

# *Production Trends and Best Practices for Better Oyster Culture*

**Brian Kingzett**

**Blue Revolution Consulting Group.**

**[www.blurevolution.ca](http://www.blurevolution.ca)**

**[Brian@blurevolution.ca](mailto:Brian@blurevolution.ca)**



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- **Global technologies of note**
  - **State of BC Technology (redux)**
  - **Estimate of tray culture best practices**
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## Global Trends

- ❑ Increase in scale of production
- ❑ Standardization of techniques within growing regions
- ❑ Increase in mechanization
- ❑ Move towards offshore grow-out



# Norway - SmartFarm

- **Mussel farm equipment for more mechanised farm**
- **Longlines with suspended nets**
- **Automated harvesting machines**



# Norway - SmartFarm



- **PE pipe used for buoyancy**
  - ❑ Less visually intrusive
  - ❑ Length is farm specific – usually 126 m
  - ❑ Easy anchoring and installation

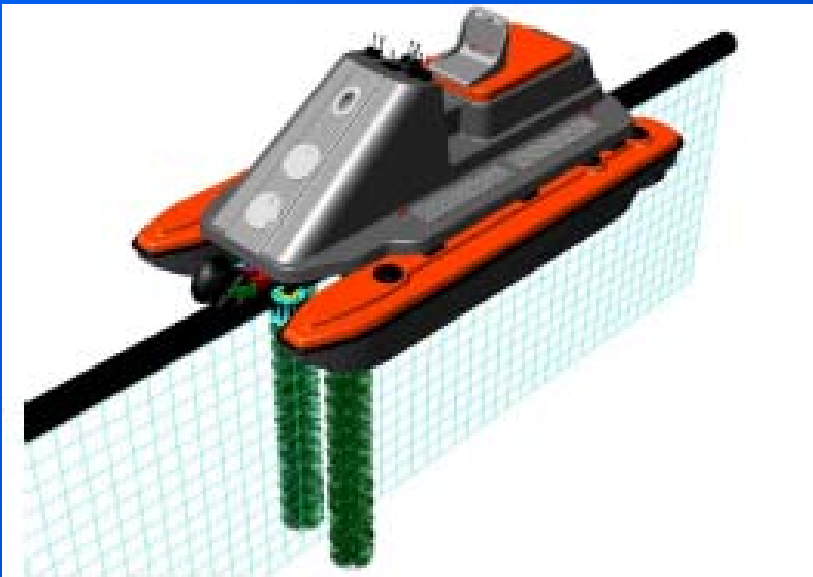
# Norway - SmartFarm

- Husbandry and harvesting done in the water
  - ❑ No disassembly and reassembly of gear



# Norway - SmartFarm

- **Scooter – rental unit for line cleaning**
  - ❑ 1 line (126 m) can be cleaned in 5 – 10 minutes



# Scotland – Xplora Mussel Farming Equipment

- **Double or Single longline floats**
  - ❑ Scotland uses 400 L floats, Norway uses 300 L floats, 200 L also available
  - ❑ Multiple colours available



<http://www.xploraproducts.com/xplora/Xplora%20floats.htm>



# Scotland – Xplora Mussel Farming Equipment

- **Fabricated Steel Construction rafts**
- **Finish - Galvanised - Marine Grade**
- **All floats rotationally moulded then filled with closed cell polyurethane foam**
  - ❑ **Wall Thickness 8 mm**
  - ❑ **UV Stabilised Medium Density Polyethylene**



# Spain – Medusa Mussel Raft

- **Circular raft for deep water mussel grow out**
- **Has been tested in high wind/wave area**



<http://www.bateamedusa.com/>  
<http://www.opmega.com/index1.htm>  
<http://www.corelsa.com/>

# Spain – Medusa Mussel Raft

- High density polyethylene for strength and flexibility
- More ergonomic handling
- Even growth around perimeter with no dead spots in the center
- Increased production and reduced growth time
- Central mooring point
- Custom sizing (here shown 34 m diameter, 150 tons production)

