

A Presentation to  
The National Research Council

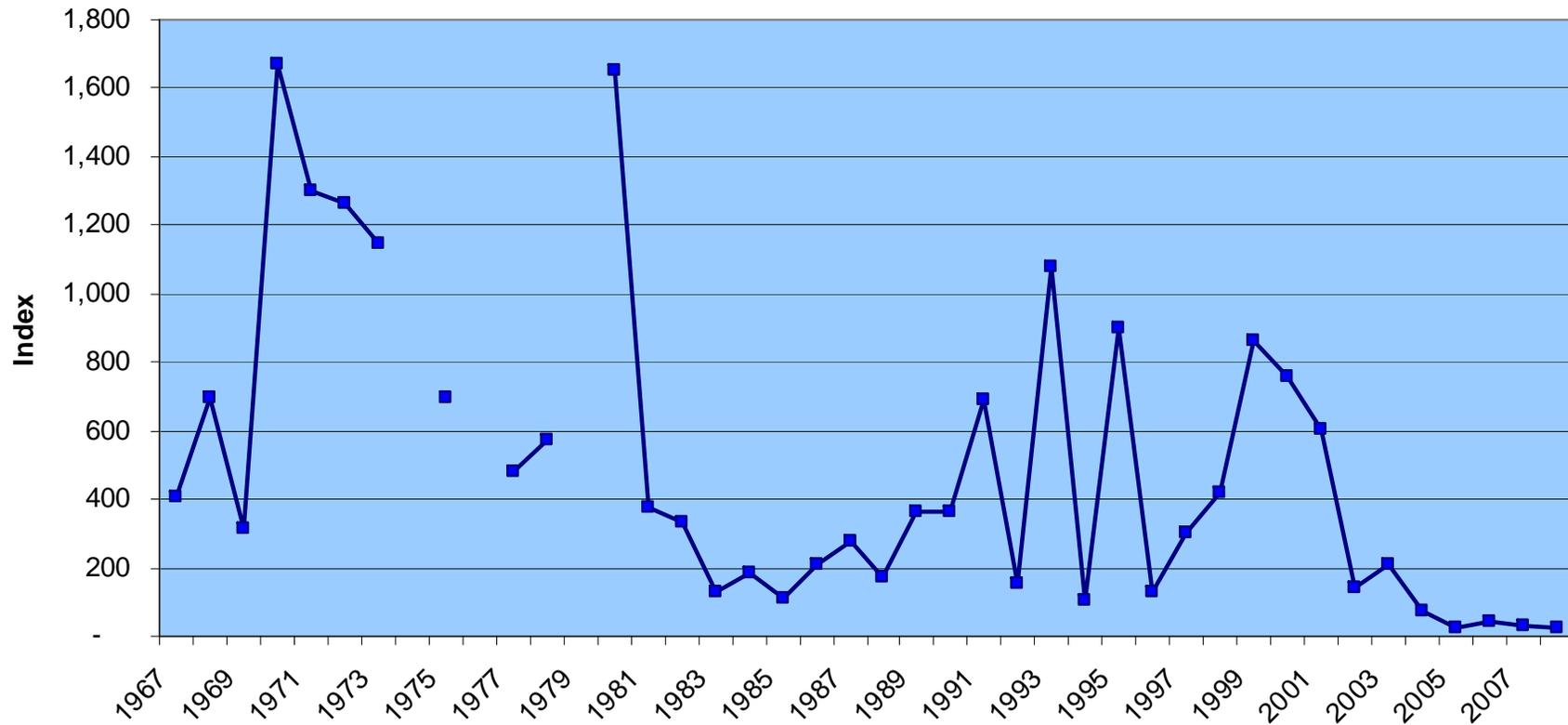
Committee on Sustainable Water and  
Environmental Management

“Considering Alternatives”

Scott Hamilton, Ph.D.



