

The background of the entire page is a close-up photograph of a large pile of oysters. The oysters are packed closely together, and many are contained within black mesh bags, which are visible as a grid pattern over the shells. The shells are various shades of grey, brown, and white, with some showing signs of being harvested or processed. The lighting is bright, creating strong highlights and shadows on the textured surfaces of the shells and bags.

Virginia Shellfish Aquaculture Situation and Outlook Report

Results of 2010 Virginia Shellfish Aquaculture Crop Reporting Survey

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Virginia Shellfish Aquaculture Situation and Outlook Report

Results of 2010 Virginia Shellfish Aquaculture Crop Reporting Survey

Recent growth of the shellfish aquaculture industry in Virginia has added significant value to the State's seafood marketplace. Today, watermen continue to harvest both hard clams and oysters from the State's public resources, albeit at diminished rates. At the same time, Virginia's watermen-farmers are providing growing additional quantities of quality shellfish to consumers. In recent years, following the lead of the hard clam industry, a significant transition to intensive aquaculture of native oysters is underway. The once-extensive oyster planting has disappeared primarily as a result of endemic oyster diseases and increasing wildlife predation of seed oysters. In its place is an emerging aquaculture

sector based on improved culture techniques and disease-resistant oyster seed.

While these trends are widely acknowledged, there has been no consistent reporting of production and economic trends in Virginia's shellfish aquaculture industry. Periodic assessments are necessary to inform growers and related interests about the actual status and trends in the industry. The intent of this survey is to continue annual assessments with which to gauge growth and inputs in Virginia's shellfish aquaculture industry. This report is based upon an industry survey completed during the first quarter of 2011.

Methodology

A mail and internet-based survey was developed to collect information from Virginia clam and oyster growers known to be active in the industry. A preliminary version of the survey instrument was pilot tested and revised based upon the field testing (Appendix 1). Fifty one complete, useable surveys were returned on the internet, mail or fax, including nineteen clam growers, forty five oyster growers, five shellfish hatcheries and nine growers who cultured both molluscs. Discussions with industry members suggest that the firms responding represent more than 90% of Virginia aquaculture's total production of market size oysters and clams during 2010.

For confidentiality reasons, the information collected is aggregated and the total represents both the eastern and western shores of Virginia.

Summary of Findings

Virginia Oyster (*Crassostrea virginica*) Aquaculture 2005-2010

The oyster industry continues to evolve from the traditional extensive planting of "shell on bottom" to more intensive, contained, aquaculture utilizing cages, racks, floats, and the like.¹ As is depicted in Figures 1 and 2, the growers surveyed reported substantial expansion in oyster aquaculture from 2009 to 2010. A nearly three-fold rise in oyster plantings occurred from 2009 to 2010, the largest single year increase since the spike in plantings from 2005 to 2006.

The nearly seventy seven million oysters planted in 2010 exceed the fifty percent increase predicted by growers in last year's survey by thirty four million oysters. Expectations reported by growers in this survey for 2011 plantings estimate an additional increase of 1.8 million oysters.

Oyster Sales and Prices

The numbers of market oysters sold by Virginia growers increased in 2010 by 34% to

Figure 1. Number of Oysters Planted by Virginia Aquaculturists

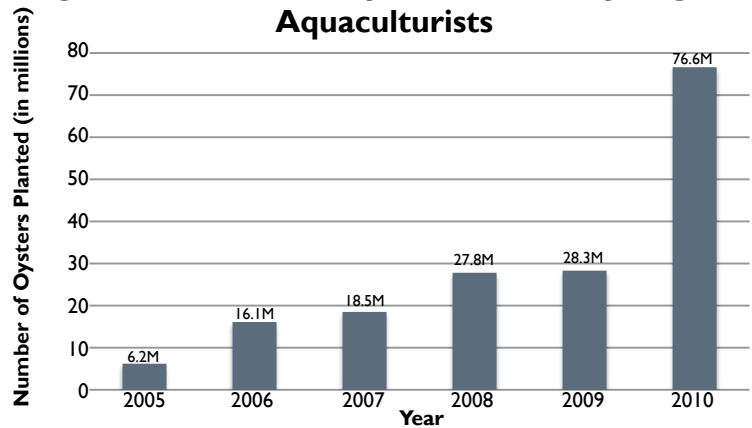
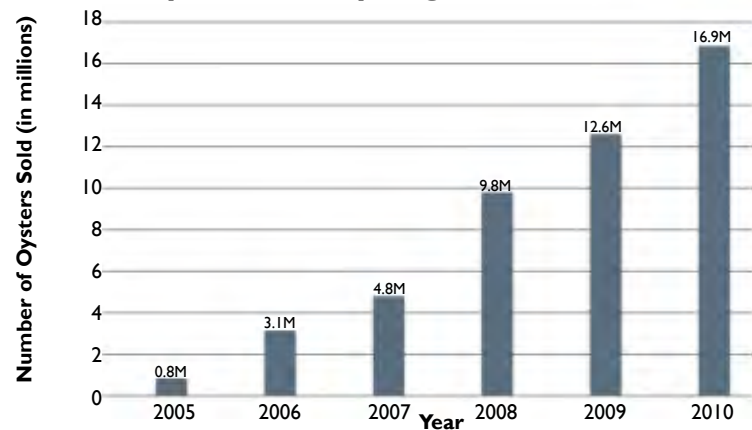


