Virginia Shellfish Aquaculture Situation and Outlook Report

Results of the 2013 Virginia Shellfish Aquaculture Crop Reporting Survey

April 2014

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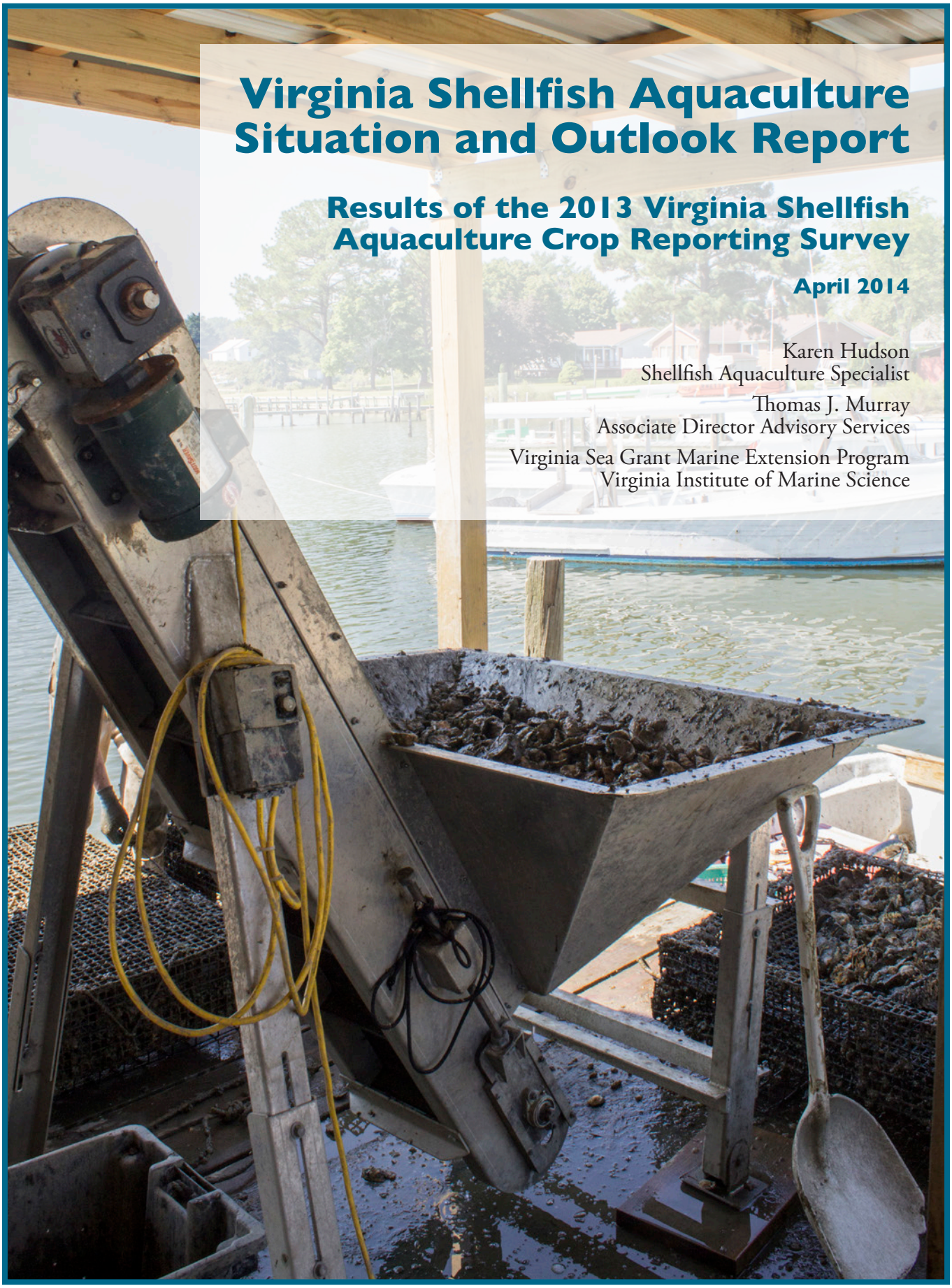


Virginia Shellfish Aquaculture Situation and Outlook Report

Results of 2013 Virginia Shellfish Aquaculture Crop Reporting Survey

The shellfish aquaculture industry in Virginia continues to grow, adding significant value to the State's seafood marketplace (figure 1). Today, watermen harvest both hard clams and oysters from the State's public resources, albeit at rates diminished from historic levels. At the same time, Virginia's watermen-farmers are providing 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 utilizing wild seed has contracted 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, until this annual survey was initiated in 2006 there had 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 in order 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 2014.

