

Pacific Aquaculture & Coastal Resources Center (PACRC)

University of Hawai'i Hilo

UH Center of Excellence for Sustainable Aquaculture



History

- ✧ Located in Keaukaha, Hilo
- ✧ Former wastewater treatment plant
- ✧ Concept originated in early 1990's
- ✧ Clean-up started in 1998
- ✧ Final BOR approval 2006
- ✧ Founded as a partnership of: UHH, UH Sea Grant, Hawai'i County, State, Economic Development Administration, Keaukaha Community Association and DHHL
- ✧ ~\$60 million invested by partners

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Fish & seaweed tanks

Seawater well & pump house

Microalgae bag system

Marine fish hatchery

Marine ornamental Fish system

Native species hatchery

Bivalve hatchery & nursery

Not visible:
Rotifer and copepod containers
Shellfish broodstock unit

Oyster & fish Grow out tanks

Laboratory

Marine and Environmental Research Institute of Pohnpei (MERIP)



Staffing

- ✧ **Dr. Maria Haws, Professor, Aquaculture**
 - ✧ Invertebrates, seaweed, fish, extension
- ✧ **Dr. Chad Callan, Associate Professor, Aquaculture**
 - ✧ Marine fish
- ✧ **Dr. Karla MacDermid, Professor, Marine Science**
 - ✧ Seaweed
- ✧ **Rhiannon Chandler-'Īao (Esq.)**
 - ✧ Policy, Restorative aquaculture
- ✧ **Simon Ellis, Direct, Marine and Environmental Research Institute of Pohnpei (FSM)**
 - ✧ Regional extension, community based aquaculture
- ✧ **Matt Connelly, Marine Science**
 - ✧ Corals
- ✧ **15 Professionals (O'ahu, Molokai, Kauai, Maui)**
- ✧ **20 Student research Assistants**

PACRC Programs

Production, Research, Extension, Education

- Marine fish
- Freshwater fish
- Shellfish
- Microalgae
- Seaweed (*limu*)
- Sea cucumbers
- Academics
- Community training
- Workforce training
- Statewide extension
- USAPI extension
- Technical assistance to *loko i'a*
- Coastal management
- Climate change adaptation
- Agriculture extension

The PACRC hatcheries provide seed & specimens to industry, *loko i'a*, for research & training

Academics

- Aquaculture specialization/Agriculture Bachelors degree
- This is the only 4 year academic program in aquaculture in Hawai'i
- Marine Science Dept/UH Hilo
- TCBES Masters degree-students may choose aquaculture research topics

New:

- **Collaboration with HCC**
- **Aquaculture courses**
- **Certificates**
- **Pipeline to 4 year programs**
- **Make “vocational” training available to UHH students (e.g. Mechanical, plumbing, small engine)**



Development of Native Foodfish Species



Āholehole (Kulia xenura)



Mullet (Mugil cephalis)



Nenu (Kyphosus spp.)



Moi (Polydactylus sexifilis)



Achilles Tang (Acanthurus achilles)

Ornamental Fish Research Program

- **Develop captive breeding methods to replace wild catch**
- **Basic research for conservation & management**



Hawaiian Flame Wrasse (*Cirrhilabrus jordani*), one of 10 ornamental species used for R&D at the PACRC

Embryos just prior to hatch



Just hatched (0 dph)



Shellfish Program

- Worked with DOH to begin shellfish farms in 2012
- *Loko i'a (Fishponds)* provide seed and technical training
- Seed sent to 30 producers in HI and West Coast
- Polyploid oyster R&D
- Selective breeding program for improved traits, e.g. climate resistant



Development of Native Bivalve Species for Production and Mitigation



Aquaculture Student Workforce Training Program



Macroalgae (*limu*)