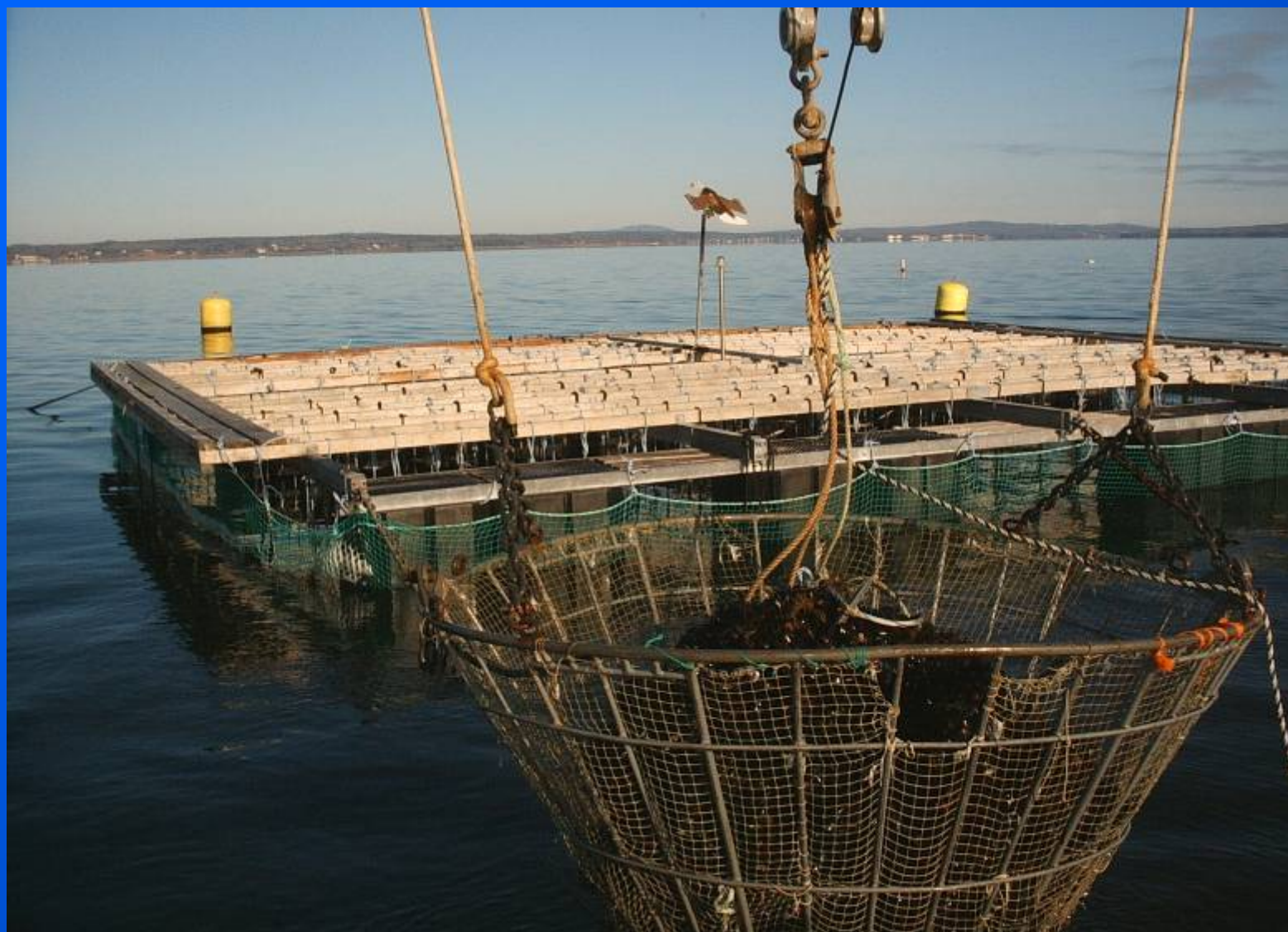


# Maine/Scotland

- **Maine Aquaculture Equipment (MAE) now markets the Scottish mussel rafts and longline system**
- **High capacity raft with long life**



