

# Sutter Bypass Salmon Project

A scenic view of a large body of water, likely a reservoir or lake, under a clear blue sky with scattered white clouds. In the background, there are green hills and mountains. In the foreground, a long, dark, rectangular floating net or barrier is visible on the water's surface, with an orange buoy at one end.

2019 season update

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# Topic Overview

- Cage experiment
- Water quality
- Lower Trophic
- Wild fish
- Next steps



# Cage Experiment

13 Locations

## 5 regions

- Butte Sink (3)
- Upper Bypass (2)
- Lower Bypass (2)
- Sacramento River (4)
- Feather River (1)

## 4 habitat types

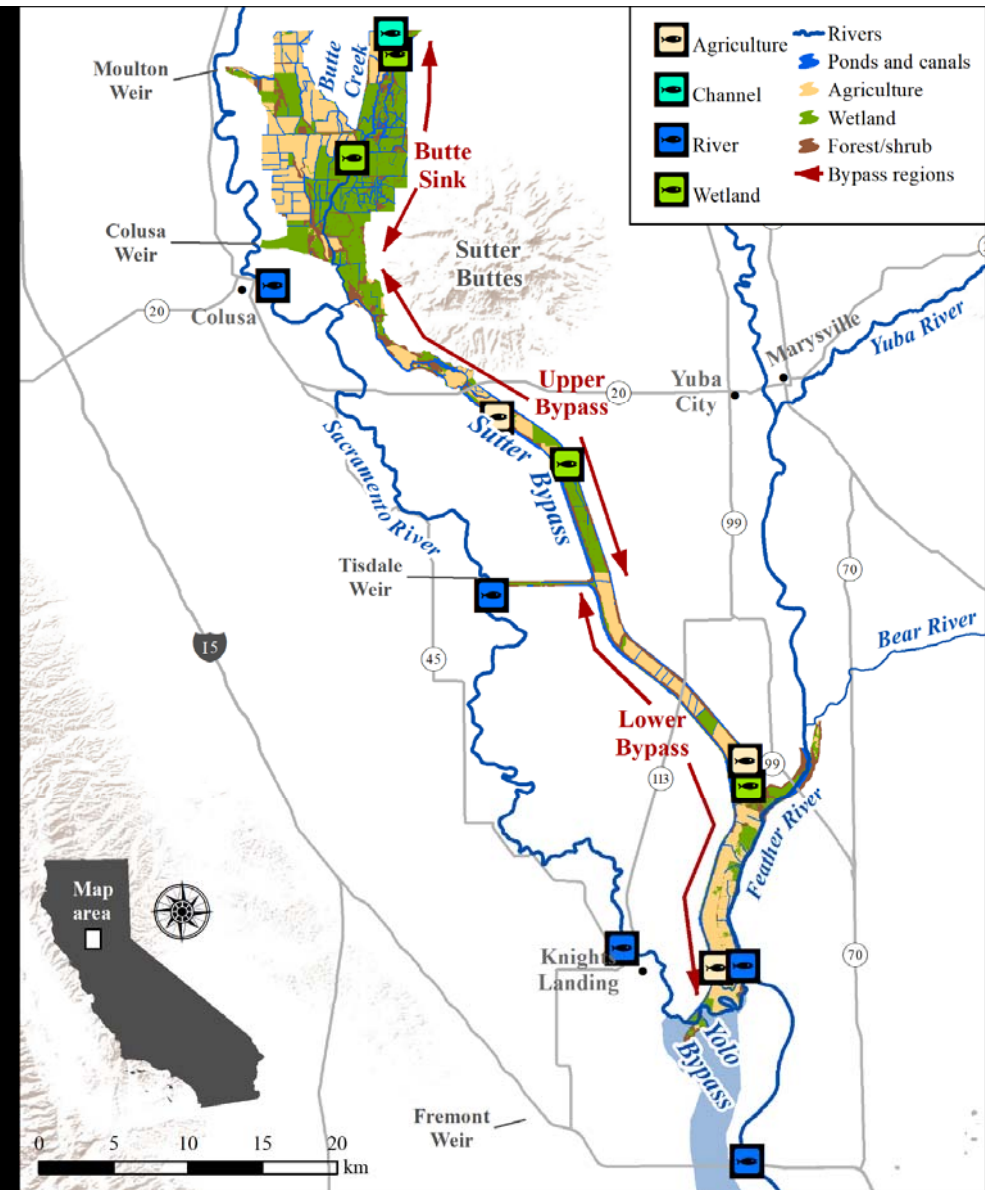
- Wetland (4)
- Tributary (1)
- Main stem (5)
- Agriculture (3)

