

## Abstract

The targets of this ongoing project are marine ornamental reef species of importance to Hawaii. Eggs were collected from pelagic spawners from a partnering institution's public exhibit and transported back to the Oceanic Institute (OI), where rearing attempts were conducted and documented. The goal was to culture new species and establish successful rearing protocols which could then be applied to other ornamental species that have not yet been aquacultured. Of specific focus are those species whose natural populations are threatened.

## Introduction

The mission of the Rising Tide Conservation Initiative (RTC) is to preserve and protect coral reefs by means of sustainable aquaculture. One of RTC's primary goals in achieving this mission is to research and develop techniques to successfully rear marine ornamental finfish in captivity. The techniques established by the collaborative efforts of RTC help foster conservation and sustainability, as the species produced in captivity by RTC are part of the only alternative to wild caught specimens for public display aquaria and aquarium hobbyists. It is also RTC's goal to disseminate information from these efforts throughout the aquarium industry to educate, increase awareness, and promote sustainable aquaculture.

Large public aquariums and their exhibits often possess mature and healthy specimens that have had a significant amount of time to acclimate to life in captivity. In many cases, these individuals spawn frequently and can provide a reliable source of eggs that can be utilized for research purposes. The large nature of these exhibits allows for egg collection from species that may be unfeasible to house in traditional research laboratory space. Many of these facilities do not have the resources to conduct rearing trials "in house" so partnerships between public and research institutions may prove to be quite valuable when utilized in this manner.



Figure 1. Aerial view of the exhibit from which eggs are collected from in this study. The exhibit houses approximately 45 different species of fishes, many of which are endemic to the Hawaiian islands.

## Objectives

- Identify the most effective means of collecting eggs from the exhibit
- Develop larval rearing protocols for species whose eggs were successfully collected
- Describe and document larval development
- Successfully rear juveniles to restock the source exhibit

## Methods

- 4 Egg collectors were constructed and deployed as permitted within the public exhibit.
- Eggs were oxygenated and transported back to OI where they were processed under the bio-security protocol.
- Eggs were counted and viability was assessed prior to setting in 200L or 1,000L rearing tanks.
- Larvae were fed copepod nauplii, enriched rotifers, enriched artemia, cyclopeeze, and an extruded dry feed accordingly with development.
- Live background algae was also added throughout larval rearing.
- Suitable water parameters were maintained and larval development was documented.
- Baseline larval rearing protocols were created upon successful rearing through settlement to the juvenile stage.

