EXECUTIVE SUMMARY
Modification to application #200202751
Mariculture Unlimited, LLC
November 17, 2003

This document describes proposed modifications to application number 200202751, requesting permits for submerged shellfish long-lines at two locations in Long Island Sound. Also included in this document is the response to the ACOE request for further information. Specifically, each of the numbered items listed in the October 15, 2003 correspondence are addressed in this document. This document is accompanied by an engineering study furnished by Ocean and Coastal Consultants (OCC) of Trumbull, CT.

Due to criticism of our initial site selection in Westport and recent developments which made an alternative Westport site available, Mariculture Unlimited has been able to relocate the proposed oyster farm location in Westport. The Westport location has been moved away from the high traffic area outside the Saugatuck River entrance. Also, the scope of the project has been scaled back and phasing of the project is being proposed for the Milford and Westport sites.

A total of 88 lines will be deployed over a three year period in two locations. In Milford the first phase of the project will be an initial installation of 10 submerged lines in 15.4 acres a distance of 2,895 feet from the MLLW line of Cedar Beach (See Map 2). In year two 8 submerged lines will be added to the Milford site and the area will increase to 27.7 acres (See Map 3). In year three 22 submerged lines will be added to the gear field for a total of 40 submerged lines in an area of 83.8 acres (See Map 4). Map 1 shows the proposed phasing of the Milford location. See Table 1 below for a summary of the phased build out.

Map 5 shows the proposed phasing of the Westport location. In Westport the first phase of the project will be an initial installation of 12 submerged lines in 20.5 acres (Map 6). In year two 12 submerged lines will be added to the Westport site and the area will increase to 46.7 acres (Map 7). In year three 24 submerged lines will be added to the gear field for a total of 48 submerged lines in an area of 91.5 acres (Map 8). Latitude/longitude coordinates for the proposed Milford and Westport locations are listed in Appendix B.

Table 1. Summary of phased build out at the proposed Milford and Westport oyster farm locations.

	Total number of lines	Total acreage	Dimensions of gear field
MILFORD			
Year One	10	15.4	425 x 1580 ft
Year Two	18	27.7	790 x 1580 ft
Year Three	40	83.8	2006 x 1580 ft
WESTPORT			
Year One	12	20.5	607 x1457 ft
Year Two	24	46.7	1399 x 1457 ft
Year Three	48	91.5	2735 x 1457 ft

Submerged long-lines are to be deployed for the purpose of growing oysters in optimal mid-water conditions. Information buoys will be placed every 300 ft along the perimeter of the gear field and one small float will mark the location of each submerged line.

The lines are 325 ft in length between end buoyancy buoys and are secured in place by screw (Helix) anchors at either end of the long-line (See Figure 3.2-2 in the OCC Equipment Evaluation Report). The anchor line is set at a depth ratio of 4:1 (Figures 1 and 2). The approximate length of the long-line from end anchor to end anchor is 420 ft in Milford and 525 ft in Westport. The long-line maintains a depth of 10 feet below mean low water (MLW) by a combination of mid-water plastic buoys and intermediate anchors (See Figure 3.2-1 in the OCC Equipment Evaluation Report). The mid-water floatation will be increased or decreased as needed to maintain the required depth during the growing season. The geometry of the long-line is maintained by the primary end anchor, a secondary Helix anchor and a large corner buoy. The direction in which the long-line will be set is parallel to the prevailing current direction. The distance between parallel lines is approximately 100 ft. and the distance between end anchors of consecutive long-lines is approximately 20 ft. (See Figure 3.2-3 in the OCC Equipment Evaluation Report). Oyster trays are suspended from the lines. Each long-line contains 50 stacks of trays, each containing 7 trays. The High Flow Aquatech trays or a similar design will be used. The Aquatech trays are 8.5 inches in height and 25 inches wide (Figures 3 and 4). The height of one stack of 7 trays is about 61.5 inches tall.

USE OF NAVIGATION AIDS

Before the aquaculture gear is installed the U.S. Coast Guard (USCG), First District; Aids to Navigation Branch at 408 Atlantic Ave, Boston, MA 02110-3350 (800-848-3942) will be contacted to coordinate the proper buoy markings. All lights, markings and other features the USCG requires shall be installed and maintained by Mariculture Unlimited. Also, before installation, a permit application will be submitted to the State of Connecticut Navigation Safety/Boating Access Unit and a copy of the permit application will be submitted to the ACOE.

Discussions with Michael Payton of the CT DEP Boating Division have already occurred. His office will be requiring information buoys to be located at the corners of each gear field and every 300 feet, along the perimeter of the gear field. The information buoys are 12 inches in diameter and extend out of the water 36 inches. The buoys will be stamped with the information symbol and the message: "submerged gear". The number of buoys required at each location is listed in Table 2 below.

Table 2: Number of information buoys required each year of operation for each location.

Location and Project Year	Number of Information Buoys Required
MILFORD	
Year One	14
Year Two	16
Year Three	26
WESTPORT	
Year One	14
Year Two	18
Year Three	24

The USCG will be supplied with any information they require to publish a "Notice to Mariners", should they deem it necessary.

