Juvenile Chinook Salmon Calcein Marking Study

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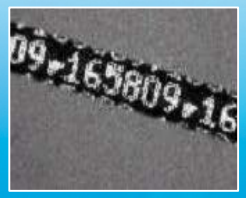
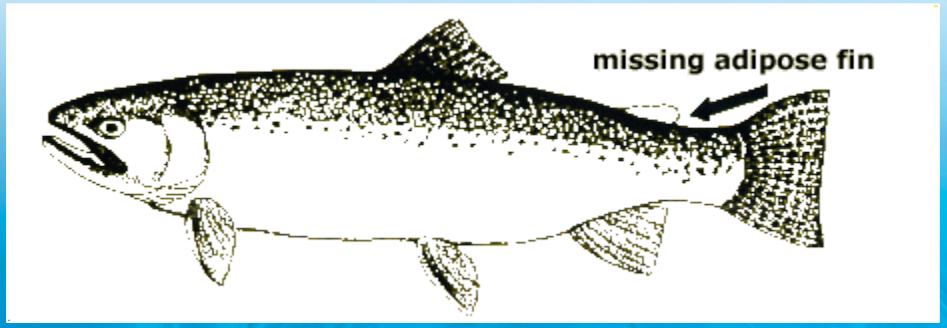
SAN JOAQUIN RIVER RESTORATION PROGRAM

Introduction

- All Chinook already coded wire tagged and ad-clipped
- Interest in externally visible mark
  - Easily identified at pumping facilities
  - Live release during USFWS and CDFW sampling activities
  - Calibration fish in RST efficiency trials





Introduction

- Calcein
  1) Nonlethal
  2) Stable mark for 4-12 months
  3) No minimum fish size
  4) Unique mark
  5) High marking survival
  6) Low predation risk

Methods

- Fish culture
  - Fall run obtained from CDFW small scale hatchery near Friant Dam
  - Initial size approximately 40-50 mm
  - Calcein treatment and controls (3,000)
  - Held in net pens
  - Fish fed 3% bw per day for study duration

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Methods

- Scoring
  - 71 d trial
  - 3 fish from each cage were collected weekly
  - All fish were stored frozen and graded at end
  - 2 readers rated the fish using hand held calcein detectors

Methods

- Scoring

  0 = no mark

  1 = dimly visible

  2 = clearly visible mark;

  3 = readily visible bright green mark

- A fish was considered marked if at least one structure (pectoral fin, pelvic fin, opercle, or jaw) received a score of 1 or higher

Methods

- Marking
  - Salt solution - 1.5 g/L for 3.5 min
  - SE-MARK calcein solution – 5 g/L for 6 min
  - 2 freshwater rinses
  - Controls went through same treatment except water instead of calcein

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Results

- Mark retention = 71 d for one cage (end of trial) and 35 d for the other
- Visibility scores were highest for jaw, intermediate for pelvic and opercle and lowest for pectoral fins
- Subjective scoring system led to considerable disagreement in ratings for structures among readers
- However readers were in 100% agreement in rating a fish as marked or unmarked

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Results

Control = week 0

Calcein marked = week 0

Calcein marked = week 1

Calcein marked = week 2

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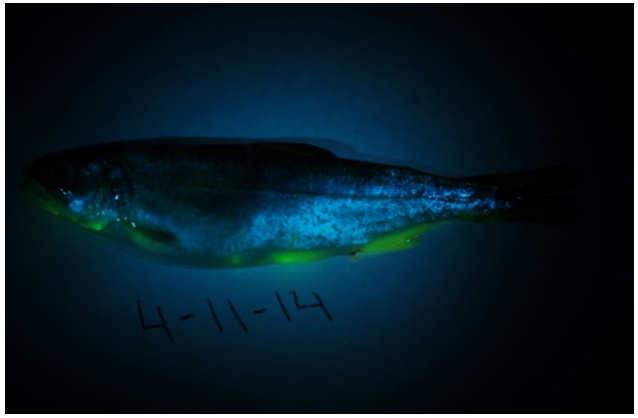
Results



Control = week 3

Calcein marked = week 4

Calcein marked = week 5

Calcein marked = week 6

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Results

Control = week 7

Calcein marked = week 8

Calcein marked = week 9

Discussion

- Mark retention = 71 d for one cage (end of trial) and 35 d for the other
  - Initial size 72.1 mm (130.1 fish/lb) vs 53.8 mm (302.6 fish/lb)
  - Calcein mark deterioration from sunlight (Honeyfield et al. 2008; Hill and Quesada 2010; Richard et al. 2014)
  - Greater mark intensity in larger fish (Negus and Tureson 2004)

Discussion

- Tag retention times for other studies in river environments vary greatly - 73 d to 365 d (Hill and Quesada 2010; Richard et al. 2014)

- Estimated travel time for smolts at Friant Dam to Chipps Island is approximately 9 d to 59 d (unpublished data from acoustic telemetry and coded wire tag recoveries)

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Discussion

- Usefulness as a unique identifier to allow for fish release during USFWS and CDFW sampling activities
- Dependent on all sampling crews being equipped with calcein detector and “dark room”

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Conclusions

- Large numbers of fish can be marked quickly with low mortality
- Uncertainty remains for mark duration and reader detectability in the field
- The exact goals and usefulness of calcein for mark and recapture and/or unique identifier needs to be discussed

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References

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