Automating Oyster Production at Scale on Submersible and Mobile Watercraft

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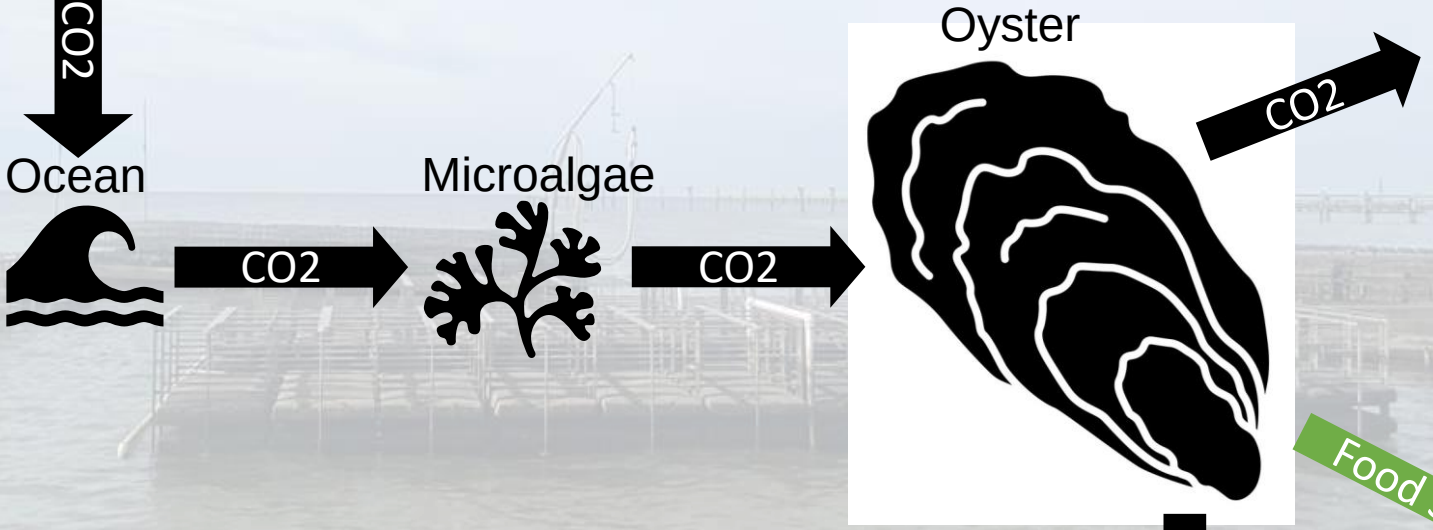
Carbon Dioxide Reduction

Long-Term Carbon Cycle

Short-Term Carbon Cycle

Emissions from tissue growth and respiration, lower than total sequestration



Shell (by-product)
Net CO2
Captured/Sequestered
250 Kg/ton live oysters

CO2

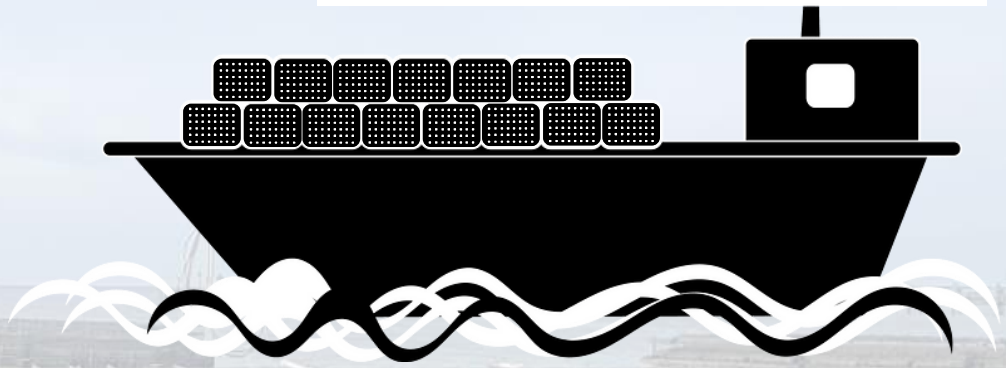
Primary Purpose
$11,000/ton live oysters

