Cost Assessment of Oyster Seed Bedding in Louisiana

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Abstract

Louisiana is the leading state in the nation for oyster production. Seed bedding is a means of oyster production where oyster farmers in Louisiana harvest seed oysters from public grounds and transport or "bed" them to their private leases. Natural seed production is unreliable, therefore other methods of oyster production are being investigated. It is important to document the cost of seed bedding to later compare against new technologies and ensure the change was economically efficient. A survey was conducted to document the costs of seed bedding, as well as measure the potential for other oyster production methods in Louisiana. It costs an average of $6.00 per barrel to bed seed. Responded oystermen show remote setting as a viable alternative to seed bedding for oyster production in Louisiana.

Introduction

Oysters are an important part of the Louisiana coastal economy. Oyster production provides many jobs, not only for the grower but also for the dealer, shipper, seller, processor and many more individuals. Louisiana has become the leading state for oyster production in the United States. In 2008 alone, Louisiana produced over 5 million kilograms of oysters (shucked meat), with a dockside value of over $38 million (NMFS 2010). Louisiana has 1.7 million acres of public oyster grounds (LDWF 2010b).

Natural oyster seed production is cyclical (Figure 1). Louisiana oyster seed production decreases with periods of drought and low Mississippi River discharge and increases with periods of high rainfall and river discharge. Due to this highly variable production of oyster seed, which is dependent on weather and environmental factors, the oyster industry is never guaranteed a reliable source of seed.

In Louisiana, the oyster industry relies primarily on seed bedding to produce market oysters. Oyster farmers harvest wild oyster seed from public grounds and transport or "bed" it to their private leases, where it remains until it reaches market-size. Melancon and Condrey (1992) report on the economics of this seed bedding process in Louisiana in 1988 dollars. They found that the expenses of bedding seed oysters averaged $4.04 per Louisiana barrel (one barrel is equivalent to two sacks), with a range from $2.52 to $5.14.

Remote setting is a process which can increase the production of oyster seed utilizing hatchery technology. It has added benefits of producing disease-resistant oysters and sterile triploid oysters, which produce a superior product than natural diploids in the summer months. The goal of this research is to document the costs to Louisiana oyster farmers associated with seed bedding as a means of oyster production and determine oystermen's willingness to participate in remote setting.

Materials and Methods

To document the costs of seed bedding, surveys were mailed out to select members of the Louisiana Oyster Dealers and Growers Association and the Oyster Commodity Group Members of the Louisiana Farm Bureau Federation. The survey asked questions to gather current information about investment costs, fixed costs and production costs of seed bedding, as well as other relevant information, such as cultch planting. Investment costs questions were formulated

to gather information about vessel operations, as well as harvest gear (i.e., dredges), using both multiple choice and "fill in the blank" styles. Production cost questions gathered information about the costs of bedding seed per boat load and annual costs of maintenance. Production cost questions were all fill in the blank style. Fixed cost questions gathered information about the annual costs of leases, licenses, insurance and dockage for vessels; these questions were both multiple choice and fill in the blank style. Other relevant information was gathered about planting seed and cultch planting. One theoretical question was asked about buying seed as a means of measuring the potential of remote setting.

Surveys were mailed initially using Louisiana Oyster Dealers and Growers Association envelops and addressed to specific individual members rather than anonymous addressees (e.g. "dear neighbor" or "dear business owner"). Included with the survey was a cover letter encouraging members to participate, as well as a stamped envelope for the survey's return. On day 8 of the survey period, another replacement survey was mailed out to the same individuals with a stamped envelope for return and a cover letter thanking individuals who had already replied.

The survey was created using suggestions from Dillman *et al.* (2009) about formatting and question style (ie. multiple choice, fill in the blank etc.) as well as knowledge about the Louisiana oystermen being surveyed.

Results

Survey mailings had a 29% return; 15 of the 52 individuals surveyed responded. Two of the responses gathered no data about seed bedding, since recipients did not bed seed. Therefore, all data is based on the replies from 13 individuals (n=13). Not all participants answered every question; therefore, all answers are based off the 13 participants unless noted otherwise.