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. Each year, the survey instrument is evaluated and revised based upon field testing (appendices 1 & 2). Eighty complete, useable surveys were returned by internet, mail, and fax, including 21 clam growers, 67 oyster growers, five shellfish hatcheries and 15 growers who cultured both molluscs. It is believed that the survey is representative of overall trends in 2013 and based on the majority of active commercial growers.

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 2005-2013

The oyster industry continues to evolve from the traditional extensive planting of "shell on bottom", utilizing wild oyster seed, to the use of hatchery produced seed.[1] Methods of aquaculture have progressed into a more intensive or containerized form utilizing cages, racks, floats, and the like. In addition, there is increasing interest in extensive planting on bottom using shell struck with oyster eyed larvae produced from a hatchery.

Intensive Culture (using cultchless, or single, seed)

Figure 2 shows a reported 106 million single oysters planted, which is a 59% increase from plantings in 2012 and exceeded grower expectations by 27%. The outlook for 2014 suggests an additional 30% increase to 138 million oysters planted by Virginia growers.

Oyster Sales and Prices

The 2013 crop reporting survey was expanded to include whether or not the grower has a cooperative agreement with another oyster producer who would likely report the sales numbers. This was due to a reported increase in oyster cooperative arrangements arising in Virginia and an effort to reduce the potential for double counting oyster sales. Eight of the 67 oyster responses indicated having some sort of cooperative relationship to market.

Figure 1. Reported Farm Gate Values

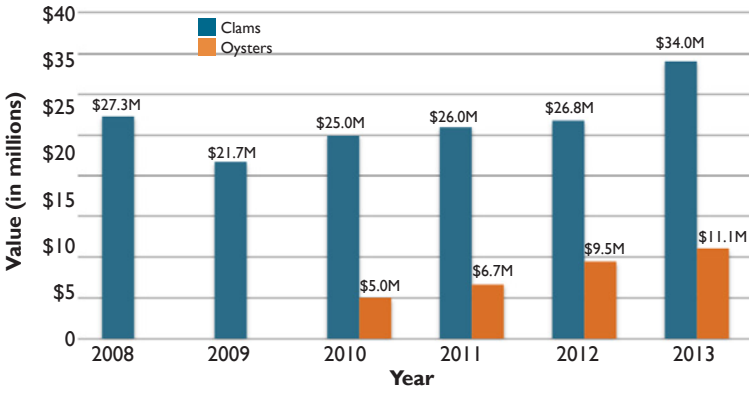
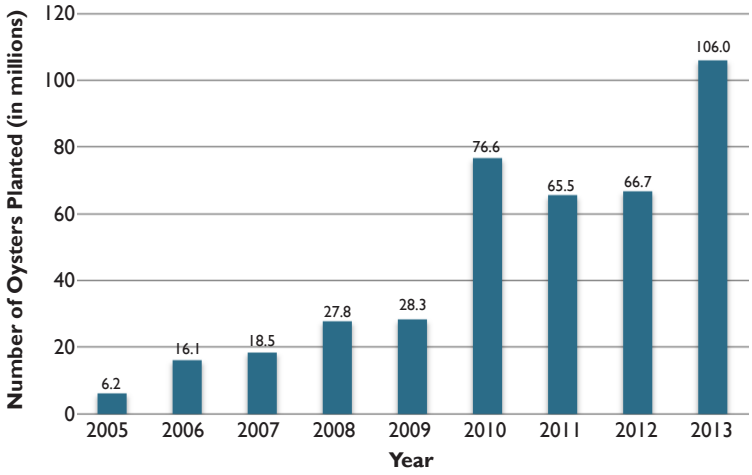


Figure 2. Number of Single Oysters Planted



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 two or three years later. Today this culture method is still practiced, however the results here do not include information on such oyster planting. The results in this report reflect the use of aquaculture practices adopted as a result of increased oyster disease and predation. which utilizes only hatchery produced seed and larvae.

