



CATALINA SEA RANCH

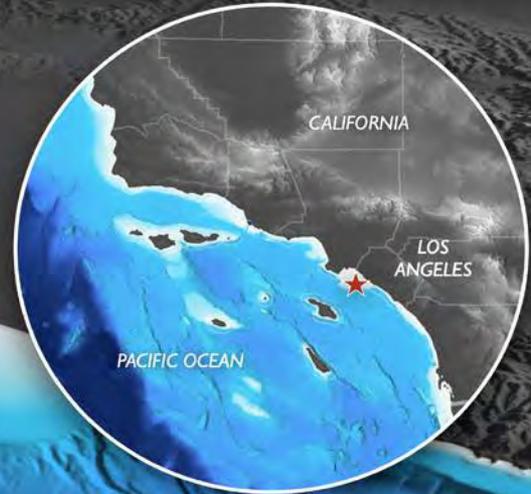
www.catalinasearanch.com

SAN PEDRO

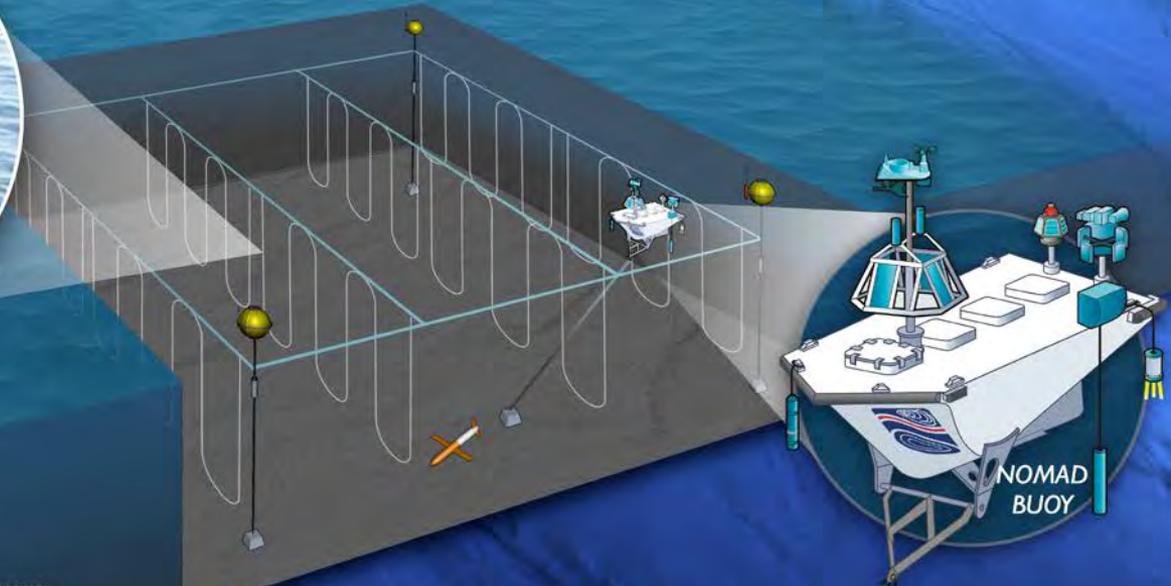
LONG BEACH

**CATALINA
SEA RANCH**

SAN PEDRO
SHELF



MUSSELS



NOMAD
BUOY

OPEN OCEAN SHELLFISH FARMING



There are numerous advantages to farming shellfish in offshore waters: The swift currents and upwelling supply ample food to promote faster growth and long-lines suspend the shellfish preventing predation and parasites that impact their cultivation in calmer shore waters. Low salinity and heavy siltation following torrential rains cause mortalities for shellfish harvested from congested and contaminated bays and estuaries leading to quality problems.

SUSTAINABLE SHELLFISH MARICULTURE

Two-thirds of current U.S. marine aquaculture is comprised from the cultivation of shellfish, which has been identified as the most sustainable form of aquaculture with minimal impact on the environment.

