

ISB - Fish and Flows Workshop

12/9/2015

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Talk Outline

What are the ongoing issues?

(1) Habitat in the delta is terrible.

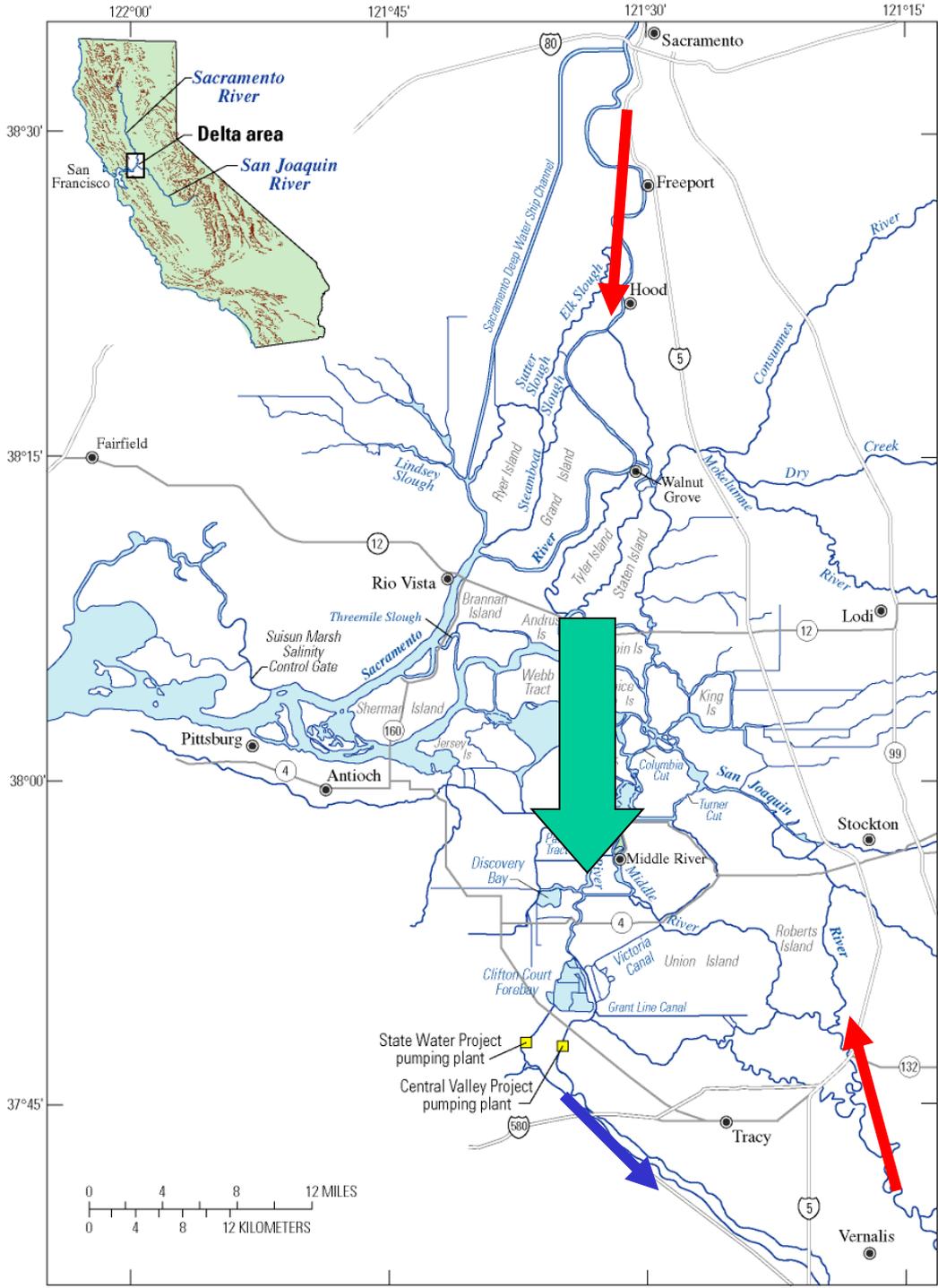
(2) Time and space scale mismatch between physical sampling, biological sampling, and regulatory metrics

(3) Tidal timescale aliasing of biological data

(4) Possible Monitoring Solutions

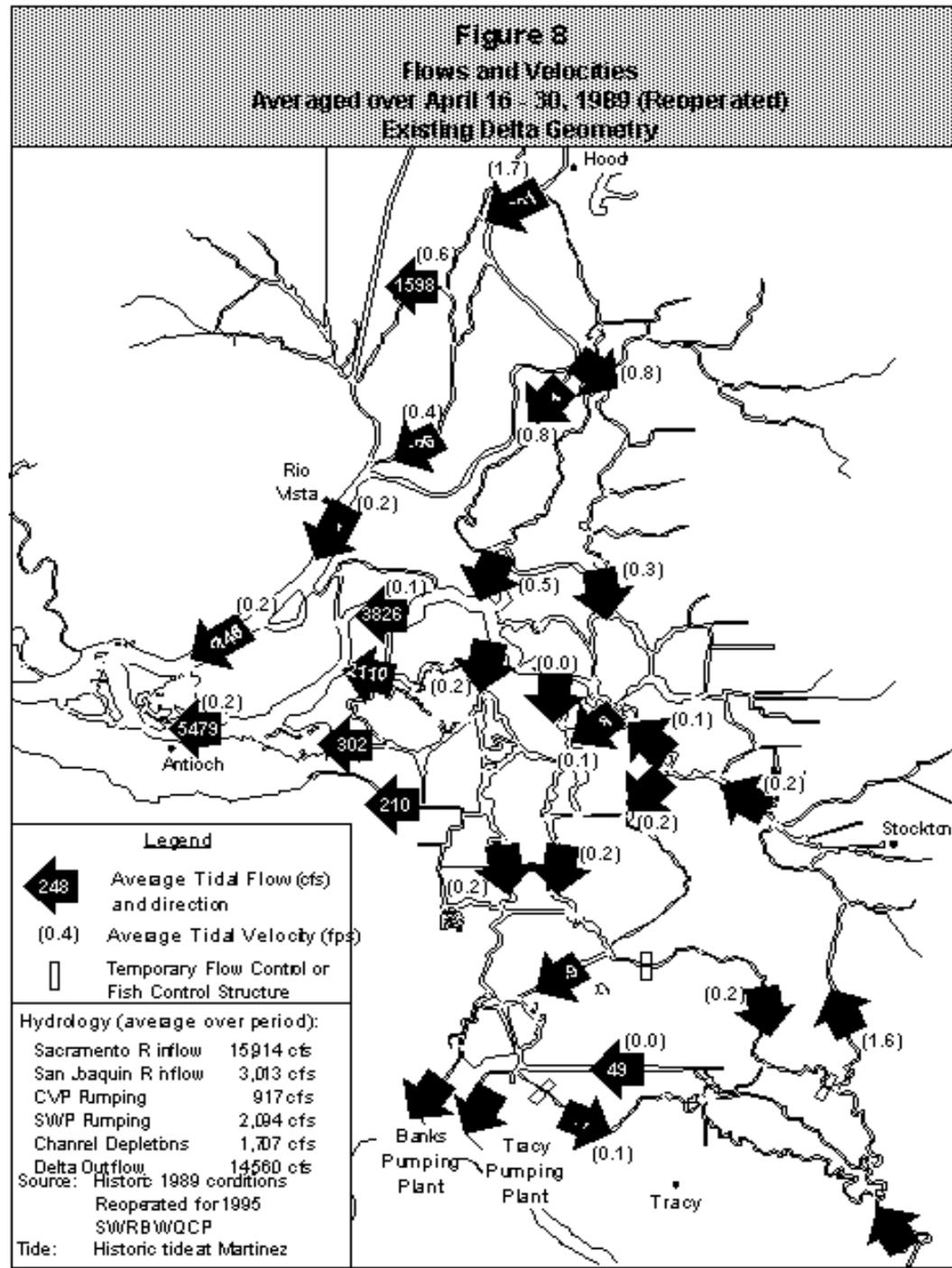
Clip 3
Levee Rock Channel Margin
Walnut Grove Levee

So what do we mean by “flows”?



