Naguabo Queen Conch Hatchery & Nursery

Development of a Fisher Operated Pilot-Scale Queen Conch (Lobatus gigas) Hatchery and Nursery Facility for Sustainable Seafood Supply and Restoration of Wild Populations in Puerto Rico.

S-K NOAA Award NA10NMF4270029

Partners

Megan Davis: *Research Professor*
FAU Harbor Branch

HARBOR BRANCH
FLORIDA ATLANTIC UNIVERSITY
Ocean Science for a Better World

Raimundo Espinoza: *Executive Director*
Conservación ConCiencia

Conservación ConCiencia

Carlos Velasquez: *President*
Naguabo Fishing Association

NAGUABO COMMERCIAL FISHING ASSOCIATION

Combining Expertise

PI: Megan Davis, PhD

Co-PI: Raimundo Espinoza

Combining Expertise

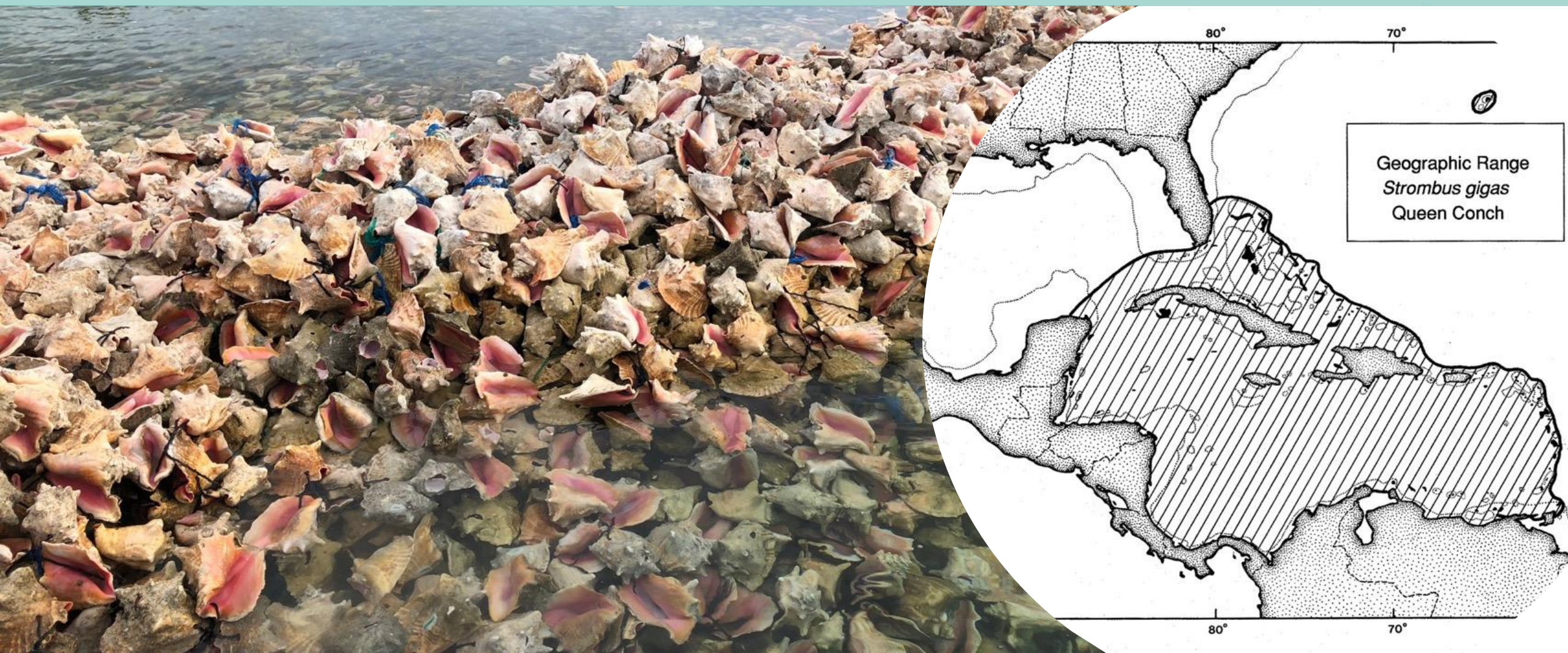
Collaborating Partner: Carlos Velasquez

Goal: to assist with restoration of queen conch fisheries in Puerto Rico by producing queen conch in a fishers-operated aquaculture facility

Build and Operate	Build and operate a pilot-scale conch hatchery and nursery facility at the Puerto Rico Naguabo Commercial Fishing Association
Open to Others	Open the facility for others to learn about queen conch aquaculture, biology, conservation and fisheries
Release	Release hatchery-reared juvenile conch for restoration purposes
Produce a Plan	Produce a plan that recommends other areas in Puerto Rico for conch hatcheries and potential grow-out areas