# Maine Aquaculture Equipment (MAE)



# Maine Aquaculture Equipment (MAE)



- Raft kit ready for assembly on truck.
- Assembly in 4 hours – 6 people

# Maine Aquaculture Equipment (MAE)

Raft ready to tow out to mooring after being constructed on the ramp.



# Maine Aquaculture Equipment (MAE)

- **rafts are 40 x 40 feet (20 x 20 available)**
- **Floats are foam filled polyethylene**
- **hang 400 x 13 m ropes off the rafts,**
  - ❑ **harvest of 1200 bushels (about 72,000 lbs) including predator net perimeter**
- **Anchored with 1 ton plough anchor**
- **Moor 3 rafts in row, 15° to flow**
- **Designed for semi-exposed sites**
  - ❑ **Recently withstood 90 knot wind – no damage**



## BC Culture State of technology

- ❑ Use of rafts and longlines
- ❑ Tray culture typically with rafts
- ❑ 5 types of trays in service
- ❑ Extensive use of FLUPSY seed and Tumblers
- ❑ Best practices not fully established!

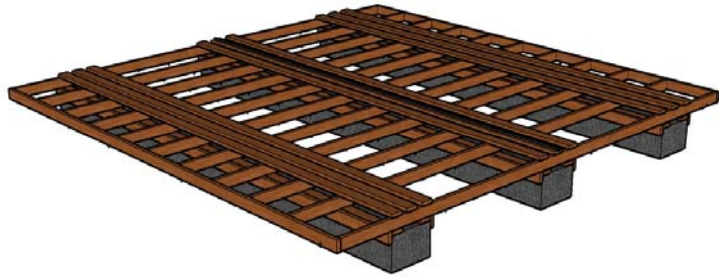


# LONGLINE CULTURE

- Best for large, more exposed or sites with less current
- Use with trays, pipes or strings
- Surface or subsurface longlines
- Barrels or oyster floats



# RAFT CULTURE



- Large amount of production in small area



- Best for small or sites with sufficient current
- Use with trays, pipes or strings
- Two and three foam designs