Figure 3. Number of Aquacultured Market Oysters Sold

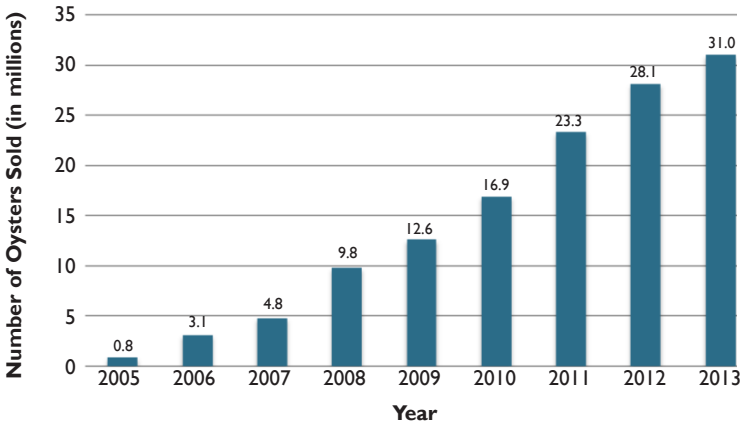
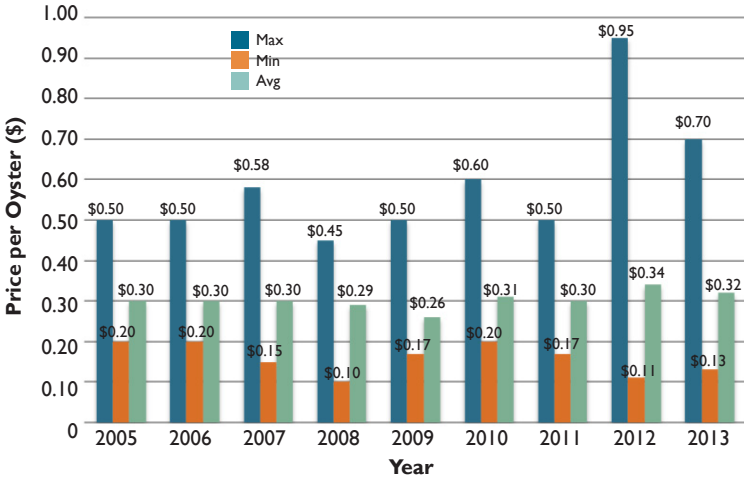


Figure 4. Oyster Prices Reported



The 2013 crop reporting survey indicated the total number of market oysters sold by Virginia, subtracting the reported sales from those indicating involvement with a cooperative, was 31 million (figure 3). This was an increase of 10% from 2012 and is slightly less than the 35 million cultured market oysters grower's expected from the previous survey year. The forecast for 2014 is reported to be an additional 51% increase to nearly 50 million market oysters sold. 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) was $11.1 million, an increase of $1.6 million from 2012.

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 4 show a continued stability in the average prices received for cultured oysters over the nine-year period while sales volume has continued to expand.[2] Trends in the percentage of single oysters sold into wholesale markets remain fairly consistent at greater than 95% for the last five years. The percentage of single oysters sold out of state has remained greater than 55% (56%-77%) for the last six years.

Extensive Culture (Spat-on-Shell)

With the expansion of large-scale "remote setting" or "spat–on-shell' oyster planting in Virginia beginning in 2008 and continuing today, the entire picture of hatchery volume 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 and 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 large quantities of oysters. Because spat-on-shell cultivation produces oysters grown in clusters (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 expansion in the use of eyed larvae for spat-on-shell continues to be clear but depends on a consistent production of eyed larvae, which was problematic in 2011

2 Smaller niche growers with sales less than 70,000 oysters reported average prices as high as $0.70 and in one case, nearly $2.00. During 2013 the median price was $0.30 per market oyster, a decrease from $0.31 in 2012. The weighted average price across all growers was $0.36 per market oyster in 2013, an increase of $0.02 from 2012.

due to poor water quality. This report has not yet expanded to include the industry trends in spat-on-shell culture, because a large portion of this development so far has been subsidized by federal monies. Trends will be reported in the 2015 survey when the investment is coming solely from private dollars and is considered more sustainable for forecasting purposes. While trends are not yet part of this report, a summary of the reported spat-on-shell production from recent years is included.

