Offshore Aquaculture in the U.S.

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Acknowledgements

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Neil Sims

KONA BLUE
KONA BLUE WATER FARMS

Snapperfarm, Inc.

Brian O'Hanlon

Colleagues and Partners

UNIVERSITY of NEW HAMPSHIRE
OOA

NOAA

Presentation Outline

- ***Rational for offshore aquaculture development***
- ***Currently active U.S. projects***
  - ***Similarities and differences***
  - ***Location/environment***
  - ***Species and production***
  - ***Technological innovations***
    - ***feeding, observing, remote ops***
  - ***Environmental Stewardship***
  - ***Planned Projects***
- ***Accomplishments***
- ***Bottlenecks/constraints on expansion***
- ***R&D needs***

Rationale for Developing Offshore Aquaculture

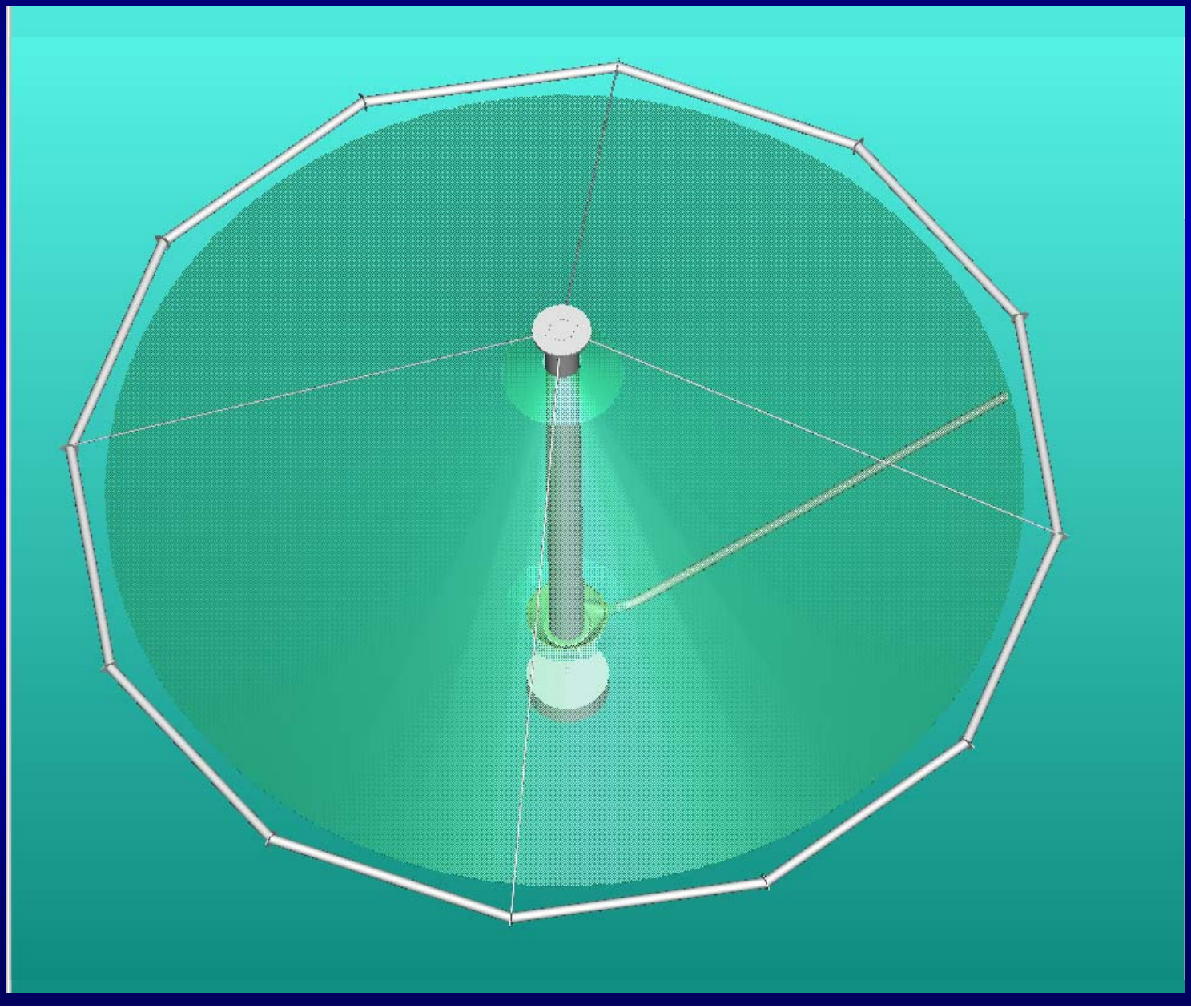
- ***Expansion of Marine Aquaculture is Needed***
- ***Due to constraints on nearshore protected waters, expansion will likely take place offshore***
- ***Potential to reduce environmental impacts***
- ***Better environment for the cultured organisms***
- ***Tremendous carrying capacity***
- ***Technological advances are making the move offshore a possibility***
- ***Significant technological challenges remain***
- ***Economic Risk not well known***