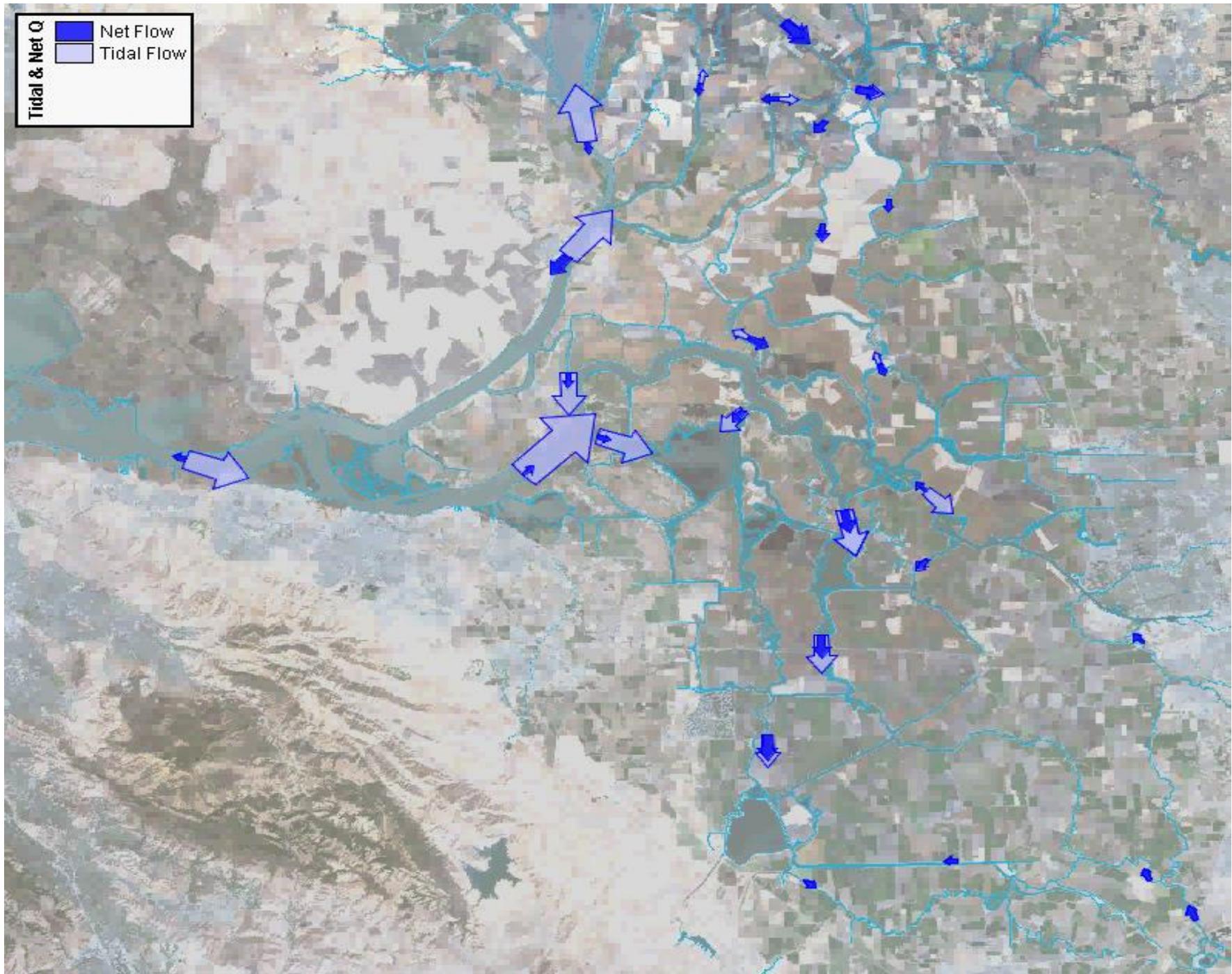
Location of flow station sites in the Delta Area of California.

River Model of the Delta (Net Flow Picture)