Investment Costs

Investment cost questions gathered information about vessels. Sixty two percent of responding oystermen use one vessel to bed seed, 15% use 2 vessels, 15% use 3 vessels and 8% use 20 vessels (i.e.: one respondent). Vessel size varied from 39% of responded oystermen using 51-60 foot vessels to 4% using 31-40 foot vessels (Figure 2). Vessel capacity shows 33% of vessels used by surveyed oystermen have a capacity of more than 600 barrels of oysters and 29% have a capacity of 201 to 300 barrels of oysters (Figure 3). The majority of the vessels, 73%, were built by the oystermen, while only 27% were purchased. Vessels were acquired from1965 to 2008, with most vessels acquired in the mid-1980s. Most oystermen, 68%, expect their vessels to last over 21 or more years, with 24% expecting to last from 11 to 15 years and 9% from 16 to20 years. It cost 32% of participants less than $200,000 to build or buy their vessel and 32% <$300,000 to build or buy their vessels (Figure 4).

Dredge Costs

Information about oyster dredges was also gathered. All oystermen surveyed use two oyster dredges per vessel to harvest seed oysters, which were purchased within the last three years. On average, dredges cost $1,000 ± $407 (n=12). Oyster dredges are purchased each year by 54% of the participants, every three years by 23% and every 2 years by 23%. Dredge repairs cost an average of $1,011 ± $782 (n=11) annually. High dredge repair costs may result from oystermen owning more than two dredges per vessel, so when some dredges are being repaired they are ensured two working dredges per vessel.

Production, Annual Variable and Annual Fixed Costs

There are many expenses associated with seed bedding. Production costs per boat load, averaged $1,216, and include labor (n=9), groceries and galley supplies (n=11), vessel fuel (n=11), oil and

grease (n=11) and propane and ice (n=10) (Table 1). Annual variable costs average $22,385 and include vessel, equipment and engine maintenance, as well as dredge repairs (n=11) and poles to mark lease boundaries (Table 1). Annual fixed costs averaged $19,855 and include lease costs (n=10), licenses (n=10), insurance (n=10), crop insurance (n=8) and dockage for vessels (n=9) (Table 1).

Other Information

The majority, 92%, of oystermen plant seed from both public and private leases, with public: private percentage ratios from 20:80 to 95:5. Fifty-six percent of oystermen plant seed from September to December (Figure 5). On average, 38 ± 18 (n=11) bedding trips are made per year by an oysterman. Oystermen use an average of 9 ± 3 (n=10) leases per year to bed seed. Oystermen travel an average of 30 ± 39 (n=9) miles to bed seed. Estimates of seed verses cultch percentage per vessel load are made during each trip by 67% of surveyed oystermen (n=12); these estimates are made 33% of the time by counting a subsample of oysters by volume, while 67% are made by guessing (n=12). The survey revealed that between 50-80% of a vessel load is seed (n=10). The average return from bedding a load of seed varies from <1 sack harvested per sack bedded to >5 sacks harvested per sack bedded, with 30% of the respondents answered <1 sacks harvested per one sack bedded (n=10) (Figure 6).

Cultch Planting

Of the 13 individual survey responses, 10 individuals plant cultch. All 10 individuals plant cultch themselves, while 2 also hire a contractor. The most prevalent type of cultch used is crushed concrete, followed by oyster shell and limestone; gravel, rock, brick and clamshell are also used as cultch. Annually, 30% of surveyed oystermen plant 2001-3000 cubic yards of cultch (n=10) (Figure 7). The cost of planting cultch averages $32 ±$19 per cubic yard (n=5).

The average return on investment from planting cultch showed 30% harvest >5 sacks per cubic yard cultch planted (n=7) (Figure 8).

A theoretical question about buying seed was asked. The results showed the worth of a boatload of spat-on-shell averages $3,083 ± 1,917(n=6). In order to obtain the worth of a barrel of spat-on-shell to compare to seed production costs, the average worth of $3,083 of a boatload of spat-on-shell was divided by the median vessel capacity of 400 barrels. This results in an average value of $7.70 for a barrel of spat-on-shell.

Costs

In order to determine the cost of seed bedding per barrel, first annual variable costs and annual fixed costs are added, giving an average total cost of $42,240. This was then divided by 38, the average number of bedding trips per year, for a value of $1,112, which was then added to the average production cost per load of $1,216, for a total average cost per boat load of $2,328. Vessel capacity will affect the cost of seed bedding per barrel. This study determined that vessel capacity ranged from 201 to over 600 barrels. The median of 400 barrels was used to divide the average total cost, resulting in an average cost of $6.00 per barrel to bed seed in Louisiana (Table 2).

Data in the literature was brought up to present dollar value by multiplication of an inflation factor. Melancon and Condrey (1992) data in 1988 dollars was multiplied by the inflation factor of 1.7476 (DNR 2010). This gives an average cost of seed bedding of $7.06 per barrel, with a range from $4.40 to $8.98.