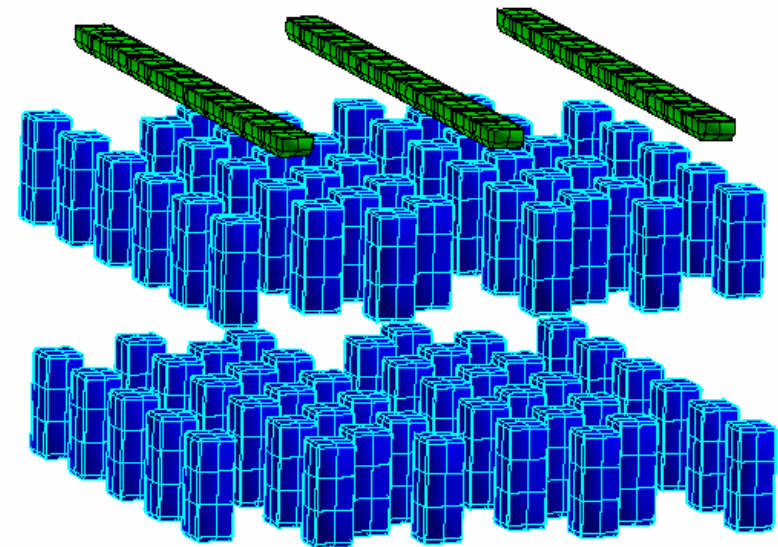
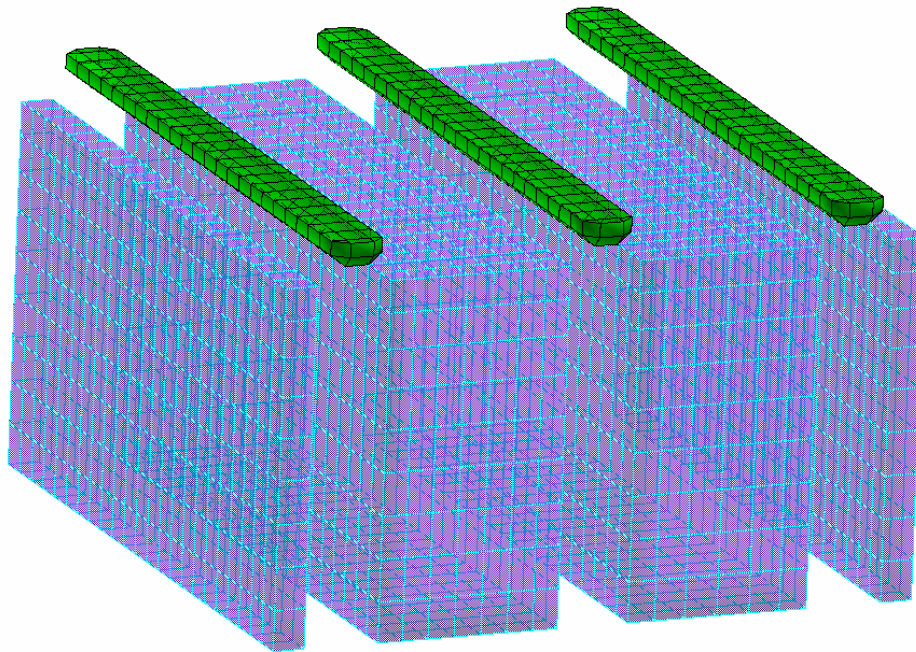
# Rafts

- Stable platform
- Last 5-10 years
- Easy to Build
- Large production in small area
- Able to withstand some rough conditions



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# 3 – Dimensional Use of Water Column by Oyster Culture Rafts