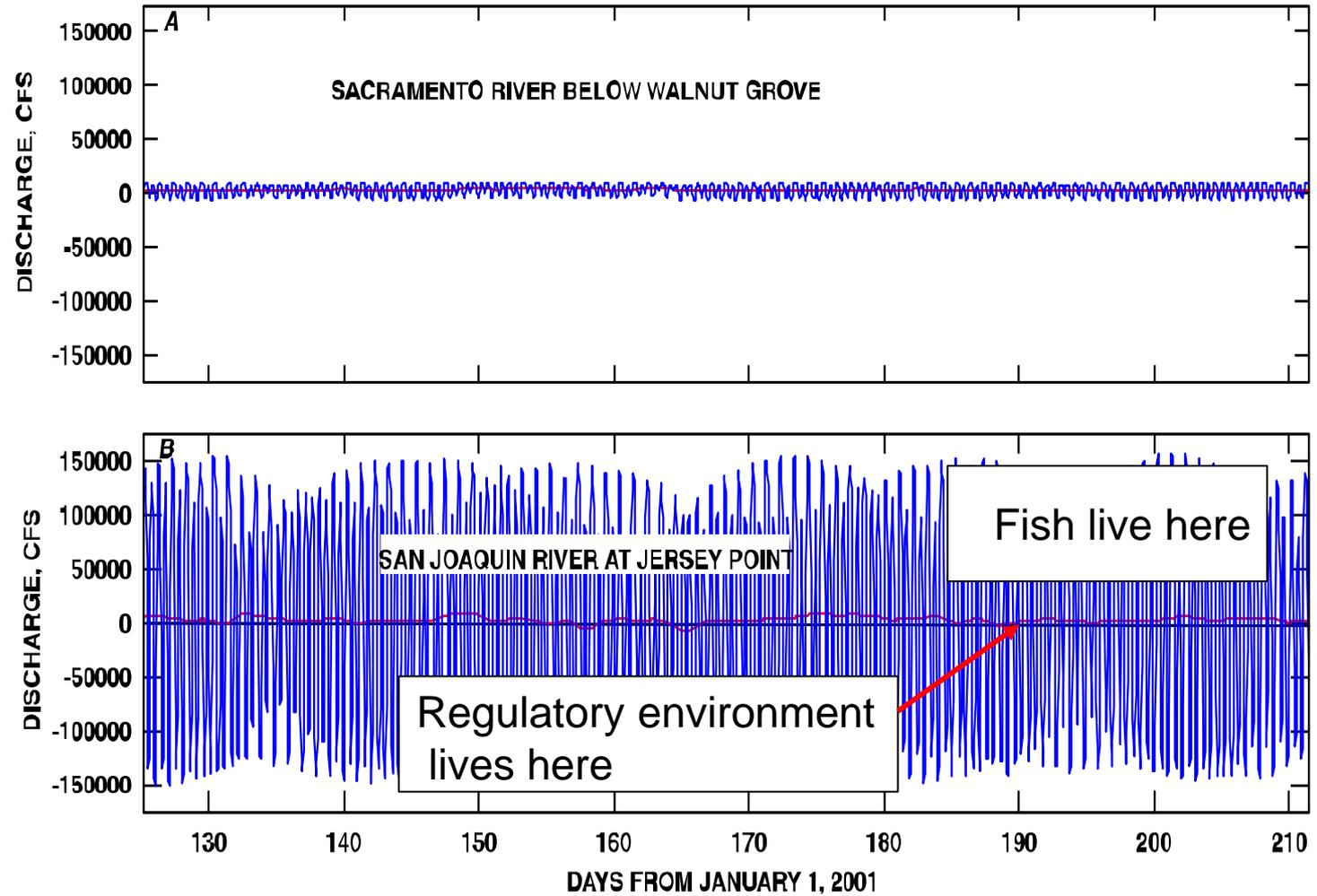
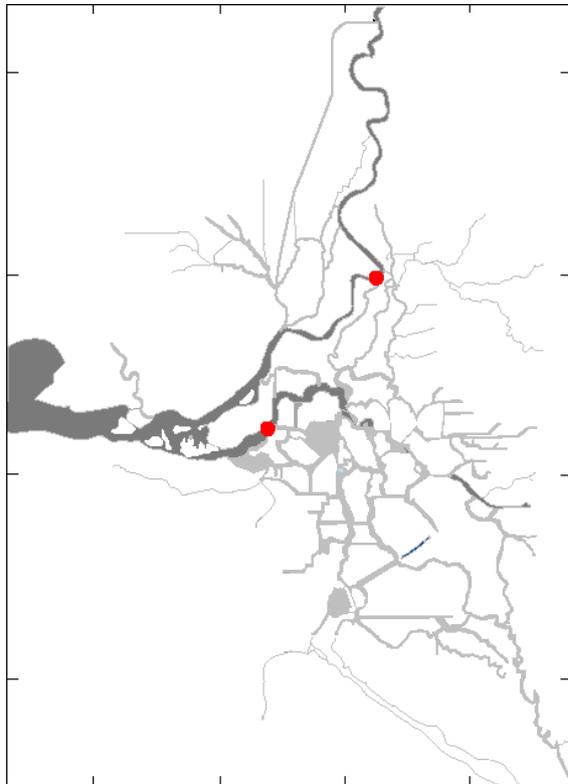


Courtesy of the
 DWR Modeling Section
 web page

The Delta is Strongly Tidally Forced



Tidal versus residual currents @ Walnut Grove and Jersey Point



The net flows are hard to measure
during low flow.

In Fact:

We can't measure delta outflow
during really low inflow periods

We've got a signal to noise problem with the field measurements

and

DAYFLOW depends on DICU, which is a guess.

DICU is relatively large during low inflow periods.

Solution

Explicitly manage the system based
on the position of the salt field
during low flow periods

Ongoing Problems

Tidal aliasing of biological data

Most organism samples are grab samples collected irrespective to the tides

These grab samples are likely highly tidally aliased

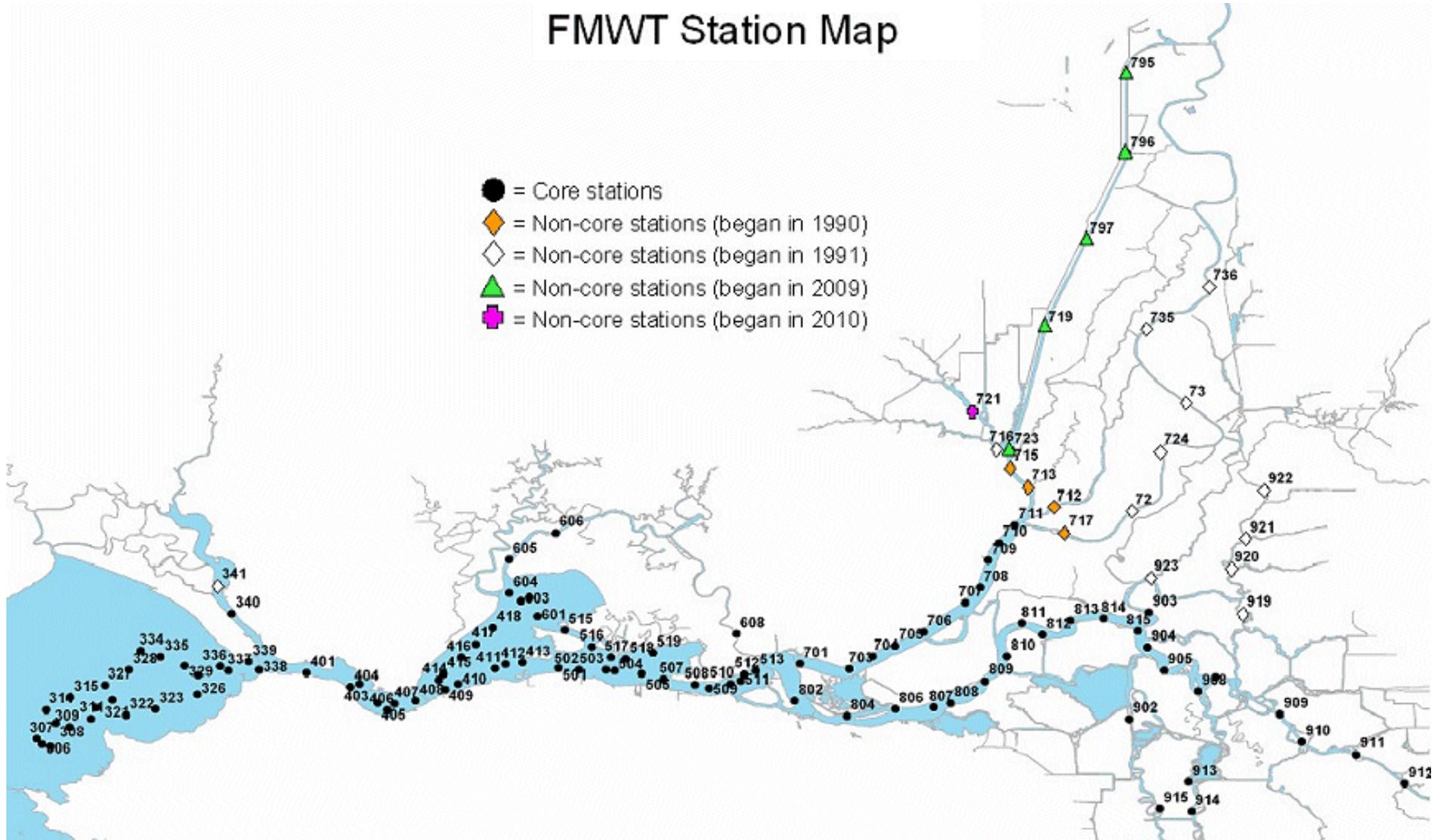
These grab samples are then combined with regulatory metrics that are tidal or fortnightly period averages (example: OMR)

Timescale mismatch!

