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Hard Clam Grow-out Using Fenced-In System vs. Traditional Nets

Linda Crewe

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Thomas J. Murray
Marine Business Specialist
Va. Institute of Marine Science
P. O. Box 1346
Gloucester Pt., Virginia 23062

Dear Tom,

Please consider this my Final Report of my Fisheries Resources Grant Program grant, "Hard Clam Grow-out Using Fenced-In System vs. Traditional Nets". Regretfully, I am having to end the project earlier than scheduled due to the severe weather we experienced this winter. A major wind storm during the first part of March caused the destruction of the fences beyond normal repair. In order to continue with the project, I would have to totally dismantle the fence system and completely rebuild it, which would defeat the purpose of the grant project. The purpose of the grant project was to see if there would be less maintenance involved using the fence system vs. nets on the bottom and, also whether the clams in the fence system would grow larger than the clams under the nets on the bottom because they would be less restricted by sand building up on top of them. Additionally, I was going to determine whether survivability would be more or less using the fence system. Unfortunately, I won't be able to determine a survivability comparison. I do feel that I was able to determine the results of the maintenance and growth aspects of the project, which I will address later in this report.

I began this project in the spring of 2000 by building six fence systems (see attachment 1 for drawing of system). I would have liked to have built them in April, but due to bad weather was not able to build them until the middle of May. The reason I wanted to build them earlier was because it would have given the fences time to build up sand around the edges and to settle in. This would have enabled the system to better exclude the possibility of crab predation. As it happened, cow-nose rays had already moved into the area and created large crater-like holes in the sand all over the lease. This made it difficult to install the fences on level sand, so there were gaps around the bottom edges of the fence systems. The fence system was constructed using 5/8" plastic mesh, cut into 1' strips, 1'tall x 20' long x 10' wide. 5/8" rebar was attached along the bottom edge with cable ties. PVC stakes were used at each of the four corner (inside) and they were attached to the mesh with cable ties. Then, 5/8" rebar stakes were placed approx. every 3 feet along the wall of the fence (alternating inside and outside) with cable ties for additional support. I then slit 10 ft sections of 3/4" PVC and slid that onto the top edge of the fence wall in order to form a smooth edge to attach the lid to with cable ties. The first lid I used was the same netting material that is used to cover the traditional squares.

Since the project called for purchasing 200,000 6-8mm seed clams and nurserying them in bags until they reached plantable size, and I had purchased that amount and size seed clams in the fall of 1999, I decided to use that seed and replace it later on. During the week of June 9 - 15, 2000, I proceeded to plant the fence systems and the traditional net squares. There were 2 sizes of clam seed planted (9-14mm & 10-20mm) and I tried to divide them equally between fence systems and nets (see attachment 2 for breakdown and diagram). I ended up with 6 planted fences and 5 planted nets. After planting, since the holes the cow-nose rays had made had not quite filled in, I also decided to add oyster toads to the fences to eat any crabs that might get into the fences. I then attached the lid and began weekly maintenance of the clams under the nets. Also, I took weekly salinity and water temperature measurements (attachment 3).

The project proceded as planned for approx. 8 weeks. Then, fouling on top of the lids of the fence systems started being a problem. First, the nets stretched and started sagging. I tightened them up by pulling the net back and securing with more cable ties. That worked for a couple of weeks. The fouling got worse and basically pulled the sides of the fences down. I knew I needed to replace the lids and decided to use 1" plastic mesh for the lid instead of net, as I already knew what the net was going to do. It took several weeks to replace the lids and also repair the system. I had to re-stake the systems. While I had the lids off, I went ahead and measured the clams (attachment 2). I also checked the density of the clams in the fences and it seemed there was good survivability. During the repair process, I lost the clams in one of the fences because I couldn't get back down there the next day to put the lid back on. It was 3 more days before I could get back there due to bad weather. Meanwhile, there was a "blow-out" tide and the birds must've eaten all the clams in the fence. I couldn't find one live clam in the fence. All that was left was clam shell. The repair process was done during the middle to the end of September, 2000.