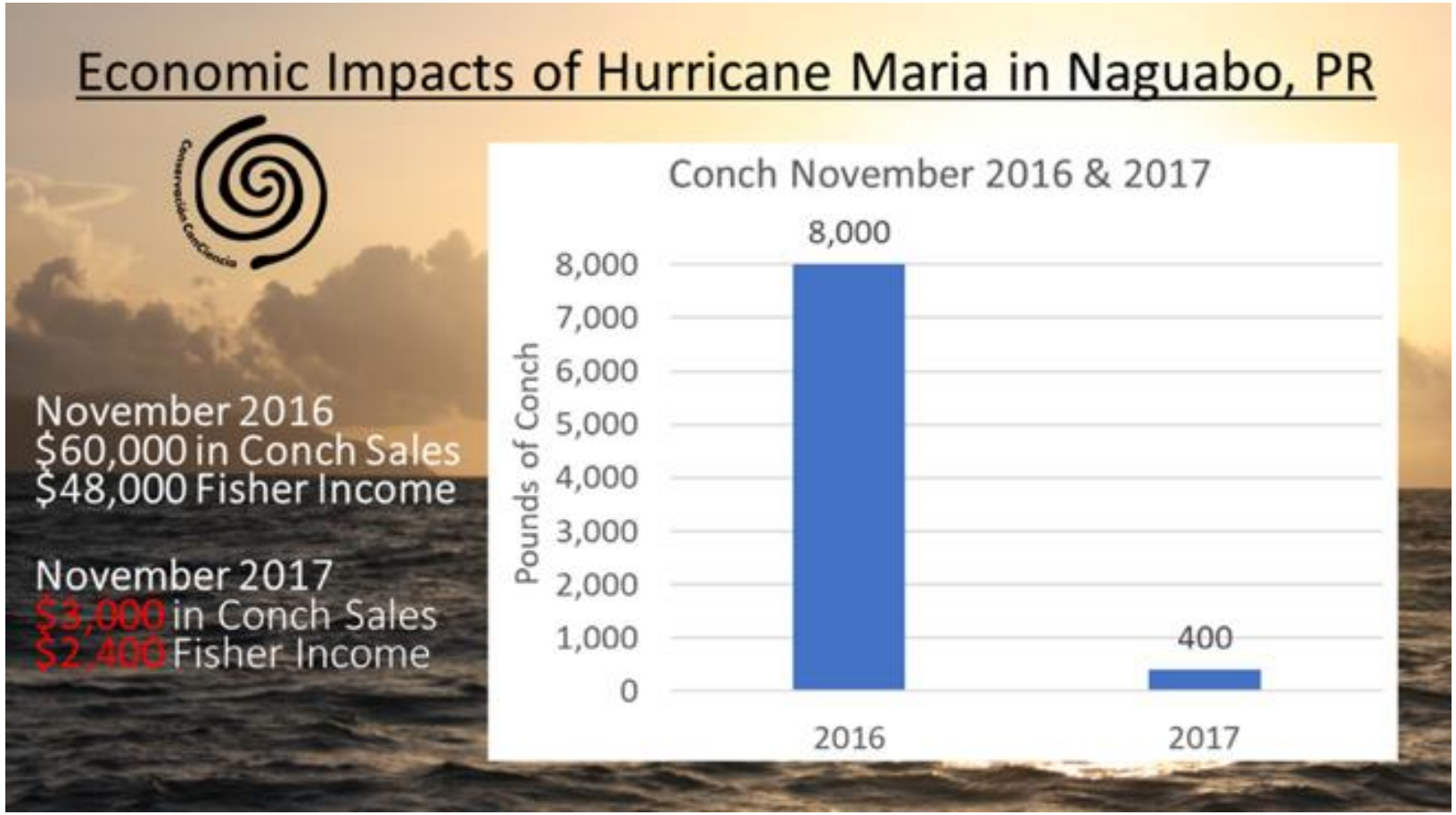
S-K NOAA Award NA10NMF4270029; September 1, 2019 to August 31, 2021

Plight of The Conch

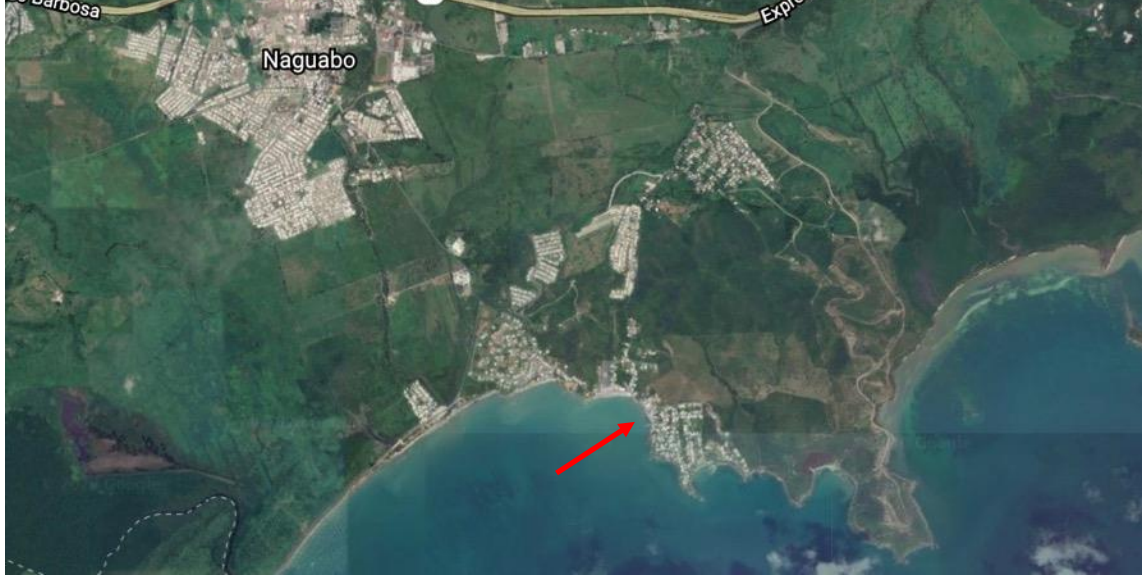


Why Puerto Rico?

