

“MARINE TECHNOLOGY TO ADVANCE OFFSHORE FARMING IN THE UNITED STATES”

Lindsay Cruver
Research & Development



FIRST OFFSHORE AQUACULTURE FACILITY IN U.S. FEDERAL WATERS





CATALINA SEA RANCH

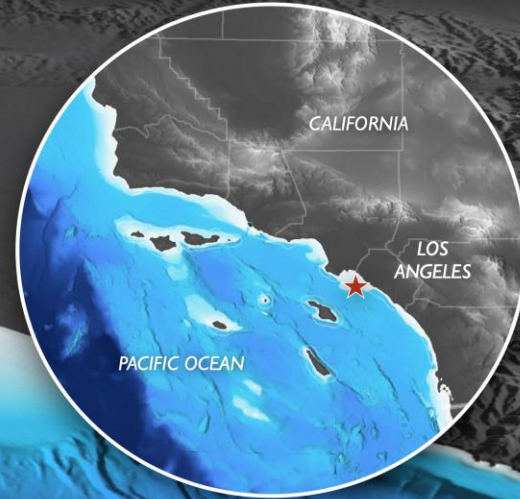
www.catalinasearanch.com

SAN PEDRO

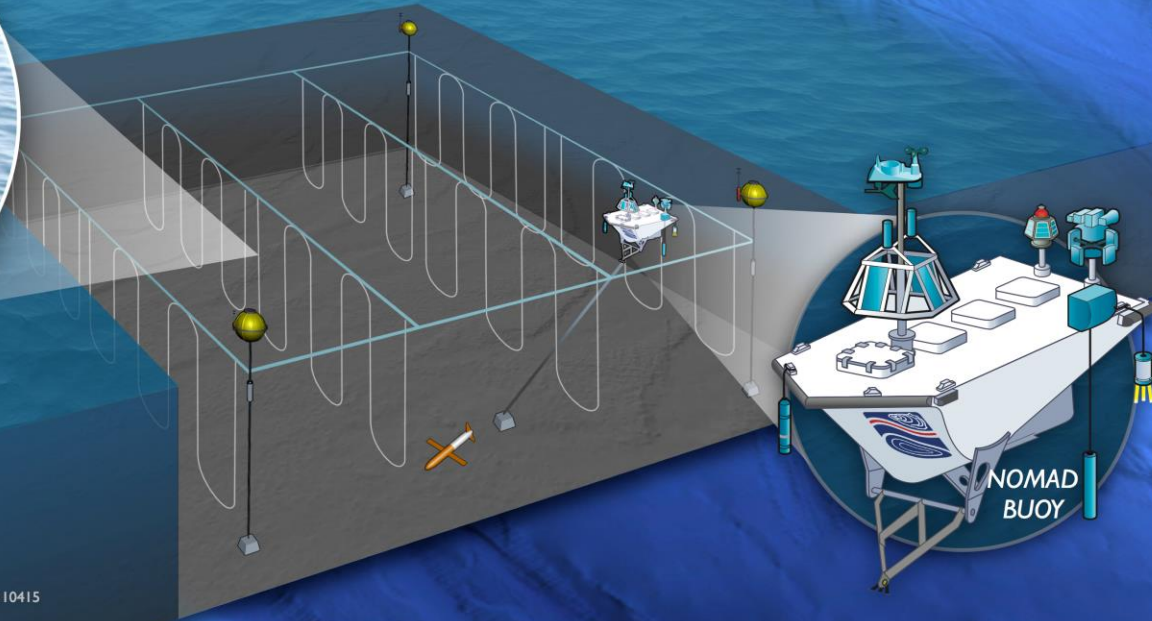
LONG BEACH

CATALINA
SEA RANCH

SAN PEDRO
SHELF



MUSSELS



NOMAD
BUOY

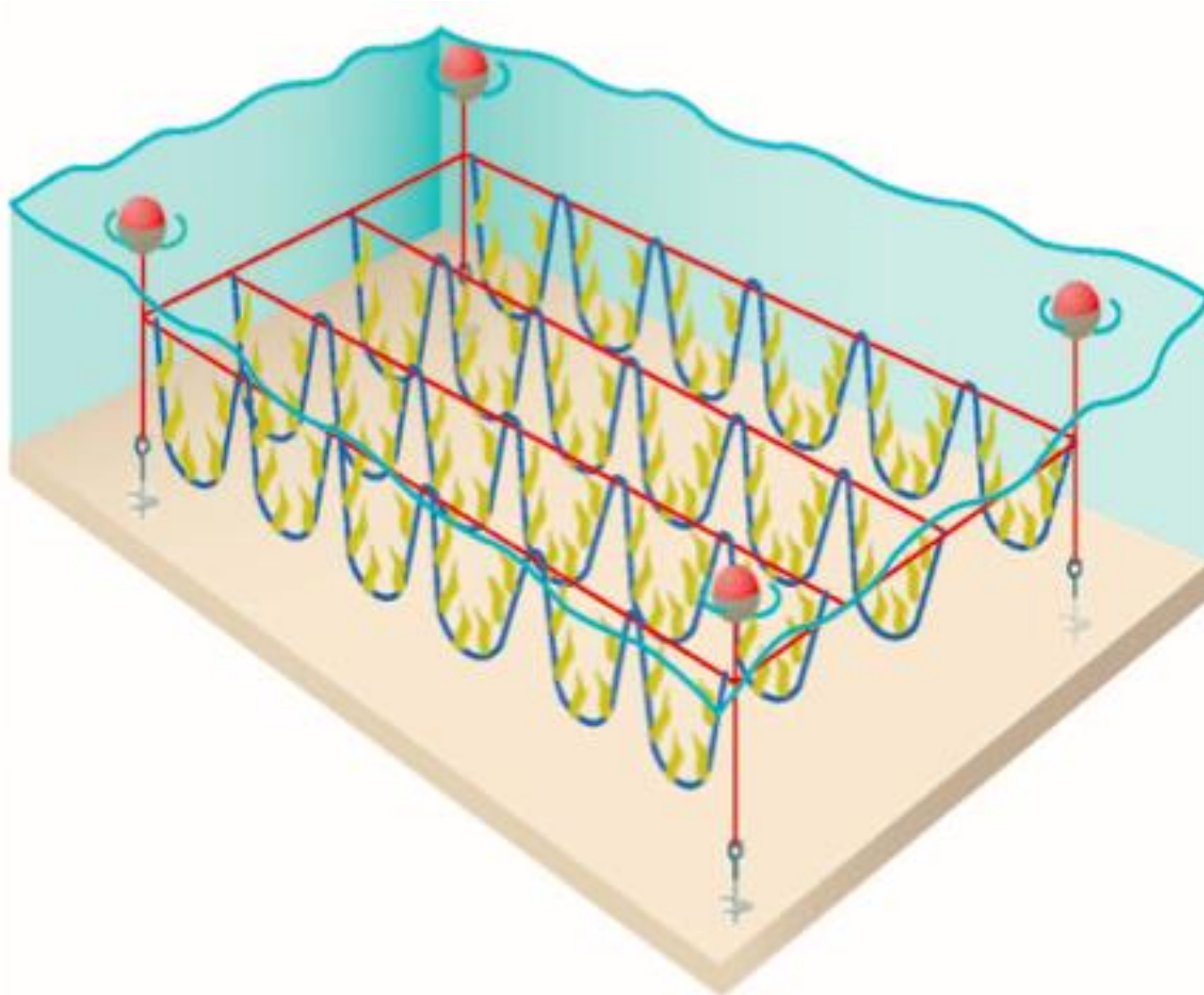
