12-1-2012

Blue Crab Industry - Oyster Aquaculture Training and Transition June 2011- June 2012 Final Report

Matthew Richmond
Virginia Institute of Marine Science

Blue Crab Industry - Oyster Aquaculture Training and Transition
June 2011- June 2012
Final Report

Matthew Richmond
Project Manager
Virginia Seafood Council

Submitted to:

Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, Virginia 23062-1346

VIMS Marine Resource Report No. 2012-15

Blue Crab Industry - Oyster Aquaculture Training and Transition
June 2011- June 2012
Final Report

Matthew Richmond
Project Manager
Virginia Seafood Council

Abstract:
Due to the depletion of the blue crab population in the Chesapeake Bay, Virginia has placed several new restrictions on the harvest. These new regulations affect the livelihoods of Virginia Crabbers. In order to supplement their income to maintain their financial stability, the state proposed to support the crabbers by training them in oyster aquaculture. Funding was needed to employ one fulltime advisory service personnel to assist the crabbers in their new venture into oyster aquaculture. Two methods of oyster aquaculture were implemented, cultchless and remote setting.

The Commonwealth recently ordered the crabbing industry in Virginia to reduce harvests in attempt to rebuild the blue crab population in the Chesapeake Bay. The elevated constraints on the crab harvest have caused the industry to search for supplemental avenues in seafood production to maintain their financial stability. One proposed method of support for the crab industry was training in sustainable oyster aquaculture practices. The training consisted of technology transfer and basic training including elements of field equipment fabrication, deployment, operation and maintenance.

One of two methods proposed to involve the crab industry was the production of spat on shell oysters. The process involves hatchery produced eyed larvae which is set on shell by the industry participants. The allotments of the project allowed for setting eyed larvae on .00 bushels of shell per year for each participant. Funding allowed for 91 applicants to participate in the spat on shell production, of those, 70 were contracted during the time covered in this report. The other method proposed was to implement a program for crabbers to participate in cultchless oyster aquaculture production. Using cages to produce 'half shell' market oysters has potential for crab industry participants. VMRC has been providing equipment and training to ten watermen per year for several years prior to the initiation of this project. The current project proposed to supply equipment, 50,000 seed oysters and grow-out training to crabbers over the course of two years. The 131 contracts were all fulfilled before the start of the 2011-2012 project.

Advisory service personnel engaged in training crabbers on all facets of "contained" oyster aquaculture. Advisory personnel traveled to participating industry sites to assist in labor aspects and answer questions. The advisor was on location for preparation and inoculating setting tanks with eyed larvae, as well as assisting in maintenance, care and troubleshooting aspects of the cultchless oyster projects. During a previous years project a basic pamphlet was created by the advisor to assist in getting started with cultchless oyster aquaculture (Appendix IV).

A survey to assess the continued interest in cultchless aquaculture was taken. The crabbers that participated in the program were beginning to harvest from their aquacultured oysters during the time of the survey. The survey was conducted after they had a full year to experience the cultchless aquaculture practices.

Results:

Cultchless

A total of 131 crab license holders chosen by Virginia Marine Resources Commission, were able to participate in the cultchless aquaculture project (Appendix I). Participants from all over the Virginia portion of the Chesapeake Bay were shown how to raise 50,000 cultchless oysters in cages for the half-shell market. Most training and all equipment transfer was completed prior to the time period covered in this report. During the 2011-2012 project, these participants were surveyed to determine future interest in cultchless aquaculture. The survey found that the majority of the respondents are going to continue cultchless aquaculture and most of them will expand their practices. The survey also found that while 48% said that it was fairly easy to market their oysters, a majority of respondents also would like some sort of help marketing (such as a Seminar on marketing or a Co-Op). Full survey results can be found in Appendix III.

Remote Setting

As of June 21, 2012 the project has set 169 times since the start of the project. Over two billion larvae have been set on 52,598 bushels of shell. The average percent of larval setting success in the remote setting takes was 15.75% over all season of the project. A spreadsheet with all of the sets and a map of setting locations can be found in appendix II.

Discussion

The summer of 2009 kicked off the project with most of the first round of cultchless participants receiving their seed and cages before the winter. While only 12 sets were completed during the 2009 season, the 2010 season had 82 sets. The 2011 season saw difficulty with larval rearing in the hatcheries causing fewer sets. So far, the 2012 season is off to a good start with 36 sets as of June 21st.

The survey (appendix III) shows that, of the participants that responded, most will continue cultchless oyster aquaculture and may even expand to more than 50,000 seed oysters in the future. Over 90% of the respondents said that the cultchless program for crabbers was helpful.

Appendix 1

2009 Cultchless Oyster Aquaculture Training Project Participants					
	Participant	Location	Geographic area	Cage Delivery	Seed Delivery
1	Crockett, Mark	Tangier, VA	Eastern Shore	15-Sep-09	15-Sep-09
2	Shores, Rudy	Tangier, VA	Eastern Shore	15-Sep-09	15-Sep-09
3	Clair, Nancy	Saxis, VA	Eastern Shore	2-Oct-09	24-Nov-09
4	Heady, Barbara	Bloxom, VA	Eastern Shore	2-Oct-09	24-Nov-09
5	Porter, Phyllis	Hallwood, VA	Eastern Shore	2-Oct-09	24-Nov-09
6	Annis, Susan	Greenbush	Eastern Shore	24-Nov-09	2010
7	Berry, John	Atlantic, VA	Eastern Shore	2-Oct-09	2010
8	Bowden, George	Chincoteague	Eastern Shore	2-Oct-09	2010
9	Justis, Wayne	Parksley, VA	Eastern Shore	2-Oct-09	2010
10	Reynolds, Louis	Atlantic, VA	Eastern Shore	2-Oct-09	2010
11	Pruitt, Anthony	Onancock, VA	Eastern Shore	10-Oct-09	2010
12	Savage, Larry	Chincoteague	Eastern Shore	2-Oct-09	2010
13	Arnold, Herbert	Franktown, VA	Eastern Shore	2-Oct-09	5-Oct-09
14	Bunce, Stephen	Franktown, VA	Eastern Shore	2-Oct-09	5-Oct-09
15	Pruitt, M. Jason	Cape Charles	Eastern Shore	2-Oct-09	6-Oct-09
16	Pruitt, William	Cape Charles	Eastern Shore	2-Oct-09	6-Oct-09
17	Wivell, Tim	Cape Charles	Eastern Shore	2-Oct-09	7-Oct-09
18	Bunce, Andrew	Franktown, VA	Eastern Shore	2-Oct-09	13-Oct-09
19	Bender, Ann	Franktown, VA	Eastern Shore	2-Oct-09	13-Oct-09
20	Reynolds, Stetson	Cape Charles	Eastern Shore	2-Oct-09	15-Oct-09
21	Starke, Donald I.	Machipongo	Eastern Shore	2-Oct-09	15-Oct-09
22	Cappel, Richard	Davis Wharf	Eastern Shore	2-Oct-09	24-Nov-09
23	Williams, (Chip)	Reedville, VA	Northern Neck	29-Sep-09	12-Oct-09
24	Crabbe, Danny	Heathsville	Northern Neck	29-Sep-09	30-Sep-09
25	Jewell, Bryn	Callao, VA	Northern Neck	29-Sep-09	30-Sep-09
26	Wood, Bruce	Montross, VA	Northern Neck	29-Sep-09	30-Sep-09
27	Carter, Bruce	Lottsburg, VA	Northern Neck	29-Sep-09	1-Oct-09
28	Daiger, Allen	Montross, VA	Northern Neck	29-Sep-09	2-Oct-09
29	Harding, Randy	Lottsburg, VA	Northern Neck	29-Sep-09	2-Oct-09
30	Harding, Ethan	Lottsburg, VA	Northern Neck	29-Sep-09	2-Oct-09

31	Hall, Wade	Heathsville,VA	Northern Neck	29-Aug-09	29-Aug-09
32	Rew, George	Heathsville	Northern Neck	29-Aug-09	29-Aug-09
33	Stevens, Howard	Heathsville	Northern Neck	29-Aug-09	29-Aug-09
34	Davis, (A.D.)	Sharps, VA	Northern Neck	29-Sep-09	30-Sep-09
35	Hall, Ida	Kilmarnock	Northern Neck	29-Sep-09	12-Oct-09
36	Haydon, Clyde	Lancaster, VA	Northern Neck	29-Sep-09	14-Oct-09
37	Eudailey, (Glenn)	Lancaster, VA	Northern Neck	29-Sep-09	22-Oct-09
38	Haydon, (Charlie)	Weems, VA	Northern Neck	29-Sep-09	23-Oct-09
39	Minor, Robert	Cobbs Creek	Middle Penn	22-Sep-09	22-Sep-09
40	Burton, (J.C.)	Mathews, VA	Middle Penn	14-Oct-09	19-Oct-09
41	Moughon, Richard	Mathews, VA	Middle Penn	16-Oct-09	23-Oct-09
42	Carney, (Bill)	Gwynn, VA	Middle Penn	16-Oct-09	30-Oct-09
43	Powell, Charles	Susan, VA	Middle Penn	22-Oct-09	2-Nov-09
44	Watson, Ray	Urbanna, VA	Middle Penn	22-Sep-09	22-Sep-09
45	Meekings, (Vera)	Virginia Beach	Southside	16-Oct-09	13-Oct-09
46	McPherson, (Chip)	Rescue, VA	Southside	14-Oct-09	15-Oct-09
47	Dewitt, Kathy	Suffolk, VA	Southside	19-Oct-09	21-Oct-09
48	McCready, Jimmy	Suffolk, VA	Southside	19-Oct-09	21-Oct-09
49	Keeling, James	Suffolk, VA	Southside	22-Oct-09	28-Oct-09
50	Owens, Desmond	Glocuester	Middle Penn	9/22/09	12-Oct-09
51	West, (Donald)	Hayes, VA	Middle Penn	16-Oct-09	22-Oct-09
52	West, James	Hayes, VA	Middle Penn	16-Oct-09	22-Oct-09
53	Dame, Kevin	Glocuester	Middle Penn	16-Oct-09	31-Oct-09
54	West, Ernest Sr.	Hayes, VA	Middle Penn	19-Oct-09	31-Oct-09
55	West, Ronald	Hayes, VA	Middle Penn	19-Oct-09	31-Oct-09
56	West, Viola	Hayes, VA	Middle Penn	19-Oct-09	31-Oct-09
57	Masters, Nicholas	Hayes, VA	Middle Penn	19-Oct-09	5-Nov-09
58	Dunn, Peggy	Norfolk, VA	Southside	2-Oct-09	13-Oct-09
59	Dunn, Jamie	Norfolk, VA	Southside	2-Oct-09	13-Oct-09
60	Brown, Harvey	Poquoson, VA	Southside	19-Oct-09	10-Nov-09

