

Evaluation of Visible Implant Elastomer as a Tagging Method to Inform Experimental Release and Supplementation of Delta Smelt

Background

- As part of the Delta Smelt Supplementation Strategy, the U.S. Fish and Wildlife Service (USFWS) and UC Davis Fish Conservation and Culture Laboratory (FCCL) conducted two studies to evaluate the use of Visual Implant Elastomer (VIE) tags for Delta Smelt (*Hypomesus transpacificus*).
- VIE tags allow for batch marking of released fish to study movement and survival after release and allow researchers to easily distinguish between released fish and wild fish.
- VIE tags have been successfully used on other small bodied marine and freshwater fish, but this is the first study of their use in Delta Smelt.

Objectives

- Measure the effect of VIE tags on Delta Smelt growth and survival.
- Determine the best colors and locations for VIE tagging with regards to retention and identification.

Methods

- Delta Smelt were hatched and reared at FCCL.
- All fish were tagged with alphanumeric VIA tags prior to the experiments so individual fish could be tracked (Fig. 2F).

Experiment 1: Color

- Treatment Groups (30 fish each): Blue, Green, Orange, Red, Yellow, and Control (no tag) (Fig. 2A-E).
- We collected fish fork length and whether the tag was visible (tag retention) at six time points over 165 days.

Experiment 2: Location

- Treatment Groups (120 fish each): Anterior Dorsal(AD), Posterior Dorsal(PD), Mid-Lateral(ML), and Control(C) (Fig. 3)
- We collected fish fork length and whether the tag was visible (tag retention) at four time points over 120 days.

Discussion

- Yellow VIE tags and tagging at the mid-lateral line should be avoided in Delta Smelt.
- Other colors and locations tested were retained and visible over 95% of the time, up to 120 days after tagging.
- As an annual species, Delta Smelt would only be found in the wild for a few months after release, and our study suggests that VIE is an effective method for tagging Delta Smelt for monitoring over this short period.
- Future studies examining the use of VIE tags in Delta Smelt in the wild or for longer durations would be informative.

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(mm)

Length

Fork

NV

PC



Figure 1: Delta Smelt being marked with a red VIE tag for release.



Figure 2: VIE tag colors (circled in each image) used in experiment 1: Blue (A), Green (B), Orange (C), Red (D), and Yellow (E). Image F shows a VIA tag used to track individual fish in both experiments



Figure 3: Three tag locations tested in Experiment 2

VIE tag color and location had no effect on the growth of Delta Smelt over time^{*}



Day of Experiment

*We tested for differences in fork length over time using a generalized linear mixed model to account for repeated measurements on individual fish. Error bars on the graphs show 95% confidence intervals. There was no significant difference between any of the treatment groups.



**We tested for differences in survival over time using a logistic regression. Error bars on the graphs show 95% confidence intervals. There was no significant difference between any of the treatment groups.

Yellow VIE tags and tags at the Mid-Lateral location were retained less well than other tag colors and locations tested^{***}



***We tested for differences in tag retention over time using a generalized linear model. In Experiment 1, yellow tags were retained less well by day 165. In Experiment 2, Mid-Lateral tags were retained less well over 120 days.





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