Fall Midwater Trawl Sampling Locations

FMWT Station Map

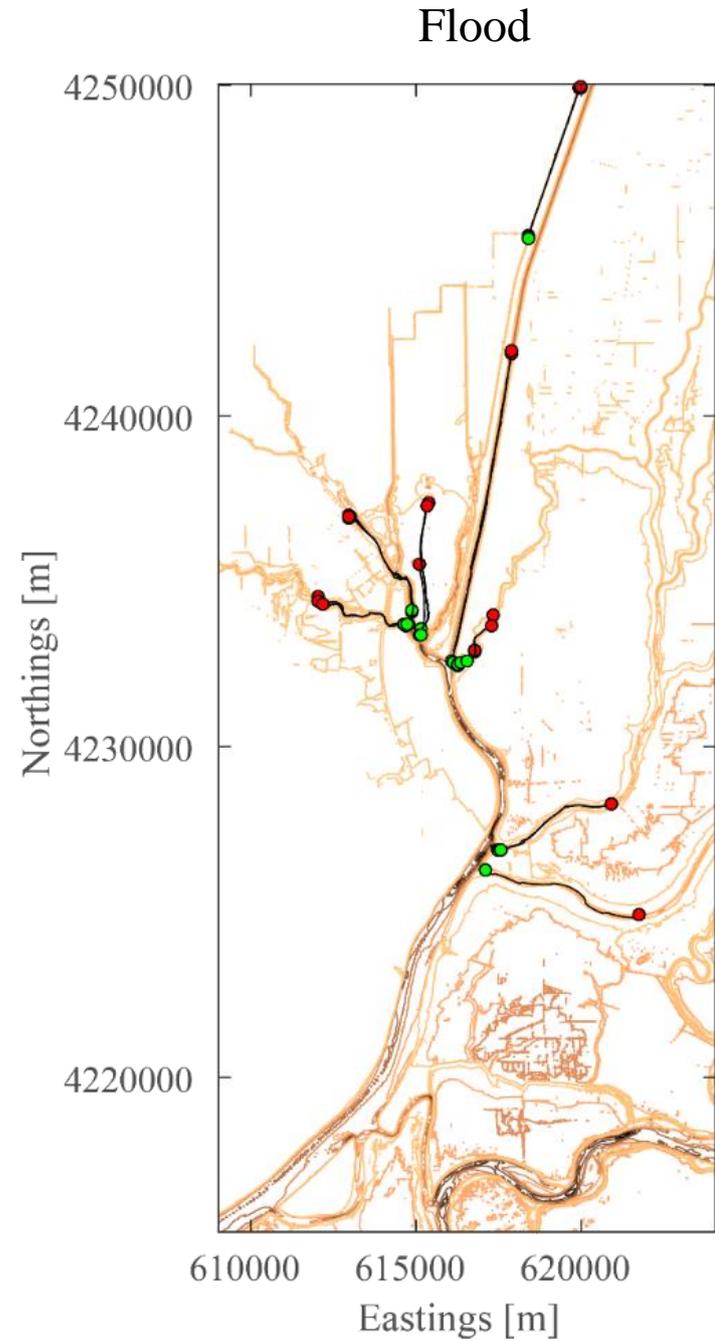
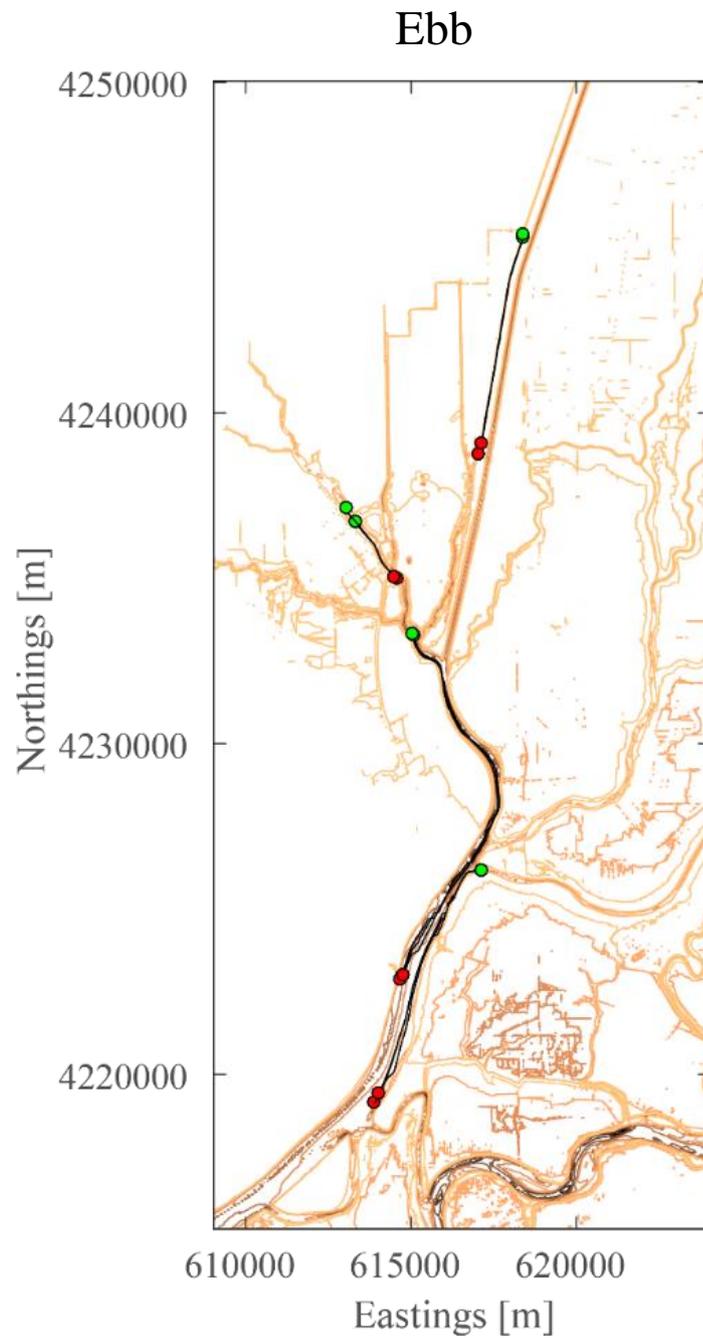
- = Core stations
- ◆ = Non-core stations (began in 1990)
- ◇ = Non-core stations (began in 1991)
- ▲ = Non-core stations (began in 2009)
- ◆ = Non-core stations (began in 2010)



