Juvenile salmon growth, movement, and survival in Butte Creek - A look at past and present tagging studies in the Sutter Bypass

Spring-run Project Work Team November 22, 2021

NOAA FISHERIES | Southwest Fisheries Science Center
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

UNIVERSITY OF CALIFORNIA
SANTA CRUZ

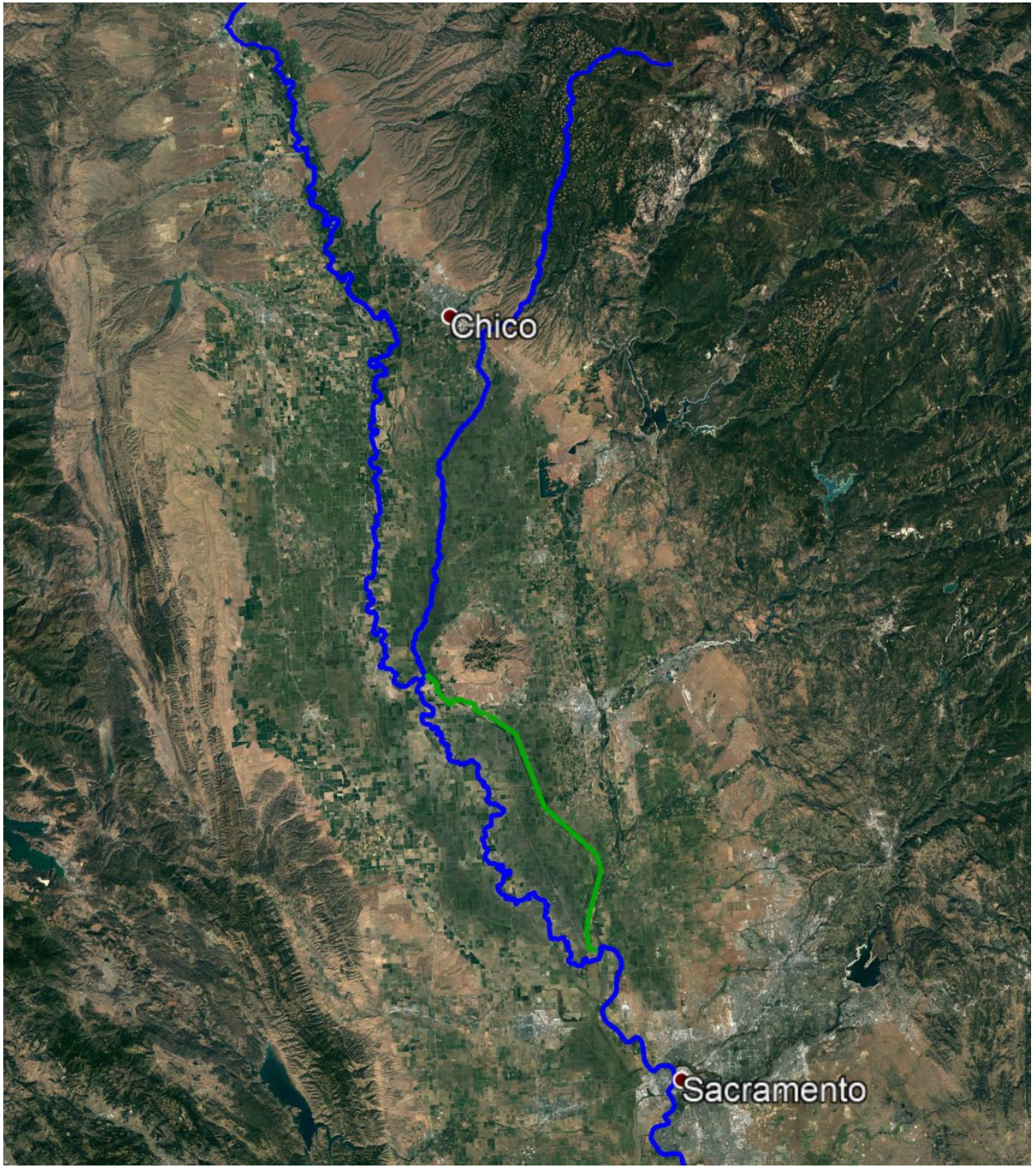
Study Objectives

Part 1:

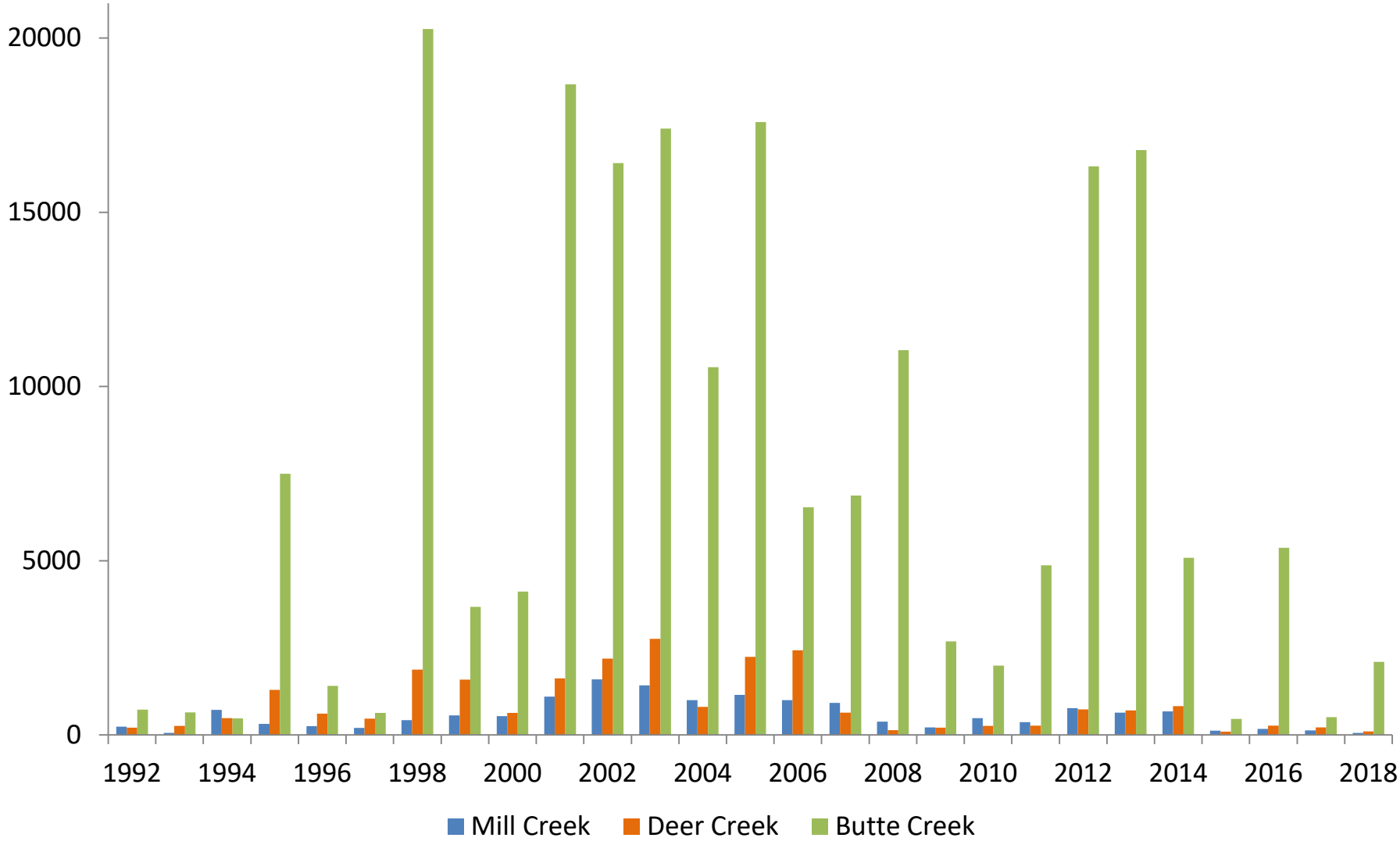
-What is the growth and residence time of spring-run juveniles rearing in Butte Creek and the Sutter Bypass? (CDFW CWT Study, 1996 - 2004)

