

Water, salt, and fish

Case studies on how science is used in management and operations in the South Delta

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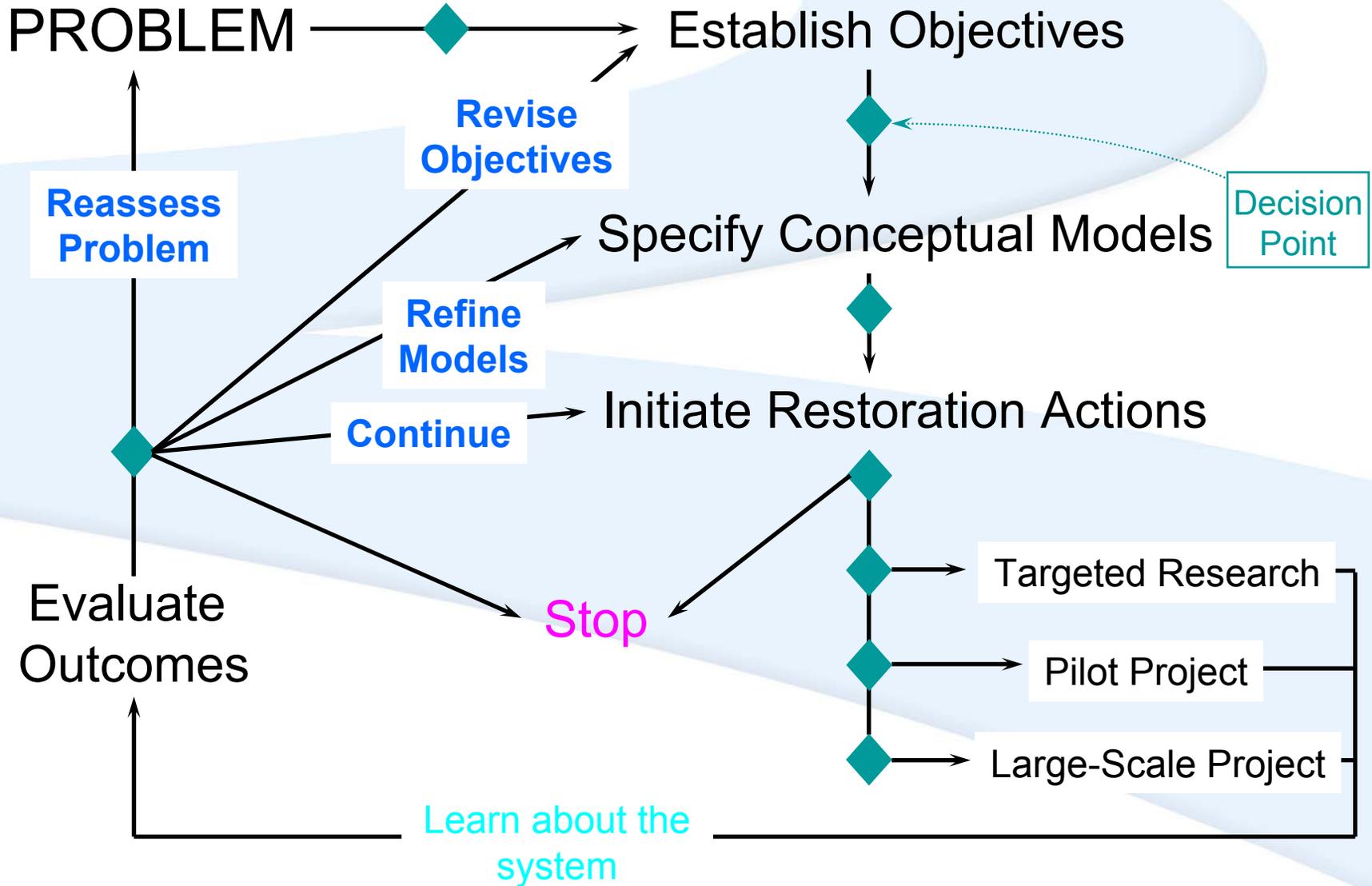
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Water, Salt, and Fish

- Purpose
 - Discuss role of recent scientific developments in guiding management of the South Delta
 - Highlight how knowledge has changed
 - Brief summary of EWA panel report
- Fundamental issues:
 - How do water, salt, and fish move through the Delta?
 - Effects of water project operations
 - How models have changed
 - What do we do differently as a result?
- Mismatch between science and management
 - Timing
 - Consequences of being wrong

Applied Adaptive Management (the Ladder Diagram)



Timing is Everything

0 —————> 2-5 years

Proposal

Research

Review/Pub.

