



# Where Do Delta Smelt Spawn in a High Abundance Year?

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## INTRODUCTION

The Delta Smelt (*Hypomesus transpacificus*) is a federal and state ESA-listed fish that is endemic to the San Francisco Estuary. Delta Smelt population abundance has been in decline for decades, yet some aspects of their life history are still a mystery to the scientific community. This study aims to gain an improved understanding of their preferred spawning habitat.

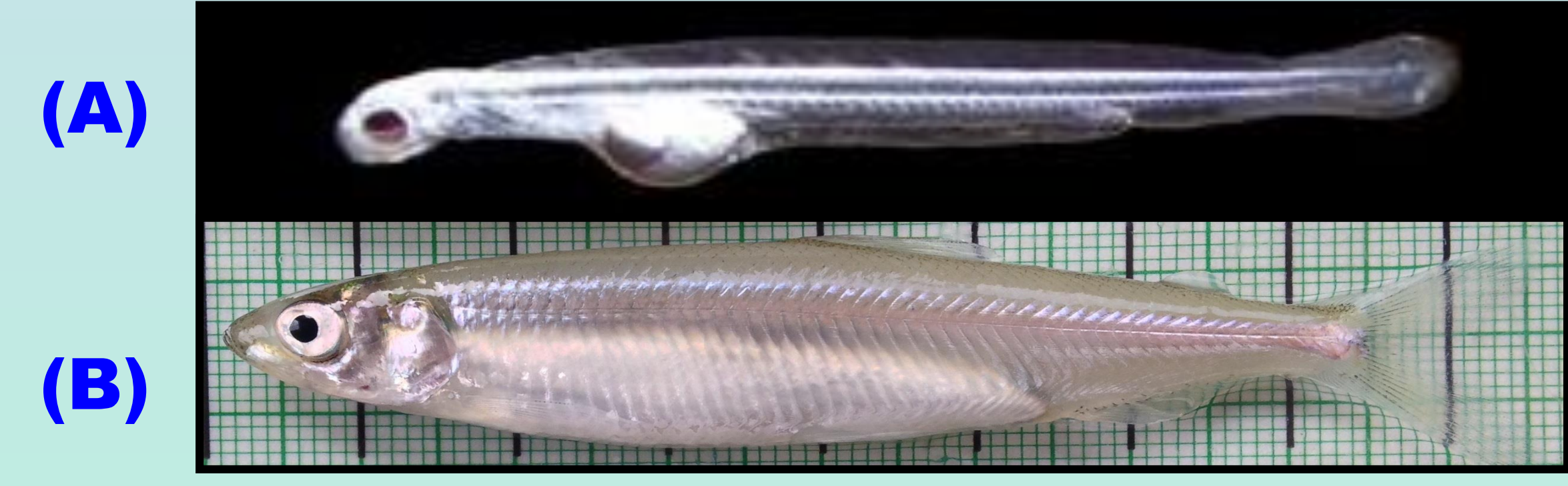


Figure 1. (A) Larval Delta Smelt (5mm)<sup>3</sup>  
(B) Gravid adult female Delta Smelt (79mm)

## METHODS

- Data was used from three CDFW long-term monitoring surveys<sup>1</sup> in January-May 2012 : Smelt Larva Survey, 20-mm Survey, and Spring Kodiak Trawl.
- We defined spawning locations based on where both newly-hatched (5-6 mm FL) and gravid female Delta Smelt were caught (Figure 1).
- We identified other potential spawning locations based on where salinity, temperature, and turbidity fell within the range established by our actual spawning locations.
- We compared the environmental variables of the spawning locations to our potential spawning locations.
- We compared the habitat attributes of areas surrounding each of our spawning locations.

