

# Tropical seaweed cultivation and harvesting

PI Loretta Roberson, Marine Biological Laboratory



*Eucheuma isiforme*

## Project Vision

Mechanized cultivation and harvesting of tropical seaweeds **resistant to climate change** and **low nutrient availability**.

## Project Impact

Production of biomass and ecosystem services **year-round** using **carrageenan** production as a step in the pathway towards viable conversion of macroalgal biomass to fuel.

Three project test sites



<https://www.mbl.edu/tropical-seaweed>

Puerto Rico, Florida, Belize

# Project Team

\* **ANCIENT MARINER** (Alaska, Northeast, Caribbean Initiative for **ENergy Technology**)

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Tom Bell  
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# Innovation & Objectives

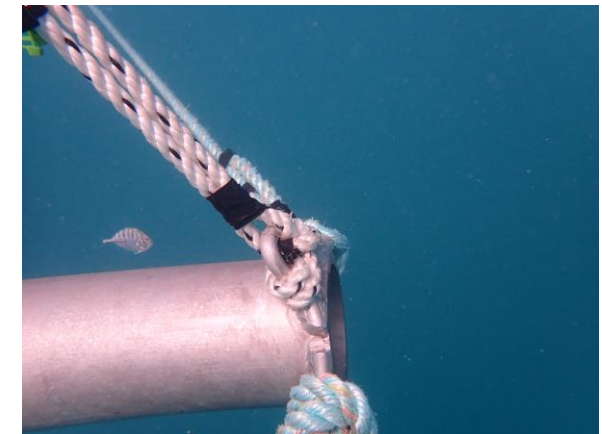
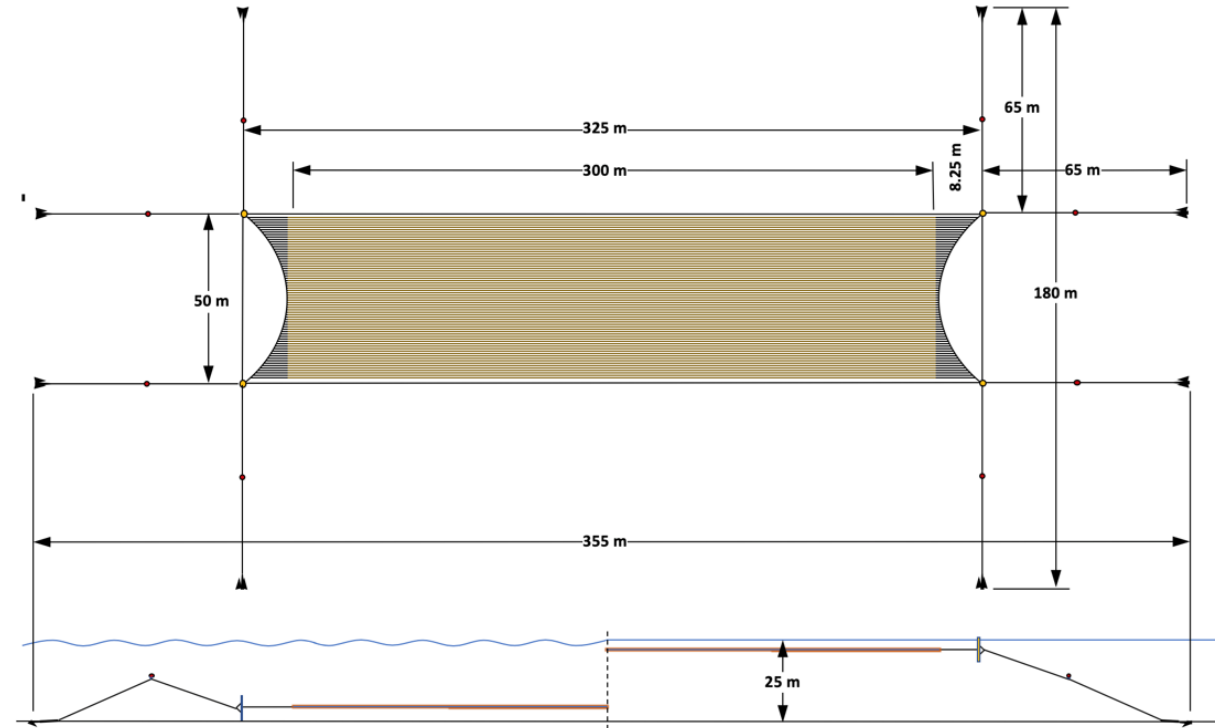
## Innovation

Fully-automated, one-step harvesting and seeding for continuous, year-round asexual production of algal biomass.