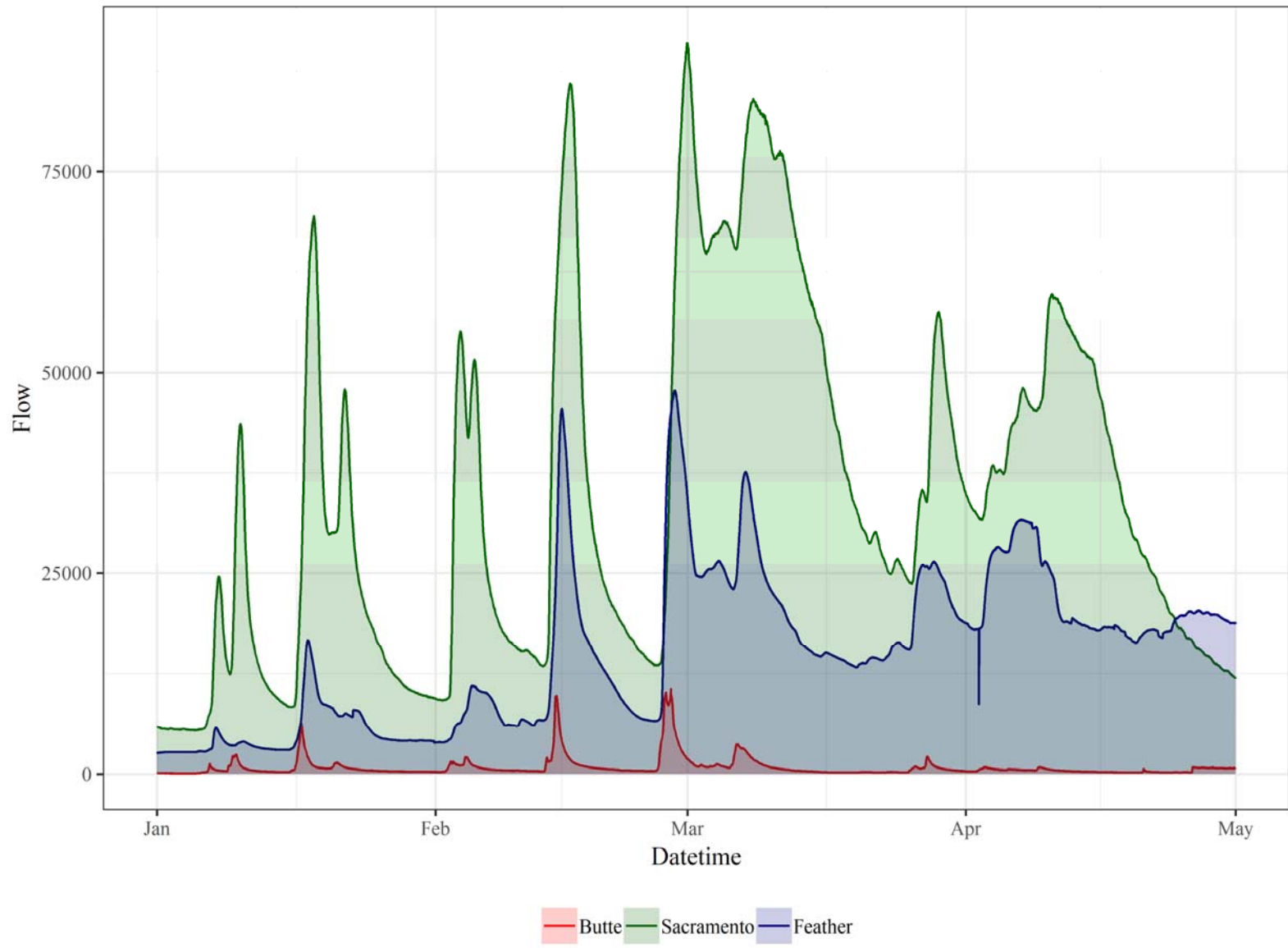
## 26 Growth cages

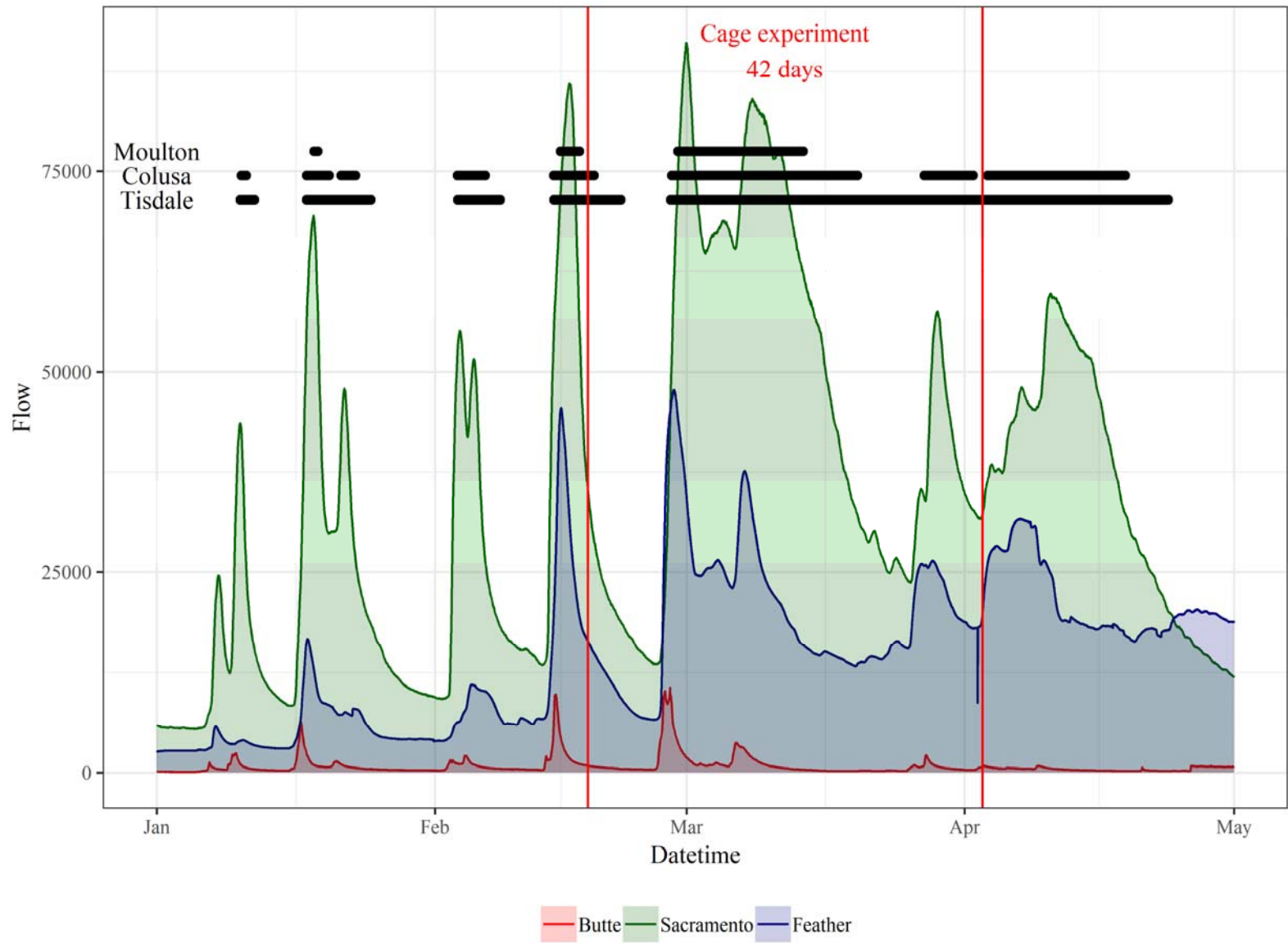
- 5 Individually PIT tagged salmon per cage

## 5 Isotope cages (1 per region)

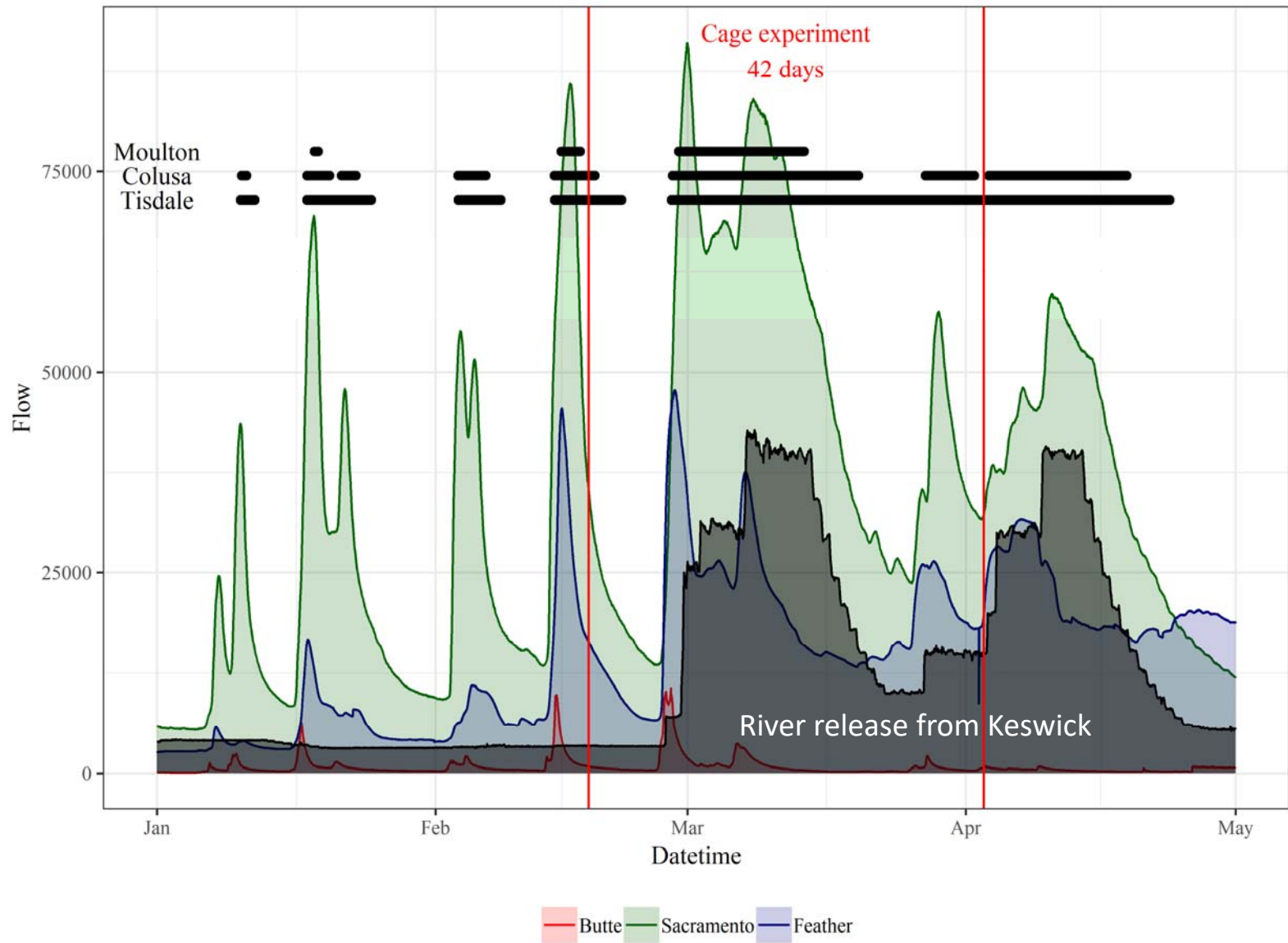
- 15 untagged salmon per cage
- Weekly sampling