### Delta Smelt Abundance Fall Midwater Trawl Index



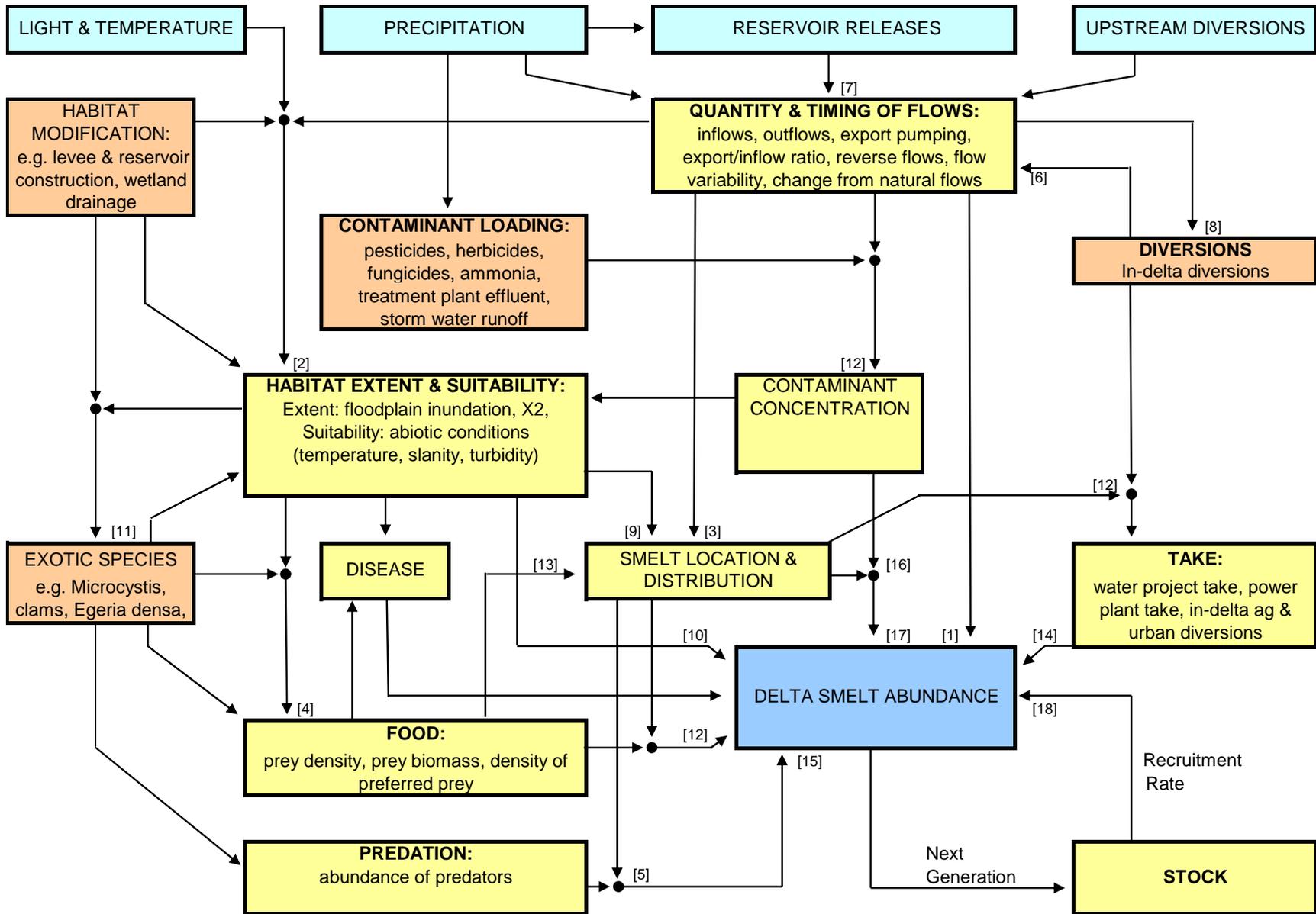


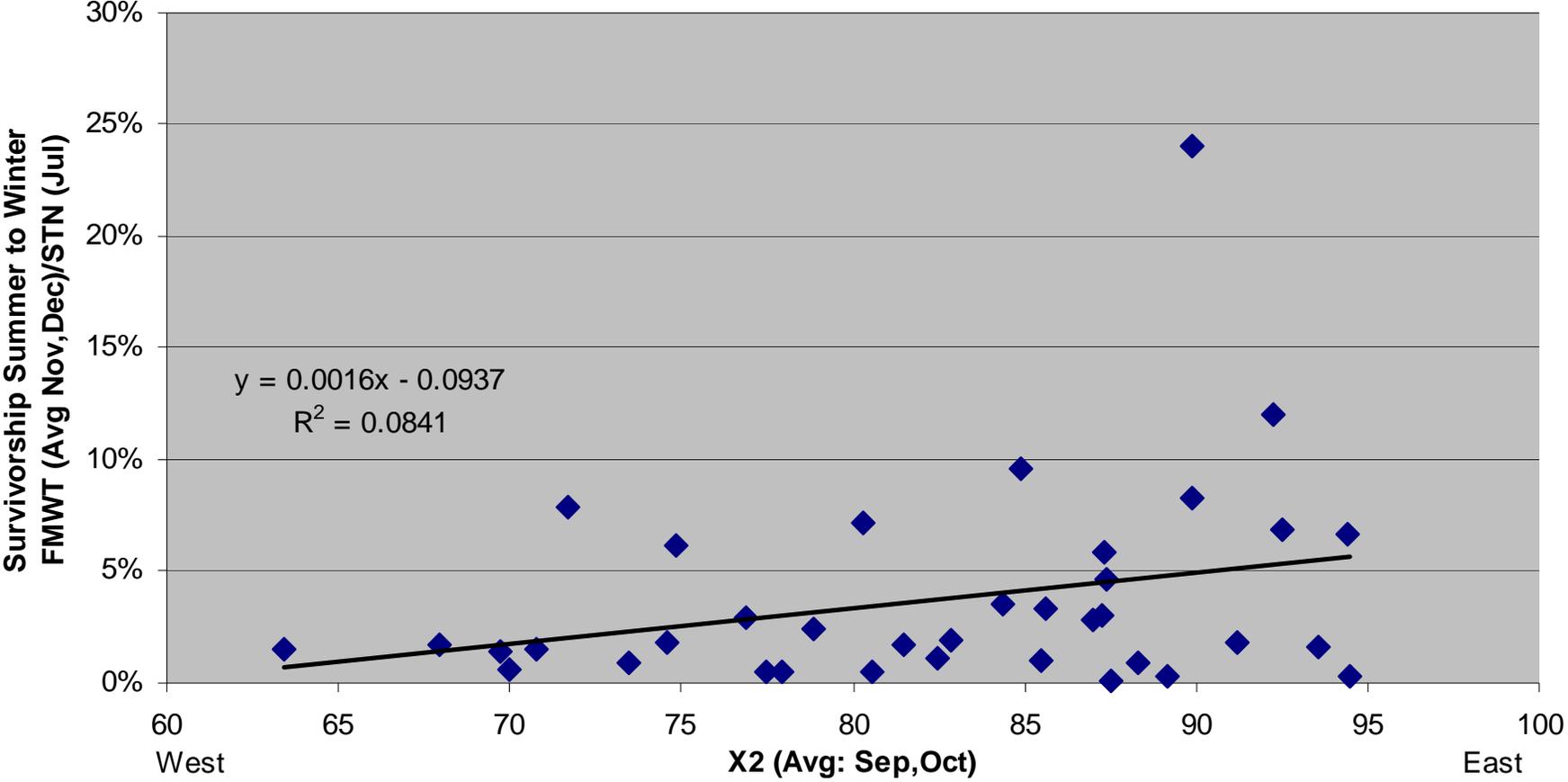
Fig. 3 - Conceptual model of factors that influence the population dynamics of delta smelt synthesized from conceptual pelagic fish models of the Pelagic Organism Decline Management