Kiloton Scale

- Footprint: 10m x 3m x 1m
- 3 tons CO2 sequestered per year
- 200 hectares at 1m depth
- Double capacity at 2m depth and 10 shelves

Megaton Scale

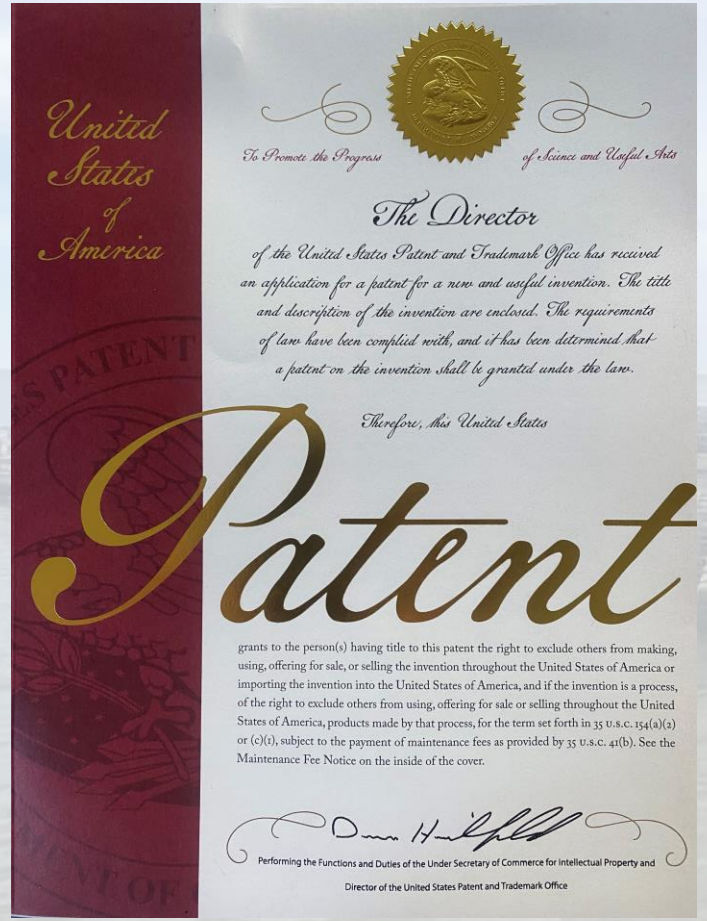
- Footprint: 100m x 40m x 10m
- 80 mesh containers per barge
- 12 tons sequestered per year per unit
- 960 tons sequestered per year per Megavator
- 200 Megavators per square kilometer



Gigaton Scale

- 3D Oyster Reefs (“Chia Plant” model)
- Spat is set on light weight matrices during 1-to-2-month nursery time on Megavator
- Matrices are transported to reef site and deployed on bottom
- 3D Oyster Reef fills out in one season
- Oyster feces & pseudofeces settles on sequestered interstitial spaces between growing oysters and withing valves after oysters die

Shellevator: Novel Invention



United States of America

To Promote the Progress of Science and Useful Arts

The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

Performing the Functions and Duties of the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office

- Shellfish Aquaculture Apparatus
  - Issued 2019
  - Tank with air inlet & exhaust port
  - Container holding shellfish above tank
  - Compressed gas source configured to supply gas to the tank via airline connected to the tank
- Pneumatic Method
  - Issued 2021
  - Floating apparatus by displacing water in tank with compressed air
  - Sinking apparatus by refilling tank with water
- Lift vessels above and below aquaculture gear
  - Issued 2022
  - Apparatus and Method
  - Depth unlimited
  - Positioned at selected positions throughout water column