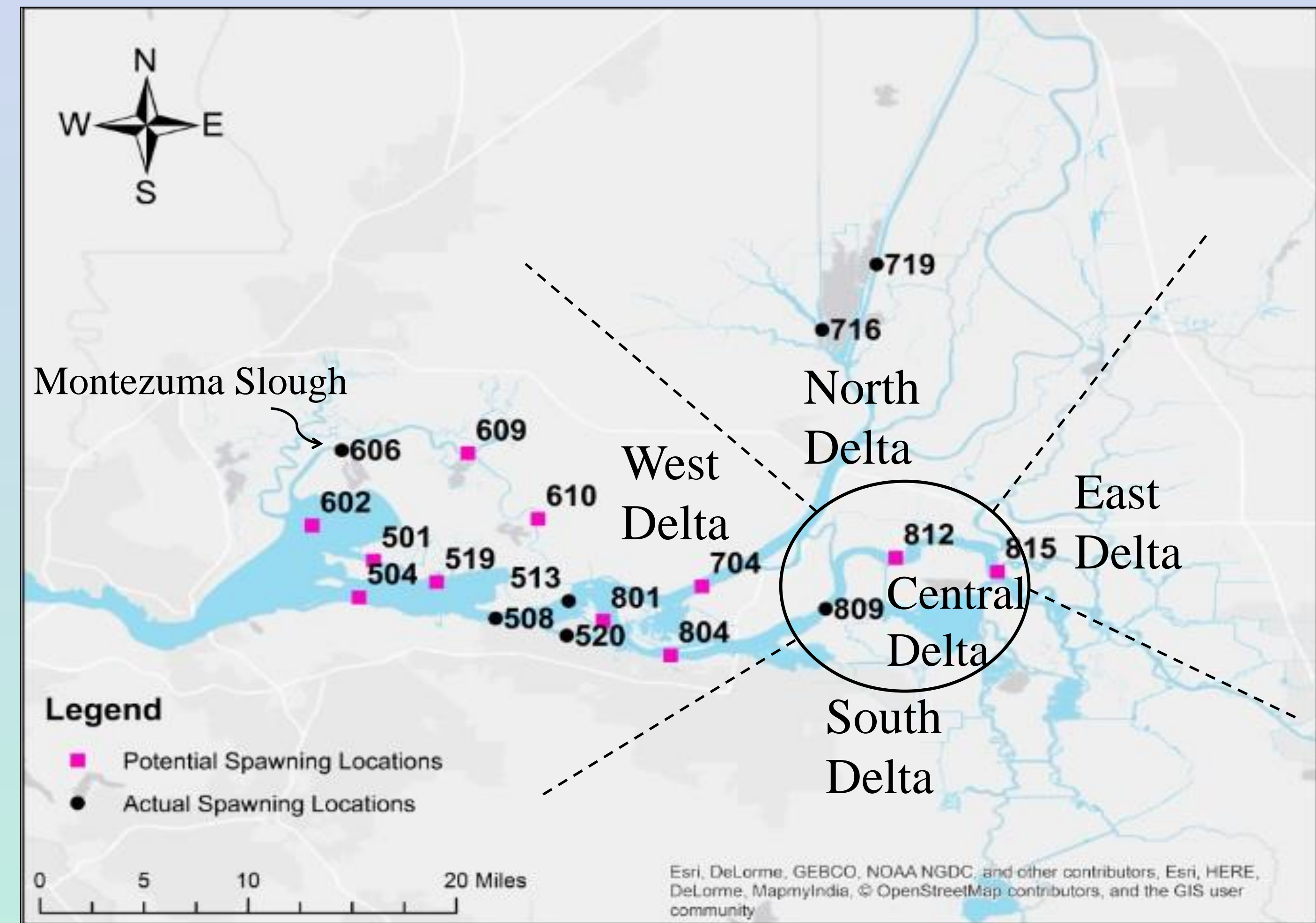


Figure 2. Actual spawning locations are where we found newly hatched larva and ripe females (black dots). Potential spawning locations have environmental variables within the range established by our actual spawning locations (pink squares).

## RESULTS

- We found 7 spawning locations in 4 geographical regions : Montezuma Slough, West Delta, North Delta, and Central Delta (Figure 2, black dots).
- The spawning locations had narrower ranges of salinity, temperature, and turbidity than all other stations sampled during the 2012 spawning window (Figure 3).
- The range of environmental variables at our spawning locations indicate 11 other potential spawning sites, however, sampling at these stations resulted in negligible Delta Smelt catch (Figure 2).
- Subtidal sloughs and marsh habitat were all in close proximity to our spawning locations (Figure 4).

## DISCUSSION AND FUTURE RESEARCH GOALS

- Delta Smelt spawning sites had a narrower range of temperature, turbidity, and salinity than non-spawning sites (Figure 3) , indicating a preference for those ranges.
- Potential spawning sites where Delta Smelt are not detected in either life stage indicate that salinity, temperature and turbidity do not exclusively determine spawning location.
- Spawning locations are near areas of increased residence time<sup>2</sup> and habitat complexity based on their proximity to off-shoot sloughs and subtidal marsh habitat.
- Future studies should examine the effect of habitat complexity, substrate type , and outfall/discharge locations on spawning habitat

