

## **eConch: eLearning for Growing Queen Conch (*Aliger gigas*)**

## **eCaracol Rosado: Aprendiendo a Cultivar Caracol Rosado (*Aliger gigas*)**

## **eLambis: Apprentissage en Ligne Lambis (*Aliger gigas*)**

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### **EXTENDED ABSTRACT**

The Queen Conch Lab is an aquaculture, conservation, research, and education program at Florida Atlantic University (FAU) Harbor Branch Oceanographic Institute. The program works with partners on community-based queen conch projects across the Caribbean. Principal investigator Megan Davis, Ph.D., has more than 40 years of queen conch aquaculture experience and is the world's foremost expert on the subject.

The queen conch is deeply rooted in the way of life for communities across the Caribbean region. Queen conch are prized for their pink shells and nutritious meat. Communities depend on conch as a source of food and income. As grazers, they play a key ecological role in seagrass habitats. Intense fishing pressure and habitat loss have resulted in declining queen conch populations. In 1992, queen conch became a CITES II managed fishery, however, this along with local regulations has not been enough to slow down the decline of the species. As an example, a recent study brought to light that commercial conch stocks could be depleted in The Bahamas in 10-15 years if changes do not take place (Stoner et al. 2019). To address the plight of the conch, the Queen Conch Lab is dedicated to Caribbean-wide conservation and restoration solutions. The Lab's comprehensive program focuses on projects that repopulate conch populations in overfished Marine Protected Areas; on conch hatcheries for conservation education, research, restoration, and sustainable seafood; and on community-based training.

In 2020, the Queen Conch Lab established the 'eConch: eLearning for Growing Queen Conch' initiative in response to requests from Caribbean communities for information on how to grow conch for restoration, conservation, and sustainable seafood purposes. 'eConch' is an interactive online course being developed in partnership with FAU Center for Online and Continuing Education. It will be hosted on Canvas, a course management system for online learning and teaching. Participants will have the option to purchase a benchtop hatchery kit that contains the basic supplies needed to begin culturing queen conch or to build a small-scale hatchery. An English version publication titled 'Queen Conch Aquaculture: Hatchery and Nursery Phases User Manual' (Davis and Cassar 2020) and a Spanish version (Davis et al. 2021) will serve as the course textbooks. The 'eConch' syllabus will feature eight modules that include video content, live virtual presentations, activities, and group discussions. The module topics are 1) Introduction to Conch Aquaculture, 2) Design and Install Aquaculture Systems, 3) Microalgae Culture to Feed the Larvae, 4) Collection and Hatching of Egg Masses, 5) Larval Rearing in the Hatchery, 6) Metamorphosis, 7) Nursery Culture of the Juveniles, and 8) Restoration and Ranching for Food. The course will be targeted to a broad audience and be accessible for all levels of education, including those without a formal science background. It will offer schedule flexibility and easy-to-use technology. There is currently no online interactive curriculum that exists for raising queen conch.

The concept for 'eConch' emerged based on findings from two focused planning sessions with nine site partners throughout the Caribbean who have signed up to beta test the course in 2022 (Figure 1). The partner sites were selected based on their stated interest to grow queen conch for education, research, restoration, and/or sustainable seafood. Throughout the beta test period, the site partners will provide feedback before the course is launched to a wider audience. As part of the course expectations, they will also engage in outreach and share their learnings from the 'eConch: eLearning for



**Figure 1.** Map of ‘eConch’ beta test partnership sites.

Growing Conch’ project with their communities, which should include students, fishers, agencies, partners, visitors, and/or the general public.

Three pilot sites have queen conch hatchery projects currently in progress and are being used to design and test course materials. These sites include the Puerto Rico Saltonstall-Kennedy NOAA Fisheries supported hatchery (Davis and Espinoza 2020); the Curaçao Sea Aquarium hatchery; and The Bahamas hatchery and farm supported by Bahamas National Trust and Richard Schneider Trust. Davis is involved in all three either as a principal investigator or scientific advisor. Five professional quality videos are being produced with the production company Timber and Frame. The filming took place at the Puerto Rico Queen Conch Hatchery and the professional video titles are: 1) A Tour of the Naguabo Queen Conch Hatchery in Puerto Rico; 2) The Seawater System; 3) Egg Collection and Incubation; 4) Larval Rearing; and 5) Microalgae Culture.

The success of this initiative will be the implementation of a well-tested eLearning course on the cultivation of queen conch that can be offered to additional participants in the Caribbean. Wide-ranging distribution of this knowledge will benefit the species, the ecosystem, and the communities that depend on the fishery. This project will empower communities to become stewards of queen conch and apply their acquired knowledge towards the restoration of this iconic species. They will contribute to its conservation in support of ecosystem health, preservation of local culture, and possibly towards the development of sustainable seafood.

The ‘eConch: eLearning for Growing Conch’ course has potential to be a very strong conservation awareness initiative throughout the Caribbean region because it will increase understanding the life cycle of the species, which is fundamental knowledge for decision-making and influencing management actions. As conch populations continue to decline despite traditional approaches, it is timely and urgent that conch aquaculture is included as an important tool in conservation. As the first group of current and future ‘eConch’ site partners learn aquaculture techniques and experience the growing of queen conch for conservation, education, and restoration, they will become empowered to be queen conch conservation leaders and ambassadors. In turn, this enables them to share the knowledge with others in their communities.

In summary, the conservation impact of the site partners engaging in the ‘eConch: eLearning for Growing Conch’ course and initiative will result in a wider-audience understanding of the life cycle of the species, its importance in the seagrass habitats, and its role as a cultural symbol and economic species. This will provide substantial benefits to each country, because this knowledge can be used by community members as they work together to make conservation decisions for the queen conch, the ecosystem, and the communities that depend on the fishery.

**KEYWORDS:** *Aliger gigas*, queen conch, aquaculture, restoration, online education

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