DISTANCES TO NAVIGABLE FAIRWAYS

Distances to navigation aids and shorelines were determined using Maptech Inc's Offshore Navigator version 5.01. This software has a function that allows users to measure distances on navigation charts. Distances were measured in nautical miles (nm) and converted and rounded to the nearest foot. The following table lists distances from the proposed aquaculture sites to points of interest in each the Milford and Westport vicinities. These distances are also labeled on the maps detailing the aquaculture sites.

Table 3: Distances to navigation aids and shorelines.

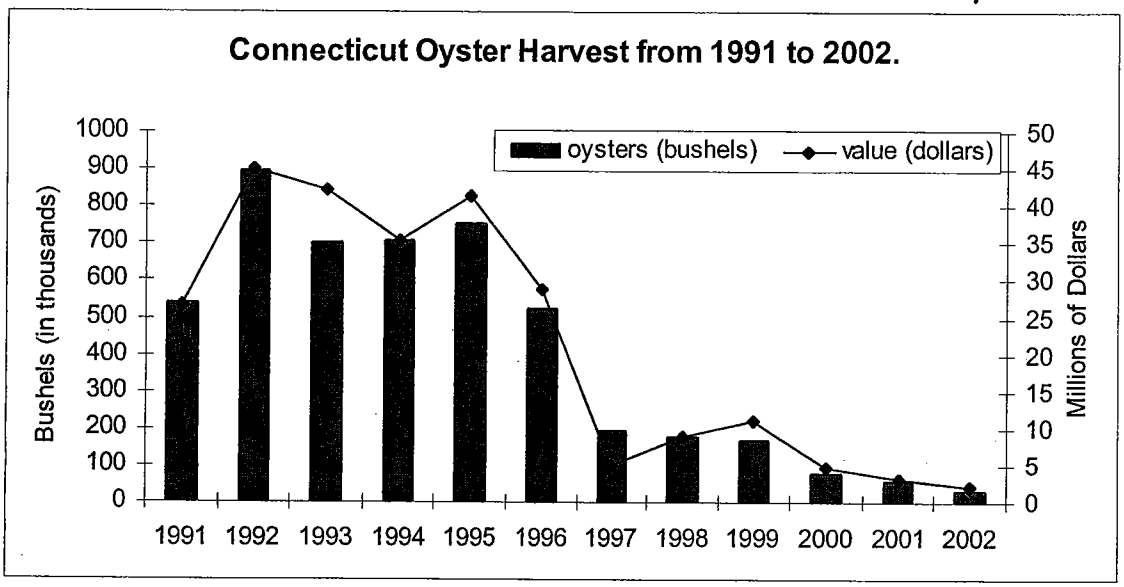
Distance description		Distance (nm)	Distance (ft)
FROM	TO		
MILFORD PHASE ONE			
Southern Corner	Breakwater Tower	0.99	6,018
Eastern Corner	R "16"	1.25	7,599
Western Corner	MLLW at Cedar Beach	0.41	2,492
MILFORD PHASE TWO			
Southern Corner	Breakwater Tower	0.92	5,593
Eastern Corner	R "16"	1.25	7,599
Western Corner	MLLW at Cedar Beach	0.41	2,492
MILFORD PHASE THREE			
Southern Corner	Breakwater Tower	0.71	4,316
Eastern Corner	R "16"	1.25	7,599
Western Corner	MLLW at Cedar Beach	0.33	2,006
Northwestern Line	MLLW at Cedar/Laurel Beach	0.41	2,492
WESTPORT PHASE ONE			
Southwest Corner	R "24"	1.43	8,693
West Line	G "1"	1.00	6,123
WESTPORT PHASE TWO			
Southwest Corner	R "24"	1.30	7,903
West Line	G "1"	0.87	5,276
WESTPORT PHASE TWO			
Northeast Corner	R "22"	1.94	11,794
Southwest Corner	R "24"	1.07	6,505
West Line	G "1"	0.63	3,830
Northeast Corner	G "3"	2.01	12,219

PROJECT PURPOSE AND NEED

It is the goal of Mariculture Unlimited to become a leader in the Connecticut aquaculture industry over the next several years. In order to accomplish this goal Mariculture Unlimited management feels a shift from the traditional method of harvesting oysters to a more gear oriented approach is necessary. Oyster landings for the state of Connecticut are down drastically from the mid 1990s, with no appreciable set of oyster spat seen in several years (Figure 5). Connecticut oyster landings fell from over 750,000 bushels in 1995 to 32,000 bushels in 2002. Clearly, to rely on the natural cycle of the Long Island Sound oyster population would be ill advised at this point in the population cycle. Mariculture Unlimited intends to reach our goals by growing disease resistant, hatchery

raised oysters. We will employ established oyster farming techniques that have been proven to increase survival and growth rates of oysters.

Figure 5:



Source: Connecticut Department of Agriculture, Bureau of Aquaculture

Mariculture Unlimited aspires to increase our oyster production level to 10 million oysters per year within the next decade. In order to accomplish these numbers at least 140 submerged lines would be needed to hold this number of oysters. The number of lines (88) requested in this permit application will allow Mariculture Unlimited to reach about 60 percent of our desired goal at full build out.

