

2007 Best Management Practices (BMP's) for Geoduck Aquaculture on State Owned Aquatic Lands in Washington State

The following are Best Management Practices (BMP's) for intertidal geoduck aquaculture on public lands leased and managed by Washington Department of Natural Resources (DNR). The shellfish industry continues to be a leader in promoting water quality protection initiatives at both the local watershed and State levels. Water quality impacts have been identified in the State's salmon plan as one of the impediments to a successful recovery. Our common goal and combined efforts in this area will benefit both fish and shellfish.

These BMP's are related to farm and crop management, and harvest. They reflect the present understanding of existing geoduck aquaculture operations. These BMPs will be adaptively managed by DNR, based on best available science—they may be modified over time as new scientific data pertaining to management practices become available. Site selection BMP's are directed at avoiding and minimizing potential impacts to eelgrass and kelp, and existing shellfish populations in Puget Sound. The appearance of the farm is very important, as is the use—and clean up—of tube, netting and other farm debris from onsite and offsite locations.

These are BMP's that apply to all 2007 geoduck aquaculture leases on State Owned Aquatic Lands.

1. Baseline Survey Work

The baseline survey will accomplish two things: a biological determination of shellfish species and their densities, and a baseline evaluation of the site with regard to aquatic vegetation, sediment characteristics, and water quality parameters.

- 1.1 Document the abundance and distribution of existing naturally recruited shellfish stocks on the lease area.
- 1.2 Conduct a survey of the leasehold for all attached or rooted aquatic vegetation.
- 1.3 Work must be conducted according to current Washington State Department of Fish and Wildlife (WDFW) survey protocols. This section may be updated.
 - 1.3.1 Determination of naturally occurring geoduck may use an alternate method if agreed upon by all parties.
- 1.4 The biological baseline survey will reference GPS leasehold corner points, as defined in the land survey.

2. Brood Stock and Seed Selection

The numbers of brood stock, pair matings, and annual spawns necessary to maximize genetic diversity in the hatchery have not been adequately evaluated. Even though genetic divergence among Puget Sound geoduck aggregations appears to be low and the populations have similar genetic profiles, fine-scale genetic adaptations of geoducks to localized selective processes have

not yet been investigated. DNR will continue to evaluate this issue and reserves the right to modify BMPs, to ensure environmental protection, as new data become available. As methods are known and become available to aquaculturists, hatchery and farm practices should be employed that minimize cultured and wild stock interactions including disease control and maintenance of wildstock genetic diversity.

The following are required by DNR for geoduck seed planted on state owned aquatic lands:

- 2.1 Provide records that seed comply with WDFW transfer regulations according to WAC 220-72.
- 2.2 Provide records that brood stock sources are disease and pest free and that the seed supplier conducts regular pathological exams.

3. Site Preparation and Seed Planting

Bed preparation/planting is, next to harvest, the most intensive activity that will occur on the farm site. Planting is generally preceded by the installation of a predator protection system. Currently, tubes and/or netting are typically installed, and seed is distributed over several low tides. There are a limited number of extreme low tide events and bed preparation and planting is, by necessity, a labor-intensive activity.

- 3.1 **Boundary Markers.** Leasehold boundary corners will be assigned GPS coordinates during the land survey. Corner markers should be in place during site preparation and planting, and during the period when predator exclusion devices are in place. They may be removed during the grow out period, but the corner marker positions must be replaced at the GPS coordinates recorded by the land survey prior to any harvest activities. They must remain in place during harvest activities. Helically anchored mooring buoys will be used for the deep water corner markers. Shallow water corners can consist of untreated piling monuments, helically anchored buoys, or other markers of a semi permanent type, but they must be visible above the water at high tide. Rebar will not be used for markers.
- 3.2 Restrict initial tube siting and placement to those locations where eelgrass (*Zostera marina*) is either absent, greater than ten feet away, or present at densities not exceeding 4 turions or shoots per square meter.
- 3.3 A ten-foot buffer zone is required around established eelgrass beds (*Zostera marina*), or where eelgrass is present at densities greater than 4 turions per square meter. No geoduck planting or operational activities will be undertaken within this buffer zone. DNR reserves the right to increase or decrease this buffer as new data become available on environmental effects.
- 3.4 Ensure tube placement, netting installation, tube removal, harvest and other geoduck farm maintenance practices prevent damage to existing eelgrass mapped during baseline farm site survey. Staging areas must be strategically placed to prevent foot traffic through sensitive areas for all farm activities.