Part 2:

-What are the survival and movement rates of smolts outmigrating from the Sutter Bypass? (NOAA Acoustic Tagging Study, 2015 - 2017)


Chico
Sacramento

Mill, Deer, Butte Creek Spring-Run Escapement 1992 - 2018

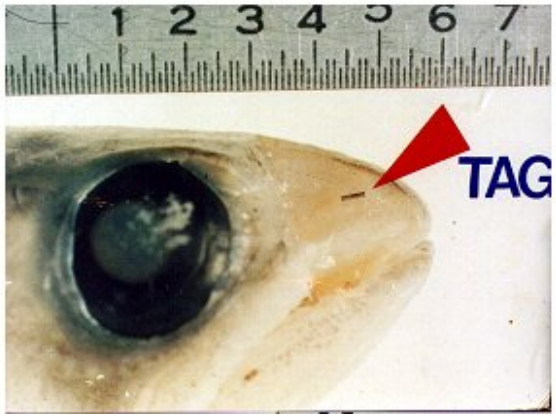


Part 1
CDFW Coded Wire Tagging (CWT) Study – 1996-2004

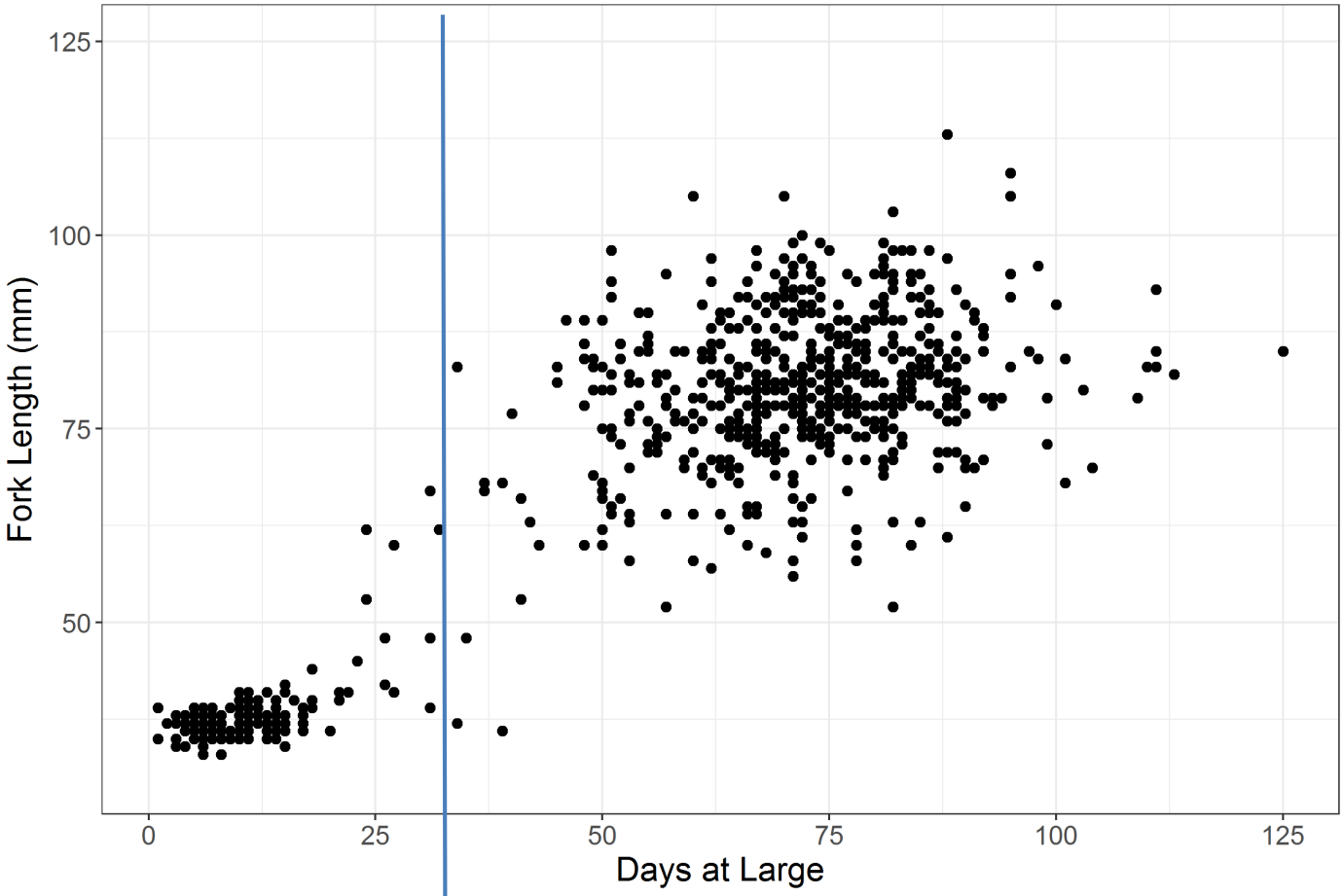
- ~750,000 spring-run juveniles (30-40mm) CWT tagged between 1996 – 2004 near spawning grounds