Bottom cages vs. Suspended baskets

There are three main issues to consider when comparing long-line gear to bottom cages. First there is the initial cost of the gear. Then there is the cost of the labor involved in working with such gear. And finally, the production levels afforded by each gear type.

In order to compare the cost of the two types of gear, the cost of gear to hold 1 million oysters at harvest size will be estimated.

One bottom cage cost $170 in materials (cage wire, ADPI bags, Clips, metal frame for bottom, and concrete runners) and requires about one hour of labor to construct. It will take 416 cages on a total of 21 lines to grow 1 million oysters (for a total of $70,720.00 in materials and 416 hours of labor for construction.)

The dark sea trays that will be suspended from the long-lines, can hold 200 oysters/basket. One million oysters would require 5,000 trays in 714 stacks on 14 lines. Each dark sea tray costs $4.50 for a total cost of $22,500. No further construction is needed to prepare the baskets for deployment. However there is a much larger expense of installing 4 helix anchors per line for the long-line system. The cost of installing helix anchors for 1 million oysters is $56,000 ($1,000/anchor).

In this cost analysis, the cost of line and buoys was not calculated. Our current bottom cage design requires two marker buoys per trawl, ($2.20/line) 90 feet of 5/8th sinking line and about 400 feet of 5/8 floating line (another $200.00/line). Approximate cost of line and buoys for 1 million oysters in bottom cages is $4,200.

Again, the long-line system is more involved with respect to buoys and lines. Buoys and line for one long-line are estimated to be about $2,250.00. Approximate cost of line and buoys for 1 million oysters in a submerged long-line system is $38,000. The following table outlines the cost comparison.

Table 4: Cost of materials to hold 1 million oysters in bottom cages and submerged long-lines.

	Bottom Cages	Submerged Long-line
Number of lines needed	21	14
Number of cages/baskets	416	714
Cost of cages/baskets	$70,720	$22,500
Cost of buoys and line	$4,200	$38,000
Cost of anchors		$56,000
Total cost	$74,920	$116,500

When applying the cost of this gear to the cost of growing one oyster, we plan to amortize the cost of gear over the life expectancy of the gear. We expect a bottom cage to hold up for, at the most, 7 years. The dark sea trays have a life expectancy of 10 years. When calculating the cost on a per oyster basis, the bottom cage costs about $0.0214 per oyster and the long line system costs $0.0233 per oyster.

Another extremely important consideration is the labor involved in this sort of operation. The current bottom cage operation requires 3 workers on the vessel. Due to deck space constraints, only 20 cages can be attached to a trawl. Because oysters are housed in plastic mesh bags in the cages, much time is spent, in the current operation, unclipping and reclipping bags. In a full day, a crew of 3 workers can get through, AT THE MOST, 40 cages (96,000 oysters).

The long-line system does not require oysters to be enclosed in the labor intensive bags. Also, the work vessel does not have to haul every basket onto the deck to work the line. The vessel works down the line, exposing only a few baskets at a time. The baskets stay attached to the line. This operation is expected to be much more labor efficient and we expect the 3 person crew to be able to get through AT LEAST 100 stacks (140,000 oysters) per day.

It is strongly believed that a submerged long-line operation will greatly increase the efficiency of the crew. Also, there will be an increase in oyster growth rates in the hanging gear. We believe that the faster growth and reduced labor costs will outweigh the additional costs of submerged long-line gear.

WAVE CLIMATE/ENERGIES

The information needed to address this issue can be found in Section 2 of the accompanying report: Mariculture Unlimited, LLC Aquaculture Project: Equipment Evaluation Report.

BENTHOS CHARACTERIZATION

The US Geological Service publication: US Geological Survey Open – File Report 00-304, titled: Georeferenced Seafloor Mapping and Bottom Photography in Long Island Sound was referenced for information on the dominant sediment types at each of the locations. Specifically Chapter 4, titled: Map Showing Distribution of Surficial Sediments in Long Island Sound was used. Dr. Lawrence J. Poppe of the USGS assisted in translating the GIS map referenced above.

The dominant sediment type for the Milford location was determined to be sand (particles 0.65mm to 2.0mm). In Westport the selected location lays on or near the boundary between clayey silt (particles 0.004 mm to 0.065mm) and sand silt clay (>20% of each component). Sediment classification schemes used are from Shepard, 1954, Journal of Geology.

Further benthic characterization was conducted using GIS maps produced for the "Ecological Mapping and Management –Based Analyses of Benthic Habitat and Communities in Long Island Sound" Project. A species richness index (number of species per sample) was determined from information in Pellegrino and Hubbard, 1983. Sample locations from this study occur in the vicinity of each of the proposed aquaculture locations. In Milford, a sample location is located about 0.5 miles to the east of the proposed aquaculture site. In Westport, a sample location is located on the western portion of shellfish lease 614. A species richness of 7 was recorded for the Milford sample and a species richness of 14 was recorded for the Westport sample location.