Mediterranean Mussel = Cash Crop



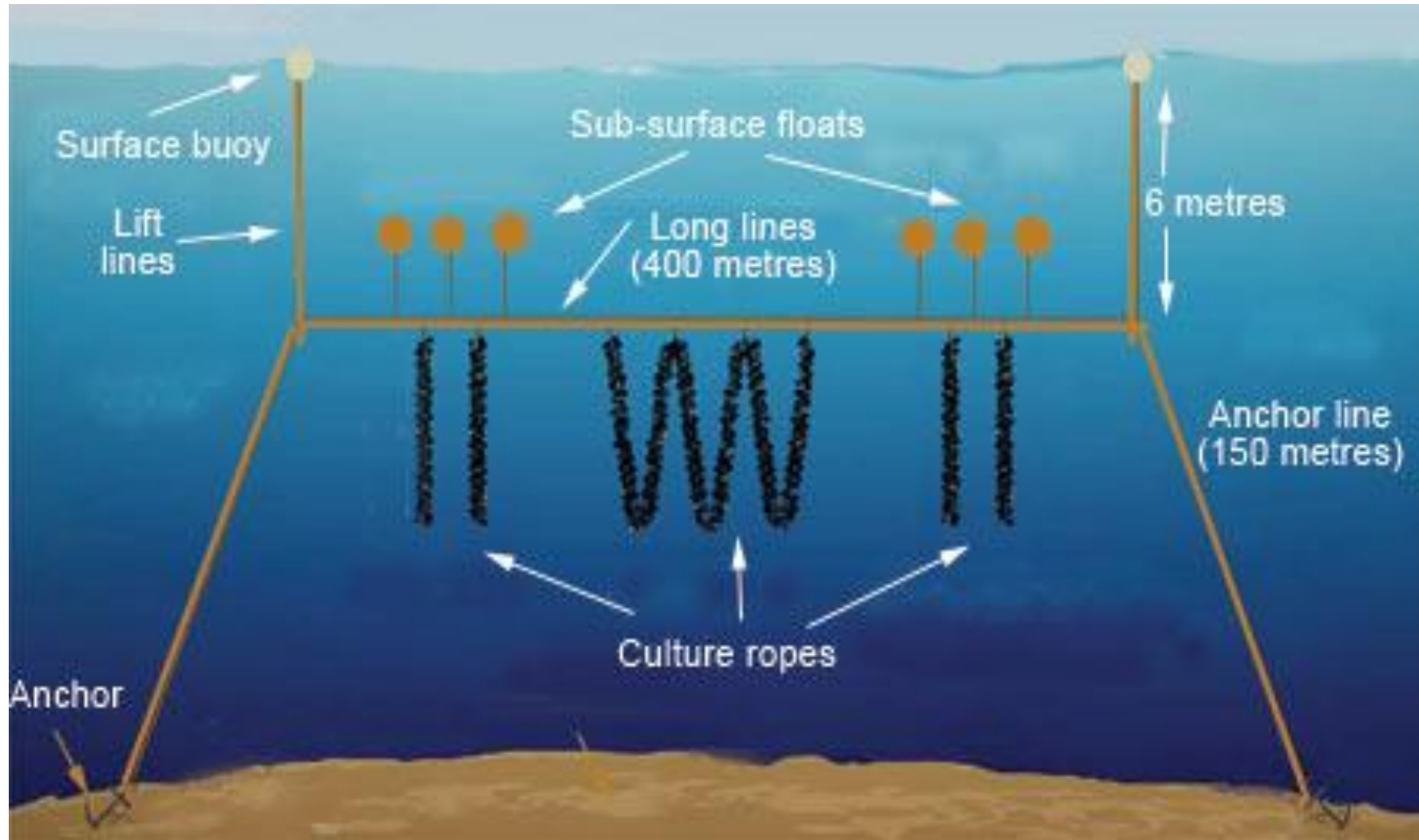
Mytilus galloprovincialis

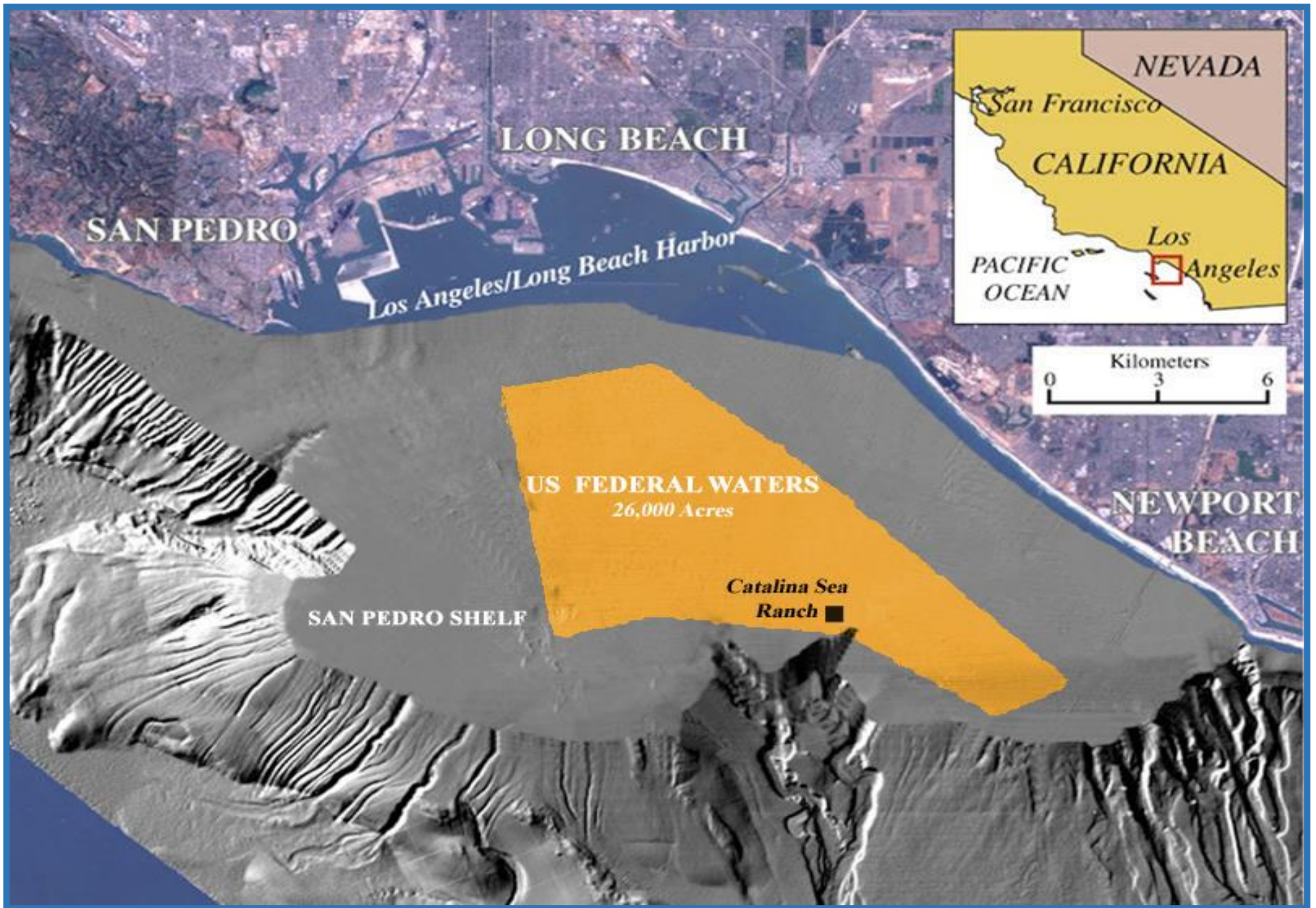
1,000 tons annually

40-Hectare Farm



One-Line Section of Farm