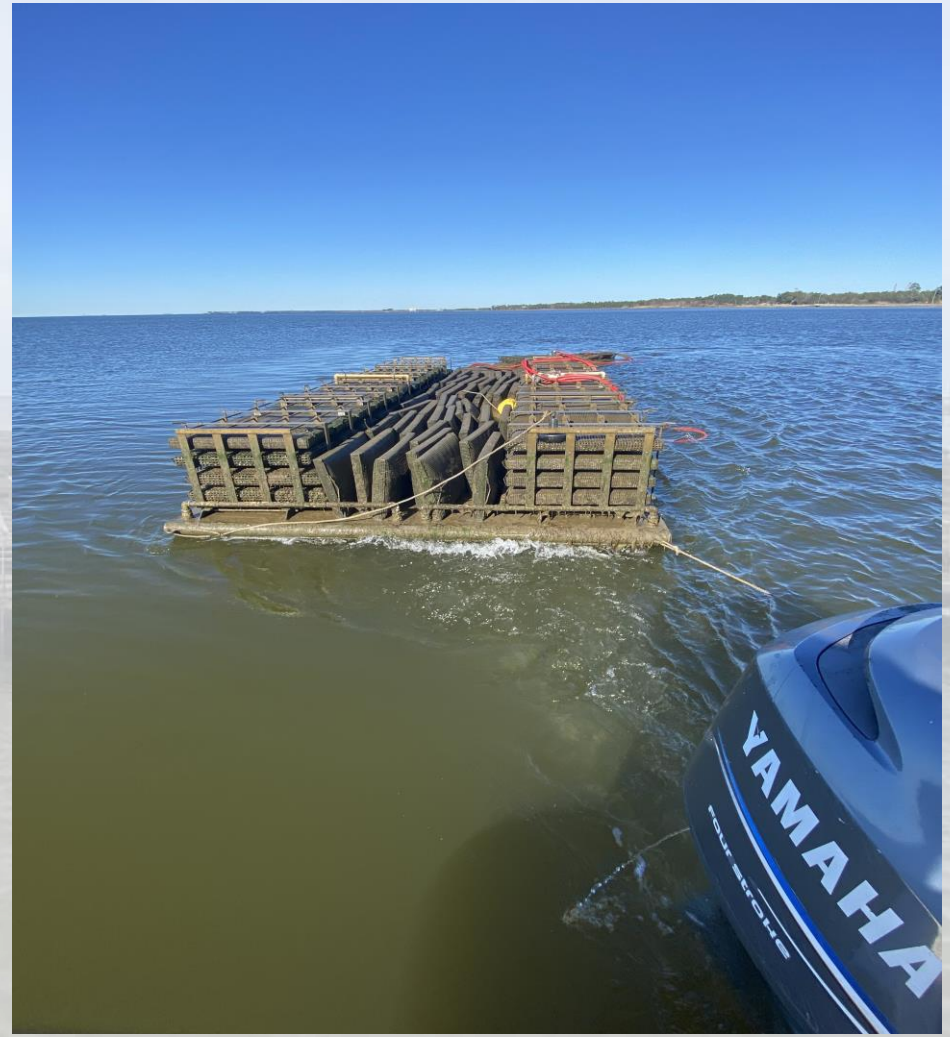
Tumble in Mass Waves & Tilt

- Polish
- Sculpt
- High density >50#/bags

Polished & Sculpted Double Cup

Mobile Oyster Farm

- Avoid harm
  - Mortality
  - Closures
- Control growth
  - Accelerate with high salinity
  - Slow at low salinity
- Enhance flavor or yield
- Improve safety
- Maintain cash flow