Catalina Sea Ranch is developing the first offshore aquaculture facility in federally regulated waters of the United States. During the first two years of operations, it will improve the technologies, validate the economics, and monitor and document any environmental impact for scaling its operations.



WE CAN GROW OUR OWN

National Marine Fisheries Service data show over 33 million pounds of **LIVE** mussels imported annually from Prince Edward Island (PEI), located over 3,500 miles from California.

1,000 acres on San Pedro Shelf would annually produce 20 million pounds of mussels amounting to about 18% of the 110 million pounds of U.S. annual imports.

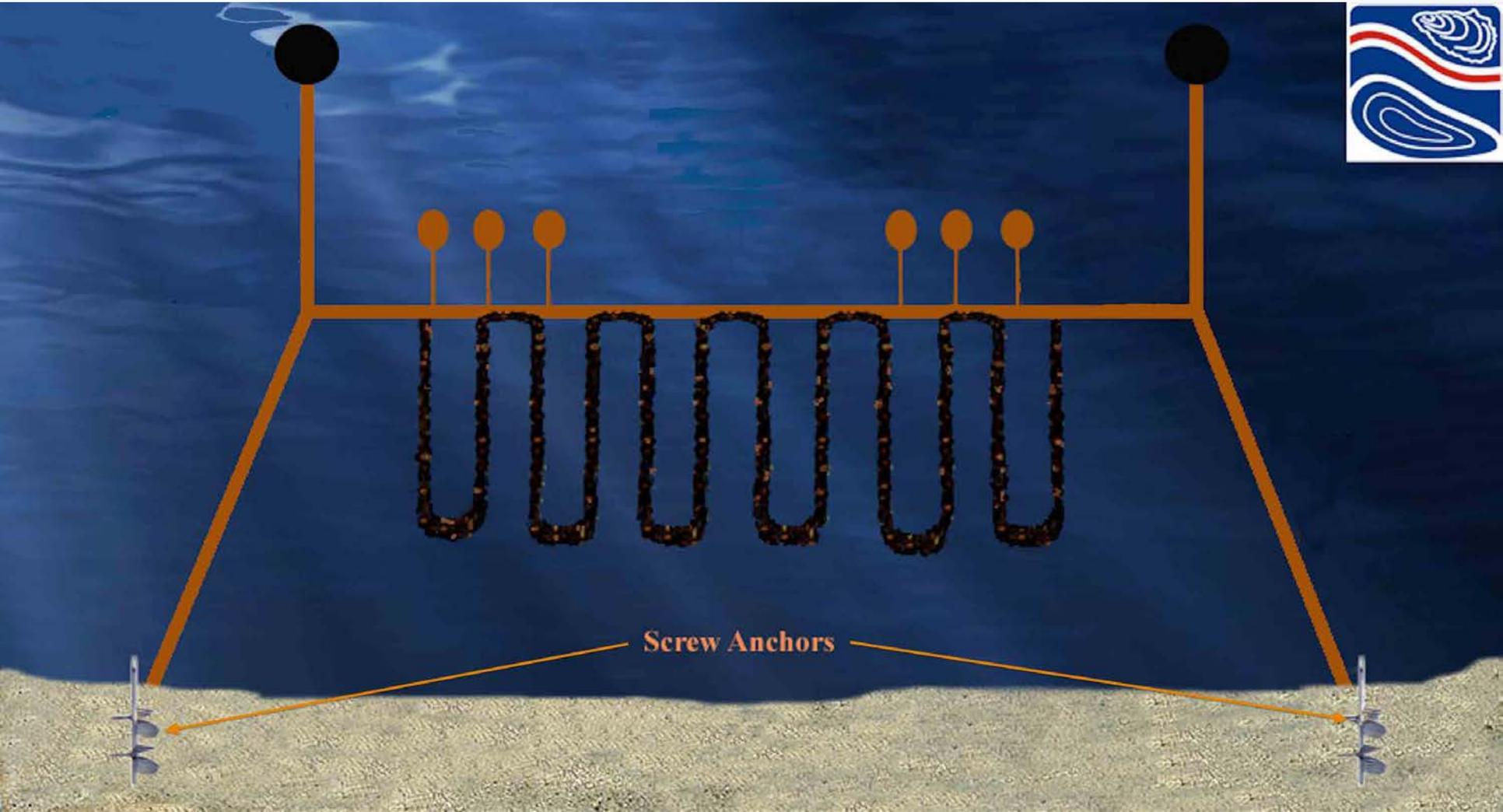
Globally, 4 billion pounds of mussels are produced annually.