Farm system enabling economical, high-density farming in depths to 100 m and tolerant of open-ocean conditions.

Measurement and modeling of the impact of macroalgae cultivation on the environment and ecosystem services.

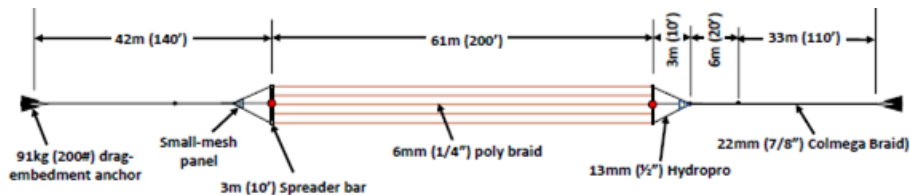
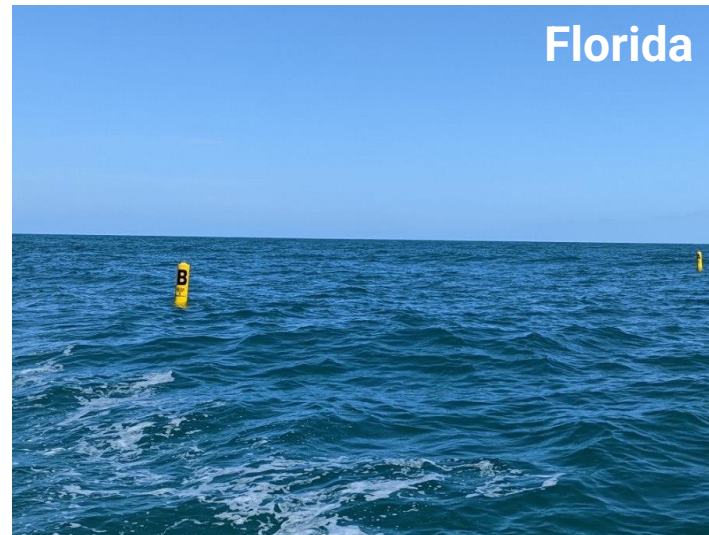
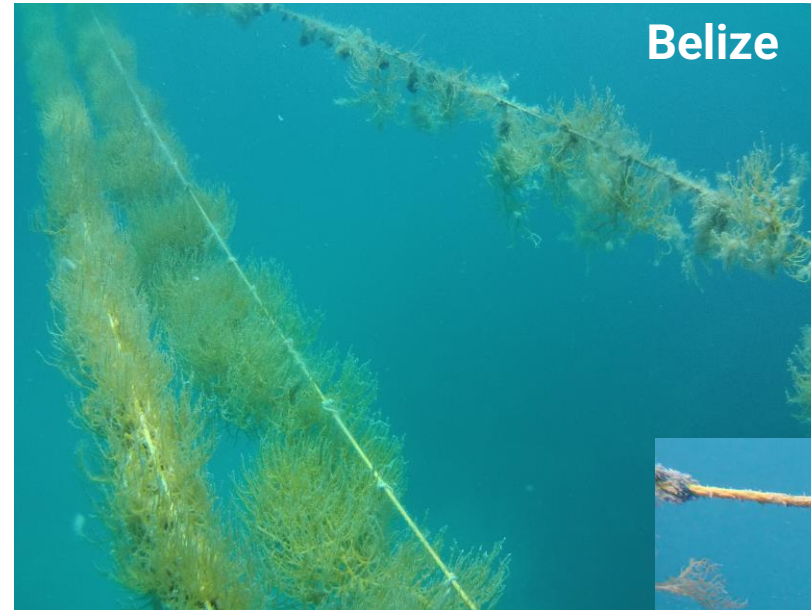
- This will be the first large-scale cultivation of native Eucheumatoid seaweeds in US tropical waters.





