

Gear Comparison for Off-bottom Oyster Culture in Florida

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Sea Grant
Florida

Off-Bottom Oyster Gear Comparison



OBJECTIVES

- 1) Document production performance of oysters
- 2) Evaluate floating gear
 - a) Type and placement of floats
 - b) Floating bag vs cage
- 3) Examine effects of biofouling control methods



Location of Field Trials

- Gulf of Mexico off Cedar Key, FL
- Experimental lease within a commercial aquaculture use zone



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Field Trial 1: Float Type & Placement

Ploidy:

3N



Float Type:

Square
Top



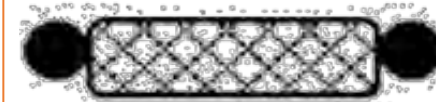
n=12

Square
Side



n=12

Bullet
Side



n=4

Timeframe:

Land-based Nursery

Field-based Nursery

Growout – SUMMER 2017



Spawn

6.0 months

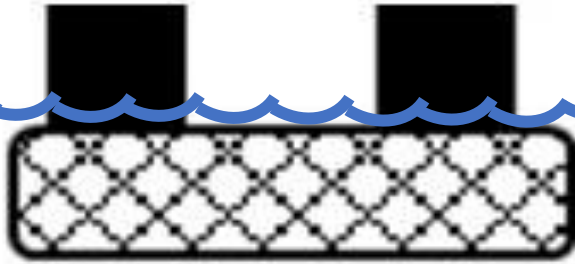
1.5 months

5.5 months

From Spawn to Harvest – 13 months

Biofouling Control: Weekly Flipping

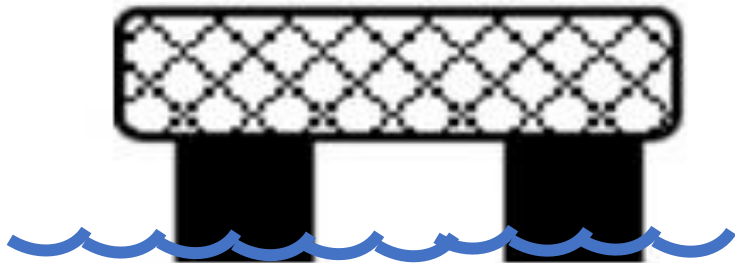
Square - Top



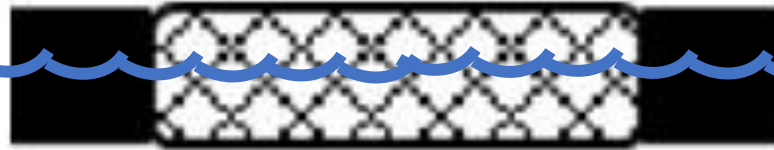
Requires "UNflipping"

Allows air drying

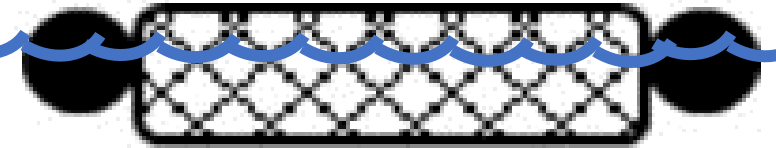
Less fouling?



Square - Side



Bullet - Side



Does NOT require "UNflipping"

➔ Less labor and less \$

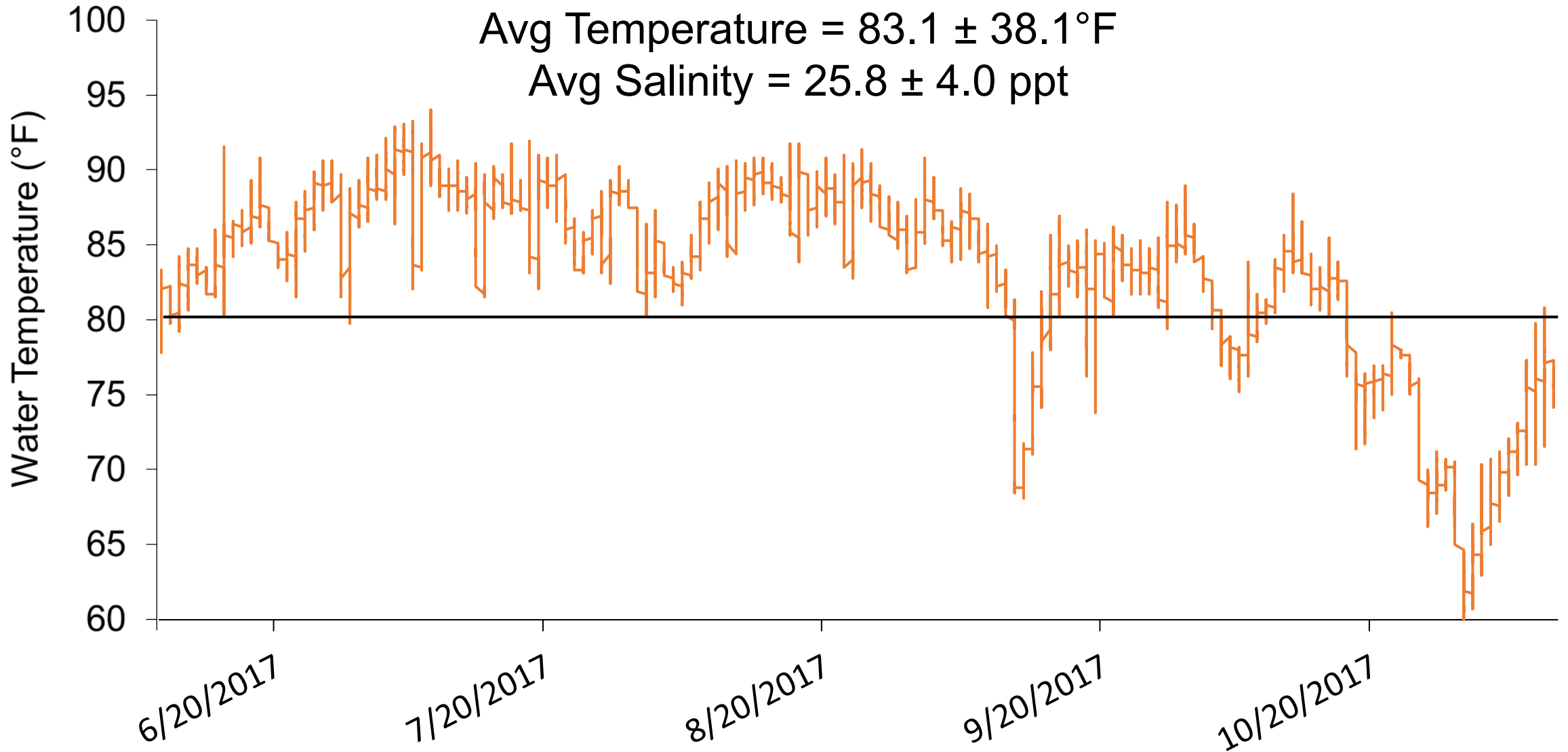
Stocking Information

- Size: 48 mm (1.9 inches) SH
- Density: 150 oysters / bag
- 14 mm Vexar bags

Temperatures, June - November 2017

Avg Temperature = $83.1 \pm 38.1^\circ\text{F}$

Avg Salinity = 25.8 ± 4.0 ppt



Variables Measured: Variables Reporting

- Shell Metrics
 - Shell height
 - Shell length
 - Shell width
- Weight Metrics
 - Total
 - Meat (wet)
 - Meat (dry)
- Condition Index
- Survival
- Biofouling Weight
 - On bags
 - On oysters
- Bag Metrics
 - Oyster volume
 - Oyster height
 - Bag height
- Labor Hours

Fall Spawn_Harvest_11.29.17.csv - Excel

Insert Page Layout Formulas Data Review View Help ACROBAT Tell me what you want to do