There are 26,000 acres of Federal waters on the San Pedro Shelf that are ideal for offshore aquaculture. Massive upwelling for producing nutrients for sustainable mollusk and macroalgae aquaculture with constant currents for requisite flushing characteristics.



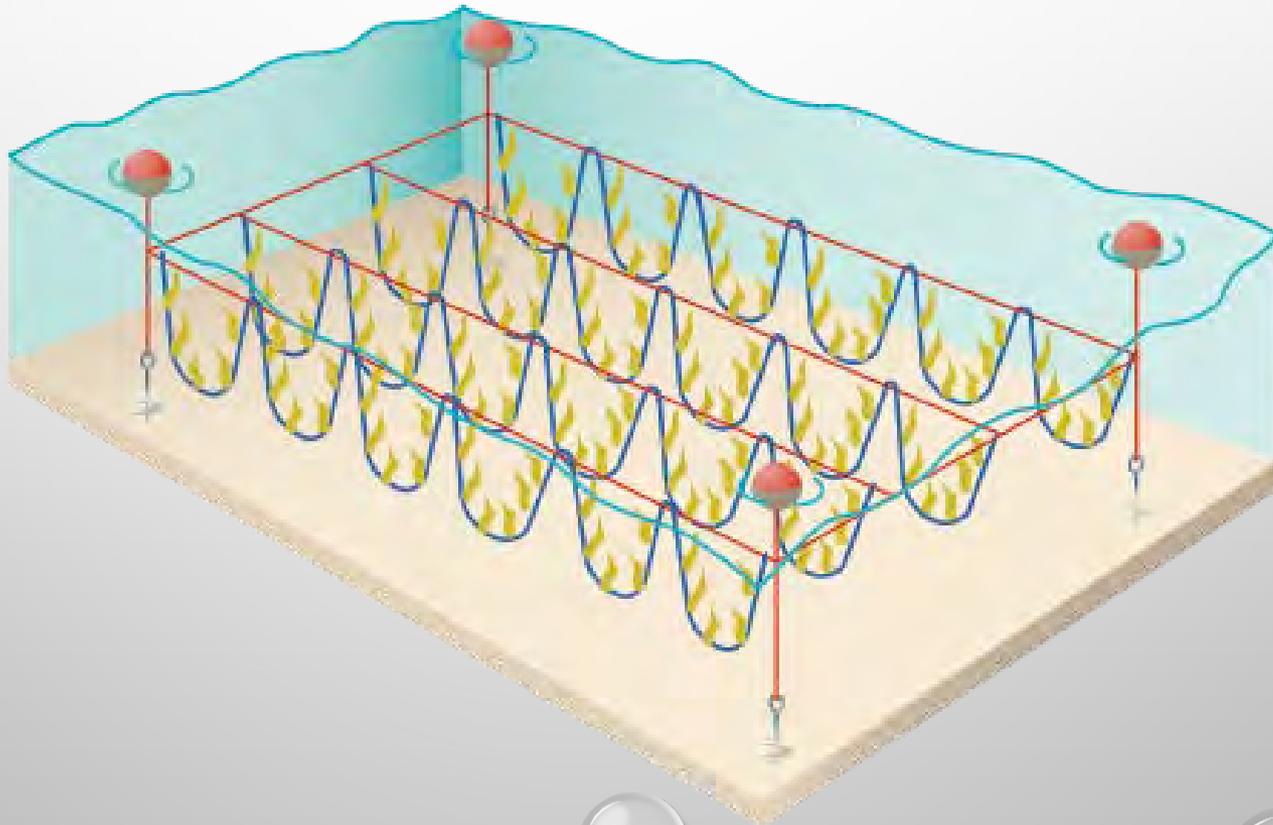
There are forty 600 foot longlines on 100 acres, each with 8,530 feet of continuous grow lines. At 5 pounds per foot yield, each line will produce about 42,000 pounds upon harvesting approximately 6 through 8 months for an annual production of about 2,000,000 pounds of mussels for each 100 acres.