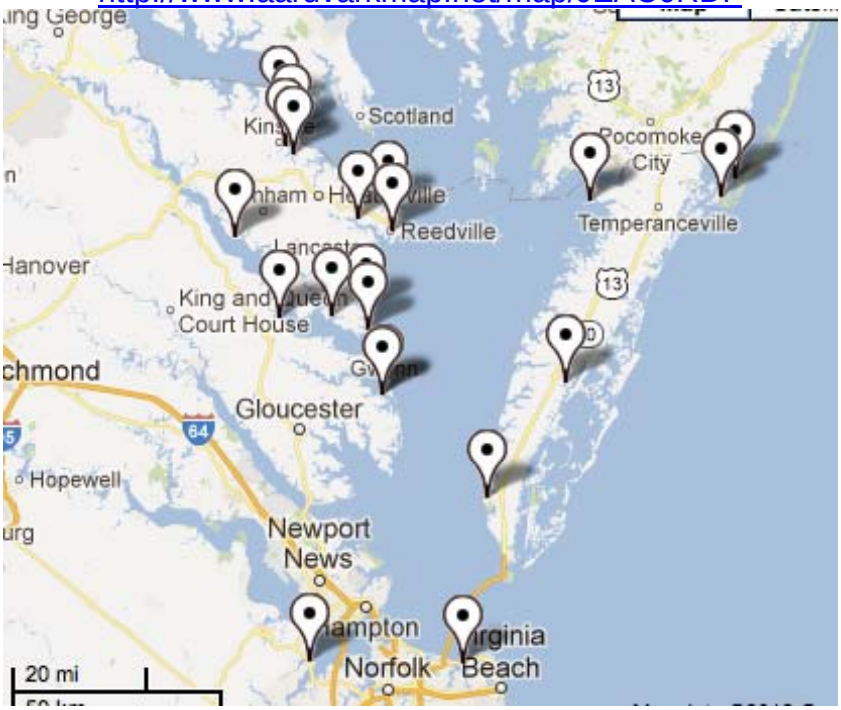
2010 Cultchless Oyster Aquaculture Training Project Participants					
	Participant	VA Location	Geographic area	Cage Delivery	Seed Delivery
1	Birch, Arthur	Chincoteague	Eastern Shore	21-May	8-Jun
2	Golini, Lawrence	Assawoman	Eastern Shore		12-Jul
3	Blake, Frank	Pungoteague	Eastern Shore	21-May	10-Jun
4	Stalgaities, Joe	Bloxom	Eastern Shore		30-Jun
5	Gillett, Joe	Wallops Island	Eastern Shore	21-May	8-Jun
6	Reynolds, Barbara	Atlantic	Eastern Shore		8-Jun
7	Parks, Richard	Parksley	Eastern Shore	21-May	10-Jun
8	Hurley, Darryl	Parksley	Eastern Shore		12-Jul
9	Evans, Ronald	Greenbackville	Eastern Shore		12-Jul
10	Brittingham, Ron	New Church	Eastern Shore		12-Jul
11	Kamm, Leonard	Bloxom	Eastern Shore		12-Jul
12	Gibson, Michael	Chincoteague	Eastern Shore	21-May	8-Jun
13	Edwards, Anthony	Onley	Eastern Shore		30-Jun
14	Terry, Kenneth	Willis Wharf	Eastern Shore		12-Jul
15	Taylor, Robert	Onancock	Eastern Shore	june	12-Jul
16	Savage, Cory	Exmore	Eastern Shore	21-May	10-Jun
17	Turner, Jonathan	Exmore	Eastern Shore	21-May	10-Jun
18	Forrest, Charles	Cheriton	Eastern Shore	21-May	10-Jun
19	Wivell, Jeanine	Cape Charles	Eastern Shore	21-May	10-Jun
20	Parker, Alvin	Cape Charles	Eastern Shore	21-May	12-Jul
21	Reynolds, William	Cape Charles	Eastern Shore	21-May	12-Jul
22	Griffith, David	Cape Charles	Eastern Shore	21-May	12-Jul
23	Heath, Curtis	Townsend	Eastern Shore	21-May	12-Jul
24	Reid, Jeff	Franktown	Eastern Shore	21-May	10-Jun
25	Williams, Carlton (Ray)	Cape Charles	Eastern Shore	21-May	12-Jul
26	Cox, Rexwood	Cape Charles	Eastern Shore	21-May	12-Jul
27	Reade, Willard Nicholas	Craddockville	Eastern Shore		30-Jun
28	Saunders, Bryan	Hague	Northern Neck	july	13-Aug
29	Newsome, James	Hague	Northern Neck	july	13-Aug
30	Jett, Joseph	Lottsburg	Northern Neck	13-Jul	13-Aug
31	Townsend, George	Montross	Northern Neck	14-Jul	2-Sep

32	Dent, Kenneth	Montross	Northern Neck	16-Jul	2-Sep
33	Rogers, Walter	Reedville	Northern Neck	13-Jul	31-Aug
34	Hundley, Gene	Hague	Northern Neck	july	13-Aug
35	Hudson, Thomas	Warsaw	Northern Neck	14-Jul	
36	Ficklin, James	Montross	Northern Neck	16-Jul	12-Aug
37	Frazier, Jack	Ophelia	Northern Neck	22-Jul	27-Aug
38	Allen, John	Hague	Northern Neck	july	13-Aug
39	Allen, William	Hague	Northern Neck	july	13-Aug
40	Masiak, Jose	Saluda	Northern Neck	29-Jun	31-Aug
41	Masiak, Jennifer	Saluda	Northern Neck	29-Jun	31-Aug
42	Hinson, Martin	Farnham	Northern Neck	12-Jul	28-Jul
43	Hardins, Emerson	Lancaster	Northern Neck	july	13-Sep
44	Watson, Rachel	Urbanna	Northern Neck	May	9-Jul
45	Mason, Alvin	Topping	Northern Neck	29-Jun	13-Sep
46	Watson, Laura	Urbanna	Northern Neck	May	9-Jul
47	Llewellyn, Doris	Topping	Northern Neck	29-Jun	13-Jul
48	Augustine, John	Topping	Northern Neck	29-Jun	13-Jul
49	Johnson, Walter	Farnham	Northern Neck	12-Jul	28-Jul
50	McCormick, Charles	White Stone	Northern Neck	july	12-Aug
51	Meekins, John	Virginia Beach	South Side	july	12-Aug
52	Hoback, William	Poquoson	South Side	july	19-Aug
53	Johnson, Mark	Battery Park	South Side	july	24-Aug
54	Johnson, Karen	Battery Park	South Side	july	24-Aug
55	Johnson, John M.	Battery Park	South Side	july	24-Aug
56	Ludford, Beverly	Virginia Beach	South Side	july	18-Aug
57	Nicosia, Joseph	Poquoson	South Side	july	12-Aug
58	King, Bonnie	Poquoson	South Side	july	12-Aug
59	Severin, John	Virginia Beach	South Side	july	12-Aug
60	Bonniville, Jerome	Gloucester	Mid-Penninsula	1-Jul	24-Sep
61	Brown, Gerald	Hayes	Mid-Penninsula	july	16-Sep
62	Green, John	Hayes	Mid-Penninsula	16-Jul	1-Oct
63	Green, Shelby	Hayes	Mid-Penninsula	16-Jul	1-Oct
64	Freudenburg, Robert	Gloucester	Mid-Penninsula	july	13-Aug
65	Setterholm, Carl	Hayes	Mid-Penninsula	july	16-Aug
66	West, James	Gloucester	Mid-Penninsula	1-Jul	14-Jul

67	West, Keith	Hayes	Mid-Penninsula	july	15-Sep
68	Owens, Violet	Port Haywood	Mid-Penninsula	12-Jul	29-Jul
69	Rilee, Gary	Susan	Mid-Penninsula	14-Jul	8-Sep
70	Reed, Michael	Port Haywood	Mid-Penninsula	12-Jul	8-Sep
71	Turner, Beauregard	Moon	Mid-Penninsula	14-Jul	8-Sep

Appendix 2

http://www.aardvarkmap.net/map/JEAC0RDF



Total # of Sets	169
Total # of Larvae	2,293,300,000
Total # of Bushels	52,598
Average Set/Shell	10.46
Average % Set	15.75