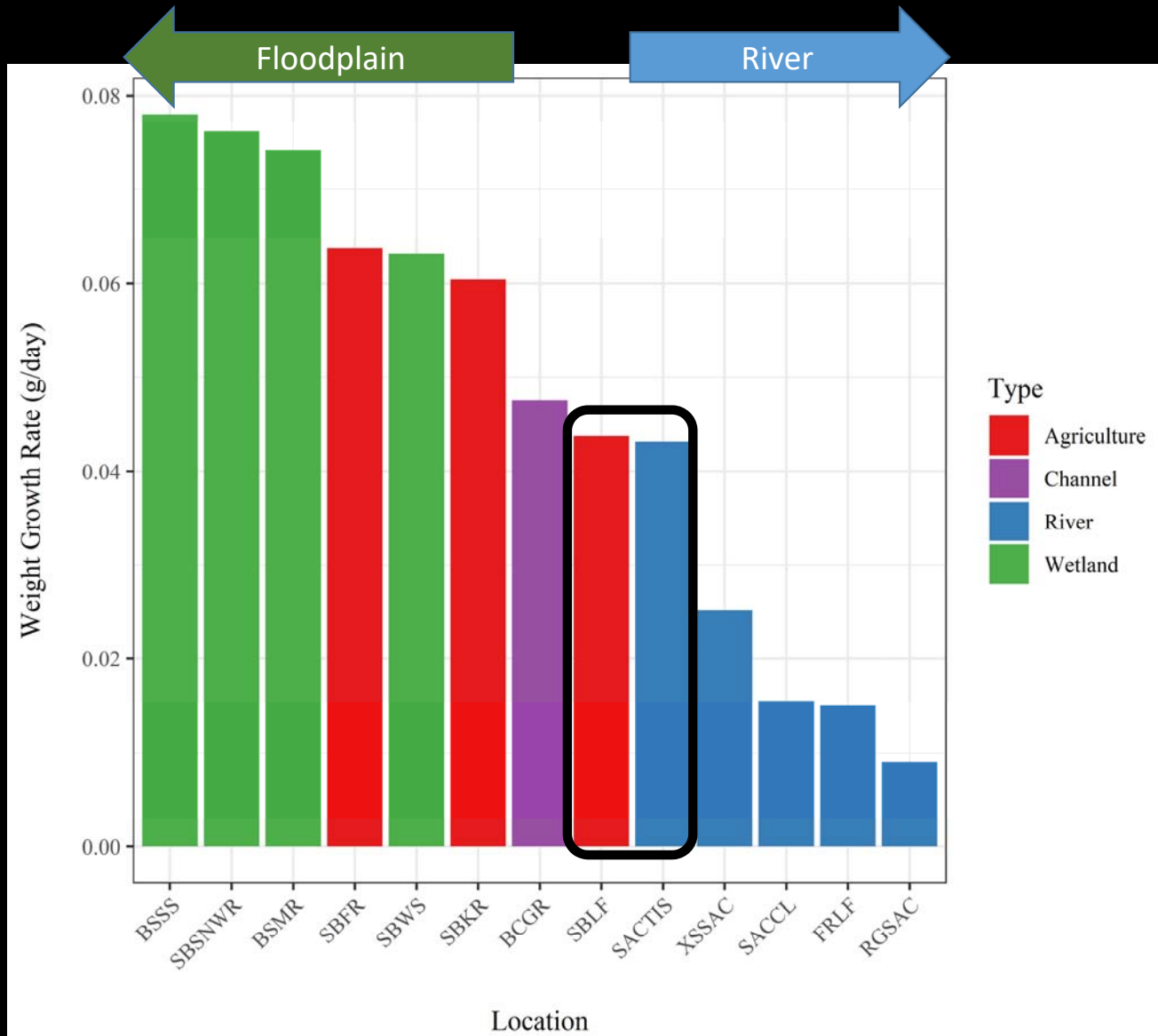




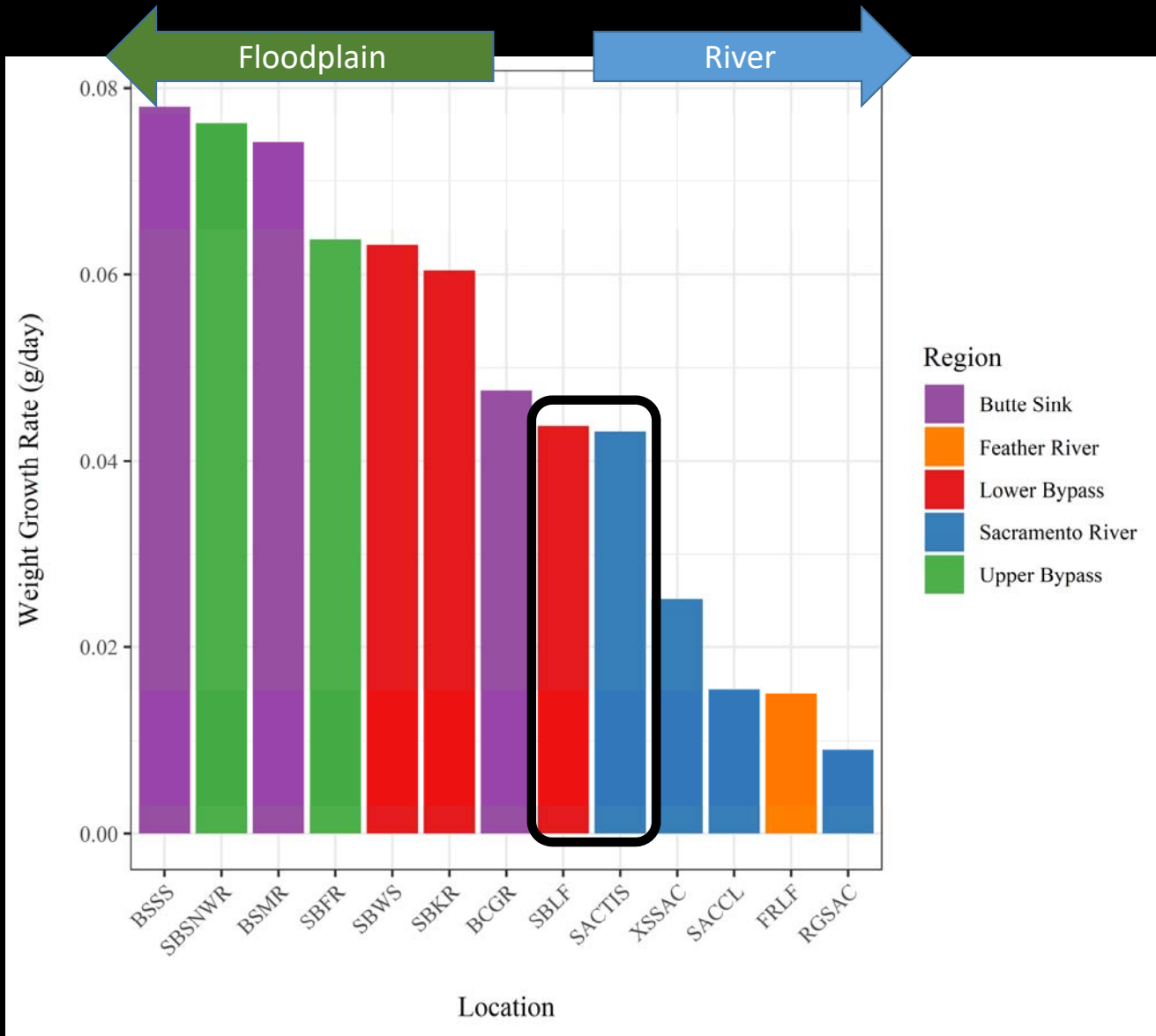
# Variable conditions in the bypass

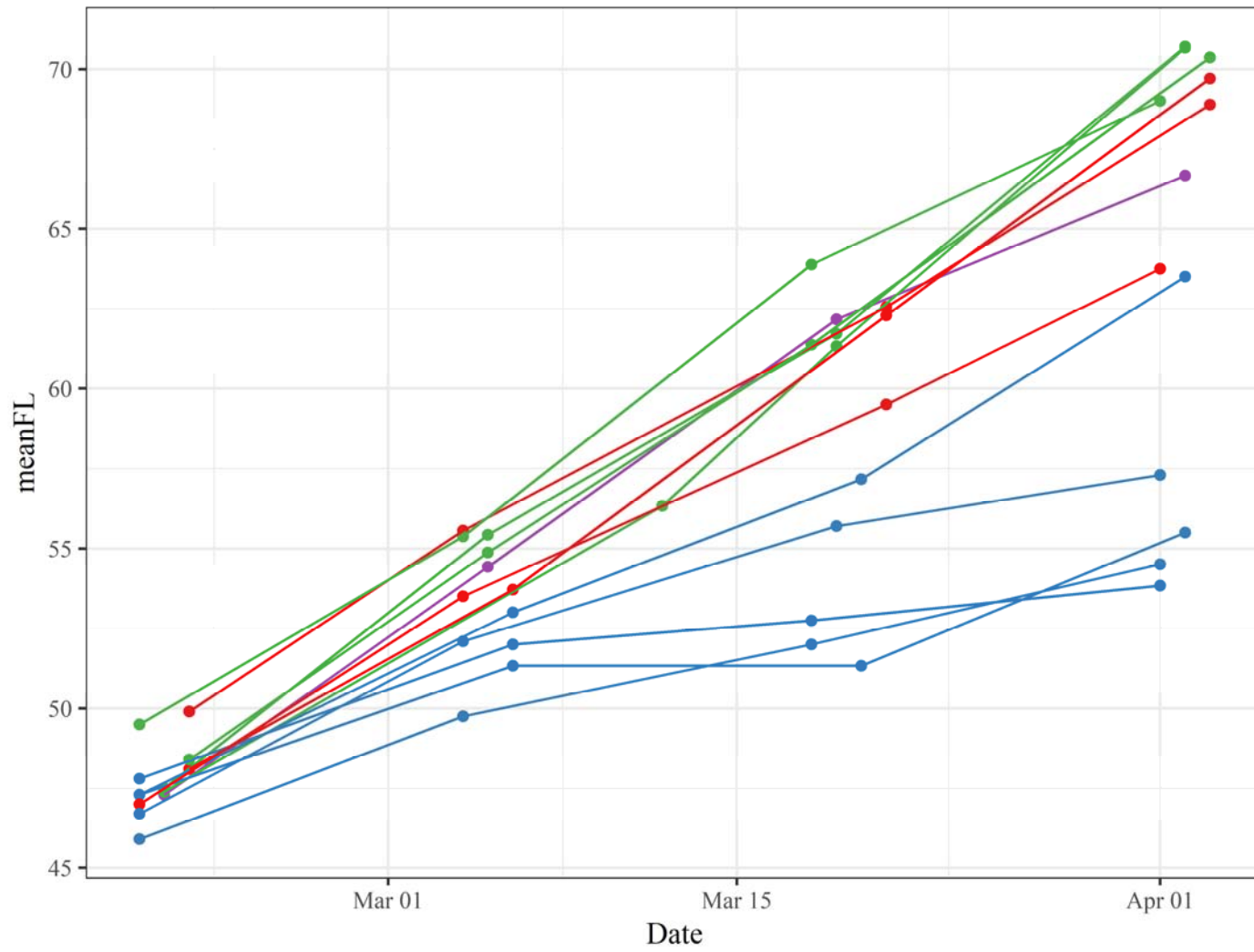
Willow slough cages at high flow (left) and during containment (right)