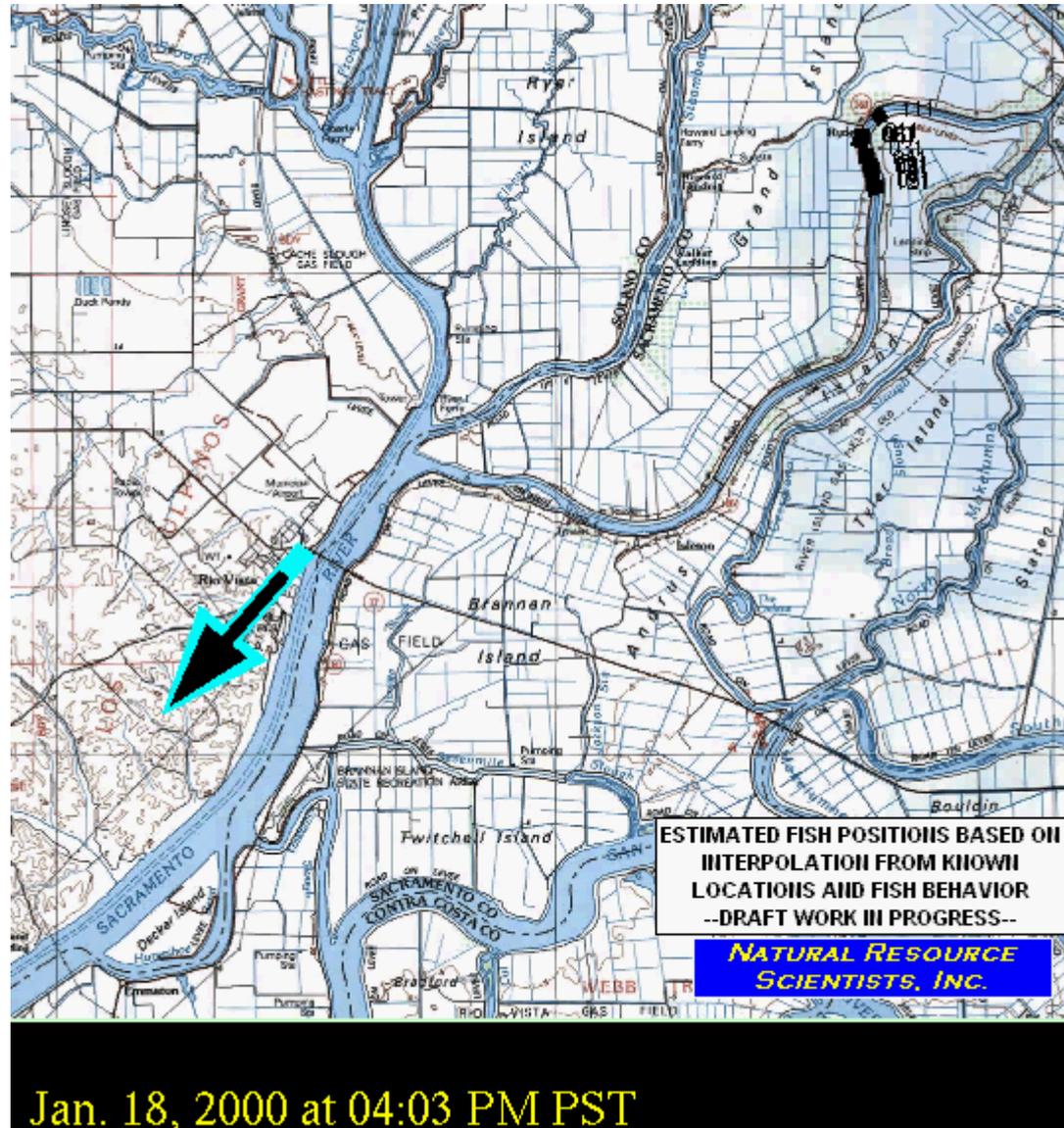
Example Drifter tracks – 2011 King Tide

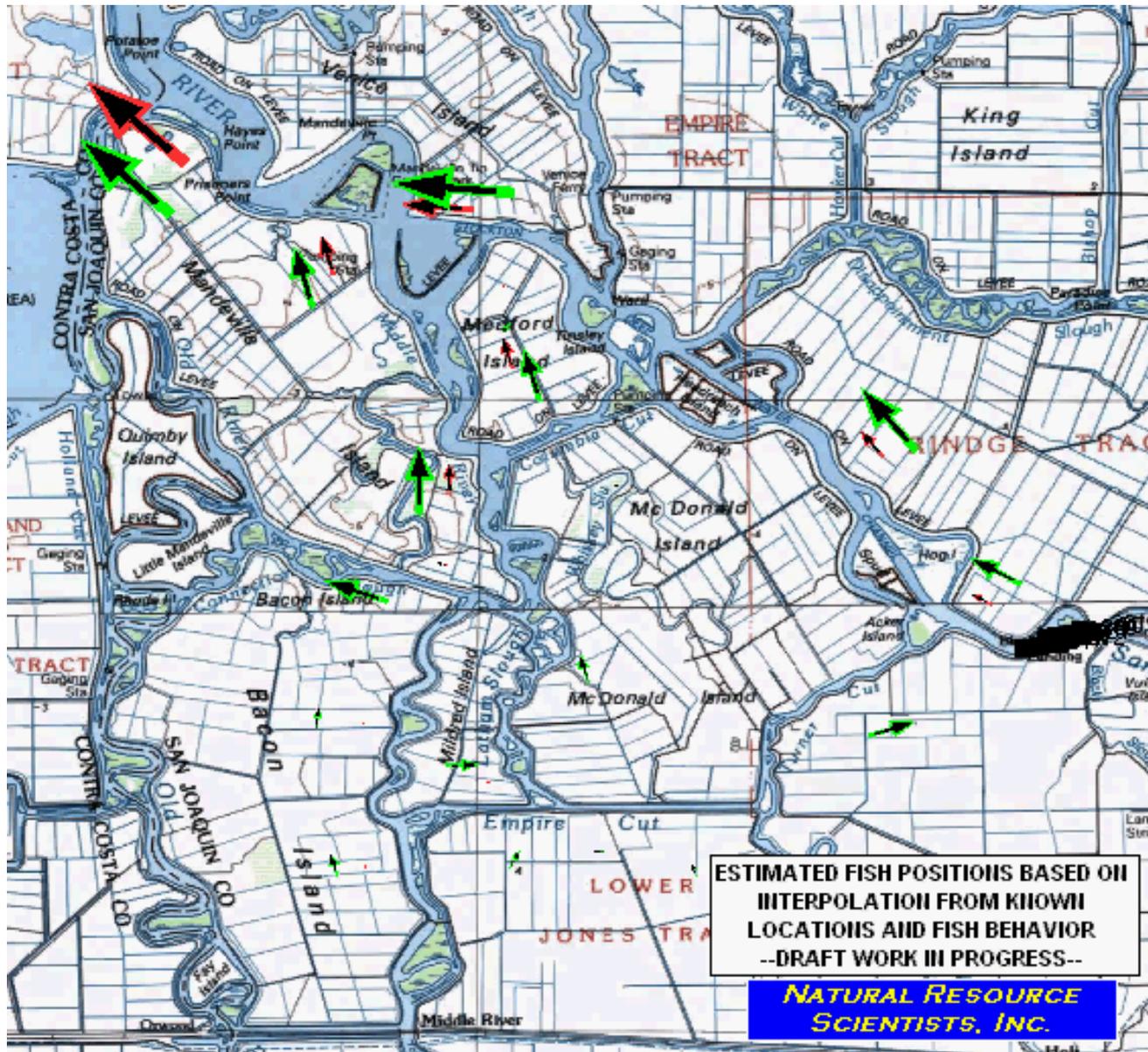


Drifter Tracks in Liberty Island



Pelagic organisms “go” with the tidal flow





Apr. 10, 2002 at 07:42 AM PST

Timescale mismatch

Regulatory (long: 12hr ave to seasons)