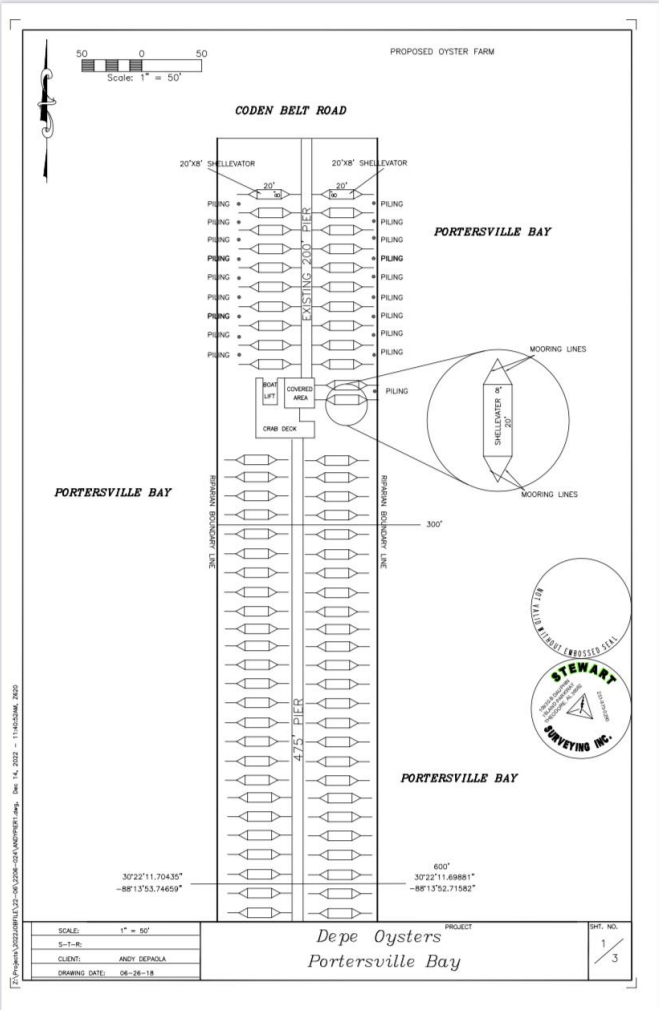


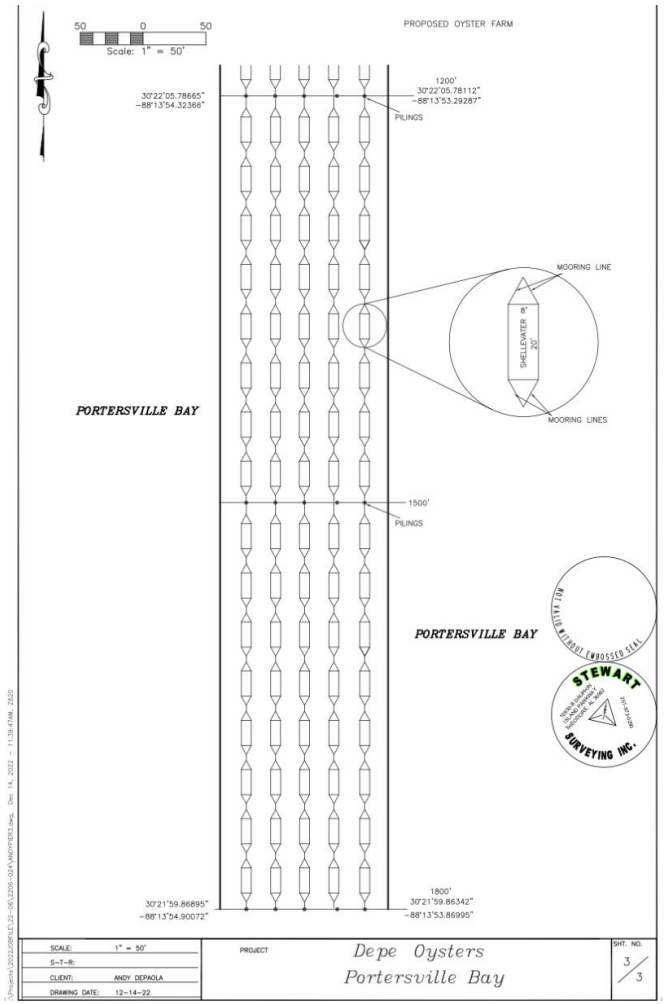
Every Shellevator has a Story

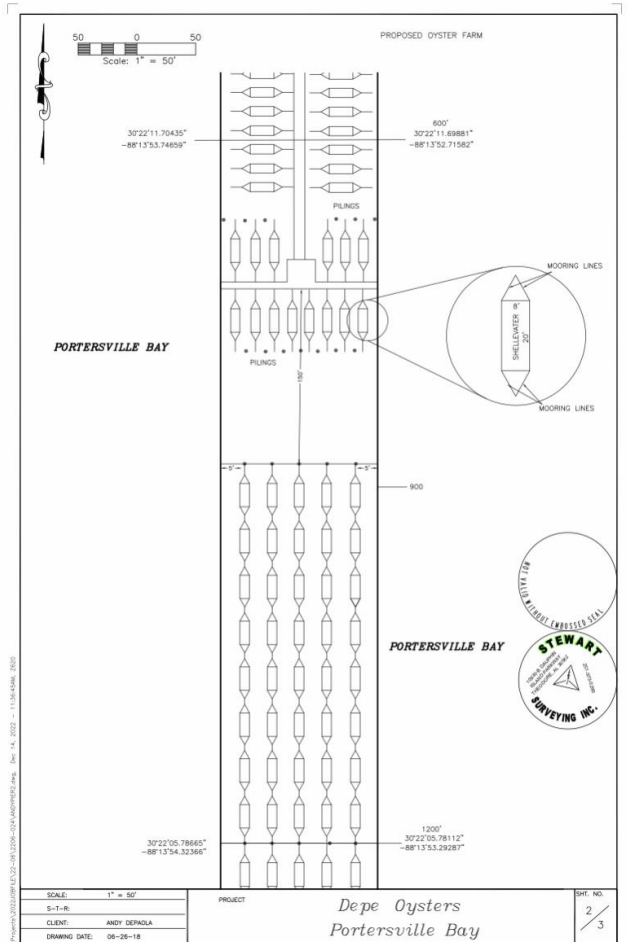
Modular Pin Barge

- Four independent lift vessels
  - 2 bow modules: 16’ X 5’
  - 2 stern modules: 15’ X 5’
- Marine grade aluminum
- Footprint: 310 square feet