S.O.S. Data Sheet 2011

	Participant	Hatchery	# Bushels	# Larvae (M)	Set Date	Average Spat/Shell	# Spat Set	% set
1	Tim Rapie	Cherry	200	7	8-May	9	1260000	18
2	Tim Rapie	Cherry	350	14	8-May	11	2695000	19.25
3	Bengi Calis	Cherry	675	42	10-May	9.25	4370625	10.4063
4	Terry Wade	OSH	300	14	11-May	10.1	2121000	15.15
5	Jess Haynie	OSH	400	14	11-May	2.425	679000	4.85
6	Dewitt	OSH	225	14	17-May	6	945000	6.75
7	Richard	OSH	400	14	18-May	2.6	728000	5.2
8	Cliffton Bowles	OSH	200	14	18-May	8.2	1148000	8.2
9	Patricial Harding	OSH	400	14	18-May	3.4	952000	6.8
10	herbert Clark	OSH	675	27.5	20-May	10.5	4961250	18.0409
11	Terry Wade	OSH	300	14	24-May	19	3990000	28.5
12	Billy Haynie	OSH	400	14	25-May	20.1	5628000	40.2
13	Scotty George	OSH	200	14	26-May	0.25	35000	0.25
14	Tim Rapine	Cherry	200	7	26-May	6	840000	12
15	James Messick	OSH	200	14	27-May	1.5	210000	1.5
16	Tim Rapine	Cherry	350	14	28-May	12	2940000	21
17	Larry Shores	OSH	345	14	30-May	9.2	2221800	15.87
18	Don Porter	Cherry	400	14	31-May	9.8	2744000	19.6
19	Mark Sanford	Cherry	200	14	31-May	23.3	3262000	23.3
20	Larry Shore (1M),	Cherry	225	9.5	2-Jun	15.4	2425500	25.5316
21	Lance Scott	OSH	450	14	3-Jun	15.4	4851000	34.65
22	Nelson McGee	Cherry	200	7	16-Jun	7	980000	14
23	Dewitt	Cherry	125	7	20-Jun	7.4	647500	9.25
24	Curtis Forrest	Cherry	400	14	20-Jun	0.8	224000	1.6
25	Lance Scott	OSH	675	21	21-Jun	14.5	6851250	32.625
26	Mark Sanford	Cherry	200	14	20-Jun	13.1	1834000	13.1
27	Nelson McGee	Cherry	200	7	21-Jun	7	980000	14
28	Nelson McGee	Cherry	350	16	21-Jun	12	2940000	18.375
29	Ray Davenport	Cherry	200	14	22-Jun	3	420000	3
30	Don Porter	Cherry	400	28	22-Jun	2.95	826000	2.95
31	Lynn Haynie	Cherry/OS	400	14	24-Jun	15.175	4249000	30.35
32	Cliffton Bowles	OSH	200	14	28-Jun	19.6	2744000	19.6
33	Malcom Luebkert	OSH	200	14	28-Jun	14.3	2002000	14.3
34	Patricia Harding	OSH	400	14	12-Jul	8.5	2380000	17
35	Nathan Garnett	OSH	345	14	12-Jul	13.1	3163650	22.5975
36	Nathan Garnett	OSH	675	21	14-Jul	8.9	4205250	20.025
37	Lynn Haynie	OSH	400	14	22-Jul	8.7	2436000	17.4
38	Lynn	OSH	400	14	29-Aug	11.3	3164000	22.6
39	Carl owens	OSH	115	3	27-Sep	4.5	362250	12.075

S.O.S. Data Sheet 2012

	Participant	*Hatchery*	*# Bushels*	*# Larvae (M)*	*Set Date*	*Average Spat/Shell*	*# Spat Set*	*% set*
1	James Headley	OSH	200	7	4/17	18	2520000	36
2	Michael Clair	Cherry	400	28	4/19	5.2	1456000	5.2
3	Mark Sanford	Cherry	200	14	4/19	4.8	672000	4.8
4	Joseph Kellum	OSH	200	7	4/20	7.83	3699675	17.6175
5	Nathan Garnet	OSH	675	21	4/20	3.2	896000	6.4
6	Patricia Harding	OSH	400	14	4/25	4.2	1176000	8.4
7	Terry Wade	OSH	400	14	4/26	11.4	3192000	22.8
8	James Headley	OSH?	200	7	5/2	16	2240000	32
9	Michael Clair	Cherry	200	14	5/4	4.9	686000	4.9
10	Carl Owens	OSH	675	21	5/5	5.73	2707425	12.8925
11	Joseph Kellum	OSH	400	14	5/12	14.63	4096400	29.26
12	Island Seafood	OSH	400	14	5/14	5.8	1624000	11.6
13	Francis Gaskins	OSH	400	14	5/14	11.4	3192000	22.8
14	James Headley	OSH	200	7	5/16	16	2240000	32
15	Wivell	Cherry	200	7	5/17		0	0
16	Carl Owens	OSH	675	21	5/19	7.5	3543750	16.875
17	Scotty George	OSH	220	14	5/25	5.5	847000	6.05
18	Curtis Forrest	OSH	400	14	5/25	4.6	1288000	9.2
19	A.D Davis	OSH	200	14	5/24	16.8	2352000	16.8
20	Ray Davenport	OSH	300	14	5/29		0	0
21	Cliffton Bowles	OSH	200	14	5/30		0	0
22	Island Seafood	Cherry	400	16	6/1		0	0
23	Joseph Kellum	OSH	400	14	6/5	10	2800000	20
24	Diane Ruark	OSH	675	21	6/5		0	0
25	Wivell	OSH	200	7	6/5		0	0
26	James Headley	OSH	200	7	6/5		0	0
27	Francis Gaskins	OSH	400	14	6/5		0	0
28	Malcom Luebkert	OSH	200	14	6/5		0	0
29	A.D Davis	OSH/Cherr	200	14	6/8	11	1540000	11
30	William Wilson	Cherry	300	21	6/8	22.3	4683000	22.3
31	William Wilson	OSH	300	21	6/8	8.4	1764000	8.4
32	Diane	OSH	330	10	6/9		0	0
33	Curtis Forrest	OSH	400	14	6/18		0	0
34		OSH	200	14	6/18		0	0
35	A.D Davis	OSH	200	14	6/19		0	0
36	W.E. Kellum	OSH	400	14	6/21		0	0

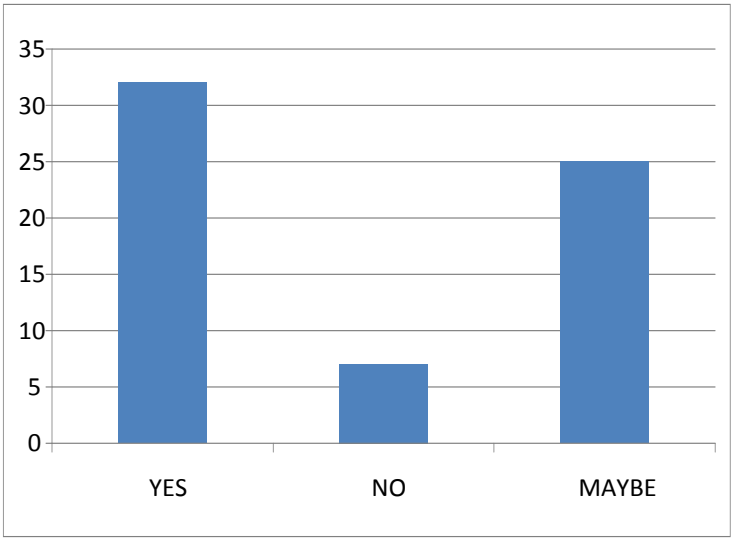
Appendix III

Results From the Cultchless Aquaculture Participant Survey:

(n=64)

1. Average Age: 54
   Age Range: 34-76
2. What % of income is from Crabbing/Fishing?
   Average: 62.6 %
   Median: 80 %
   Mode: 100 %
   a.) What % of income is from Aquaculture?
   Average: 12.5 %
   Median: 5%
   Mode: 0%

Will Aquaculture be a higher % in the future?



Yes= 32

No= 7

Maybe= 25

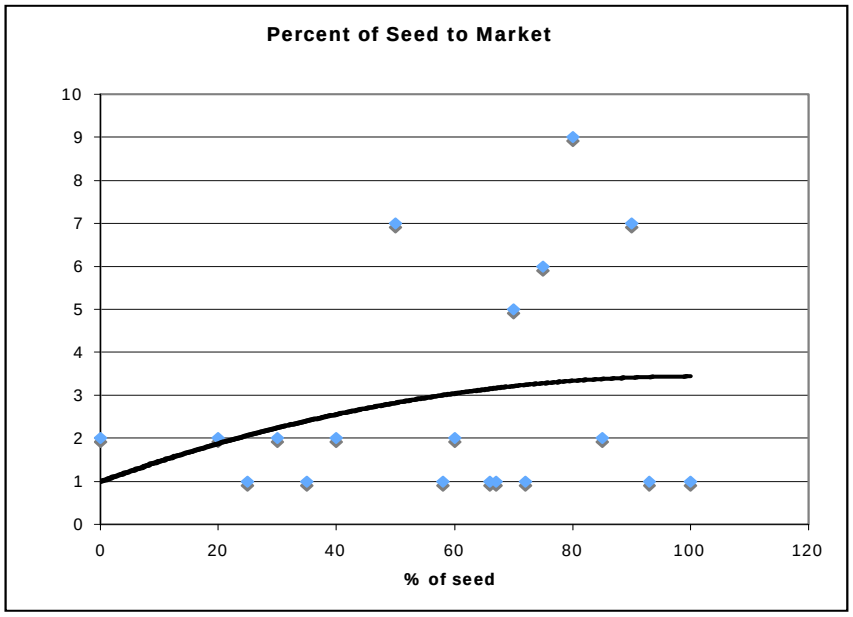
3. How would you rate the program to introduce crab fishermen to growing oysters by cage culture on the following scale?