- 769 recaptured ~70 miles downstream in the Sutter Bypass

- Unique ID on CWT allows for analysis of group movement and growth rates



1996 – 2004 CWT Recaptures in Sutter Bypass



Runners
n = 137 (17%)
Av. residency = 11 days (± 5.6)
Av. growth = 3mm (0.27mm/day)
Av. length = 38mm (± 4mm)

Walkers
n = 628 (83%)
Av. residency = 72 days (± 13.5)
Av. growth = 44mm (0.62mm/day)
Av. length = 80mm (± 10mm)

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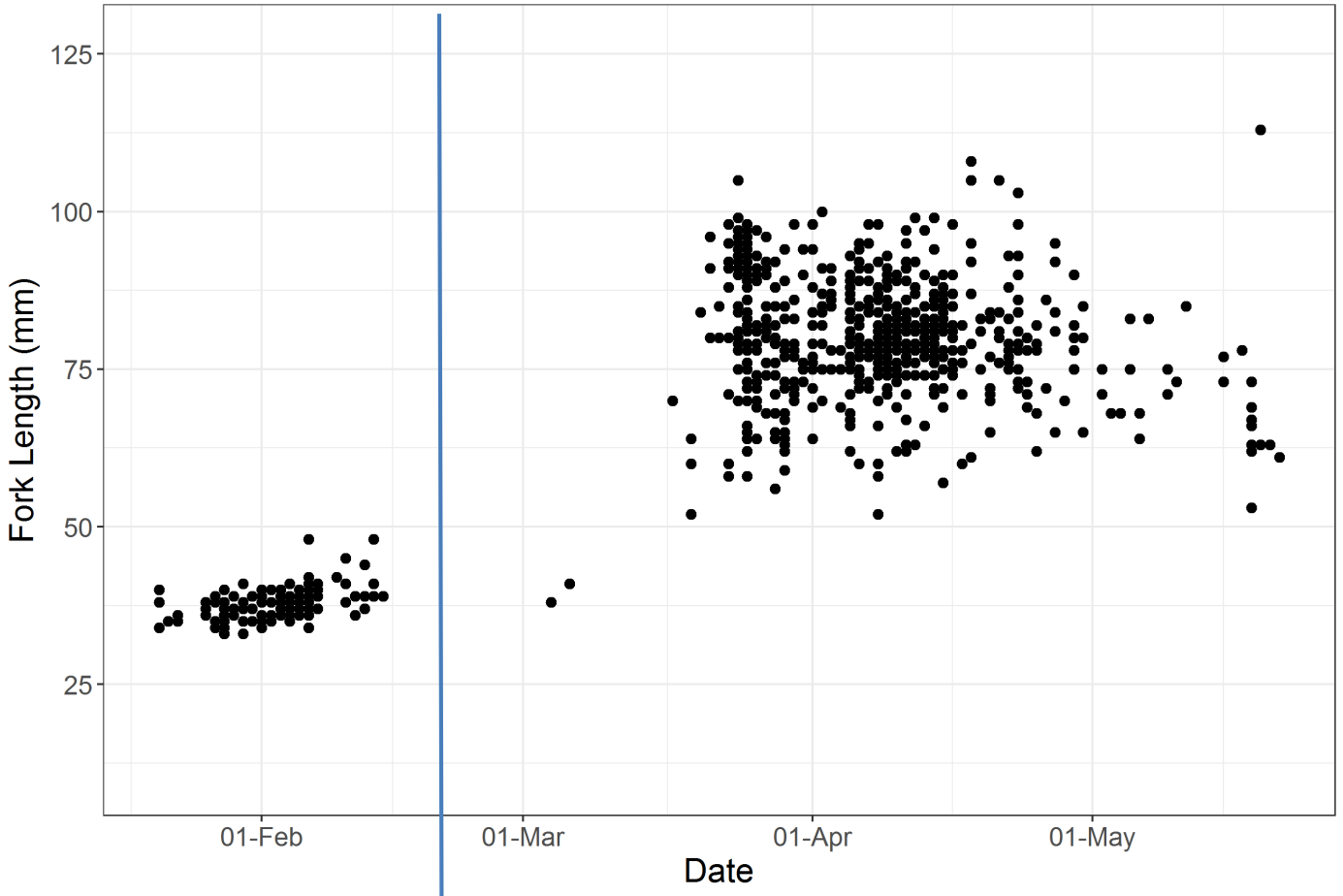