Team (adapted from Armor et al 2005, Baxter et al 2008).

# Approach for Assessing RPAs

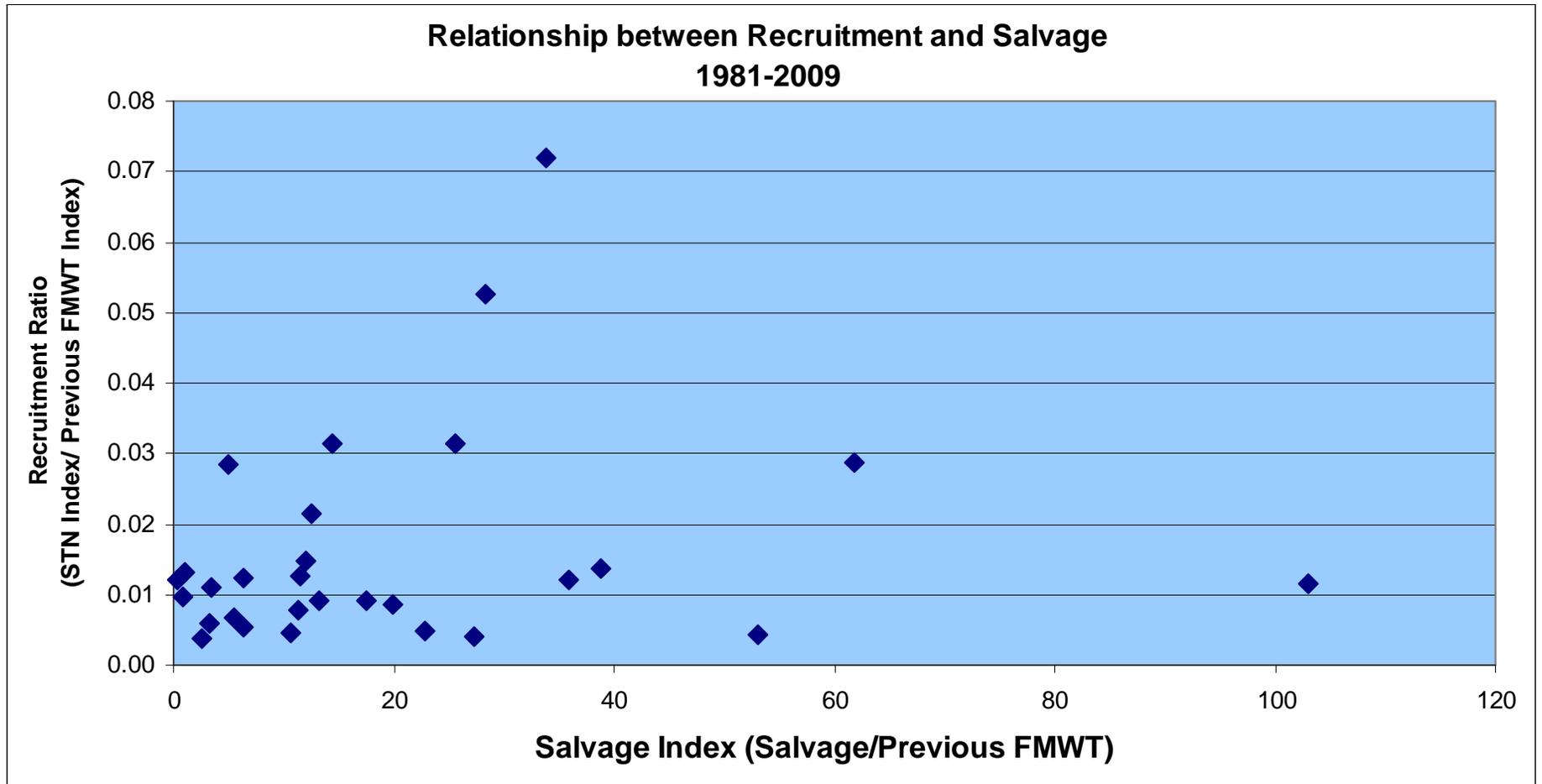
- Effective, efficient and commensurate
- Illustrations: examples not recommendations
- Quantification of impacts of the proposed actions
- Measurement & assessment of performance