# Technology Progress

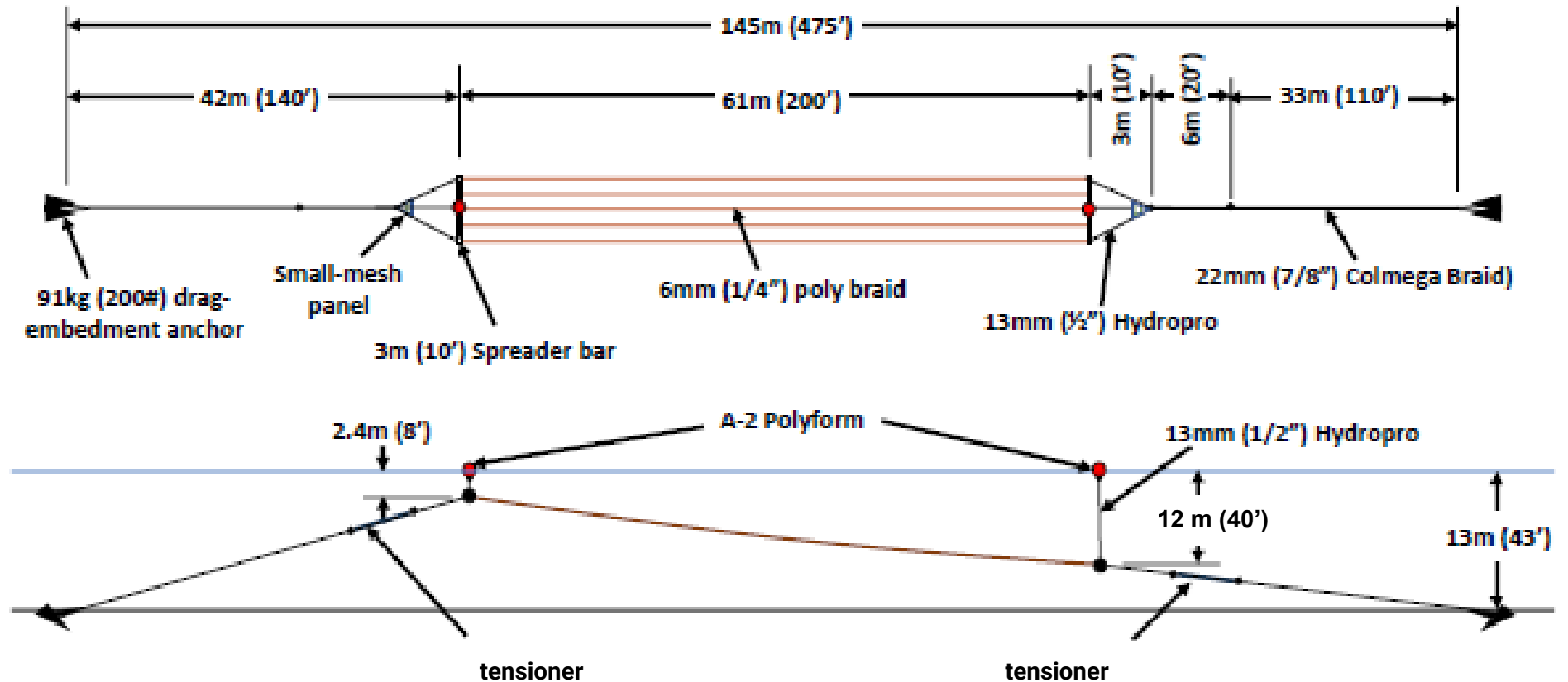
- First farm system deployed in Belize December 2020 by the Belize Women's Seaweed Farmers Association (BWSFA) and TNC
- First farm system in Puerto Rico deployed April 2021
- First farm system in Florida/Gulf of Mexico deployed June 2021 by Two Docks Shellfish



# Technology Progress I

Titled array design to expand nutrient availability and further explore optimal grow depths.