Figure 2. Number of Aquacultured Market Oysters Sold by Virginia Growers



almost seventeen million. This is similar to the increase reported from 2008 to 2009, which was 29%. If the growers' expectations indicated in this survey materialize, more than twenty nine million cultured market oysters will be sold by Virginia growers in 2011 (a 74% increase). Combining the overall sales of single, market oysters with the weighted average price per oyster it is estimated that the total revenue for oyster aquaculturists (not including spat on shell production) is \$5 million.

¹ Historically the most common oyster "culture" technique in Virginia was the transplanting of wild harvested seed to leased growing grounds. Prior to the onslaught of diseases, the grower paid little attention to the grounds between the time seed was planted and the time mature oysters were harvested, some 2 or 3 years later. Today there is little such culture practiced and the results here do not include information on such oyster planting. The results here represent the use of intensive aquaculture practices adopted as a result of increased oyster disease and predation using hatchery produced seed.

Figure 3. Oyster Prices Reported by Virginia Growers

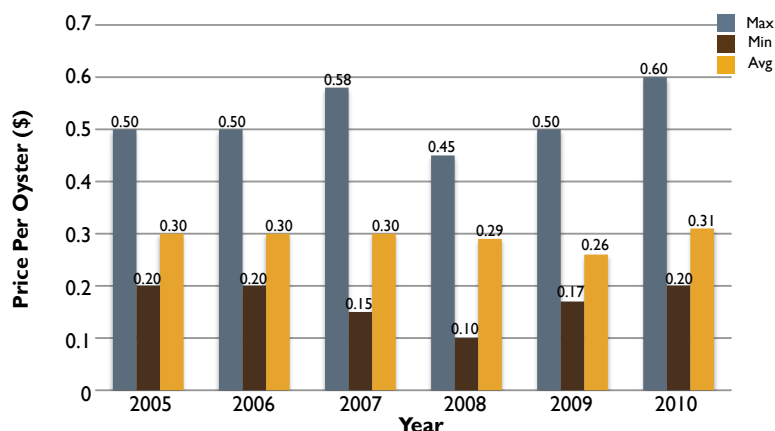
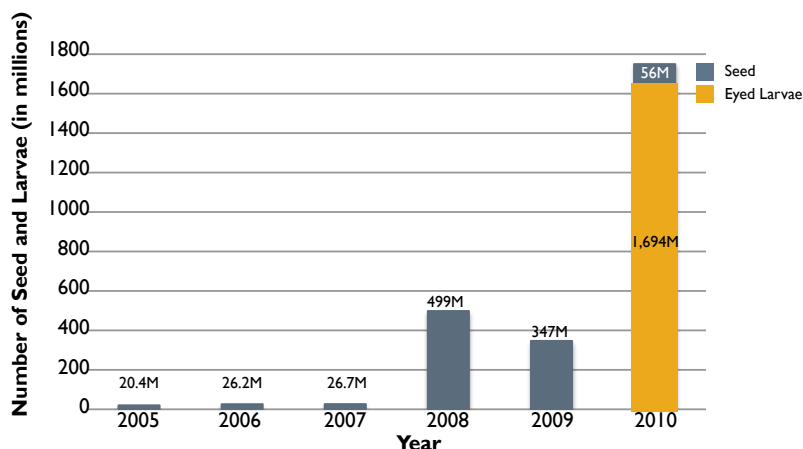


Figure 4. Oyster Seed and Larvae Sold by Virginia Hatcheries



For the purposes of this report, oyster prices are not broken down as to market segment (i.e. primary wholesale, secondary wholesale, retail, etc.). The data in Figure 3 show continued stability in the average prices received for cultured oysters over the five-year period while volume of sales have continued to expand.²