VS

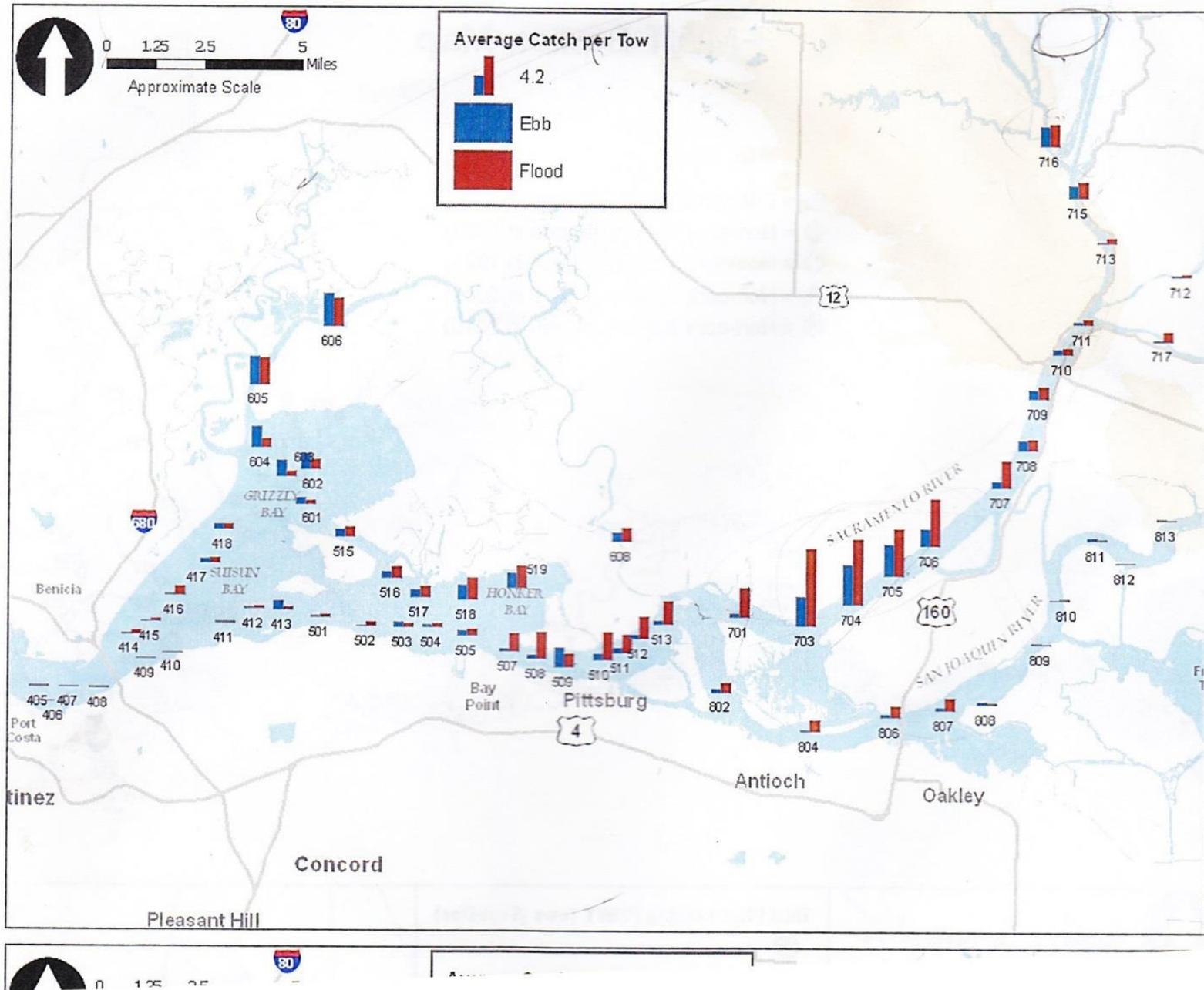
reality (short:<12hr period)

Sampling of physics (<hourly)

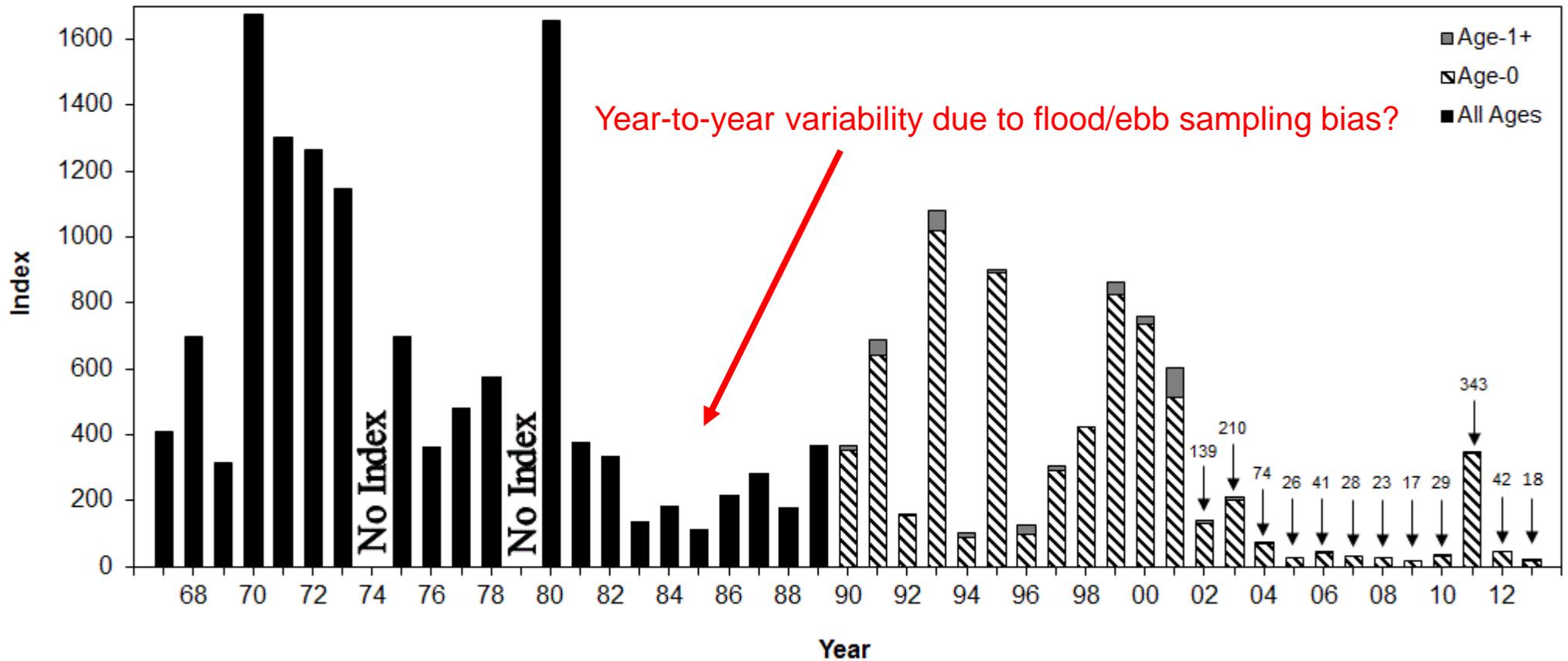
VS

sampling of fish (> monthly)