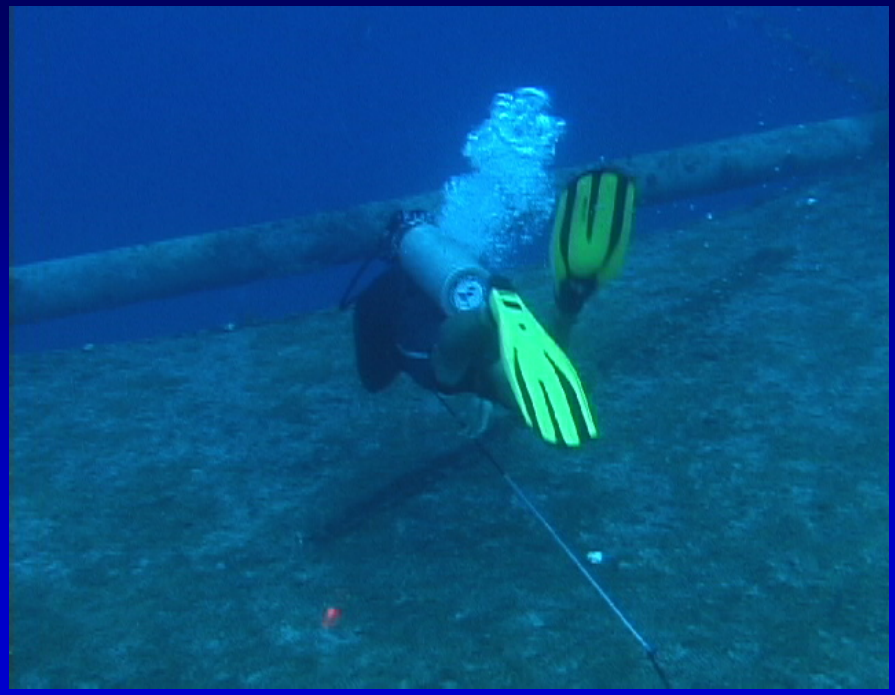
Alaska
United States
Northern Mariana Islands
Guam
Wake Island
Midway Islands
Hawaiian Islands
Johnston Atoll
Howland Island
Baker Island
Palmyra Atoll
Kingman Reef
Jarvis Island
American
Navassa Island
Puerto Rico and the U.S. Virgin Islands

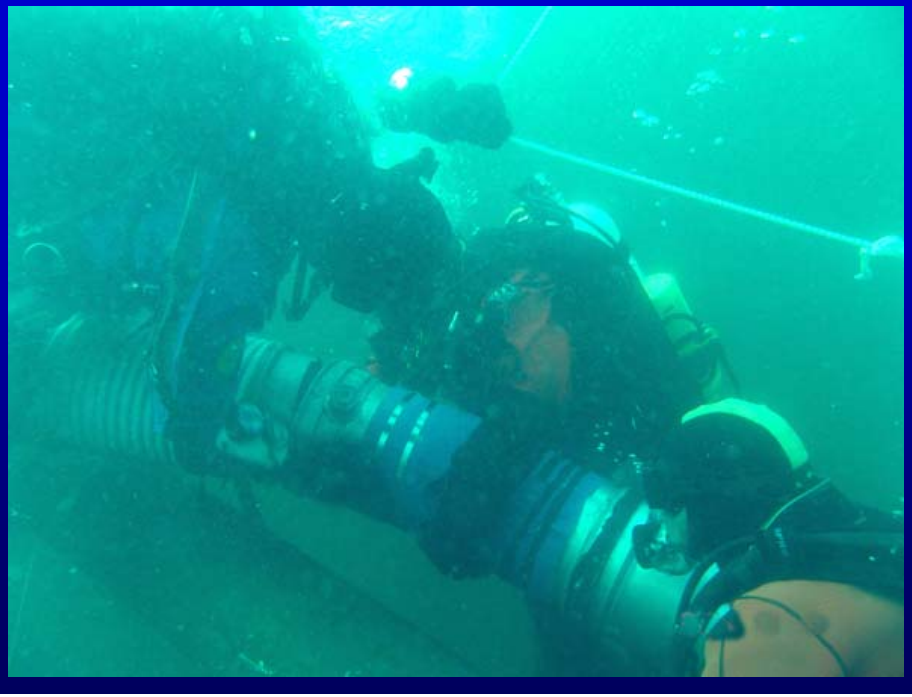
Characteristics of U.S. Offshore Projects

- ***Share common goal of economically viable and environmentally sustainable offshore production***
- ***Academic, private sector and government collaboration***
- ***Located in deeper and more highly flushed waters, though none are in the EEZ***
- ***Submerged cages-low visibility, protected from damaging sea conditions***
- ***Indigenous species***
- ***New technology development/application***
- ***Comprehensive environmental monitoring programs***