Port of Los Angeles

Offices, Laboratory, Research, Processing, Storage



RESEARCH &

FLEET

Captain Jack



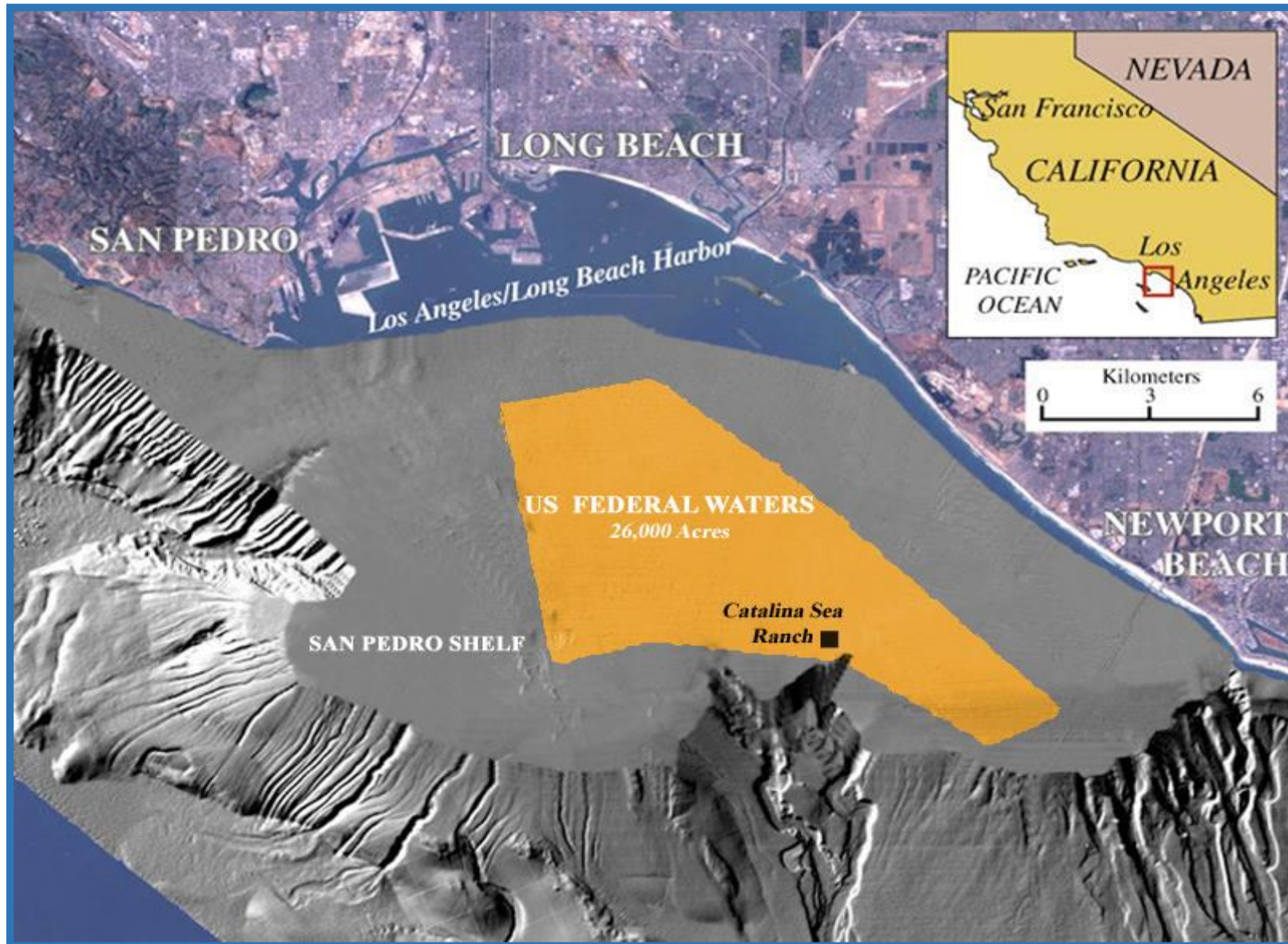
Enterprise

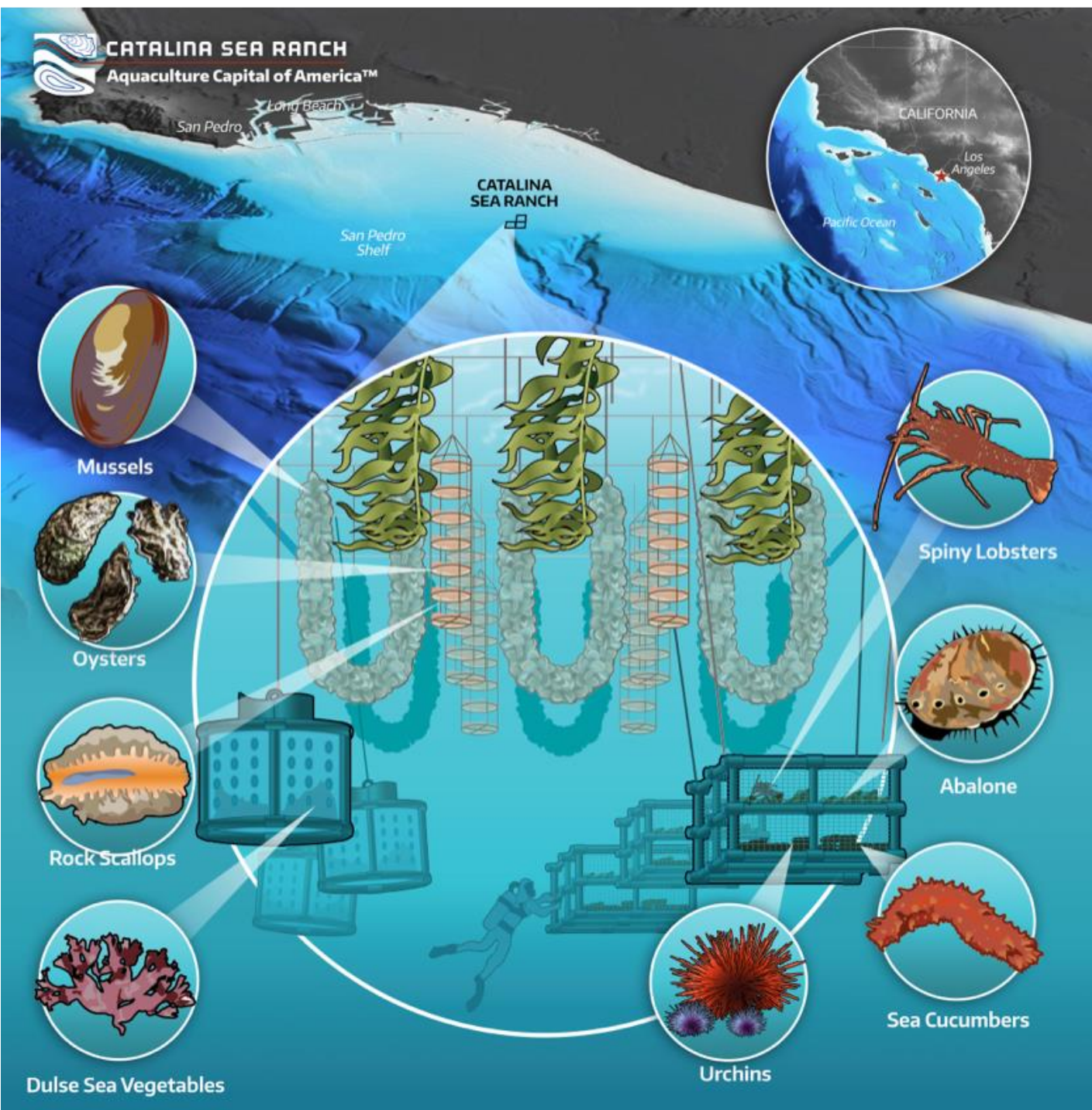


