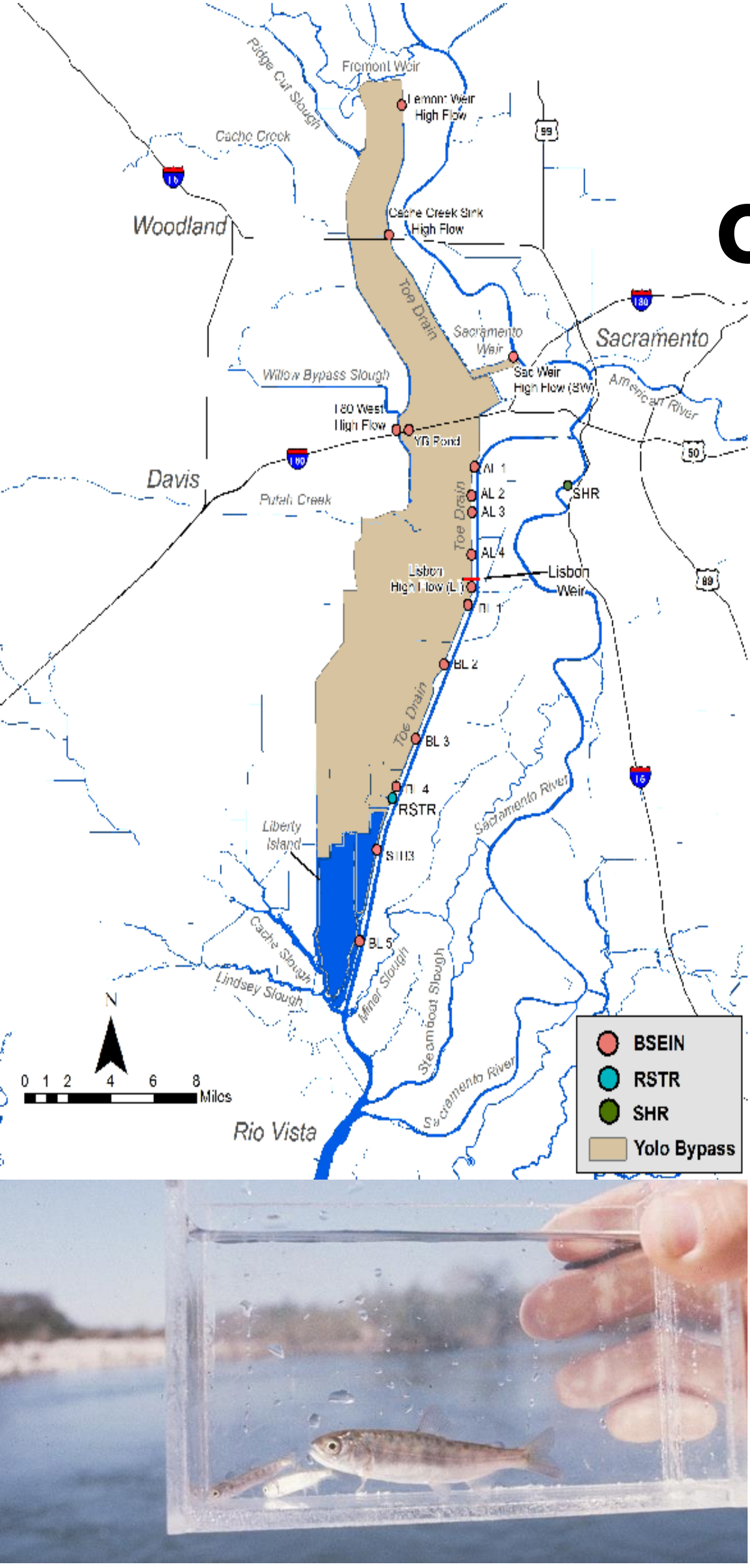


# Juvenile Chinook size variation in the Yolo Bypass: our current understanding and implications from over a decade of change

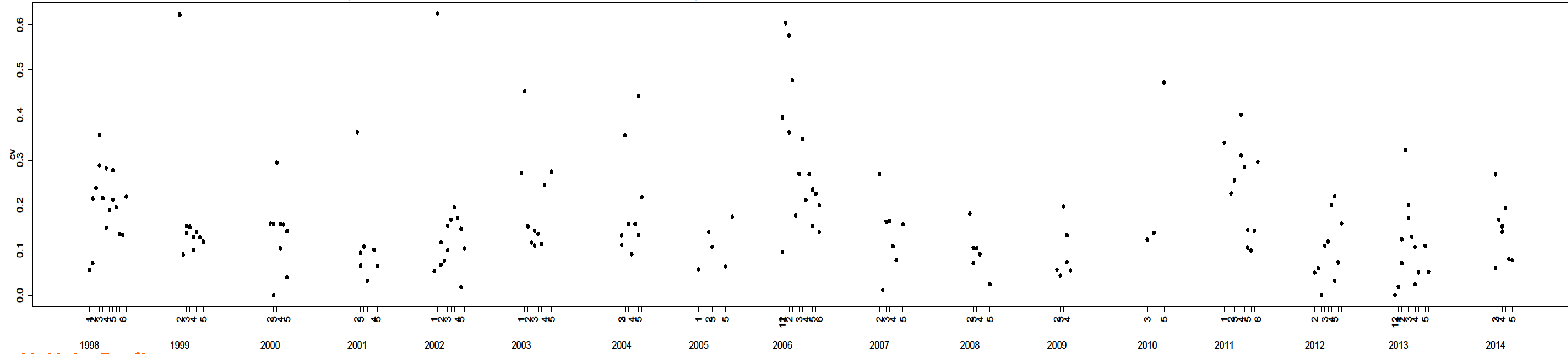
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A central goal in salmon conservation is understanding how populations respond to altered environments; an issue that has become increasingly important as we are confronted with potentially irreversible and cascading effects of climate change. In salmon, population diversity has emerged as an important mechanism for resilience in changing environments (Hilborn 2003, Schindler 2010). However little is known about how to manage exploited species in ways that promote the necessary population diversity for resilience to effectively guard against the impacts of rapid environmental change. Size variation and timing by life stage is one way to measure diversity in salmon. We have gathered data from several long-term monitoring programs (DWR, CDFW, USFWS), and hope to describe ways a managed resource, like the Yolo Bypass, could foster diversity in size and timing for juvenile Chinook salmon.



- Q1:** Is size variation in the Yolo Bypass affected by conditions within the Yolo Bypass?
- Q2:** Is size variation in the Yolo Bypass a reflection of size variation in the Sacramento River and North Delta?
- Q3:** Is size variation in the Yolo Bypass simply a matter of timing?
- Q4:** Is size variation in the Yolo Bypass controlled by sampling method and frequency?

## H<sub>1</sub> Coefficient of Variation (CV) in juvenile Chinook size in the Yolo Bypass over time (1998 to 2014, December to June)



- H<sub>2</sub> Yolo Outflow**
- H<sub>3</sub> Yolo Temperature**
- H<sub>4</sub> Yolo Turbidity**

**Next steps:** We are now investigating statistical approaches that will combine our many possible covariates (and their varying time scales) into a single analysis to test what influences size variation in juvenile Chinook in the Yolo Bypass.

- H<sub>5</sub> Sacramento River Hatchery Releases**
- H<sub>6</sub> Central Valley Chinook Salmon Escapement**
- H<sub>7</sub> CV in size from the Sacramento Trawl**

We are considering GLM, GLS and GLMM, can you think of anything else? Please write on this poster with any ideas.