61m (200'), Tilted 5-line Eucheuma Rig



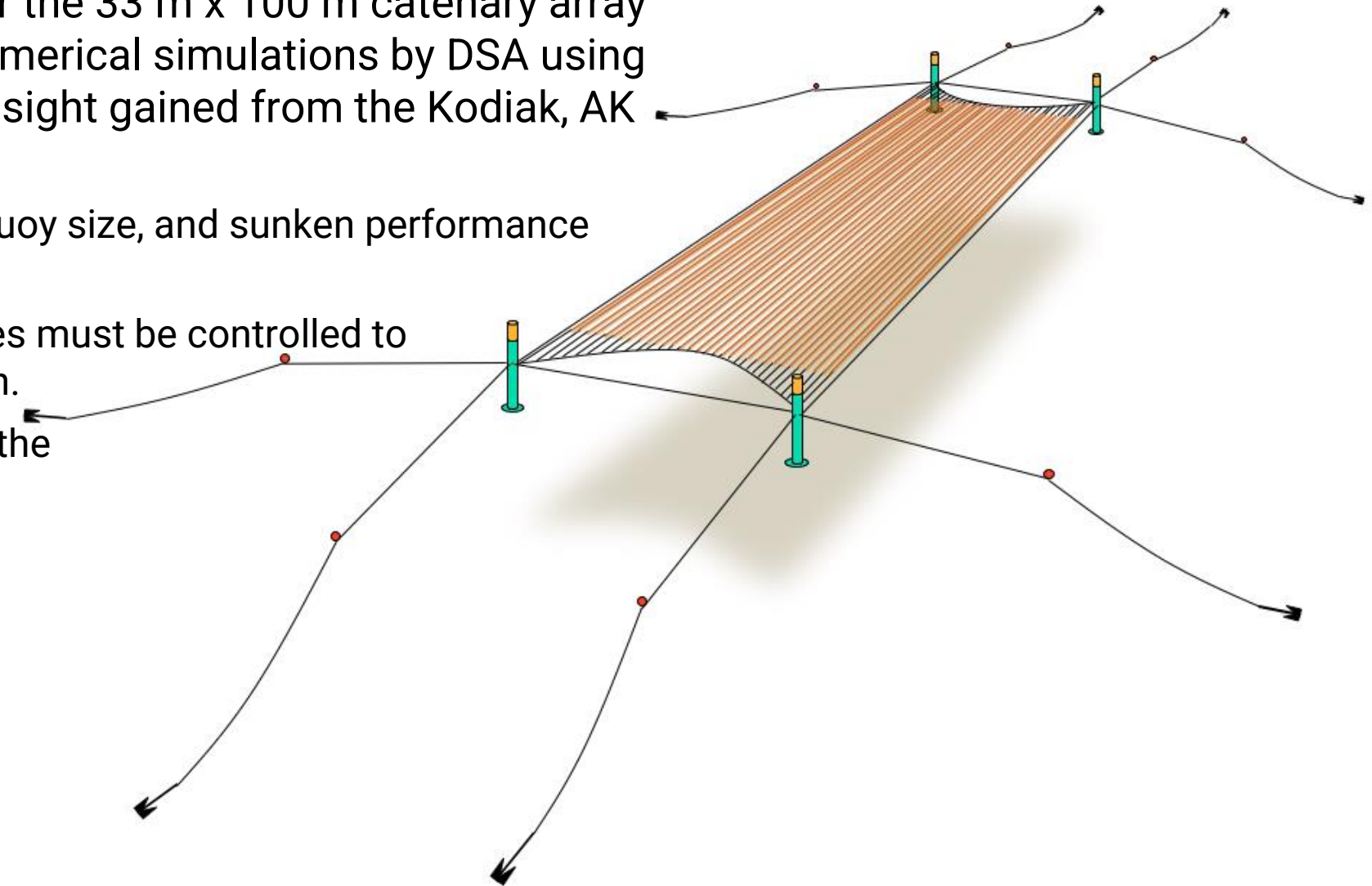
Grow depths  
3-12 m

**Tensioners** allow for easy adjustment during deployment

# Technology Progress II

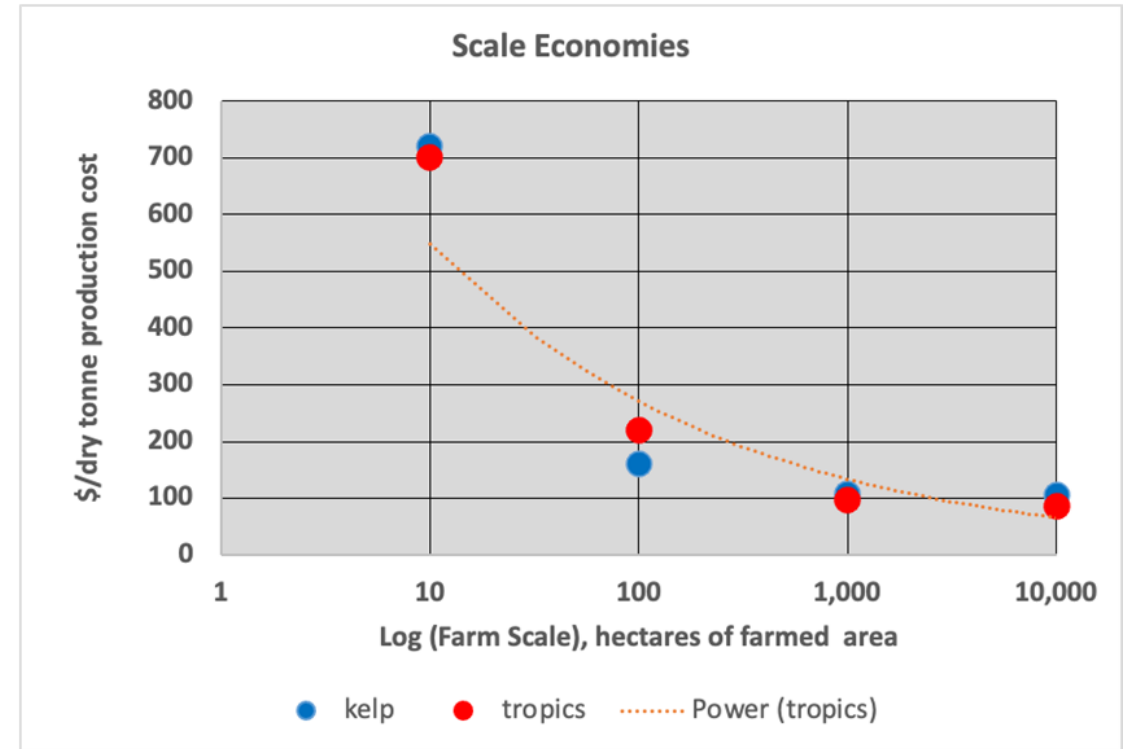
The final specifications for the 33 m x 100 m catenary array are emerging based on numerical simulations by DSA using Proteus tools and some insight gained from the Kodiak, AK project farm.

- Anchor size, submerged buoy size, and sunken performance are priorities.
- The sag of the 64 growlines must be controlled to optimize depth and growth.
- Issued permit allows only the 4 corner buoys at surface.
- A novel subsurface 4-line spreader will be used.



# Commercial Opportunities/T2M

- ▶ We are exploring **economies of scale** to support single module farm development
- ▶ Partnering with established companies for **product testing** (e.g., Exxon – biofuels; BCA Global – food and nutrition)





# Commercial Opportunities/T2M

- Queen conch hatchery in Puerto Rico operational
- Will begin testing *Eucheuma* as food supplement for juvenile conch summer 2021
- Funded by S-K program to Megan Davis, Harbor Branch Oceanographic Institute and Raimundo Espinoza, Conservación ConCiencia/Pesca Responsable





# Future Vision

- ▶ **Best management practices guide for the region**
  - Collaboration with The Nature Conservancy
  - Co-cultivation clams and seaweed in the Gulf of Mexico; collaboration with Two Docks Shellfish (awarded NOAA S-K 2021)



Sunray venus clams

# Future Vision

- ▶ Probiotics and disease monitoring
  - Collaboration with Cat. 5 teams (*Saccharina* and *Macrocystis*), SAMS (David Green, Claire Gachon, and Adam Hughes), and Shell (Jeffrey Fedenko)



Colleen Hansel, WHOI

Diver-operated  
Submersible  
Chemiluminescent  
sensOr (DISCO)