During the next quarter, I kept up maintenance of the nets and also periodically checked the fences. They appeared to be doing well until the end of January. I started noticing the lids had sagged again, pulling the sides of the fences in. Additionally, due to a lot of Northwest winds, I noticed a major build-up of sand inside the fences.
I was also getting major sand deposits on the traditional squares and was spending 2 days a week keeping them clean. I also tried to take a measurement of the growth of the clams, but only got measurements from one square as the water was too cold to get measurements from all the squares (38 degrees). The only way I could've repaired the system during this time would have been if I had gotten several good "blow-out" tides. Unfortunately the weather was extremely bad during this time period and the water temperature too cold. Finally, the first week in March, there was a bad storm that caused the side supports of the system to pull through the mesh wall, making the system beyond repair. I removed one of the lids to see what the fouling was that caused it to sag, and underneath, along the outside edges were mats of sea squirts. Also, because of the storm (mostly severe northwest winds), there was a build-up of sand inside and outside to where the east end of the systems were almost completely buried in sand. I would have liked to re-build the systems in order to be able to determine survivability, but because of the cost involved, am unable to. I was able to take final measurements (attachment 2) on March 25, 2000.

The main reason I did this project was to try and find a way of growing hard clams that would cut down on the amount of maintenance I have during winter months. My lease is in an open, volatile area of the York River. The predominate wind during that time is from the northwest and this wind shoves sand directly onto the lease. After a major wind event, I will get a build-up of sand on my nets that can be as much as 2 inches deep. It is very difficult to get this sand off and prohibits me from being able to grow large amounts of clams. During January through March, it is a full-time job for me just to keep the sand off of the nets. In some ways, there was less maintenance using the fence system as it did eliminate having to spend time getting sand off of the nets. However, having to make repairs and/or rebuild the system periodically requires time. It took approximately 3 days to repair each fence system. To rebuild would take longer as you have to totally dismantle and haul off the old sections and then assemble and rebuild the fence. Fouling was the major problem with the system. In order to keep from having to periodically repair the system, the lid would have to be removed and cleaned approximately once a month or replaced with a new lid, which would add cost. Fouling on the side walls of the system wasn't the problem. It was the fouling on the lid that caused the problems. Possibly, the fouling could be dealt with by the use of a pressure washer on site if the plastic mesh was used for the lid. Using net, it would either have to be replaced periodically with new net or removed and allowed to dry out before re-using. Drying it out would have been too difficult as the nets get so heavy and would have to be dragged ashore or loaded into a boat to take somewhere to dry out. This would have left the square vulnerable to predation (crabs or birds during a blow-out tide) while the net was drying out.

I was able to determine that there was no significant difference in growth between the fences and the traditional nets (attachment 2). I had originally thought that the clams in the fence would be able to grow larger than the ones under the nets because the nets frequently are covered in sand which I thought would slow their growth. I thought if they were able to feed at all times, they would grow faster. Apparently, they are still able to feed even if covered in a lot of sand.

I also believe that you would get similar survivability between the fence system and using the traditional net, even though I don't have the data to back that up. The fence system did exclude cow-nose rays and, with the addition of oyster toads, crabs were controlled. Also, as long as there was a lid on the structure, birds were kept out. The reason I believe this is because when I did my final growth measurement, the clams seemed to be just as dense in the area where I got my sample as they did under the traditional nets. The only places were there weren't as many clams was around the edges where the lid was covered in sea squirts.

If the fouling could be somehow controlled, I feel that this system could be worth pursuing as an alternative to growing clams under nets. The only alternative I could come up with other than dealing with the fouling would be to use different materials that could withstand a year or so of fouling without collapsing. Maybe the use of a rigid plastic manufactured specifically to construct fences of different sizes. I have an idea for this that I might pursue at a later date.

I appreciate the opportunity that was given for me to be able to test the idea, even though I couldn't see it all the way through to the end. If you or anyone else has any questions, please don't hesitate to contact me.