The Milford sample station was characterized by a high abundance of *Mulinia lateralis* and *Nucula annulata*, moderate abundances of several other bivalves, and high abundances of *Nephtys incise*. The Westport sample location was characterized by high abundances of the polychaete *Pectinaria gouldii*, the amphipod *Corophium acheruscum*, and moderate densities of several bivalves including *Mulinia lateralis*, *Nucula annulata*, *Pitar morhuanna* and *Tellina agilis*. Abundance values for each species at the two locations are listed in Appendix C.

WATER DEPTHS AT THE PROPOSED AQUACULTURE SITES

MILFORD
The chart used for describing depths at the Milford location was USA-NOAA chart #12370-1, titled "North Shore of Long Island Sound Housatonic River and Milford Harbor". Edition 18, dated 08/01/2002 was used in the depth determination.

The depths depicted on this chart, inside the selected aquaculture location ranged from 20 to 23 feet at Mean Lower Low Water, (MLLW). For a definition of MLLW see Appendix A.

The shallow portion of shellfish lease #390 in Milford is not suitable for the deployment of this type of aquaculture gear. It has been removed from the permit application, thus shifting the boundary closest to shore further from the Milford shoreline.

WESTPORT
Two charts were used for describing depths at the Westport location. The first chart used had a scale of 1:80,000. This chart was USA-NOAA chart #12363, titled "Long Island Sound Western Part". Edition 39, dated 07/15/2000 was used in the depth determination.

Because of the scale of this chart, only two depth soundings (37 and 38 feet at MLLW) are listed on the chart within the proposed aquaculture location.

A second chart with more bottom detail was used to determine depths more accurately. This chart used had a scale of 1:20,000, and was USA-NOAA chart #12369-1, titled "North Shore of Long Island Sound Stratford to Sherwood Point". Edition 25, dated 06/01/2002 was used in the depth determination.

The depths depicted on this chart, inside the selected aquaculture location ranged from 35 to 38 feet at Mean Lower Low Water, (MLLW). Also, this chart characterizes the bottom in the vicinity of the aquaculture site as mud and soft bottom.

DESIGN SPECIFICATIONS

The information needed to address this issue can be found in Section 3 of the accompanying report: Mariculture Unlimited, LLC Aquaculture Project: Equipment Evaluation Report.

CERTIFICATION BY ENGINEER

The information needed to address this issue can be found in Section 4 of the accompanying report: Mariculture Unlimited, LLC Aquaculture Project: Equipment Evaluation Report.

WAVE ANALYSIS IMPACT ASSESSMENT

The information needed to address this issue can be found in Section 2 of the accompanying report: Mariculture Unlimited, LLC Aquaculture Project: Equipment Evaluation Report.

CONTINGENCY PLAN FOR LOSS OF GEAR

The proposed long-line design has a redundant helix anchor at each end of the line. Should a major storm event or other unpredictable circumstances cause the relocation of aquaculture gear; a contingency recovery plan will be in place.

After a severe weather event an inventory of all lines will be conducted to ensure all lines are accounted for. In the event that some portion of the gear is lost or relocated from its permitted position, a "Loss of Gear" notification form will be filled out and submitted to ACOE within 48 hours of loss or discovery of the loss of gear.

Vessel logs and daily reports generated by the vessel crew will document the location of long-lines worked on that day. "Loss of Gear" notification forms will be filed with ACOE, should any gear be discovered missing.

Should ACOE or another agency be notified by a third party of relocated gear, they should contact the Mariculture Unlimited office as soon as possible. Once Mariculture Unlimited is made aware of the location of this gear, efforts will be made to salvage or recover the lost gear in a timely manor.

BOND ISSUE

Mariculture Unlimited is prepared to secure a surety bond to ensure the performance of the aquaculture gear and protect the public in the event that the aquaculture gear breaks loose or to cover the costs of gear removal and site restoration should the site be abandoned.

Obviously, the bond amount depends on the number of lines permitted. An amount of $3,000 to $4,000 per line should be adequate to cover the costs of removing the gear.

FIELD VERIFICATION OF GEAR LOCATION

The work vessel is outfitted with sensitive sounding equipment, as well as accurate GPS and radar equipment. Using this equipment the vessel crew will be able to verify both the location and depth of a given line.

The GPS model installed on the vessel has a tide data function available. Once the depth of the line is determined, the point of the tide cycle at which the depth was recorded can be evaluated. Then an adjustment to the MLW depth can be made to determine if the line is located at its designated depth.

End buoy locations will be recorded during their installation. Records of all end buoy locations will be kept aboard the vessel and cross referenced when a particular line is being tended.

The data and reports generated by the vessel crew will be compiled annually for any compliance reports ACOE deems necessary.

SEASONALITY OF OPERATION

Populations of oysters and most fouling organisms, in the Long Island Sound, have life cycles which are most active in the spring, summer and autumn months. For this reason, a long-line operation located in the coastal waters of Connecticut will have most of its operational activity occurring from April to November of each year. Activities occurring during this time period are:

1.) Stocking oysters to baskets
2.) Cleaning oysters and baskets of fouling organisms
3.) Sorting oysters by size
4.) Thinning densities of oysters in baskets as they grow
5.) Adjusting floatation as required
6.) Harvesting oysters from baskets

Once a long-line is deployed and stocked with oysters, it remains deployed year round. The oysters stocked to baskets in the summer and fall of one year will remain on the long-line until they are ready for harvest, hopefully the following year. That is, they will remain deployed over the winter months.