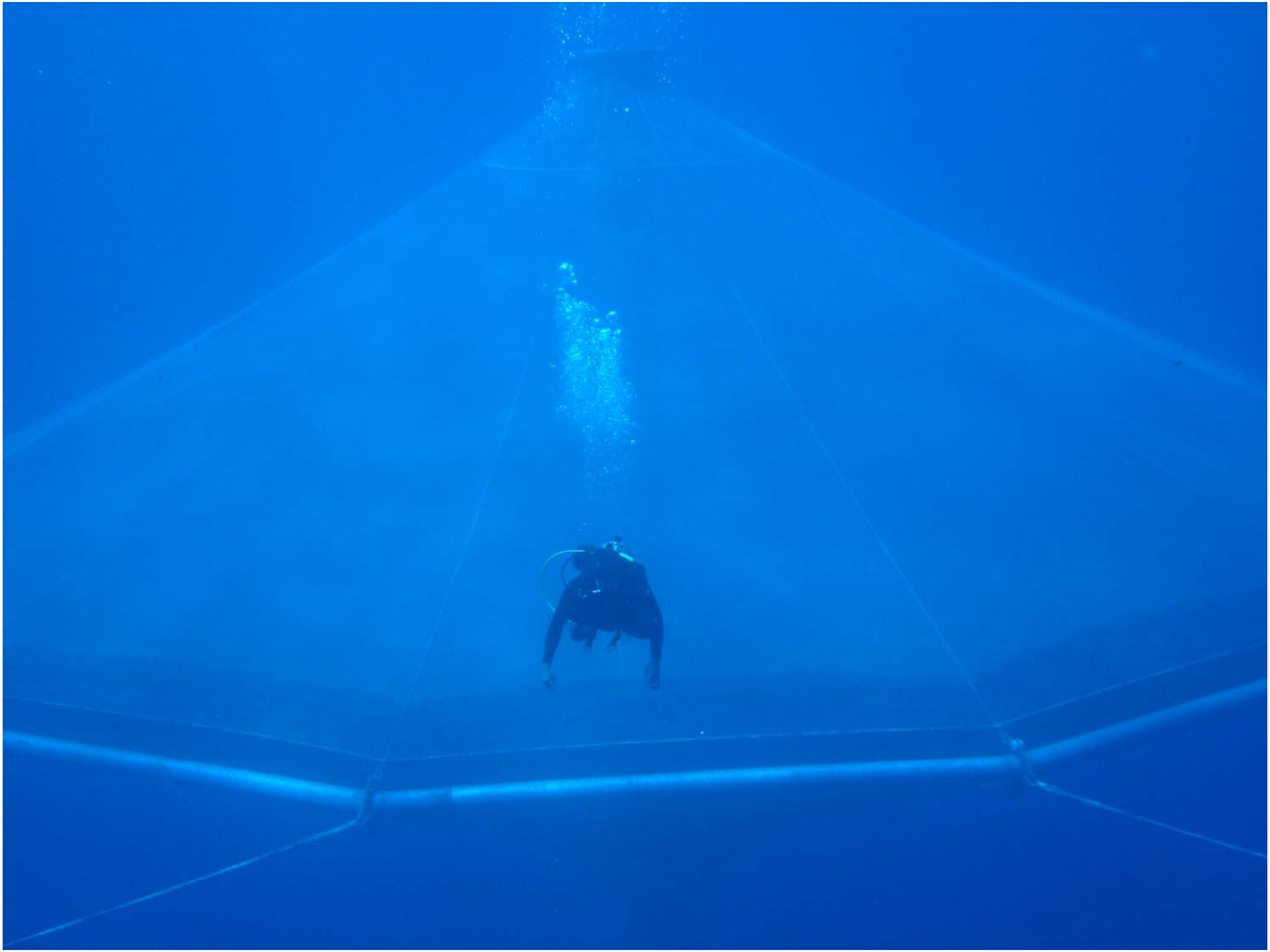
Ocean Spar Sea Station

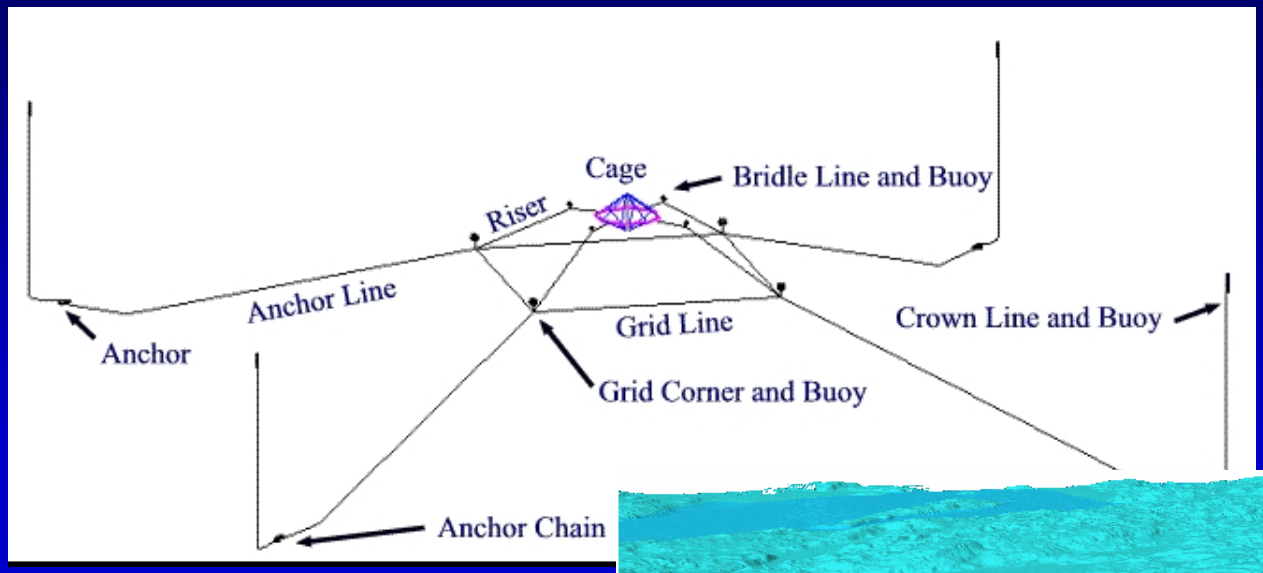


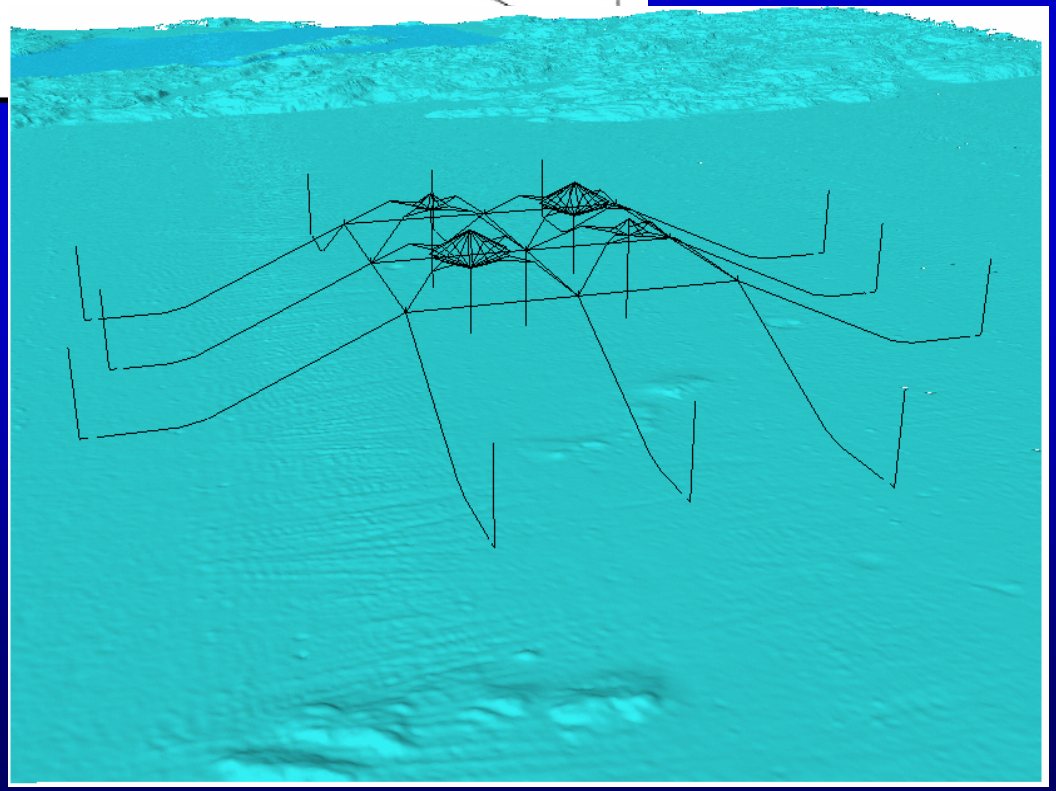




NITRO
NITRO




Cage
Bridle Line and Buoy
Riser
Anchor Line
Grid Line
Crown Line and Buoy
Anchor
Grid Corner and Buoy
Anchor Chain



Cates

International, Inc.

P.O. Box 535
Kailua, Hawaii 96734

Pacific Threadfin- Moi

Four SST 3,000 cages

Annual production 160 tons

Plans to increase to 8 cages

Hatchery in Development

Kona Blue Water Farms-permit for six submerged cages

KONA BLUE