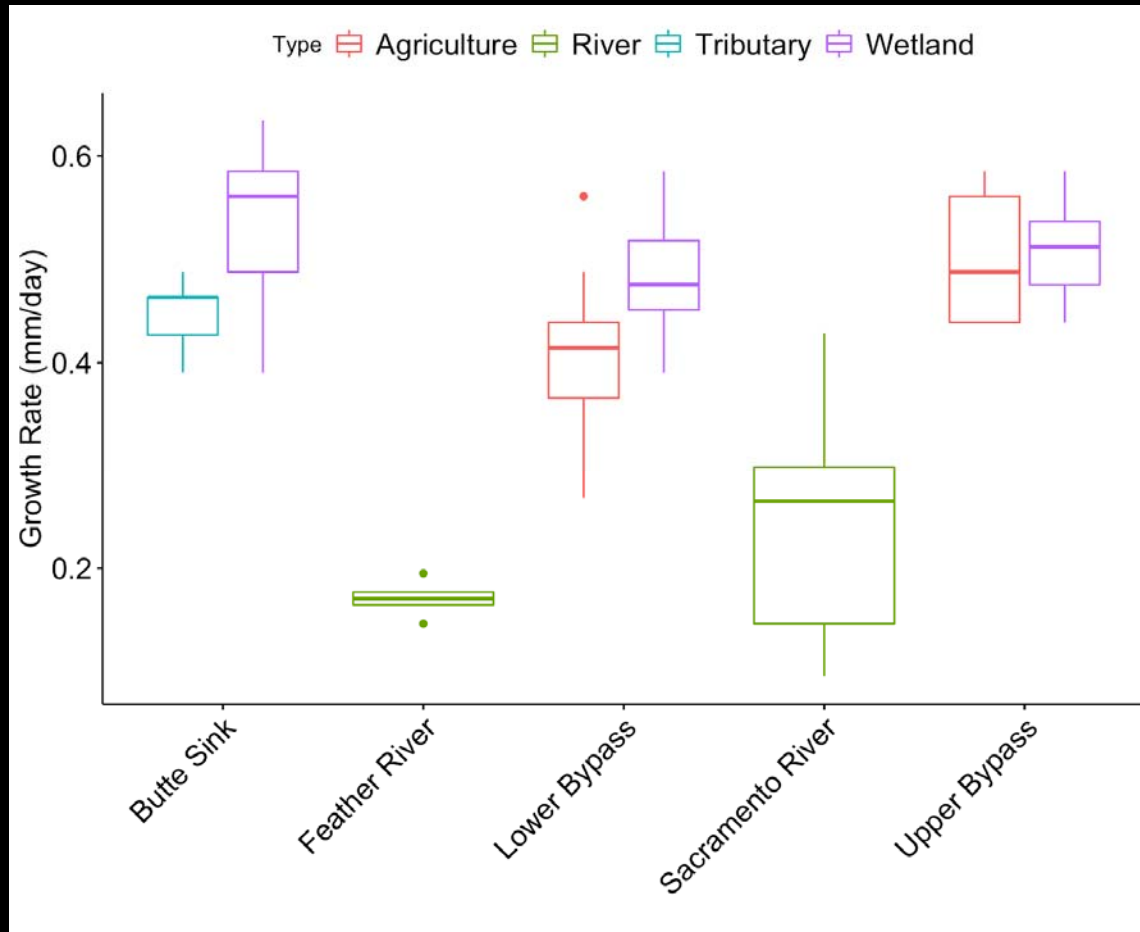






Type — Agriculture — Channel — River — Wetland

# Juvenile salmon growth rate



# Sanborn Slough – Butte Sink Wetland



FL: 47mm

FL: 69mm

Week 1

Week 6

# Sacramento River at River Garden Farms – Main stem



FL: 47mm

FL: 51mm

# Water quality sampling

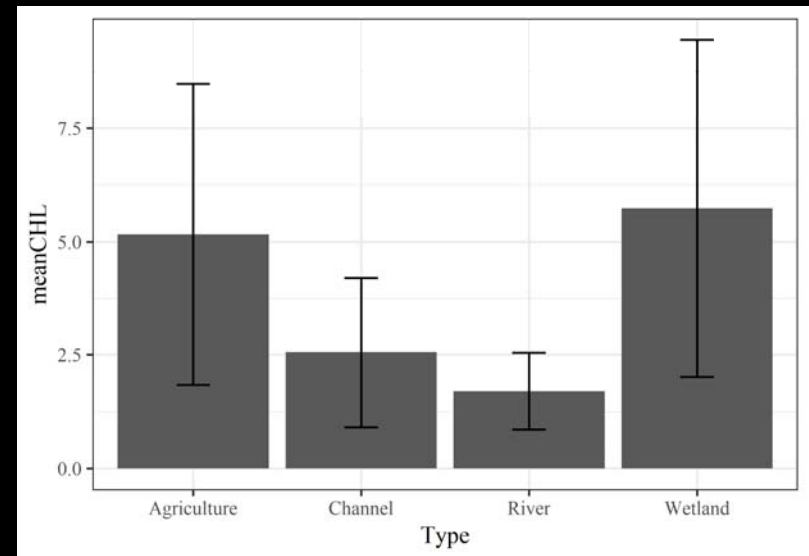
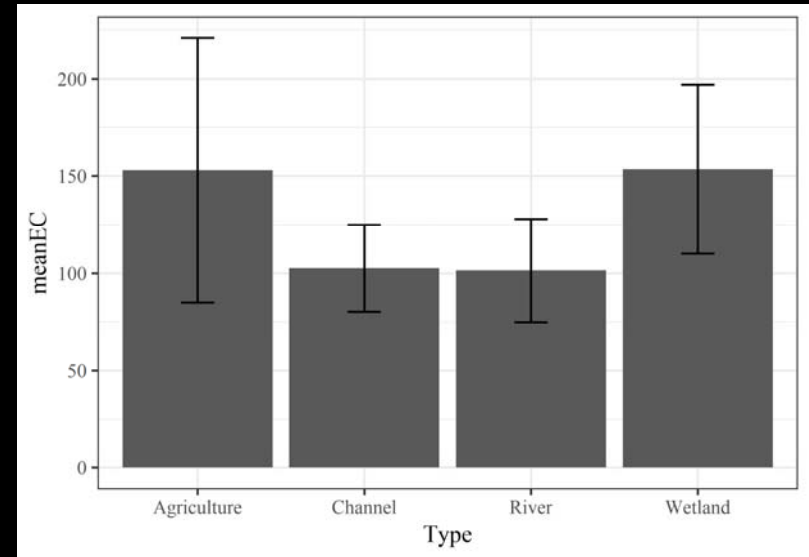
- Sonde point measurements
- Chlorophyll  $\alpha$
- Nutrients
- Continuous DO and Temp



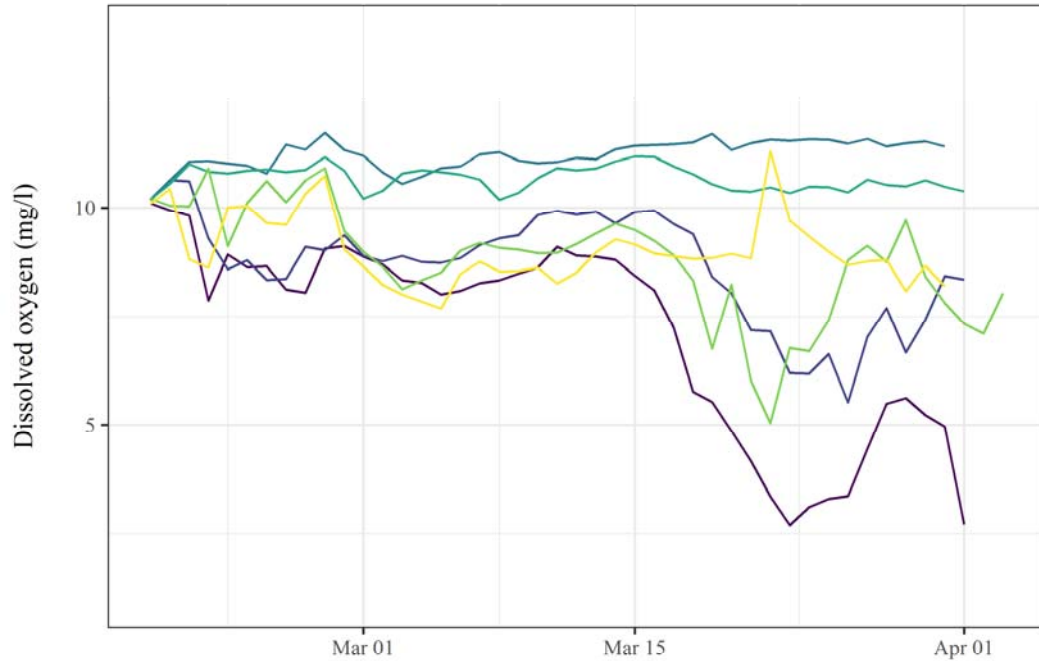


## General Takeaways

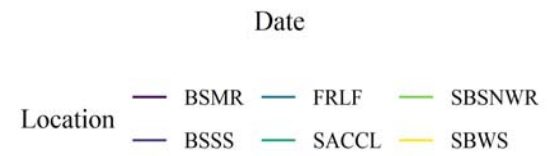
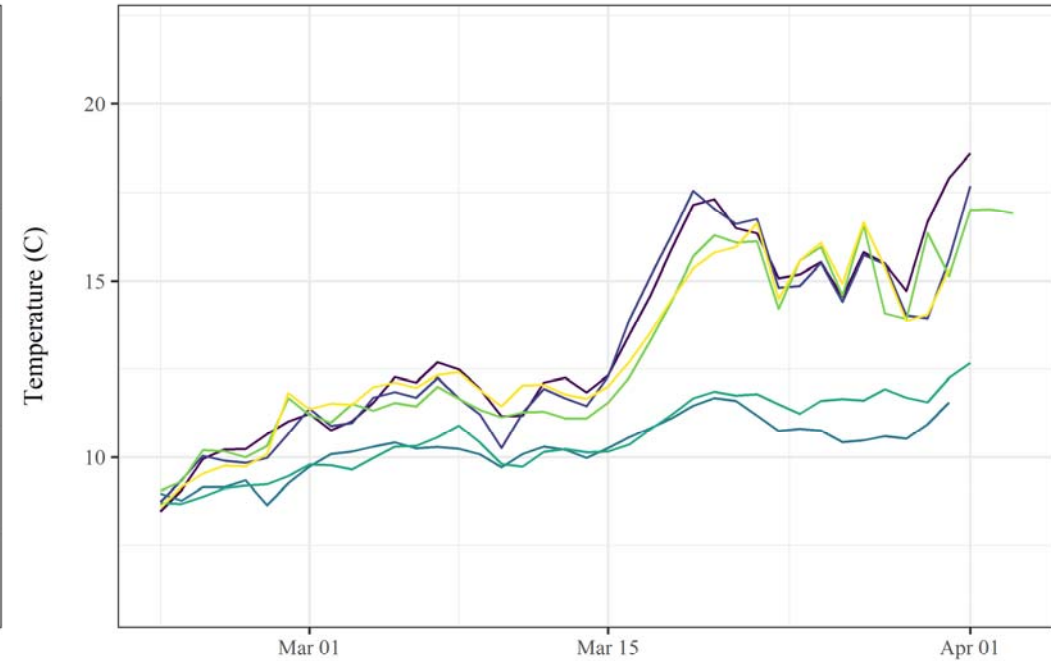
- Higher EC in floodplain
  - Longer residence time
  