First Harvest: July 30, 2018



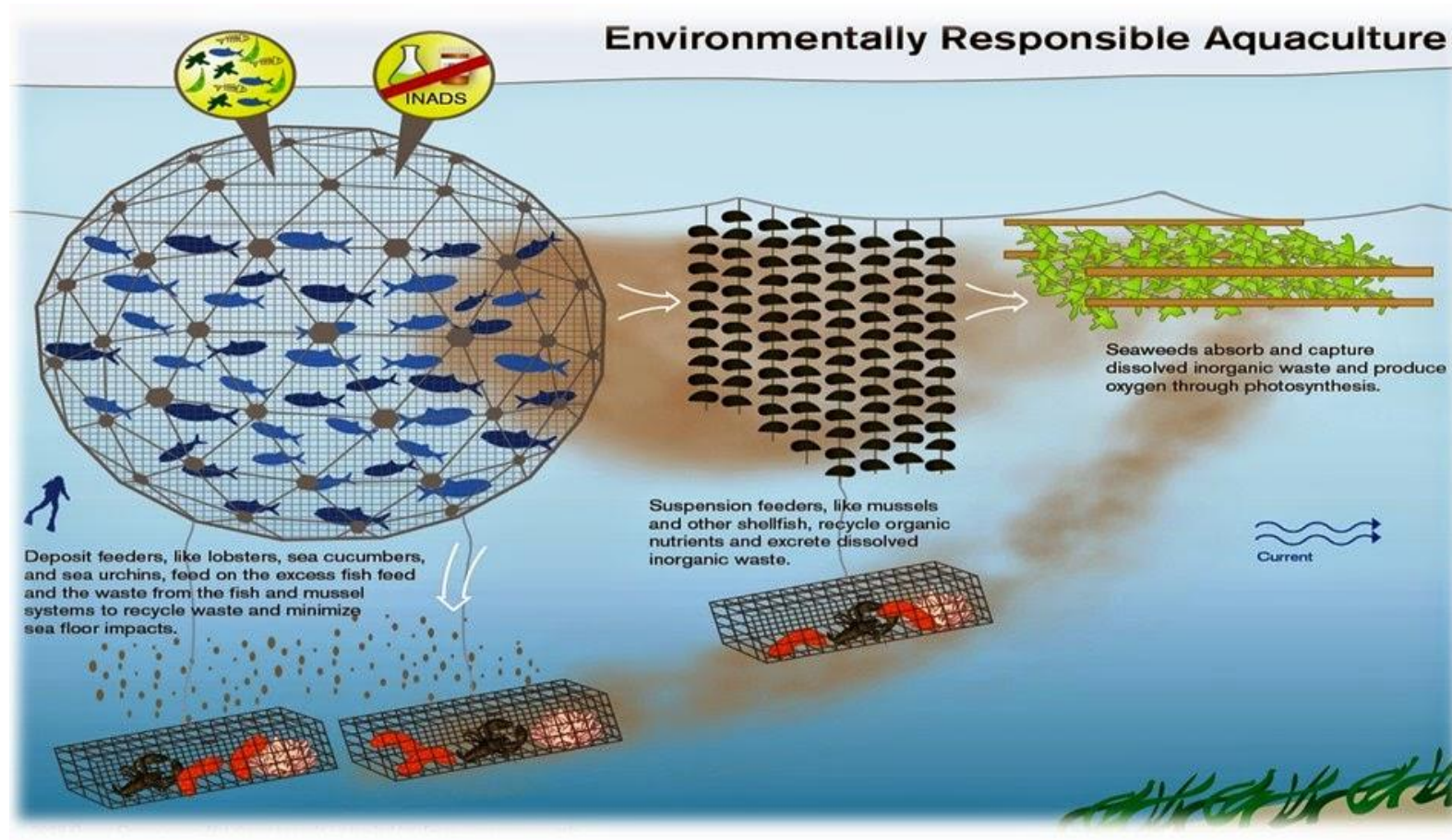
Expansion: 1,000 Hectares





- Mussels
- Oysters
- Scallops
- Kelp
- Dulse
- Ogo
- Urchins
- Sea Cucumbers
- Abalone
- Lobster