KONA BLUE WATER FARMS

Amberjack-Kona Kampachi
Produced at KBF hatchery
KONA BLUE
KONA BLUE WATER FARMS

Four SST 3,000 cages, two surface nursery cages

100 tons/year production

910 tons/ year end of 2006

KONA BLUE
KONA BLUE WATER FARMS

Snapperfarm, Inc.

ATLANTIC OCEAN

CARIBBEAN SEA

RSMAS University of Miami
ROSENSTIEL SCHOOL OF MARINE & ATMOSPHERIC SCIENCE

Aquaculture Center of the Florida Keys, Inc.

Nine months after stocking, cobia averaged 10 lbs with some fish as large as 18 lbs

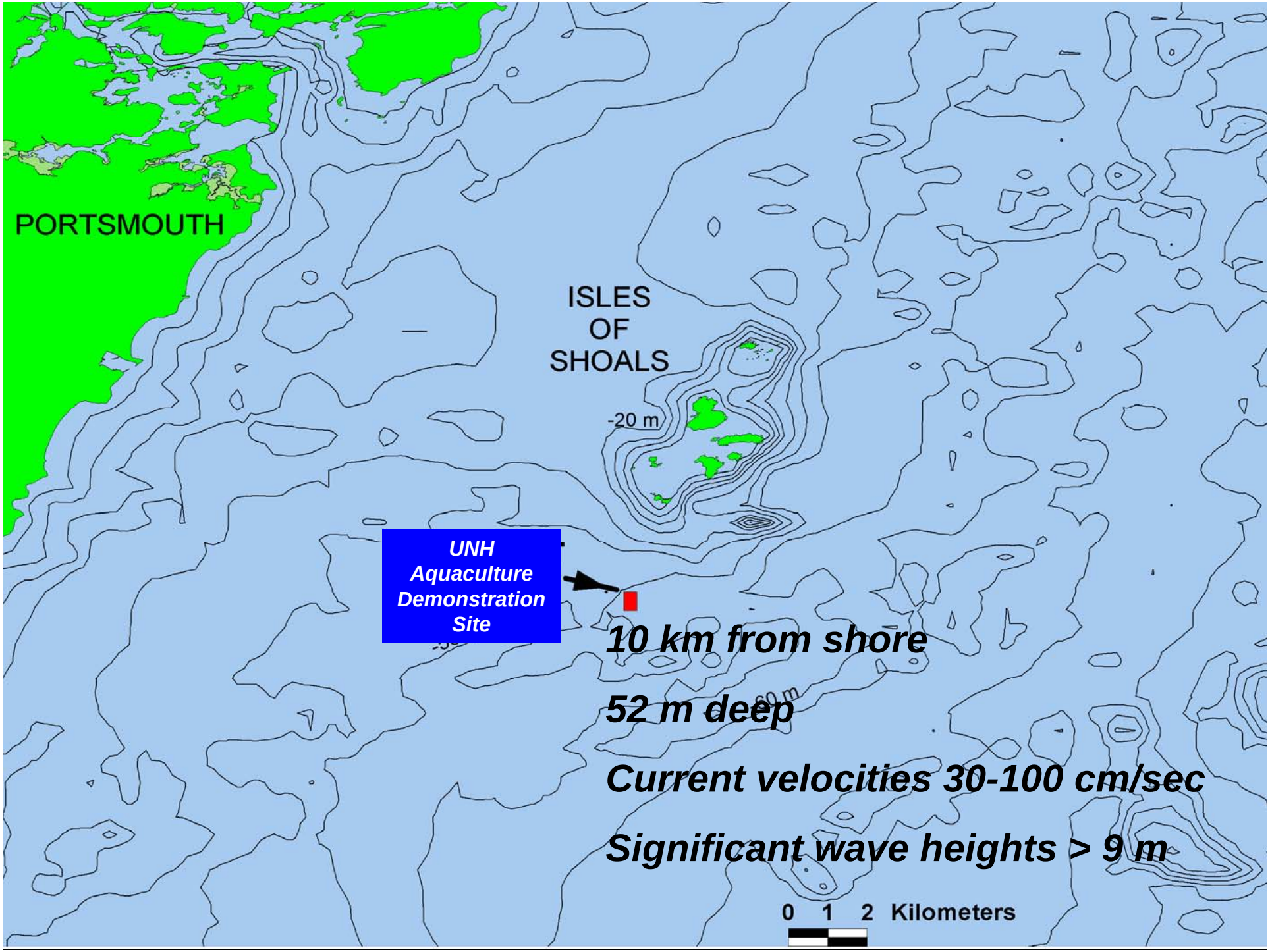
Snapperfarm, Inc.