	Answers	% of Answers
1. Not Helpful	4	6.3%
2. Barely Helpful	2	3.1%
3. Somewhat Helpful	22	34.4%
4. Helpful	23	35.9%
5. Very Helpful	14	21.9%

4. Did you receive additional training/help from outside the program?
   Yes 29
   No 33
5. Did you have previous experience growing oysters in cages?
   Yes 45
   No 20
6. How many people were required to grow your oysters?
   Average # of people: 1.778

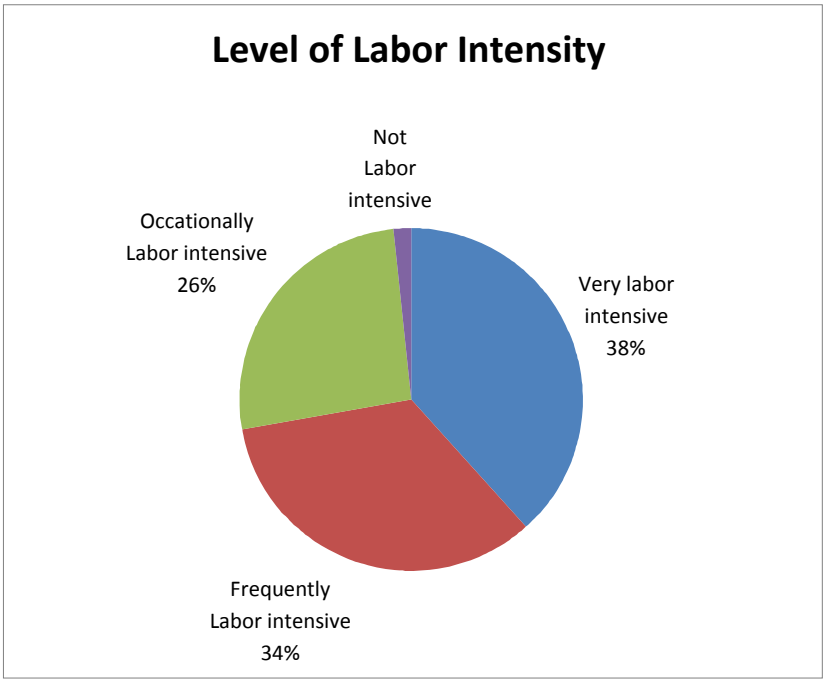
7. What % of your seed will make it to market?

Average:	64.6 %
Median:	70 %
Mode:	80 %



Rate the level of single seed aquaculture:

		Answers	% of Answers
A.	Very Labor intensive	25	39.1%
B.	Frequently Labor intensive	22	34.4%
C.	Occasionally Labor intensive	17	26.6%
D.	Not Labor intensive	1	1.6%



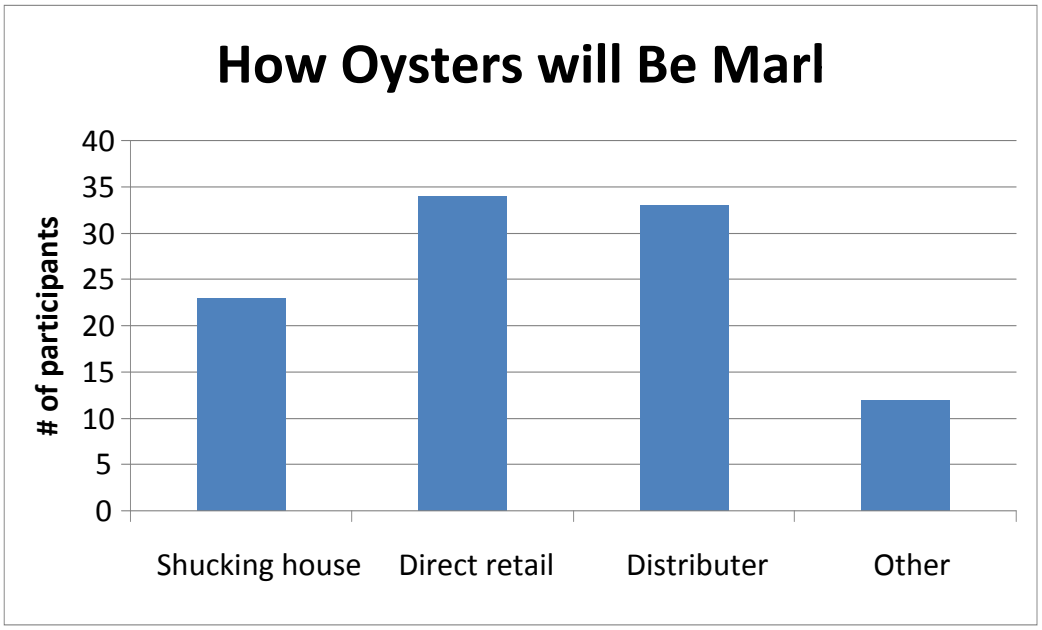
8. Do you plan to continue growing seed oysters in bag cages?

Yes	55
No	6
Not sure	3

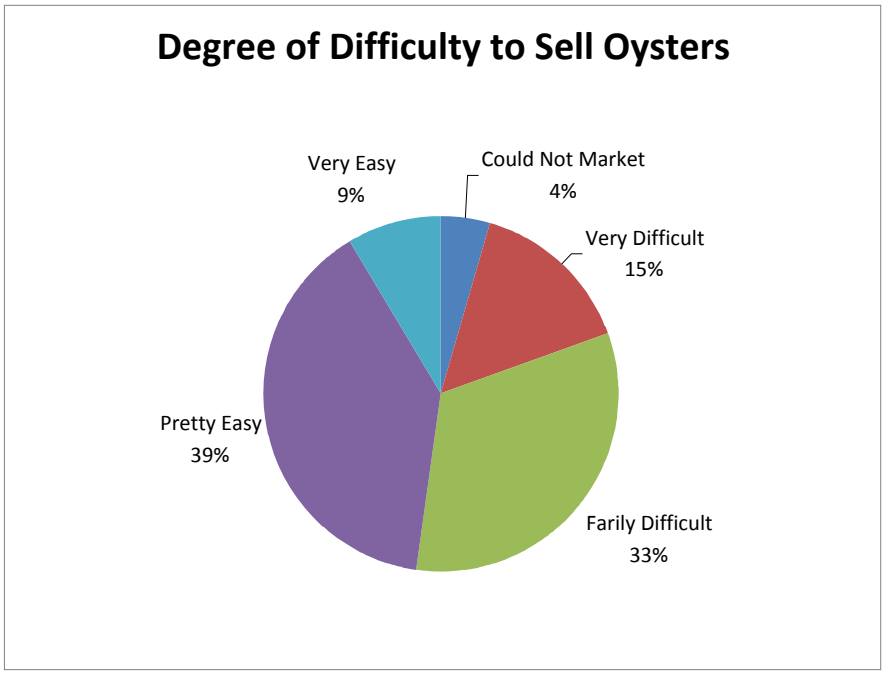
If Yes, do you plan to continue or also invest more into aquaculture (time, more seed, cages, etc.)

	Answers	%of survey responce
(a1) Yes, I will continue growing about 50,000 seed oysters	17	26.7%
(a2) Yes, I will probably expand to more than 50,000 seed oysters	34	53.1%

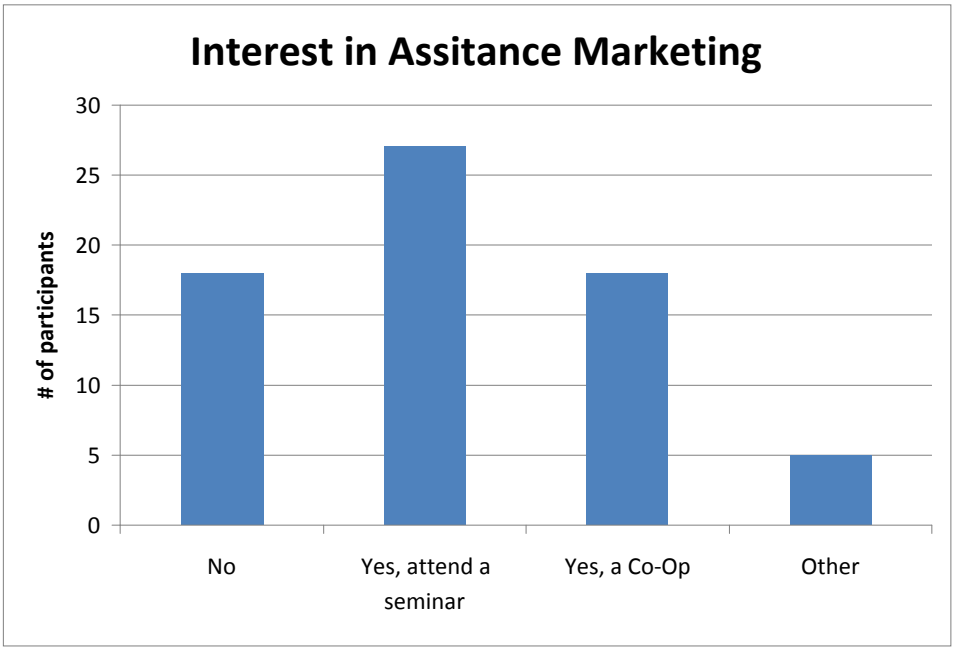
9. How will you market your oysters? (Circle each one that applies if you market in different ways.)
   a. I will sell them to a shucking house.
   b. I will sell them to restaurants or other retailers.
   c. I will sell them to a distributor for the half-shell market.
   d. Other

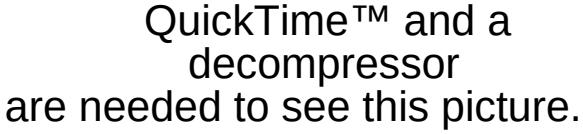


10. Rate the degree of difficulty you had marketing your oysters on this scale.



11. Would you be interested in a program to assist you in marketing of the oysters?
    a. No
    b. Yes, I would attend something like a one-day seminar on marketing my oysters.
    c. Yes, I would participate in a Co-Op type of organization.
    d. Other




QuickTime™ and a
decompressor
are needed to see this picture.

Cultchless Oyster Aquaculture Pamphlet

VSC

Virginia Sea Grant

2010

Cultchless Oyster Aquaculture Grow-out Methods:

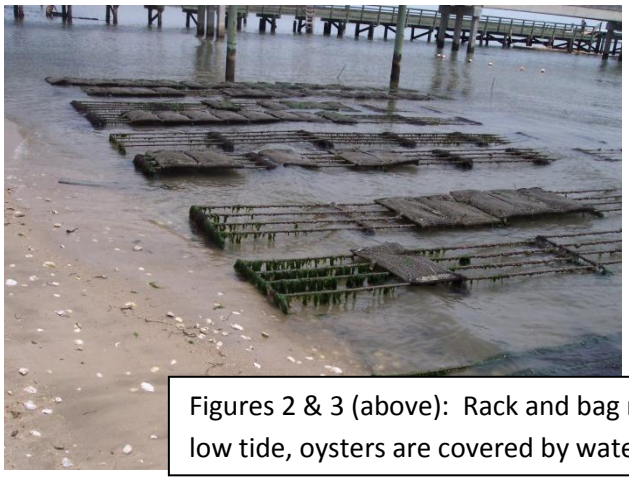
After a proper nursery, oysters are moved to the grow-out phase. Grow-out can require much less work than the nursery if it is executed with care. Most aquaculturist try to move oysters out of the nursery system as soon as they will fit into a 3/8" mesh bag. Like the nursery system, stocking densities are critical to oyster growth in this phase. A bag that has too many oysters will be greatly overcrowded as they get larger, which will put an added stress on the oysters and could cause slowed growth and mortality. The oysters will also develop into a less desirable long and narrow shape. As they continue growing, oysters will need to either be transferred to containers larger mesh sizes or separated into more units with reduced densities to insure maximum water flow.