The spat-on-shell production reported over the last few years from survey data shows bushels planted expanding from over six thousand in 2008 to 28 thousand in 2013. The percentage of triploids used has been at or near 100%. Numbers of bushels harvested have expanded from roughly two thousand in 2009 to almost 13 thousand in 2012 and 2013. These numbers reflect only what is reported in the survey, which is assumed to be a mix of private investment and subsidized support.

Oyster Hatcheries

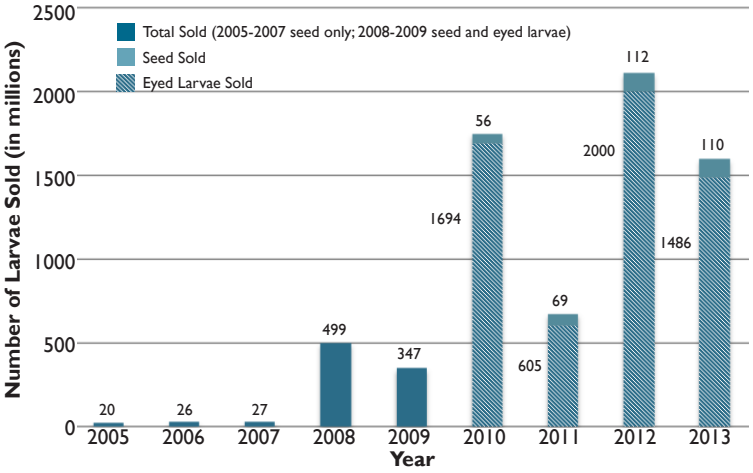
The expansion of hatchery infrastructure in recent years prompted the addition of hatchery-specific questions in the 2010 survey. Hatchery questions were then moved to a stand-alone survey sent directly to the Virginia shellfish hatcheries beginning with the 2011 survey.

The continued growth in aquaculture of oysters in Virginia directly drives the hatchery forecast. Virtually all of the seed and eyed larvae produced is either planted by the hatchery owners themselves in their aquaculture operations or sold to other Virginia growers. This vertically integrated system with eventual sales to many out-of-state consumers adds important economic development to local coastal communities.

Sales of oyster seed and eyed larvae by Virginia hatcheries realized an almost four-fold increase from 2008 to 2010 with the majority of the sales being eyed larvae (1.7 billion). This reflects the growth of the oyster industry as seen in figure 3 as well as the expansion of extensive culture which is not yet represented graphically in this report.

Oyster growers have adopted improved strains of oyster seed and larvae over the years to optimize growth rates, disease resistance, and meat quality during warmer months. Triploid eyed larvae and seed were the source of the overwhelming majority of the oysters reported by growers and produced by hatcheries. In 2013 the percent triploids planted on Virginia farms was 93%. In the last five years, the percent triploid has remained in the range of 80%–95%. 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.

Figure 5.[3] Oyster Seed and Larvae Sold by Hatcheries



The continued potential for expansion lies in the production of oyster eyed larvae for spat-on-shell aquaculture. Difficulties in production attributed to poor water quality were reported in the summer of 2009 and 2011 and resulted in the dramatic decline of eyed larvae production seen in figure 5.[3] Efforts are ongoing to research and monitor water quality; determining the cause of decline and developing mitigation strategies to maintain consistent production. The 2012 and 2013 hatchery seasons regained productivity, and although the reported sales show a decline in 2013, this represents more production going to hatchery owners' private planting. Hatcheries forecast an increase in sales of oyster seed in 2014 with no additional increase in the sale of eyed larvae.

3 Data in figure 5 from 2005-2007 represents oyster seed sales in millions. In 2008 and 2009, the numbers represent a combination of seed and eyed larvae sales with the majority being eyed larvae due to the initiation of large-scale spat-on-shell culture. The 2010 survey was the first to collect sales data directly from the hatcheries and is separated into seed and eyed larvae sales. Note that the reported sales do not account for production used for internal use by the owner company. The drop in production in 2009 and 2011 was due to poor water quality.