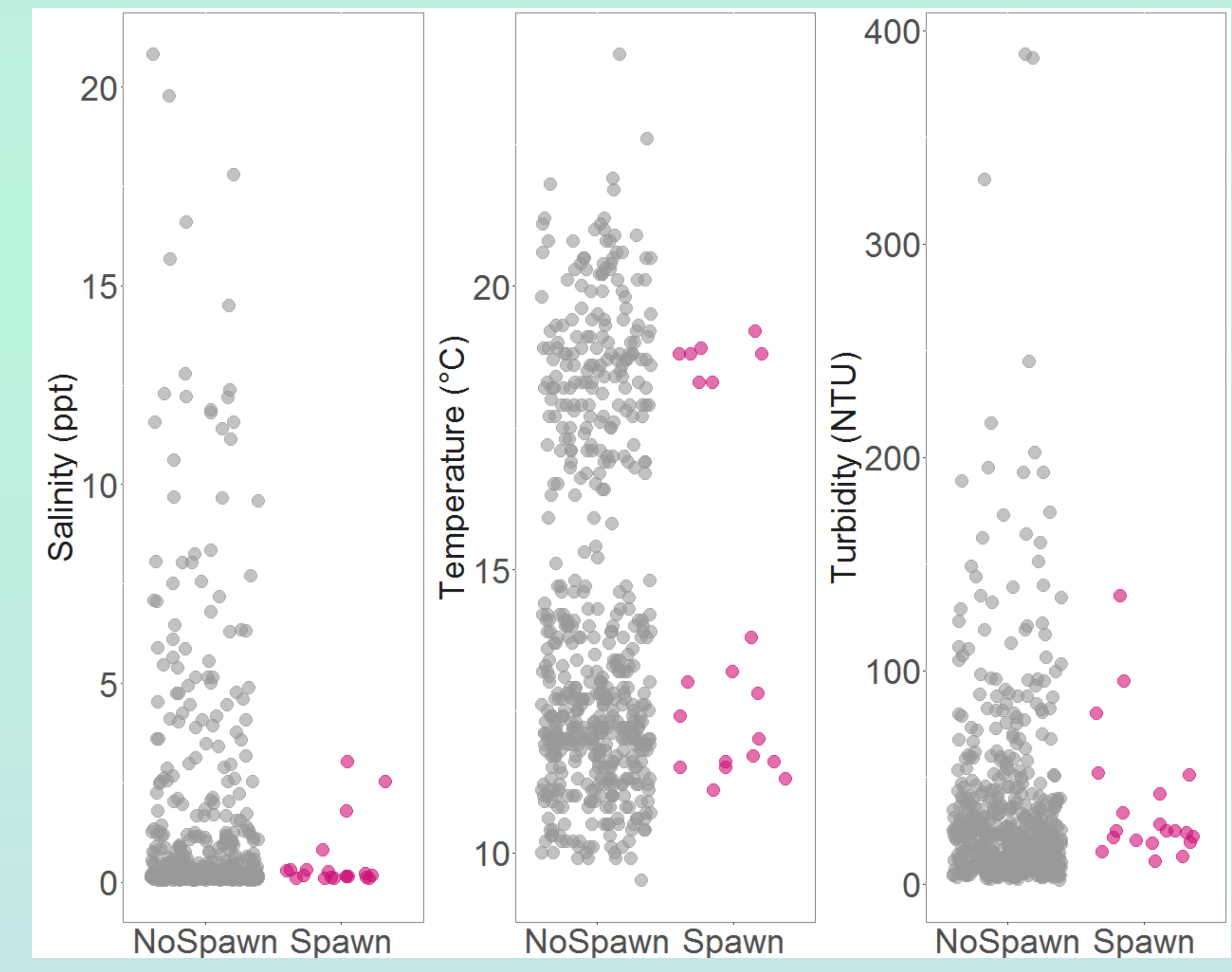


Figure 3. Spawning locations demonstrate a narrower range of temperature, salinity, and turbidity than other parts of the Estuary during spawning months

## ACKNOWLEDGEMENTS

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<sup>1</sup> <https://www.wildlife.ca.gov/Regions/3>  
<sup>2</sup> Sommer, T. Mejia, F. 2013 A Place to Call Home: A Synthesis of Delta Smelt Habitat in the Upper San Francisco Estuary  
<sup>3</sup> Photo credit: US Bureau of Reclamation- René Reyes  
<sup>4</sup> <http://www.sfestuary.org/about-the-estuary/estuary-maps/>

Water  
Land  
Tidal Marsh  
Flooded Island



Figure 4. Actual spawning locations found near subtidal marshes and sloughs. <sup>4</sup>