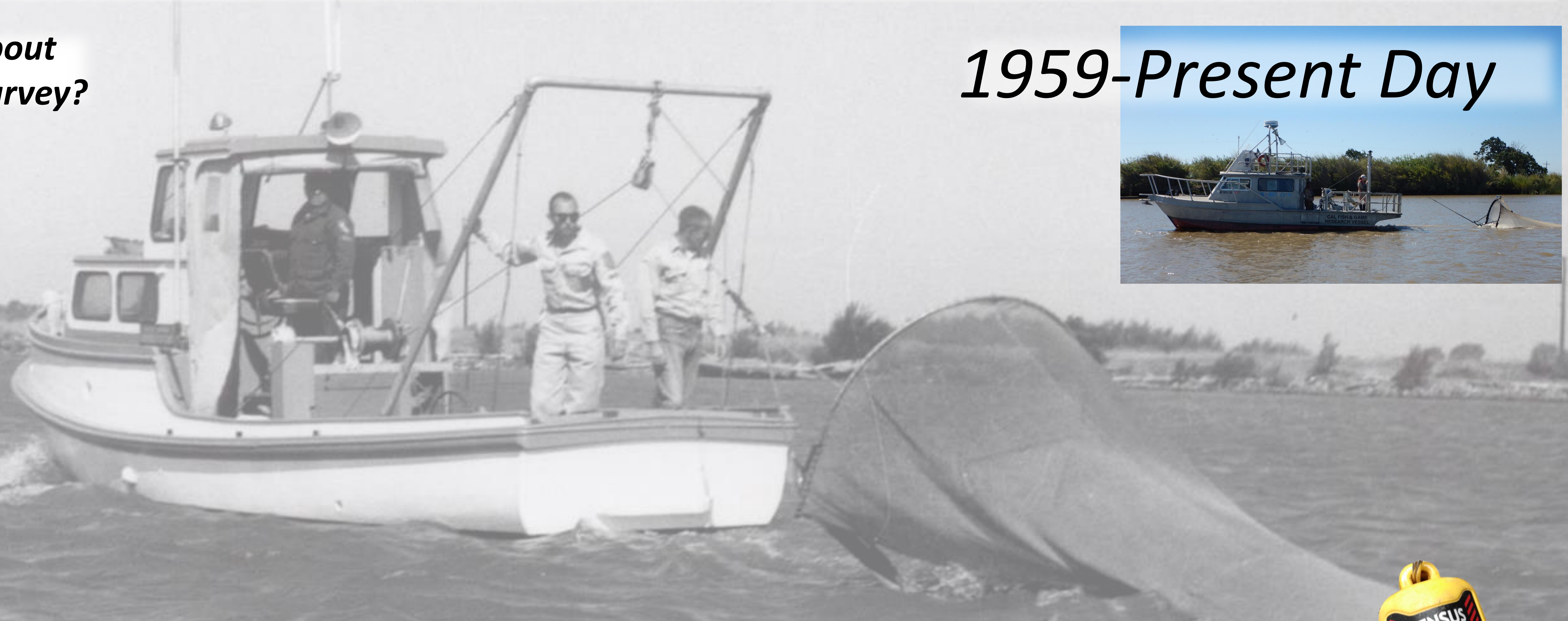
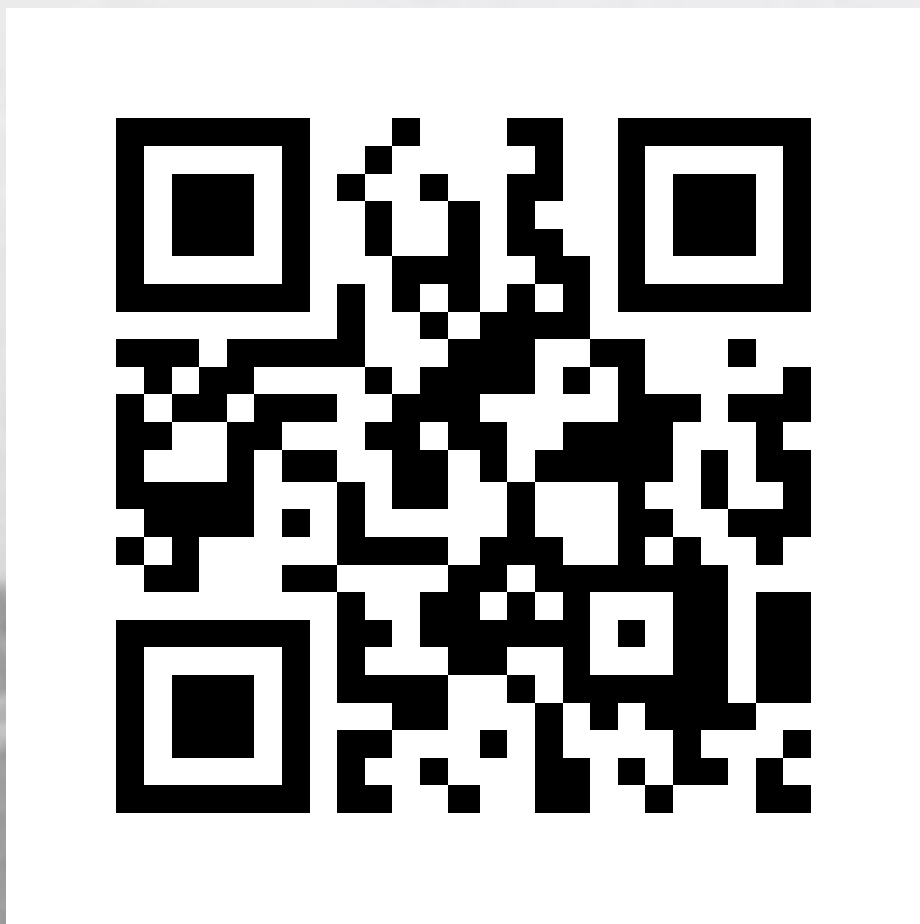


# Diving into Summer Towntnet: Depth Logger and Flowmeter Variability in Towntnet Sampling

Timothy D. Malinich, PhD., California Dept. Fish and Wildlife, IEP Workshop, August, 2020

Long-Term Monitoring programs, such as the Summer Towntnet Survey (STN), are dependent on minimizing variation through consistent standardized sampling protocols. Variation in depth and volume sampled were investigated.