Management Problems

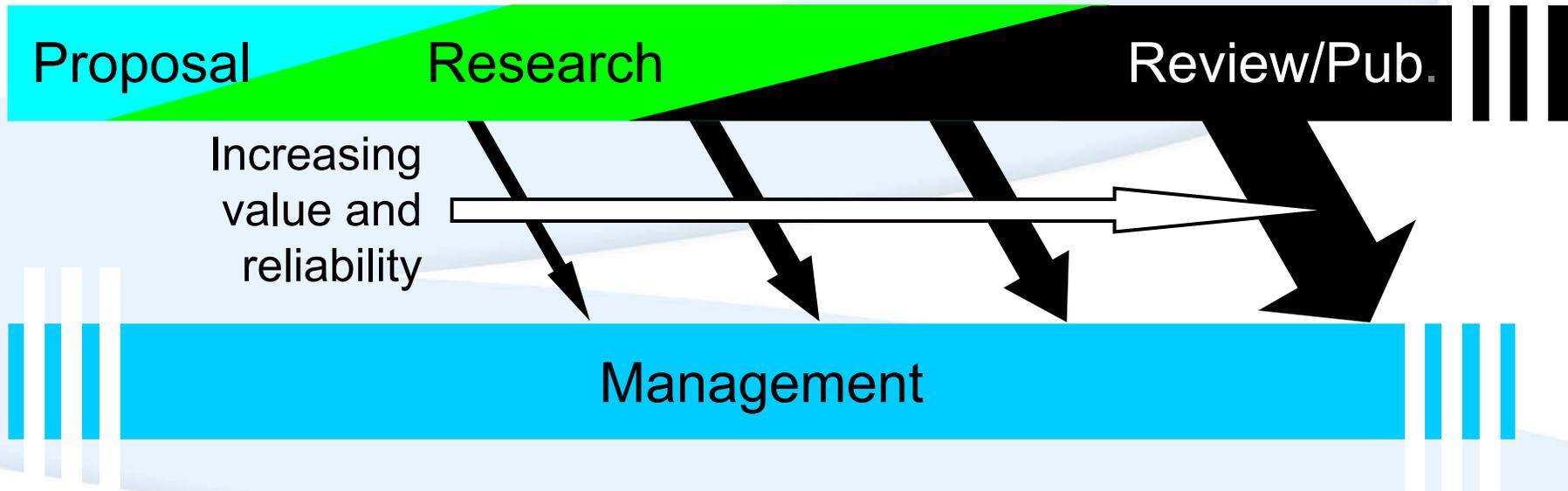
The problem:

This takes too long!

What can we do to streamline it?

Timing is Everything

0 → 2-5 years



The solution:

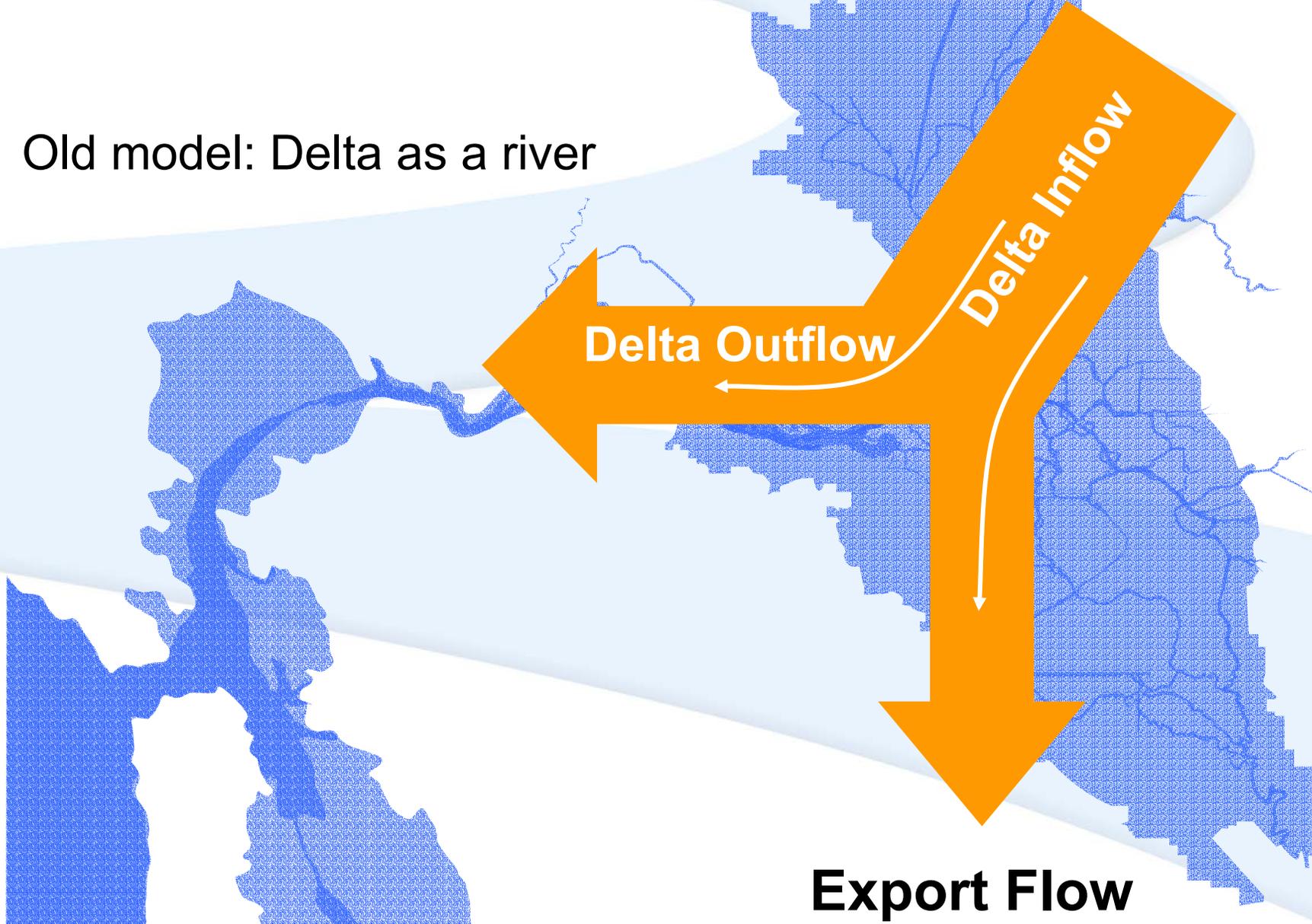
- Use information during scientific process
- Value published over unpublished results
- Think strategically
- Consider consequences of being wrong

Some Case Studies

- Outline
 - Old model
 - New(er) model
 - Why does it matter?
 - Next steps
- Topics:
 - Flow patterns in the Delta
 - Flow in Franks Tract
 - Effects of Delta export flow on winter-run salmon