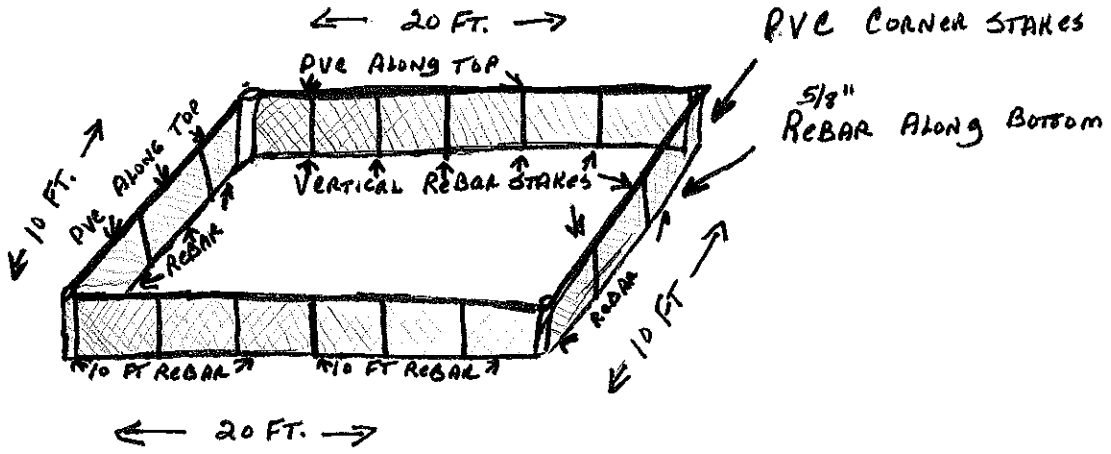
Sincerely,

Linda Crewe

Linda Crewe

Attachment 1

FENCE SYSTEM

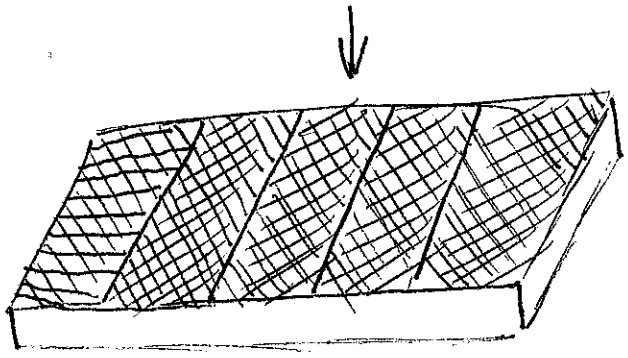


6/00

Originally used ½" x ½" net to cover fence system, attached with cable ties all the way around.

9/00

Replaced net with 1" x 1" x 4' wide plastic mesh, attached with cable ties to each other & all the way around.



Attachment 2

Diagram

Fence #3
10-20 mm
13,350
PLANTED
6/9/00

Fence #2
9-14 mm
18,720
PLANTED
6/9/00

Fence #1
9-14 mm
14,000
PLANTED
6/9/00

Fence #4
9-14 mm
13,000
PLANTED
6/9/00

Fence #5
10-20 mm
12,000
PLANTED
6/9/00

Net #3
10-20 mm
13,000
PLANTED
6/10/00

Net #2
9-14 mm
13,000
PLANTED
6/10/00

Net #1
9-14 mm
13,000
PLANTED
6/10/00

Fence #6
10-20 mm
13,000
PLANTED
6/9/00

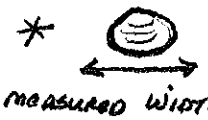
9/00
Birds got clams
Fence #6

Net #4
9-14 mm
14,000
PLANTED
6/10/00

Net #5
10-20 mm
12,880
PLANTED
6/10/00

* Measurements

	6/9/00	9/9/00	3/25/01		6/[illegible]/00	9/9/00	3/25/01
Fence # 1	9-14 mm	19-22 mm	24-32 mm	Net #1	9-14 mm	19-31 mm	26-37 mm
# 2	9-14 mm	18-25 mm	24-35 mm	Net #2	9-14 mm	20-27 mm	25-36 mm
# 4	9-14 mm	20-27 mm	25-37 mm	Net #4	9-14 mm	20-30 mm	28-32 mm
Fence # 3	10-20 mm	24-31 mm	26-36 mm	Net # 3	10-20 mm	21-28 mm	25-37 mm
# 5	10-20 mm	21-30 mm	25-37 mm	Net # 5	10-20 mm	20mm-26 mm	24-36 mm
# 6	10-20 mm	19-27 mm	Birds Got clams				



Attachment 3

Date	Water temp	Salinity
6/9	72°	22 ppm
6/17	74°	22 ppm
7/4	78°	24 ppm
7/12	82°	24 ppm
7/28	85°	20 ppm
8/15	76°	22 ppm
8/24	75°	22 ppm
9/6	70°	23 ppm
9/12	77°	20 ppm
10/1	68°	22 ppm
10/14	66°	23 ppm
10/26	62°	21 ppm
11/1	60°	22 ppm
11/15	58°	22 ppm
12/1	50°	22 ppm
12/13	46°	22 ppm
12/20	42°	22 ppm
1/15	38°	22 ppm
1/30	42°	22 ppm
2/12	44°	22 ppm
2/28	44°	20 ppm
3/8	44°	20 ppm
3/15	46°	20 ppm
3/25	47°	20 ppm