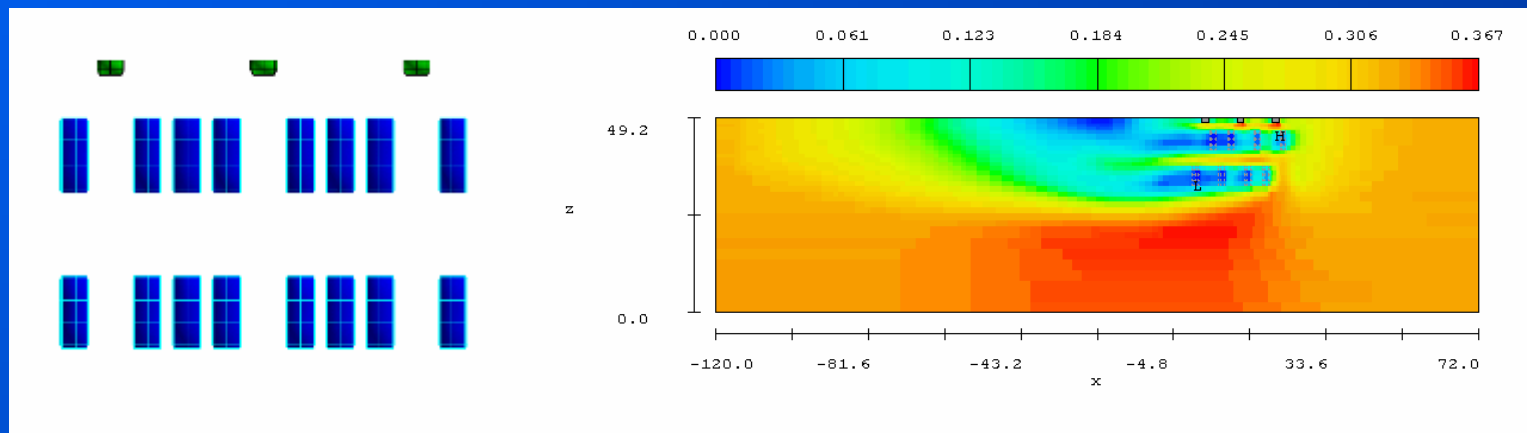
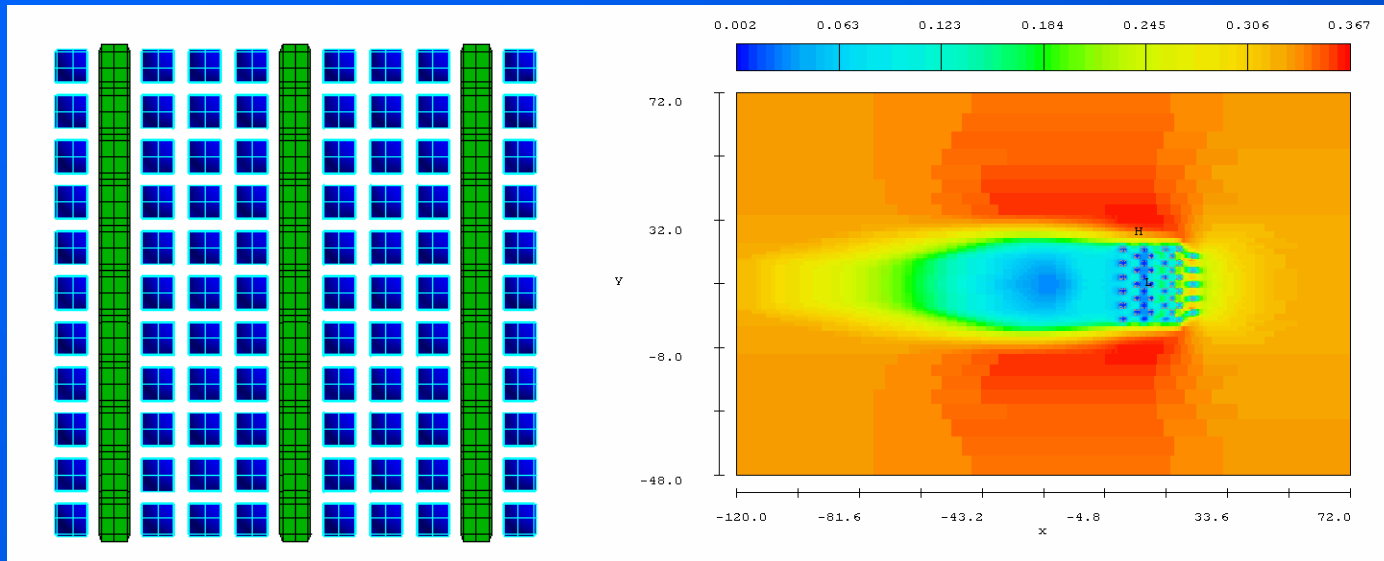


Graphics Courtesy of John Richardson, Earth-Tec Inc.



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# Physical and Biological Modelling of Rafts used for Oyster Tray Culture