- Depth range: 3.5 – 9’
- Scale
  - Ten tons lift
  - 180 bags
- Modular design
  - Facilitates transportation
  - Increase size or number of modules

3-D Growth Through Water Column
3-5 million oysters/Acre







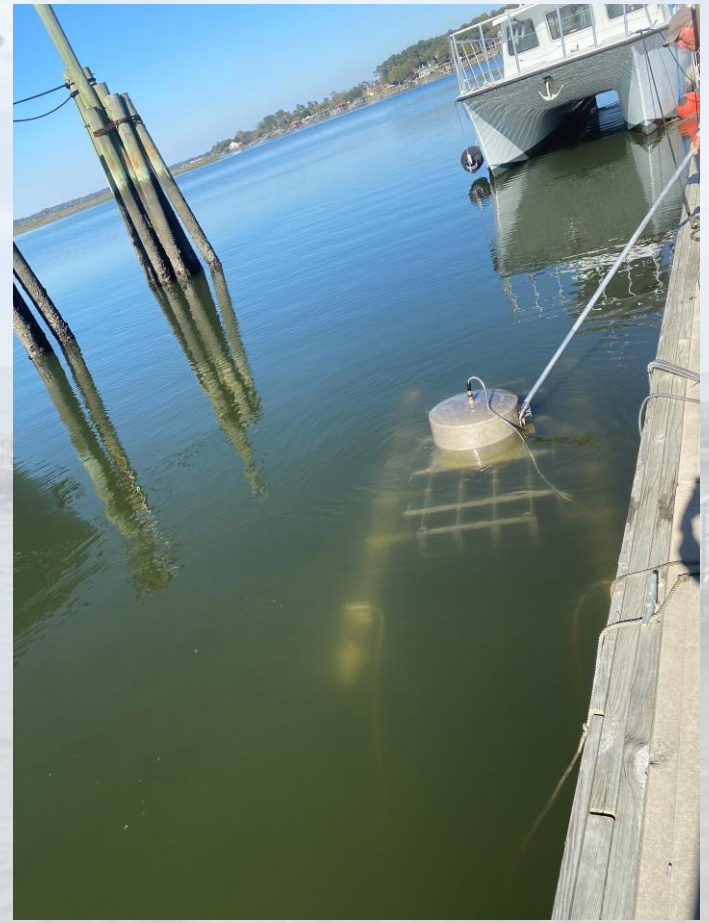
Shellevator Economics: Oysters for a Dime