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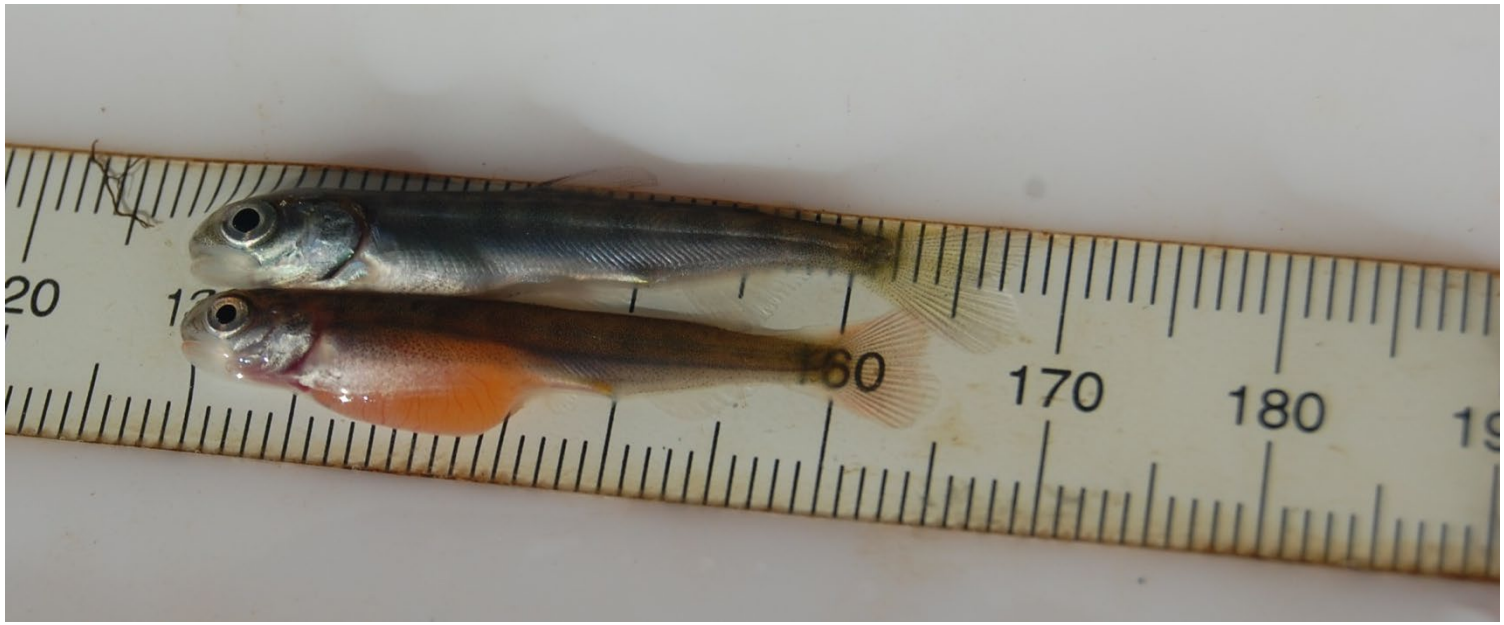
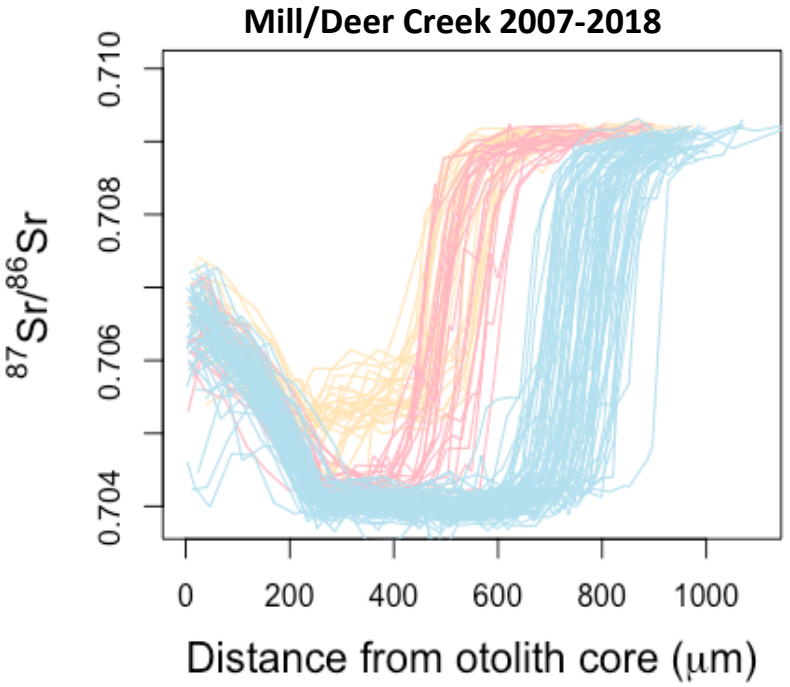
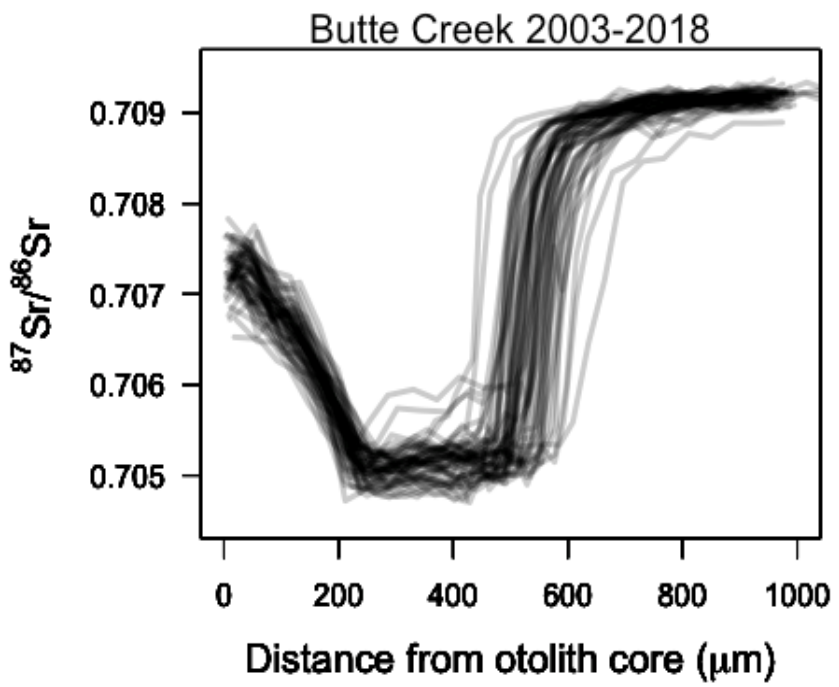
Walker