Figure 1: Triploid *Crassostrea virginica* seed that was grown in a Taylor float. About 1 inch in size at 2 months old

There is no right or wrong method for the grow-out of oysters. The different methods can all be equally as successful. Choosing a method hinges on the resources available to each individual grower and unique characteristics of the grow-out site. Each method has advantages and disadvantages.

1. Racks and Bags:

The rack and bag method requires that the oysters be grown in a place along the shoreline that can be accessed on foot at low tide. Location is critical with this method and a few major things should be considered when determining a place. Oysters should be covered by water for the majority of the tidal range but still accessible in order to be worked. They should also be in a place that experiences good water flow. The flow of water can sometimes drastically decrease around the shore. Oysters need constantly moving water in order to feed properly. Wind exposure may also impact growth rate and should be taken into consideration for both location and orientation of racks and bags.



Figures 2 & 3 (above): Rack and bag method of oyster aquaculture at low tide, oysters are covered by water for most of the tidal range.

The rack and bag method requires a stable metal frame on which the bags full of oysters will lie. The frame should allow the bags to sit one foot off the substrate. The exact height of the rack could be specific to individual sites. The bags then must be tightly secured to the racks to prevent them from falling off in inclement weather. In Figure 4 the bags are bungeed to the racks in all four corners.

Figure 4: 1/2" mesh Bags of oysters are tightly secured to the rack

The racks should be able to support the entire length and weight of the bags with market size oysters in them. Bags are typically just over three feet long and 1.5 feet wide (40"x 20"). Bags can be secured with bungees, zip-ties or PVC. They should be closed securely to keep out predators such as crabs, but still easily accessible for maintenance.

The rack and bags method of oyster aquaculture would be recommended for smaller operations, less than one million oysters. Maintenance of materials is relatively easy and inexpensive. Bags with oysters should be flipped and have fouling reduced as necessary.

2. The Long Line:

The long line method is used in many different ways around the world. Different types of oyster holding devices are hung from a taut line between two pilings. In most cases, the mesh bags would be hung from the line as in figure 5 and 6. Sometimes the bags can be hung vertically as well as horizontally. This method of grow out can be inter-tidal or submerged at all times.

Figure 5: bags hung from a long line grow out system

Figure 6: Long line oyster grow out system

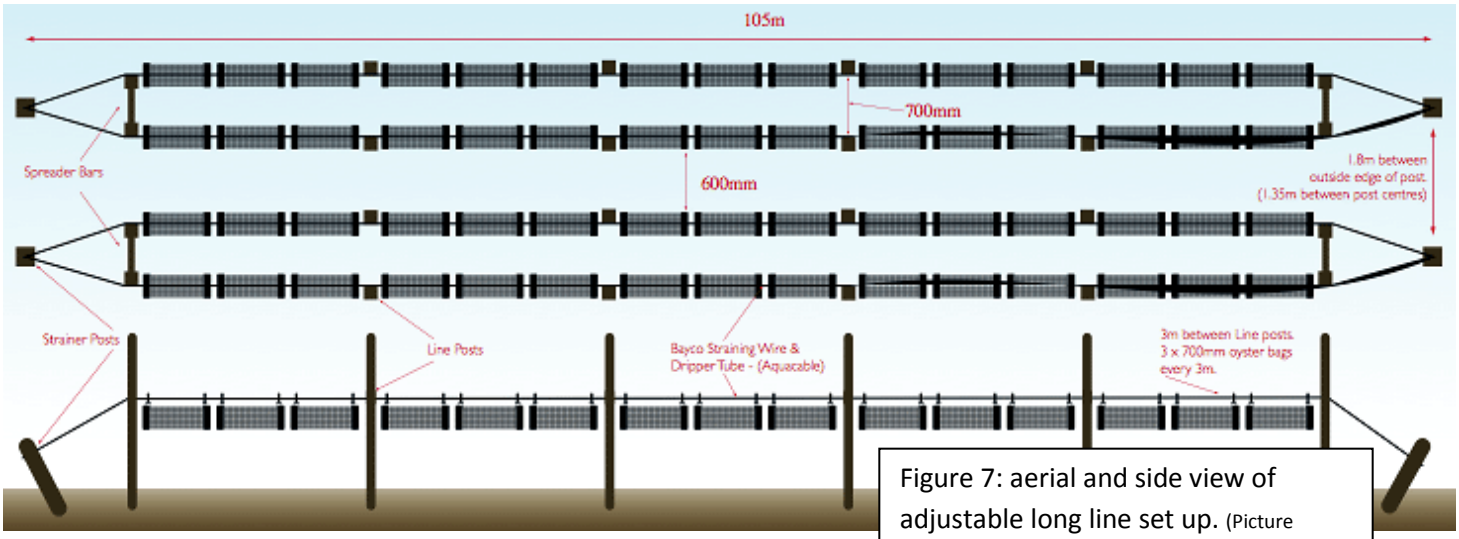


Figure 7: aerial and side view of adjustable long line set up. (Picture credit: © Copyright 2009 BST Oyster Supplies, www.bstoysters.com)

Long line systems can be constructed in many different ways. They can be as simple as a cable wire strung between two posts or a more complex adjustable long line system. The adjustable long line system would be most commonly set up like in figure 7. A wench or come-a-long would be placed on one of the two end poles and would be used to tighten or loosen the line as necessary. Bags can be suspended parallel to the lines like in figure 5, or they may be hung between two lines like in figure 6. Bags should be tightly secured to the line so that they are not lost in rough water.

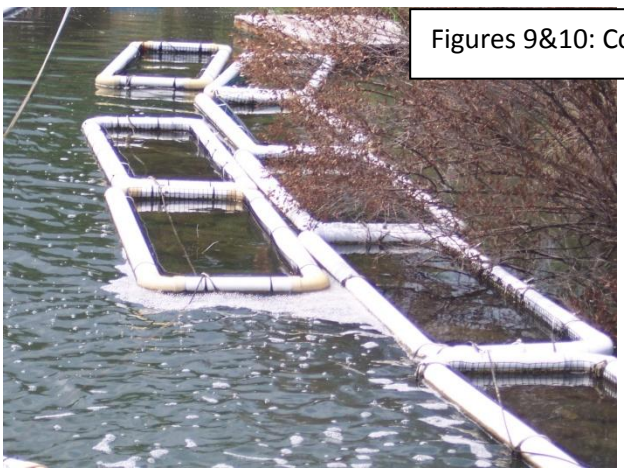
The long line system is used all around the world. Many different kinds of bags have been created to best suit the needs of individual growers. Figure 8 is one kind of basket that can be purchased for long line grow out.

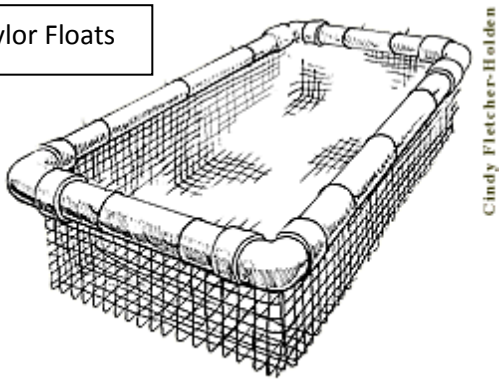
Figure 8: oyster basket hung from a long line, created by SEAPA in Australia. (Picture from www.seapa.com.au)

3. Floats:

Growing oysters in floats is ideal for small oyster growing operations. The floats keep oysters constantly at the top of the water column which is ideal for the flow of food resources. Many different kinds of floats have been created for oyster aquaculture and can be easy and inexpensive to maintain. The most

Figures 9&10: Common Taylor Floats





Picture from Maryland SeaGrant

common type is the Taylor Float, like in figures 9 and 10. Taylor Floats can be easily assembled with PVC and rubber coated wire mesh. The wire mesh is made into a basket and securely suspended inside the airtight PVC rectangle.

The coated wire mesh should be at about 1". The inside of the float can be lined with a smaller mesh or bags can be placed in the floats until the oysters are large enough to be placed directly on the 1" mesh without falling through. The basket should be one to two feet deep. Floats should be placed in deep enough water so that they do not touch the bottom at low tide. Floats must be securely tied or the PVC collar can crack if it contacts a piling during rough water, in which case the float will sink.

Many different designs of floats are sold. Most claim to be easier to maintain.