In the winter months, required work on the long-line operation will decline due to the reduction in fouling organism and oyster growth. In the winter months, oysters will not be stocked to the long-lines and cleaning, sorting and thinning of oysters will usually not be required. The harvesting of oysters may continue through out the year and adjusting the floatation may be necessary as oysters are removed from the baskets.

EFFECTS ON NAVIGATION

In the final phase of the proposed Milford oyster farm plan the distance between the Cedar Beach MLLW line and the most landward point on the proposed oyster farm area will be a distance of 0.33 nautical miles (nm), a distance of 2,006 feet. In the first two phases of the proposed project, the distance to the MLLW line of the Milford Beaches

will be 0.41 nm (2,492 ft). This is a considerable distance, especially when compared to other distances recreational fishermen must navigate between in the vicinity of the area. For example, the widths of the Housatonic River and Milford Harbor entrance channels are 200 feet and 100 feet respectively. The entrance to Bridgeport Harbor, which has regular large vessel traffic, has a width of 543 feet.

In the final phase of the proposed Westport oyster farm location, the distance between the "G 1" navigation aid and the western boundary of the oyster farm will be 0.63 nm (3,830 ft.). In phases 1 and 2, this distance will be even greater: 6,123 feet in phase 1 and 5,276 feet in phase 2. Again, when comparing this distance with the width of the Saugatuck River entrance, the corridor afforded by the oyster farm location is considerable.

As stated above, should a vessel operator wish to navigate around the proposed oyster farm, there is more than ample room to do so. However, the long-line system proposed for both locations was designed to allow for a shallow draft vessel to pass over the submerged line with no chance of the vessel catching the line. The submerged line is buoyed and weighted so that it will be no closer than 10 feet from the surface at MLLW. At other times of the tidal cycle, the depth of the line will be greater than 10 feet. For further discussion on the topic of water clearance over the submerged line, see Appendix E.

The proposed Westport aquaculture site was relocated further offshore in order to accommodate the Cedar Point Yacht Club (CPYC) race area. The new proposed location does not overlap the CPYC race area and so will not impact the club's organized racing events.

ACCESS TO THE SAUGATUCK HARBOR

The new location for the proposed Westport oyster farm is over 2 miles from the Saugatuck Harbor entrance. The proposed location was moved further off shore in order to accommodate the heavy recreational boating traffic that moves into and out of the Saugatuck River.

Vessels heading to the Saugatuck River from points east would most likely travel to the north of the new proposed lot. Traffic from the west would come around navigation aid "G 1" to enter the Saugatuck River. A vessel on this track has a corridor of 3, 830 feet in which to travel without a chance of contacting aquaculture gear.

Boat traffic from points southeast may take a course through the proposed aquaculture site. However, should a vessel operator not wish to traverse the aquaculture site, there is ample space for the operator to navigate around the area. Also, the aquaculture site will be well marked so a vessel operator should have no problem avoiding the area if so desired.

ENVIRONMENTAL IMPACTS

Water Quality:
Increased turbidity and resuspension of sediments are expected during installation of the anchorage system. This effect will rapidly diminish upon initial completion and is expected to be well below background levels currently attributed to natural occurrences in these waters. There is no addition of food, so the impacts to water quality associated with other aquaculture operations do not apply.

Benthic Flora and Fauna:
Disturbance to fauna associated with installation of the anchorage system and seasonal maintenance will be minor, temporary and localized in nature. Installation of bottom cages will result in the effective displacement of benthic species, however the actual footprint of the gear in contact with the substrate is negligible and this impact is likely to be mitigated by the addition of benthic structure and access to additional sources of forage. Submerged aquatic vegetation will not be adversely impacted by the proposed project.

Finfish and plankton:
There may be displacement of fish associated with installation of culture gear, but this impact is likely to be mitigated by the addition of benthic structure and access to additional sources of forage. It is anticipated that habitat diversity will be increased by installation of the gear, as the structures will function as fish attraction devices.

Shellfish:
Turbidity during installation of anchors is expected to be short term in nature and minor in scope. As these sites currently support limited shellfish populations impact to such will be negligible. The culture of oysters will provide a source of seed to enhance natural beds.

EFFECTS ON RECREATIONAL FISHING

Both Cedar Beach and Laurel Beach in Milford are popular recreational fishing areas. The vicinity of our proposed project to these areas is of a concern. The reduction in scale of our proposal in this area should allow trawling and bottom fishing to continue unaffected.

In the final phase of the proposed Milford oyster farm plan the distance between the Cedar Beach MLLW line and the most landward point on the proposed oyster farm area will be a distance of 0.33 nautical miles (nm), a distance of 2,006 feet. In the first two phases of the proposed project, the distance to the MLLW line of the Milford Beaches will be 0.41 nm (2,492 ft). Anglers wishing to pursue bluefish, striped bass, winter flounder, fluke and blackfish off Cedar and Laurel Beaches have a corridor of over 2,000 feet wide in which to do so without any concern of contacting aquaculture gear.