Case Study: Flow Patterns in the Delta

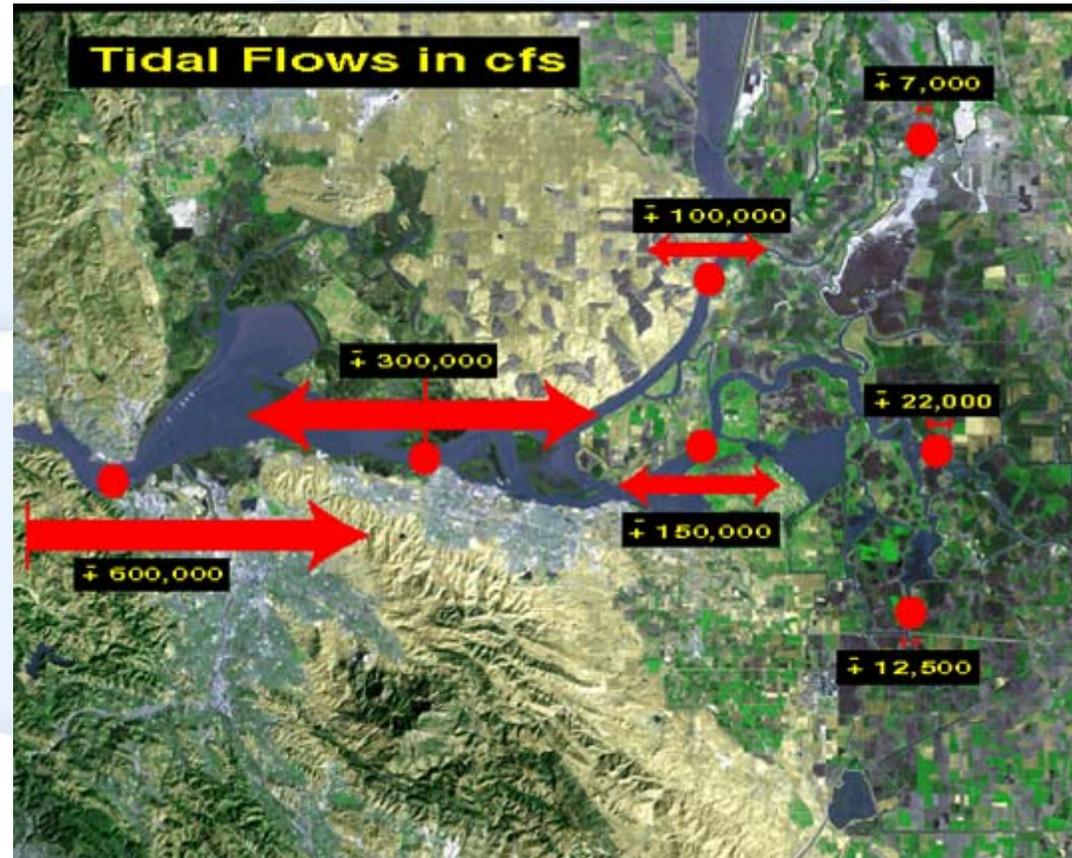
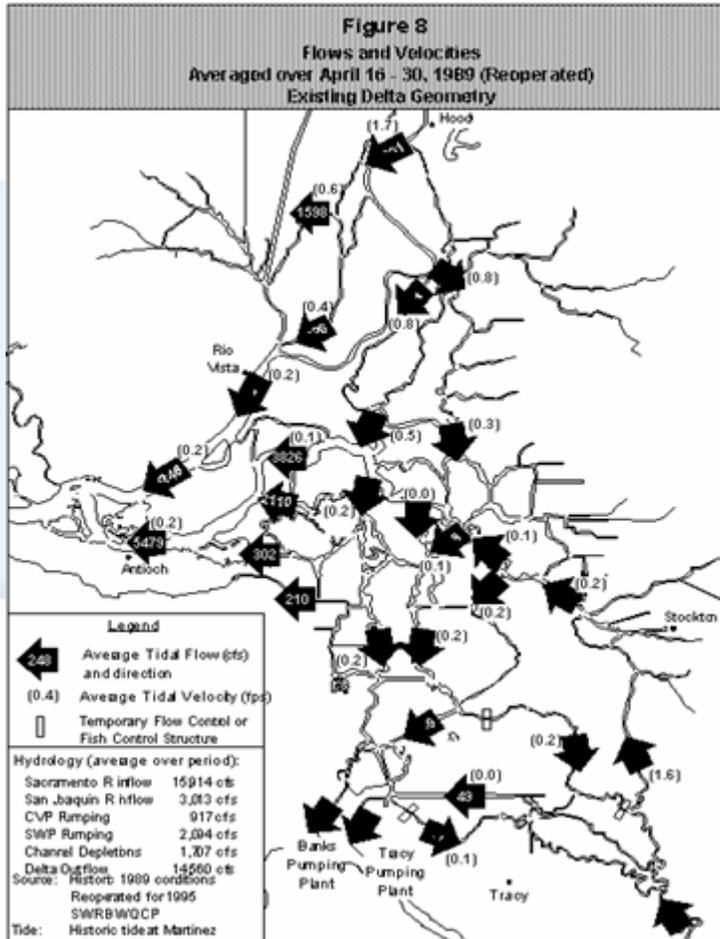
Old model: Delta as a river