- Higher CHL  $\alpha$  in floodplain



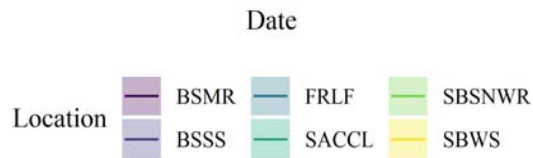
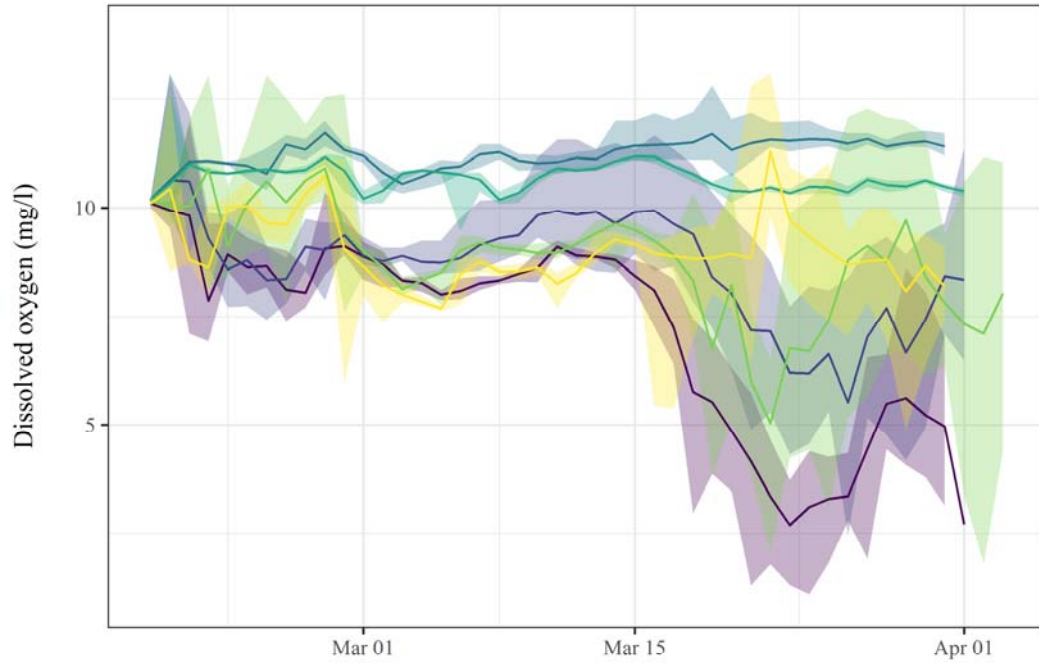
# Dissolved oxygen (mg/l)



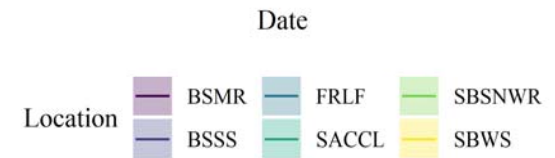
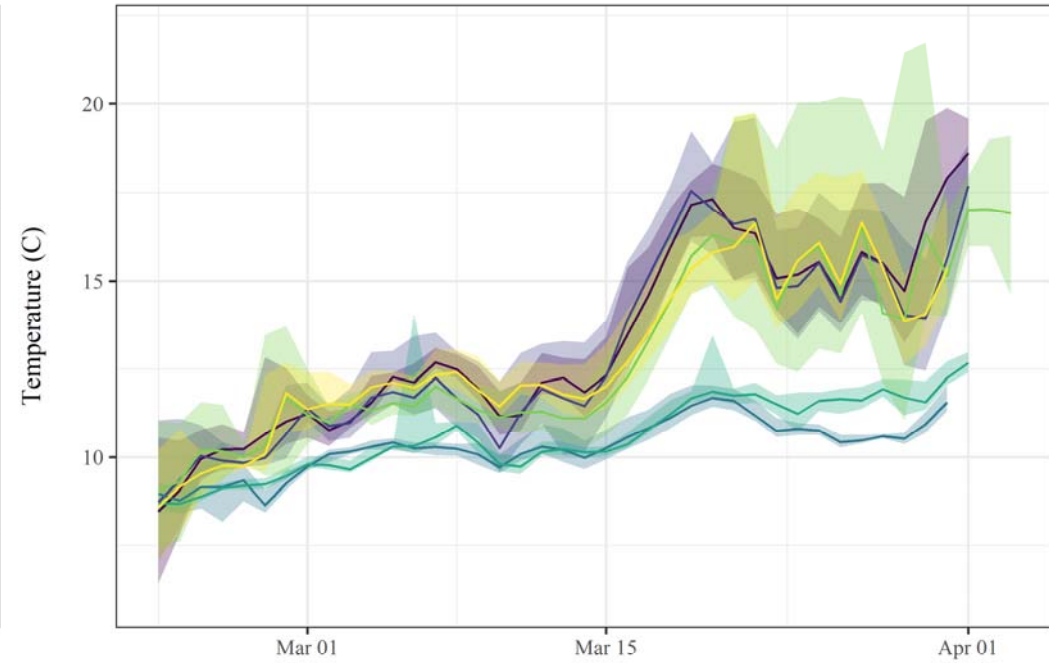
# Water temp (c)



# Dissolved oxygen (mg/l)



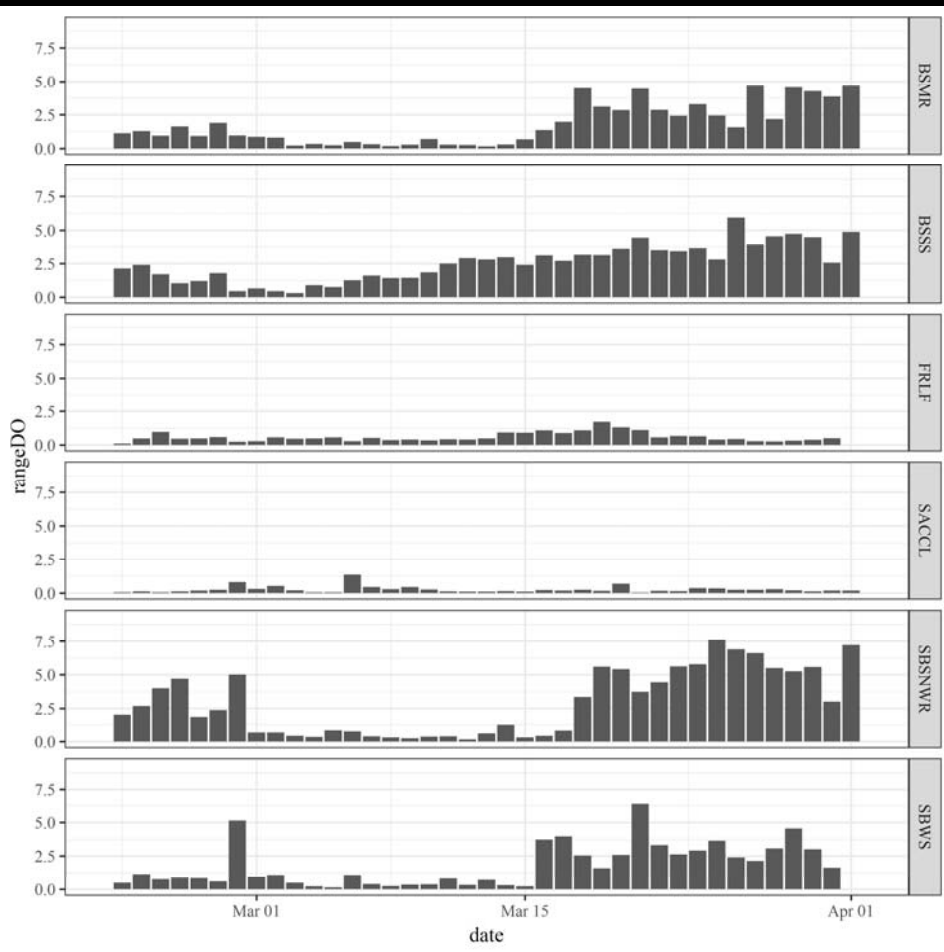
# Water temp (c)