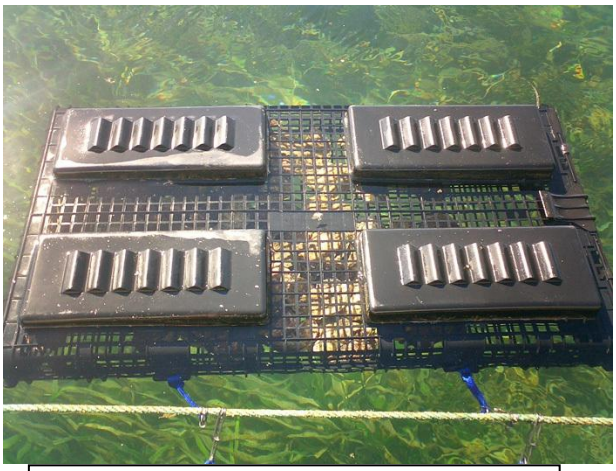


Figure 11&12: Zapco Aquaculture floats

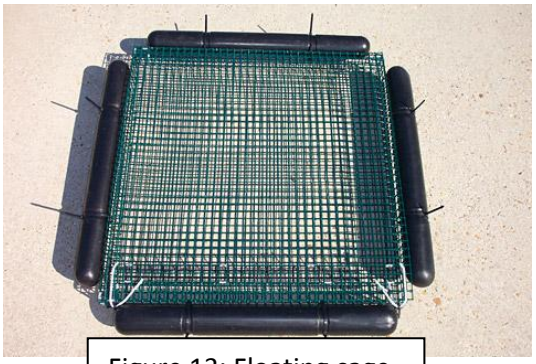


Figure 13: Floating cage

Figure 14: Floating bags

4. Cages:

Grow out cages are great for large and small oyster growing operations because they are easy to use and maintain. Cages can be set on ground that can be accessed at low tide by foot or put in deeper waters where a small crane would be needed to pull them up.

Cages are usually made out of 1" rubber coated wire mesh. They usually do not sit more than 12" off the substrate. Length and width can vary according to individual preference. Some cages may consist of two or more layers that sit on top of each other. Too many layers may result in fouling on the bottom layer and will asphyxiate the oysters on that level. It is important for cages to sit on a sandy or hard substrate. If cages are located on soft mud they can easily sink, be silted over, and suffocate the oysters.

Figure 16 (left): Oysters are often initially grown in bags inside the cages until they are large enough to sit on the 1" mesh without falling through.

Cages should be tightly closed with bungee cords or zip-ties. If predators, such as crabs or cownosed rays, are able to gain access to the cage they will eat a large portion of the oysters.

Oyster Aquaculture websites:

- Equipment-
  - www.bayoyster.com
  - www.atlanticaquaculture.com
  - www.blueswimmer.com
  - www.fukuina.com
  - www.oystertraps.com
- Permitting issues-
  - www.mrc.state.va.us/forms/index.shtm
- Helpful gardening sites-
  - www.oystergardener.org
  - www.deq.state.va.us/coastal/gardening.html
  - www.gnb.ca/0168/oyster.pdf

General Maintenance:

No matter what grow out method is used, general care and maintenance is necessary for all oyster aquaculture production. After seed leaves a nursery system it should be placed into grow-out bags, usually starting with a 3/8" mesh. Sorting oysters by size will optimize output. If oysters are not sorted by size, the larger oysters will out compete the small oysters for resources which will stunt the growth of the smaller oysters. Sorting oysters will ensure that they all reach their maximum growing potential in the shortest amount of time. A simple sieve made out of a wooden frame with a given mesh size would be easy and inexpensive to make.


© 2003 Northwest Aquaculture Ltd. (www.northwestaqua.ca/flupsy.htm)

More complex methods can be used to more efficiently sort oysters. The picture on left shows a shaker table being used to sort seed into two sizes. The table comes with changeable screen sizes to be used as the oysters grow. The table is secured to the ground and shakes rapidly in a circular motion when turned on, causing smaller oysters to fall out of the bottom. Another common method of sorting oysters is by the use of a tumbler. The tumbler can be lined with different screen sizes when necessary. Oysters are placed in one end of the tumbler and then roll down to the other end. The smaller oysters will fall through and be caught under the tumbler in bins. After oysters are sorted, they should be placed on an appropriate mesh size for grow-out.

Oysters should be sorted several times during the year. They may need to be sieved more frequently when they are small, because some oysters can double in size in a matter of weeks when at that stage. When transferring oysters into larger mesh bags, sieving can insure that none will be lost through the mesh because they were too small.


Tumbler being used to sort oysters. While the barrel is rotating, oysters are placed in this end and tumble down to the other while small oysters fall to the bins below. (Picture from www.bluerevolution.ca/services/equipment.htm)

Note that sieving methods are not perfect. For example, if oysters catch on a ¼" screen they should be placed on a slightly smaller mesh size to grow.

After the seed leaves the nursery it should be grown out in appropriate mesh bags or cages. As the oysters grow, the mesh size should increase to insure maximum water flow. Smaller mesh sizes accumulate fouling faster than larger sizes. Seed that is in smaller mesh sizes should be closely monitored so that the oysters are not suffocated by regular fouling. Moving the oysters into larger mesh sizes as often as possible will help to keep fouling under control.

If oysters are grown entirely in bags, as oysters increase in size they will also need to be split into more bags. Keeping densities low will reduce the number of hours spent working on the oysters as well as insure less competition between oysters for resources.

When using cages or floats for final grow-out, the oysters will eventually not need bags. The oysters can be placed directly on the cages or in the floats without bags once the oysters have grown large enough to not fall through the wire mesh. Also, if the cages or floats are lined with a smaller mesh, bags may not be necessary at all. When the oysters get large enough, the smaller mesh should be removed, and oysters should sit directly in the cage or float.

Figure above: oyster in a grow-out bag.

Figure right: oysters large enough to be placed directly in cages without bags.

Once oysters are in directly in cages, floats or in the largest mesh bags, the oysters should still be monitored several times a year. The fouling should not be so much that the oysters are not receiving enough water. Also, densities should allow for additional room to grow.

Figure left: Oyster grow-out cage covered in grass and fouling reduces water flow to oysters. This cage should be cleaned.

Nursery Styles

Seed can be purchased from the hatchery at many sizes, but the larger the seed, the greater the cost per oyster. In an effort to reduce that cost a grower can easily nursery smaller seed. There are several ways to create a small nursery that will cut cost and be simple to maintain.

Figure 1: 500,000 oyster seed upon arrival from hatchery, a dime is placed next to the seed for size comparison. (Picture: www.oysterfarm.com, Glidden Oyster Co.)

1. Spat bags-

Cost- Low

Maintenance- Relatively High, time consuming

Seed from the hatchery can be placed in a very small mesh bag referred to as a "spat bag." When seed arrives from the hatchery it will often look like a ball of moist, coarse sand (Figure 1). Obviously this seed will not stay in a regular grow-out bag with a ¼" or 3/8" mesh. Spat bags will usually start with a 1/32"(75μm) mesh and gradually increase to a 1/4" mesh. Due to the very small mesh, the bags foul relatively fast. For this reason, a lot of maintenance is required to clean bags. Also, a close eye must be kept on the seed to insure that it is transferred to larger mesh sizes as needed. With proper care at this early stage oysters can double in size in a matter of days. The grower must also be observant for crab production from the outside of the bag.

Be sure not to Place too much seed in one bag. Lower densities will result in more rapid growth. As Figure 2 shows, spat bags can be placed in cages to grow, but they can also be hung from a dock or boat until they get large enough for a grow-out bag. Remember that water flow is essential to growth, so wherever the bags are placed make sure the oysters will have plenty of water flow and are safe from predators.

Figure 2: seed being placed in spat bags (Picture: www.oysterfarm.com, Glidden Oyster Co.)

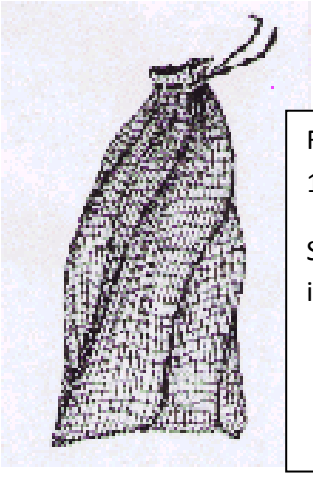


Figure 3: average spat bag with draw-string. Mesh sizes range from 1/32" (75μm) to 1/4".

Spat bags can be purchased from almost any aquaculture supplier including:

- Chesapeake Bay Oyster Co.- www.bayoyster.com
- www.fukuina.com

2. Simple Land upweller- used for small amounts of oyster seed

Cost- slightly more than spat bags, but still reasonable

Maintenance- moderate

Figure 4: example of simple land upwelling system (picture: www.mbl.edu/goetz/quahog.html)

In order to construct an upweller you will need to have access to the water. An upweller can be constructed in many different ways. The basic idea for an upweller is to constantly be forcing water (food) past oyster seed which will increase potential for growth.

The design of a land upweller system can be done many different ways. Presented here is the basic function and set-up of one way to make a single upweller.

Materials: 5 gallon bucket, 2"PVC, 1mm mesh screen, water pump, 30 gallon trashcan or barrel, PVC glue

1. The bottom of the 5 gallon bucket must be removed so that there is and open ended cylinder.

2. Create a hole 3-4 inches from the top of the bucket so that the 2 inch PVC can fit tightly in the whole.

3. On the bottom of the bucket, adhere the 1mm mesh screen so that it is taut. This is best done in colder temperatures. The screen can be secured with PVC glue if the edges of the bucket are sanded first. In figure 5, the 1mm mesh has been stapled to a 2x6 wooden frame in order to keep the mesh taut while it is being glued to the bucket. Use glue liberally and several times.