Figure 6. Virginia Oyster Farm Employment

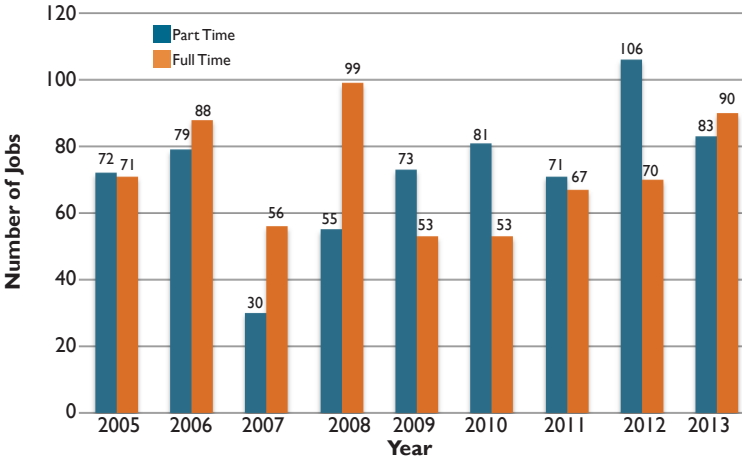


Figure 7. Number of Hard Clams Planted in Virginia

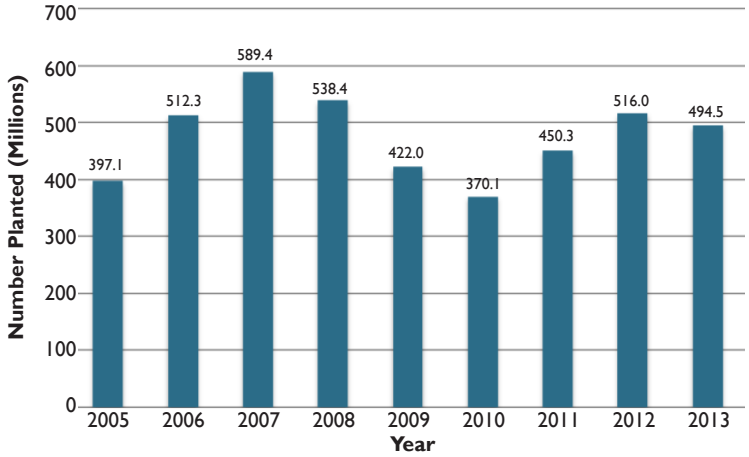
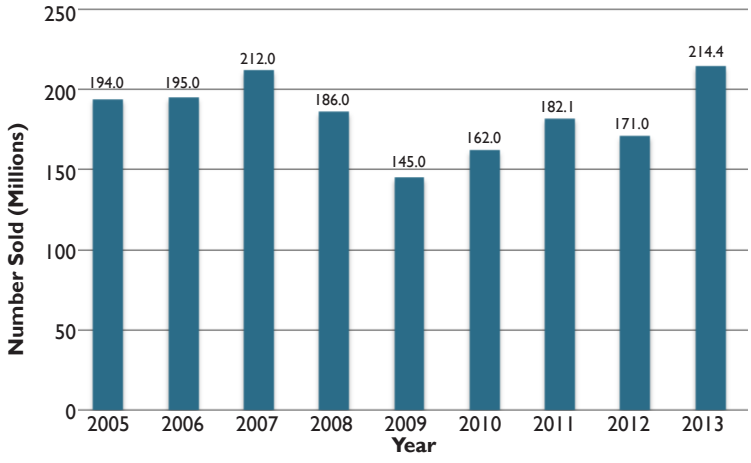


Figure 8. Number of Hard Clams Sold in Virginia



Employment

Finally, as shown in figure 6, employment associated with oyster aquaculture has remained variable over recent years but shows an increase in the number of full time employment in 2013. 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 a consistent expectation that with successful development of both spat-on-shell and cultchless oyster aquaculture, additional employment will be required to meet the greatly expanded planting and production needs.