# Daily Range

## Dissolved oxygen (mg/l)

## Water temp (c)



Wetland

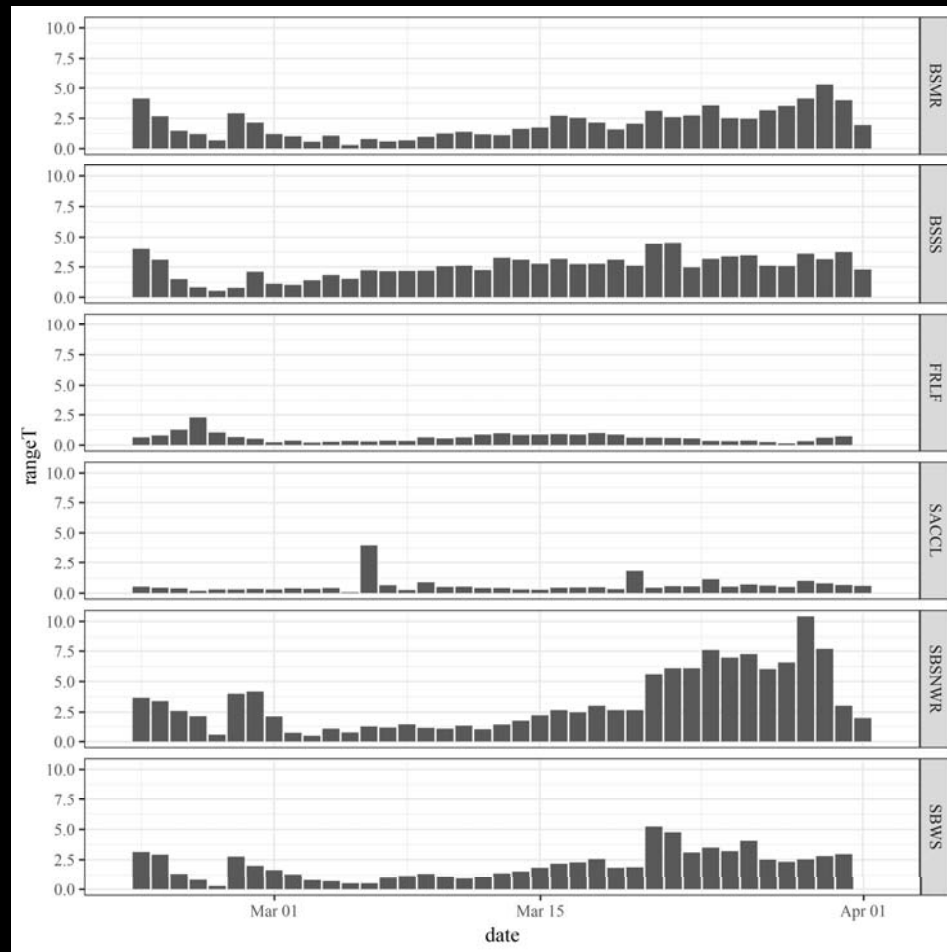
Wetland

River

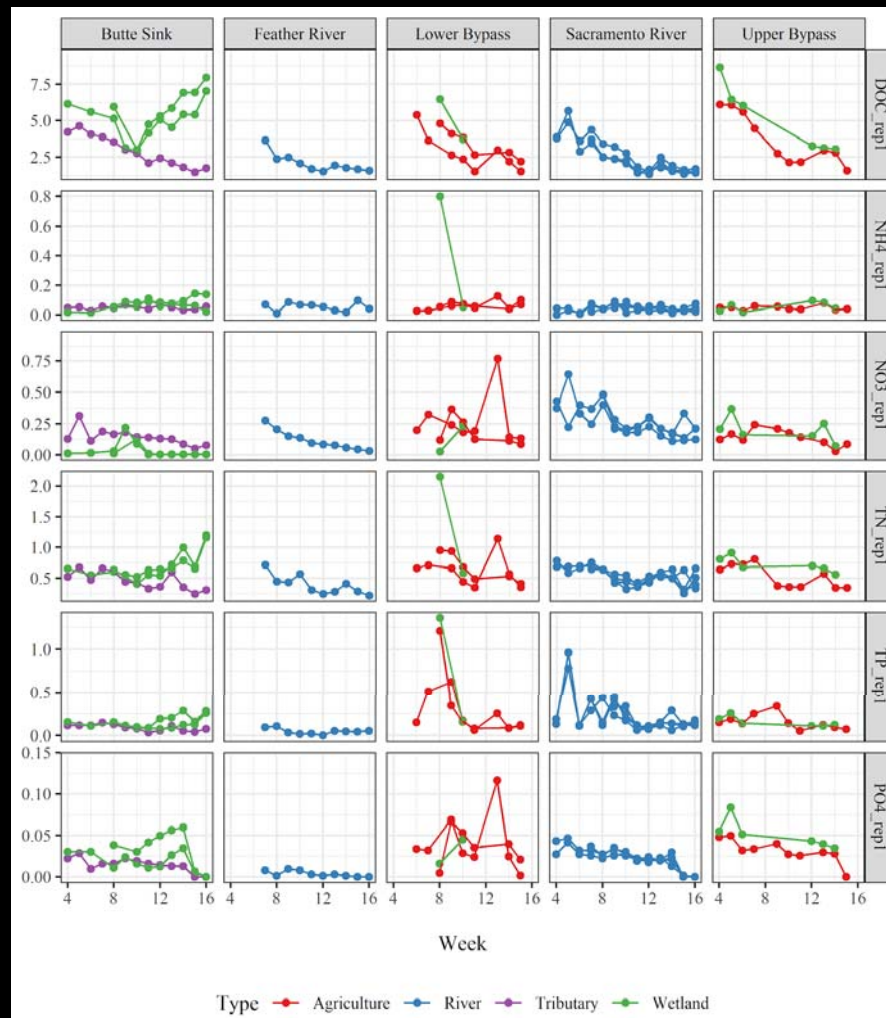
River

Wetland

Wetland



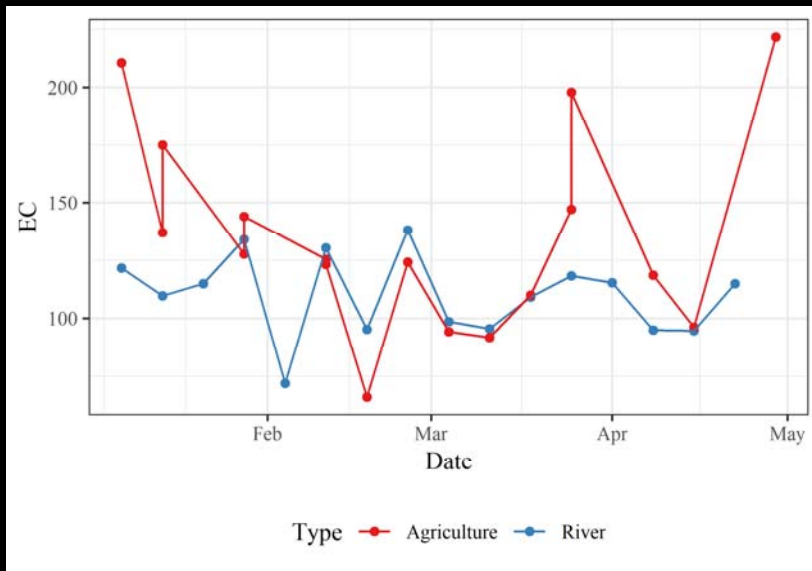
# Water quality





# Distinct banding in the bypass

- Especially apparent below weir inputs (i.e. Tisdale)
- Lower bypass west side very similar water signature to Sacramento River at Tisdale



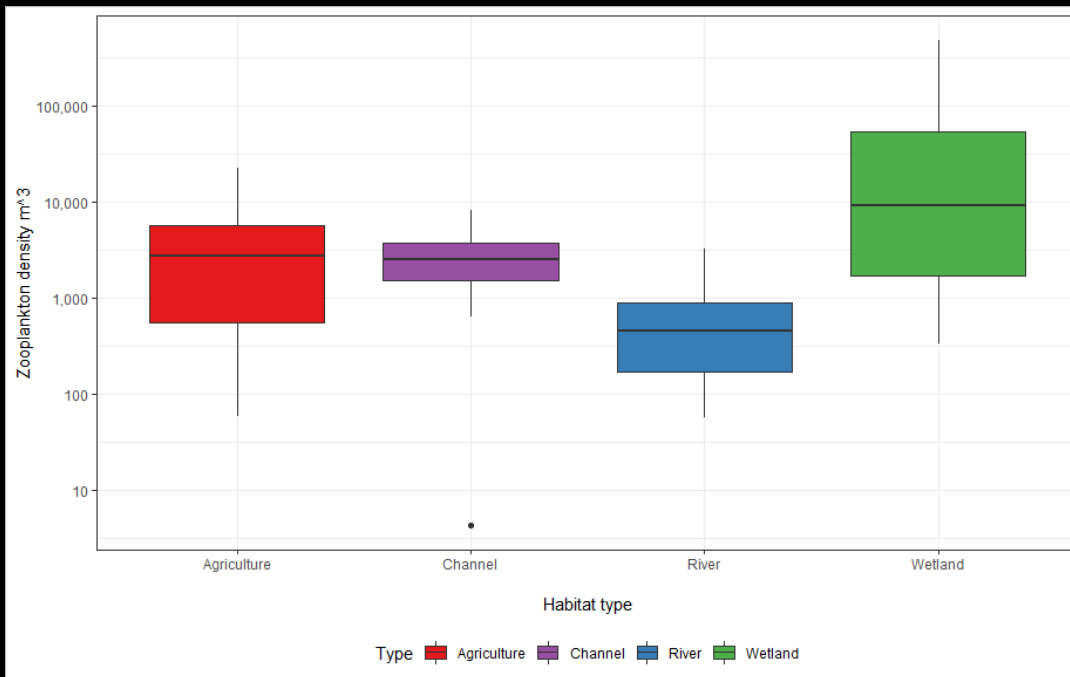
April 13, 2019

# Lower trophic sampling

- Samples collected weekly at all cage locations
- Paired with WQ measurements
- Species identification and enumeration in lab
- Density calculation