With the expansion of large-scale “remote setting” or “spat-on-shell” oyster planting in Virginia during 2008 and continuing today, the entire hatchery volume picture changed, as existing firms became active in purchasing not just cultchless seed, but large quantities of eyed larvae for spat-on-shell development. Remote setting is a method of oyster cultivation in which oyster larvae and old oyster shells are mixed in a controlled environment in large tanks on land rather than in open Bay waters. After the larvae attach or set on

the old oyster shells and metamorphose into seed or spat oysters, the resulting spat-on-shell is ready for almost immediate planting in the Bay where the spat will grow naturally until ready for harvest.

The primary advantage of spat-on-shell cultivation is that it requires less labor and fewer materials than single-oyster cultivation, thereby making it a more economically feasible option for producing oysters. Because spat-on-shell cultivation produces oysters grown in clumps (similar to wild-caught oysters), the primary product is oysters for shucking rather than single oysters for half-shell consumption. For this reason, remote setting is not meant to take the place of single-oyster culture (which produces consistent, high-quality, half-shell oysters) but to complement it with a means of producing, on large scale, a local oyster for use by Virginia’s oyster processors.

The industry forecast for continued growth in use of eyed larvae for spat-on-shell remains. Difficulties in hatchery production in 2009 were reportedly the cause of the decline seen in that year; however significant advancement in the production of both seed and eyed larvae is evident by the surge in 2010 shown in Figure 4. Production of oyster seed and eyed larvae by Virginia hatcheries realized an almost four-fold increase from 2008 to 2010 with the majority being eyed larvae (1.7 billion).³

This forecast derives directly from the continued growth in aquaculture of oysters in Virginia, as virtually all of the seed produced is either planted by the hatchery owners themselves in their aquaculture operations or sold to other Virginia oyster growers. This vertically integrated system with eventual sales to many out-of-state consumers adds important economic development to local coastal communities.

2 During 2010 the median price was \$.32 per market oyster up from \$.30 in 2009.

3 For a complete description of the spat on shell remote setting industry development see: <http://web.vims.edu/adv/frg/FinalSpatonShell%20Project.pdf?svr=www>

Finally, as shown in Figure 5, Employment associated with oyster aquaculture has remained variable over the recent years. The difficulty of estimating the time and labor associated with relatively small-scale aquaculture conducted in conjunction with other business lines makes estimates of oyster culture labor problematic at this point in industry development. In view of this fact, the trends in these employment figures should be not overly interpreted. There is consistent expectation that with successful development of both spat-on-shell and cultch-less oyster aquaculture, additional employment will be required to meet the greatly expanded planting and production needs.

Oyster growers have adopted the use of improved strains of oyster seed and larvae over the years to optimize growth rates, disease resistance, and meat quality during warmer months. The use of triploid eyed larvae and seed is the overwhelming majority reported by growers. In 2009 and 2010 the percent triploids used in Virginia farms was 80% and 91% respectively. Industry reports that the sterile triploid seed is more viable from a commercial standpoint, as the oysters grow faster and do not diminish in quality with seasonal spawning.

Virginia Clam (*Mercenaria mercenaria*) Aquaculture 2005-2009

The aquaculture of hard clams in Virginia while expanding from 2005 to 2007 began contracting somewhat in 2008 and has been declining further since 2009. Based upon previous economic assessments compiled by the authors, Virginia leads the nation in the culture of hard clams. While Virginia continues to lead the nation in hard clam aquaculture production, a continued downturn in planting and sales is evidenced by the most recent surveys.

As depicted in Figure 6, for the third year in a row, clam growers reported a decline in seed plantings during the most recent year. The firms reporting indicated that during 2010 they decreased plantings by nearly

fifty one million clams (-12%) compared to 2009. The outlook for 2010 was incomplete at the time of the 2009 survey; however, those reporting suggested the likelihood of an increase in their seed planting of 7% during 2010 which is not consistent with the data from this survey.