- Equipment costs
  - Initial purchase: $0.50-$1.00 per oyster
  - Life span: 15 years +
  - ~$0.03 per oyster
- Seed cost (R6): $0.03
- Labor costs (2.5-3” oyster): $0.04

Shellevator Explorer: Emerging Technology

Sea Trial: Oyster South Savannah
>20’ in 5 Knot Current

Expands Operational Bandwidth



Inversion Proof

Suspend Anywhere in Water Column

- Expands operational bandwidth
  - Depth >100m
  - Position at selected depth
- Applications
  - Position below thermocline for *V. parahaemolyticus* purging
  - Out of sight and off bottom to avoid predators or low oxygen
- Expands aquaculture opportunities
  - Suspend lines mussels or kelp
  - Fish pens below

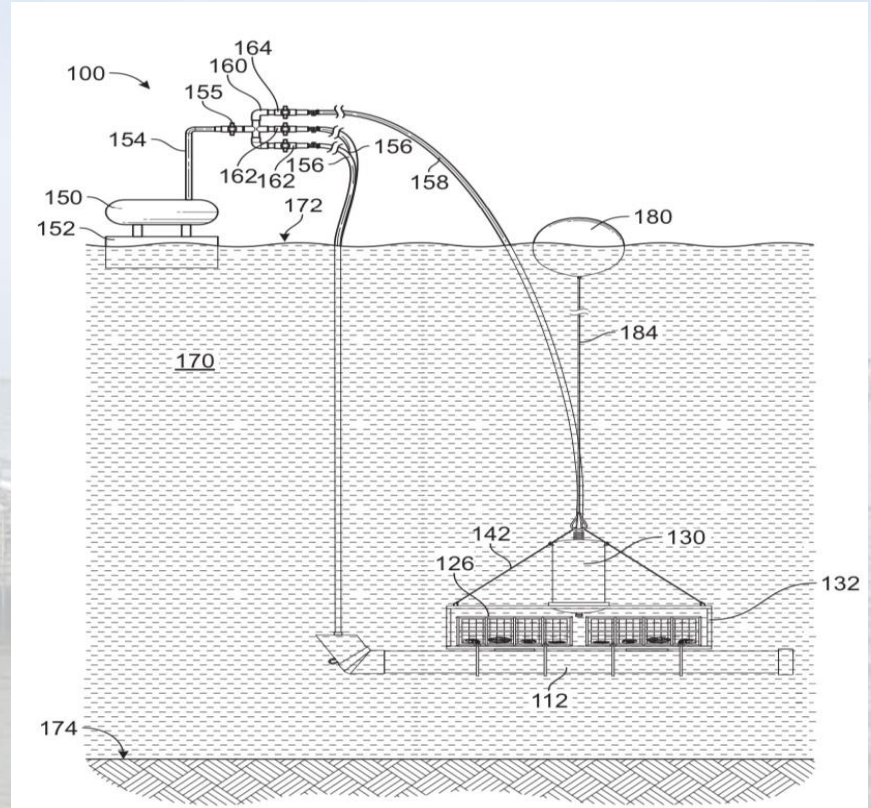


FIG. 16

Shellevator Advantages

- Automation reduces labor and saves $$$$
- Simple – No submerged moving parts
- Fast/Efficient- raised & sunk in minutes for pennies
- Seamless Portability reduces uncertainty
- Durable/robust – withstood multiple hurricanes
- Compact 3D
- Secure- out of sight