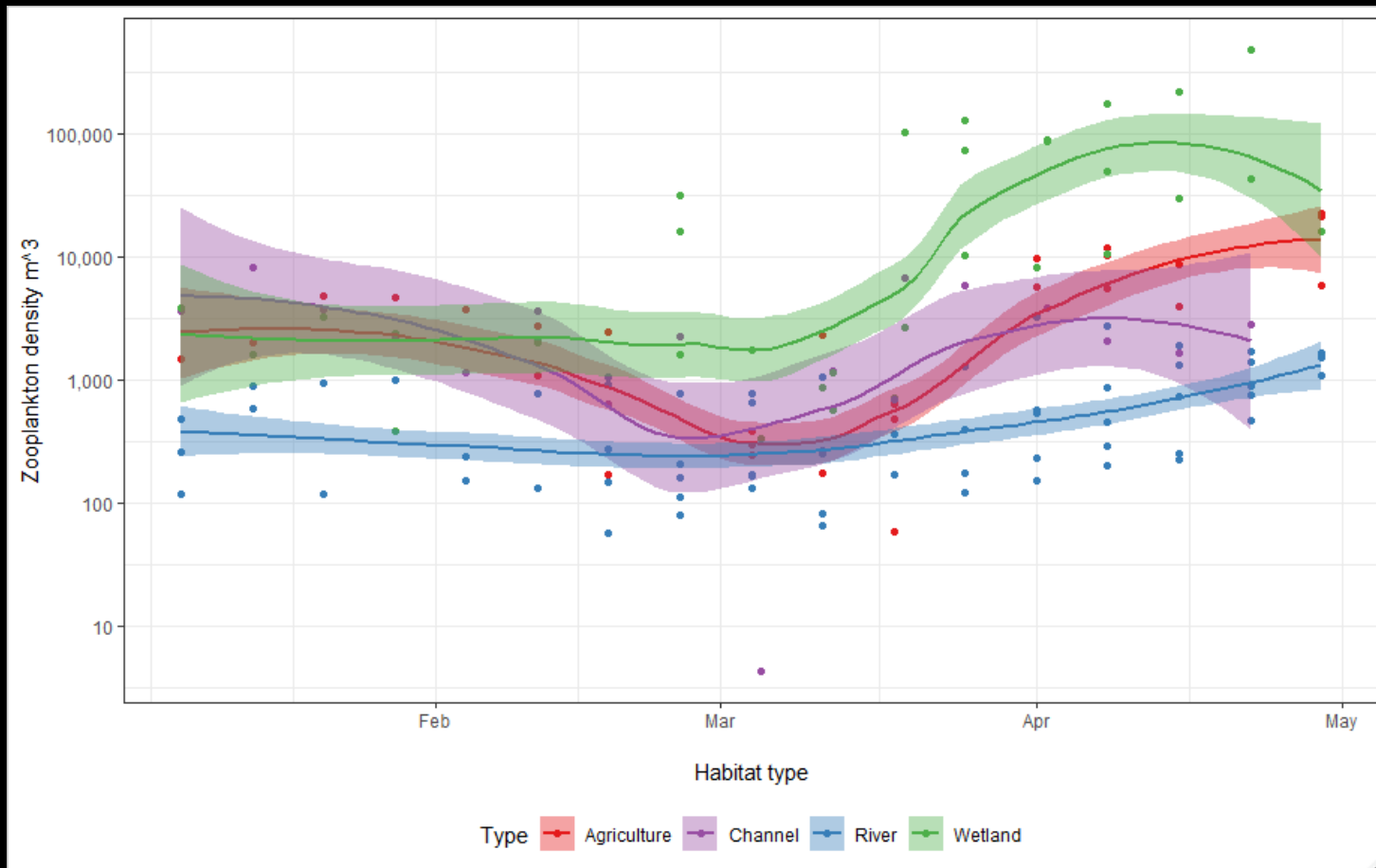


# Zooplankton Abundance



- All 214 zooplankton samples have been processed to date
- Highest densities in the Butte Sink and wetland habitats

# Zooplankton by Habitat Type









# Wild fish sampling

- Methods: seine and fyke nets
- Goals
  - See when and where salmon from different runs are using the bypass
  - Use concurrent cage growth study to estimate habitat quality

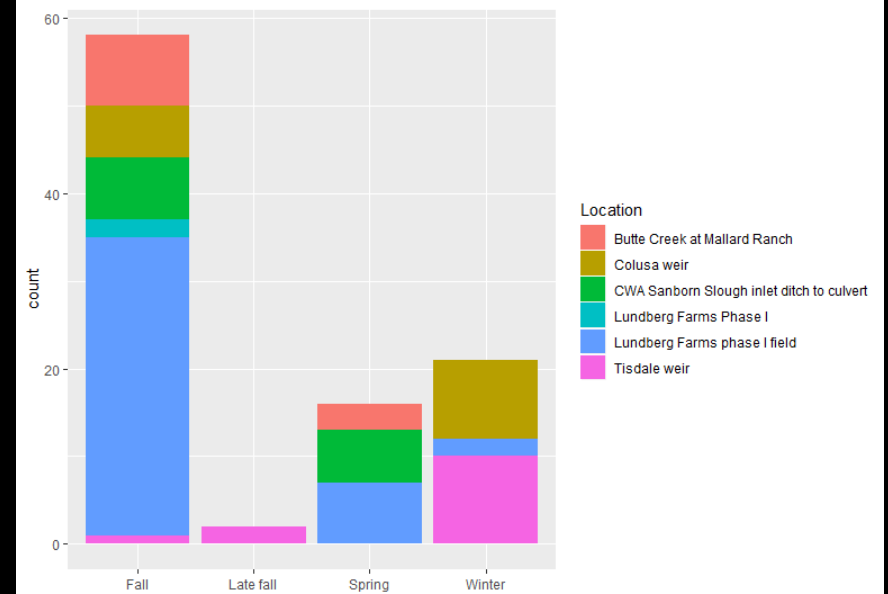
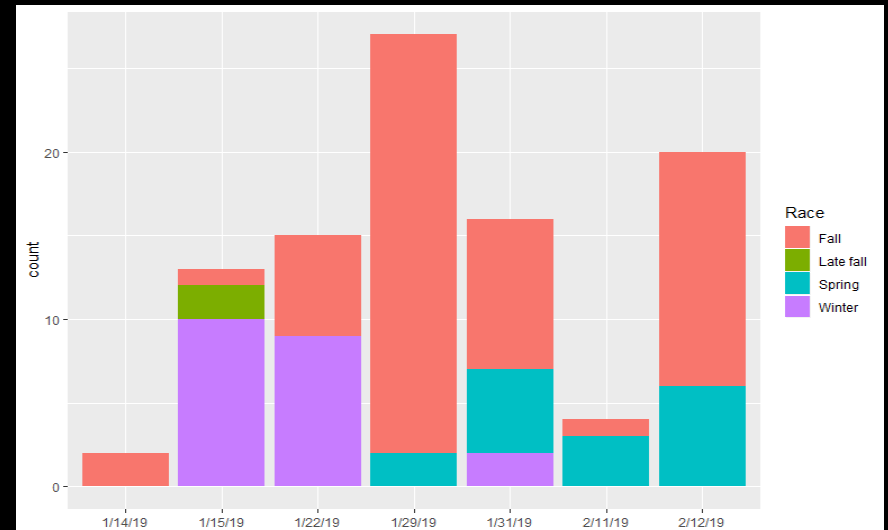
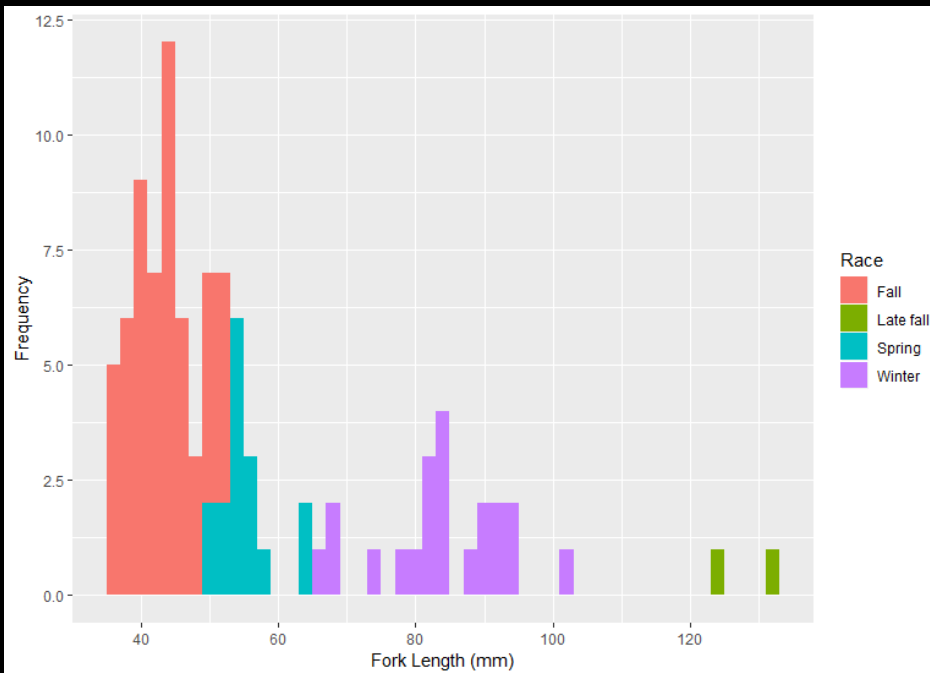