Two views of flow in the Delta

Net flow

Tidal flow



Strong tidal currents lead to long tidal excursions



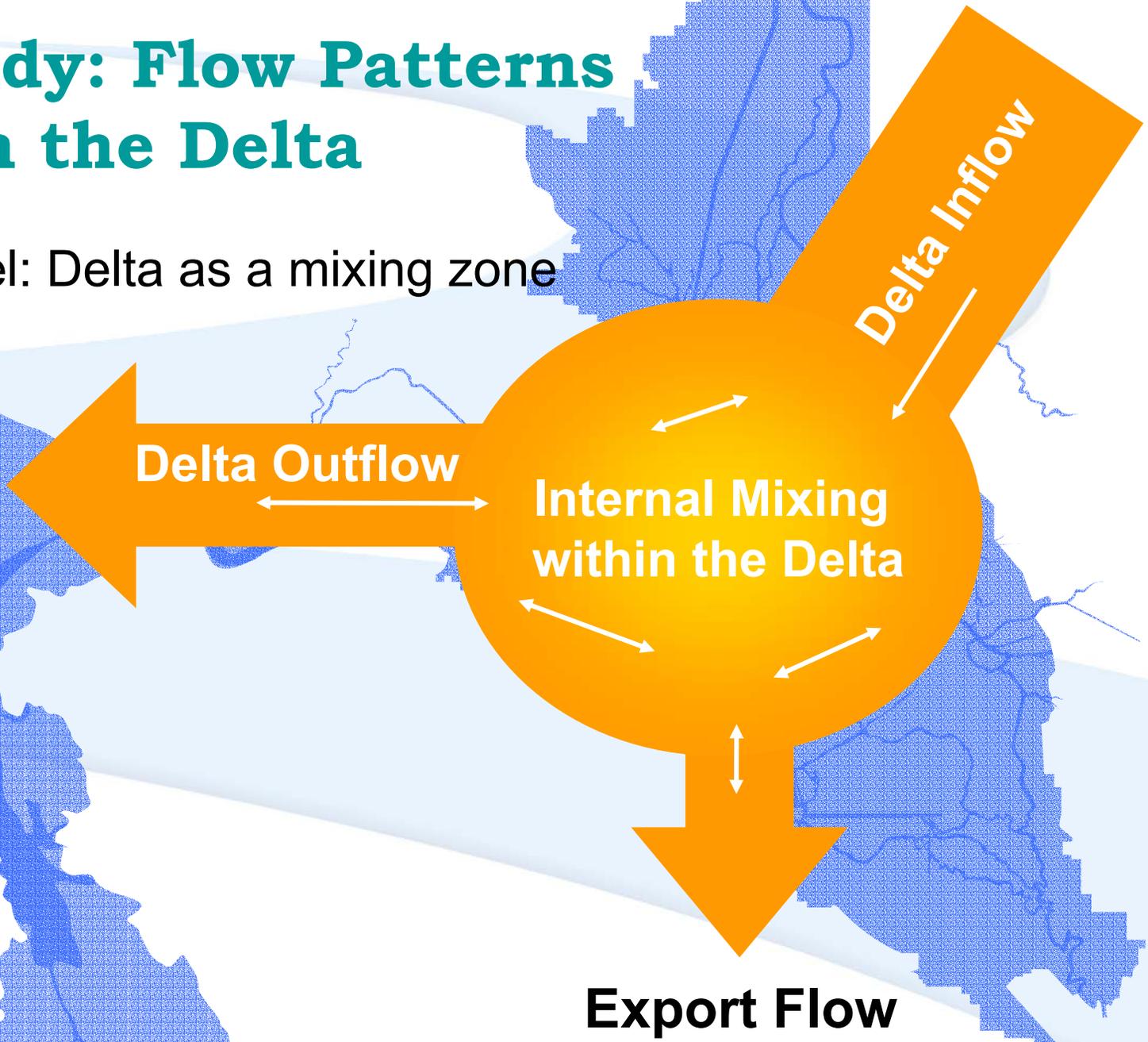
Flood release

Ebb release

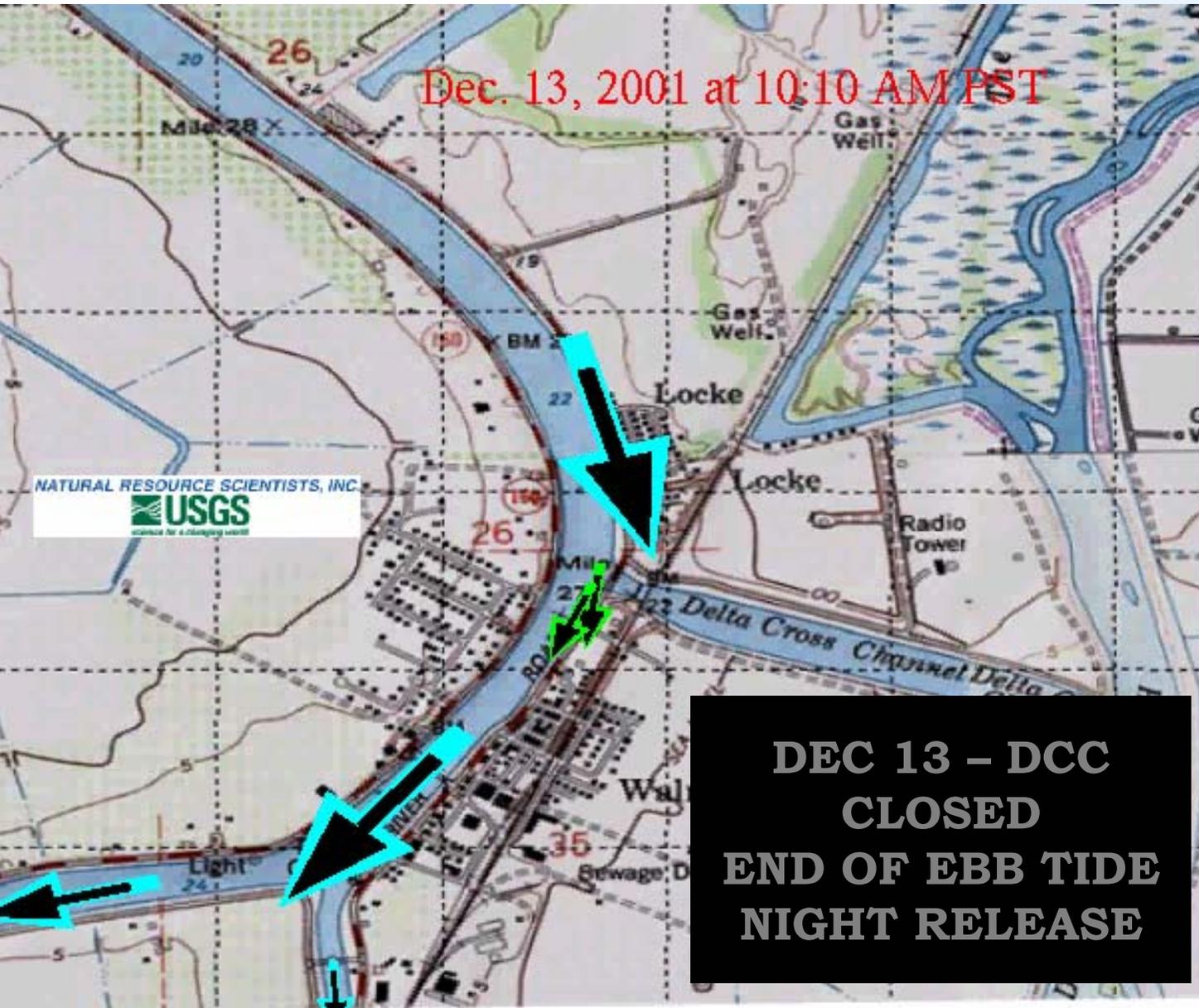


Case Study: Flow Patterns in the Delta

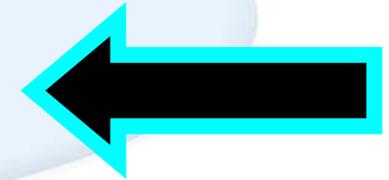
New model: Delta as a mixing zone



Case Study: Flow Patterns in the Delta



Dec. 13, 2001 at 10:10 AM PST



Tidal Current