Virginia Clam (*Mercenaria mercenaria*) Aquaculture 2005-2013

Based upon previous economic assessments compiled by the authors, Virginia continues to lead the nation in the culture of hard clams. The aquaculture of hard clams in Virginia, while expanding from 2005 to 2007, began contracting somewhat in 2008 and showed a further decline for the following two years. Reports for 2011 and 2012 show a slight increase in seed plantings but remain slightly lower than plantings reported in 2008.

As depicted in figure 7, clam growers reported a slight decrease in seed plantings during the most recent year. The firms reporting indicated that during 2013 they planted roughly 495 million clams, a 4% decrease compared to 2012. The outlook for 2014 estimates an increase of approximately 6%, totaling 524 million clams.

Clam Sales and Prices

The 2013 crop reporting survey reflects an increase in the total number of Virginia market clams sold between 2012 and the end of 2013. During 2013, it is estimated that Virginia's total farm output reached 214 million "market" clams, as shown in figure 8. Combining the overall sales with the weighted average price per market clam, it is estimated that total revenue for hard clam aquaculturists in 2013 was $34 million—an increase of $7.2 million from the prior year.[4]

Figure 9 displays the survey findings regarding relative prices received for market clams. The average price reported per market clam at the farm gate was $0.17 during 2013, $0.01 higher

than in the previous three years. Trends in the percentage of market clams sold into wholesale markets remain fairly consistent at greater than 97% for the last five years. The percentage of market clams sold out of state has remained between 73% and 91% for the last six years.

Clam Hatcheries

Clam seed production and sales have remained stable and the reported average price of clam seed has remained the same for the last several years.[5] Industry sources indicate that much of hatchery capacity is dedicated to producing seed for each hatchery owner's own planting. Essentially, all of the seed produced is planted in Virginia. This vertically integrated system with eventual sales to many out-of-state consumers adds important economic development to local coastal communities.

Employment

Figure 10 illustrates an increase in the full time level of employment. However, as noted above, the employment situation with all shellfish aquaculture is complicated by the diversity of the firms involved. The vast majority of the clam production is conducted by relatively large vertically integrated companies, however they often contract with self-employed grower cooperatives which, as with oysters, also complicates the estimates of labor involved in this industry.

Given the ambiguity of reporting labor used for both oyster and clam culture noted above, it is useful for a benchmark to review the economic impact model developed for Virginia shellfish aquaculture for the 2012 growing year.[6] The IMPLAN model used for the assessment estimates that just under one (0.9) full time employee is needed to produce $100,000 of cultured shellfish output. Based upon this model, the full time employment needed to produce the 2013 estimated output of $45.1 million would be about 400, an increase of 22% over the 2012 estimate of 328 direct employments. Those figures do not represent the indirect and induced employment multipliers.

Figure 9. Reported Clam Prices

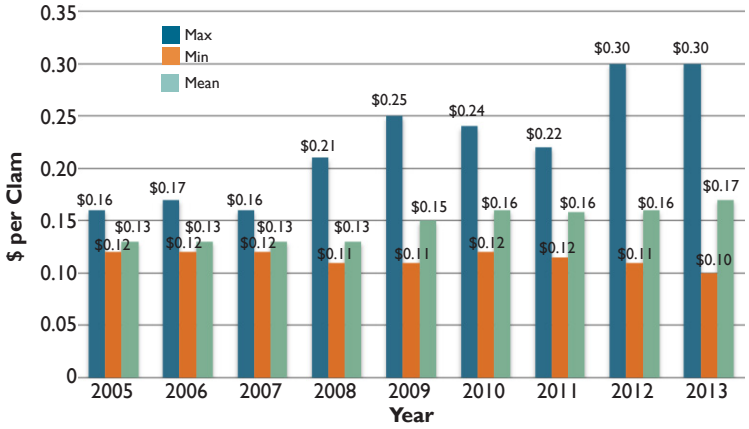
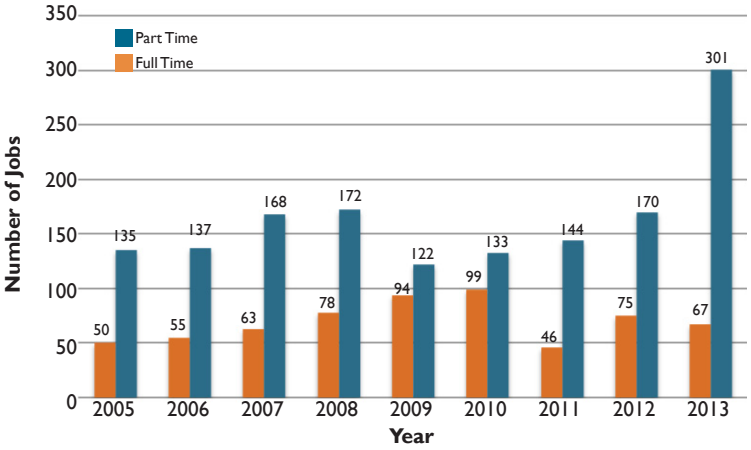