- U.S. Caribbean
- The Queen Conch Resources Fishery Management Plan (CFMC)
- Majority of the conch fished are consumed locally ($6 – $9 / lb)
- Disruption of conch habitats from hurricane Maria severely impacted fisheries and fishing communities
- Previous conch hatchery and nursery at UPR in 1980s (Ballentine & Appeldoorn)




Isabela
Arecibo
San Juan
22
Aguadilla
Pueblo
Puerto Rico
Bayamón
Flamenco,
Culebra,
Puerto Rico
Mayagüez
Humacao
52
Cabo Rojo
Yauco
Ponce
Guayama

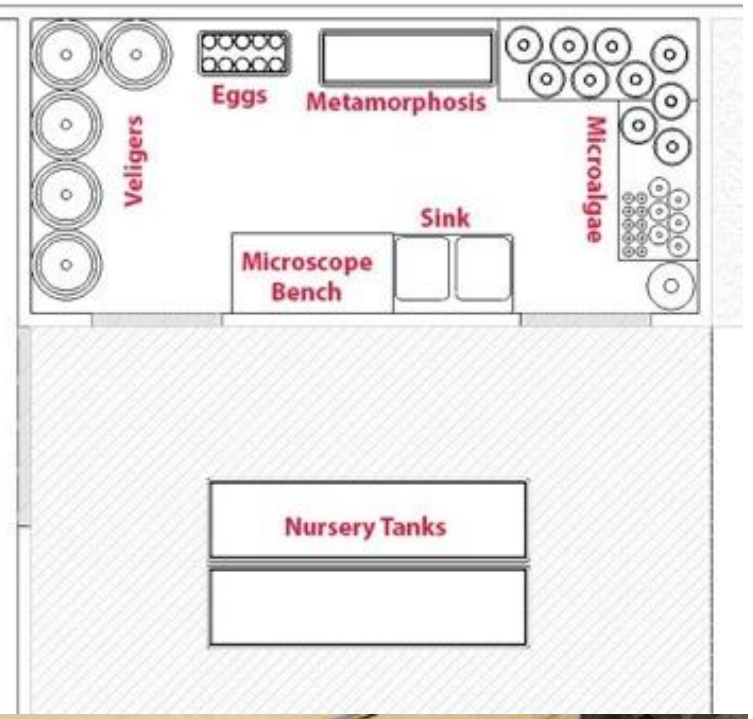

Naguabo

Kickoff Meeting!
(September 2019)

- With fishers at Naguabo Commercial Fishing Association

- Students at the University of Puerto Rico (Humacao) Marine Science program

Design Planning & Renovating (December 2019 – January 2020)



Installation
(In Progress)

- Shipments delayed due to COVID19
- Finally arrived on Friday (June 19, 2020)!

Queen Conch Training Manual (February - Present 2020)

ACUÍCULTURA DEL CARRUCHO

GUÍA DE USUARIO

Naguabo, Puerto Rico

S-K NOAA Award NA10NMF4270029

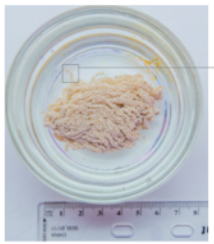
Development of a Fisher Operated Pilot-Scale Queen Conch *(Lobatus gigas)* Hatchery and Nursery Facility for Sustainable Seafood Supply and Restoration of Wild Populations in Puerto Rico

Conservación Con Ciencia · HARBOR BRANCH Florida Atlantic University · NOAA FISHERIES · FISHING ASSOCIATION DE NAGUABO

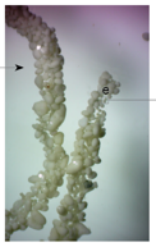
1. Recoleccíon de Huevos

*The first step to culturing (farming) conch in a hatchery, is to collect sections of **egg masses** from the wild. A full egg mass has 500,000 eggs - much more than what we need! This is why we only collect 1/4 or less of the total egg mass:*

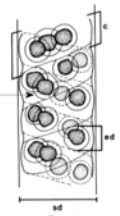
Whole egg mass.



1/4 of an egg mass covered in sand placed in a glass dish.



Close up of egg mass strand covered in sand: e, eggs visible inside of the strand.



Egg mass strand section: c, coil of the strand; ed, egg capsule diameter; sd, strand diameter.

FIELD KIT

To collect egg mass sections, you will need to bring a **Field Kit** with you containing the following:

- Data sheet with clipboard
- 5 gallon bucket with lid
- Snorkeling gear
- Pencil with eraser, and sharpener
- Refractometer (to measure salinity*)
- Thermometer (to measure temperature)
- Ziploc bags (Quart size and freezable) labelled 1-6.