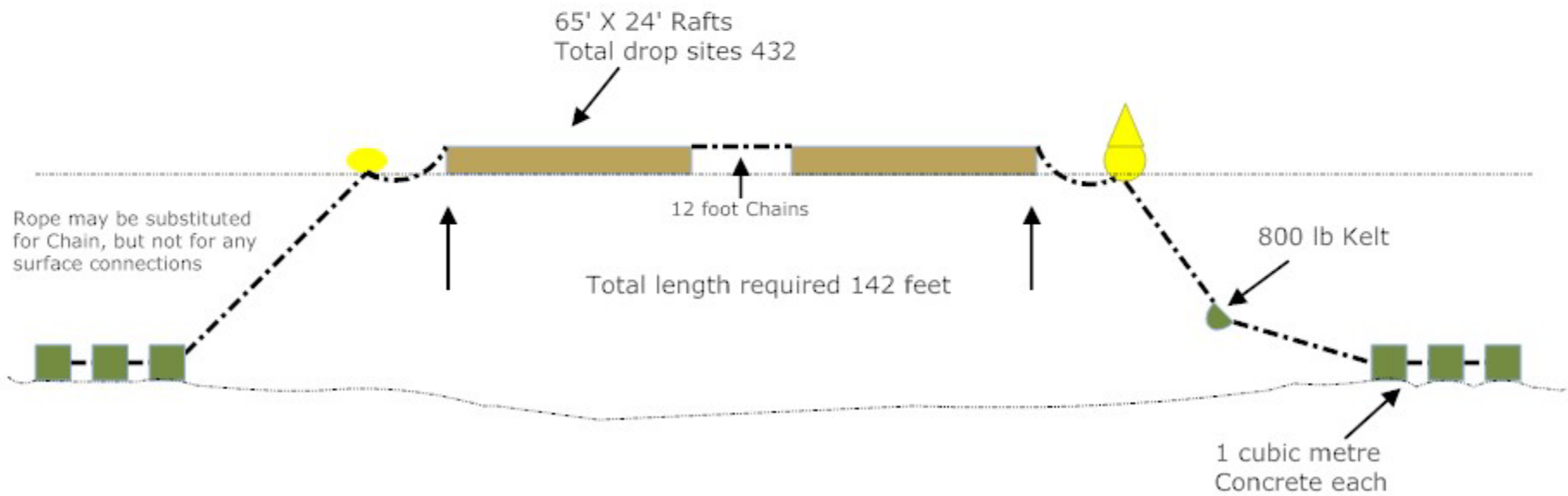


Graphics Courtesy of John Richardson, Earth-Tec Inc.

# Easy to Build



## Anchoring System for Paradise Oyster Company





# Working on the raft



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# Working on the raft



# Tumbler



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# Tumbler



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# Rotary Oyster Tumbler and Grader