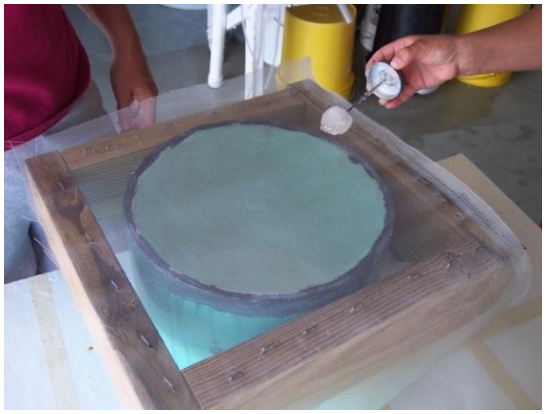
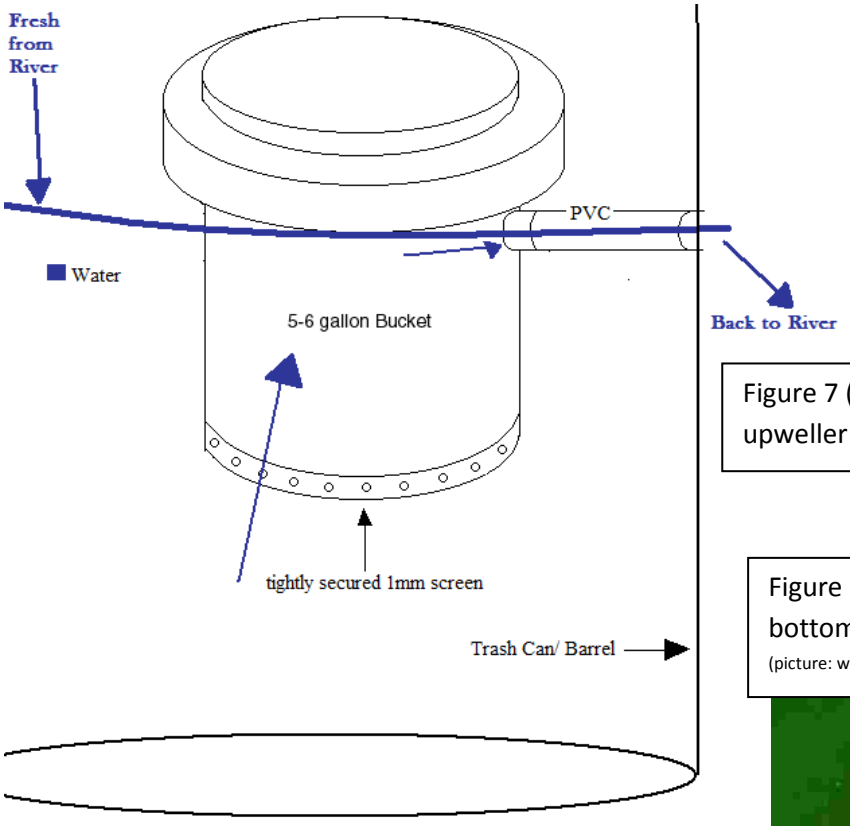


Figure 5 (above): Gluing mesh screen to bucket or silo

Figure 6 (left): Bucket with screen and PVC overflow.

4. Seal the PVC with caulk or glue into the 2” hole that was drilled into the bucket. Drill a hole into the barrel so that the 2” PVC can fit into it snugly. You will want to fix a permanent coupling to the hole in the barrel so that it does not leak and the 2” PVC from the bucket can be easily removed for cleaning the bucket.



5. The bucket should sit in the barrel as shown in figure 7. The bucket should not be sitting on the bottom of the barrel.

6. Assemble the water pump to put water in the barrel (not directly in the bucket). The water should fill the barrel at the same rate that it exits through the PVC in the bucket.

Figure 7 (Left): Completed simple upweller system.

Figure 8(below): oyster seed sitting in the bottom of the bucket in the upwelling system.
(picture: www.mbl.edu/goetz/quahog.html)

Oyster seed from the hatchery should be gently placed in the bottom of the bucket before it is filled with water. This nursery method is specific for small amounts of seed. Be sure not to place too many oysters in the bucket or the screen on the bottom will break. When filling the bucket with water some oysters will float to the top. It is necessary to break the surface tension of the water and let these oysters fall back to the bottom of the bucket, otherwise they will be lost out the drain. Regular cleaning of the screen and barrel are necessary for proper water flow.

A helpful website for the assembly of this type of system can be found at www.mbl.edu/goetz/quahog.html. The website includes a full list of supplies and directions for making a simple upweller.

3. Complex Land upwelling system- Used for large amounts of oyster seed
   Cost- High
   Maintenance- high

For handling larger amounts of oyster seed from hatcheries, this is one nursery method that can be used. The principle is the same as the previously mentioned simple upweller system, except this method uses larger tanks and many different upwellers with different screen sizes.

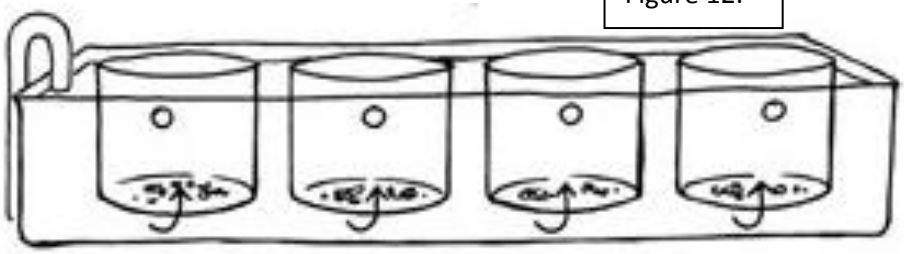
Figure 9 and 10 (above): large scale land upweller systems (figure9: ct-oysters.com)

Figure 11 (below): oyster seed in a large scale upwelling system

These systems can be constructed just like the smaller scale ones, except in a larger tank with a larger water pump.

Figure 12: below is a diagram of how the large scale nursery tanks would look.

Figure 12:



Seed cultivation in upweller

4. FLUPSY- Floating Upweller System

Cost- High

Maintenance- High

The FLUPSY suspends oyster seed at the top of the water column while supplying them with a constant flow of nutrients. Water is pumped through large bins that hold the oyster seed. While this method is probably the most expensive, it is also extremely efficient for the nursery of large numbers of seed. This method of nursery would be recommended for oyster growing operations of greater than one million oysters.

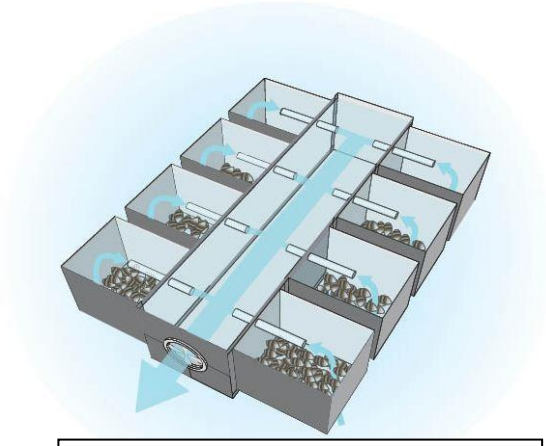


Figure 13: diagram of a FLoating UPweller SYstem (FLUPSY). (illustration by Jeff Ferzoco on www.governorsislandalliance.org/newsite/events

Like all nursery systems, the FLUPSY must be cleaned on a regular basis to insure maximum water flow. Cleaning a FLUPSY can be done by pulling the silos out of the water and removing the fouling with a hose. The silos can be quite heavy and may require a wench to pull them out of the water (figure 14). Cleaning is usually done 2-3 times a week in the summer. Seed can grow very fast in this type of system and should be monitored closely. If the seed is left in the FLUPSY for too long it can get heavy and create too much strain on the silo causing it to break the mesh bottom. If that happens all of the seed will fall too the bottom of the river and be lost.

Figure 14 (above): Using a winch to pull a silo from the FLUPSY. This must be done to perform regular cleaning (www.reclamthebay.org/images/journal/fall07/silo.jpg)

Figure 15 (left): A FLUPSY in the water. A pump pushes water out of the middle trough causing water to be pulled in from the bottom of the silos, past the oysters and back into the trough. (Picture: www.fishersislandoyster.com)

*Selecting Seed to Fit Your Need

The most important factor to consider when selecting seed or larvae is salinity. Disease pressure from MSX and Dermo (Perkinsus) is greater in higher salinities. VIMS has developed families ("lines") of oysters based on disease pressure from high and low salinity zones.

Disease	Salinity Ranges	Temperature Ranges	Notes
MSX	Low to No Infections: <10ppt	Inactive: <5°C (41°F) (Winter)	Kills susceptible oysters in One season
	Infection: 15ppt	Infection: 20°C (68°F)	
	Proliferation and Mortality: >20ppt	above 20°C susceptible oysters are killed	
Dermo	Low to No Infections: <9ppt	Less infection below 15-20°C (59-68°F)	Kills susceptible oysters in two seasons
	Proliferation and Mortality: >12-15ppt	Proliferation and Mortality:>25°C (77°F)	
SSO (Seaside Organism)	Above 25ppt	Seasonal Mortality in May and June	Only prevalent on seaside

(Table 1: *Denotes diseases that affect Virginia oysters, and describes individual conditions for infection*)

Lines developed by VIMS (thus far)

Each line has specific characteristics. Lines developed for higher salinity, higher disease pressure sites are Deby-H (DBY-H), Hana and a cross between the two called CROSBreed-H (or XB for high salinity). These lines were developed in the York and Lynnhaven Rivers where the salinities average about 20-25ppt. Lines developed for lower salinity sites have different disease pressure. These lines are Deby-L (DBY-L), Lola and a cross between them referred to as CROSBreed-L (or XB for low salinity). Currently, the Deby-H and Deby-L are interchangeable, so these will be referred to as Deby. The CROSBreed-H and CROSBreed-L are also interchangeable, so these will be referred to as XB.

	Attributes	Site selection
Deby	• High tolerance for MSX • Moderate tolerance for Dermo	All purpose line for all salinities
XB	• High tolerance for MSX • Moderate tolerance for Dermo	Salinities >15ppt, Being developed for low salinities
Hana	• Moderate tolerance for MSX • High tolerance for Dermo • Fast Growth	Moderate salinities (15-9ppt)
Lola	• Low tolerance for MSX • High tolerance for Dermo • Fast Growth	Low salinities (<10ppt)

(Table 2: *outlines the 4 main lines developed by VIMS and identifies where each survives the best*)

Diploid vs. Triploid

When deciding what seed is best suited for your needs, diploids and triploids come into question. How fast do you want to be able to harvest? How much are you willing to spend on seed? Do you want your seed to broadcast spawn into areas surrounding your growout?

Diploids	Triploids
Reproductively capable	Sterile
Grow to market size (3inches) in 14-24 months	Grow to market size (3 inches) in about 12 months
Some disease resistant	All disease resistant
Usually less expensive from hatchery	Usually More expensive from hatchery

(Table 3: *Outlines the differences between Diploids and Triploids that should be considered when deciding what seed to purchase*)

*Developed from the Aquaculture Genetics and Breeding Technology Center's Manifesto

FAQ:

When to split bags?