Certain measures will be implemented to minimize conflicts with the proposed aquaculture gear should anglers wish to pursue their sport in the area of the oyster farm. The Boating Division of CT DEP is requiring information buoys be placed and maintained every 300 ft along the boundary of the oyster farm area. The 300 ft spacing is required so that a buoy is visible whenever a vessel approaches the oyster farm. An angler approaching the oyster farm will be aware of its existence and would be able to alter fishing technique to avoid the aquaculture gear. For example, provided that the trolled fishing gear is no deeper than 10 feet, trolling can be conducted right over the oyster farm area.

While anchoring in the oyster farm area may be difficult it will not be impossible. Anglers wishing to take advantage of the structure provided by our aquaculture gear can certainly anchor within the proposed 100 foot buffer zone. Not only will the angler be made aware of the presence of the gear by the required information buoys but each individual line will
have an 8 inch by 16 inch marker buoy attached to it. These marker buoys should give anglers an idea of the spacing of the submerged lines. So, setting of anchors may be possible in fair to moderate weather conditions. Retrieval of anchors will also be able to occur. By powering a vessel forward, until it is over the set anchor, before breaking the anchor free, contact with the submerged lines will usually be avoided.

MAINTENANCE CYCLE

Bio-fouling organisms will be removed from the equipment during routine work operations, and returned to the aquatic environment for re-assimilation. A high volume seawater hose usually supplies enough pressure to wash off most fouling organisms. Occasionally, a pressure washer will be required to remove the more stubborn fouling organisms. Each line will be subjected to this routine cleaning operation about every two weeks during the growing season (May through November). Cleaning of fouling organisms is not necessary in the winter months.

Visual inspection of the suspended line and all hanging baskets can be conducted during routine work operations about every two weeks during the growing season, and less frequently in the winter months. Daily reports or vessel logs will detail any repairs or other corrective action required.

A visual inspection of each deployed submerged long-line system will take place twice a year. At the beginning (May or June) and end (November) of each growing season, a visual inspection of all anchors, connection points and hardware associated with the submerge long-line system will be conducted. This visual inspection will be conducted by a SCUBA diver. The diver will be supplied with a checklist of all parts to be inspected. The checklist, diver notes and notes of corrective actions will be compiled for annual reports required by ACOE.

COMMERCIAL FISHERMEN

No commercial fishing operations will be displaced by the proposed activity. In Milford, verbal communication with a lobsterman was established to determine if any lobstermen set pots in the Mariculture Unlimited shellfish lease #390. It was determined that, year round; the proposed area is not fished for lobster. Commercial draggers also do not use the area.

For the waters of Westport, attempts have been made to contact two known lobstermen who may set lobster gear in the area of concern. Personnel from the Fisheries Division of CT DEP have commented that the 100 foot spacing between parallel submerged lines would probably accommodate a lobster fisherman who may want to set gear between the parallel lines. Also, the submerged lines will be set parallel to the prevailing current; the same direction a lobsterman would set his gear.

MITIGATION FOR ADVERSE IMPACTS

There are a few short term environmental impacts which can not be mitigated. For example, any temporary and localized impact to the benthic habitat during installation of the helix mooring systems is unavoidable. It is likely that the aquaculture gear will mitigate displacement of benthic species due to the addition of benthic structures and by increasing forage. Also, the cultured oysters will provide a source of seed to enhance natural beds.

Any perceived impact to recreational fishing can be mitigated by the fact that aquaculture gear acts to aggregate fish populations, and fishing opportunities may actually increase in the area.

Appendix B

Latitude/longitude coordinates for proposed aquaculture sites.

Gear corners: coordinates of waypoints that define the area in which aquaculture gear will be deployed.

Buffer corners: The coordinates of waypoints that define the boundary of the buffer zone to be placed around each aquaculture gear field.

Milford

Gear Corners

	Latitude	Longitude
Year One	41° 10.567	73° 04.931
	41° 10.450	73° 04.583
	41° 10.391	73° 04.689
	41° 10.520	73° 05.000
Year Two	41° 10.567	73° 04.931
	41° 10.450	73° 04.583
	41° 10.347	73° 04.742
	41° 10.445	73° 05.000
	41° 10.520	73° 05.000
Year Three	41° 10.567	73° 04.931
	41° 10.450	73° 04.583
	41° 10.204	73° 04.923
	41° 10.279	73° 05.279
	41° 10.442	73° 05.146
	41° 10.397	73° 05.000
	41° 10.520	73° 05.000

Buffer Corners

	Latitude	Longitude
Year One	41° 10.589	73° 04.941
	41° 10.450	73° 04.579
	41° 10.369	73° 04.683
	41° 10.519	73° 05.034
Year Two	41° 10.589	73° 04.941
	41° 10.450	73° 04.579
	41° 10.321	73° 04.744
	41° 10.432	73° 05.034
	41° 10.519	73° 05.034

Year Three	41° 10.589	73° 04.941
	41° 10.450	73° 04.579
	41° 10.180	73° 04.923
	41° 10.266	73° 05.318
	41° 10.462	73° 05.159
	41° 10.432	73° 05.034
	41° 10.519	73° 05.034