Discussion

Overall, this survey had acceptable return of 29%. Dillman *et al.* (2009) noted an acceptable 8% return on mail-in surveys to businesses. The Louisiana Department of Wildlife

and Fisheries' mail-in survey sent to individuals with hunting licenses had a 25% response (LDWF 2010b). Survey return numbers could be attributed to the fact that they were mailed to specific individuals rather anonymous addressees (e.g. "dear neighbor" or "dear business owner"). This helps to personalize the survey, in turn making individuals more likely to participate. Surveys were also mailed in Louisiana Oyster Dealers and Growers Association envelopes, which are familiar to most recipients and provide further encouragement for completion of the survey. These factors also made it more likely that recipients would open the envelope instead of simply discarding.

This survey documents the costs associated with seed bedding, as well as additional information about bedding and cultch planting. This data showed that the cost of seed bedding per barrel is $6.00. This data is less than Melancon and Condrey (1992) reported value of $7.06 per barrel, adjusted for inflation. Although higher, this may be due to inflation factor error. Since the inflation factor is for the entire United States; Louisiana or the Gulf region inflation may not be as high. This survey also showed the worth of a purchased barrel of spat-on-shell is $7.70, greater than both seed bedding production cost estimates. This information also shows that remote setting may be an acceptable alternative for production of oysters in Louisiana. Future analyses can be compared to the cost of seed bedding when new technologies are implemented for the production of oysters. A comparison of new versus old production methods is important to determine economic change.

As a result of this research, an accounting tool for the documentation of seed bedding was created as a Microsoft Excel spreadsheet. This tool will aid in recording costs associated with seed bedding and standardize documentation.

If seed could be produced via remote setting for purchase by oyster farmers, this may be an acceptable alternative to seed bedding. Such seed production would guarantee farmers a reliable source when natural production is low. It can also produce an oyster resistant to disease and sterile triploids, therefore producing a superior product than what nature can provide.

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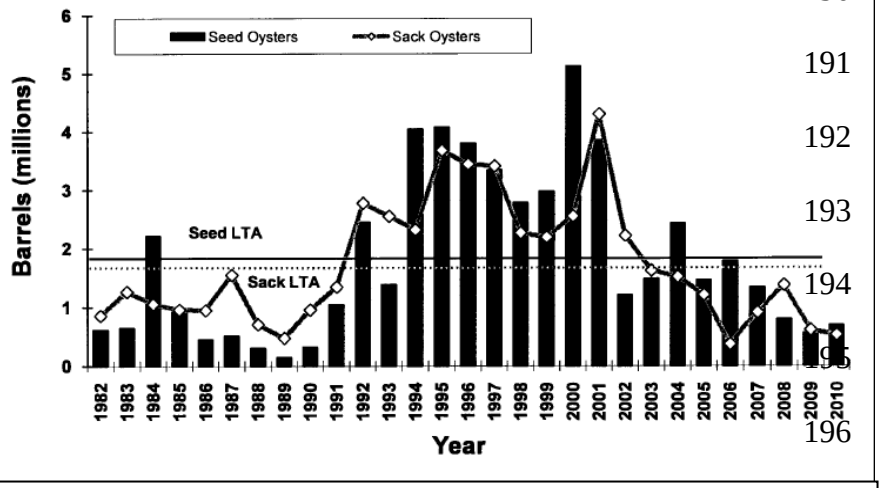

Figure 1: Historical Louisiana oyster stock size on public oyster areas. LTA denotes long-term average from 1982-2009. LA Department of Wildlife and Fisheries Annual Stock Assessment (LDWF, 2010a).

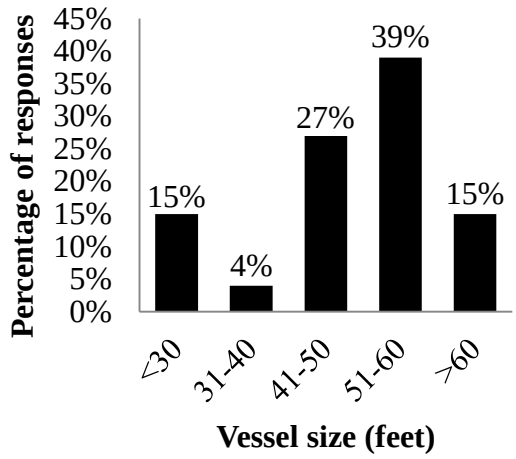

Figure 2. Size of vessels (feet) used to bed seed by percent of oystermen responses.