# Oyster Grading and Tumbling

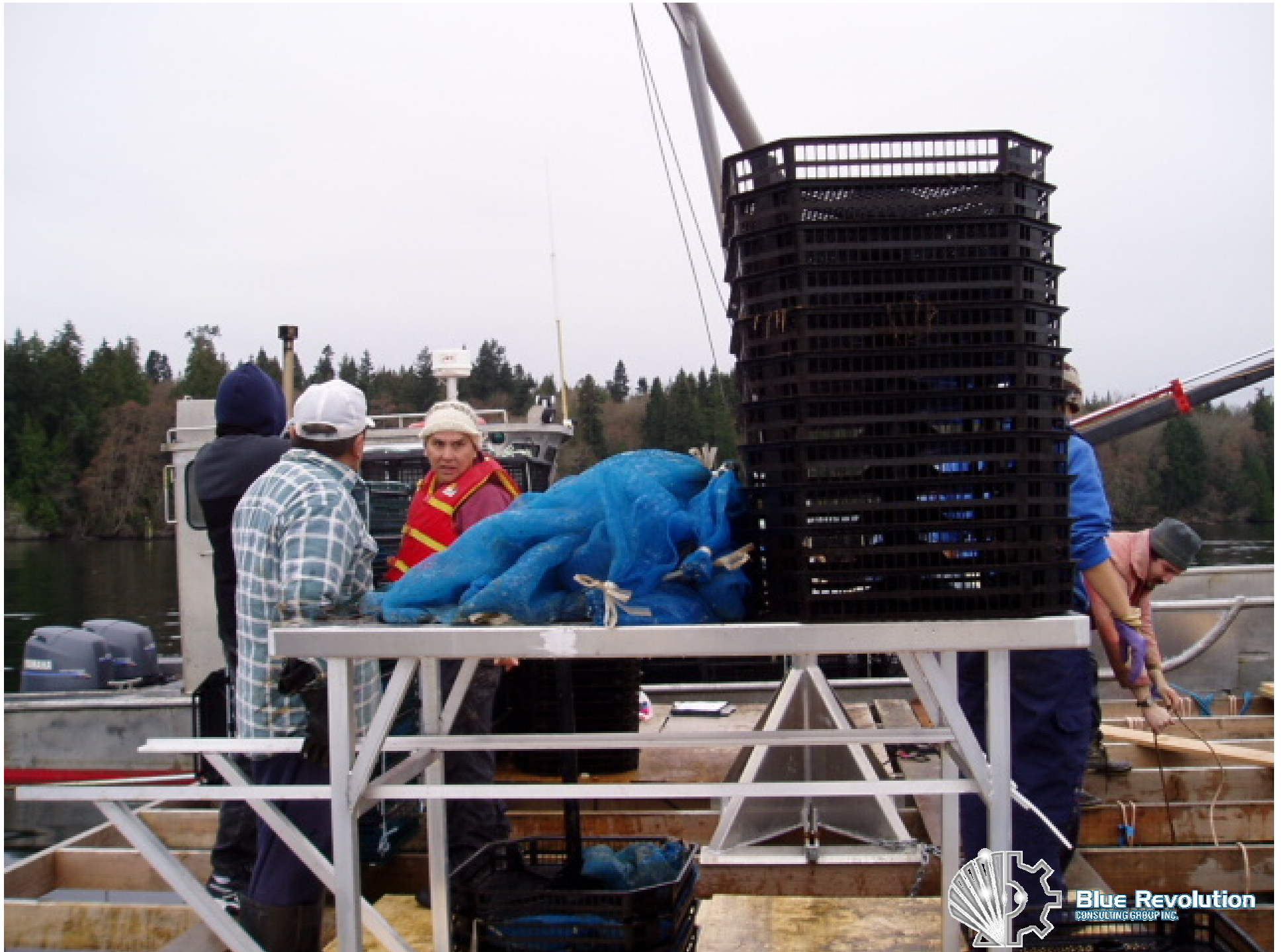




# Working on the raft – lightweight sorting table









# New Developments: Taylor Mussel Raft



*New Floats: [www.barrplastics.com](http://www.barrplastics.com)*



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# Potential Production Values per raft sites

An aerial photograph showing a large body of water with numerous oyster rafts. The rafts are arranged in several parallel lines, each consisting of many small, rectangular units. The water is dark, and the background shows a shoreline with some buildings and a concrete structure.

**Raft Culture Oysters  
@ 20 rafts per hectare**

**~ 100 – 180 tonnes per  
hectare per year**

# Potential Production Values per Rafts Surface Area 8 m<sup>2</sup>

## Tray Culture Oysters

~5000 – 6000 doz sm – med per 1 – 1.5 yr  
rotation (Hi-Flow/Aqua-Pacific)

~ 8,000 - 10,000 doz Xsmall per 1 – 1.5 yr  
rotation (Dark – Sea)

( ~ 6 – 9 tonnes)



# Rough comparison of capital costs

	Costs	Dozens	\$/doz
<b>Raft</b>	\$ 2,000		
Hi Flow or Aquamesh Stacks	\$ 6,720		
<b>Total Capital cost</b>	<b>\$ 8,720</b>	<b>5600</b>	<b>\$ 1.56</b>
<b>Raft</b>	\$ 2,000		
Hi Flow or Aquamesh Stacks	\$ 9,600		
<b>Total Capital cost</b>	<b>\$ 11,600</b>	<b>9600</b>	<b>\$ 1.21</b>
<b>Longline (2)</b>	\$ 1,440		
Lantern Nets	\$ 2,800		
<b>Total Capital cost</b>	<b>\$ 4,240</b>	<b>6400</b>	<b>\$ 0.66</b>