Figure 5. Estimated Virginia Oyster Aquaculture Employment

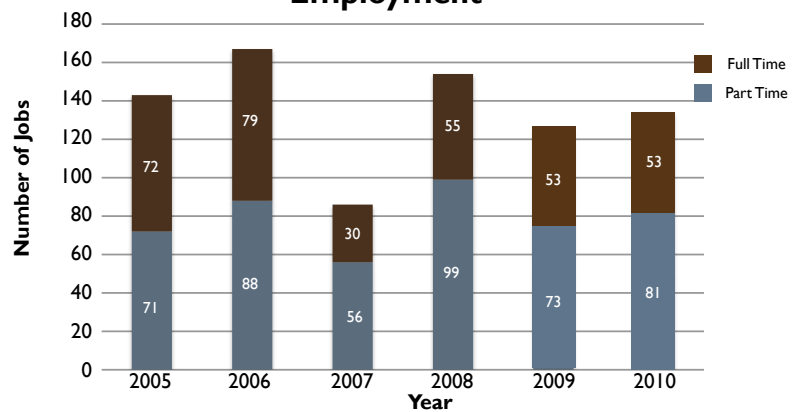


Figure 6. Number of Hard Clams Planted in Virginia

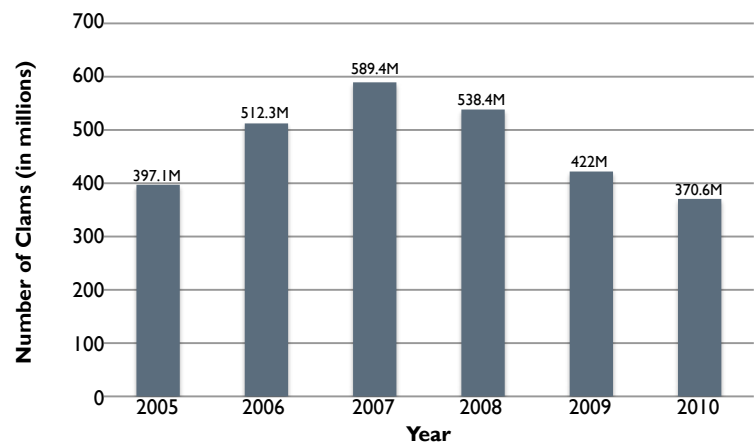
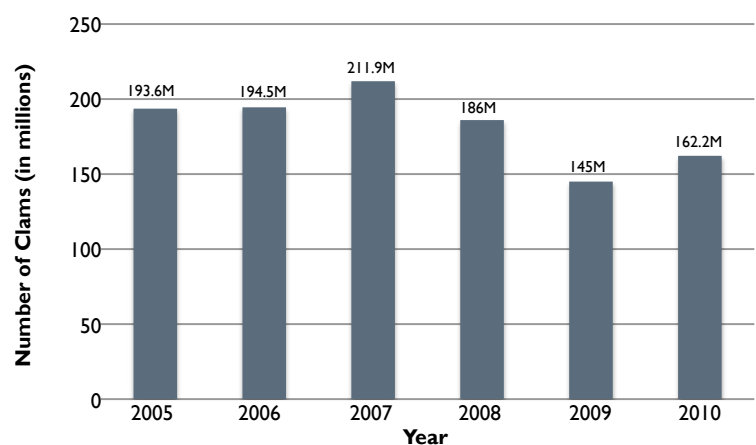