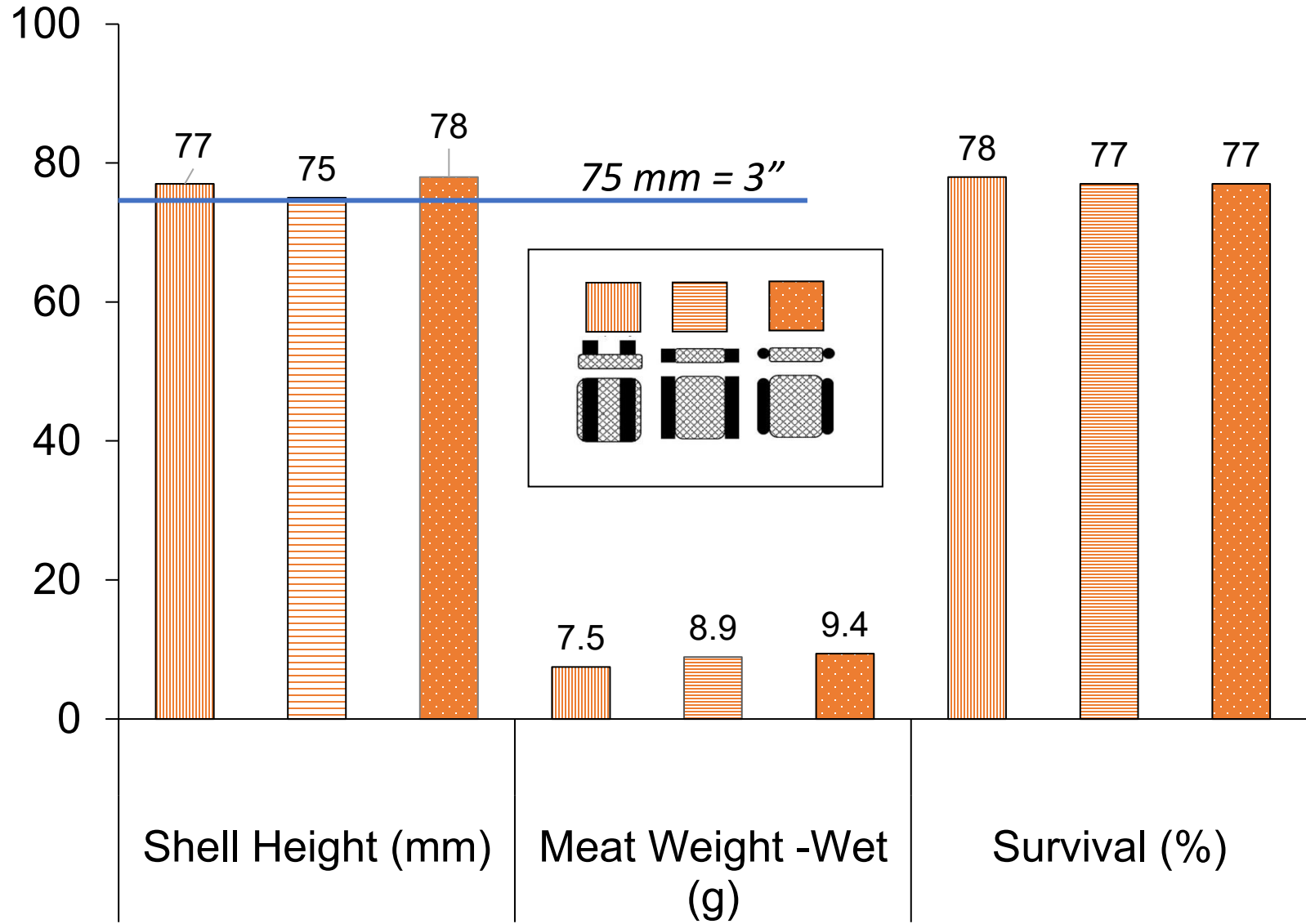
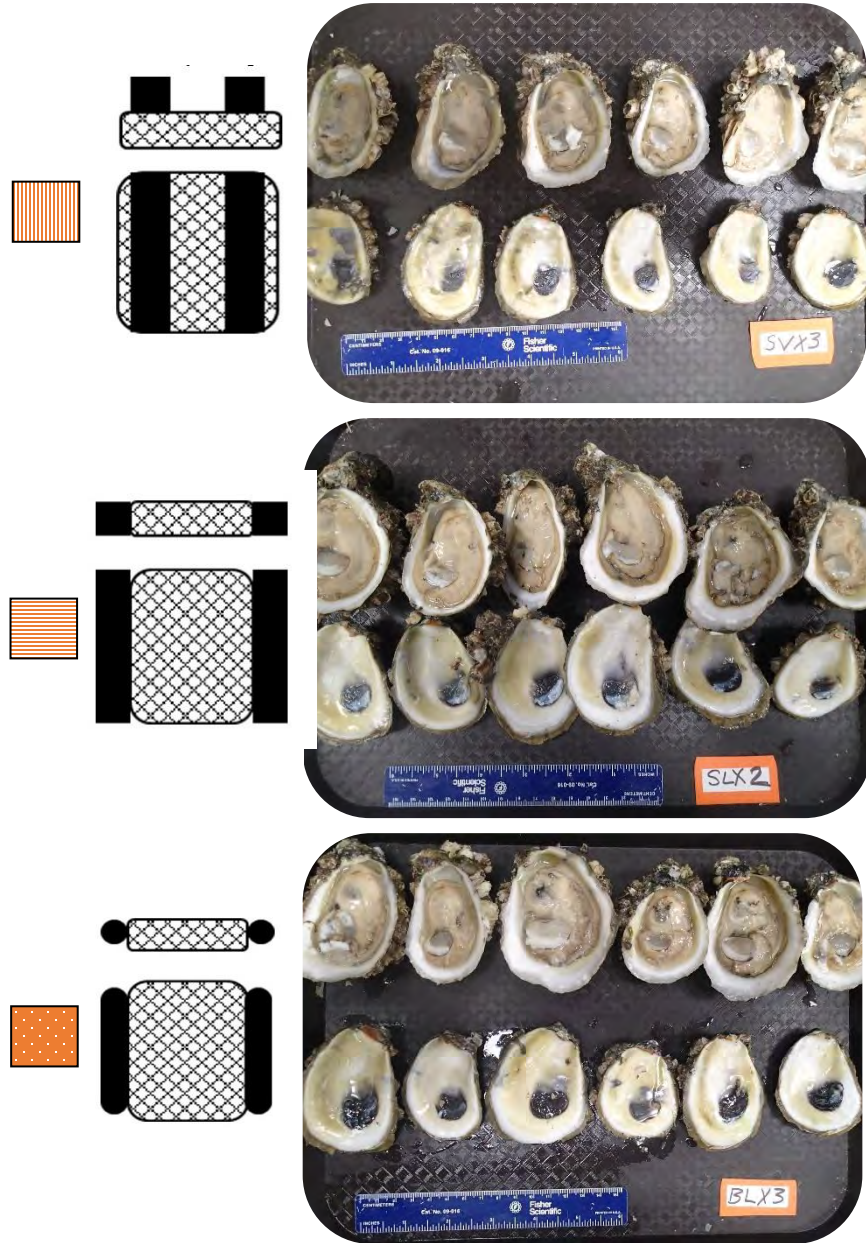
Calibri 11 Font Alignment Number Styles Cells Editing