Two SST 3,000 Cages

50 tons annual production

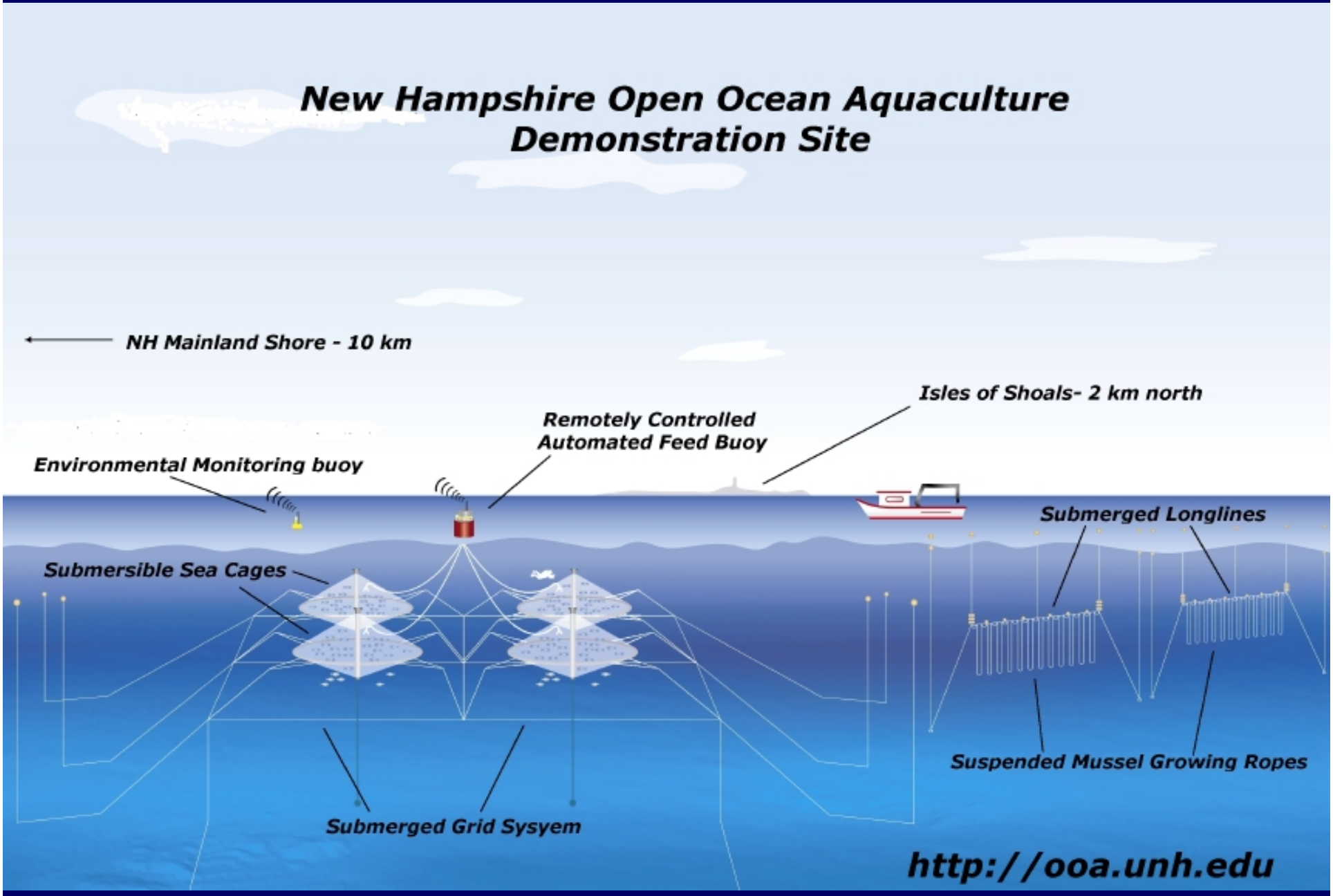
Capacity for 120 ton/year

Expansion to 8 cages- 750 tons


PORTSMOUTH
ISLES
OF
SHOALS
-20 m
UNH
Aquaculture
Demonstration
Site
10 km from shore
52 m deep
Current velocities 30-100 cm/sec
Significant wave heights > 9 m
0 1 2 Kilometers

