

# Warren J. Baker Endowment

*for Excellence in Project-Based Learning*

# Robert D. Koob Endowment for Student Success

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## FINAL REPORT

### I. Project Title

Understanding the transition from dispersive larva to benthic adult: A study of the environmental factors that impact *Kelletia kelletii* larval settlement

### II. Completion Date:

4/15/2017

### III. Student(s), Department(s), and Major(s)

Megan Wilson, Biology, Biological Sciences

### IV. Faculty Advisor and Department

Crow White, Biological Sciences

Dean Wendt, Biological Sciences

### V. Cooperating Industry, Agency, Non-Profit, or University Organization(s)

Central Coast Aquarium, Avila Bay

CSU Fullerton, Dr. Danielle Zacherl

### VI. Executive Summary

There is a paucity of information concerning the growth, development, and behavior of early life history stages of *Kelletia kelletii*, a marine predatory gastropod and emerging fisheries species. This is a significant barrier to our current understanding of the population dynamics of this species, as the early life stages are responsible for the dispersion of individuals. For this project, *Kelletia kelletii* specimen were collected and spawned, their egg capsules incubated, and their larvae reared in a laboratory setting. We measured the size of individual larvae at each developmental stage within the capsule, and fit several growth functions to the data. We analyzed the fit of these functions and selected the best-fit function to represent the intra-capsular growth of the 'veliger' developmental stage. I disseminated our results as an educational poster for K-12 students at the Central Coast Aquarium, and I am writing up this project for my senior thesis. I also aim present our results at the COSAM Undergraduate Research Conference. The protocol, equipment, experience and set of observations compiled by this project can be used in future studies which require gastropod larval culture, and our results and observations can be used to better understand the dispersal timeline of this species. Further, we established a base growth rate which can be utilized in future studies evaluating changes in growth rate in altered environmental conditions. Future directions which would expound upon this project include a more robust quantification of the incubation period, assessing veliger growth rates as a function of environmental condition, and incorporating both into dispersal and population connectivity models for *Kelletia kelletii*.

## **VII. Major Accomplishments**

- (1) Established and amended laboratory protocol to culture larval *Kelletia kelletii*
- (2) Established a detailed record of observations and measurements of *Kelletia kelletii* eggs and larvae from oviposition to the pediveliger stage
- (3) Observed an intra-capsular incubation period that challenges a previously recorded and widely accepted value
- (4) Selected a best-fit growth model for *Kelletia kelletii* veliger larval stage

## **VIII. Expenditure of Funds**

The Baker-Koob Endowment funds were essential to the execution of this project. Funds were used in three main capacities: equipment, travel, and publication. Funds were used to buy the materials to build the larval culture apparatus, rearing implements and food to sustain the larvae, and diving equipment for specimen collection. A second portion of funds were used to support travel fees to the Western Society of Naturalists conference. Lastly, a portion of funds were used to assemble both a research poster to be presented at a student research symposium, as well as an educational poster for K-12 students at the Central Coast Aquarium.

## **IX. Impact on Student Learning**

The most significant impact of receiving the Baker-Koob funding was the freedom to explore a subject that fascinated me, irrespective of the lack of current research projects on this topic at Cal Poly. I had the financial means to develop my own project, and so I was free to ask questions and explore topics that have not been addressed at Cal Poly. Thus, I was able to conduct firsthand each step of the scientific process. I pioneered a project with no established protocol, and so I learned to collaborate with professors and technicians to attain laboratory space and build my own, specialized equipment. Because I was not able to bring the larvae to metamorphic competency, I was not able to study on their settlement behavior as I had originally planned. However, I learned tremendously from this experience, including the value of careful observation and how to generate accurate and useful information even from a failed experiment. I realized that failing – not just success – is a part of the scientific process. Lastly, the experience and unique skill set I accrued in designing, conducting, and sharing my own project motivated and enabled me to pursue graduate school to continue studying larval biology.



Figure 1. Cultures of larvae (above) and egg capsules (below) in an incubator. Larvae are stirred by a continuous swinging paddle apparatus, built by Megan Wilson and Biology department technicians.



Figure 2: A week-six veliger larvae (post oviposition). "L" and "W" represent the length and width measurements that were taken.