Westport
Gear Corners

	Latitude	Longitude
Year One	41° 05.526	73° 18.039
	41° 05.281	73° 18.039
	41° 05.258	73° 18.162
	41° 05.500	73° 18.162
Year Two	41° 05.526	73° 18.039
	41° 05.281	73° 18.039
	41° 05.461	73° 18.325
	41° 05.221	73° 18.325
Year Three	41° 05.526	73° 18.039
	41° 05.281	73° 18.039
	41° 05.398	73° 18.617
	41° 05.159	73° 18.617

Buffer Zone Corners

	Latitude	Longitude
Year One	41° 05.544	73° 18.013
	41° 05.269	73° 18.013
	41° 05.227	73° 18.179
	41° 05.508	73° 18.179
Year Two	41° 05.544	73° 18.013
	41° 05.269	73° 18.013
	41° 05.473	73° 18.343
	41° 05.187	73° 18.343
Year Three	41° 05.544	73° 18.013
	41° 05.269	73° 18.013
	41° 05.411	73° 18.640
	41° 05.117	73° 18.640

Appendix C
Benthos Data

The following information was take from: US Geological Survey Open – File Report 00-304, titled: Georeferenced Seafloor Mapping and Bottom Photography in Long Island Sound Chapter 10: A benthic Community Geographical Information System (GIS) For Long Island Sound. By Roman N. Zajac, Ralph S. Lewis, Lawrence J. Poppe, David C. Twichell, Joseph Vozarik, Mary L. DiGiacomo-Cohen, and Matt Robinson.

From Benthos GIS Layer

Species	MILFORD Mean Abundance	WESTPORT Mean Abundance
Pectinaria gouldii	0.876	40.9
Nephtys incisa	5.4	2.5
Mediomastus ambiseta	1.4	4
Polydora websteri	0.046	1.93
Aricidea jeffersyii	0	1.25
Prionospio heterobranchia	0.015	0.562
Paraonis fulgens	0.38	0
Asabellides oculata	0.092	0.25
Clymenella zonalis	0.32	0.875
Spiophanes bombyx	0	0
Cirratulus grandis	0.015	0.25
Cirratulus cirratus	0.015	0
Lepidontus squamotus	0	0
Steblospio benedicti	0.03	3.37
Owenia fusiformis	0	0.312
Nephtys picta	0	0.25
Capitella capitata	0	0
Ampharete arctica	0	0
Prionospio tenuis	0	0
Ampelisca abdita	0.69	0.75
Unciola irrorata	0.323	0.937
Leptocheirus pinquis	0	0
Ampelisca vadorum	0.015	0
Prothaustorius wigleyi	0	0
Ancanthohaustorius millsi	0	0
Aeginina longicornis	0	0
Corophium acheruscum	0	17.4
Mulinia lateralis	11.9	15.87
Nucula annulata	9.6	15.25
Pitar morrhuana	3.1	4.875
Telline agilis	0.38	6.375
Yoldia lamatula	0.8	0.625
Pandora gouldina	0.076	0.625

Ensis directus	1.03	0
Mytilus edulis	0.138	0

Community composition was determined by first reviewing data at all 413 of their sampling stations and selecting the 35 most commonly found species for further detailed analysis. These analyses consisted of a multivariate clustering analysis of the 413 stations, based on a community matrix comprised of the 35 species, and some simple univariate statistics using the stations comprising each cluster. In the benthic community data layer, the associated data table depicts the cluster designation for each station the number of species at that station and of the mean abundance of each of the 35 species selected for the analysis across the stations comprising that community type.
The communities depicted in the data layer were interpreted based on the main groupings of stations (or clusters) revealed by the classification analysis. It must be stressed that the results depict general assemblage types that can occur at various locations with then LIS. The data used for the analyses were collected only at one time for each station. Therefore, they represent a "snapshot" of the ecological communities that are present in the Sound, and are best interpreted as representing the general spectrum of community types that occur in different areas of the Sound.

From Species Richness GIS Layer

	Milford Location	Westport Location
Individuals	28	362
Richsed	129	61
Richsed-id	129	61
Range	6-10	11-15
spec	7	14

Appendix D

June 26, 2003 correspondence to CT DEP

The following pages are the correspondence to CT DEP dated June 26, 2003. The correspondence was a response to a request for further information from the Office of Long Island Sound Programs (OLISP).

Mariculture Unlimited, LLC
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Home of the Bluff Point Oyster™

June 26, 2003

Peter B. Francis
c/o Kristen Bellantuono
DEP-OLISP
79 Elm St.
Hartford CT 06106-5127

Dear Mr. Francis:

This letter is a response to your request for further information or materials in regards to our proposed suspended shellfish growing system (US ACOE file #200202751, DEP file #FCC-02-036-KB).

I have attached to this letter the list of requested information you sent to us dated April 17, 2003. I have made every attempt to address each item on the list. Also, I will refer to the number of each request in this letter in order to simplify the structure.