IMTA = Integrated Multitrophic Aquaculture



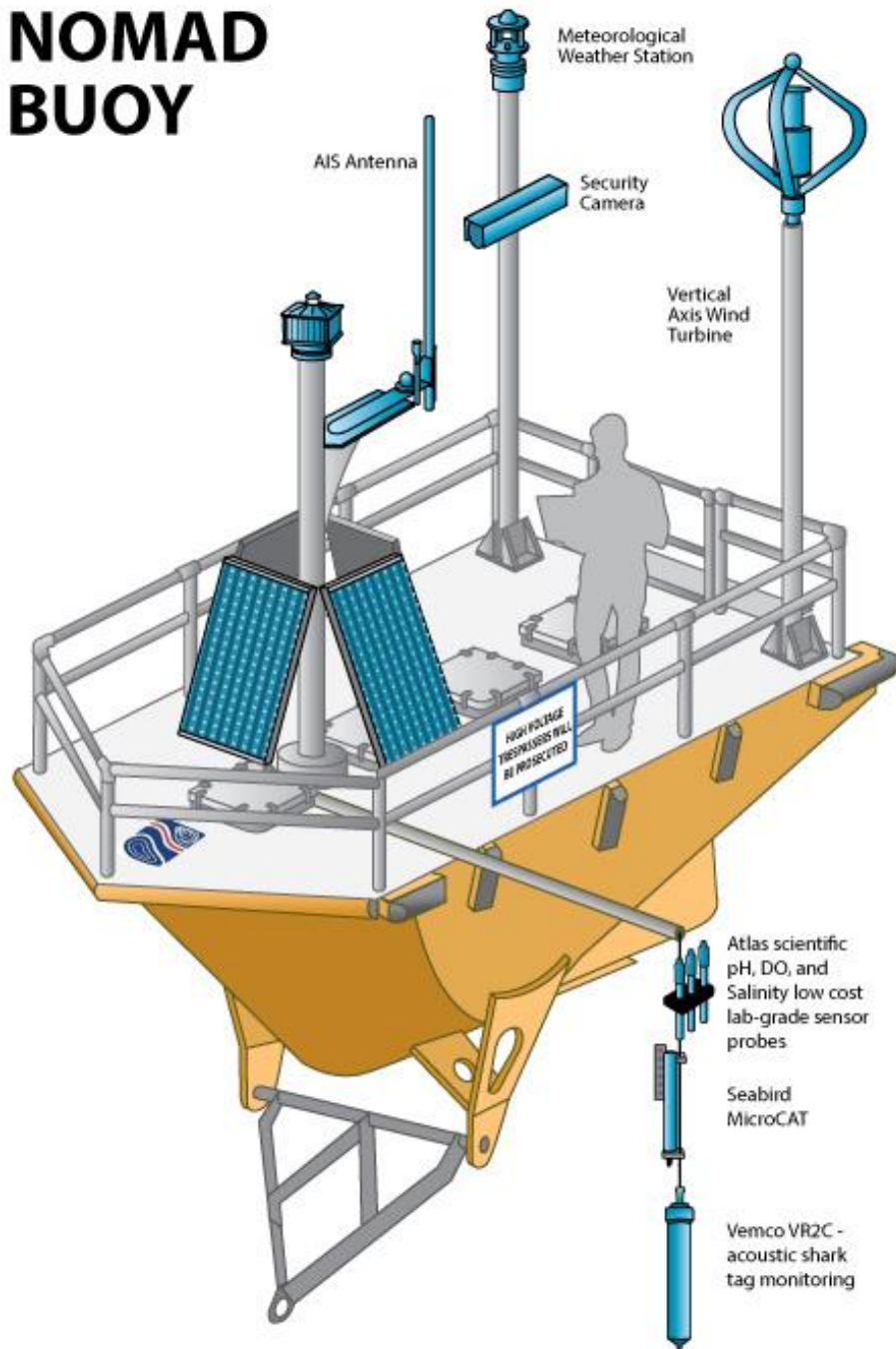
Monitoring

NOMAD buoy = Navy Oceanographic Meteorological Automatic Device



“Sound regulations based on solid science”

NOMAD BUOY



- Solar panels
- Vertical axis wind turbine
- Automatic Identification System (AIS)
- Meteorological weather station
- Security camera
- Tagged shark monitor
- Cytobot
- Fluorometer
- Conductivity
- Temperature
- Pressure
- Dissolved oxygen
- Current

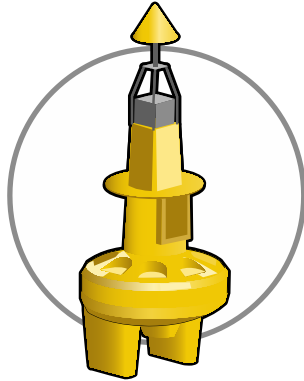
Ocean Internet of Things Platform

AIS RECEIVER

Receives AIS data and disseminates information via a web browser. Provides security areas and local vessel movement.

NOMAD BUOY

Fitted with a V-20 AIS Aton to broadcast position and weather data.



PERIMETER BUOY

Fitted with USCG approved lanterns.

NOMAD BUOY

Sensors collect environmental and aquaculture husbandry data including temperature, salinity, pH, dissolved oxygen and phytoplankton density.

Verizon's shore-based **CELLULAR** located in Huntington Beach transmits the raw data to its cloud server for scientists to analyze via the Internet.



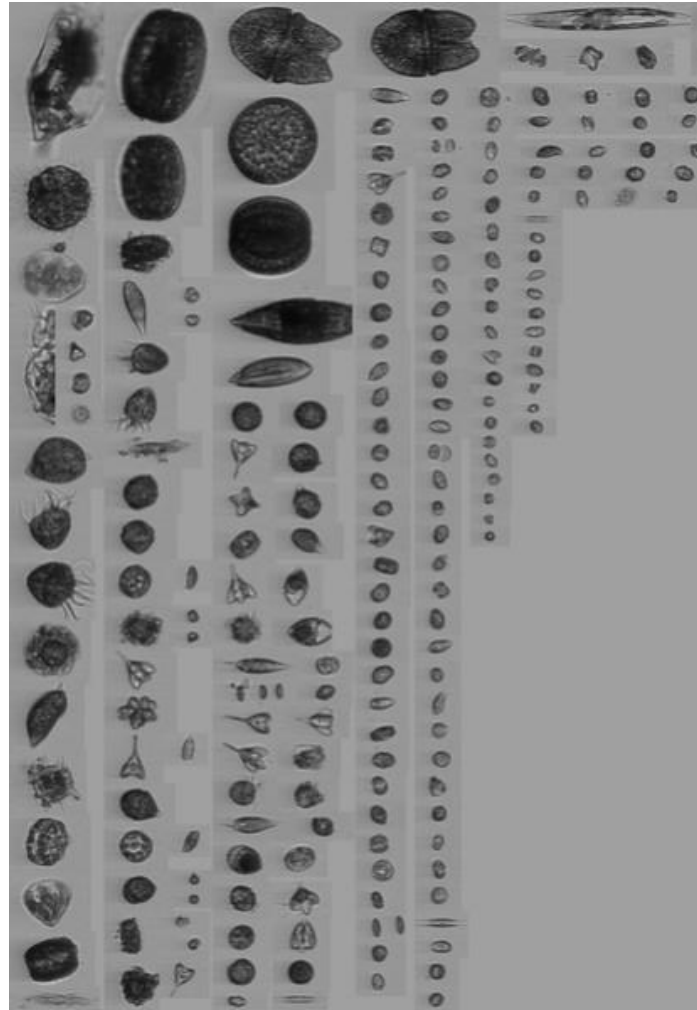
ELECTRONIC FENCE

AIS enabled electronic warning fence.