# Fall Flows

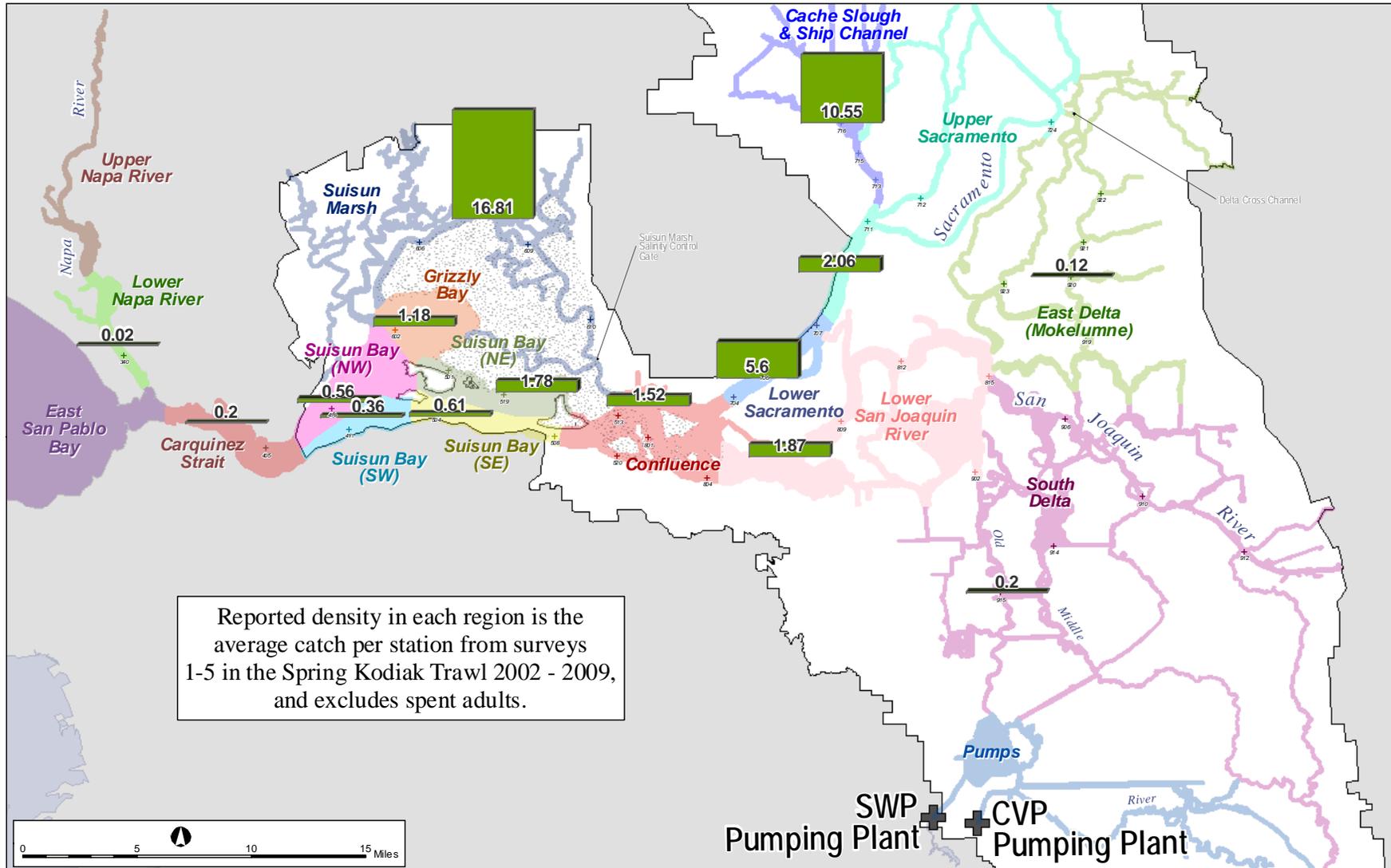
Figure 1  
Survival Versus Sep-Oct X2: 1969-2007