An Aliasing Example



Delta Smelt Indices From 1967-2013



Given the combination of low populations and tidal aliasing inherent in our sampling designs we are likely sampling the noise floor.

We are trying to understand how the ecosystem works
Using data that was never intended for that purpose

Why?

Because most of the data we collect is for:

Status and Trends
Regulatory Requirements

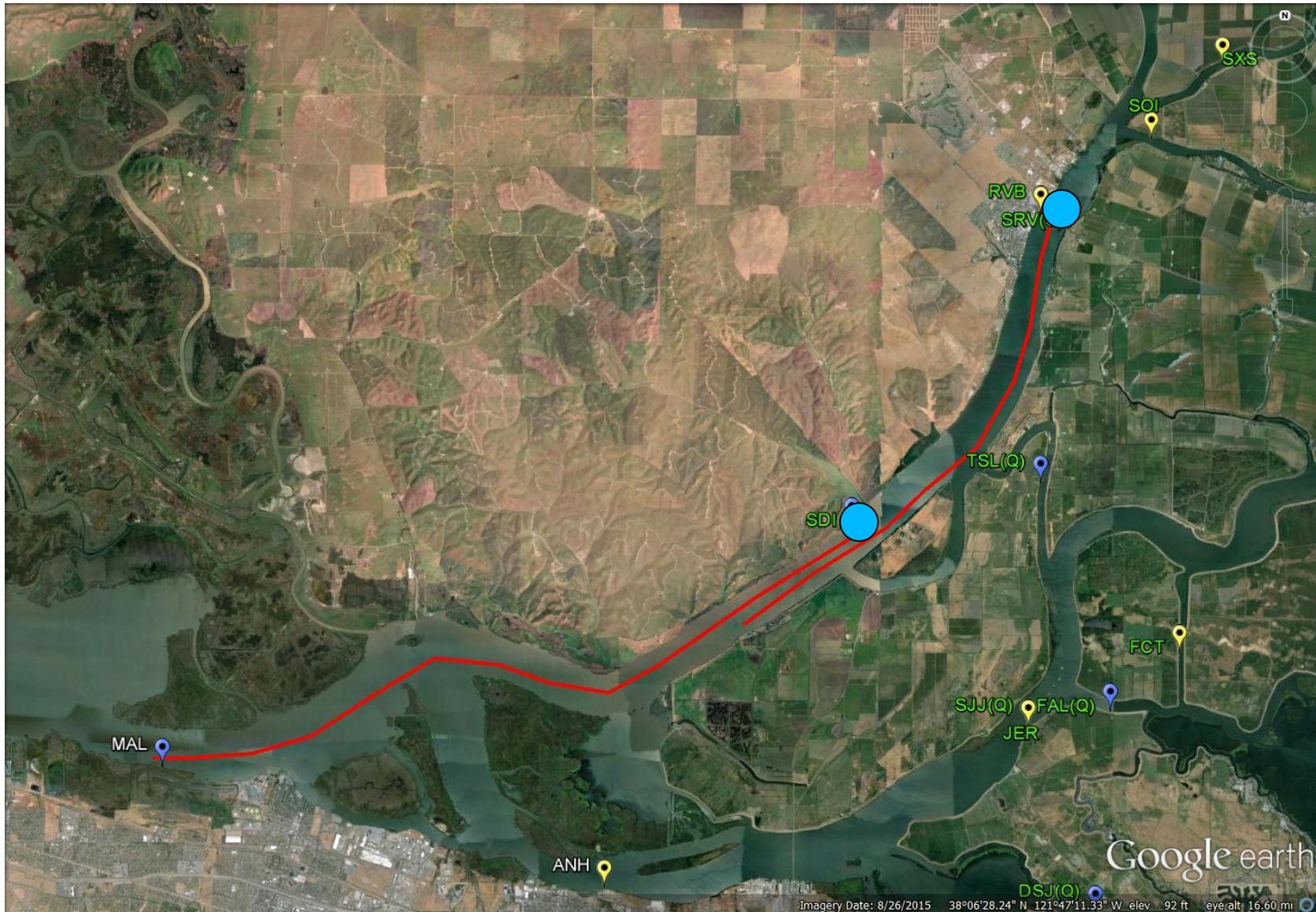
We continue to sample in a way that tells us we have a problem.

We are not sampling in a way that informs solutions.

So what do we do?

Alternative Sampling Strategy

Sit in one place for ~12 hours and let the tidal currents bring organisms to you!