*Estimates only does not include construction costs, freight, anchoring*



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## RECOMMENDATIONS FOR TRAY MANAGEMENT

- Frequency of handling is most important
- Regular handling **MUST** be adaptive to biological fouling
- Generally, regular handling as effective as tumbling
- Post handling time to return to water important (minimize)
- Tumbling may be done w/out increased mortality/slightly beneficial shell shape characteristics – recommend early intervals.
- Starting stock at high densities and reducing densities can be done without decreasing quality characteristics – economic benefits of optimizing trays



## Best Practices?

- Start with as large seed as possible
- Load high density and reduce each handling  
500>250>125>../layer
- Handle at least every 2 months during growing cycle
- Tumble early cycles – handle afterwards
- Extra handling to prevent build-up of fouling
- Production records at each handling
- On-going environmental monitoring





# Example Production calculation

Stock trays in August with 5 litres of 400/L = 2000 per tray

Total number of oyster seed: 1,000,000

Cost of seed: \$30,000

Total Trays (High Flow) = 500 (7 per stack = 71 stacks)

Handle once per month in growing season, every 3 months in winter,

	Trays	Trays per stack	Stacks	Rafts	Seed per tray	Total Stock 1% mort/mos	Handling cost/tray	Handling Cost	Stock Sold	Revenue per oyster	Revenue
Sept	500	7	71		0.9	2000	1,000,000	\$1.50		\$750.00	
October	990	7	141		1.8	1000	990,000	\$1.50		\$1,485.00	
January	980	7	140		1.8	1000	980,100	\$1.50		\$1,470.15	
April	1213	7	173		2.2	800	970,299	\$1.50		\$8,490.12	
May	1537	7	220		2.7	625	960,596	\$1.50		\$2,305.43	
June	1902	7	272		3.4	500	950,990	\$1.50		\$2,852.97	
July	2354	7	336		4.2	400	941,480	\$1.50		\$3,530.55	
Aug	2796	7	399		5.0	333	932,065	\$1.50		\$4,194.29	
Sept	3691	7	527		6.6	250	922,745	\$1.50		\$5,536.47	
October	4568	7	653		8.2	200	913,517	\$1.50		\$6,851.38	
November	4522	7	646		8.1	200	904,382			\$0.20	\$0.00
December	4377	7	625		7.8	200	875,338		20,000	\$0.20	\$4,000.00
January	4233	7	605		7.6	200	846,585	\$1.50	20,000	\$0.20	\$4,000.00
February	3891	7	556		6.9	200	778,119		60,000	\$0.20	\$12,000.00
March	3552	7	507		6.3	200	710,338		60,000	\$0.20	\$12,000.00
April	3216	7	459		5.7	200	643,234	\$1.50	60,000	\$0.20	\$12,000.00
May	2684	7	383		4.8	200	536,802		100,000	\$0.20	\$20,000.00
June	2876	7	411		5.1	150	431,434	\$1.50	100,000	\$0.25	\$25,000.00
July	2047	7	292		3.7	150	307,120		120,000	\$0.25	\$30,000.00
August	1227	7	175		2.2	150	184,049	\$1.50	120,000	\$0.25	\$30,000.00
Sept	415	7	59		0.7	150	62,208		120,000	\$0.25	\$30,000.00
October	0	7	0		0.0	150	0		62,208	\$0.25	\$15,552.02
								\$54,794.83			\$194,552.02
Harvest Cost of 15%								\$31,950.00			
Seed Cost								\$30,000.00			
Total Expenses:								\$116,744.83			
									Balance		\$77,807.19

**Initial Loading**

**High OK – needs more attention**



# Overgrowth in oyster trays



# Fouling in Oyster Trays



# Biological Fouling Control – Green Urchins



# Biological Fouling Control – Green Urchins