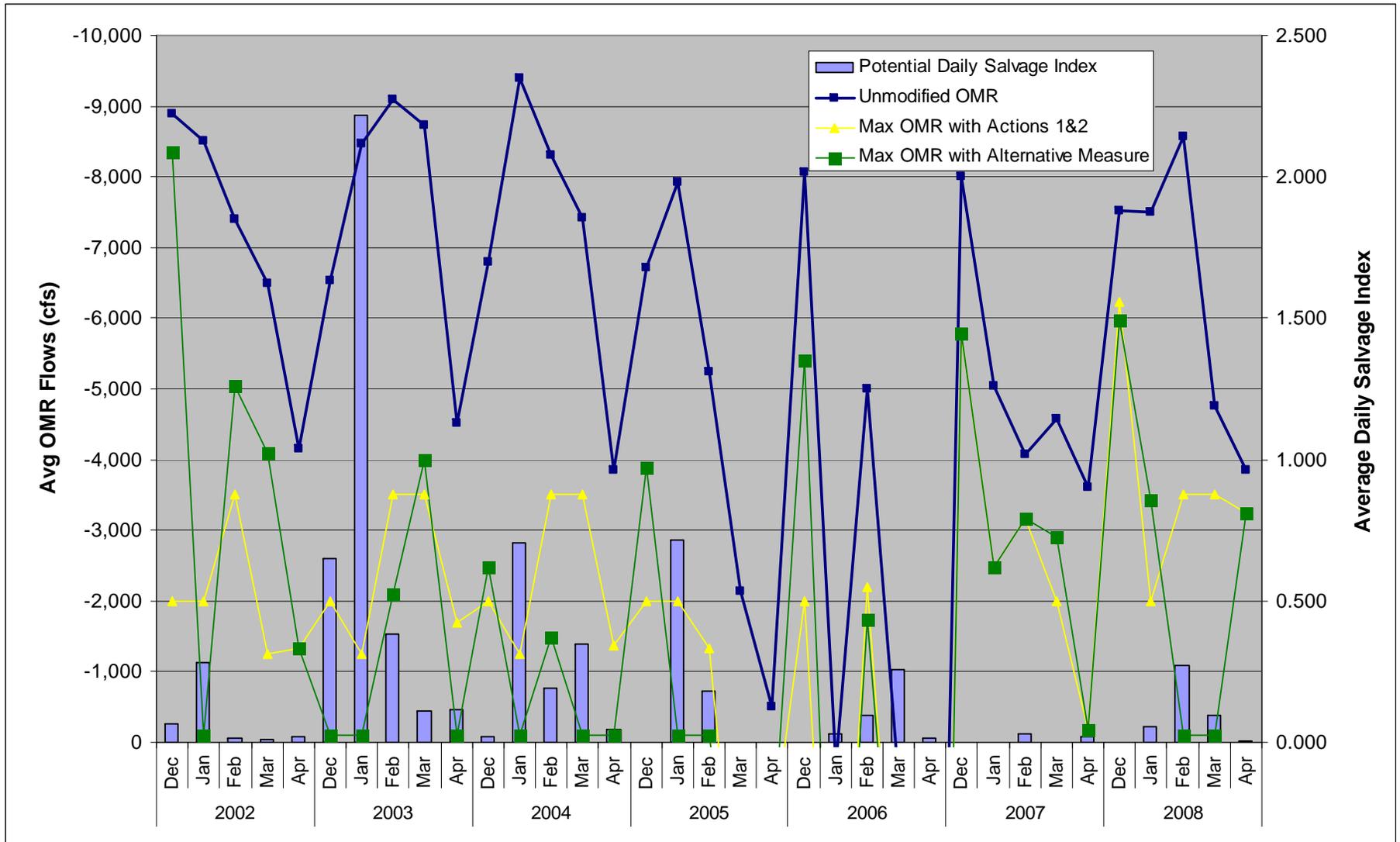
# Entrainment of Adults at Water Projects