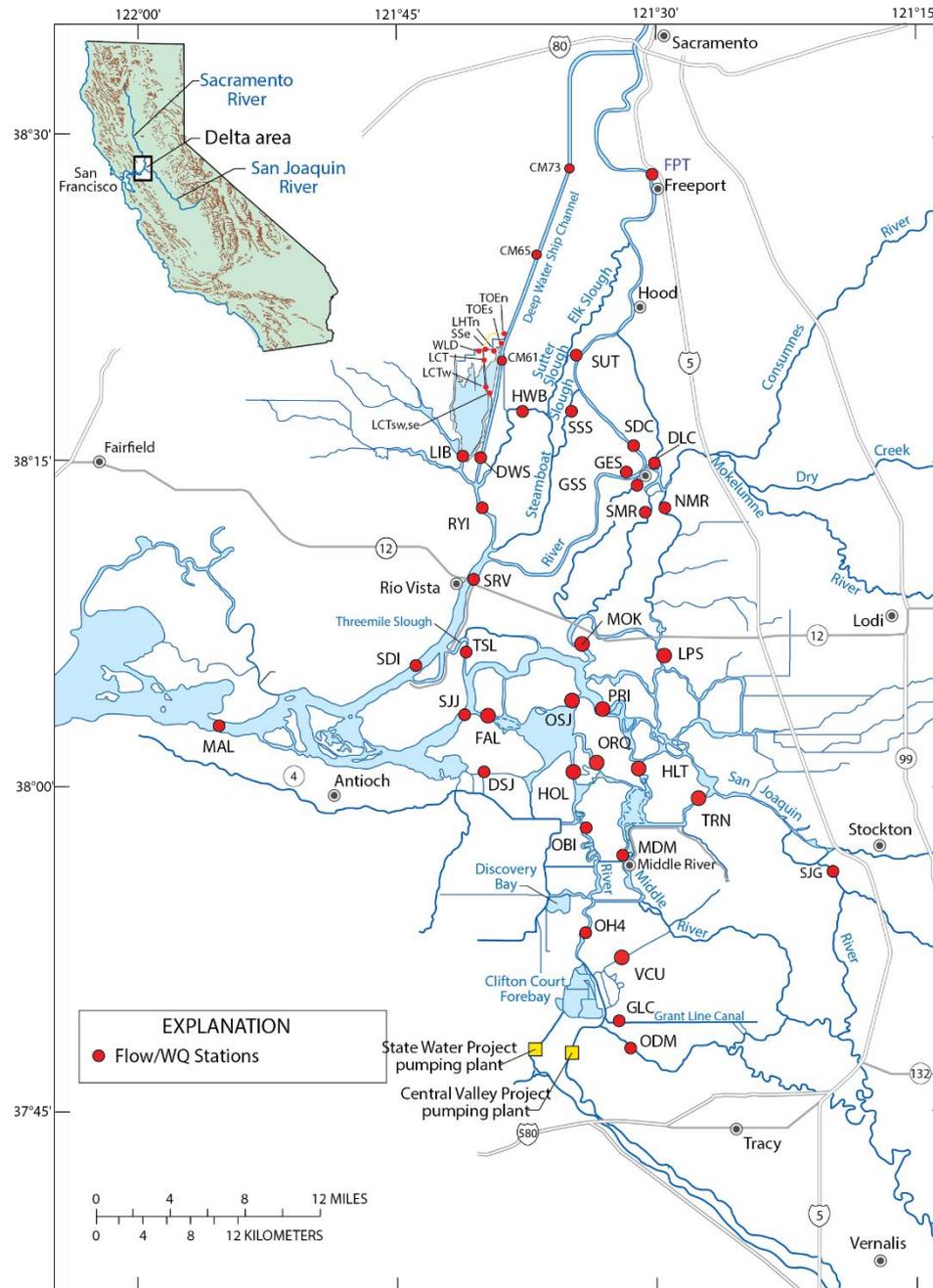


This allows sampling in space in a way
that avoids tidal aliasing

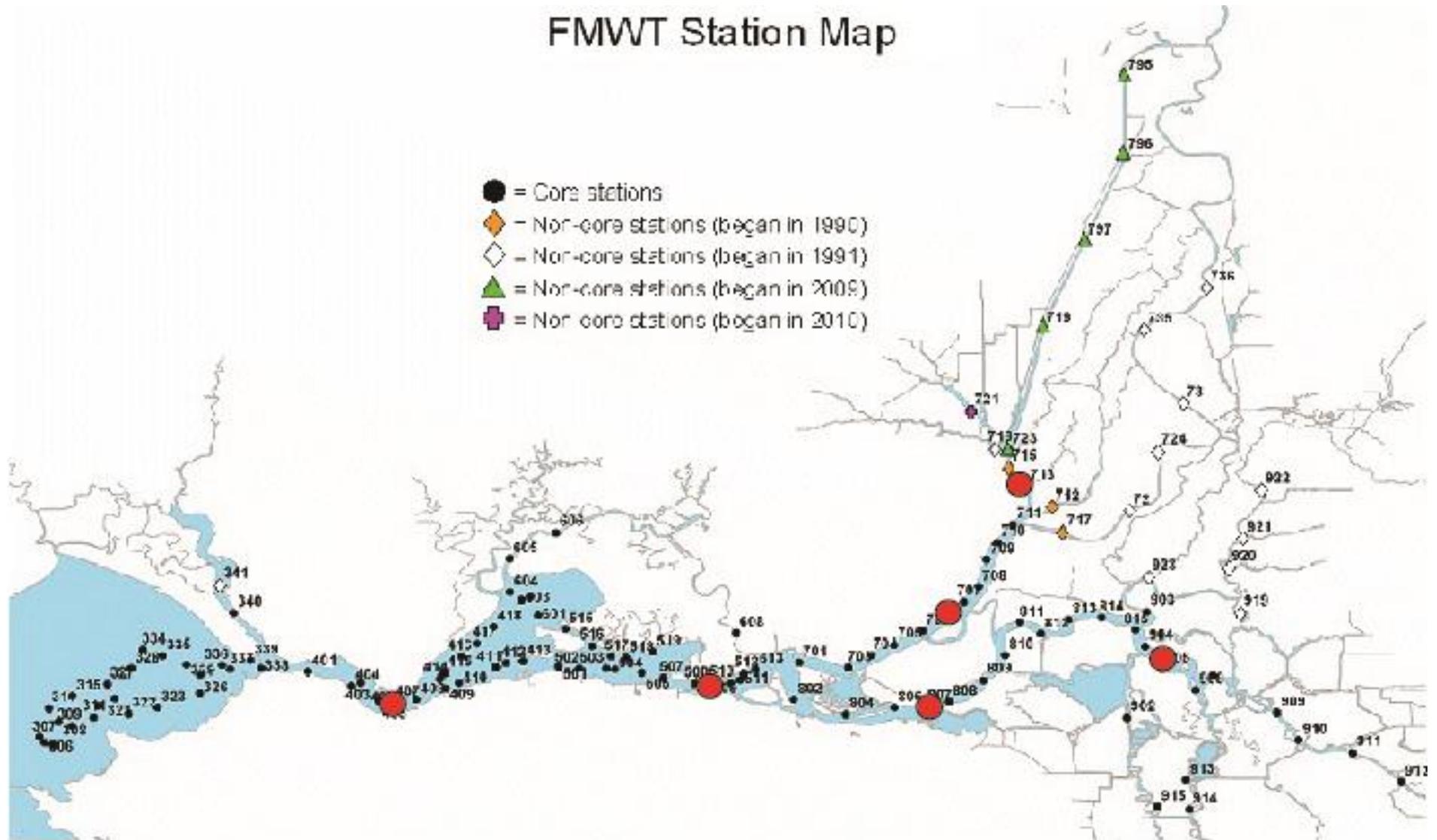
The measured velocity gives us space for time
(Just like the speed of light does in astronomy)

So where to sample?

At flow and
water quality
stations



FMWT Station Map



Sampling at 2 sites per day for 12 hours at each site for three days

Sampling at a flow/WQ station over ~12 hours allows us to place an organism within a velocity and water quality field (including gradients) and within a water quality time history

This is data collection that is inherently interdisciplinary

Collecting physical measurements at the same place and time as the biological measurements





Juvenile salmon survival in the delta is terrible

Bumper Sticker:

We've got a predation problem

That is really a habitat problem

We are trying to solve with water.

We've spent a huge amount of energy on "fish and flows"

Almost nothing on habitat improvements

This should change

When we confine ourselves to "fish and flows" we are ignoring a significant stressor on the ecosystem

ISB Questions

(Re-arranged by someone who works on soft money)

(1) How would can I aid decision-makers ?
(What can I do to reduce key uncertainties?)

(2) What are the ongoing (not emerging) issues?

(3) Where are the greatest opportunities for collaboration, scientific advancement, or integrated monitoring?

(4) What is my programs short or long-term research and monitoring plans in the next 5 years?