Salmon smolts

**DEC 13 - DCC
CLOSED
END OF EBB TIDE
NIGHT RELEASE**

Why does it matter?

Fish "see"
tidal flow

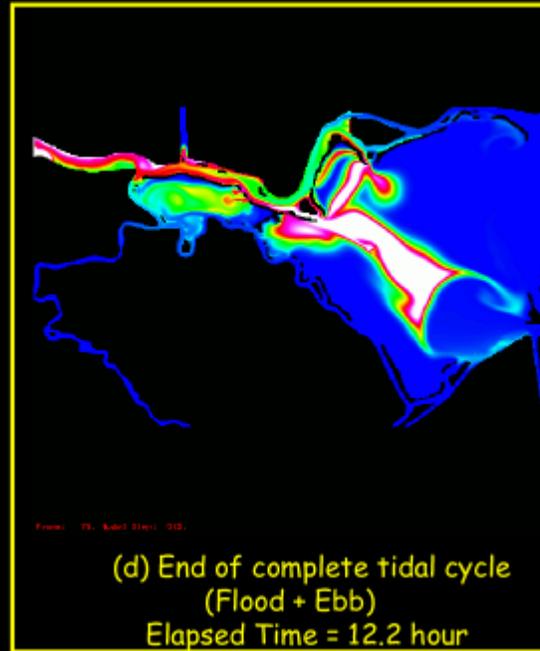
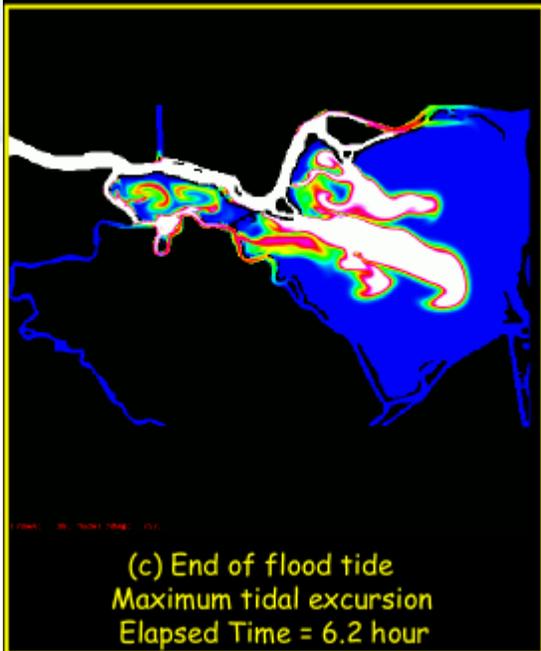
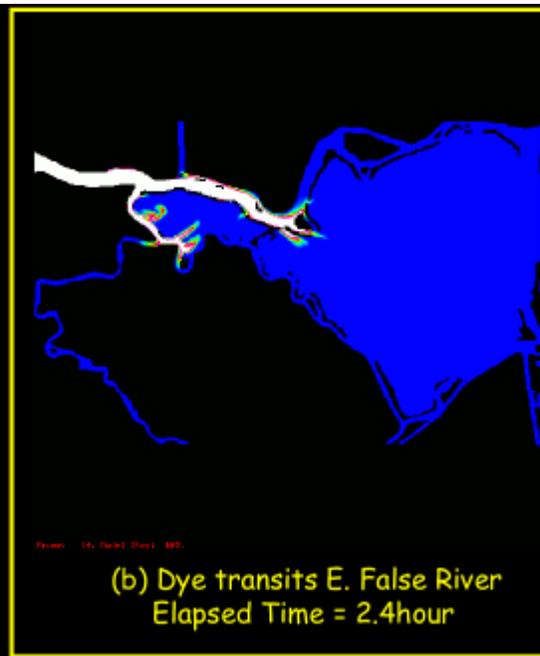
Case Study: Franks Tract

Model studies
show strong jet
causing intense
mixing

Why does it matter?
Reconfiguring Franks
Tract to eliminate the
jet **could** reduce
salinity in the Delta

