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### Progression of Activity and Predator Avoidance in California Grunion Larvae

#### Abstract

The California Grunion, *Leuresthes tenuis*, is a beach-spawning fish that lays its eggs in the sand. Grunion eggs normally hatch when the high tide comes in, about every two weeks based on the semilunar cycle. However, the eggs left behind are still able to hatch during the next high tide cycle by stabilizing their metabolic activity once the embryos develop. This delayed period of hatching may affect the Grunion's chance at survival because they have less yolk to rely on for energy. I hypothesized that the rate of predator avoidance would be lower in larvae that were hatched during the extended incubation period compared to larvae hatched in the normal period. Egg samples were collected from the beach, incubated and hatched in lab, and tested in two phases for primary and delayed hatching (10 days and 24 days after fertilization). Catch percentages by an artificial predator were used to analyze avoidance success for the larvae. Significant findings were that predator avoidance declined 7 days after hatching in primary larvae and 4 days after hatching in delayed larvae. Additionally, percent catch for delayed larvae was much higher than for primary larvae by day 4. Since the delayed larvae declined in avoidance more quickly, they had a higher risk of mortality. This conclusion supported my hypothesis because larval avoidance dropped as incubation time increased and as time passed after hatching. Findings suggest that crucial differences exist between the two hatching periods.

**Keywords:** beach spawning, delayed hatching, environmentally cued hatching, larval activity