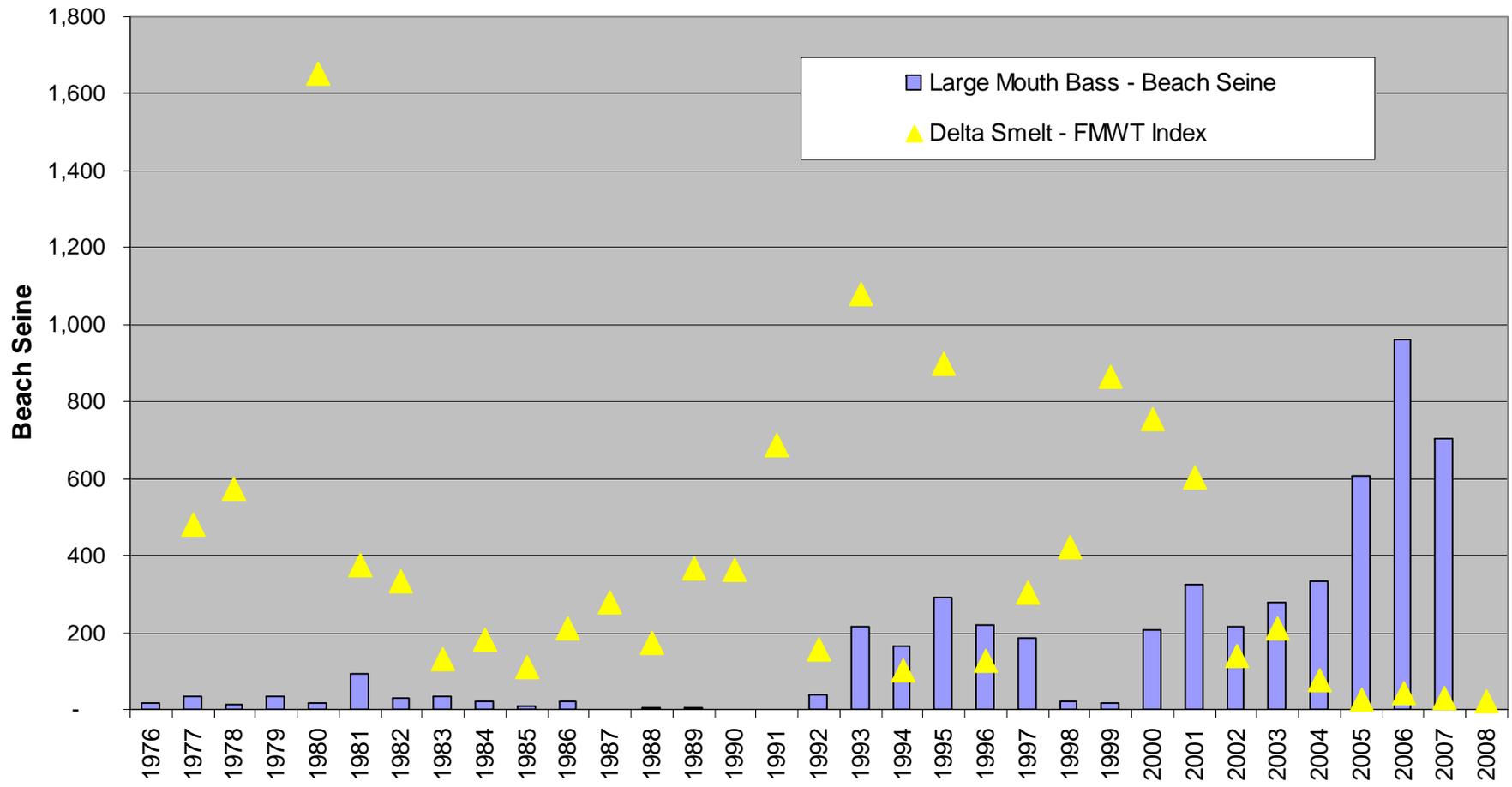
# Relative Density of Pre-spawning Adult Delta Smelt