Figure 7. Number of Hard Clams Sold in Virginia



Clam Sales and Prices

Figure 8. Number of Clam Seed Sold by Virginia Hatcheries

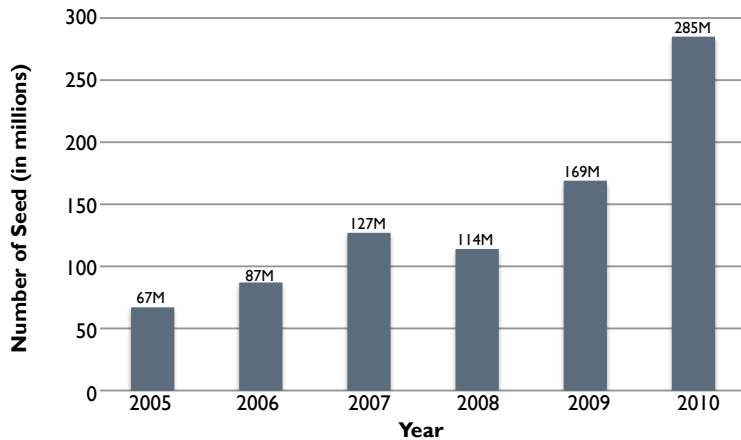


Figure 9. Clam Prices Reported by Virginia Growers

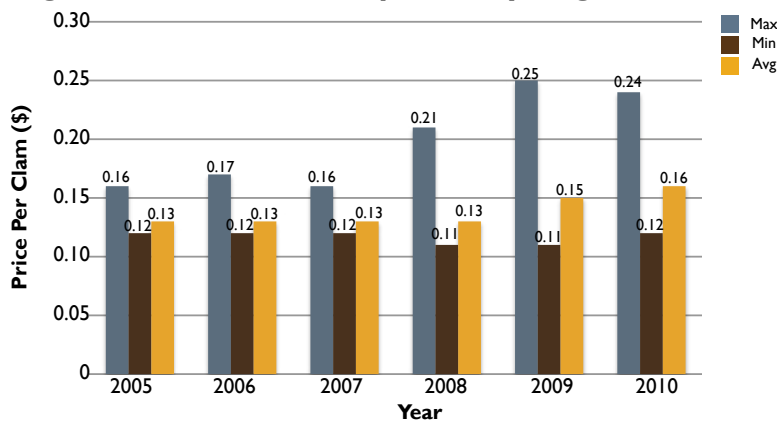
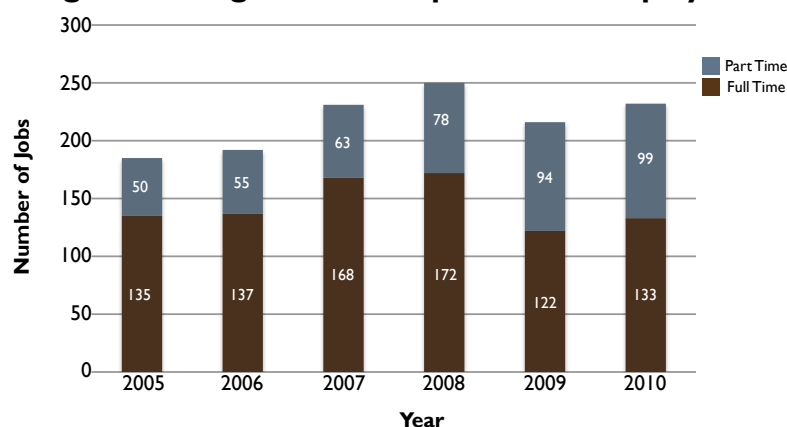


Figure 10. Virginia Clam Aquaculture Employment



The 2010 crop reporting survey reflects a slight increase (12%) in the total number of Virginia market clams sold between 2009 and the end of 2010. During 2010, it is estimated that Virginia's total farm output reached an estimated one hundred sixty two million "market" clams, as shown in Figure 7 (previous page). Combining the overall sales with weighted average price per market clam it is estimated that total revenue for hard clam aquaculturists in 2010 was \$25 million—a slight increase of \$3.3 million from the prior year.

There was an estimated 69% increase in sales of clam seed (Figure 8) in 2010 compared to the prior year; however this survey was the first year specific hatchery data was received, therefore it may be an artifact of that change. Industry sources indicate that much of the hatchery capacity is dedicated to producing seed for the hatchery owner's own planting. Essentially, all of the seed produced is planted in Virginia. The reported average price of clam seed was the same in 2010 as it has been in previous years.⁴

Figure 9 displays the survey findings regarding relative prices received for market clams. The weighted average price reported per market clam at the farm gate was \$.16 during 2010, up slightly from the prior year.⁵

Also, as shown in Figure 10, even with reported contraction at the farm level both levels of employment showed a slight increase. Full time employment increased 5% and part time personnel increased 9% during 2010.

4 The price of seed depends upon size but the modal price reported was \$.025 per seed in 2010; essentially the same since 2007.

5 Smaller niche growers, with production and sales of less than 50,000 clams reported average prices as high as \$.24. Seventeen cents per market clam was the modal price to the grower. It should be pointed out that market level for most growers is equivalent to farm gate prices. Some smaller growers market product directly at the retail level. The weighted average across all growers was \$.158 per market clam in 2010.

Virginia Shellfish Grower Situation & Outlook Survey - 2011

Welcome

Thank you for taking a few minutes to complete the following commercial shellfish aquaculture survey. With your help, Virginia's past annual surveys have shown how useful timely information is for the shellfish aquaculture industry. Such information is vital to understanding the importance of Virginia's growing aquaculture business to the economy, and in turn the importance of clean water, reasonable land use and tax policies, access to financial capital and the like to shellfish growers.

A new section on hatchery production has been added. Please see the instructions within the survey to avoid a double counting of information.

All information provided will be held in the strictest of confidence and used only when combined with all of those providing information on their individual operations.