Formula Bar: 50.1378

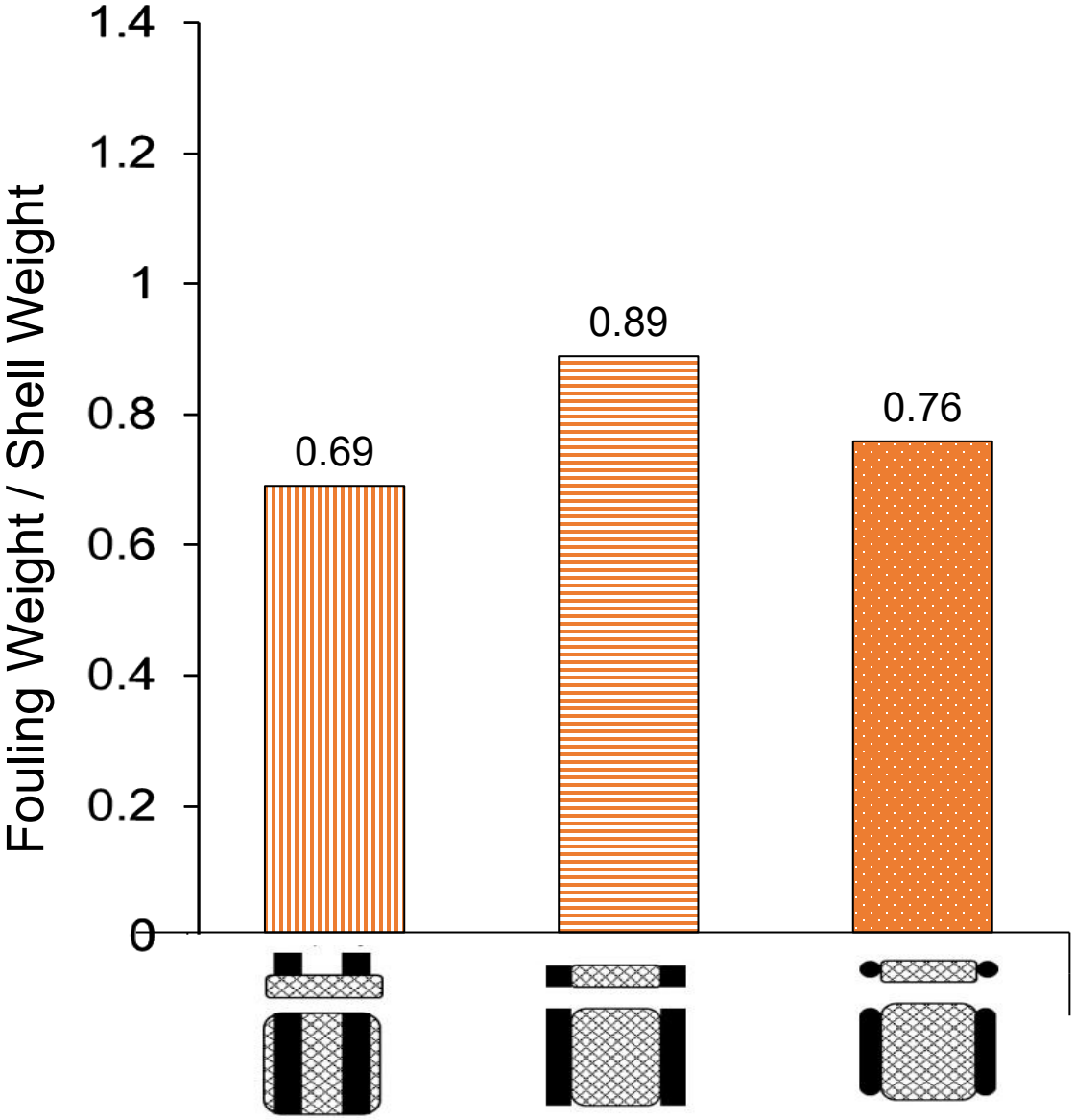
	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
	Float Sha	Float Posi	Paint	SH (mm)	SL (mm)	SW (mm)	TW (g)	MW (g)	Alive	Survival	AsinSqrt S	S Dead	*Notes	Delta SH (Delta SL (r	Delta SW	Delta TW	Delta MW	Bag Weigi	Float Wei	Initial Bag	Delta Bag	3n	
3 s	v	n		68.22	47.5186	26.1132	89.28776	8.23	96	0.64	0.927295		32	21.416	16.06465	9.998	73.64776	5.346	2.88	2.68	0.9	1.98	SH	
3 s	v	n		71.4412	50.2852	27.0186	109.124	9.31	118	0.786667	1.090682		19	24.6372	18.83125	10.9034	93.484	6.426	4.9	2.68	0.9	4		
3 s	v	n		66.5326	46.1636	26.112	88.036	7.37	*77 BAG RIPPED			16*	BAG RIPPE	19.7286	14.70965	9.9968	72.396	4.486	5.24	2.48	0.88	4.36		
3 s	v	n		74.3306	50.4908	29.5276	113.448	7.26	91	0.606667	0.892891		17	27.5266	19.03685	13.4124	97.808	4.376	6.54	2.9	0.9	5.64		
3 s	v	f		77.0312	52.4636	29.085	114.394	10.7	111	0.74	1.035726		24	30.2272	21.00965	12.9698	98.754	7.816	4.9	2.66	0.9	4		
3 s	v	f		72.6154	51.2198	26.5378	129.74	8.79	107	0.713333	1.0058		19	25.8114	19.76585	10.4226	114.1	5.906	6.26	2.4	0.92	5.34		
3 s	v	f		74.048	49.3718	28.6388	108.498	6.46	97	0.646667	0.934254		22	27.244	17.91785	12.5236	92.858	3.576	8.04	4.62 (water	0.9	7.14		
3 s	v	f		73.0016	50.1378	28.1334	126.538	7.21	94	0.626667	0.91346		26	26.1976	18.68385	12.0182	110.898	4.326	9.94	2.98	0.9	9.04		
3 s	v	x		77.8254	52.73	27.8364	122.496	9.24	113	0.753333	1.051055		27	31.0214	21.27605	11.7212	106.856	6.356	6.8	2.62	0.9	5.9		
3 s	v	x								0											0.9	-0.9		
3 s	v	x		78.53	51.8604	28.149	117.582	6.2	126	0.84	1.159279		10	31.726	20.40645	12.0338	101.942	3.316	11.56	4.84	0.9	10.66		
3 s	v	x		74.455	49.9828	27.53	116.46	7.054545	112	0.746667	1.043357		17	27.651	18.52885	11.4148	100.82	4.170545	8.72	3.86	0.9	7.82		
3 s	l	n		69.0016	47.422	27.835	89.734	7.73	124	0.826667	1.141388		20	22.1976	15.96805	11.7198	74.094	4.846	1.08	2.04	0.9	0.18		
3 s	l	n		70.4224	49.4662	26.2092	109.62	7.46	120	0.8	1.107149		23	23.6184	18.01225	10.094	93.98	4.576	1.4	2.86	0.9	0.5		
3 s	l	n		68.6534	50.3884	27.9458	94.048	6.745455	120	0.8	1.107149		22	21.8494	18.93445	11.8306	78.408	3.861455	1.2	1.94	0.9	0.3		
3 s	l	n		77.0662	56.0048	29.4302	130.794	8.5	121	0.806667	1.115535		11	30.2622	24.55085	13.315	115.154	5.616	1.32	1.96	0.9	0.42		
3 s	l	f		71.2168	50.0616	28.8732	101.224	8.52	124	0.826667	1.141388		18	24.4128	18.60765	12.758	85.584	5.636	1.26	2.18	0.9	0.36		
3 s	l	f		65.1356	45.7702	27.724	101.444	7.81	117	0.78	1.082591		23	18.3316	14.31625	11.6088	85.804	4.926	1	1.9	0.9	0.1		
3 s	l	f							*24				*2	BAG REIPPED MANY LOST					1.6	2.34	0.9	0.7		
3 s	l	f		79.8272	57.2958	29.6	132.26	9.37	136	0.906667	1.260328		8	33.0232	25.84185	13.4848	116.62	6.486	1.38	2.12	0.88	0.5		
3 s	l	x		62.4838	43.7852	26.4046	79.424	8.68	107	0.713333	1.0058		37	15.6798	12.33125	10.2894	63.784	5.796	1.08	1.88	0.9	0.18		
3 s	l	x		79.58408	55.96776	30.88265	149.5939	9.9	117	0.78	1.082591		18	32.78008	24.51381	14.76745	133.9539	7.016	1.14	2.04	0.9	0.24		
3 s	l	x		75.05449	52.99306	29.29367	128.9469	7.72	119	0.793333	1.098866		13	28.25049	21.53911	13.17847	113.3069	4.836	1.72	6.7	0.9	0.82		
3 s	l	x		84.10959	58.25286	28.33816	153.1102	9.43	116	0.773333	1.074587		6	37.30559	26.79891	12.22296	137.4702	6.546	1.96	3.8 (water	0.9	1.06		
3 b	b	x		78.2518	51.6748	27.8204	108.5367	9.39	113	0.753333	1.051055		27	31.4478	20.22085	11.7052	92.89673	6.506	5	2.82	0.9	4.1		
3 b	b	x		77.6576	55.1188	30.2904	129.554	9.58	114	0.76	1.058824		20	30.8536	23.66485	14.1752	113.914	6.696	3.4	2.4	0.88	2.52		
3 b	b	x		77.2486	55.1552	28.9102	127.83	9.93	117	0.78	1.082591		15	survival cc	30.4446	23.70125	12.795	112.19	7.046	4.26	2.38	0.9	3.36	
3 b	b	x		78.506	53.4156	29.052	117.564	8.71	120	0.8	1.107149		5	31.702	21.96165	12.9368	101.924	5.826	4.16	3.18	0.9	3.26		
2 s	v	x		57.524	40.1154	22.4728	55.814	4.55	110	0.733333	1.028157		19	17.324	12.1354	9.0528	46.414	2.69	7.06	2.66	0.9	6.16		
2 s	v	x		63.081	42.8126	23.637	65.832	5.09	114	0.76	1.058824		20	22.881	14.8326	10.217	56.432	3.23	9.12	9.72	0.9	8.22		

Ready

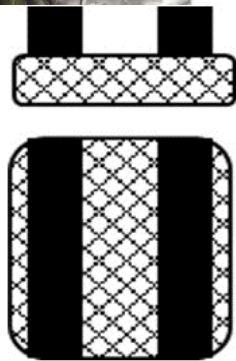
Trial 1: Float Type/Placement Results



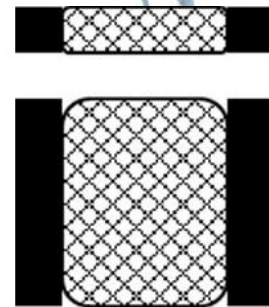
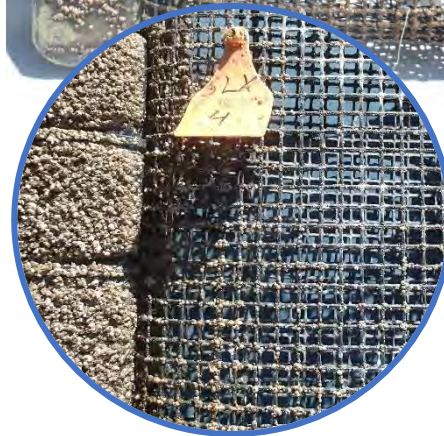
Trial 1: Biofouling on Oysters