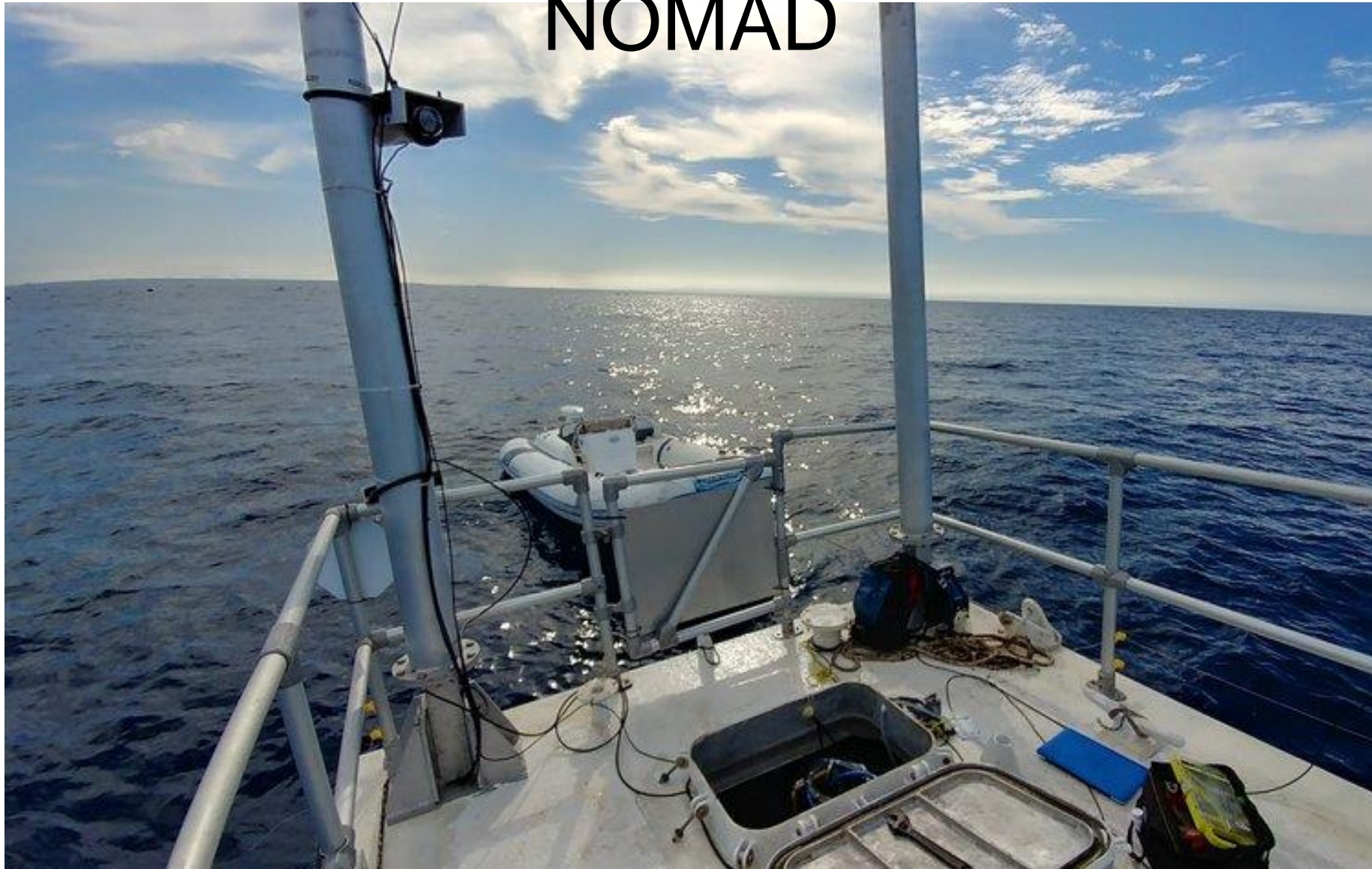


CATALINA SEA RANCH
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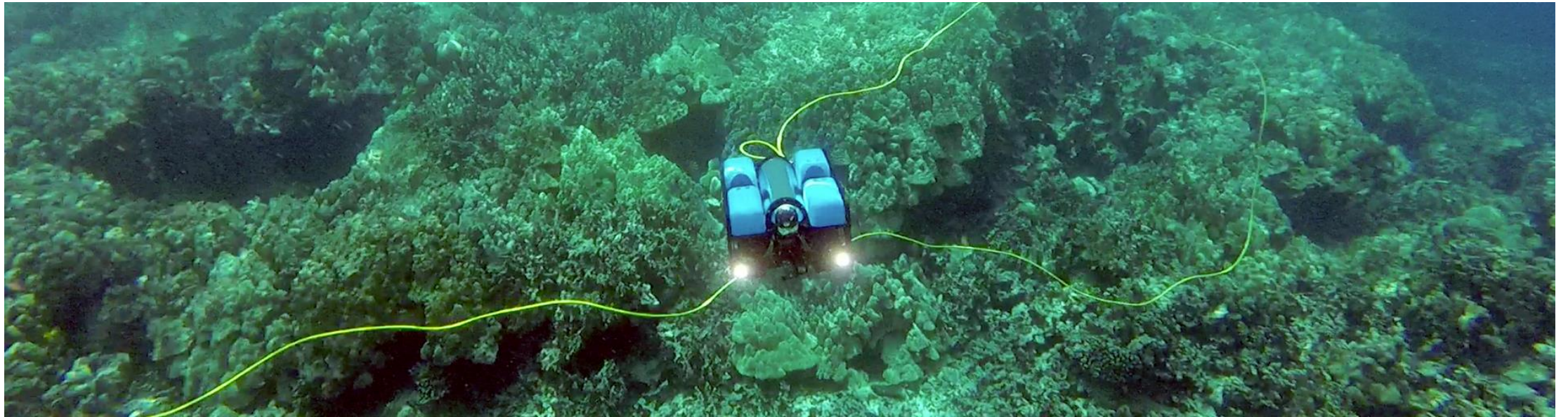
Imaging Flow CYTOBOT



