

Cultch Study
Scaled vs. Non-Scaled Oyster Shells
by Colleen Smith and Bob Lewis

Abstract

The study compares natural oyster larval strike (spatfall) success on two variant culches—shells directly from shucking houses, also known as green shell, and the same shells with the treatment of scalding. Shells used for this study had to be identical in each trap so as to make accurate comparisons of the data collected. This study provides numerical data on wild spatfall on two variations of oyster shells from the same shucking house—one being the shells that have had no treatments and the other being shells that have been scalded.

Results of the study showed that scalded shells recruited 7% less spatfall than the non-scaled shells. The extent of this study was limited to one study site that had historically high spatfall nearly every year. The study was also limited by the number of traps, with four traps having scalded shells and four non-scaled shells. The variance within each type of traps was significant, suggesting other factors might have impacted the study. Therefore, the conclusion is that spatfall likely does not vary appreciably between scalded shells and non-scaled shells. Additional study is needed.



Julia Wright taking and recording water quality readings at Seminary Point. Julia is a senior in the GMHS STEM Academy.

Background

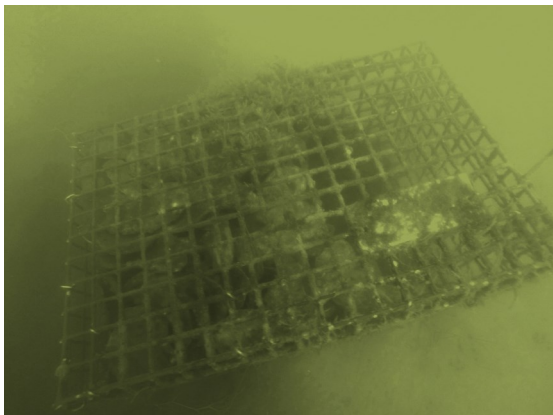
In order to reap the best benefits of the oyster population in the St. Mary's River, the watermen have been closing off a section (approximately 10 to 15 acres) of the public harvest bottom for a few years, and shelling the area with 20,000 bushels of oyster shells. In this way the "reserve area" recruits significantly more natural spatfall than adjacent unshelled bottom. This process has allowed the watermen to harvest significantly greater quantities of oysters, maybe 3,000 bushels, more or less, from the reserve area in the third or fourth year after shelling. Without this shell application, the area likely would provide a few hundred bushels harvest annually at most. [Kelley, Trossbach] However, in a February 2020 oyster recruitment study planning meeting, watermen claimed that the scalded shell does not strike as well as non-scalded shells. [Hite] Therefore, watermen claimed it was important that shells used in traps to study spatfall in the tidal St. Mary's estuary, should not be scalded.

Implementation

To test the watermen's claims, eight cages (12"x 18" x 8") each filled with 8.375 liters of shells (measured with a bucket). The shells varied in size. Therefore a volume measurement was chosen over a count of shells. All oysters shells used in the study were wild grown, aged shells that all came from the same shucking house.



Four cages were filled with scalded shells that were power washed and then boiled for ten minutes, while the other four cages were filled with shells that were power washed but not boiled. Two chain of custody forms were completed in order to track each trap throughout the study thus insuring accuracy. Each form tracked two pairs of traps—two traps with scalded