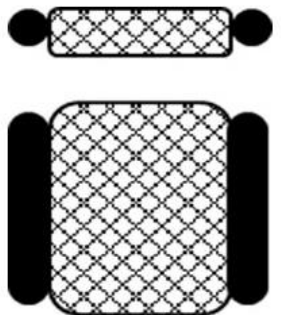
Trial 1: Biofouling on Bags



Square-Top
17.9 lbs



Square-Side
1.3 lbs



Bullet
7.3 lbs

Trial 1: Foul Weather



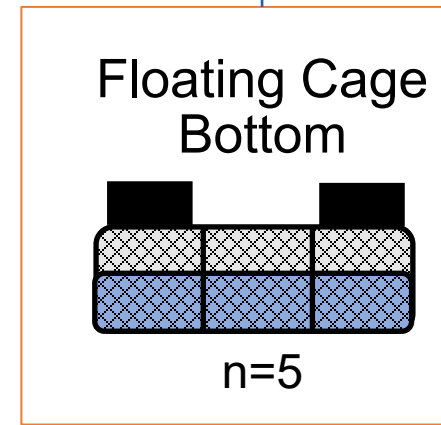
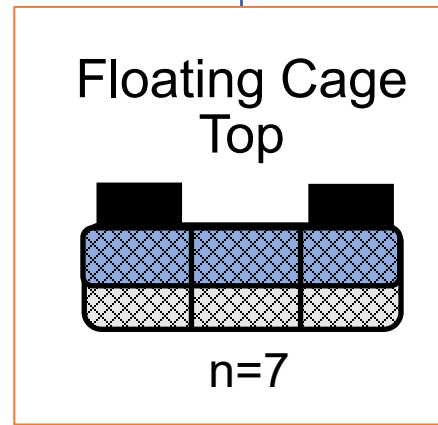
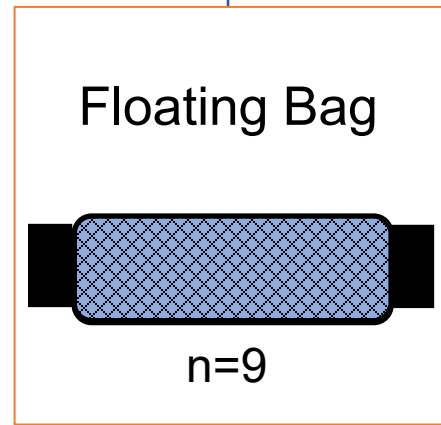
Field Trial 2: Floating Bag vs Cage



Ploidy:

3N

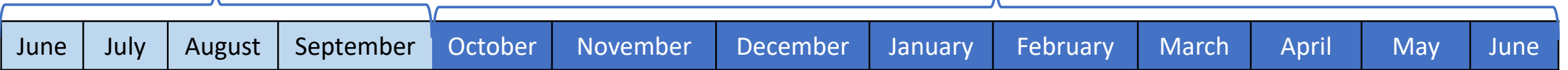
Gear Type:



Timeframe:

Nursery

Growout - WINTER 2017-18



4 months

9 months

Spawn

From Spawn to Harvest – 13 months

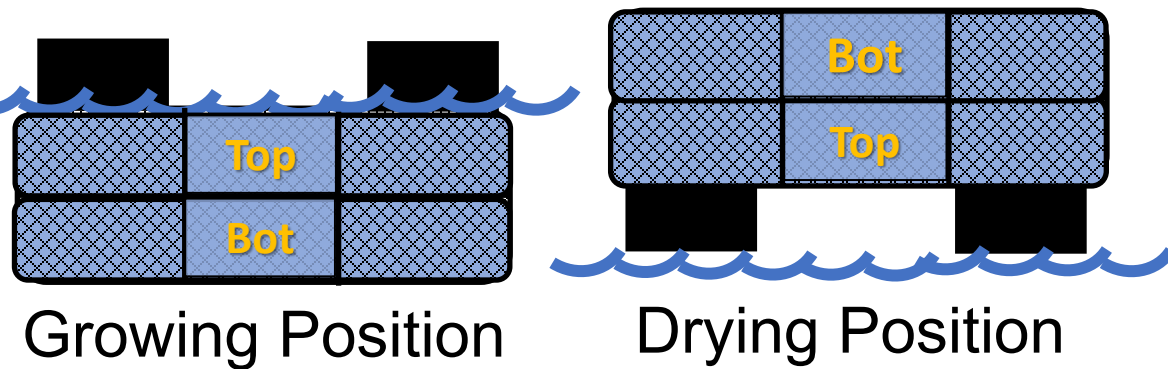
Gear Type and Float Placement



Floating Cages

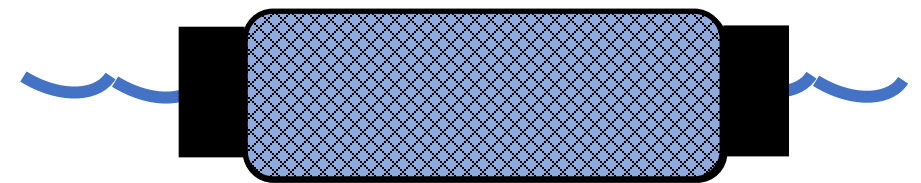


Floating Bags



Growing Position

Drying Position



Square – Side Float

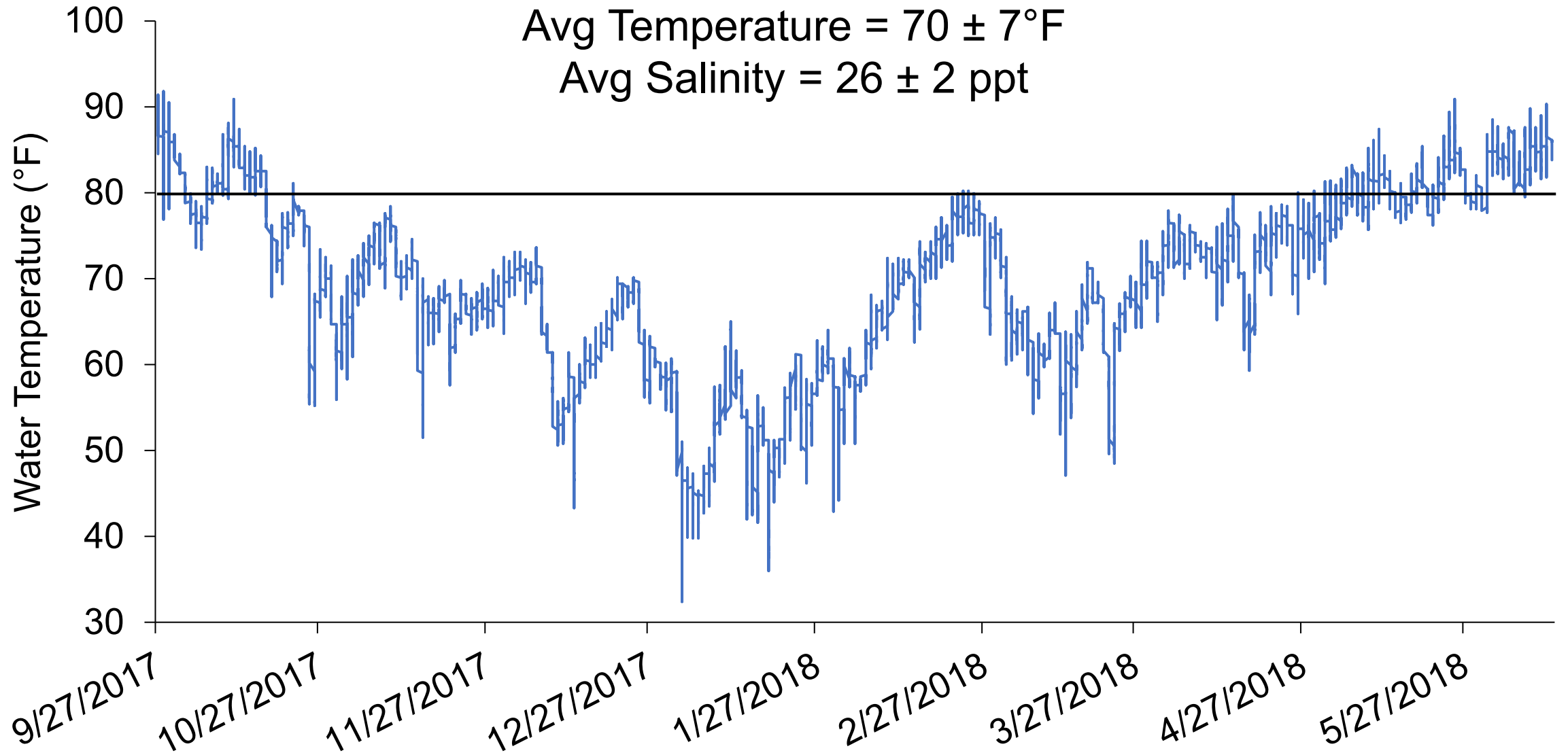
Stocking Information and Biofouling Control

- Stocking size: 52 mm (2 inches) shell height (SH)
- Stocking density: 150 oysters / bag
- 14 mm Vexar bags
- Weekly Flipping
 - Floating Cage: Aerial drying, 24 hr exposure, flipped back
 - Floating Bag: Does not require flipping back (“unflipping”)