CYTOBOT on NOMAD

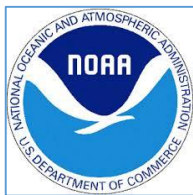


ROV (Remote Operated Vehicle) Monitoring





Grants and Collaboration



Improving Seed Production for Marine Shellfish Aquaculture in the United States

Awarded September 2015 and August 2016

PHASE I
\$95,000

PHASE II
\$400,000



Cryopreservation of Mussel Larvae for Advancing United States Aquaculture

Awarded August 2016

\$100,000



U.S. DEPARTMENT OF
ENERGY



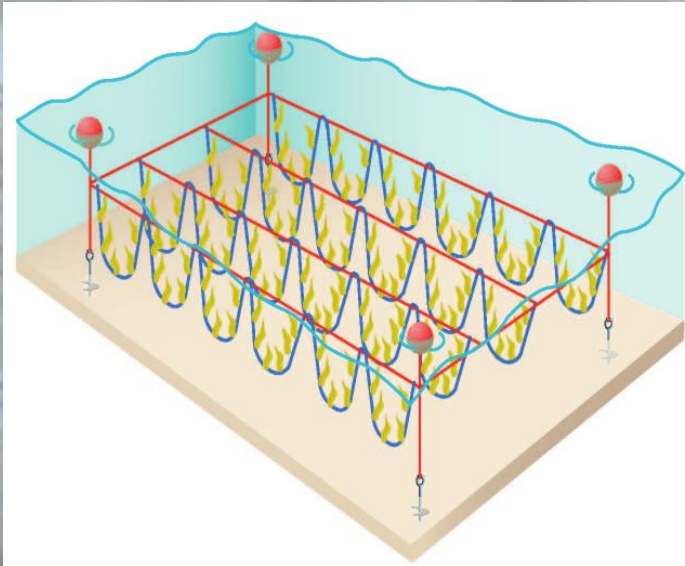
CHANGING WHAT'S POSSIBLE

Hortimare



**CATALINA
SEA
RANCH**

ARPA-E MACROALGAE RESEARCH AWARDS



PRIME

Catalina Sea Ranch

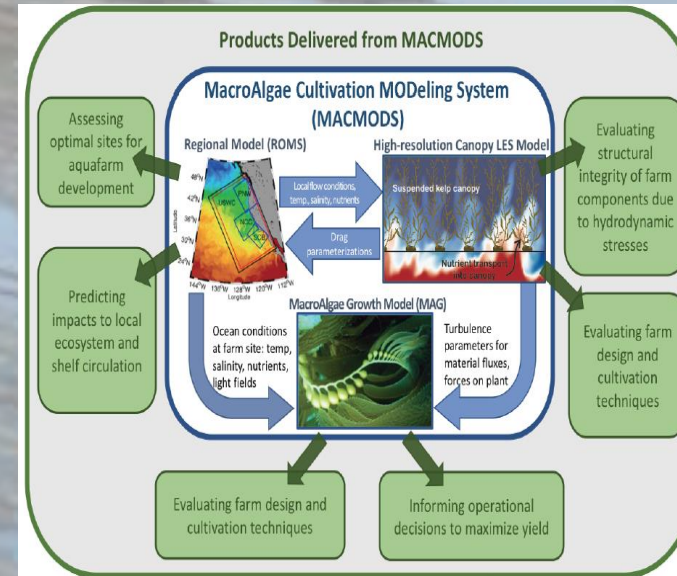
Subcontractors:

Ocean Rainforest

Patagonia Seaweeds

*'Design of Large Scale
Macroalgae Systems'*

\$500,000



SUBCONTRACTOR TO:

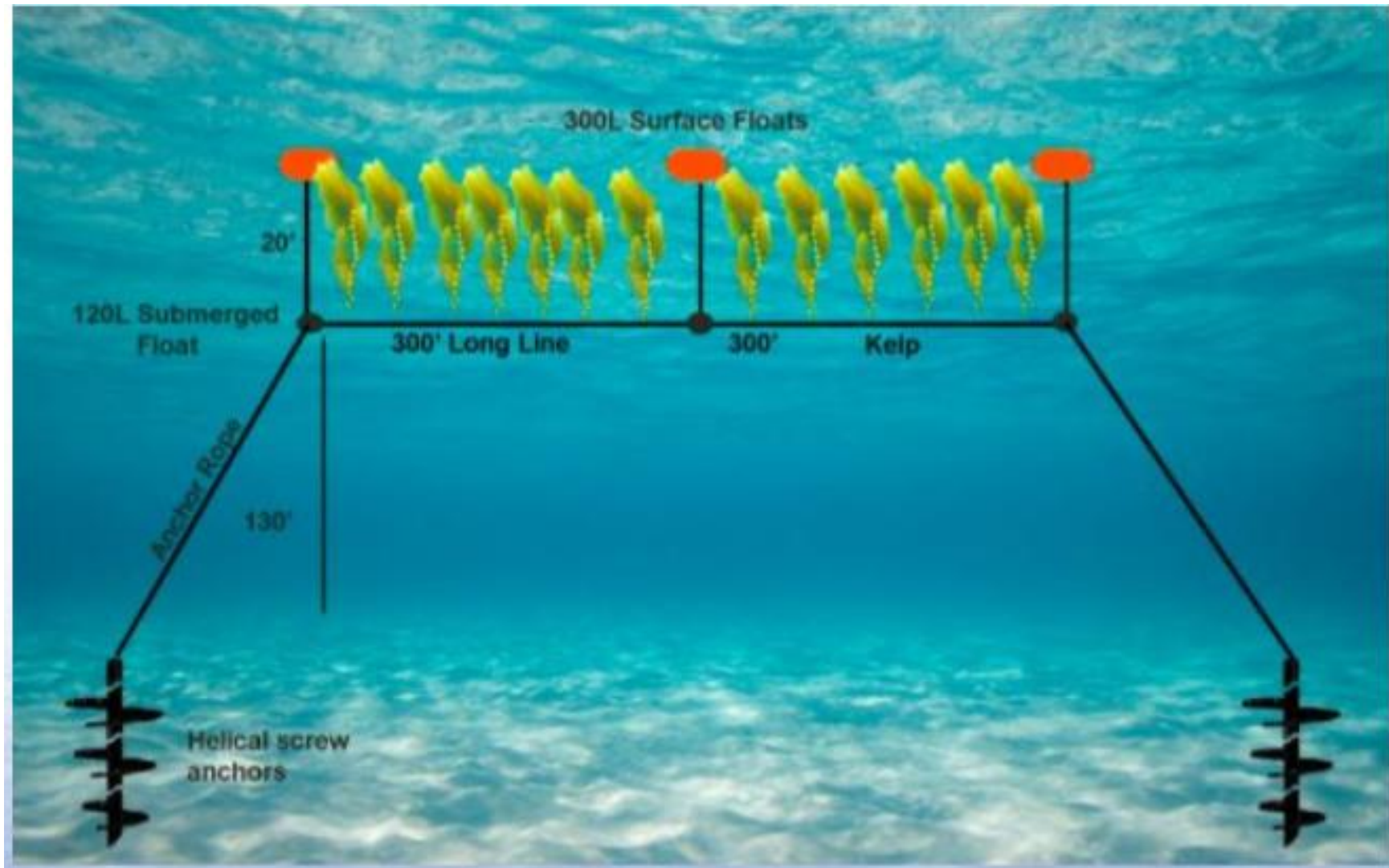
UC-Irvine

UC-Santa Cruz

UC-Los Angeles

*'MacroAlgae Cultivation
MODELing System'*

\$1,815,529





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