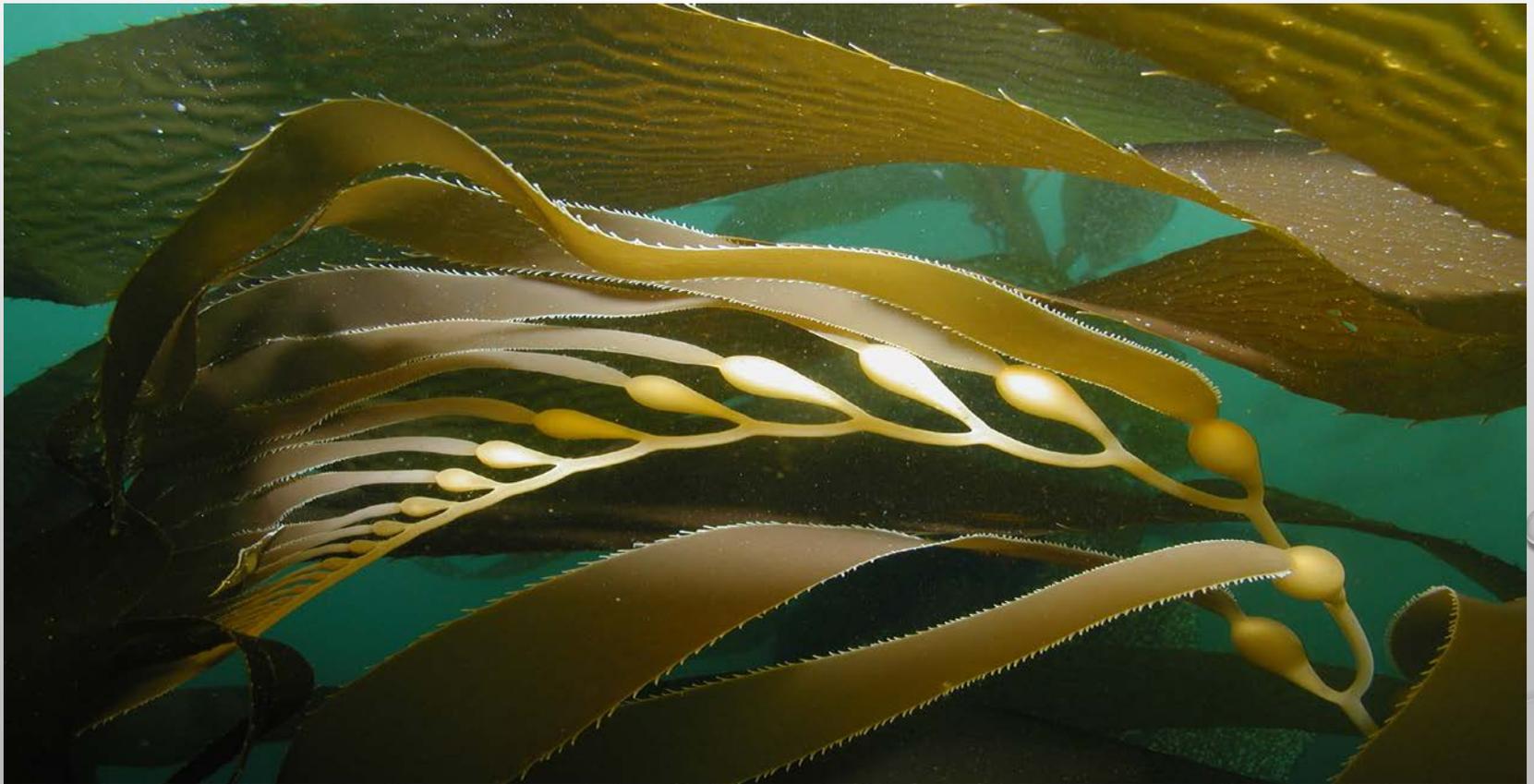
Mussels are a low-risk cash crop. The infrastructure will support experimentation with the polyculture of additional sustainable and higher value marine crops for diversification with future expansion.