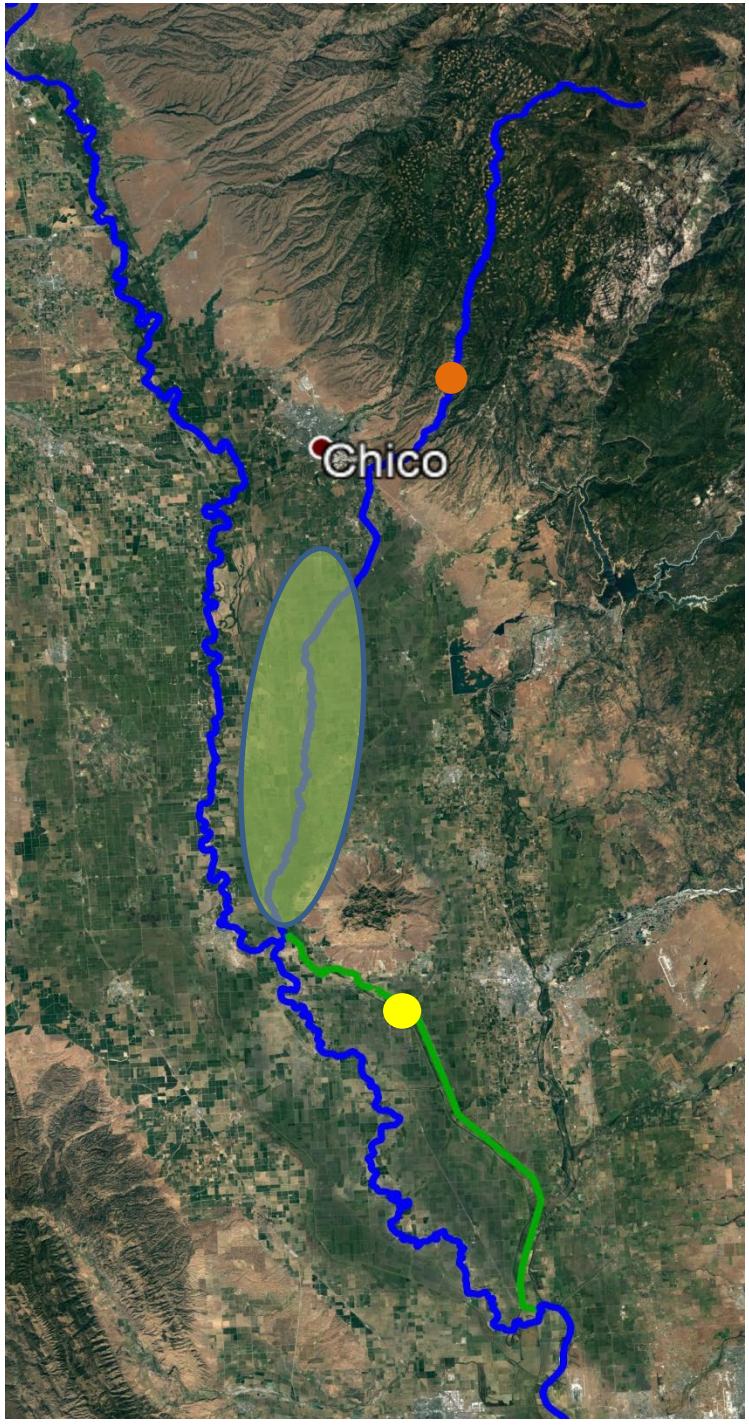
Runners



Juvenile life history reconstruction based on otolith isotope analysis

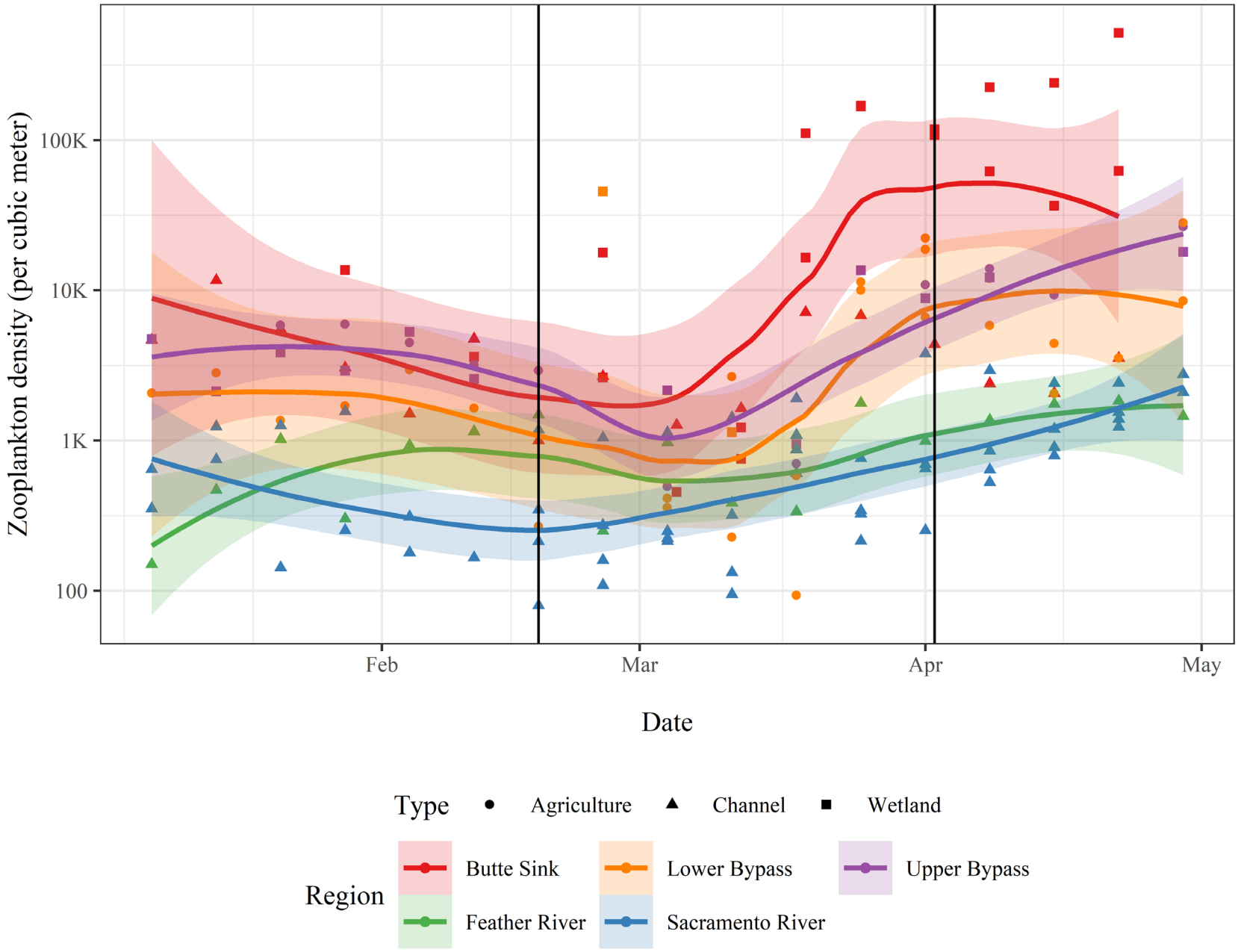






Butte Basin

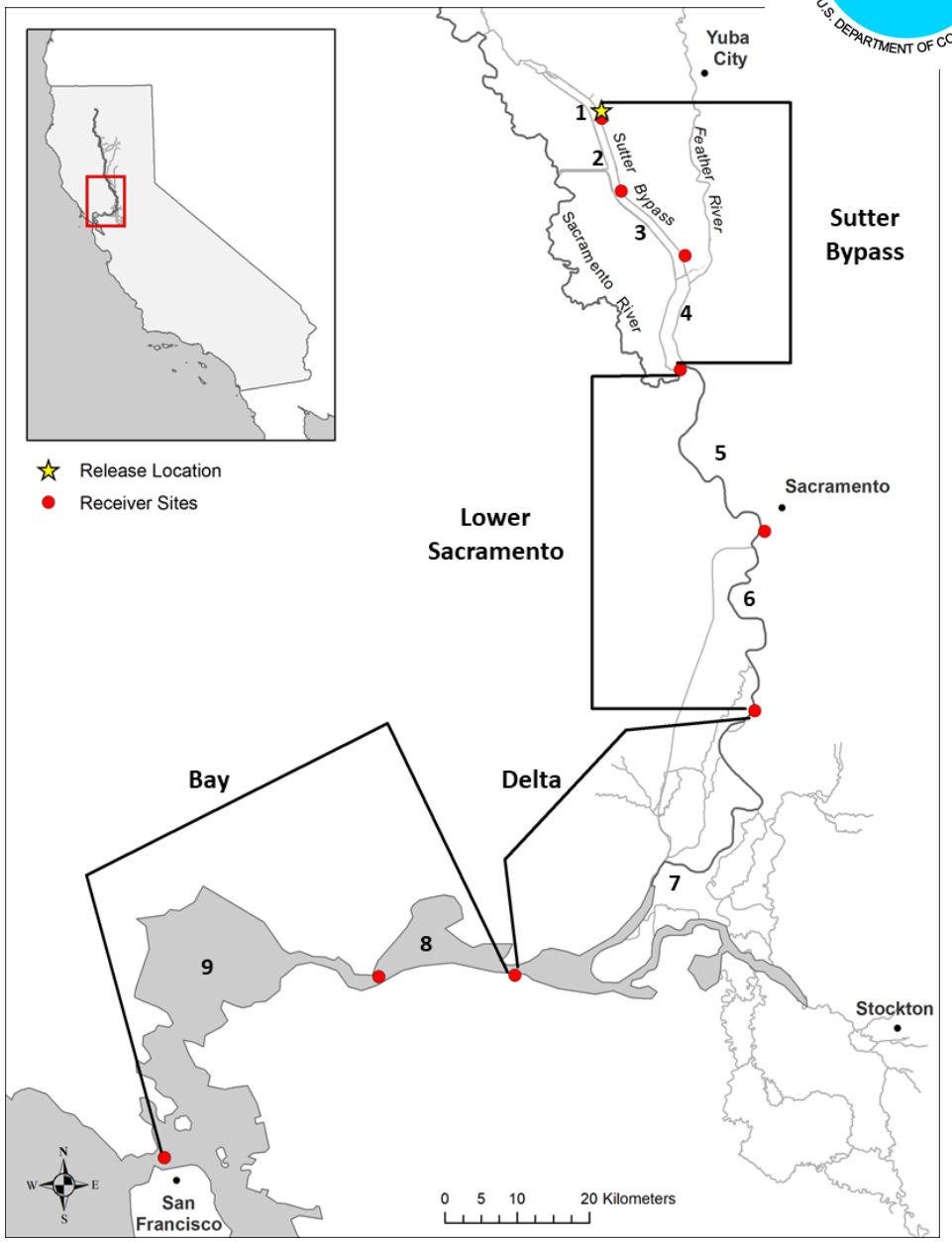
- Largest contiguous wetland habitat in the Sacramento Valley
- Butte Sink managed by USFWS as a wildlife refuge