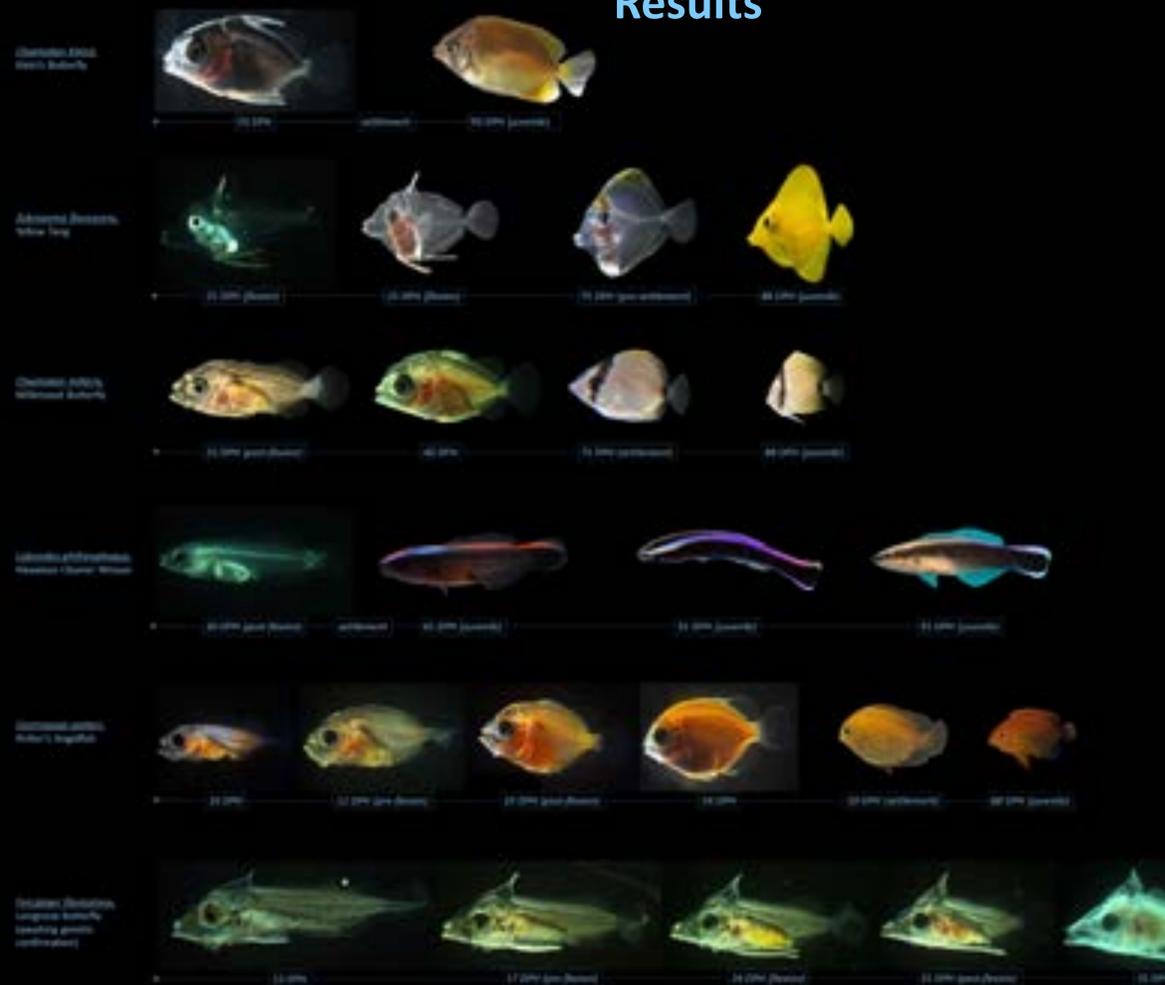


Figure 2. Internal view of an air driven egg collector designed and built for this project.



Figure 3. Freshly collected pelagic eggs from the exhibit approx. 19 hours post fertilization.

## Results



## Results (cont'd)

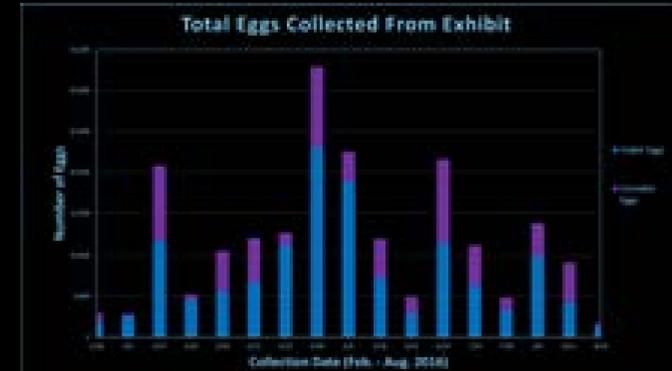


Figure 4. Total number of viable and unviable eggs per collection from the start of the project through August 2016.

## Discussion

The significance of this project is multidimensional. It not only identifies new species and methods for captive-breeding, but it also aims to educate during the process. The successful collection, transport, and rearing of eggs from public aquaria gives merit to the mission of Rising Tide Conservation to preserve and protect coral reefs by means of sustainable aquaculture. The collaborative efforts and sharing of information has a positive effect on the captive rearing of marine ornamentals. As a result of this project, as well as the efforts of the many collaborators within RTC, new species have been successfully reared. Every rearing attempt provides valuable insight, which helps promote the sustainability of marine ornamental aquaculture. Continued efforts within Rising Tide Conservation such as this one may have profound impacts on the marine ornamental industry and are vital to reducing our impact on coral reefs.



Figure 5. The first *Chaetodon miliaris* and *Labroides phthirophagus* ever reared in captivity as well as *Zebrazoma flavescens* also reared from this project returned to the source. (Phot credit: M.L.A.)

## Acknowledgements

Projects such as this one are rarely accomplished without the help of others. A most sincere thanks to the entire husbandry crew responsible for maintaining the public exhibit at the partnering institution and the team at OI: Dean Kline, Randall Scarborough, and Blake Thompson for their assistance with live feeds/algae production and Aurora Burgess, Emma Forbes, and Renee Touse, for caring for the larvae in my absence. A most sincere thanks to Dr. Brett Olds, for his assistance with genetic analysis to verify unknown species and to E. Huntley Penniman for her assistance with media announcements. This work was supported by Rising Tide Conservation and the SeaWorld & Busch Gardens Conservation Fund.

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