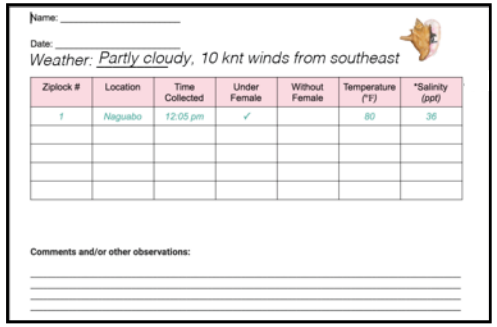
** salinity is measured by parts per thousands*

PASO 1:
During breeding season (June-November), look for egg masses under females. Newly laid egg masses like these are stronger for transport tha masses found on the sand without a female.

PASO 2:
Once located, use your hands to gently break off 1/4 or less of the egg Place it in Ziploc bag with seawater. Make sure you only have one egg mass section per Ziploc bag.

PASO 3:
Back on the boat, carefully place your Ziploc bag into the bucket which filled with seawater, and close the lid. Keep the bucket out of the sun an gently refill every 2 hours, always keeping it 3/4 full.

PASO 4:
Fill out the **Egg Mass Collection Data Sheet** after EACH egg mass se collected.This is very important! Repeat the process until you have the desired amount of egg mass sections (up to 6 per month).



Name: _____

Date: _____

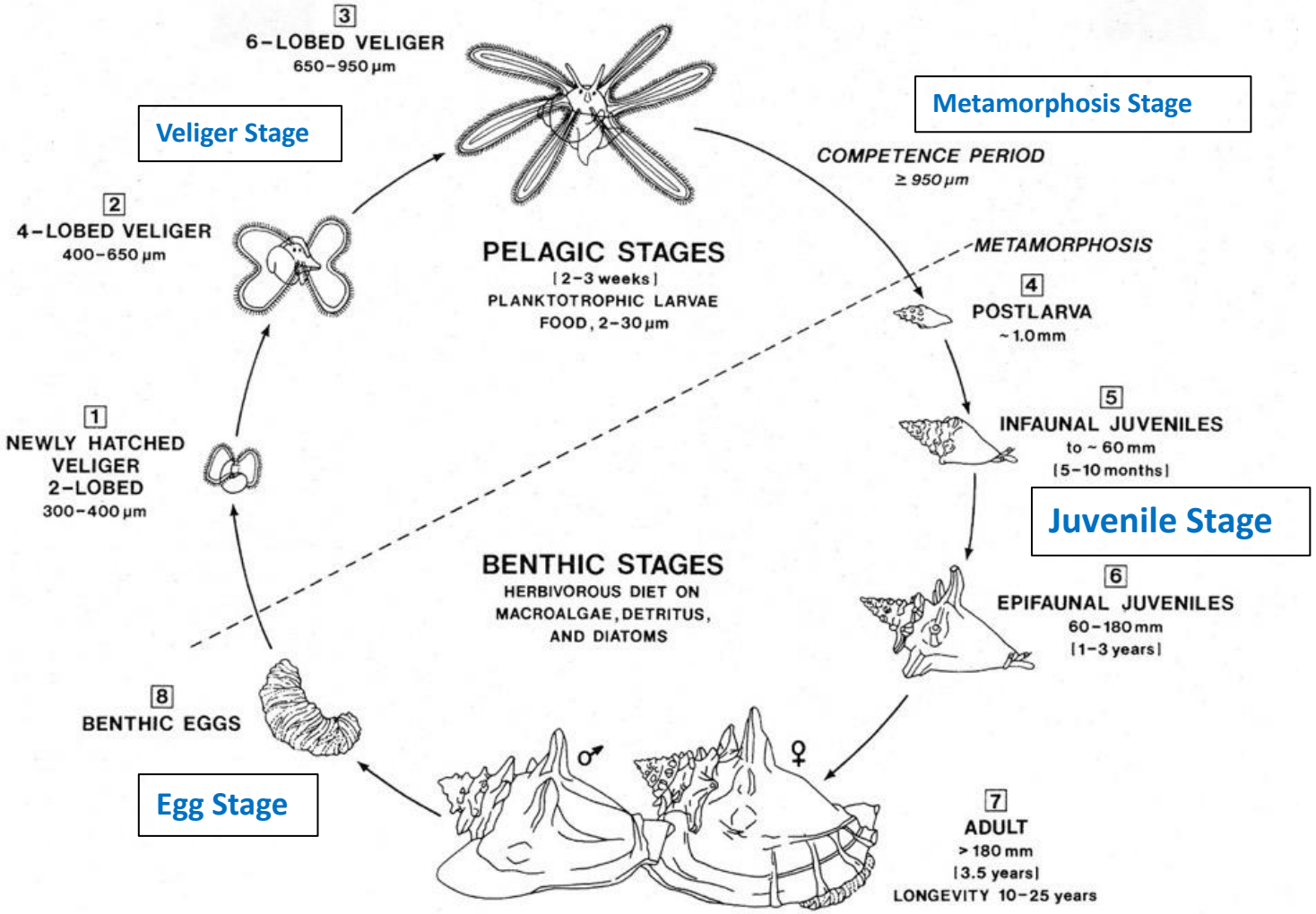
Weather: Partly cloudy, 10 knt winds from southeast