- Mostly comprised of private land with 32 conservation easements



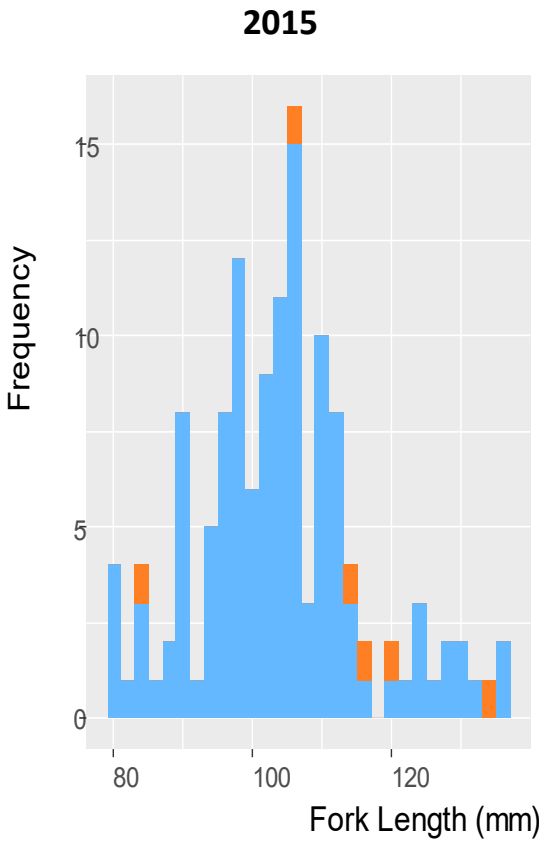
Data provided by Eric Holmes (UC Davis)

Part 2
2015 – 2017 Sutter Bypass Acoustic Tagging Project

- Minimum fish size > 80mm, 6.0 g
- Unique ID for each tag, pings every 5 seconds for 30 days
- Fish released at 9pm to allow for recovery