Figure 10. Virginia Clam Farm Employment



4 Smaller niche growers with production and sales of less than 10,000 clams reported average prices as high as $0.22. One small grower reported receiving a maximum price of $0.30 per clam. 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 $0.16 per market clam in 2013.

5 The price of seed depends upon size but the modal price reported was $0.02 per seed in 2012, essentially the same since 2007.

6 ***Economic Activity Associated with Shellfish Aquaculture in Virginia – 2012,*** VIMS Marine Resource Report No. 2013-4

Appendices

2013 Grower and Hatchery Surveys

Appendix 1: Grower Survey

Virginia Shellfish Grower Situation & Outlook Survey 2014

Welcome

Thank you for taking a few minutes to complete the following commercial 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.

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 February 28, 2014.

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

You can also file online by accessing http://www.surveymonkey.com/s/shellfishsurvey2014

If filing online, please note your answers can be saved if you exit the survey before completion. You can then return at a later time to finish the survey.

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Virginia Shellfish Grower Situation & Outlook Survey 2014

Commercial Clam Aquaculture

1. **Do you aquaculture clams?** Yes ○ No ○
2. **Do you have a clam hatchery?** Yes ○ No ○
3. **Do you "re-sell" seed?** Yes ○ No ○
4. **Do you have a "cooperative" agreement with another clam producer? (who will likely be reporting these numbers)** Yes ○ No ○
5. **Do you purchase hard clam crop insurance?** Yes ○ No ○

6. **2013 Commercial Clam Aquaculture**

a) # Clams planted

b) % Seed purchased

c) Ave. price of seed purchased

d) # Seed sold

e) % seed sold out-of-state

f) # Market (non-seed) sold

   i. % wholesale

   ii. % retail

g) % Market sold out-of-state

h) Ave. price per market clam

   i. Avg. price wholesale

   ii. Ave. price retail

i) # Full-time help

j) # Part-time help

Virginia Shellfish Grower Situation & Outlook Survey 2014

Commercial Clam Aquaculture

7. 2014 *ESTIMATED* Commercial Clam Aquaculture

a) # Clams planted

b) % Seed purchased

c) Ave. price of seed purchased

d) # Seed sold

e) % seed sold out-of-state

f) # Market (non-seed) sold

   i. % wholesale

   ii. % retail

g) % Market sold out-of-state

h) Ave. price per market clam

   i. Avg. price wholesale

   ii. Ave. price retail

i) # Full-time help

j) # Part-time help

8. Comments or Explanatory Notes on 2013 and 2014 Clam Aquaculture:

Virginia Shellfish Grower Situation & Outlook Survey 2014

Commercial Oyster Aquaculture

This section covers two methods of commercial oyster culture: spat-on-shell and single oysters. Each method has its own series of questions.

9. Do you aquaculture oysters? Yes ○ No ○

10. Do you aquaculture spat-on-shell oysters? Yes ○ No ○

Commercial Spat-on Shell Oyster Aquaculture

*Please report only oyster production which originated from an onshore hatchery.
This does NOT include "natural strike" product moved to private ground.