DANGER

New Hampshire Open Ocean Aquaculture Demonstration Site

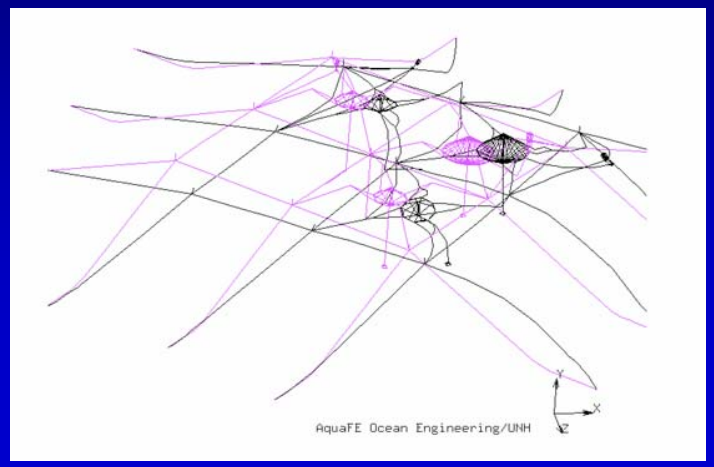


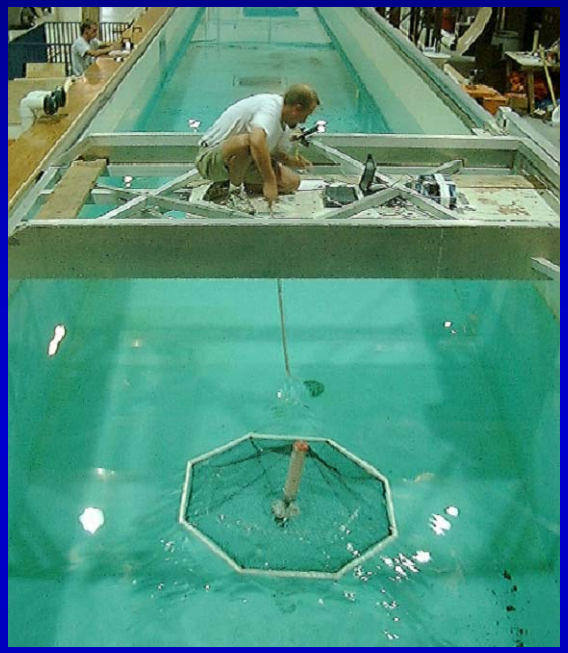
One SST 3,000, two SST 600s

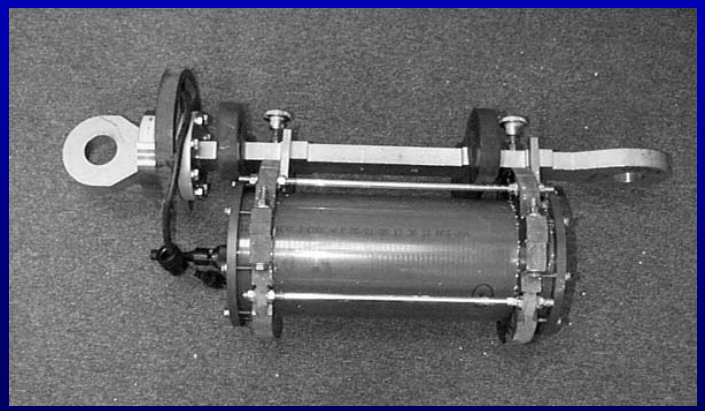
Capacity for 75 ton/year

Commercial Mussel Production 80 tons by end of 2006, 240 tons 2007

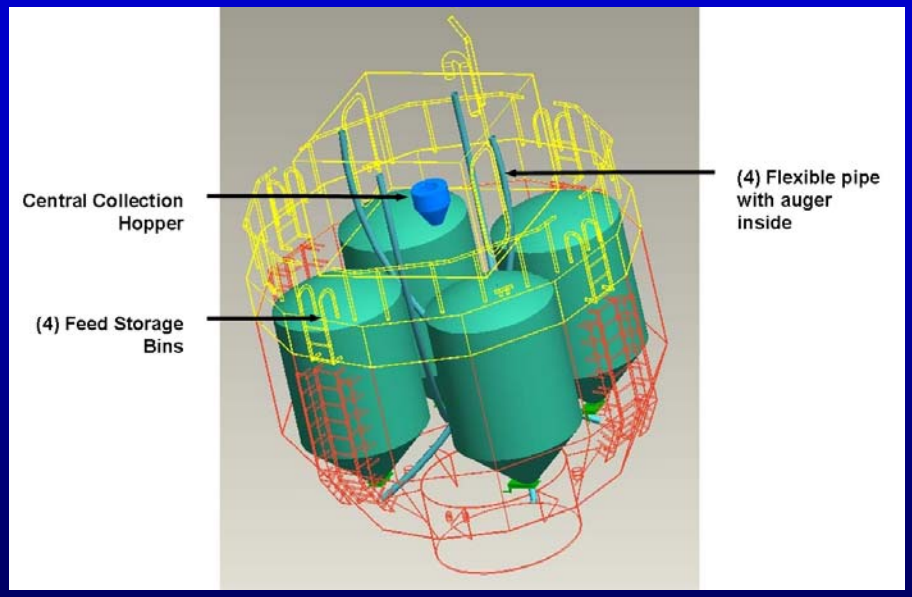
Innovation: engineering design and assessment tools