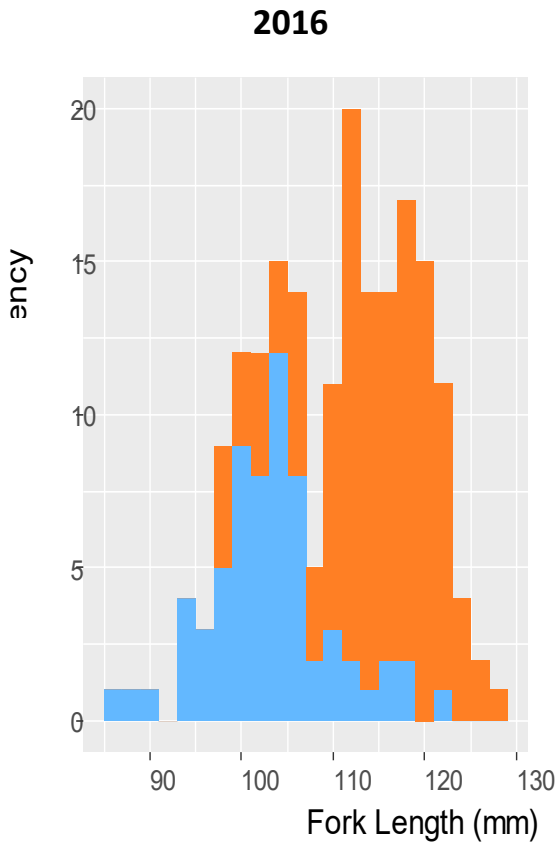


Genetics By Year



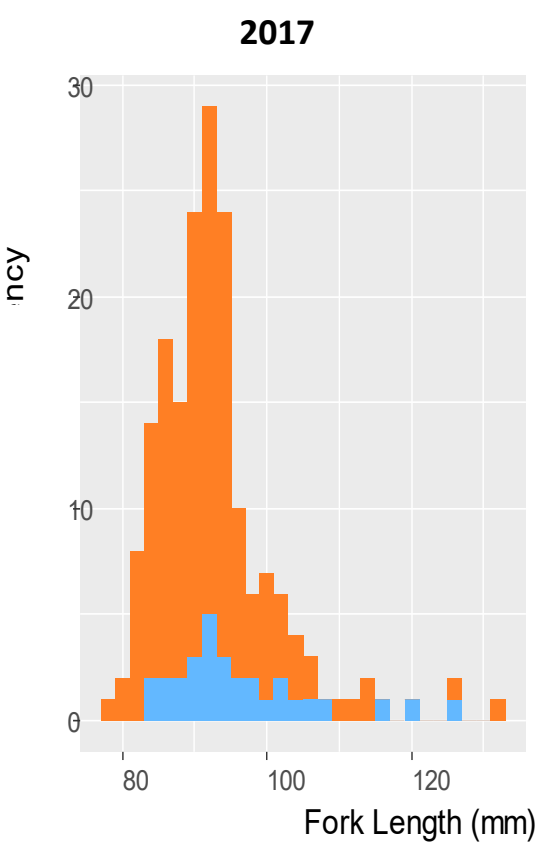
n = 141

Av. length = 105 mm



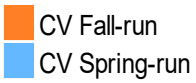
n = 200

Av. length = 110 mm

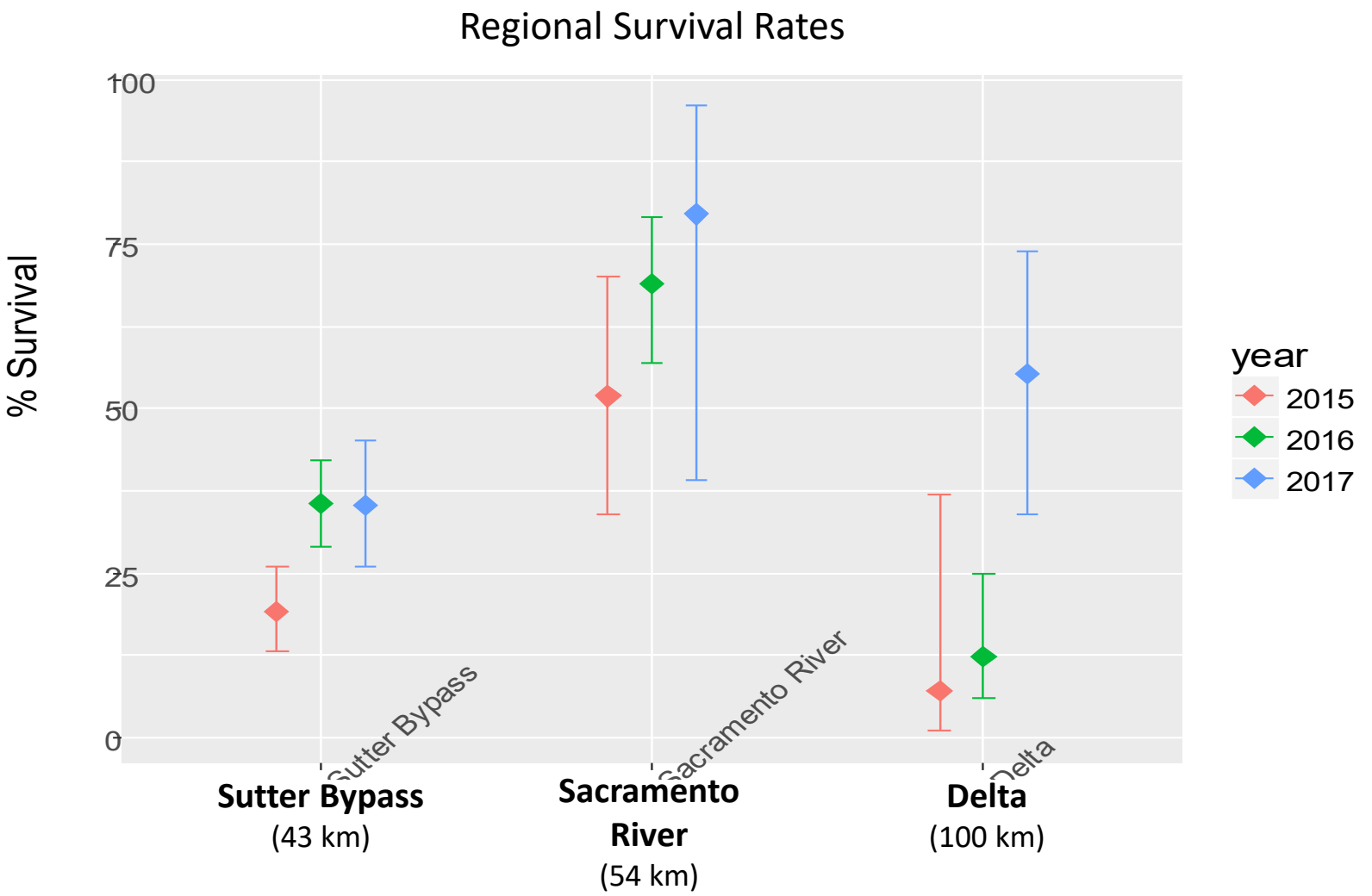


n = 190

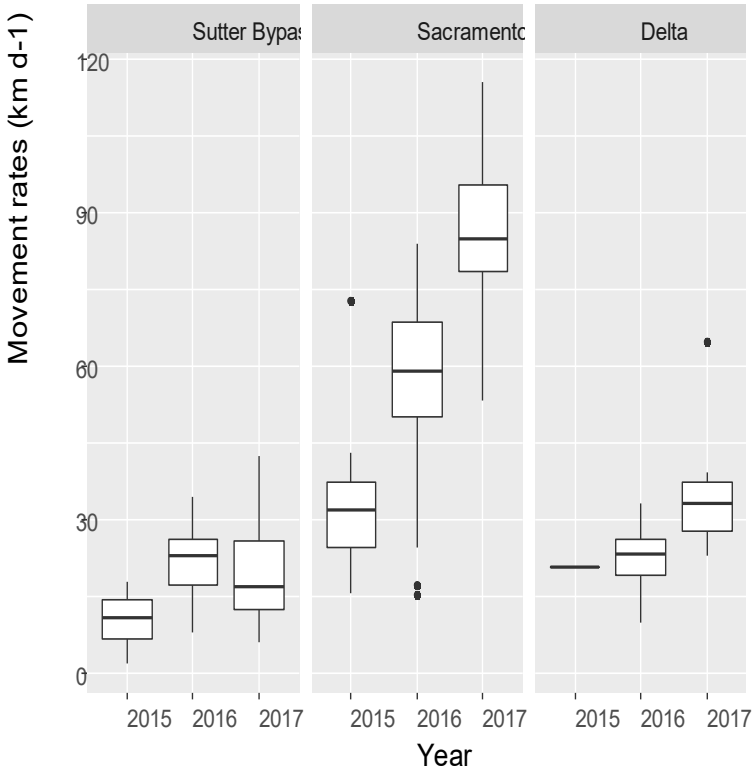
Av. length = 93 mm

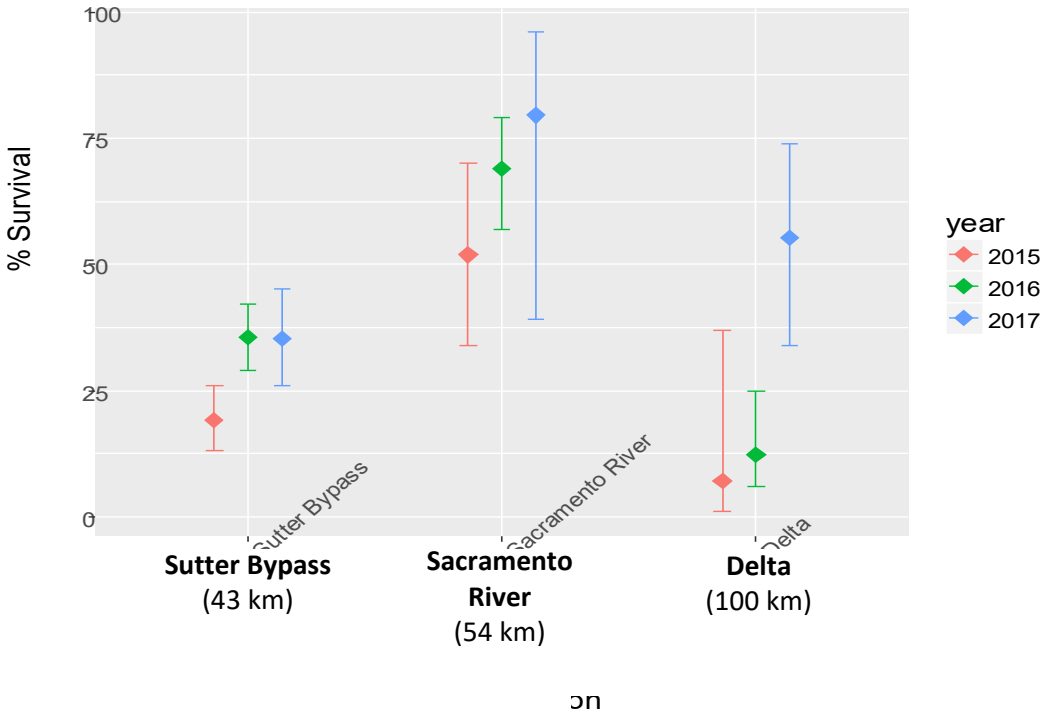


Samples analyzed by Carlos Garza lab (NOAA Fisheries)


Regional Survival Rates
% Survival
100
75
50
25
0
year
2015
2016
2017
Sutter Bypass
Sacramento River
Delta
Sutter Bypass
(43 km)
Sacramento
River
(54 km)
Delta
(100 km)

Movement Rates vs. Survival





Conclusions

- Juveniles tend to walk (72 days, 83%) vs run (11 days, 17%) through Butte Creek and the Sutter Bypass
- Growth rates averaged 44mm (0.6mm/day) for walkers vs 3mm (0.3mm/day) for runners
- Relatively low smolt survival rates through the Sutter Bypass and Delta, higher in the lower Sacramento River in recent years
- Smolt survival appears to be correlated with movement speed: faster movement speeds lead to higher survival rates

Thank you

Flora Cordoleani

Alex McHuron

- Clint Garman
- Tracy McReynolds
- Paul Ward

Questions ?