11. 2013 Commercial Spat-on-Shell Oyster Aquaculture

a) # Eyed-larvae used

   i. % Diploid

   ii. % Triploid

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

c) # Bushels spat-on-shell planted

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

e) Ave. price received per bushel of "market-size" spat-on-shell

12. 2014 *ESTIMATED* Commercial Spat-on-Shell Oyster Aquaculture

a) # Eyed-larvae used

   i. % Diploid

   ii. % Triploid

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

c) # Bushels spat-on-shell planted

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

e) Ave. price received per bushel of "market-size" spat-on-shell

13. Comments or Explanatory Notes on 2013 & 2014 Commercial Spat-on-Shell Oyster Aquaculture:

Virginia Shellfish Grower Situation & Outlook Survey 2014

Commercial Oyster Aquaculture

14. Do you aquaculture cultchless (single) oysters? Yes ○ No ○

15. Do you re-sell oyster seed? Yes ○ No ○

16. Do you have a "cooperative" agreement with another oyster producer who will likely be reporting the number of market oysters sold (Question 17.f.) Yes ○ No ○

Cultchless (single) Oyster Aquaculture

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

17. 2013 Commercial Single Oyster Aquaculture

a) # Oyster seed planted

   i. % diploid

   ii. % triploid

b) % Planted seed purchased from out-of-state

c) # Seed sold

d) % Seed sold out-of-state

e) Avg. price of seed sold ($ per 1,000)

f) # Market (non- seed) oysters sold

   i. % wholesale

   ii. % retail

g) % Market oysters sold out-of-state

h) Avg. price per market oyster ($ per piece)

   i. Avg. price wholesale

   ii. Avg. price retail

i) # Full-time help

j) # Part-time help

Virginia Shellfish Grower Situation & Outlook Survey 2014

Commercial Cultchless (single) Oyster Aquaculture

18. 2014 *ESTIMATED* Commercial Single Oyster Aquaculture

a) # Oyster seed planted

   i. % diploid

   ii. % triploid

b) % planted seed purchased from out-of-state

c) # Seed sold

d) % Seed sold out-of-state

e) Avg. price of seed sold ($ per 1,000)

f) # Market (non- seed) oysters sold

   i. % wholesale

   ii. % retail

g) % Market oysters sold out-of-state

h) Avg. price per market oyster ($ per piece)

   i. Avg. price wholesale

   ii. Avg. price retail

i) # Full-time help

j) # Part-time help

19. Comments or Explanatory Notes on 2013 & 2014 Commercial Single Oyster Aquaculture:

Virginia Shellfish Grower Situation & Outlook Survey 2014

Thank You

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

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

***If yes*, please fill out the contact information below** Yes ◯ No ◯

22. Contact Information (Optional)

***At a minimum, please provide the zip code so the report can inform where production is occurring.**

Name	
Company	
Address	
City, State, Zip	
Telephone	
Email	

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

Appendix 2: Hatchery Survey

Virginia Shellfish Hatchery Situation & Outlook Survey 2014

Welcome

Thank you for taking a few minutes to complete the following commercial shellfish hatchery 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 hatcheries and growers.

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Virginia Shellfish Hatchery Situation & Outlook Survey 2014

Shellfish Hatchery Production

1. 2013 Clam and Oyster Hatchery Production

a) # Clam seed produced

b) # Clam seed sold

c) % Clam seed sold out-of-state

d) # Oyster eyed larvae produced

e) # Oyster eyed larvae sold

i. % diploid

ii. % triploid

f) % Oyster eyed larvae sold out-of-state

g) Ave price per million oyster eyed larvae sold

i. diploid

ii. Triploid

h) # Single oyster seed produced

i) # Single oyster seed sold

i. % diploid

ii. % triploid

j) % Single oyster seed sold out-of-state

k) # Full-time help

l) # Part-time help

2. 2014 *ESTIMATED* Clam and Oyster Hatchery Production

Please indicate any changes in production, sales and employment expected for 2014. If no changes are expected, please write "same".

Virginia Shellfish Hatchery Situation & Outlook Survey 2014

3. Comments or Explanatory Notes on 2013 & 2014 Commercial Shellfish Hatchery:

4. Please provide any comments on the shellfish hatchery situation.

Thank You

5. Contact Information (Optional)

Name	
Address	
City, State, Zip	
Telephone	
Email	

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

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