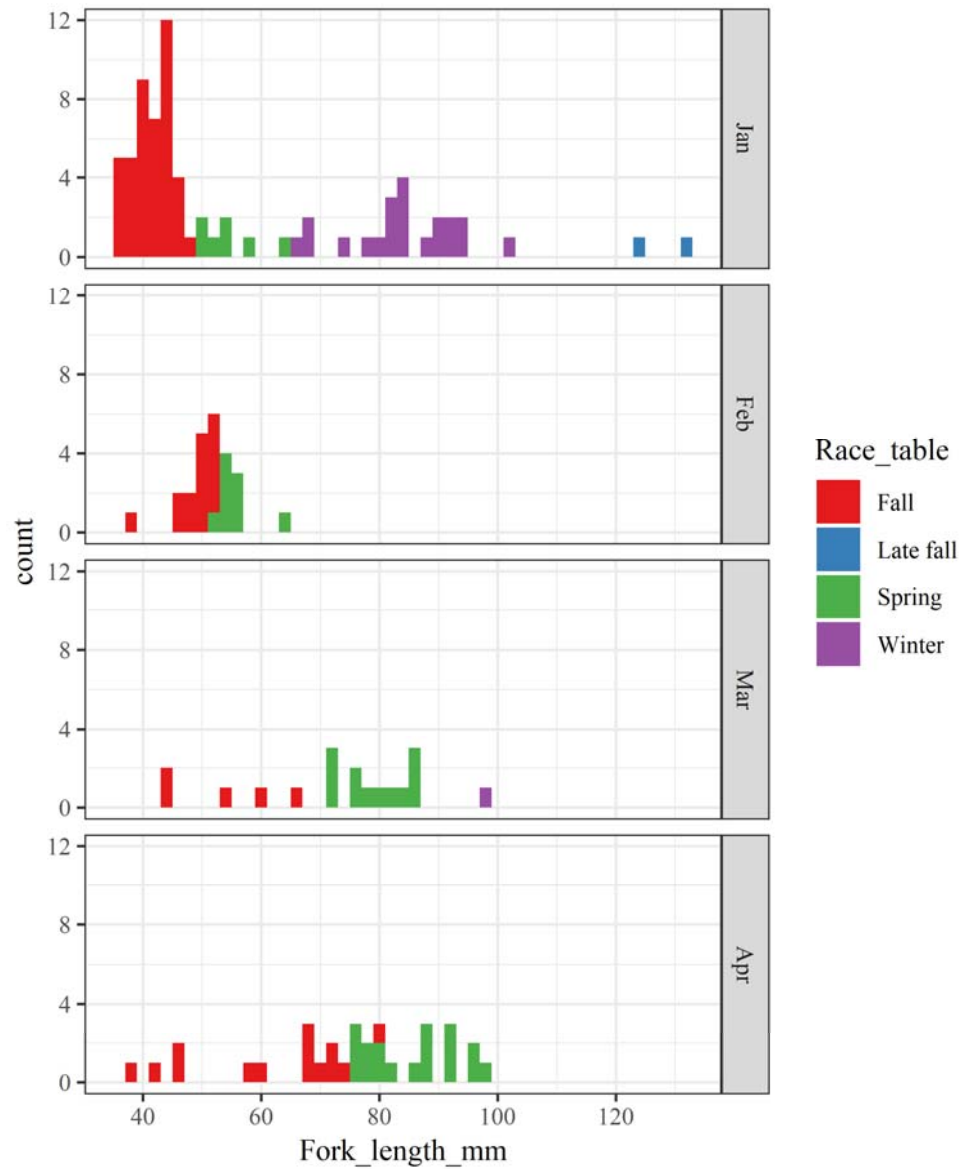
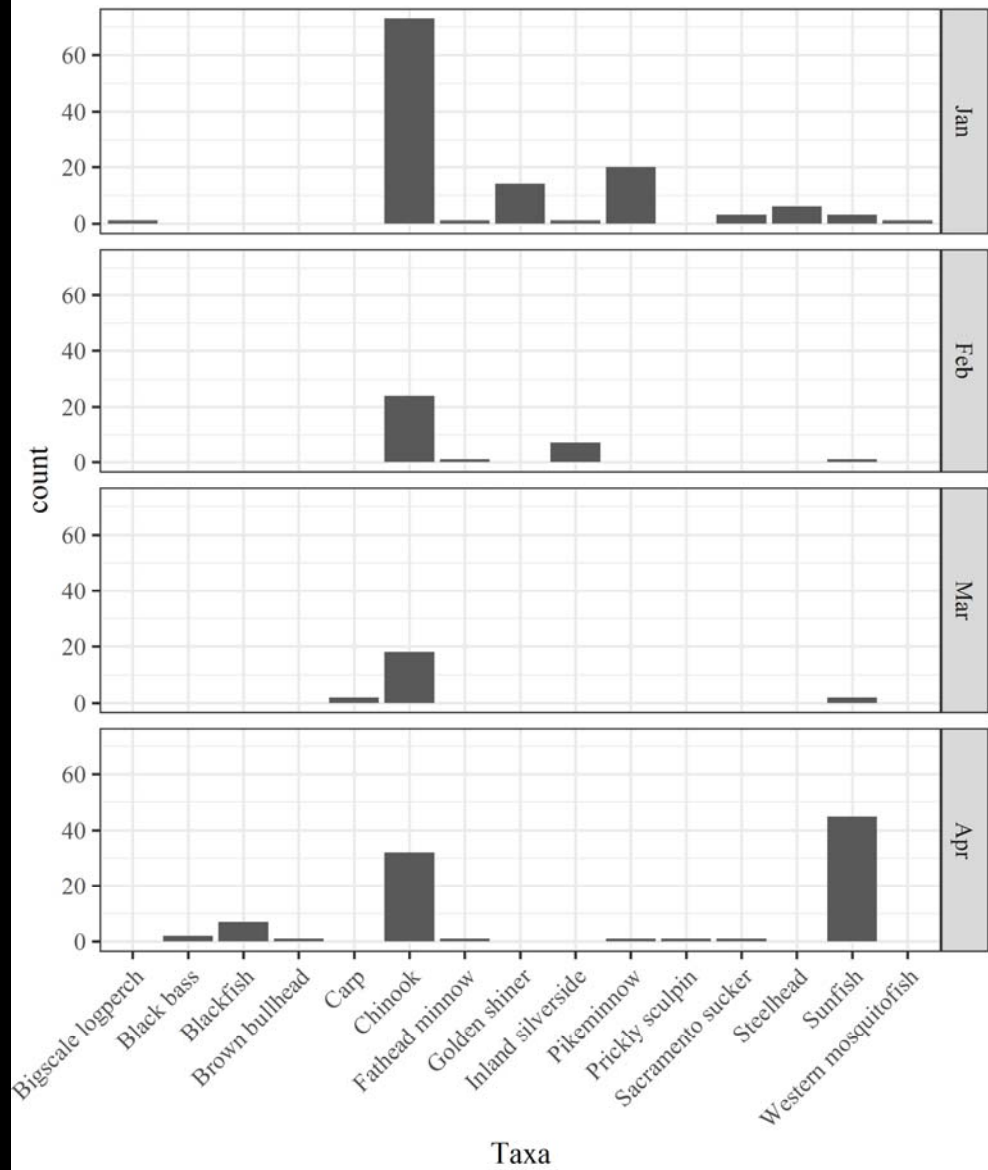
<u>Run</u>	<u>Wild</u>	<u>Ad clipped</u>	<u>Total</u>
Fall	76	2	78
Late fall	0	2	2
Spring	43	3	46
Winter	24	0	24
			150



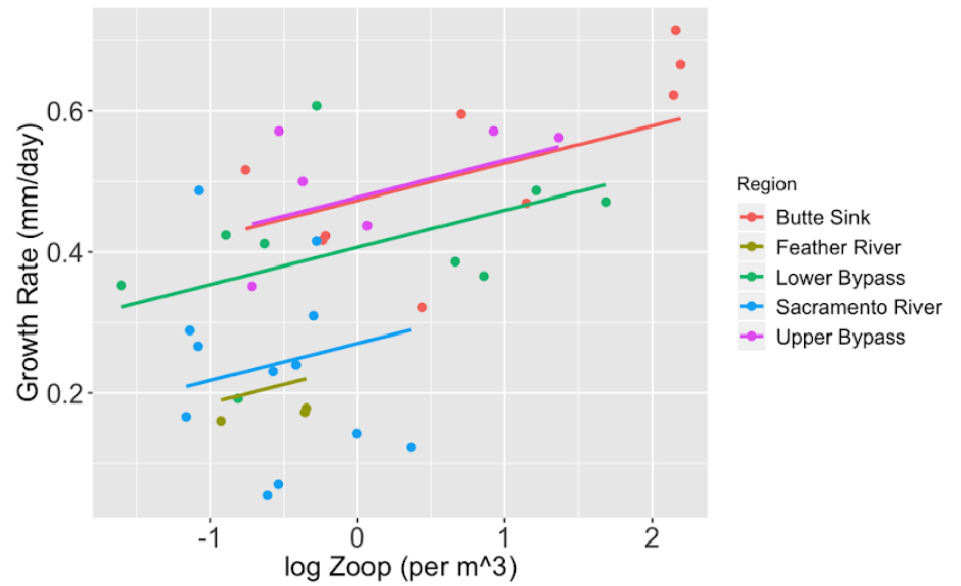
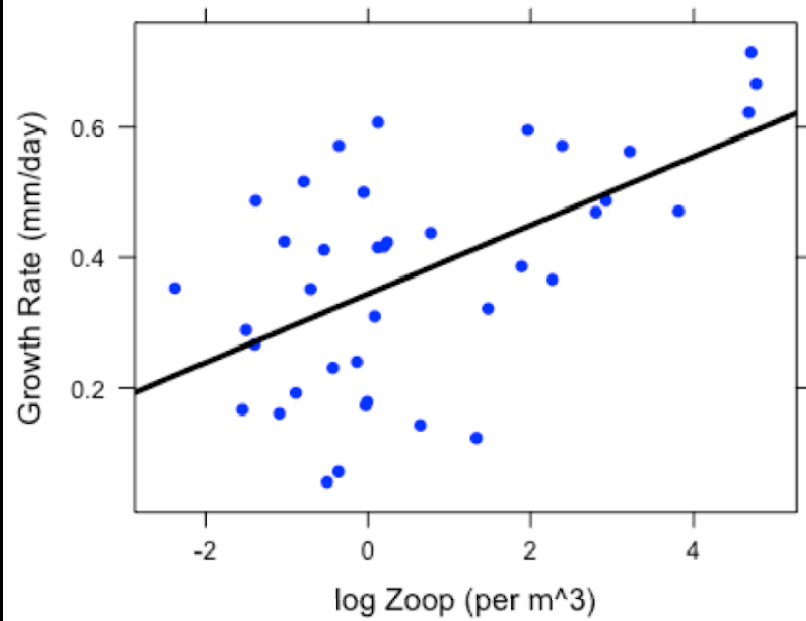
# 2019 Seining Data

Race	Min FL	Max FL	Mean FL	Count
Fall	35	53	44.0	58
Late Fall	124	132	128.0	2
Spring	50	65	55.4	16
Winter	67	102	84.2	21





# Growth rate by zooplankton abundance





# Next steps

- Isoscape samples submitted (loofahs)
- Dissections (Caged and wild caught)
  - Diets
  - Isotopes (otoliths, eye lenses, muscles, organs, fins)
    - MET funded
- Present Central Valley cage salmon experiments at AFS
- Plan for next year's field season
- Periodic updates to shiny app
  - [http://shiny.cws.ucdavis.edu:3838/shiny/ejholmes/Sutter\\_data\\_playground/](http://shiny.cws.ucdavis.edu:3838/shiny/ejholmes/Sutter_data_playground/)