If California developed a seaweed industry matching that of Indonesia (6.5 million tons in 2012) it would have the following positive environment impact: 234,000 tons of carbon removed, proportional to 90,602 home's energy use in a year; remove 23,400 tons of nitrogen and 2,340 tons of phosphorus; and creating thousands of new jobs.



New California law requires dairies that produce about 20% of our nation's milk supply and other livestock operations to reduce methane emissions 40% below 2013 levels by 2030. A single cow can produce up to 130 gallons of methane in a single day and methane is 30 times more potent than CO₂ as a greenhouse gas. Research shows that the digestive process of cattle with 2% of their feed as seaweed, methane production was reduced to less than 99%.



Catalina Sea Ranch has developed an automated offshore aquaculture monitoring system for remotely evaluating real-time environmental data for collaborative and transparent web-based scientific analyses.

Verizon's shore-based cellular tower located in Huntington Beach, California transmits the data to its cloud server for analyses by marine scientists via the Internet.

This capability will lead to **sound regulations based on solid science.**



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RESEARCH & WORKBOAT FLEET



Captain Jack Research Vessel is a floating laboratory for conducting research and promoting educational outreach at sea. This steel 111 ton versatile vessel is equipped with a wet laboratory, large lecture salon, 5 ton knuckle crane, and other amenities to comfortably accommodate scientists, researchers and students.

Enterprise Workboat is 70 foot landing craft converted as an all-purpose offshore aquaculture work vessel used for seeding, harvesting and transporting marine crops to shore. It has an 8-ton long reach crane and three davits with hydraulic winches. A \$310,000 grant from the South Coast Air Quality Management District repowered this vessel with two new low-emission diesel propulsion engines.



Catalina Sea Ranch has constructed a laboratory and offices at AltaSea for expanding its R&D programs. It is developing a mollusks and macroalgae commercial hatchery to produce seed for supporting aquaculture and restoration projects.



Catalina Sea Ranch has 15 research proposals pending for federal funding. Even if not awarded, these projects provide partnership opportunities with prestigious research organizations and scientists for pioneering aquaculture best practices and marine spatial planning.