Not all questions may apply to your situation. Please answer all that do. The more accurate the information provided, the better the characterization of the Virginia aquaculture industry.

Please complete the survey by March 31, 2011.

If you have any questions or would like to discuss, please contact us at:

Thomas J. Murray
Marine Business Specialist
Phone: 804-684-7190
Fax: 804-684-7161

Karen Hudson
Aquaculture Specialist
Phone: 804-684-7742
Fax: 804-684-7161

Commercial Clam Aquaculture

1. Do you aquaculture clams?

- ☐ Yes
☐ No

Commercial Clam Aquaculture

2. Do you have a clam hatchery?

- ☐ Yes
☐ No

Virginia Shellfish Grower Situation & Outlook Survey - 2011

3. Do you "re-sell" seed?

- ☐ Yes
☐ No

4. Do you have a "cooperative" agreement with another clam producer?

- ☐ Yes
☐ No

5. Do you purchase hard clam crop insurance?

- ☐ Yes
☐ No

Commercial Clam Aquaculture

6. 2010 Commercial Clam Aquaculture

- | | |
|----------------------------------|----------------------|
| a.) # Clams planted | <input type="text"/> |
| b.) % Seed purchased | <input type="text"/> |
| c.) Avg. price of seed purchased | <input type="text"/> |
| d.) # Seed sold | <input type="text"/> |
| e.) % Seed sold out-of-state | <input type="text"/> |
| f.) # Market (non-seed) sold | <input type="text"/> |
| i.) % wholesale | <input type="text"/> |
| ii.) % retail | <input type="text"/> |
| g.) % Market sold out-of-state | <input type="text"/> |
| h.) Avg. price per market clam | <input type="text"/> |
| i.) Avg. price wholesale | <input type="text"/> |
| ii.) Avg. price retail | <input type="text"/> |
| i.) # Full-time help | <input type="text"/> |
| j.) # Part-time help | <input type="text"/> |

Virginia Shellfish Grower Situation & Outlook Survey - 2011

7. 2011 *ESTIMATED* Commercial Clam Aquaculture

- | | |
|----------------------------------|----------------------|
| a.) # Clams planted | <input type="text"/> |
| b.) % Seed purchased | <input type="text"/> |
| c.) Avg. price of seed purchased | <input type="text"/> |
| d.) # Seed sold | <input type="text"/> |
| e.) % Seed sold out-of-state | <input type="text"/> |
| f.) # Market (non-seed) sold | <input type="text"/> |
| i.) % wholesale | <input type="text"/> |
| ii.) % retail | <input type="text"/> |
| g.) % Market sold out-of-state | <input type="text"/> |
| h.) Avg. price per market clam | <input type="text"/> |
| i.) Avg. price wholesale | <input type="text"/> |
| ii.) Avg. price retail | <input type="text"/> |
| i.) # Full-time help | <input type="text"/> |
| j.) # Part-time help | <input type="text"/> |

8. Comments or Explanatory Notes on 2010 & 2011 Clam Aquaculture:

Commercial Oyster Aquaculture

9. Do you aquaculture oysters?

- ☐ Yes
- ☐ No

Commercial Spat-On-Shell Oyster Production

Virginia Shellfish Grower Situation & Outlook Survey - 2011

Commercial Spat-On-Shell Oyster Production

**Please report only oyster production which originated from an onshore hatchery.
No "natural strike" product moved to growing grounds.**