It should also be noted that in your request there are several items which will require an ocean engineering study to completely address these questions. Cori Rose of US ACOE suggested I wait until all issues and questions are evident before we hire an engineering firm to conduct the studies. This costly engineering study is being planned and will be conducted once all facets of the study have been determined.

1. Attached is revised figure 1 to show boundaries of shellfish leases 612 and 602 and the boundaries of the Westport gear field.

2. As mentioned in our amendment to our application, any gear placed inside the designated Shellfish Containment Area (SCA) will be set back from the boundary by 100 ft.

3. The number of buoys marking the location of each long-line is proposed to be two, one at each end. However, we can reduce that number to one if the number of marker buoys becomes an issue. The number of "marker buoys" needed in the current proposal (2/long-line) will be 338 in Westport and 112 in Milford. See attached figure for orientation of long-lines in leases 602 and 612.

4. The "marker buoys" will be the typical foam lobster style buoy 14 inches long and 6 inches in diameter.

   The buoy planned to suspend the long-line is larger in size. The specified buoy is cylindrical in shape and is 2 feet tall and 2 feet in diameter. This buoy will be submerged at the depth of the long-line (10 ft in Westport and 8 ft in Milford).

5. Attached is revised figure 6 to show boundaries of shellfish lease #390 and proposed gear field.

6. See attached figure for orientation of long-lines in lease 390.

7. It is Mariculture Unlimited's position that the gear specified in our proposal will have little impact on the CPYC's ablility to hold races in the area. Besides the marker buoys and the associated buoy lines, the long-line gear is to be at least 10 feet below the surface when at rest. When a vessel is working a long-line, the line will be at the surface. It is our intention to not work with this gear on busy recreational boating days (i.e.: weekends and holidays).

   The only potential conflict with the proposed gear is with anchors. And even this conflict will be minimal. If parallel long-lines are spaced 100 ft apart, a vessel should have no problem retrieving an anchor by powering forward, directly over the anchor before lifting it off the bottom. We feel it will be a rare occasion that a vessel catch an anchor on one of the long-lines and is not able to free it.

8. The two shellfish containment areas are **not** proposed to be restricted boating areas. In fact we decided to propose the submerged long-line system because it allows for boat traffic to navigate through the area.

9. As mentioned above, engineering analysis is still to be conducted. Our submitted plans are based on a long-line system designed by certified ocean engineers. An engineering study will be conducted to apply site specific conditions (of Milford and Westport) to the proposed long-line system.

10. Again, wave analysis and wave impact studies will be included in the engineering study.

11. At this time no agreement has been reached between Mariculture Unlimited and lobster fishermen in the Westport area.

Please note that in the figures 1b and 6b, fewer long-lines were placed in the diagrams than were originally proposed. In Westport, 169 long-lines were originally proposed but only 94 were able to fit in the specified area at the specified compass orientation. The Milford area has the same situation, 56 long-lines were initially requested for this area however, only 51 long-lines will fit into the allotted space.

The difference in the number of long-lines requested and the number on the diagram is due to the unusable triangular areas that occur when orientating long-lines in the same compass direction. The original number of long-lines requested will have to be scaled down in order to comply with the specified spacing and compass orientation.

Should you have any questions regarding my responses to your questions, please contact me for further information. Thank you.

Sincerely,

Joe Conti
Operations Manager
Mariculture Unlimited

(203) 767-5563 or (203) 336-6567.

Appendix E

OCC memo on water clearance over submerged line

The follow memo was written by OCC staff. Mariculture Unlimited asked OCC staff to describe the clearance over the submerged line in a storm event that would produce the computer modeled wave heights of 9 feet.

Azure Dee Emerle
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http://www.ocean-coastal.com

Ocean and Coastal Consultants, Inc.

Memo

To: Joe Conti, Operations Manager

Repr: Mariculture Unlimited, LLC

CC: John Garfalo

Date: December 11, 2003

Re: USACOE Application #200202751

The water depths at mean low water (MLW) are approximately 24 to 32 feet at the Westport site and 15 to 22 feet at the Milford site. The longlines are proposed to be installed at a minimum depth of 10 feet below MLW. During these low water conditions, the 20-year storm significant wave heights will be 8.17 feet and 3.71 feet for Westport and Milford, respectively. Simplified wave theory estimates that the wave height will be equally distributed above and below the still water level (SWL). However, a more accurate ratio of crest elevation above SWL can be determined using Figure 7-69 from the US Army Corps of Engineers *Shore Protection Manual* (1984). Approximately 63% of the wave height will be above the SWL at the Westport site and 59% of the wave height will be above the SWL at the Milford site. If the 20-year return period design storm conditions should occur at MLW, the clearance from the water surface in the trough of the wave to the longline system will be approximately 7 feet and 8.5 feet for Westport and Milford, respectively. These depths should be sufficient for the majority of recreational boaters.

It should also be noted that the 20-year return period design wave climate would be the result of an infrequent, but predictable storm event. This type of storm event is usually predicted well in advance of its arrival and it is reasonable to assume that recreational boaters will be in sheltered locations during this type of event, and not in the vicinity of the longlines.

Azure Dee Emerle

Azure Dee Emerle, Engineer