Want to know more about the Summer Towntnet Survey?

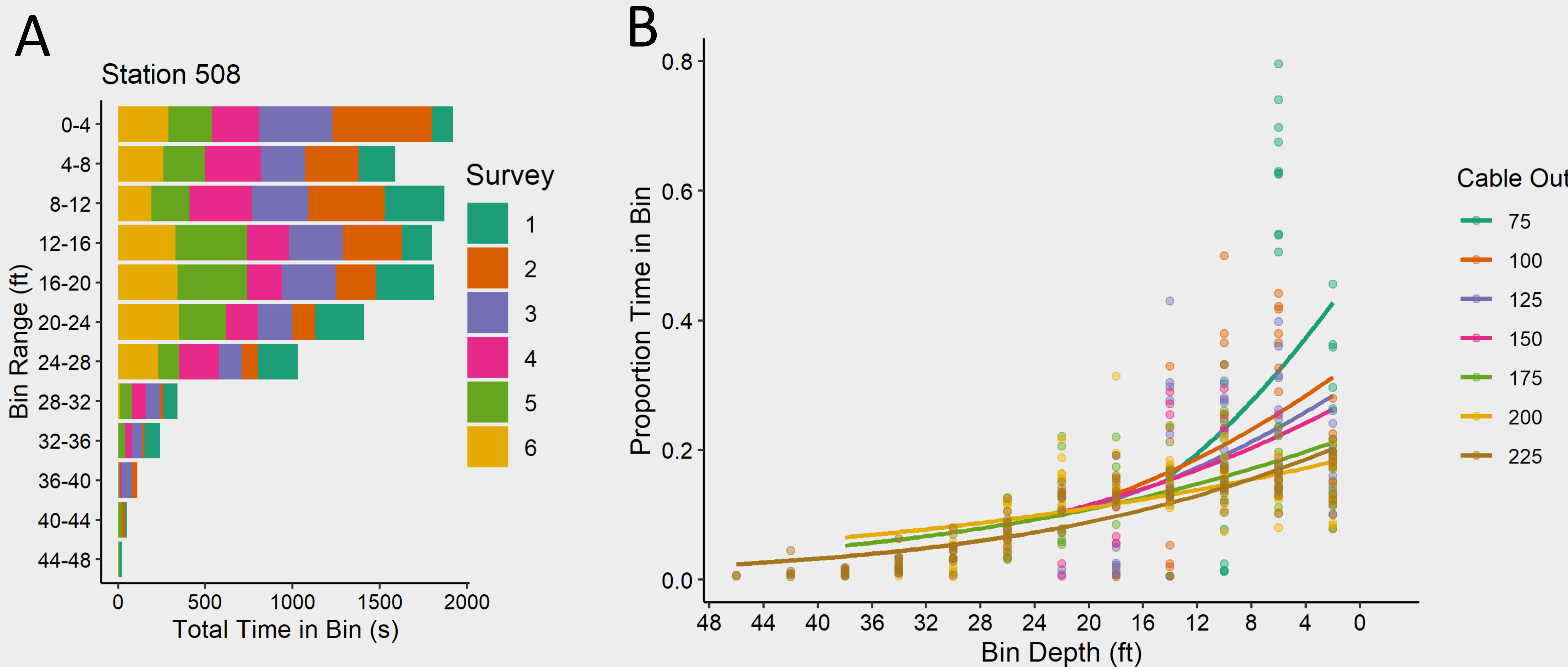


1959-Present Day



## Towing Depth

While most of the water column is sampled by STN, there is **variation** in time spent at different depths (see Figures A & B below). Differences in **Vessels** and **Wave Strength** can contribute to **significant** differences in time spent at different depths.



### Depth

- Depth Logger (Reefnet Sensus Ultra) records depth every 10 seconds

### Analysis (2019)

- Towing Depth data (N=210) from all 40 STN stations and 6 survey weeks.
- Depth data is sorted into 12 four-foot bins
- Generalized Linear Model
  - Vessels ( $p > 0.05$ )
  - Depth Bin ( $p < 0.01$ )
  - Cable Out ( $p > 0.05$ )



### Towing Volume

- Measured by Flowmeter (General Oceanics)
- Measures water flow through the Towntnet using an impeller attached to a counter

### Analysis (2019)

- General Linear Model & Variance Partitioning
- Flowmeter data (N=234) presented covers only 39 STN stations across 6 surveys.
  - Cable length ( $p < 0.01$ )
  - Vessels ( $p < 0.01$ )
  - Wave Condition ( $p = 0.02$ )
  - Flowmeter ID ( $p = 0.96$ )

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## Towing Volume

Variation in Towing Volume is largely unknown with **50% variation (var) unexplained**. However **Vessels (32% var)**, **Wave Strength (0.3% var)**, **Flowmeter ID (3% var)**, and **Amount of Cable (15% var)** produce **significant differences ( $p < 0.05$ )** in towing volume (See Figure C, Right).