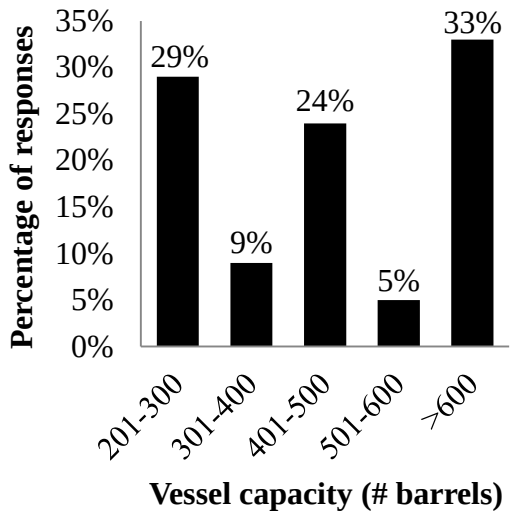

Figure 3. Capacity of vessels (barrels) used to bed seed by percent of oystermen responses.

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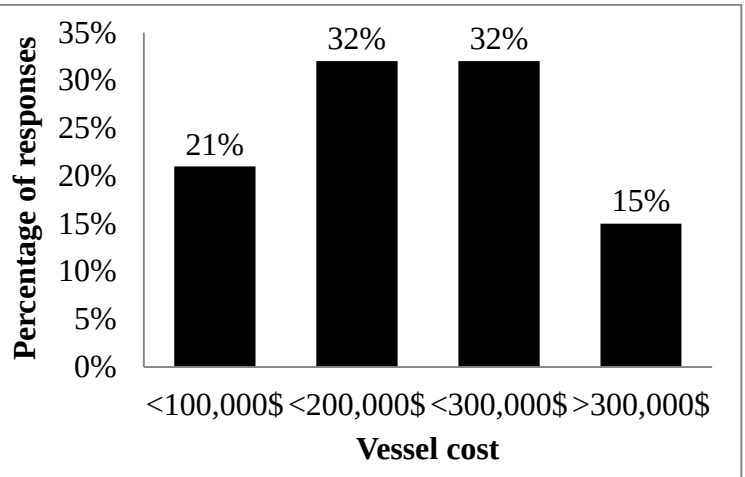

Figure 4. Cost of vessels used to bed seed by percent of oystermen responses.

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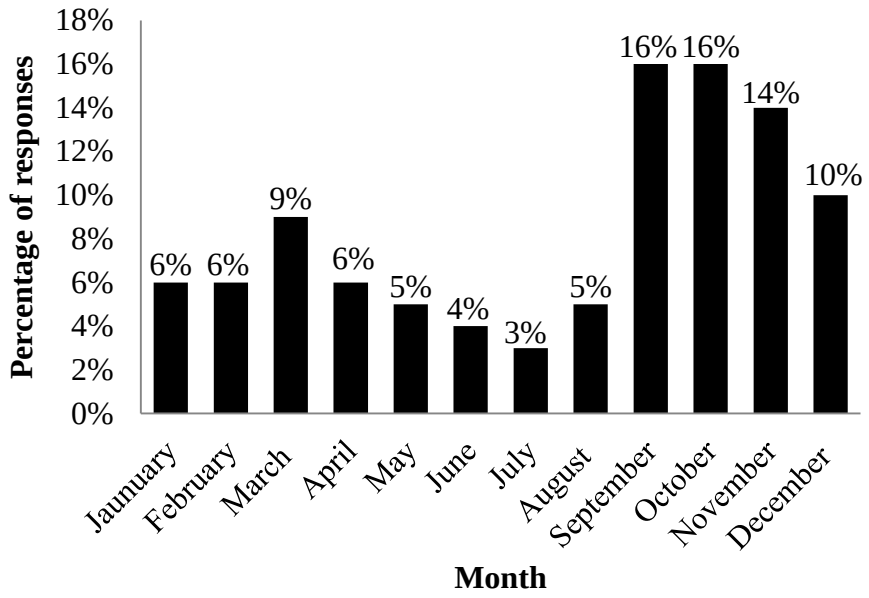

Figure 5. Percent of responded surveyed oystermen that plant seed each month.