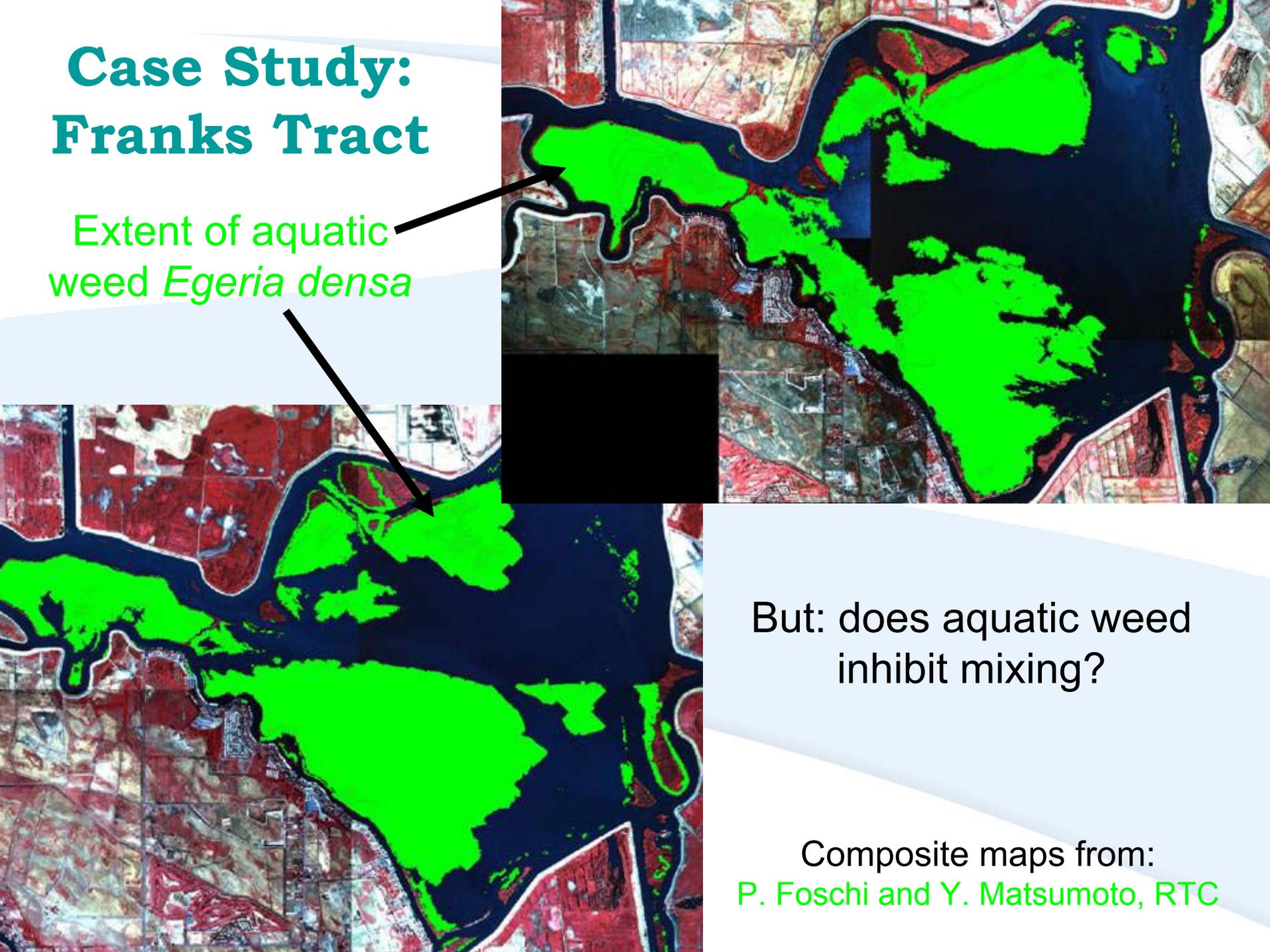
TRIM2D
Model results

J.R. Burau
USGS



Case Study: Franks Tract

Extent of aquatic
weed *Egeria densa*



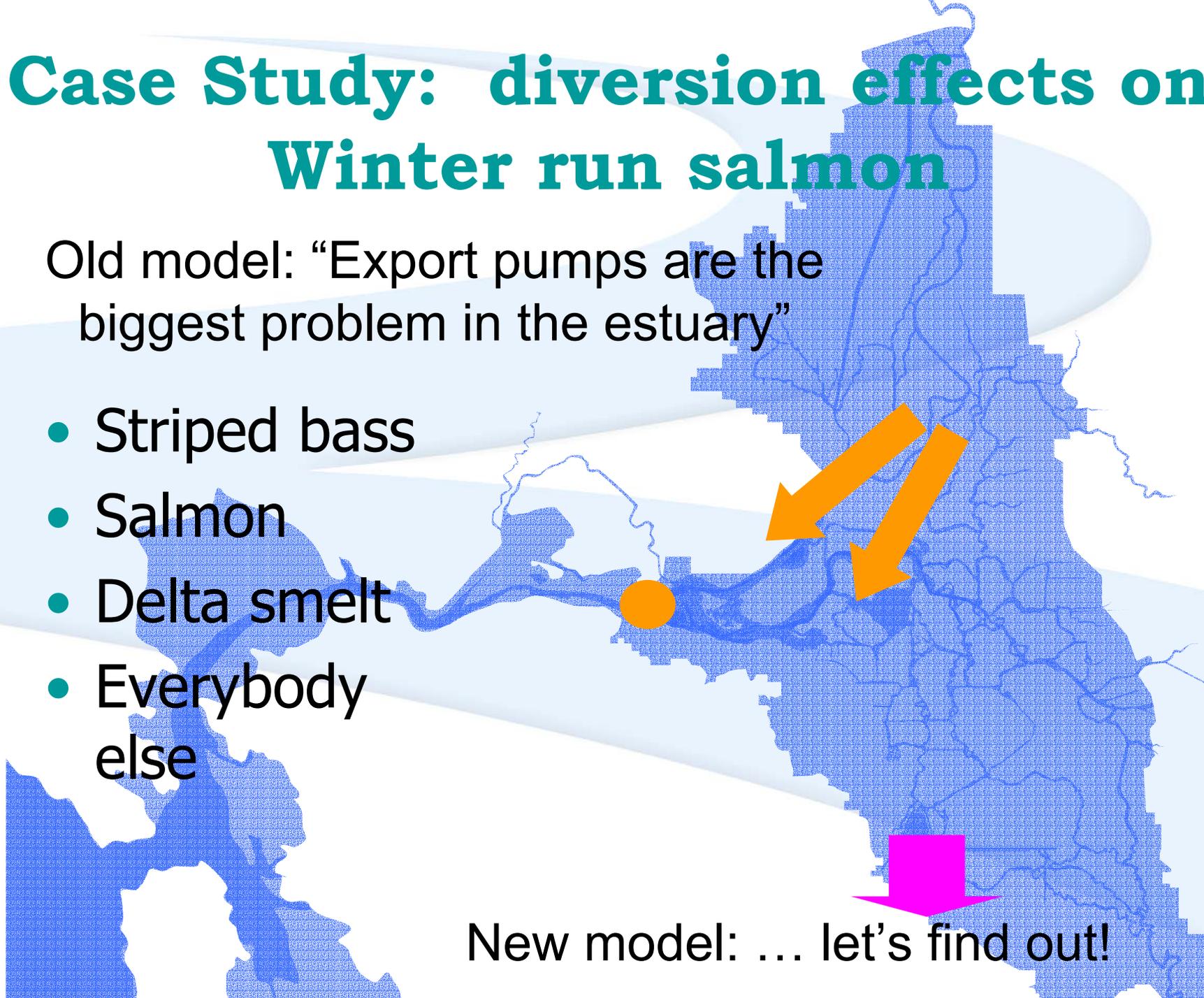
But: does aquatic weed
inhibit mixing?

Composite maps from:
P. Foschi and Y. Matsumoto, RTC

Case Study: diversion effects on Winter run salmon

Old model: “Export pumps are the biggest problem in the estuary”

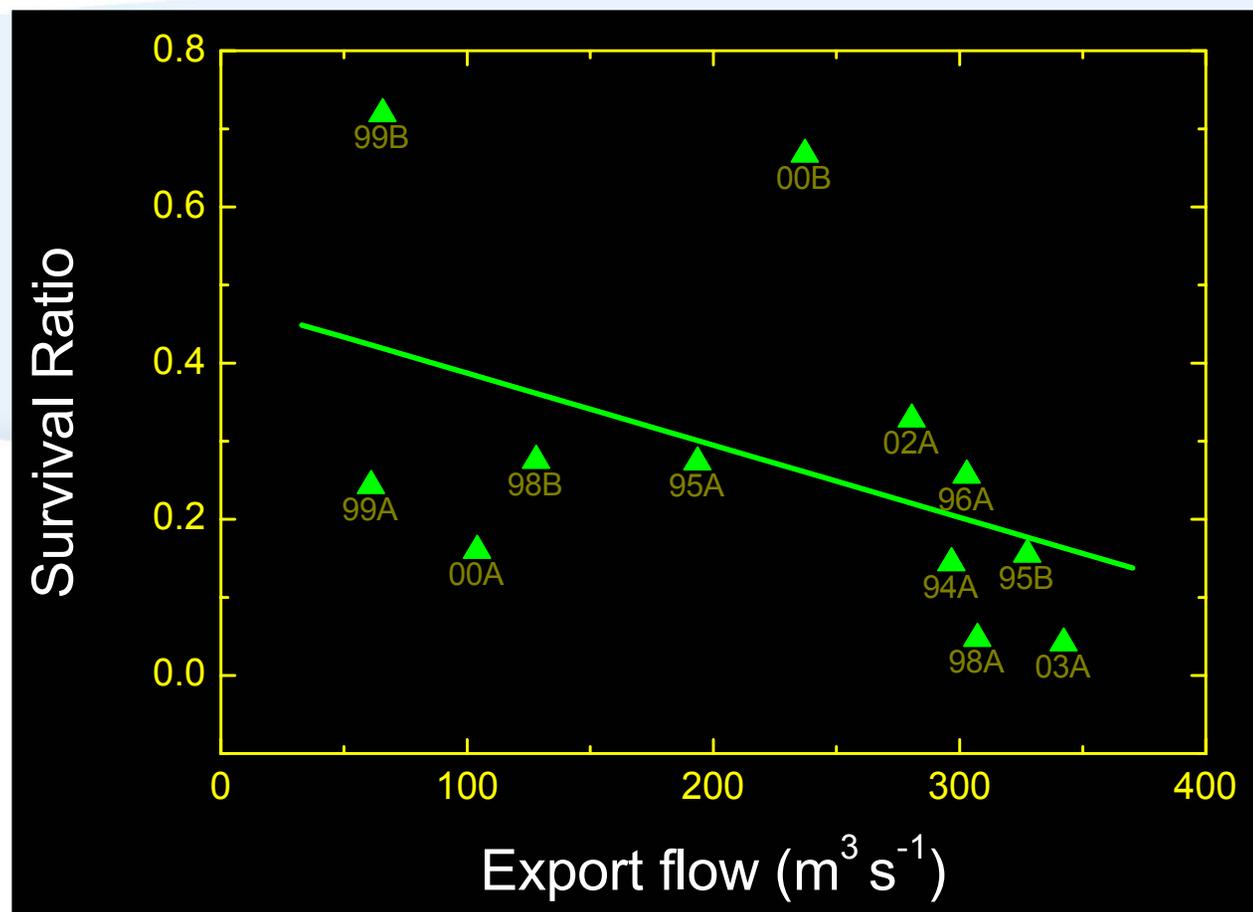
- Striped bass
- Salmon
- Delta smelt
- Everybody else



New model: ... let's find out!