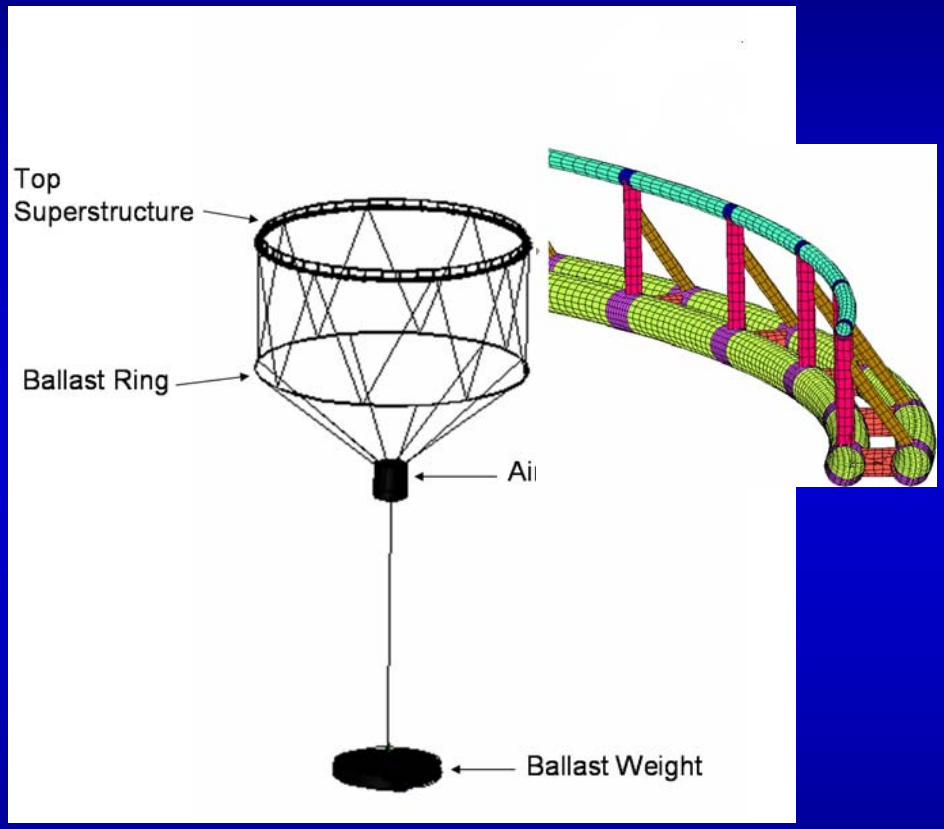


Automated Feeding Systems

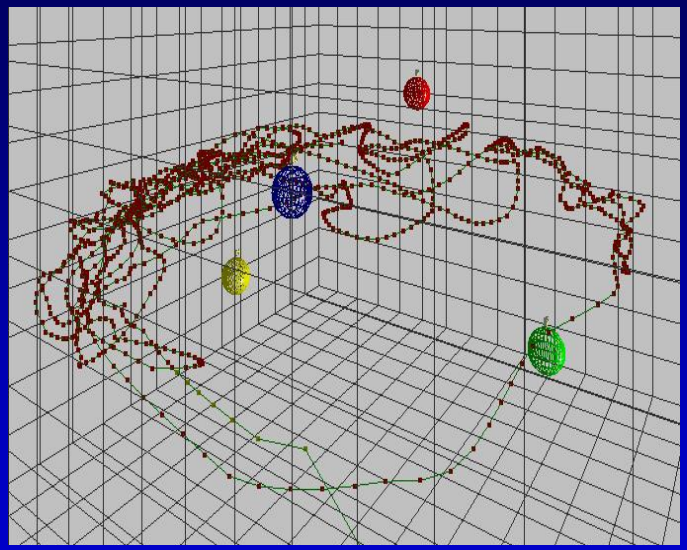


Improved Cage Technology

New Cage Designs



Remote Observation and Control



Demonstrating Environmental Stewardship

Sediments and infauna

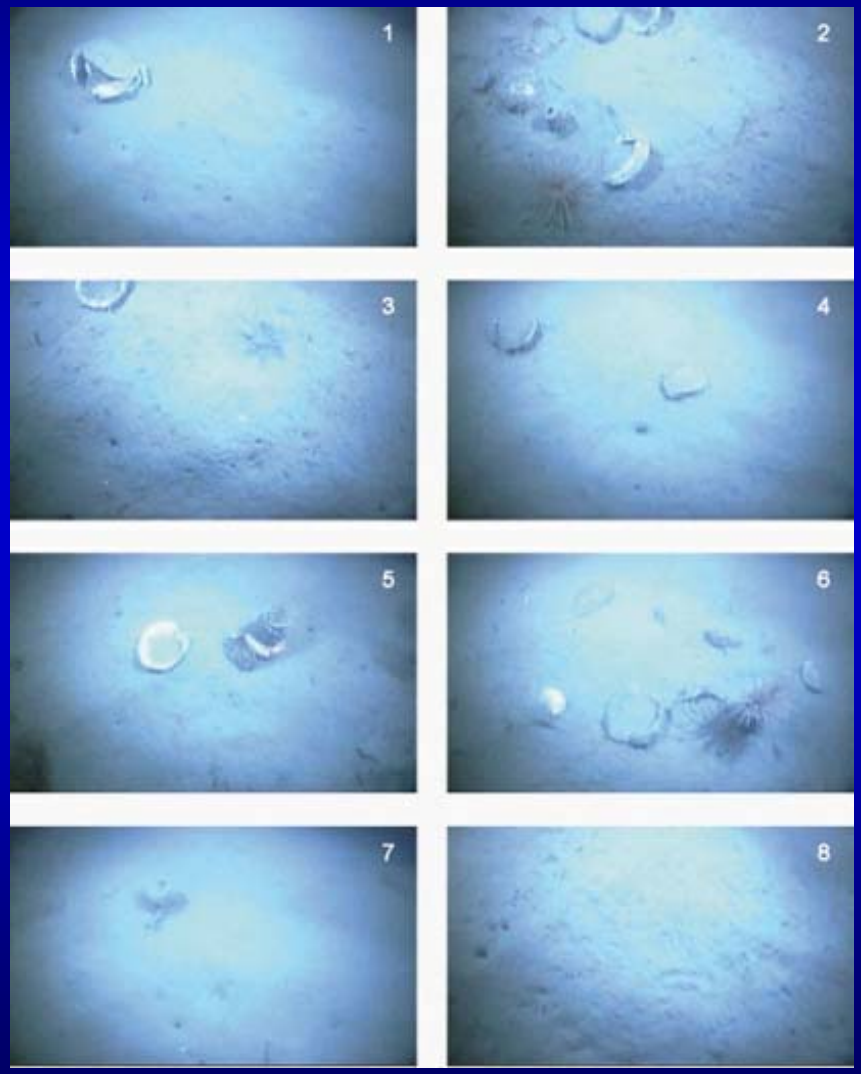
Water column

UNH &KBF-Marine Mammals, KBF-coral reef

Epifaunal community

Environmental Assessment

All locations reporting no detrimental changes in water column or benthic conditions

