for

this commercial activity. The public is restricted from walking the shoreline at low tides and small boat activity (kayaking and canoeing) is severely hindered.

My personal experience walking on the beach in the area where the harvesting of geoduck has occurred has been somewhat alarming due to the soft quicksand nature of the substrate as one walks along the beach. It was not unusual to sink nearly to my knees in the sand and to have extreme difficulty in staying upright. One does not experience this problem in areas where wild geoduck harvest has occurred as the harvest is restricted to depths greater than a minus 20 ft water depth. The cultured geoducks are removed from the nearshore habitat (a minus 4 ft to a plus 2 ft tidal reach) by using a hydraulic hose under extreme pressure to blast the sand away from the burrowed animal and extracting the critters from the exposed holes in the sandy nearshore area.

I have also personally observed the process of installation (development) of the aquaculture site. The barges and machinery are present on the beaches for several days and movement along the beach by foot and by small craft at high tide is severely limited due to the presence of this equipment. There are structures placed in the water and on the sand and beach area that restrict the movement by the public and also result in entrapment of other organisms.

### Environmental Impact

In addition to the degradation of the nearshore habitat with the process that has been described above there is a significant environmental impact from a number of activities associated with the entire operation.

My personal observation of an intensive geoduck culture that included netting placed over the pipes that have been inserted to seed the animals resulted in the lethal impact to animals that became trapped in the netting. Netting may or may not be used for this project. There were several species of crab that had been entangled in the netting and died from exposure to the sun during low tides. In addition there were dead star fish and other crustaceans that had become entangled in the netting and did not survive the intense sunlight and long exposure out of the water.

The entire area of development eliminates the area from being used by a diversity of fish and wildlife including other species of clams and burrowing aquatic animals. The intensity and closeness of the plastic pipe totally precludes any other organism from using this space that covers several thousand square meters of area particularly any of the flat fishes that utilize the nearshore sandy bottom habitat..

There are research documents and observations by other groups that are concerned with the impact on water quality due to the excretion of body waste from the intensive culture process. My personal concern is one that has not been discussed in any document I have been able to review. This is the impact on the amount of phytoplankton and zooplankton in the water column that is critical for forage fishes (Asmus & Asmus, 1991). There are many documents that reference the impact of shoreline activities and development along the shorelines in Puget Sound that have a significant impact on spawning and survival of sand lance and surf smelt (Brennan et

al, 2004). This issue has been dismissed as not impacting sand lance and surf smelt because the geoduck culture activities are at a lower water level and outside the spawning area for sand lance or surf smelt. Personal observations by myself and others have seen the presence of the intensive shell fish culture activity well within the area that will be utilized by sand lance. In addition this argument ignores the use of the lower tide levels by the larval and juvenile stages of these critical forage fish species as they immerse from the spawning area (Healy, 1991). These small forage fish will congregate in the areas adjacent to the spawning habitat and search for small plankton to feed on. If one calculates the volume of water being filtered by the increased density of cultured clams (Grizzle, et al, 2006, Kaspar, et al, 1985, Shumway, et al, 1985) it is likely that there is a significant impact on the available food for forage fish that are now protected under ESA regulations as a critical food source for Chinook salmon and Puget Sound Steelhead. Based on the limited amount of research that is available concerning the life history of geoducks the following levels of impact have been calculated.

1. An average size animal ingests an average of 15 ml/hr of plankton.
2. A typical culture site involves a total area of 10 ha with a density of 2.2 million critters.
3. At an average filtration rate as above the total volume of water that is filtered and discharged as a waste product is the equivalent of the amount of sewage generated by a community of 150,000 residents (based on standard liter/day of water consumption for a residential site).

This increased level of utilization of plankton can impact the health and survival of forage fish and other marine organisms in the area of the geoduck operation.

The arguments expressed above apply equally well to the habitat and utilization of this nearshore area by many of the groundfish/flatfish species such as English sole, Dover sole and starry flounder.

### **Unknowns Concerning Geoduck Culture**

The following areas have been identified by a number of scientists as lacking the adequate level or no research concerning the impacts of geoduck aquaculture.

1. What wild populations (i.e. location) support recruitment of natural reproducing populations.
2. There is no data on the retention time of domoic acid (associated with PSP) in the sands where some of the animal waste is deposited by the animals in the sand and sediment.
3. No completed, peer reviewed research on the genetic impact of cultured geoducks on wild populations.
4. No available independent data on the actual filtration rate of geoducks in a culture site.
5. No specific data on culture site geoduck bio-deposition (excretion rates); only data from other bi-valves.
6. No peer reviewed data on the environmental impact of mesh (net) cover PVC tubes at a culture site.
7. No completed, peer reviewed research on impact of culture sites on the benthic community adjacent to the sites.

8. No completed, peer reviewed research on the environmental impact of the harvest process.
9. No completed, peer reviewed data on the diseases specific to wild stocks of geoducks.

## **Cumulative Environmental Impacts**

The Habitat Assessment Report, prepared by Dorn Salmon Enhancement Services, was completed in 2007 prior to the listing of steelhead trout as a threatened species in Puget Sound. This raises an additional environmental impact of cumulative impacts associated with destruction and alteration of the nearshore areas of Puget Sound. There is less environmental utilization data available on the habitat utilization of steelhead as the listing was only completed in September of 2008 and the critical habitat designation is still in the process of being completed and published.

Recent beach seine studies and data published in Brennan, et al, 2004 clearly indicates that migrating juvenile steelhead are found along the areas that would be impacted by intensive geoduck culture. In addition research has shown that one of the important sources of food for immigrant Chinook salmon and steelhead is forage fish. These juveniles will spend up to 6 to 8 months in the estuary areas prior to moving to the deeper open ocean areas. While utilizing this estuary habitat the primary sources of food are insects (up to 80% of the diet), larval hearing, sandlance, crab larvae and harpacticoid copepods. These sources of food are critical for the growth of juvenile salmonids and will be present and dependent on the habitat that will be destroyed by the intensive geoduck culture operations. Of particular concern is the volume of water that is taken in by the large area of geoducks, filtered to take out the food organisms, and discharged as waste. Publish data clearly indicates the geoducks feed on many of the same larval stages of aquatic life as salmon and steelhead use for their source of food. In addition the phytoplankton and likely also the zooplankton consumed by the geoducks is the same food necessary for larval and juvenile forage fishes as well as adult forage fish. There is no known research completed at this time to identify and quantify the impact of the removal of the sources of food critical for forage fish and salmonids. This was admitted to by the former Director of the Washington Department of Ecology, Jay Manning, at a public meeting that I attended on Bainbridge Island in October, 2010.

**These environmental impacts together with the physical impact to the nearshore habitat clearly demonstrate the need for at least requiring an EIS and the associated studies that are required to be completed prior to granting a permit for this operation.**

The existing permit documents clearly are deficient in the following areas required under the WAC:

- Several marginal impacts when considered together may result in a significant adverse impact.
- Adversely affects environmentally sensitive or special areas.
- Adversely affect endangered or threatened species or their habitat.
- Conflict with local state or federal laws or requirements for the protection of the environment.

In my efforts to understand the practice of intensive culture of geoducks the following references have been searched for data to assess the impact of this aquaculture activity in Puget Sound.

Wayne Daley, January 31, 2011

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