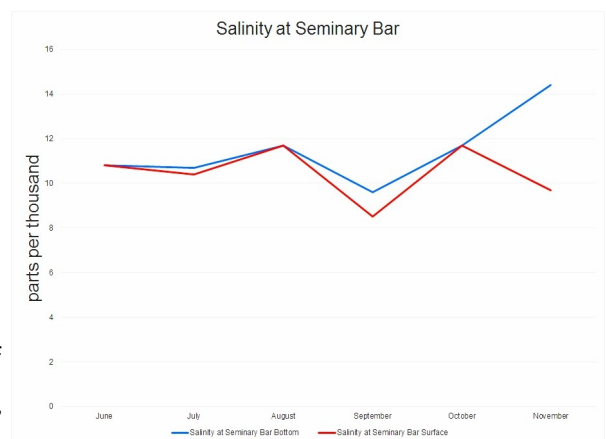
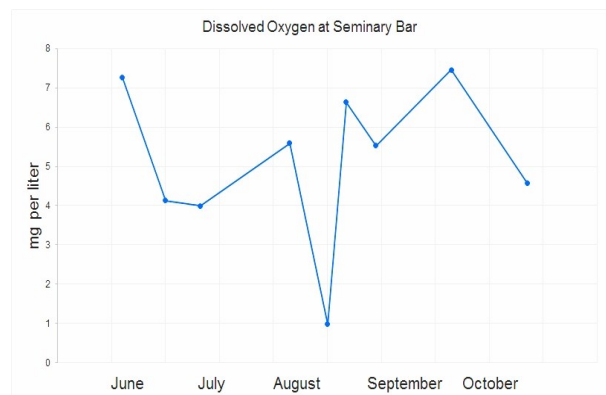
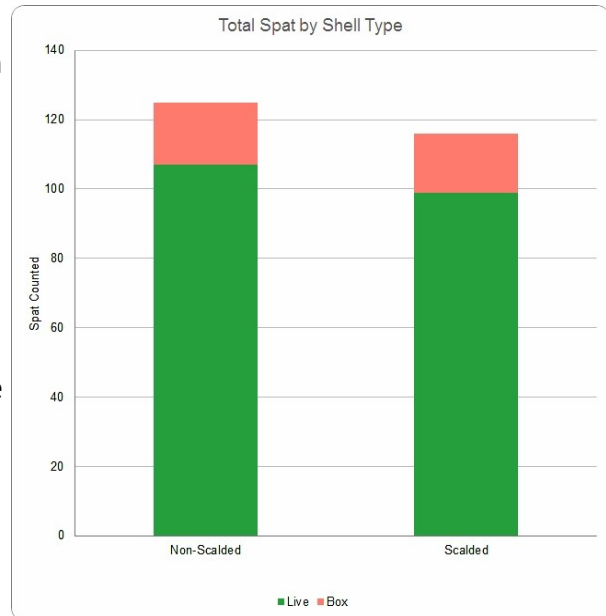


shells and two with non-scalded shells. The eight cages were deployed on June 18th, 2020, 9:40 a.m. at Seminary Bar (N 38.18857 W -076.43580) in pairs of traps containing either scalded or non-scalded shells. Black cable ties labeled the traps that held scalded shells and white cable ties labeled the traps that held non-scalded shells. The cages were placed in a line perpendicular to the shore beginning at a depth of 5 feet MLW (mean low water) and ending at 8 feet MLW.

The two pairs of cages (4 cages) closest to shore were retrieved on September 30th, 2020 at 14:30 EDT and the other two pairs of cages from deeper waters were retrieved on October 7, 2020 at 14:30 EDT. A chain of custody form was completed for each step in order to track each trap throughout the study thus ensuring accuracy. The spat on the shells in each trap was counted on the day the trap was retrieved by Bob Lewis and Colleen Smith and counts for each trap were recorded by size grouping and status (living or dead). (A dead oyster is commonly referred to as box or scar.) Size groupings were 10mm and under, 11mm to 25mm, and over 25mm. Once a trap count was completed by either Bob or Colleen, the other person (Colleen or Bob) would inspect all shells in order to assure accuracy.

The non-scalded shells in four traps had a greater total spat count than the four traps with scalded shells—125 versus 116 respectively—or a 7% difference. Comparing paired cages revealed a somewhat mixed result with the two cages nearest to shore having more spat in the non-scalded shell trap; the next two cages moving offshore had more spat in the scalded trap. The four traps furthest offshore did have more spat in each of the paired traps with non-scalded shell although it was merely one spat difference in the deepest pair of cages. This mixed result suggests that the shell type may not be a factor. It was concluded that there was likely no difference in the strike depending on the shell type.

A persistent algae bloom that occurred August 5 through to September 15 caused low oxygen levels, especially at the bottom of the river. At Seminary Bar, the dissolved oxygen level was recorded at 0.98 mg/L at the bottom of the river and 4.85 on the surface on August 17th,



which was the lowest reading we recorded. A healthy oxygen level returned after several days and was 6.6 mg/L on August 24. There was also a decline in salinity levels August into September due to the extreme rainfall events. Areas within the watershed received between 24 and 28 inches total rainfall in August. On September 2nd, the salinity was recorded at 8.5 parts per thousand (ppt) at the bottom and 9.6 ppt at the surface. Mortality in the traps was slightly higher in deeper water as might be expected—low dissolved oxygen level were somewhat persistent in waters deeper than 8 feet MLW, the outer depth where our traps were deployed.

Conclusion

In total, there were 241 spat counted from both sets of cages, and of those 241 spat, 35 were dead. This 15% mortality rate is within expectations when considering historic annual fluctuations and long term average mortality on natural bars in the area.