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

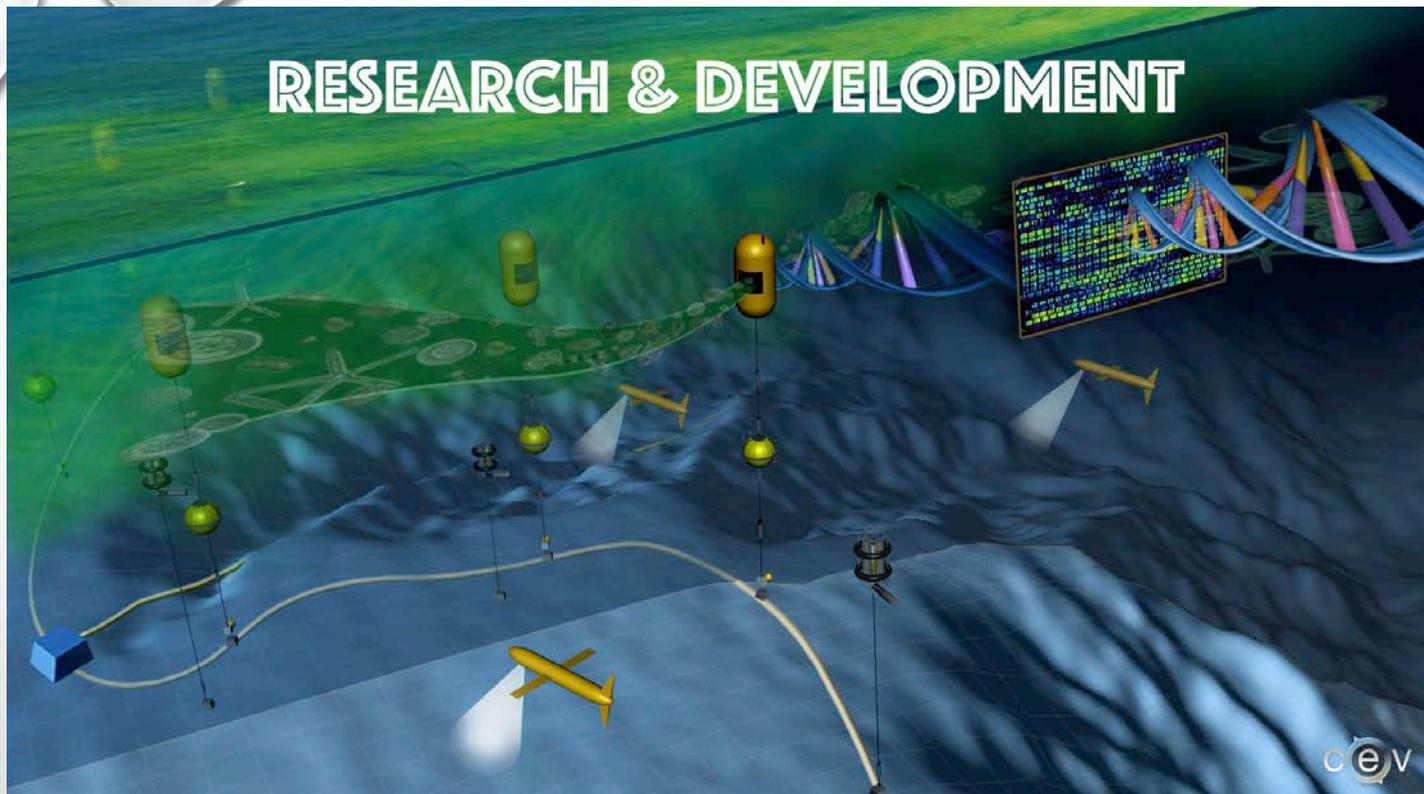


Cryopreservation of Mussel Larvae for Advancing United States Aquaculture

Awarded August 2016

\$100,000

\$600,000



- 1) Applied research will increase marine aquaculture husbandry efficiencies.
- 2) These contracts to “conduct research” are booked on the balance sheet.
- 3) About 20% of an award contributes to corporate overhead.
- 4) Technology creates barriers to entry for future competition.
- 5) Intellectual Property patents expenses are paid for by U.S. Government.
- 6) R&D creates positive publicity and sophisticated corporate image.
- 7) Monitoring technologies will accelerate the scaling to over 1,000 acres

Catalina Sea Ranch is collaborating with leading genomic institutions and scientists employing next generation DNA sequencing tools for producing higher performing marine crops with shortened growth cycles, higher yields and greater uniformity. Advances with selective breeding, cryopreservation and genomics promise to be disruptive and transformative to the global aquaculture industry.