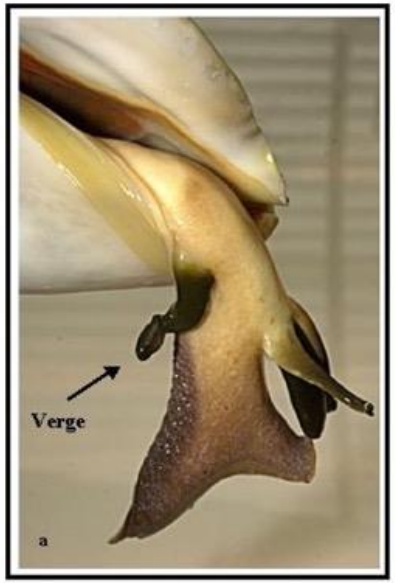
Ziplock #	Location	Time Collected	Under Female	Without Female	Temperature (°F)	*Salinity (ppt)
1	Naguabo	12:05 pm	✓		80	36

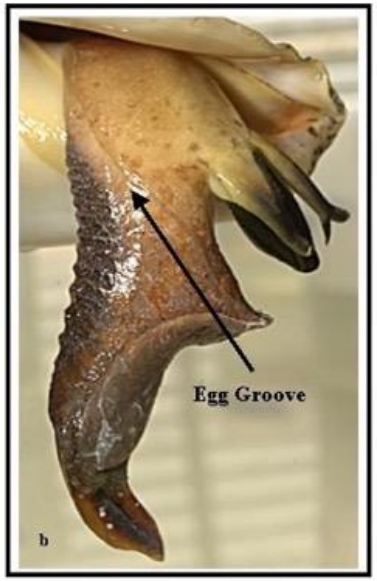
Comments and/or other observations:

Egg Mass Collection Data Sheet

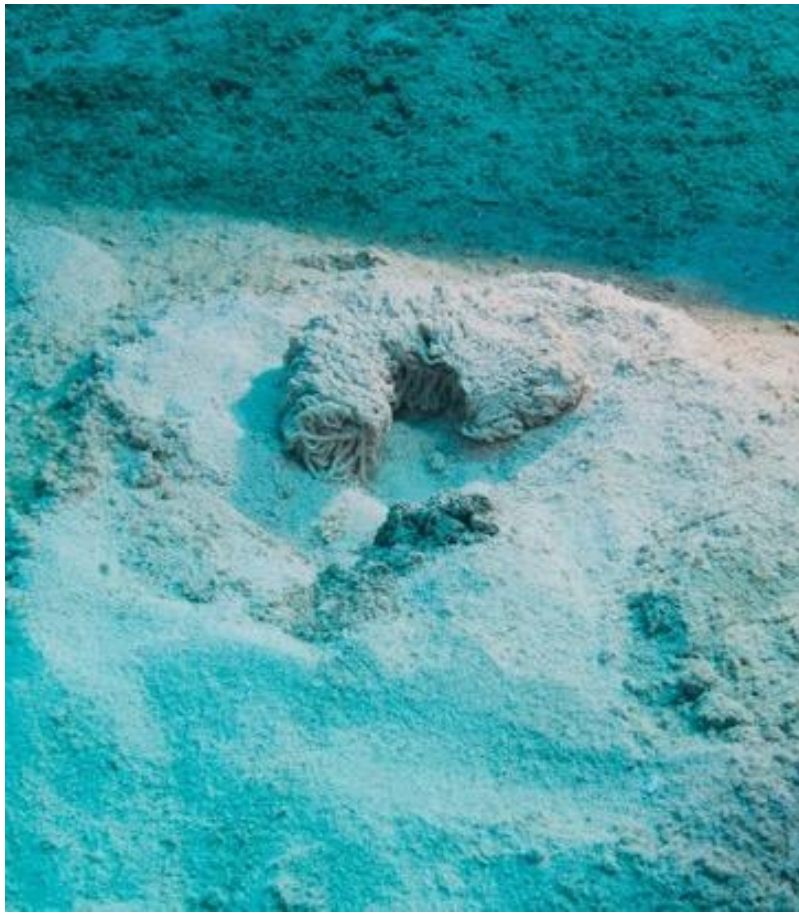
Life Cycle & Reproduction Overview



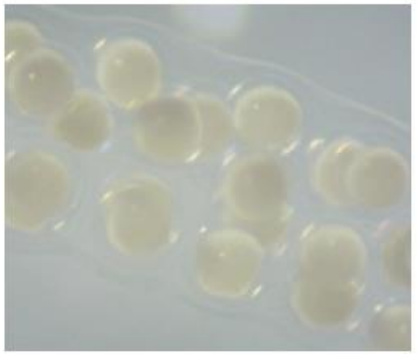




Collection of Egg Masses

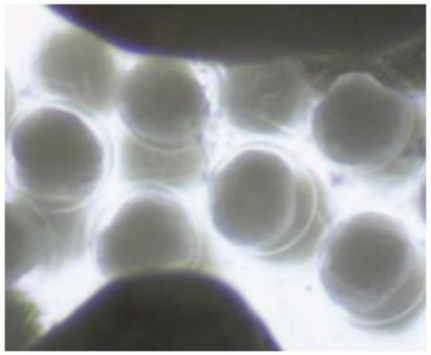


EGG DEVELOPMENT STAGES



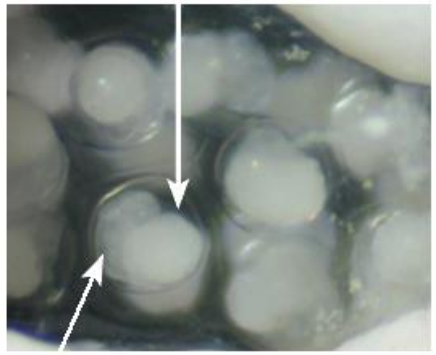
Stage **1**

The eggs look round & smooth.