10. 2010 Commercial Spat-On-Shell Oyster Aquaculture

a.) # Eyed-larvae purchased

i.) % diploid

ii.) % triploid

b.) % Eyed-larvae purchased from out-of-state

c.) Avg. price per million eyed-larvae purchased

d.) # Bushels spat-on-shell planted

e.) # Bushels "market-size" spat-on-shell harvested/sold

f.) Avg. price received per bushel of "market-size" spat-on-shell sold

11. 2011 *ESTIMATED* Commercial Spat-On-Shell Oyster Aquaculture

a.) # Eyed-larvae purchased

i.) % diploid

ii.) % triploid

b.) % Eyed-larvae purchased from out-of-state

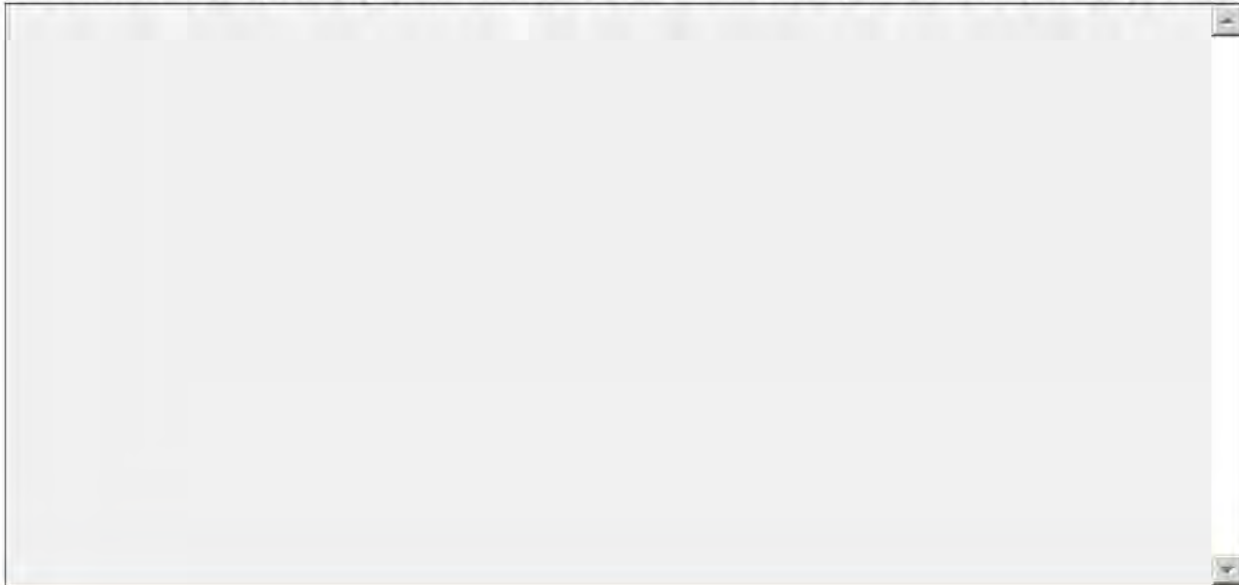
c.) Avg. price per million eyed-larvae purchased

d.) # Bushels spat-on-shell planted

e.) # Bushels "market-size" spat-on-shell harvested/sold

f.) Avg. price received per bushel of "market-size" spat-on-shell sold

12. Comments or Explanatory Notes on 2010 & 2011 Commercial Spat-On-Shell Oyster Aquaculture:



Virginia Shellfish Grower Situation & Outlook Survey - 2011

Commercial Cultchless (Single) Oyster Production

Please report only oyster production which originated from an onshore hatchery.

No "natural strike" product moved to growing grounds.

13. 2010 Commercial Single Oyster Aquaculture

a.) # Oysters planted	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
b.) # Seed purchased	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
c.) % Seed purchased from out-of-state	<input type="text"/>
d.) Avg. price of DIPLOID seed purchased (\$ per 1000)	<input type="text"/>
e.) Avg. price of TRIPLOID seed purchased (\$ per 1000)	<input type="text"/>
f.) # Seed sold	<input type="text"/>
g.) % Seed sold out-of-state	<input type="text"/>
h.) Avg. price of seed sold (\$ per 1000)	<input type="text"/>
i.) # Market (non-seed) oysters sold	<input type="text"/>
i.) % wholesale	<input type="text"/>
ii.) % retail	<input type="text"/>
j.) % Market oysters sold out-of-state	<input type="text"/>
k.) Avg. price per market oyster (\$ per piece)	<input type="text"/>
i.) Avg. price wholesale	<input type="text"/>
ii.) Avg. price retail	<input type="text"/>
l.) # Full-time help	<input type="text"/>
m.) # Part-time help	<input type="text"/>

Virginia Shellfish Grower Situation & Outlook Survey - 2011

14. 2011 ESTIMATED Commercial Single Oyster Aquaculture

a.) # Oysters planted	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
b.) # Seed purchased	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
c.) % Seed purchased from out-of-state	<input type="text"/>
d.) Avg. price of DIPLOID seed purchased (\$ per 1000)	<input type="text"/>
e.) Avg. price of TRIPLOID seed purchased (\$ per 1000)	<input type="text"/>
f.) # Seed sold	<input type="text"/>
g.) % Seed sold out-of-state	<input type="text"/>
h.) Avg. price of seed sold (\$ per 1000)	<input type="text"/>
i.) # Market (non-seed) oysters sold	<input type="text"/>
i.) % wholesale	<input type="text"/>
ii.) % retail	<input type="text"/>
j.) % Market oysters sold out-of-state	<input type="text"/>
k.) Avg. price per market oyster (\$ per piece)	<input type="text"/>
i.) Avg. price wholesale	<input type="text"/>
ii.) Avg. price retail	<input type="text"/>
l.) # Full-time help	<input type="text"/>
m.) # Part-time help	<input type="text"/>