The experiment was implemented on just one site and utilized only four replicates of each shell type. No strong evidence supports the argument that the scalded shell is a less suitable culch than non-scalded shell for oyster recruitment studies or in the wild. Based on the limited data collected, the premise by the watermen that “scalded shell does not strike well” cannot be validated nor refuted. More experiments need to be conducted with many more replicates deployed in several areas and repeated through several spawning seasons.



Shells with wild-caught spat from the traps at Seminary Bar

Primary Sources

Hite, Brian - Waterman is the chair of the County Oyster Committee (an advisory board to MD DNR). Comments from a February 24, 2020 meeting at the Muldoon River Center.

Kelley, Craig - Ridge waterman has worked in the St. Mary's River for over 55 years. Kelley is a former chair of the County Oyster Committee (an advisory board to MD DNR) and was chair for the period from July 2016 until July 2018. Interviewed by Bob Lewis on January 11, 2018 and June 17, 2018 at his dock and at the St. Mary's College of Maryland waterfront respectively.

Trossbach, William "Bill" - Drayden waterman has worked in the St. Mary's River for over 60 years. Interviewed by Bob Lewis on December 18, 2018 at St. Mary's College of Maryland Glendenning Hall.

* * * * *

2019 RECRUITMENT SURVEY

FIELD DATA SHEET

Not Scalded
Whiteable Toe
TRAP ID NS 1

DATE 9/30/20

TIME 3:30 PM

PAGE # 1 of 1

WHO Bob & Colleen

Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1			1			
2			2			
3			1			
4			1			
5		0			1	
6		1				
7			1			
8			2		1	
9			1			
10	1					
11					1	
12			1			
13			1			
14					1	
15	1					
16			1			
17			1		1	
18					1	
19			1			
20					1	
21					2	
22	1					
23			1			
24					1	
25	1		1			
26			1			
27	0	3				
28	1				1	
29						
30						

2019 RECRUITMENT SURVEY

FIELD DATA SHEET

Not Scalded
white cable tie

TRAP ID

NS 2

DATE

9/30/20

TIME

4:00 PM

PAGE #

1 of 2

WHO

Bob & Colleen

Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1					1	
2			1			
3	1					
4			1			
5	1					
6	1		2		1	
7					1	
8					1	
9					1	
10			1			
11	1					
12					1	
13	1					
14			1			
15			1			
16					1	
17			1			
18			1			
19			1			
20					1	
21	1					
22			1			
23		1				
24			2			
25			1			
26					1	
27	1					
28			1			
29			1			
30			1			

2019 RECRUITMENT SURVEY
FIELD DATA SHEET

TRAP ID NS2

PAGE # 2 of 2

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
61			2			
62			1			
63	1					
64					1	
65					2	
66			1			
67					1	
68				1		
69					1 (46)	
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						
82						
83						
84						
85						
86						
87						
88						
89						
90						

2020 RECRUITMENT SURVEY

FIELD DATA SHEET

TRAP ID NS # 3 white cable tie

DATE 10-7-2020

TIME 2:40
~~11:00~~ PM

PAGE # 1 of 1

WHO Colleen Smith
Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
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N 38.18857° W 76.43580°

2020 RECRUITMENT SURVEY

FIELD DATA SHEET

TRAP ID MS # 4 *white cable tie*

DATE 10-7-2020

TIME 3:41 PM

PAGE # 1 of 1

WHO Colleen Smith + Bob

Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1			1			
2			1			
3			1			
4			1			
5				1		
6			1			
7		2		1		
8					1	
9			1			
10			1			
11					1	
12					1	
13			1			
14						
15						
16						
17						
18						
19						
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23						
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25						
26						
27						
28						
29						
30						

* 34, far shore
1-2, near shore

2019 RECRUITMENT SURVEY

FIELD DATA SHEET

Black Capie Tie
 TRAP ID S1 (Scalder)

DATE 9/30/20 TIME 3 PM

PAGE # 1 of 2

WHO Bob & Colleen
 Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1			1			
2	1		1			
3					1	
4			1			
5					1	
6			1			
7			1			
8	2					
9					1 (46)	
10	1				1	
11				1		
12					1	
13			2			
14	2					
15			1			
16			1			
17			2			
18			2		1	
19			0		1	
20			1			
21					1	
22			1			
23			1			
24			2			
25			2			
26					1	
27					1	
28			1			
29			1			
30			1			