Case Study: diversion effects on Winter run salmon

Ratio of survival of smolts released in the Sacramento River to smolts released in Georgiana Slough

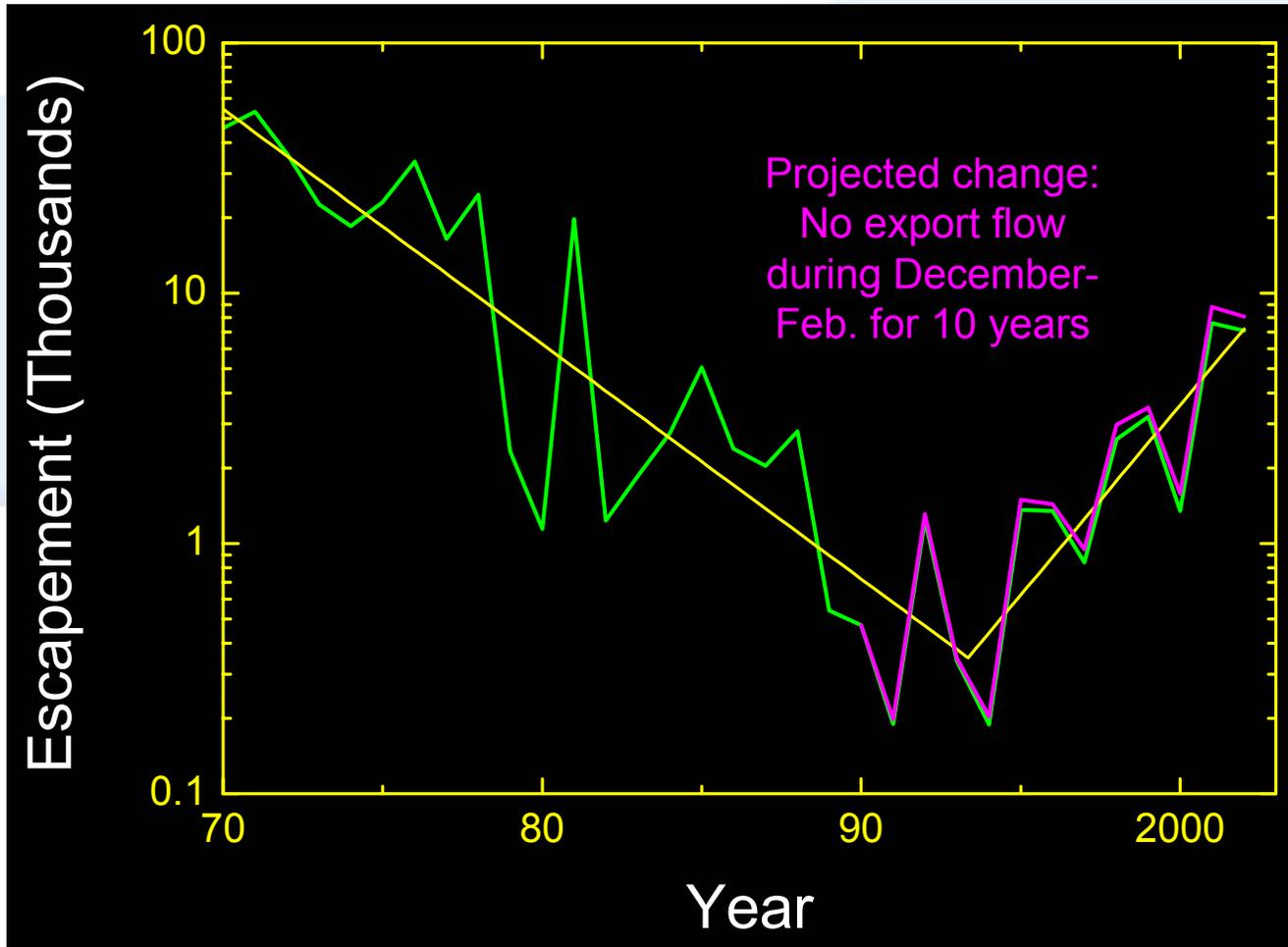


Fish that go into the interior Delta survive poorly; things get worse if export flow is high –

Does it matter?

Data Source:
Pat Brandes (USFWS)

Case Study: diversion effects on Winter run salmon



Assumptions:

Delta mortality according to model by Brandes, using 17-day averaging period for effects of export flow on experimental survival.

Data Source:
DFG summary
(Terry Mills)

Summary of Case Studies I

- Delta Flows
 - Some results published
 - Additional modeling work underway
 - Consequences: rethinking of how the Delta works
 - Next steps: Incorporate model in our thinking!
- Delta Cross Channel
 - Not published or reviewed
 - Consequences: if correct, possible management implications

Summary of Case Studies II

- Franks Tract
 - Based on a handful of presentations
 - Possible consequences: if correct, change in salt penetration into the Delta
 - Next steps: model, field analyses
- Export effects on Winter Run Salmon
 - Based on presentations of crude analyses
 - Possible consequences: focus EWA and similar efforts on other species
 - Next steps: thorough review and analysis of data

Summary

- Recent scientific developments
- Key point: how to use science
- Case studies show:
 - How much we are learning
 - Relevance of science to management
 - Importance of completing the work

Summary of EWA Panel Report

- **Positive findings, e.g.:**
 - Diversification of water resources and models
 - Increasing cooperation among agencies
- **Recommendations, e.g.:**
 - Conduct comprehensive internal review
 - Improve integration with other CALFED programs
 - Incorporate science in EWA and regulatory documents
 - Need resources to develop scientific basis
- **Challenges for long-term EWA**
 - Manage more than annually
 - Increase accountability