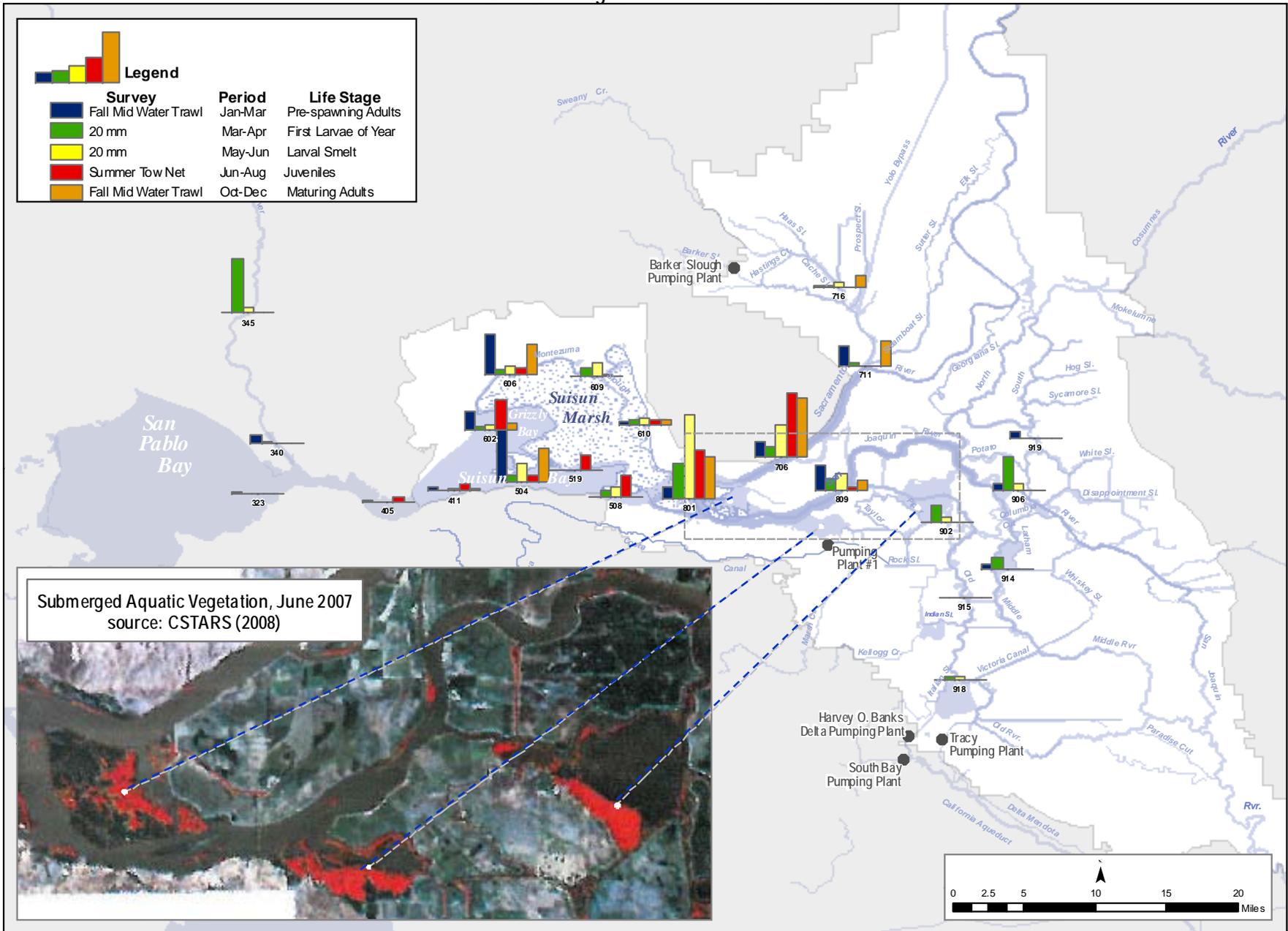
# OMR Reregulation to Reduce Salvage



### Historic Abundance of Large Mouth Bass and Delta Smelt 1976-2008



## Relative Distribution of Delta Smelt at Each Life Stage in Years of Moderate Flow



# Alternative RPAs for Listed Salmonids

Bradley Cavallo, Cramer Fish Sciences

**CALFED Science Panel reviewed the BiOp, and while supportive of jeopardy decision, they concluded:**

*“We believe that lack of quantitative integrative tools will hinder the development of RPAs because NMFS cannot presently quantify the relative contributions of the different project effects to population status nor can NMFS quantitatively determine the potential benefits of specific remedial actions to population recovery.”*