2019 RECRUITMENT SURVEY
FIELD DATA SHEET

TRAP ID S1

PAGE # 2 of 2

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
361		2			1	
62	1		1			
63			1			
64			1			
65					1	
66			1			
67			1	2		
68			1			
69					1	
70					1	
71	_____					
72						
73						
74						
75						
76						
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2019 RECRUITMENT SURVEY

FIELD DATA SHEET

Black
Castle TIE

Scalped

TRAP ID

52

DATE

9/30/20

TIME

4:30 PM

PAGE #

1 of 2

WHO

Bob & Colleen

Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1						1
2					1	
3					1	
4			1		1	
5					1	
6					3	
7			1			
8				1		
9			2			
10			1			
11			1			
12	1					
13			2			
14			2			
15					1	
16					1	
17					1	
18			1			
19					1	
20					1	
21				1		
22					1	
23					1	
24					1	
25			0	1		
26			1		1	
27			1			
28			2		1	
29			1			
30			1			

2019 RECRUITMENT SURVEY
FIELD DATA SHEET

TRAP ID 52

PAGE # 2 of 2

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
61				1		
62			1		2	
63	1					
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
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89						
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2020 RECRUITMENT SURVEY

FIELD DATA SHEET

TRAP ID S # 3 *black cable tie*

DATE 10-7-2020 TIME 3:13 PM

PAGE # 1 of 1

WHO Colleen Smith
Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1		1				
2			2			
3		3				
4		1				
5		1				
6			2			
7		1				
8			1			
9			1			
10			1			
11			1		1	
12			1			
13						
14						
15						
16						
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27						
28						
29						
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2020 RECRUITMENT SURVEY

FIELD DATA SHEET

TRAP ID S #4 black cable tie

DATE 10-7-2020 TIME 3:27 pm

PAGE # 1 of 1

WHO Colleen Smith
Print all names

Record the total number of spat on each shell in the appropriate size category: (more spaces on reverse side)

SHELL NO.	LIVE 0 to 10 mm	BOX 0 to 10 mm	LIVE 11 to 25 mm	BOX 11 to 25 mm	LIVE over 25 mm	BOX over 25 mm
1			1			
2					2	
3			1			
4			3		1	
5			1			
6					1	
7					1	
8			1			
9			1			
10	1					
11			1			
12						
13						
14						
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28						
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CHAIN OF CUSTODY

Name of study: Culch Study 2020

Page 1 of 2

General description of item(s): Cages with shells inside

Item ID	Date Prepared	Time Prepared	Date Retrieved	Time Retrieved	Comments
NSI	6-4-20	10:00	9-30-20	15:20	
SI	6-6-20	9:50	9-30-20	15:20	
NS2	6-4-20	10:00	9-30-20	15:20	
S2	6-6-20	10:05	9-30-20	15:20	
Relinquished By	Date	Time	Received By	Date	Time
MC	6-4-20	10:10	BR	6-4-20	10:10
BR	6-6-20	10:35	BR	6-6-20	10:35
BR	6-18-20	9:00	JW	6-18-20	9:00
JW	6-18-20	9:40	Deployed in River	6-18-20	9:40
River	9-30-20	14:30-17:00	CS	9-30-20	17:00
CS	9-30-20	17:20	Warehouse	9-30-20	17:20
Warehouse	10-7-20	15:45	CS	10-7-20	15:45
CS	10-7-20	16:00	Spot Planted in River	Empty Cages Stored	

NSI & NS2

SI & S2

CHAIN OF CUSTODY

Name of study: Catch Study

Page 2 of 2

General description of item(s): Cages with shells

Item ID	Date Prepared	Time Prepared	Date Retrieved	Time Retrieved	Comments
NS3	6-4-20	10:00	10-7-20	14:30	
S3	6-6-20	10:15	10-7-20	14:30	
NS4	6-4-20	10:00	10-7-20	14:30	
S4	6-6-20	10:25	10-7-20	14:30	
Relinquished By	Date	Time	Received By	Date	Time
MC	6-4-20	10:10	BR	6-4-20	10:10
BR	6-6-20	10:35	BR	6-6-20	10:35
BR	6-18-20	9:00	JW	6-18-20	9:00
SW	6-18-20	9:40	Deployed in River	6-18-20	9:40
River	10-7-20	14:20	CS	10-7-20	14:20
CS	10-7-20	16:00	Spat Planted in River	Cages cleaned & stored	

NS3 & NS4
S3 & S4
(all four)