“Tankless” Oyster Setting:

A new tool for seeding oyster reefs in the Chesapeake

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Funded By:

Chesapeake Oyster Status

Population:

- One percent of historic levels
- Broodstock limited
- Low natural recruitment in most areas
- Substrate limited

Chesapeake Oyster Status

<u>Current Restoration Standard:</u>
Hatchery- produced spat-on-shell to seed reefs

Works, but has limitations:

- **Tank-space limited;**
- **Materials-handling intensive;**
- **No economy of scale;**
- **Shell intensive in a shell-limited environment**

Tankless Oyster Setting

Concept:

Set larvae directly onto a reef.

- **Surround a small-scale reef with a temporary boom;**
- **Release larvae into the boom;**
- **Compare set to controls and typical tank set rates**

Tankless Oyster Setting

Project Design:

Reef:

- **New shell reef constructed for this experiment**
- **Approx 3 meters across and .3 meters high**
- **Scale of experiment approximates the size of a setting tank**
- **Set larvae as we would in a tank**

Tankless Oyster Setting

Project Design:

Boom:

- **Based on a commercial 'curtain boom'**
- **Closed-cell foam floats**
- **Reinforced plastic curtain**
- **Weighted bottom**
- **One water-exchange portal covered with fine mesh**

Project Design:

Location:

- **MLW 1 meter; tidal difference .5 meters**
- **Protected: little wave energy; no vessel traffic**
- **Mesohaline: salinity ranged from ~10.2-12.4**
- **No natural oyster reefs or spat set in this creek**

- **Solar bubbler utilized**

Experimental Design:

- Mesh bags of shell placed onto the reef
- Control A: mesh bags of shell upstream and downstream of boom
- Control B: mesh bags of shell placed in shore side mesocosm (mesocosm was set with larvae from the same batch)
- Continuous water quality monitors in inside boom and shoreside mesocosm
- 3-day setting period for larvae
- Three replicates
- 21-day grow-out time
- Compare sets between tank and controls

Results

Metric for comparison:
Average number of spat-on shell among treatments

Statistical analysis:

- **Kruskal-Wallis (non-parametric test in lieu of a 1-way ANOVA)**

- **Post-hoc multi-comparison tests for significance**

Trial	Inside the Boom	Shoreside Mesocsm	Upstrm Control	Downstm Control	p-value	Significant differences
1	4.9	12.9	0	0	<0.001	M>B> UC =DC
2	5.7	6.3	0	0	<0.001	M=B> UC=DC
3	5.2	4.4	0	0	<0.001	M=B> UC=DC
Pooled	5.3	7.9	0	0	<0.001	M=B> UC=DC

Data pooled over trials showed that

sets in the boom (“*tankless set*”)

and sets in the mesocosm (*traditional tank set*)

were *NOT* statistically different.

Results:

Comparison to traditional tank-produced spat-on-shell:

	Traditional Tank Set Rates (spat per shell)	"Tankless" Set Rates (spat per shell)
	10.6	4.9
	5.6	5.7
	4.2	5.2
	10.2	
Ave	7.65	5.3

Next Steps/ Discussion:

- Scale up (1-2 acres)
  - •Crane for boom deployment
  - •Possible 'mother ship' anchored outside boom for 3-day setting period (oxygenate; tend boom)
- Utilize this technique on an alternative-substrate reef, creating a completely "shell-less" reef
- On-bottom aquaculture applications?
- Refine technique/ Compare cost and efficiency (cost; set rates; shell limitations; materials handling; scalability) to traditional tank setting
- •May not work well in low-salinity waters; one possible scenario:
  - Oligohaline = hatchery-produced spat-on-shell;
  - Mesohaline = Tankless setting
  - Polyahline w/ low natural spat set= Tankless setting
  - Polyhaline w/ high natural spat set = "Build it and they will come"