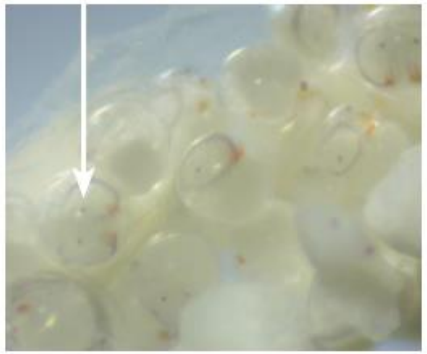
Stage **2**

The eggs look round & bumpy.



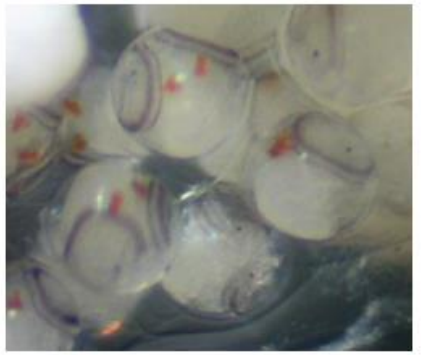
Stage **3**

The shell & lobes of the embryo become visible.



Stage **4**

The black eyes & orange foot become visible. The edge of the lobes darken. Embryos begin to slowly rotate.

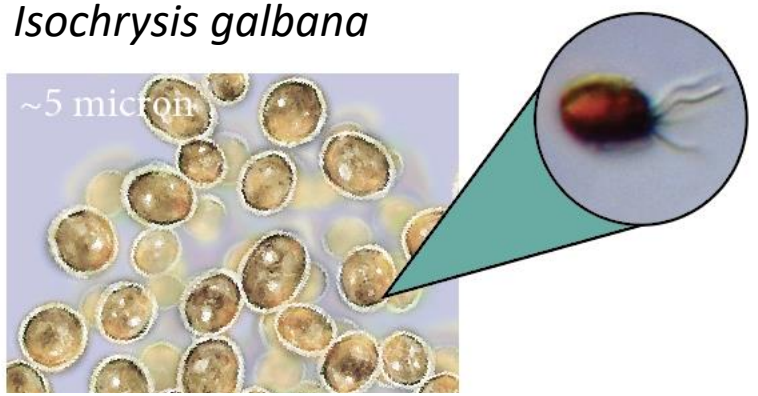


Stage **5**

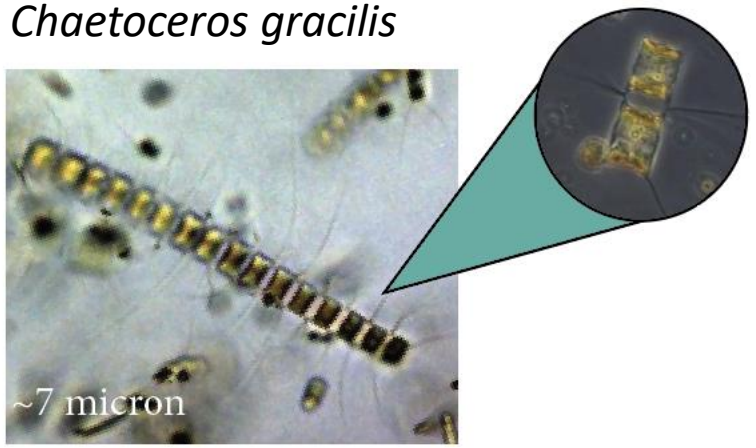
The edge of the lobes become thicker & darker. The rotation is obvious.