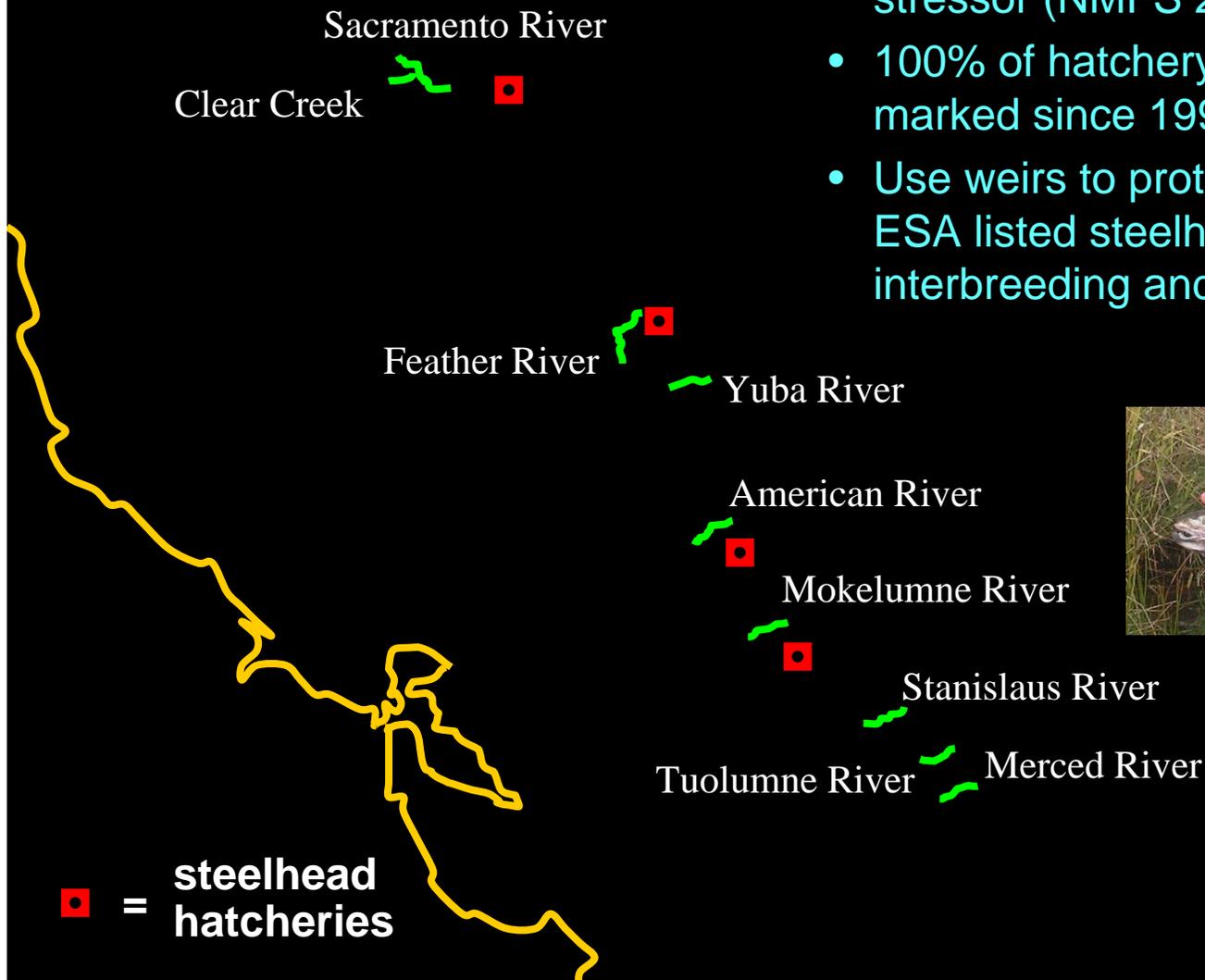
# Improving Salmonid Population Viability: Spring Run Chinook Salmon

- Fall run-introggression: Very high stressor (NMFS 2009 Recovery Plan)
- Use weirs to minimize interbreeding and competition with fall run Chinook!



# Improving Salmonid Population Viability: Central Valley Steelhead

- Hatchery introgression: Very high stressor (NMFS 2009 Recovery Plan)
- 100% of hatchery steelhead externally marked since 1998
- Use weirs to protect natural origin, ESA listed steelhead from interbreeding and competition



## Alternative RPAs Conclusion

- Yesterday we heard ...
  - we must have “expedient actions” and can’t defer to additional studies
  - we have “very little margin for error”
  - that for any scientific uncertainties, we must err on the side of protecting ESA listed fish
- Are the BiOp RPA consistent with these standards?
- Other RPAs to consider
  - Habitat restoration & food web enhancement
  - Restoration of more natural hydrograph
  - Reducing mortality caused by non-native predators
  - Contaminant reduction
  - Reduce other sources of “take”
  - Implement actions to minimize adverse hatchery effects
  - SJ River steelhead smolt trap and ferry through Delta

## General Findings

- In the preliminary analyses presented here, the data suggest that regulating flows are not an effective means of achieving population-level benefits for delta smelt.
- A large number of other RPAs are available that are more effective and more efficient.
- While not presented today, similar preliminary analyses have been developed for Chinook salmon and steelhead. The findings there are similar: relatively little benefit from flow regulation when other measures are available that appear more effective and more efficient.