15. Comments or Explanatory Notes on 2010 & 2011 Commercial Cultchless (Single) Oyster Aquaculture:

Virginia Shellfish Grower Situation & Outlook Survey - 2011

Shellfish Hatchery Production

16. Do you have a shellfish hatchery?

☐ Yes

☐ No

Shellfish Hatchery Production

17. 2010 Clam & Oyster Hatchery Production

a.) # Clam seed produced	<input type="text"/>
b.) # Clam seed sold	<input type="text"/>
i.) % external sales	<input type="text"/>
c.) % Clam seed sold out-of-state	<input type="text"/>
d.) # Oyster eyed-larvae sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
e.) % Oyster eyed-larvae sold out-of-state	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
f.) Avg. price per million oyster eyed larvae sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
g.) # Single oyster seed sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
h.) % Single oyster seed sold out-of-state	<input type="text"/>
i.) # Full-time help	<input type="text"/>
j.) # Part-time help	<input type="text"/>

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18. 2011 ESTIMATED Clam & Oyster Hatchery Production

a.) # Clam seed produced	<input type="text"/>
b.) # Clam seed sold	<input type="text"/>
i.) % external sales	<input type="text"/>
c.) % Clam seed sold out-of-state	<input type="text"/>
d.) # Oyster eyed-larvae sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
e.) % Oyster eyed-larvae sold out-of-state	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
f.) Avg. price per million oyster eyed larvae sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
g.) # Single oyster seed sold	<input type="text"/>
i.) % diploid	<input type="text"/>
ii.) % triploid	<input type="text"/>
h.) % Single oyster seed sold out-of-state	<input type="text"/>
i.) # Full-time help	<input type="text"/>
j.) # Part-time help	<input type="text"/>

19. Comments or Explanatory Notes on 2010 & 2011 Commercial Shellfish Hatchery:

Virginia Shellfish Grower Situation & Outlook Survey - 2011

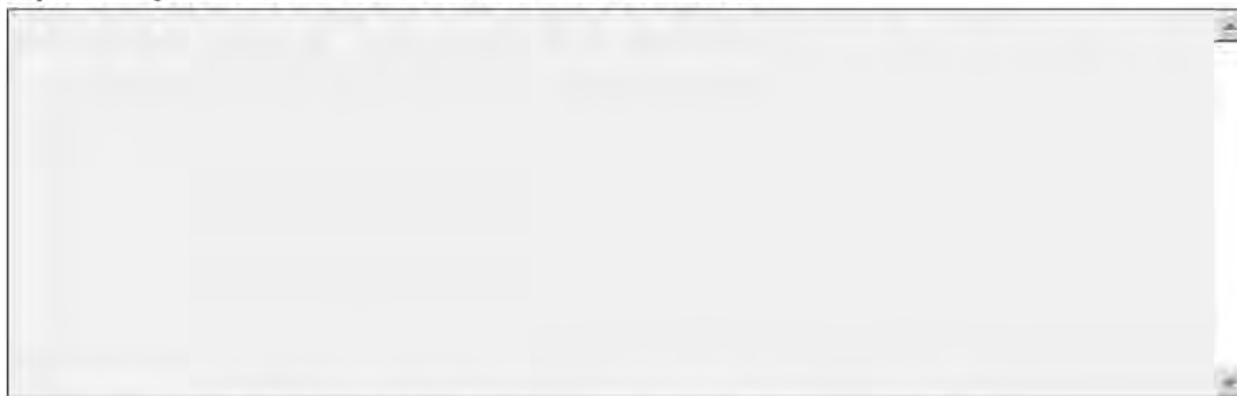
Thank You

20. Please provide any comments on the shellfish aquaculture industry situation.



21. The 2011 Virginia Aquaculture Conference is scheduled for November.

We are looking for your input on information that would be of interest to you. Below, please suggest topics that you would like to see covered at the conference.



22. Would you like to receive a copy of the overall report when completed?

☐ Yes

☐ No

23. Contact Information (Optional)

Name	<input type="text"/>
Address	<input type="text"/>
City, State & Zip	<input type="text"/>
Telephone	<input type="text"/>
Email	<input type="text"/>

Thank you for completing the *Virginia Shellfish Grower Situation and Outlook Survey*.



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