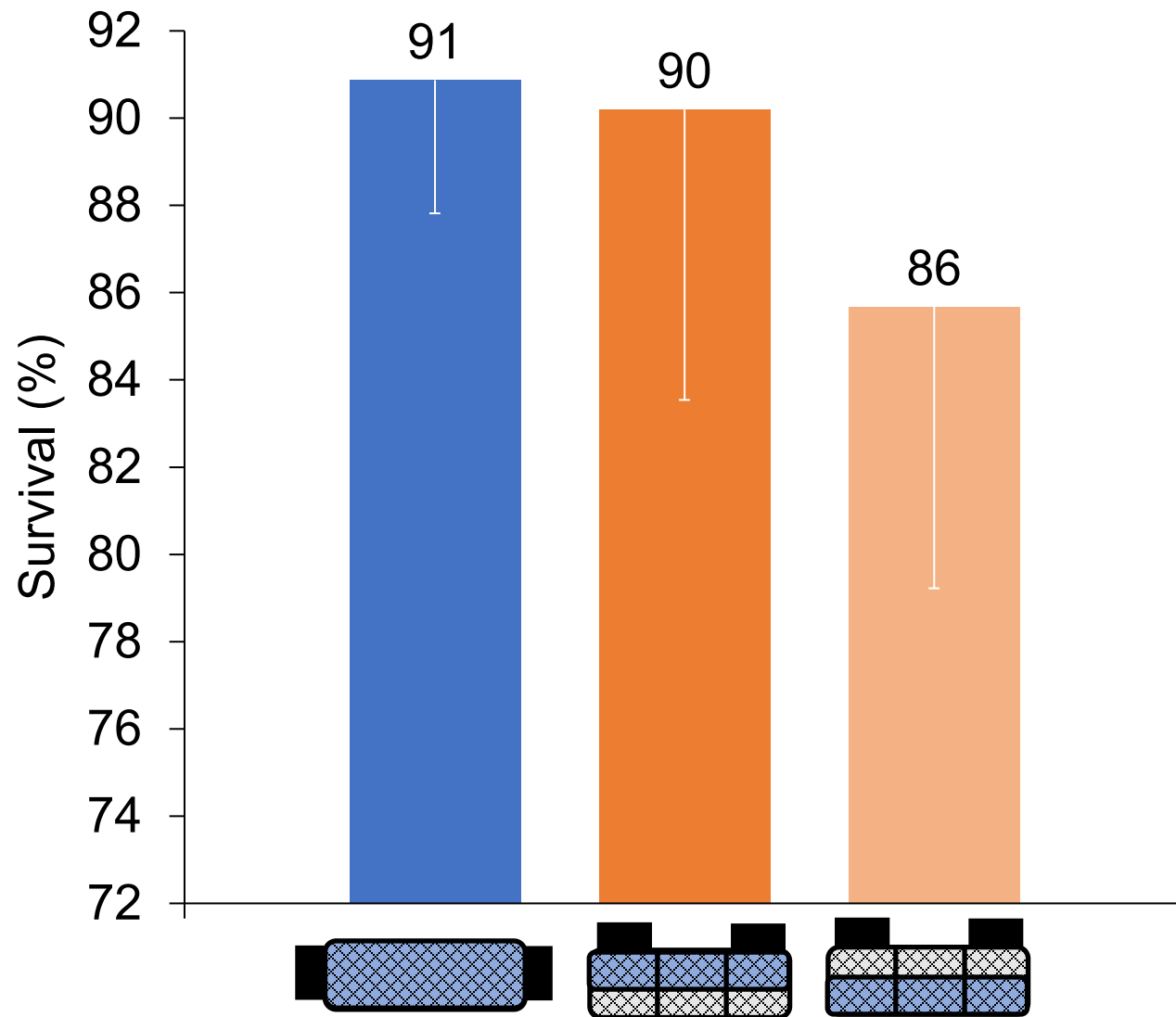


Temperatures, October 2017- June 2018

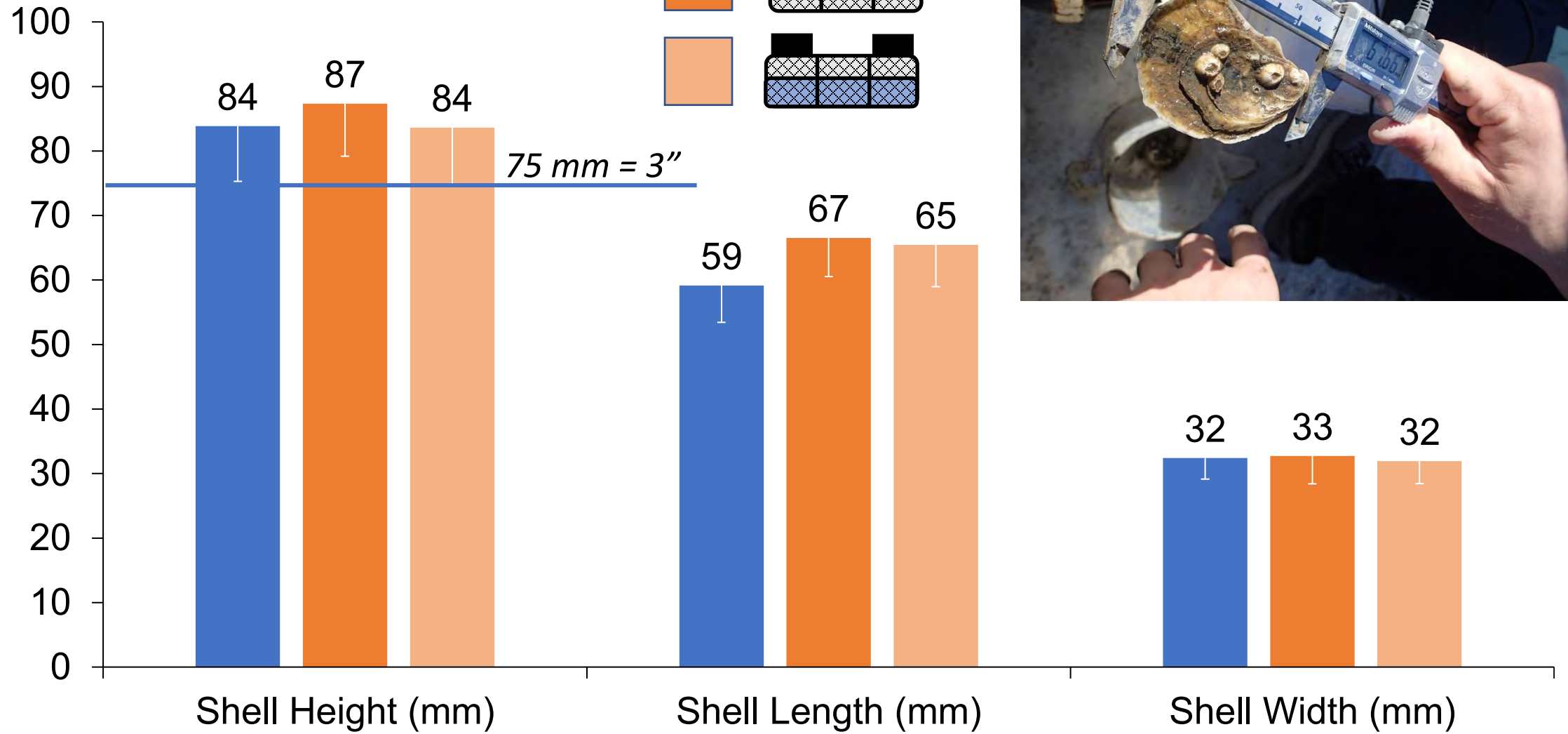
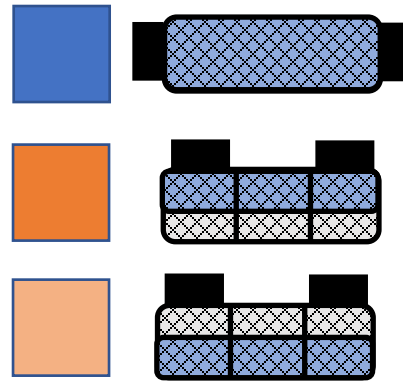
Avg Temperature = $70 \pm 7^\circ\text{F}$
Avg Salinity = 26 ± 2 ppt



Trial 2: Survival



Trial 2: Shell Measurements



Oyster Shell Shape



Shell Height (SH)



Shell Length (SL)



Shell Width (SW)

Preferred
Ratio:

3

:

2

:

1

Fan Ratio

$$SL/SH = 2/3 = 0.67$$

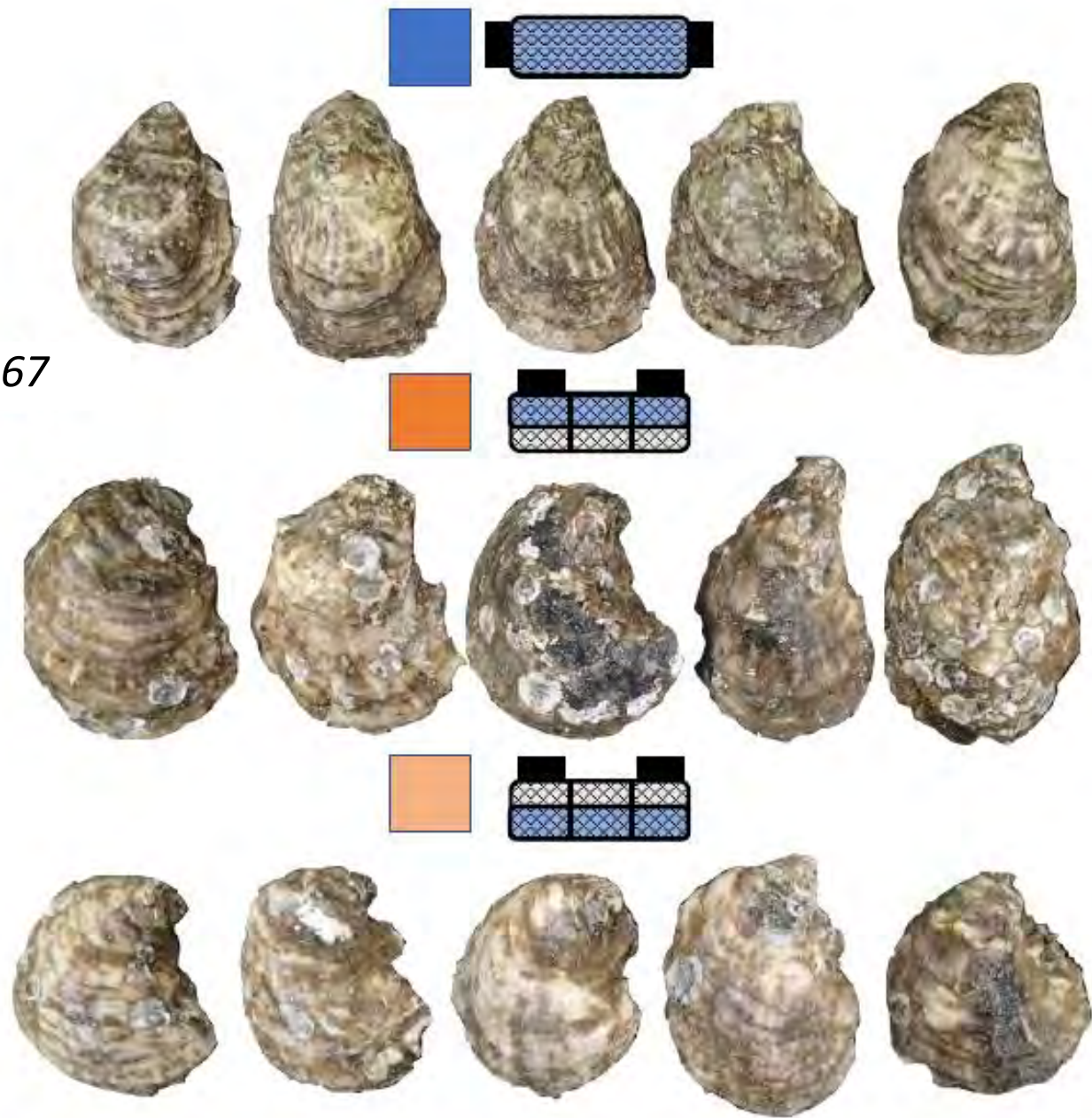
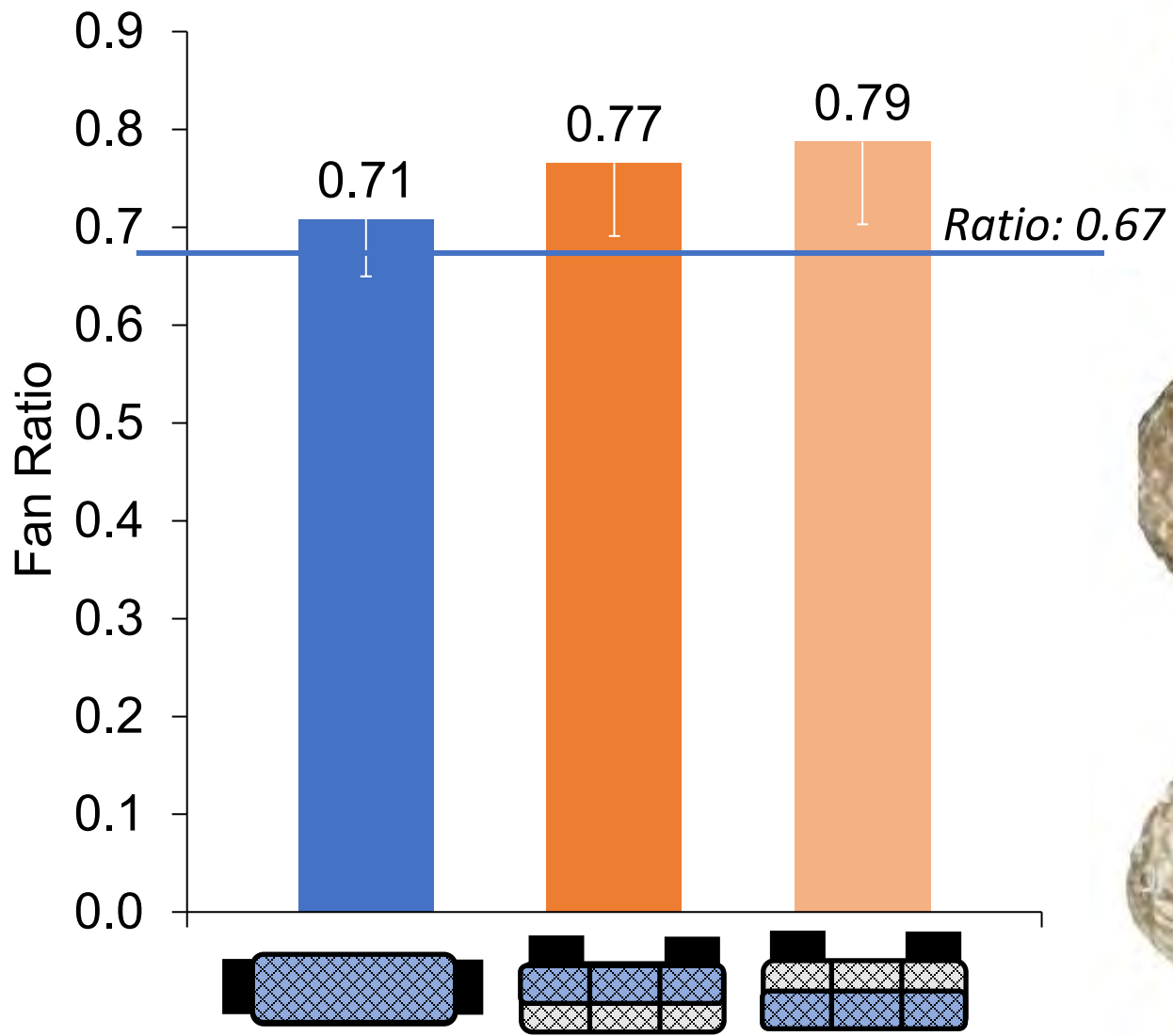