- 3.5 If eelgrass (*Zostera marina*) grows into and encroaches on the planting area during grow out, harvest and replanting of geoduck will be allowed within those areas of new eelgrass growth previously determined during the baseline survey to be free of vegetation or containing scattered shoot densities (not exceeding 4 turions per square meter).
- 3.6 There is no authorization of net loss of eelgrass (*Zostera marina*) from baseline conditions. If a net loss of eelgrass on the leasehold is determined to be the result of farm activity, then at the time of replanting, BMP's and/or planting area may be adjusted.
- 3.7 Install pipe or other predator exclusion devices in straight rows or blocks that are appealing to upland observers.
- 3.8 Whenever and wherever possible, use pipe colored to blend into the surrounding environment.
- 3.9 Predator exclusion nets should be designed so they do not break free and cause beach littering onsite or offsite. If individual tube netting is employed, secure the netting with UV-resistant fasteners (such as rubber bands). If large-cover nets are used, rebar should be avoided if possible and other anchoring systems utilized.
- 3.10 Remove all excess and/or non-secured tubing, netting and other materials from the beach prior to the next incoming tide so that all unnatural debris, nets, bands, etc., are maintained and prevented from littering the waters or the beaches.
- 3.11 No seeding, culture or other operations are done in biologically sensitive areas of the beach such as herring or smelt spawning grounds.

4. Bed Maintenance and Tube Removal

This phase of the operation is largely a period of low-intensity farm observation and growth/mortality monitoring. Tubes and predator netting are usually removed during the first twelve to eighteen months of grow out, however, if predation pressure is extreme they may be left in place for a longer period. The process of tube and net removal is a labor intensive activity and will be subject to the same BMP's as initial tube installation. **No materials should escape from the farm. Every effort must be made that tubes, nets, and fasteners should not wash off the farm area.**

- 4.1 Set up maintenance operations (foot traffic, equipment, vehicles, vessels) so that they prevent impacts to eelgrass. Avoid impacts to other submerged aquatic vegetation.
- 4.2 Maintain farm in an orderly fashion. Remove unnatural materials (pipe, nets) as soon as practical when young geoducks are no longer vulnerable to predators. Remove marker stakes and buoys when they are no longer necessary.

- 4.3 When tubes and netting are removed, secure this material and remove it from the beach prior to the next incoming tide.
- 4.4 Patrol area beaches on a regular basis to retrieve debris that does escape the farm as well as other non-natural debris. Due to wave, current or wind action, debris tends to accumulate in certain areas. These areas should be identified early in the growing cycle and crews shall patrol these areas after weather events to pick up debris. Sometimes these areas are in deeper water and it may be necessary to dive for debris and litter. Keep a log of this activity for the annual environmental performance review.

5. Harvesting

The impacts of subtidal geoduck harvest are disturbance of the substrate, disturbance of other organisms, and short-term increases in water turbidity. Similar effects have been observed on intertidal harvest tracts. Typically, when intertidal geoduck are harvested by hand using hydraulic methods, sediments driven by wind waves and water currents tend to obscure visible harvest effects within one to two weeks. The hand-dug trench harvest method may produce the least turbid water and possible siltation, but will produce the greatest disturbance of substrate materials and should be avoided as a harvest method.

- 5.1 Geoducks planted within 50 feet of eelgrass may only be harvested when exposed at low tide (i.e. dry harvest only). If eelgrass is not present within 50 feet of planted geoducks, then wet harvest (at flooded tidal stages) can occur.
- 5.2 Farm operations should be conducted so that propeller wash from vessels approaching the site does not affect eelgrass, neither should vessel-anchoring systems. Vessels should be moored in water greater than -18 feet (MLLW) in depth, or deeper than the photic zone to minimize impacts from shading.
- 5.3 DNR's preference is that water pumps used for harvest be placed on floating rafts, which are anchored temporarily in water greater than -18 feet (MLLW) in depth. If no submerged vegetation is present and the seabed is shallow for a long distance from the beach, the anchoring of rafts in shallower water will be allowed. If the raft is likely to drift over eelgrass beds, care should be taken in the design of the raft to prevent it from affecting eelgrass if grounded at low tide.
- 5.4 Pump intake screens should minimize potential entrainment of aquatic organisms.
- 5.5 Harvest can only be undertaken using low-pressure water-jets with a nozzle inside tip diameter of 5/8-inch (WAC 220-52-019(2a)) or less. The nozzles will be hand held and controlled by the operator; the nozzle pressure is limited to about 100 psi measured at the pump.
- 5.6 Conduct harvest activities during tides where the least amount of turbidity will occur as practicable. On moderately sloping beaches with fine-grained sediments, consider controlling down-beach movement of sediments at each harvest point with a sand-filled cloth tube or similar sediment containment method.

- 5.7 Minimize noise from pumps, generators, and other mechanical devices, radios, etc. The State noise standard for residential areas is 55 dBA (WAC 173-60-040). DNR's standard for geoduck harvest has been 50dBA at 200 yards from the source. Harvesters must be aware of and consider the potential for harvest noise to affect nearby residences and eagle nesting sites.
- 5.8 Maintain nighttime lighting to the minimum necessary for safe and efficient operations.
- 5.9 Remove all tools and products of harvest activities from the site when each day's harvest is completed.
- 5.10 Inform adjoining neighbors of upcoming harvest activities, at least five days in advance if possible.
- 5.11 Time harvest to avoid spawning and incubation periods for sand lance, surf smelt, and herring if they are documented by WDFW to occur in the farm area.