There is not set time period that is required to split-up the bags. Every location has different growout needs. Locations with optimal water conditions will grow oysters faster than locations with minimal water flow and food resources. Bags should be split when the oysters inside the bag begin to get crowded. When oysters are growing into the bags, growing into each other, or out competing each other for resources resulting in mortality, then these are signs that the bags are overcrowded. Bags should be monitored on a regular basis to insure that overcrowding does not occur.

How deep do cages need to be in the water?

Cage depth is not a major factor in growing success. Oysters should be deep enough in water so that they are not exposed on low tides during freezing periods in the winter. If oysters are exposed to freezing air temperatures in the winter months they will die. In the summer months it is not as necessary to keep them submerged at all times, but if the oysters are not in water then they are not eating and therefore not growing.

Does the substrate matter?

When determining where to place the cages ground quality is important. Harder grounds usually allow for cages to sit at a maximum height from the substrate allowing for more water flow around the cage. A soft muddy bottom may cause the cage to sink down and eventually could cover the oysters with too much silt.

What, if any, permits are needed?

Several permits are required for the aquaculture of oysters. Acquiring private oyster grounds has the largest initial cost, but is only $1.50/acre/year to maintain. The type of permit required will depend on how you deploy your cages. If cages are 12" tall or less, on private ground, with no buoys, no permit may be required. If buoys are attached to each of the cages, then permits will be required for the cages.

In order to sell oysters from your private ground, a permit from the normal MRC licensing agent is required:

Oyster Aquaculture Product Owners Permit	$10 (purchase from licensing agent)
Oyster Grounds-	
Initial Application Fee	$600-$700
Yearly rental	$1.50/acre

How much does everything cost?

- Cages- $30-$45/cage
- Bags- $4-$6/bag
- Oyster Seed- $5-$30/1000 oyster, Dependent on size and type
    - Smaller size is less expensive
    - Triploid(sterile)- usually more expensive than diploid

What is the preferred method for cage set-up?

There are three ways that most growers use when putting their cages in the water.

1. Preferred Method- Keep cages close to shoreline where no buoy or ropes are needed
2. Long-Line Method- A line is run between two stationary buoys or stakes and cages are placed between the markers and attached to the line via clips. The cages can then be unclipped from the line and hauled in a boat for regular working.
3. Individual buoys can be placed on each cage that has been outfitted with a bridal. The cages can then be hauled onto a boat using a wench. This method is not suggested because the large numbers of buoys become boating hazards. And a permit for the growout method will be required.

Where do I purchase oyster seed?

Oyster seed can be purchased directly from a hatchery or from a nursery. Some local oyster hatcheries include

Hatcheries:

Oyster Seed Holdings	Gwynn's Island	425 Callis Wharf Rd. Grimstead, VA 23064	804-725-3046 (www.oysterseedholdings.com)
Middle Peninsula Aquaculture	Mobjack Bay	P.O. Box 769 North, VA 23128	804-725-0159
Shooting Point Oyster Co.	Eastern Shore	5466 Bayford Rd. Franktown, VA 23354	757-693-1303
KCB Hatchery	Coan River	755 Lake Landing Dr. Lottsburg, VA 22511	804-529-6101

Nurseries:

Chesapeake Bay Oyster Co.	Rappahannock River	P.O. Box 96 Wake, VA 23176	804-338-6530 (www.bayoyster.com)
Purcell's Seafood	Little Wicomico River	P.O. Box 7 Burgess, VA 22432	804-453-3300

Rules and Regualtions:

Cages must not surpass 12 inches from the substrate

If the cages do exceed 12 inches in height a permit is required

Cages must be placed on private ground leased from the state

Applying for Private Grounds:

Private grounds are leased from the state for a yearly fee. The application can be found on the Virginia Marine Resources Commission website (http://www.mrc.state.va.us/forms/index.shtm). Oyster grounds can be transferred from one leaseholder to another for a smaller fee.

A Use Plan for oyster Grounds must also be completed and turned in with the application.

COMMONWEALTH OF VIRGINIA
MARINE RESOUCES COMMISSION
2600 WASHINGTON AVE., 3RD FLOOR
NEWPORT NEWS, VA 23607

APPLICATION FOR OYSTER PLANTING GROUND

Name: _____

Address: _____
Street or P.O. Box City State Zip

Telephone: _____ _____ SSN(Tax ID): _____
Work Home

Name of responsible party if more than one applicant or contact person for corporations or companies:
_____

I/We, a resident of The Commonwealth of Virginia, hereby apply for oyster ground pursuant to Virginia law. Said ground is in the waters of _____, near _____ and estimated to contain _____ acres, and situated in District No. _____ in the City/County of _____ and described and bounded as follows:

North by: _____
East by: _____
South by: _____
West by: _____
_____

I submit herewith my non-refundable fee of $25.00. I agree to promptly pay the newspaper, for the required advertising. I also agree to promptly pay all charges for surveying, mapping, assigning, and recording as specified in the Code of Virginia, Title 28.2. I agree to comply with all legal requirements pursuant to oyster ground leasing. I understand that this application will be given priority in the order that it is received by the Virginia Marine Resources Commission, Engineering/Surveying Department.

Do you presently lease oyster ground in this name? yes____ no____ Billing number is _____

_____

_____
Signature of Applicant(s)(All applicants must sign) Date

Note: **A use plan is required for all regular oyster ground applications. If the attached Oyster Ground Application Use Plan is not completed and included with this application, processing beyond initial acceptance will cease until a plan is provided.**

FOR OFFICE USE ONLY

VMRC App. No: _____ Billing No: _____ Lease No: _____ Map No: _____

Area VMRC Surveyor: _____ Assigned Surveyor: _____

_____ _____
Chief, Engineering/Surveying Date Law Enforcement Supervisor

INSTRUCTIONS

Return the completed Application for Oyster Planting Ground with the $25.00 non-refundable fee to:

Virginia Marine Resources Commission (VMRC)
Attn: Engineering/Surveying Department
2600 Washington Ave., 3rd Floor
Newport News, VA 23607

Money orders or checks are accepted and payable to "Treasurer of Virginia."

THE FOLLOWING CHARGES ARE EFFECTIVE AS OF 6/1/2006

APPLICATION FEE (NON-REFUNDABLE).....$25.00
ADVERTISING COST IN THE NEWSPAPER WILL BE BILLED TO APPLICANT DIRECTLY.....cost varies
SURVEYING: VMRC SURVEY FOR LEASE ASSIGNMENT.....$510.00
ADDITIONAL PLAT CHARGE (if needed).....$75.00
RECORDING FEE FOR EACH ASSIGNMENT & PLAT.....$12.00
ASSIGNMENT FEE FOR EACH ASSIGNMENT & PLAT.....$1.50
RENTAL AMOUNT (PER ACRE/PER YEAR)(NO ANNUAL CHARGE FOR RIPARIAN LEASES).....$1.50

Pursuant to the Code of Virginia, your application will be advertised in the local newspaper for four consecutive weeks. VMRC will submit the notice to the newspaper and they will bill you directly for the advertisement. **Contact the newspaper for charge amounts**.

If you are applying for a riparian oyster ground lease, the name must be shown exactly as on the highland deed. A plat or deed of your highland property is required to complete the survey.

Additional Information:

Code of Virginia related to Oyster Planting Ground: 28.2-600 ET. SEQ.

Applications: Description can be made from an Oyster Planting Ground composite map in an unassigned or vacant area. (Contact the Engineering/Surveying Dept. for assistance).
Application must be advertised once a week for four weeks at applicant's expense.
Application must be posted in vicinity, two or more places for 60 days, (VMRC responsibility).

Survey: After 60 day posting and advertising time VMRC will make the survey and prepare a plat. 30 day waiting period after plat is made is required by Code before ground can be assigned. (You may use any licensed land surveyor, but he must contact this office to insure the survey and plat meet VMRC standards). If the application is protested a public hearing will be scheduled for full Commission consideration.

For a riparian lease, it must adjoin the mean low water and be in the same name as the highland owner. The highland must border a minimum of 205 feet along the MLW, however the riparian lease may be as narrow as 105 feet and cannot contain more than one half acre (except for Northampton and Mathews Counties and the James River and its tributaries above the James River Bridge- contact the Engineering/Surveying Department concerning these areas).

Phone numbers: Chief Engineer: 757-247-2225
Draftsman/Cartographer: 757-247-2230
Program Support Technician: 757-247-2226

6-1-2006 Oyster Lease Use Plan Questionnaire

Due to increasing conflicts over uses of subaqueous bottomlands (and water column) for traditional oyster cultivation, aquaculture shellfish farming, other commercial uses, recreational water uses, and riparian areas the Engineering/Surveying Department at VMRC requires a use plan for all applications for regular shellfish leases.

The Code of Virginia requires that leased areas "be occupied for the purpose of planting or propagating oysters" (Chapter 6, 28.2-603). Shellfish lease applications will not be accepted for the sole purpose of attempting to exclude other legal uses of the area.

Please provide information related to the following:

1. Will the lease be used for traditional shelling of the bottom or to cultivate existing shell resources? Yes ____ No ____

2. Will there be any planting of spat and/or seed oysters on bottom.

   Yes ____ No ____

3. Will there be the placement of structures on-bottom for shellfish production?

   Yes ____ No ____

   If yes will they exceed a height of 12-inches from the substrate?

   Yes ____ No ____

   (Note that any structures that extend <u>more than 12-inches</u> above the substrate, or that <u>are marked with buoys or stakes</u>, and/or <u>any floating structures</u> currently <u>require a subaqueous permit</u> from the Habitat Management Division <u>and are not defacto authorized</u> on oyster lease grounds).

4. Will there be clam cultivation using traditional methods on bottom?

   Yes ____ No ____

   (Any structures or nets <u>may</u> require additional authorization, see above).

5. Are other uses proposed not included above?

   Yes ____ No ____

   If yes please explain: _____
   _____

   Applicants Signature: _____