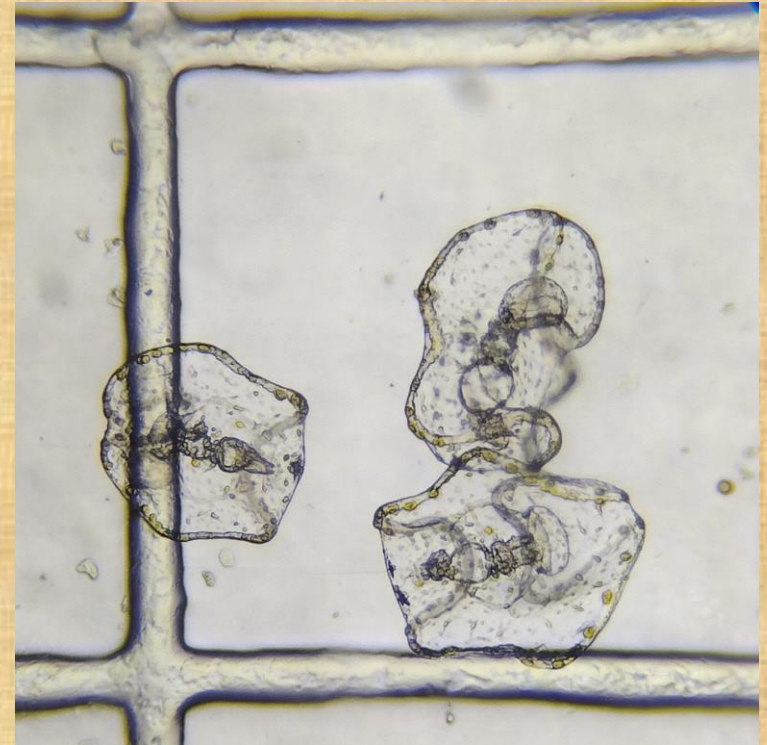


Caulerpa racemosa

Species of interest: *Asparagopsis taxiformis* (*limu kohu*), *Caulerpa* spp. (Sea grapes), *Halymenia* spp. (*lepe-o-Hina*) and *Gracilaria* (various species).

Developing Sea Cucumber Hatchery Methods

- ✧ In partnership with Kaua'i Sea Farm
- ✧ Other *loko i'a*



Technical Support to Loko I'a



Restorative aquaculture with Hawaiian oysters at He'eia & Waikalua

Solar powered shellfish nursery system at He'eia



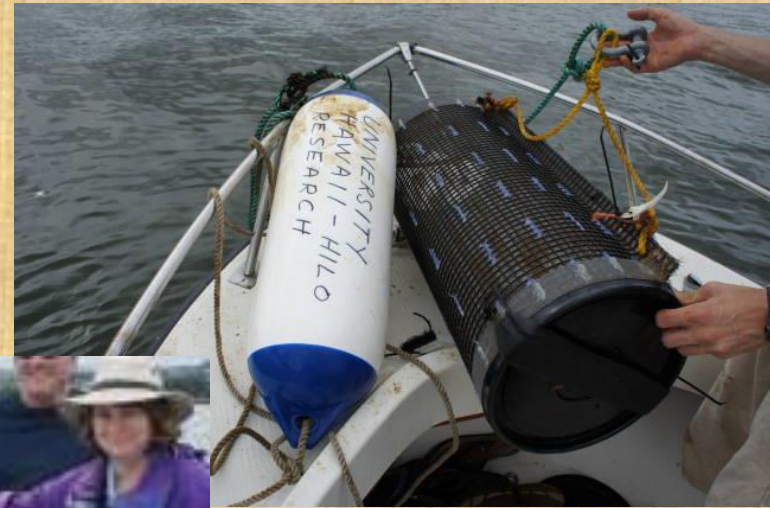
Oyster trials and depuration system design at Kualoa Ranch

Hilo Bay "Farm" & Hilo Aquaculture Cooperative



Native oysters, pearl oysters, Pacific oysters, limu

SHELLFISH AND LIMU FARMING IN HILO BAY AQUACULTURE PARK DEVELOPMENT



First trials with oysters for water quality improvement in Hawai'i

Testing limu species

Assisting Hawai'i County with planning for a marine aquaculture park

Overcoming Obstacles to Aquaculture in Hawai'i

- ✧ **Regulations and permitting**
- ✧ State support of efforts
- ✧ Little extension support
- ✧ Public perception
- ✧ Siting
- ✧ Financing
- ✧ Few native species developed/ready
- ✧ Education/training

How to Increase Aquaculture Production?

1. Increase the ease and availability of grow out sites
2. Enable leases for State-controlled *loko i'a*
3. Streamline permitting for nearshore sites
 - a. *Tiered system? Similar to the fishpond permit streamlining in 2012*
 - i) *research/restorative,*
 - ii) *start-up commercial*
 - iii) *large-scale, established commercial*

4. Time limit on approving permit applications (e.g. can take 1-2 years for approvals, even for renewals)

4. Marine aquaculture zoning (prioritize neighbor islands' abundance of land & water)

e.g. Hilo Bay marine aquaculture park

e.g. South shore of Molokai

e.g. West Maui

- 5. Increase # of shellfish growing areas for multiple farms. **DOH** could proactively identify and begin classification*
- 6. **Aquaculture Development Program** to facilitate and support permit applications*
- 7. Grants for R&D and farm start-up similar to **HDOA** microgrants for agriculture (~\$20k minimum)*

Benefits of Streamlined Permitting and Making More Sites Accessible

- ✧ Increased local food production
- ✧ Food sovereignty
- ✧ Direct benefits to the community
- ✧ More small-scale farms
- ✧ Attract investors
- ✧ Job creation

Acknowledgements

- ✧ Our 100's of students!
- ✧ NOAA
- ✧ Waiwai Ola Waterkeepers Hawaiian Islands
- ✧ CTSA
- ✧ Hawai'i County
- ✧ DAR, HDOA, DOH
- ✧ Hawai'i Community Foundation
- ✧ Western Sustainable Agriculture and Extension (WSARE)
- ✧ Center for Tropical and Subtropical Aquaculture
- ✧ PIPES internship program
- ✧ Hilo Fish Company, Ocean Era
- ✧ Goosepoint Oyster and Hawaiian Shellfish LLC



***High School Students
Keawanui, Moloka`i***

For Further Information...

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