6. General

- 6.1 Companies participating in farming on leased beaches shall train employees in meeting environmental objectives through a standardized training program. These companies shall be responsible for the employees' environmental performance.
- 6.2 Ensure that pumps, boat motors, and harvesting equipment are routinely serviced in order to avoid/minimize the loss of fluids.
- 6.3 Where petroleum products are used, participating growers will have in their possession, at harvesting sites, equipment necessary to address spills of hydraulic fluids and fuels including absorbent materials.
- 6.4 Prepare a contingency plan for addressing vehicle breakdowns in the intertidal area.
- 6.5 Avoid or minimize the use of vehicles and other heavy equipment on intertidal areas and beaches.
- 6.6 Where driving on the beach is unavoidable, routes will lead through intertidal areas to hard surfaces along the upper intertidal zone, minimizing intertidal interference to the maximum extent feasible. Shore crossings will be designated at single locations, choosing the shortest route possible, so disturbance to the foreshore is minimized.
- 6.7 Adequate sanitation (toilet and washing) facilities will be available at all times for employees working on the beach. Employees will not use the beach, adjacent uplands or waters for personal sanitation.

- 6.8 Lessees will not moor support vessels on the leasehold, or offshore from the leasehold for extended periods. If lessee wishes to moor a vessel for an extended period, they should apply to DNR for a commercial mooring buoy lease.

7. Record Keeping

An accurate accounting of farm operations is vital. This process must be transparent to both parties; however, because the activities will be occurring on state lands. Note that certain elements may also be open to public disclosure. Key records to be provided to DNR by the lessee include:

Farm Plan Record Keeping Log

- 7.1 The results of all surveys conducted, as part of the lease, must be provided to DNR within ten business days of receipt of results.
- 7.2 Records on routine operations during the life of the farm. This will include at a minimum:
 - 7.2.1 the mapped location(s) and aerial extent(s) of farm site(s);
 - 7.2.2 harvest records (weight and species) of any non-farmed valuable product, if that amount is greater than a recreational harvest limit;
 - 7.2.3 the timing, location, number, type, and description of predator protection installations;
 - 7.2.4 geoduck seed planting numbers, locations, dates, and sizes;
 - 7.2.5 survivorship and growth data by location and year-class from farm inspections during grow out;
 - 7.2.6 harvest numbers, total, and average weights, dollar value, date, year-class, and location of harvest tract;
 - 7.2.7 other data determined during the initial lease negotiations to be of mutual benefit to DNR and the lessee. The format and schedule for providing this information to DNR will be set out in the lease agreement.
 - 7.2.7.1 to determine source of potential impacts, keep records of all activities on the leasehold, such as time of activity, numbers of people, anchoring locations of vessels, trucks on the beach, etc.

Events and Issues Log

- 7.3 Information on specific farm events or issues that may have a material effect on farm operations or the DNR-lessee agreement. The following information will be provided to DNR staff as the events or issues occur:
 - 7.3.1 correspondence between the lessee and other government or tribal entities;
 - 7.3.2 complaints and resolution of those complaints;
 - 7.3.3 Record of correspondence from adjacent property owners and recreational users;
 - 7.3.4 Measures taken as a result of complaints from adjacent property owners or recreational users;
 - 7.3.5 Spills or cleanups conducted on the beach.

Environmental Monitoring

- 7.4 Environmental monitoring data (if applicable for this lease) shall be collected as per DNR protocols in the lease.

Annual Environmental Review

- 7.5 Performance Measures for Annual Environmental Review.
 - 7.5.1 Hatchery certification of the origin of brood stock and number of brood stock used in the production of seed planted on the farm site(s);
 - 7.5.2 Equipment Maintenance records;
 - 7.5.3 If driving on the beach is necessary, a map defining best route to avoid impact;
 - 7.5.4 Record of employee training records for meeting environmental objectives;
 - 7.5.5 Review of petroleum product spill contingency plans and vehicle breakdown plans;
 - 7.5.6 Review of measures taken to reduce turbidity of adjacent waters;

- 7.5.7 Review of farming methods and discussion with farm manager of any possible related impacts;
- 7.5.8 Review of nighttime lighting operations and measures to reduce impact to nearby upland residences;
- 7.5.9 Record of beach cleanup activities;
- 7.5.10 Record of salmon returns in applicable farm areas;
- 7.5.11 Record of water quality participation efforts;
- 7.5.12 Record of scientific studies supported by geoduck companies that address salmon issues;
- 7.5.13 Record of eelgrass beds in farm areas;
- 7.5.14 Record of research proposals on eelgrass issues;
- 7.5.15 Record of participation on eelgrass studies;
- 7.5.16 Record and results of proactive outreach activities done by lessee to local residents;
- 7.5.17 Records of upland owner notification of harvest;
- 7.5.18 Harvest operation downwind noise readings at 200 yards, once per configuration if possible;
- 7.5.19 Other short-term events (PSP and other water related quality closures, unusual predation, poaching, or other bed disturbances, etc.).