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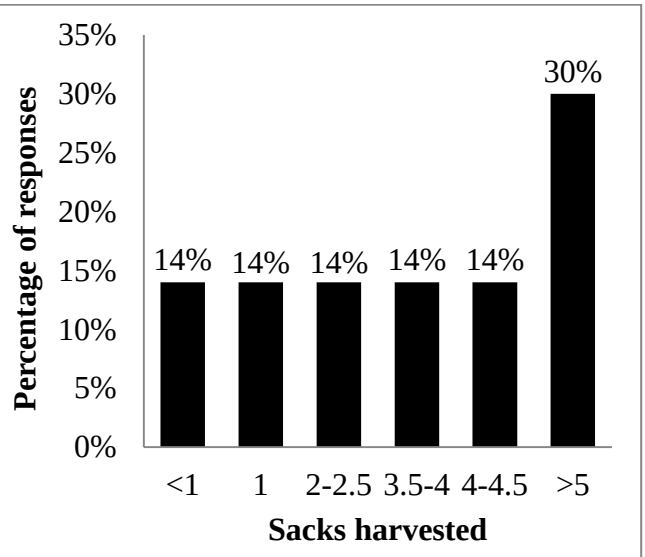

Figure 6. Average number of sacks harvested per sack bedded by percentage of surveyed oystermen

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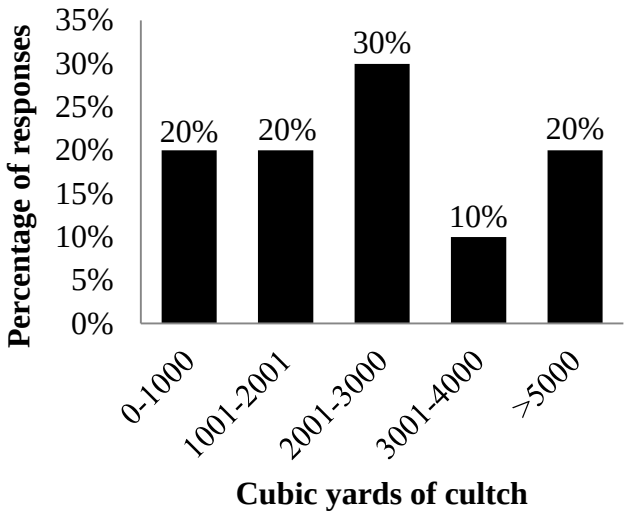

Figure 7. Cubic yards of cultch planted annually by percent of oystermen responses.

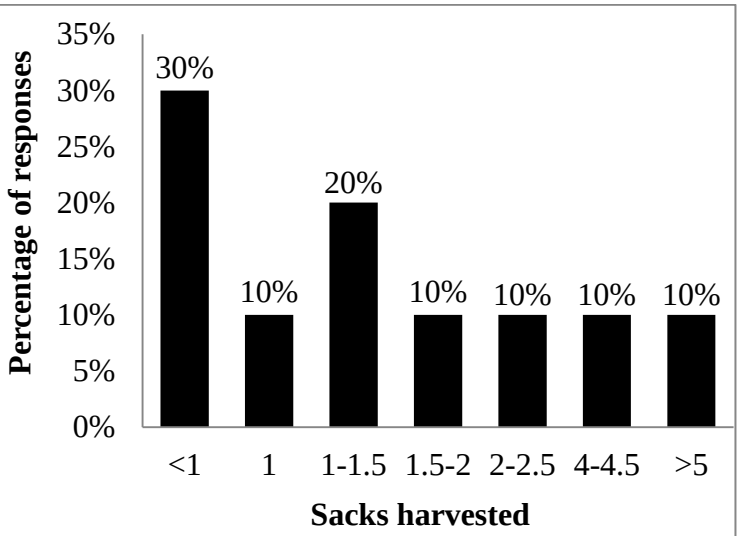

Figure 8. Average number of sacks harvested per cubic yard of cultch planted.

Table 1. Expenses associated with seed bedding. Data from 13 participants.

Costs	Average	SD
Annual variable costs		
dredge repairs*	1,011	782
vessel maintenance	9,577	5,972
equipment maintenance	5,538	3,388
engine maintenance	2,682	1,901
poles to mark lease boundary	3,577	3,141
Total	22,385	
Annual fixed costs		
lease costs**	3,530	1,616
licenses *	845	527
Insurance**	11,625	5,437
crop insurance****	2,844	2,389
dock or slip***	1,011	284
Total	19,855	
Production costs per boat load		
Labor***	598	356
Groceries and galley supplies*	157	150
vessel fuel*	411	243
oil and grease*	43	37
propane and ice**	7	9
Total	1,216	

*denotes n=11 **denotes n=10 ***denotes n=9 ****denotes n=8

Table 2. Calculation to determine cost of seed bedding per barrel.

	Average
Annual costs	$22,385
Annual fixed costs	$19,855
Sum	$42,240
Bedding trips/year	38
Quotient	$1,112
Production cost/ boat load	$1,216
Sum	$2,328
Vessel capacity (barrels)	400
Quotient (cost of seed bedding/ barrel)	$6.00