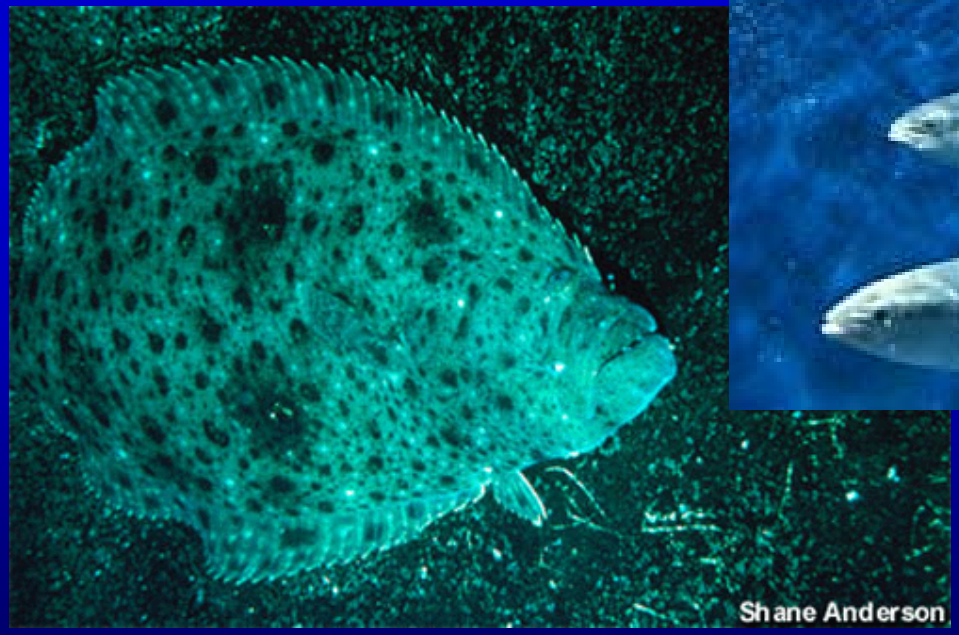


Planned Projects…

Gulf of Mexico and California

Gulf of Mexico

California

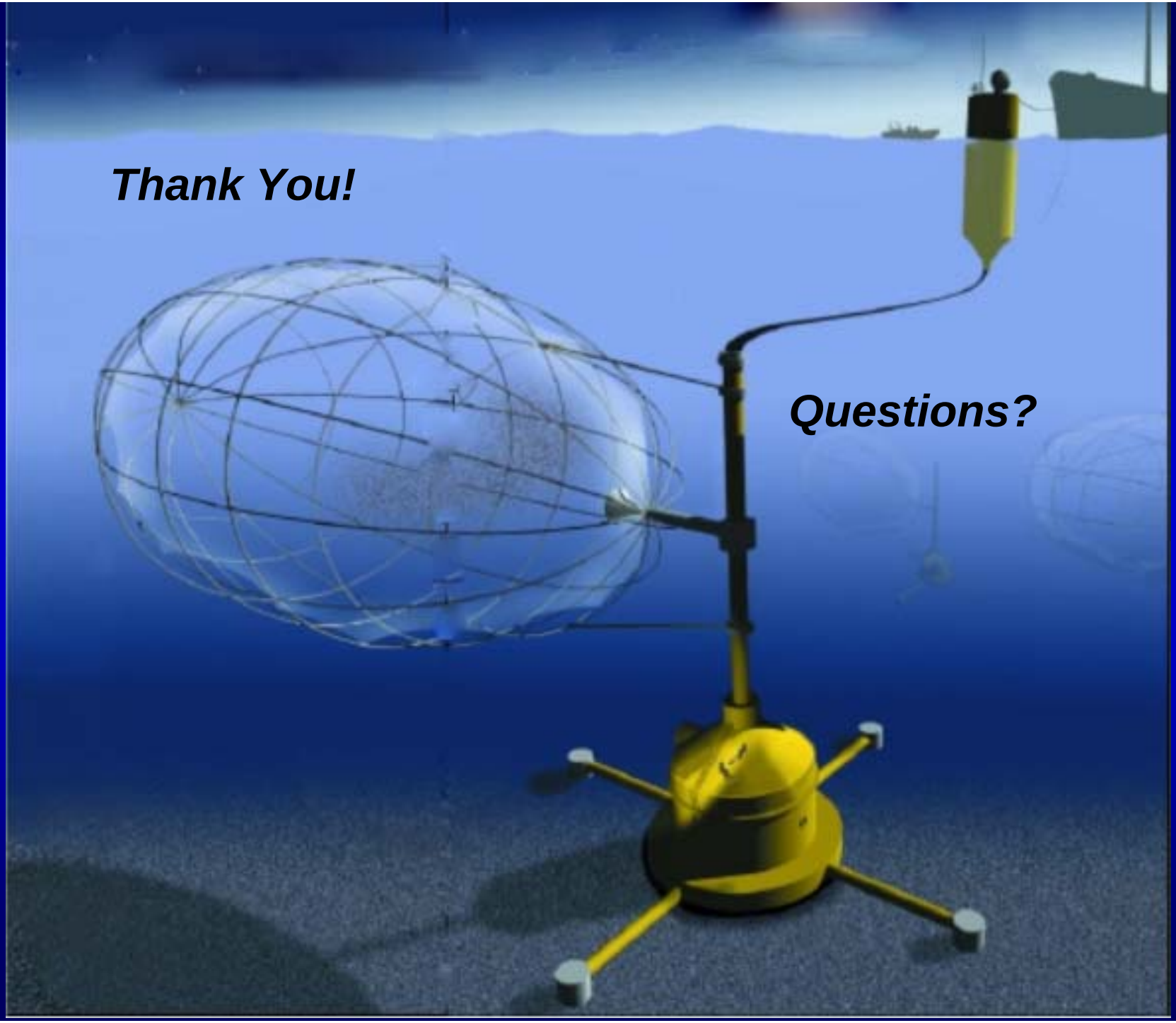


Bottlenecks/Constraints on Expansion

- ***Regulatory constraints***
- ***Resource and user conflict***
- ***Hatchery capacity***
- ***Infrastructure lacking***
- ***Biofouling control***
- ***Predator control***
- ***Domestication of culture species***
- ***Reliance on SCUBA***
- ***Public funding for R&D***

R&D Priorities

- Automation/ mechanization for …
  - Cage cleaning and inspection
  - Abundance/biomass estimation
  - Feeding systems (mobile)
- Mooring and cage technologies
  - Moorings for deeper water
  - Controlled ascent and descent
  - Materials to replace netting
  - Alert systems
- Domestication of species
  - growth rates, delayed maturation, behavior
- Alternative energy sources
- Alternative sources of protein and lipids


Thank You!
Questions?