Cup Ratio

$$SW/SH = 1/3 = 0.33$$

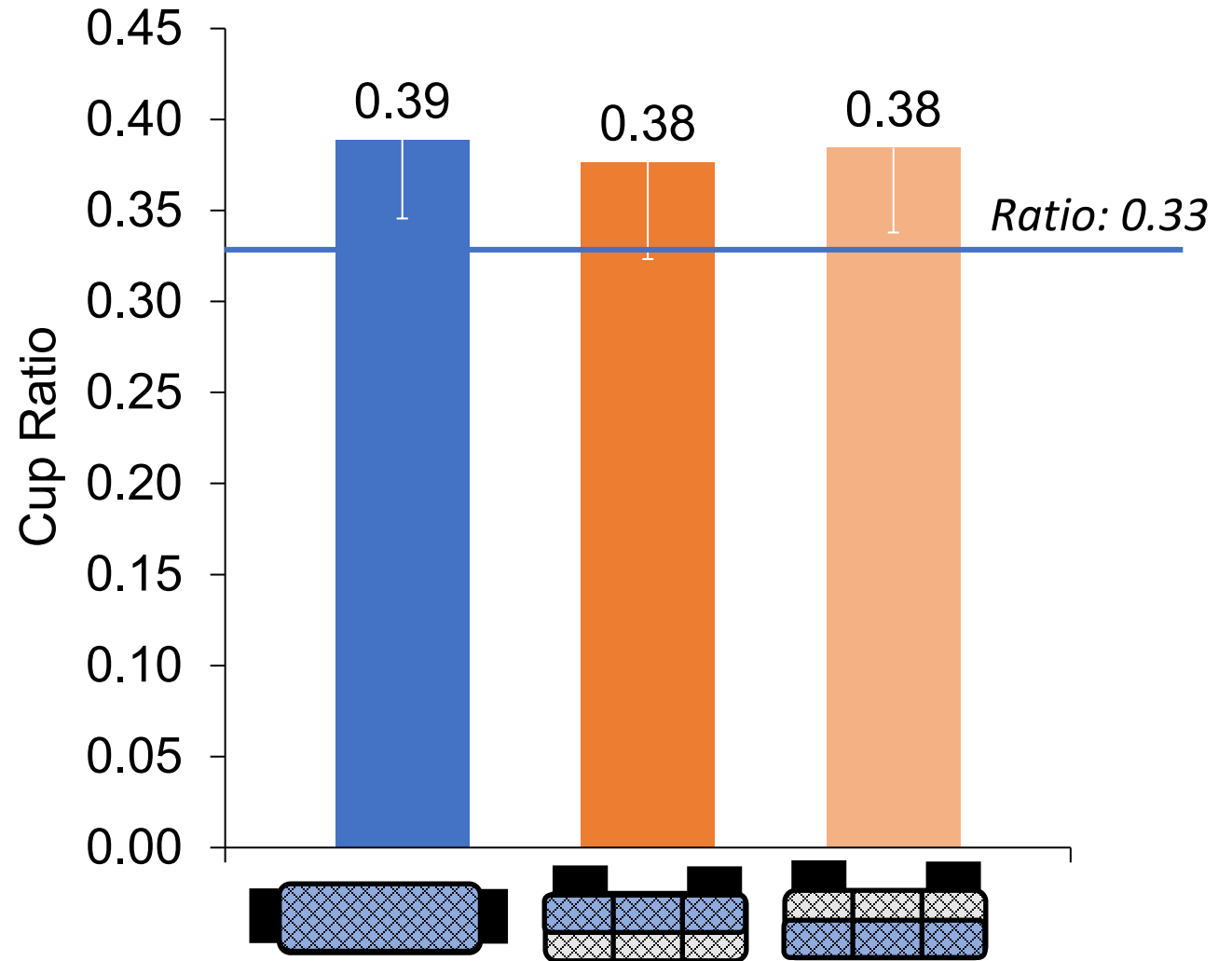


Trial 2: Oyster Fan Ratio

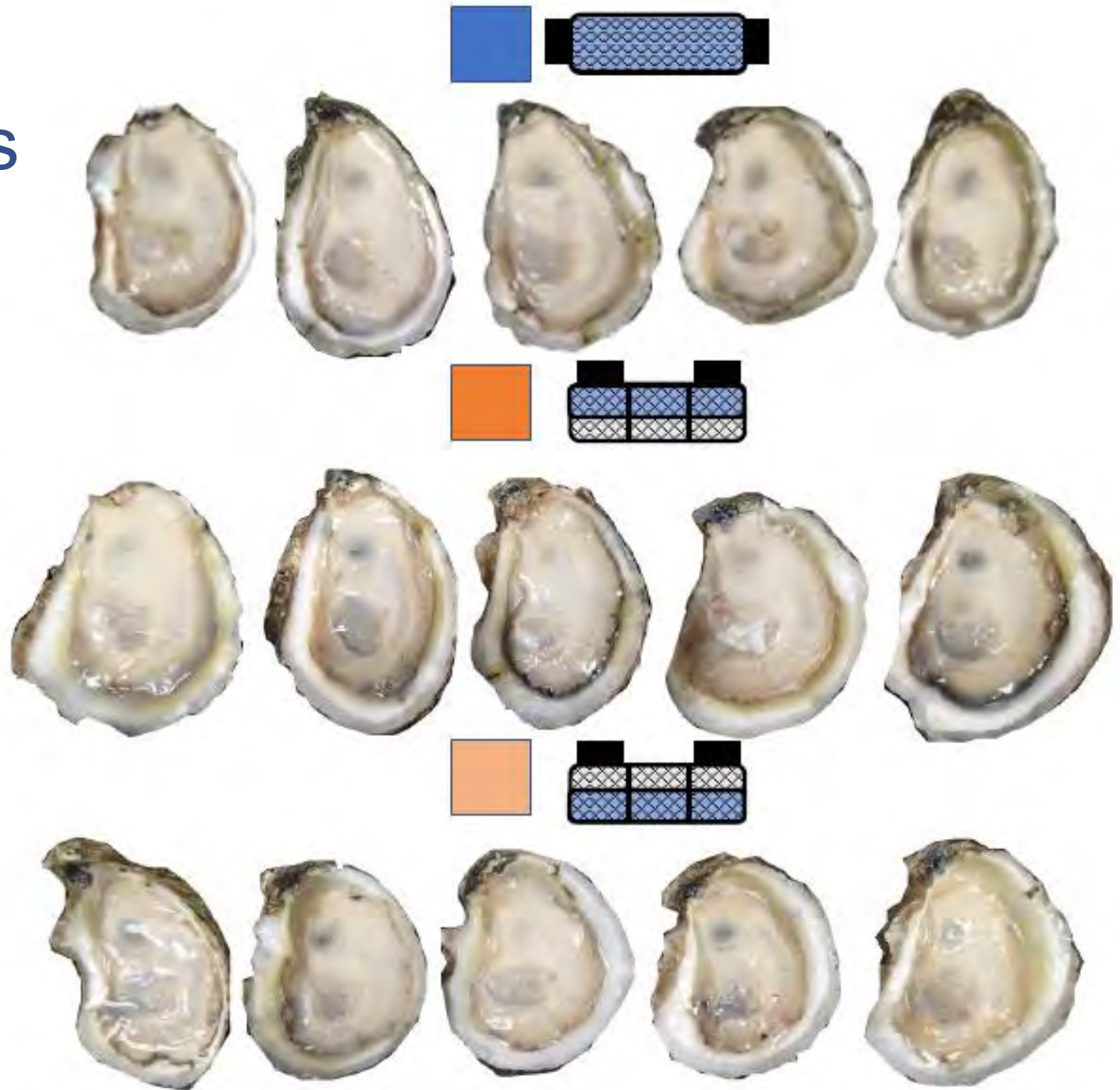
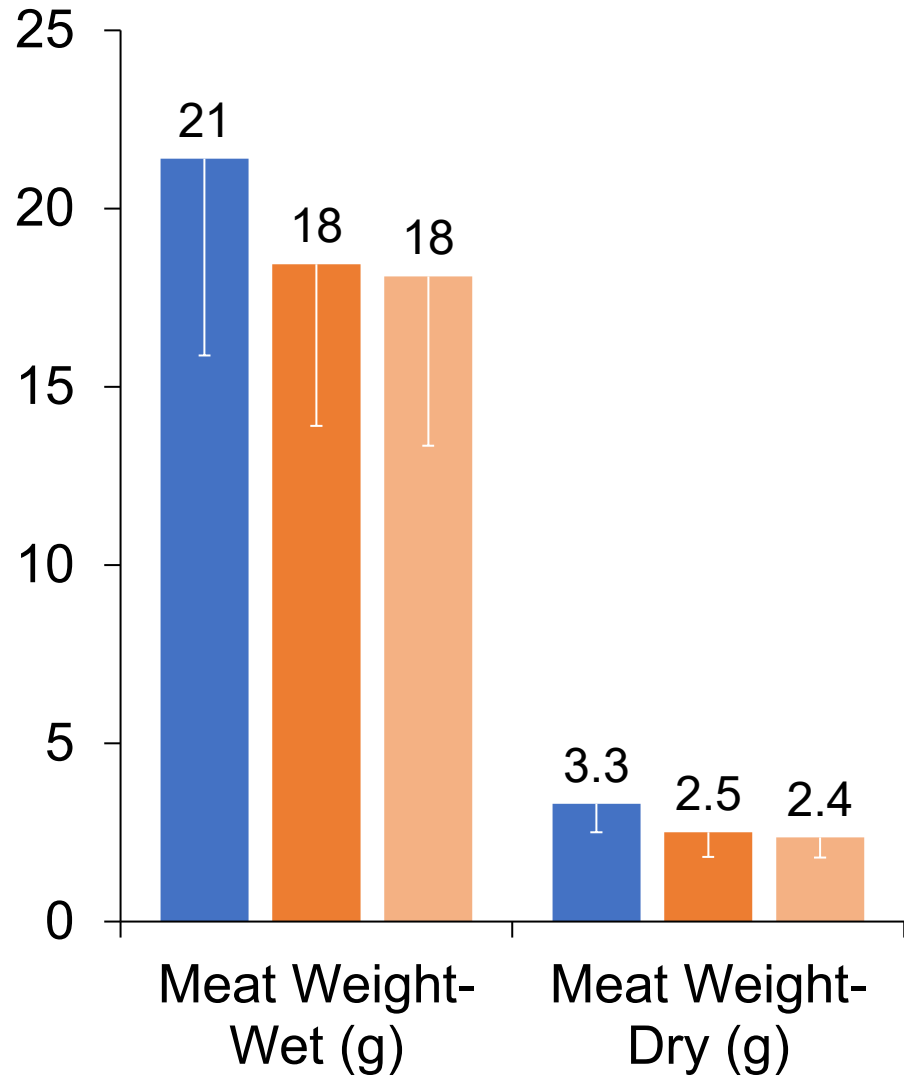