Growing Microalgae

Isochrysis galbana

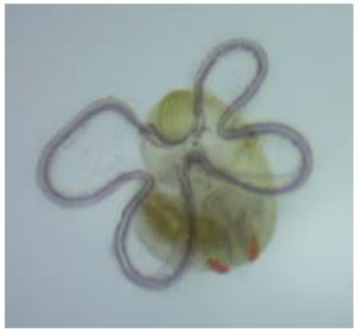


Chaetoceros gracilis



VELIGER DEVELOPMENT

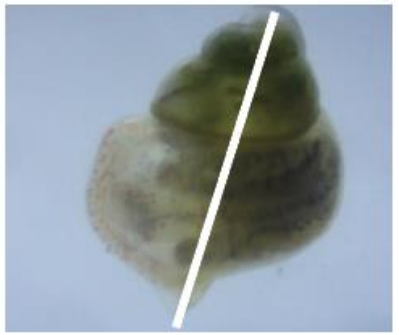
STAGE 1:
2 lobes



STAGE 2:
4 lobes

STAGE 3:
6 lobes

STAGE 4:
6 elongated lobes



STAGE 5:
Shell length is 1-1.2 mm

1.5 whorls

2 whorls

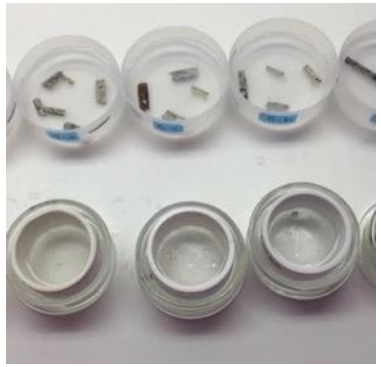
2.5 whorls

3 whorls

4 whorls

METAMORPHOSIS

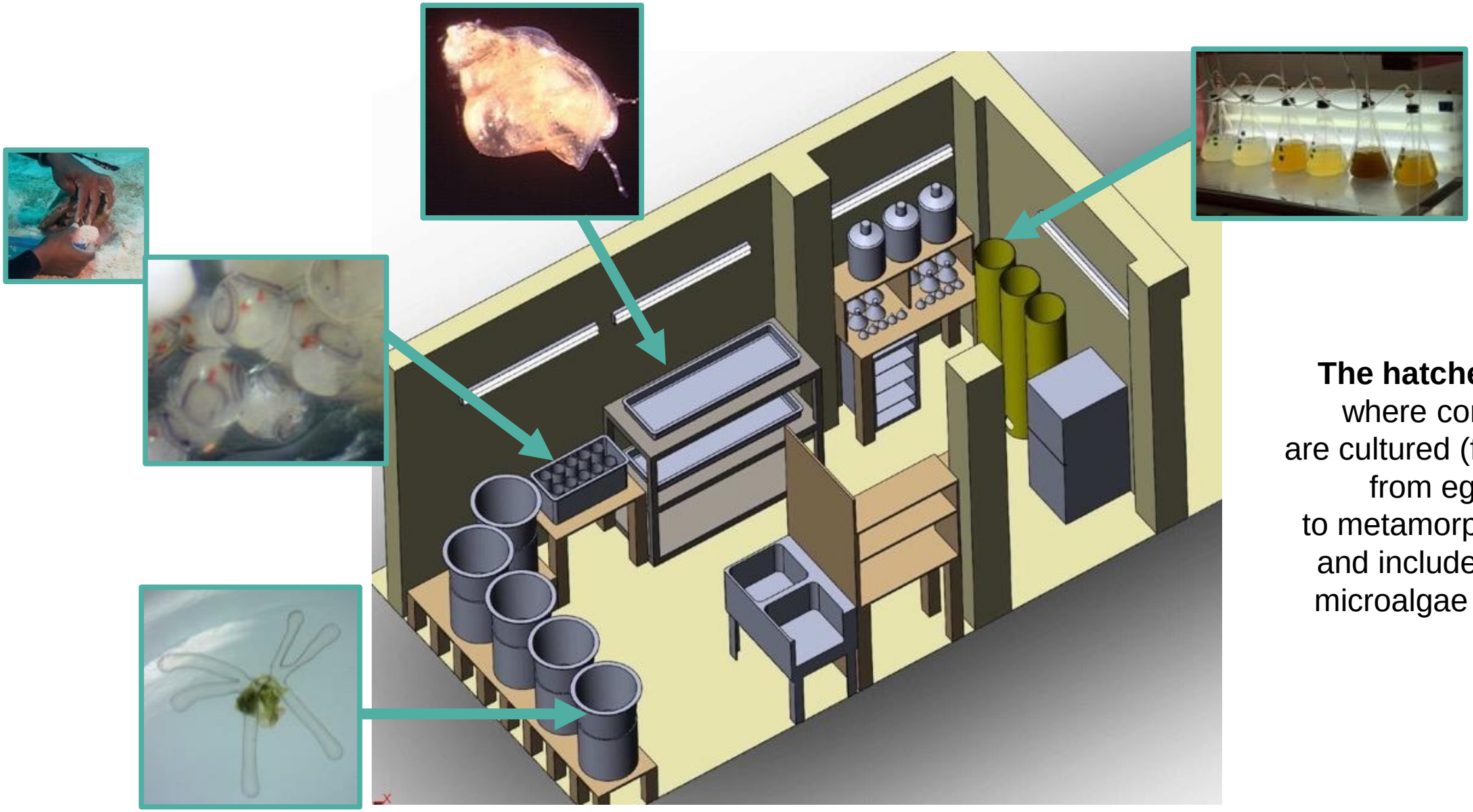






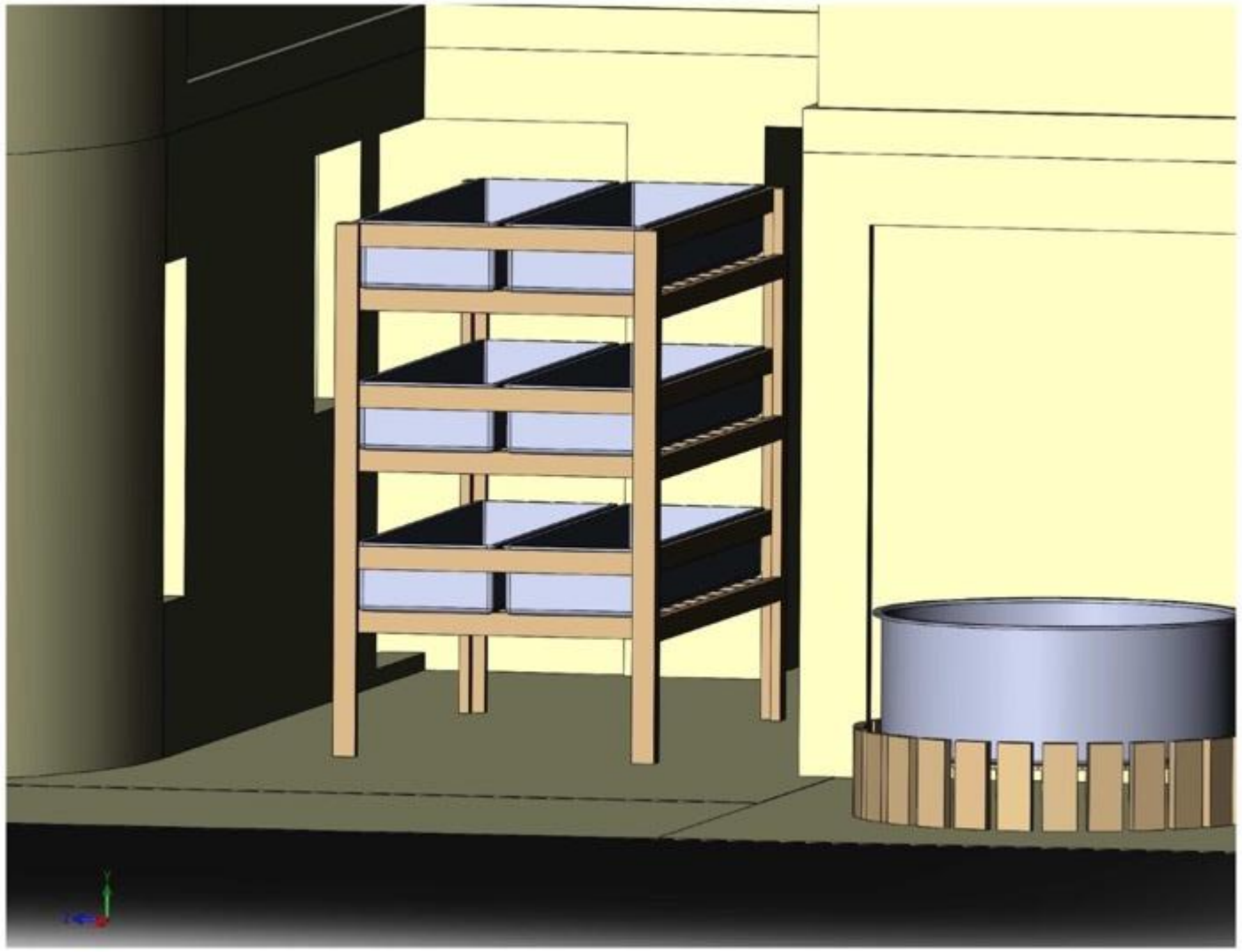
Newly metamorphosed conch grazing on flocculated algae.

HATCHERY



The hatchery is where conch are cultured (farmed) from egg to metamorphosis, and includes the microalgae area.

Nursery



The nursery is where the small juvenile conch are grown until they are large enough to be released into the wild.

Production Schedule

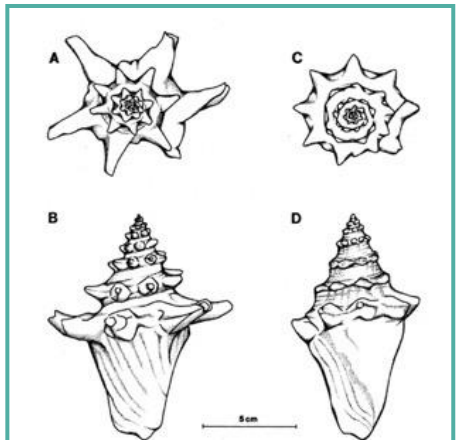
(2020-2021)

- Target for grant: 2,000 juveniles for release.

Stage	No.	Time	Size (SL)	Stocking Density	Survival	No. of Tanks	Size of Ea. Tank
Egg Mass	36	3-4 d until hatch		1 per container		1 tank with 10 containers	75 L
Larval Culture	14,400	3 weeks	300-1200 microns	Start 100/L; 10/L by meta		5 conical tanks	68 L
Metamorphosis	7,200	3 weeks	1.0–4.5 mm	3,500/m^2	50%	2 rectangular tanks	0.5 m^2
Nursery	5,400	10 months	70 mm	1700/m^2; reduce to 600 or less/m^2	75%	6 rectangular tanks	1.5 m^2

Stock Enhancement Considerations

- Shell size (7-9 cm)
- Shell strength
- Morphology (with spines)
- Time of Day and Year (Fall)
- Lunar Phase
- Density (1-5/m^2)
- Conditioning
- Habitat
- Conch Movement



Project Significance

- Serves as a model to transfer technology to other fishing communities in Puerto Rico and elsewhere
- Provides diversified incomes for fishing community
- Provides training and career opportunities for students
- Assists with a stock enhancement strategy for the conch population
- Provides partnership integration

QUESTIONS?

For more information:

Fau.edu/hboi
Conchaquaculture.org
Conservacionconciencia.org

Social media:

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@queenconch2020
@conservacionconciencia