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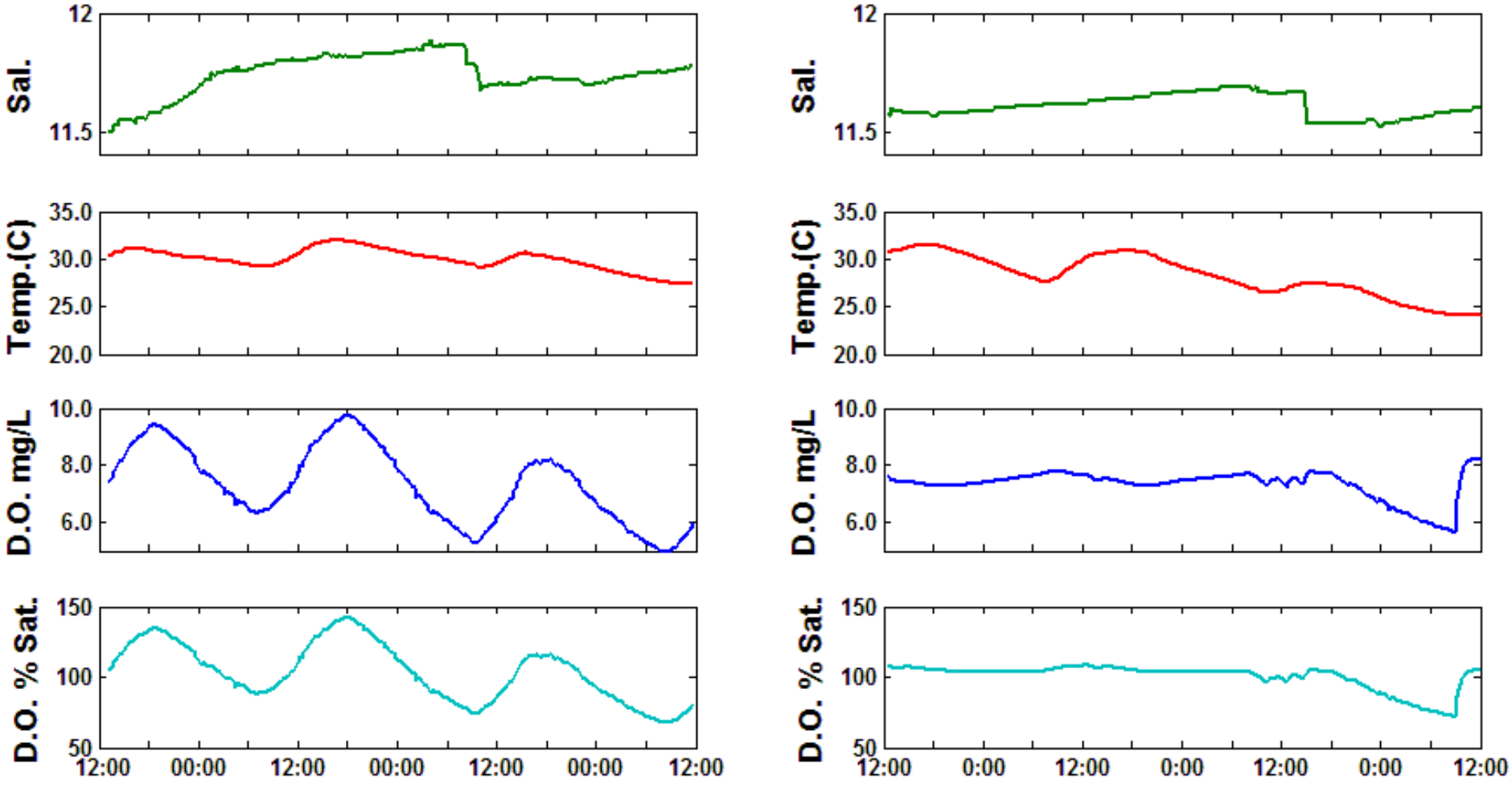
Results- Physical Parameters Trial #1



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