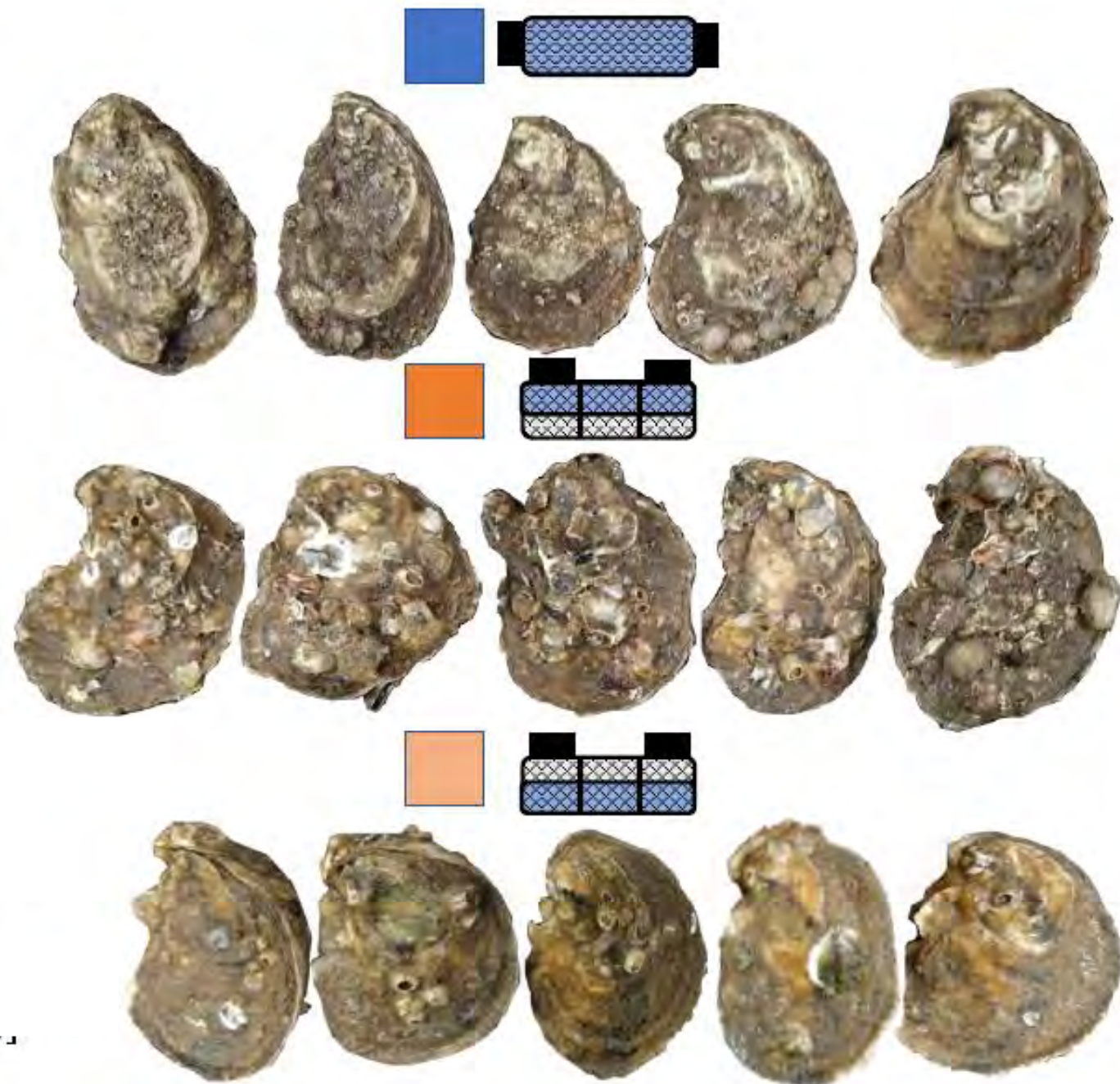
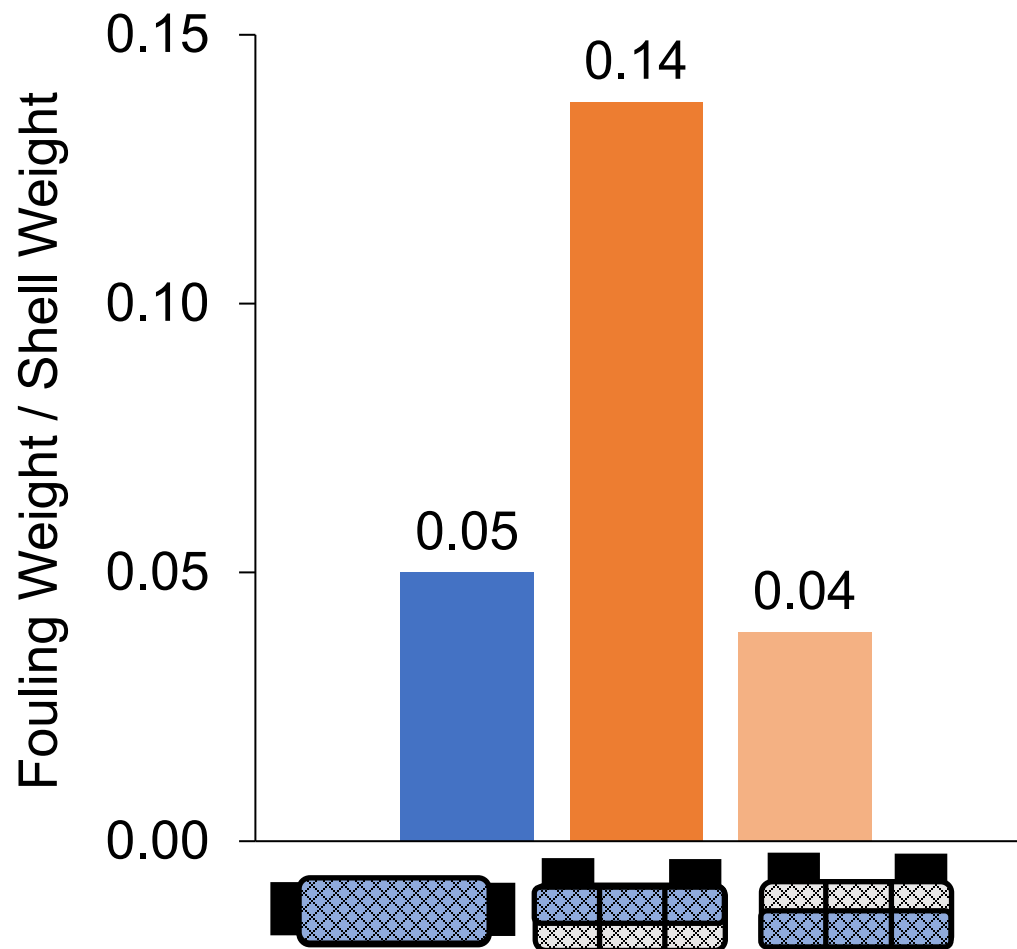
Trial 2: Oyster Cup Ratio



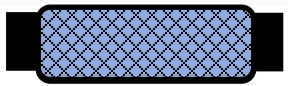
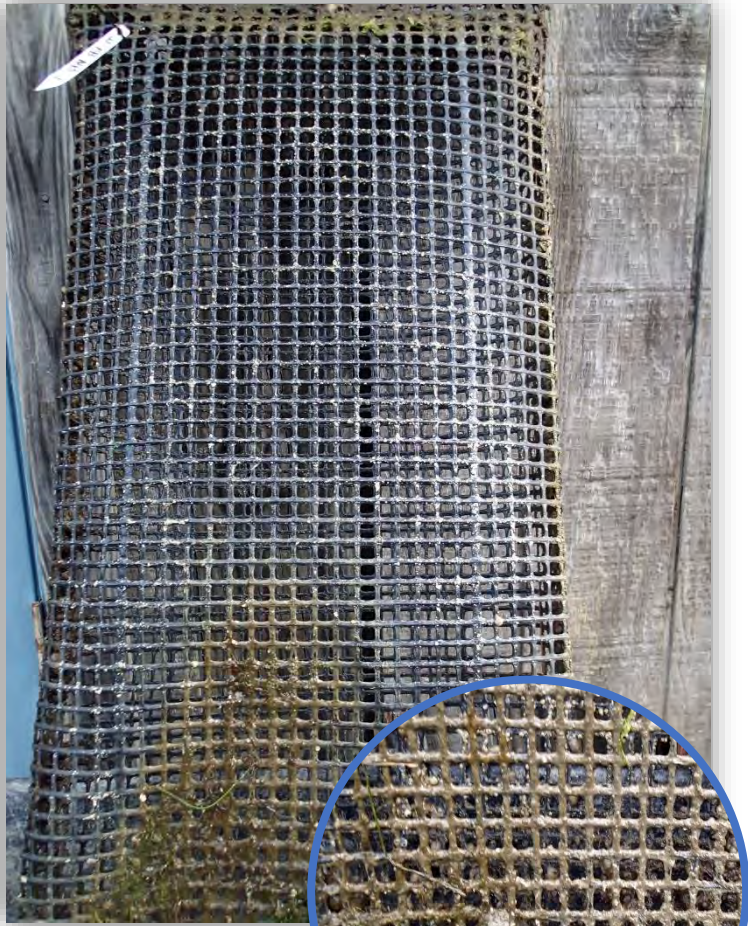
Trial 2: Weight Measurements



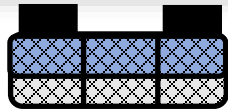
Trial 2: Biofouling on Oysters



Trial 2: Biofouling on Bags



1.5 lbs



3.7 lbs



1.9 lbs



Summary: Production



- Lower survival (77-78%) of oysters cultured over “Summer” growout period versus higher survival (86-91%) over “Winter” period
- Starting with a 2-inch oyster in final growout bag, reached 3-inch harvest size in 5.5 months over “Summer” and 6 months over “Winter”

Summary: Biofouling



Trial 1: “Summer” Growout Period

- Biofouling was less on oysters in bags with square floats on top (0.69) compared to floats on side (0.89)
- Floats on top resulted in higher biofouling weights on bag (17.9 lbs) compared to square floats on side (1.3 lbs)

Trial 2: “Winter” Growout Period

- Oysters and bags in top position of floating cage had higher biofouling (0.13, 3.7 lbs) compared to those in bottom position of floating cage (0.04, 1.9 lbs) and floating bags (0.05, 1.5 lbs)

Summary

- Commercially acceptable survival and growth
- Floating bags do not need to be flipped back reducing labor and costs by 50%
- Need additional biofouling control, such as tumbling, at high salinity culture sites

