

# **The Bay Institute**

## **Recommendations to Improve Fishery Resources, Slow or Stop the Decline of Delta Smelt, and Improve Water Quality Conditions in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary**

**June 19, 2007  
SWRCB Workshop**

# Summary

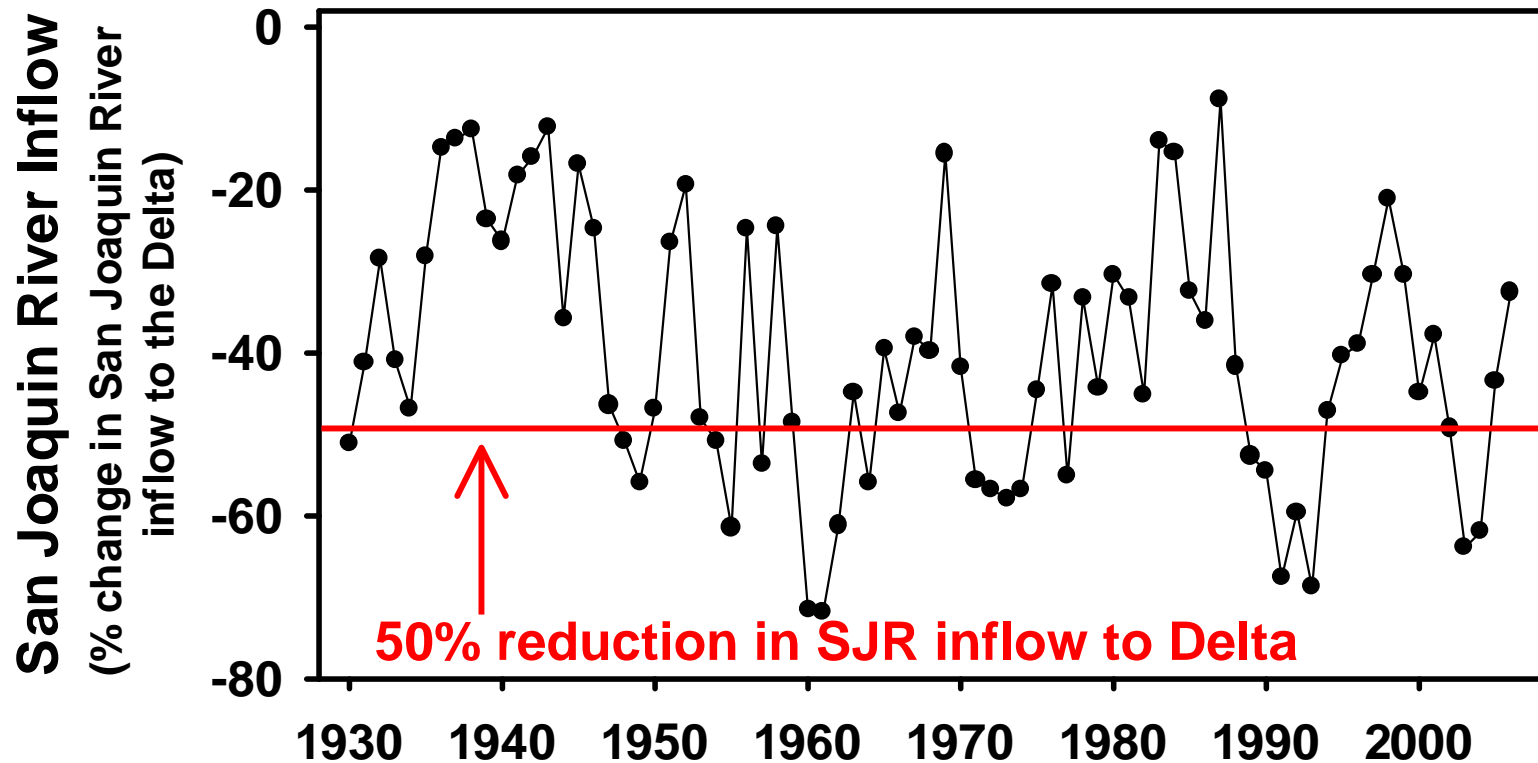
- **Overall flow and water quality conditions in the Delta are deteriorating**
- **Delta smelt and other native species at imminent risk of extinction**
- **Research shows contributing factors are:**
  - **San Joaquin River flows**
  - **Delta outflows**
  - **Exports**
  - **In-Delta channel hydrodynamics**
  - **Episodic toxicity**
  - **Harmful invasive species**

# Summary

- **Agency response has been inadequate**
  - Protective measures have not been implemented
  - No valid ESA permits
- **Long-term planning efforts will not provide near-term protections for species at imminent risk of extinction**
- **SWRCB has sufficient information - and the authority - to issue cease and desist orders, adopt new permit conditions and issue discharge permits to address unsustainable and deteriorating conditions in the Delta**

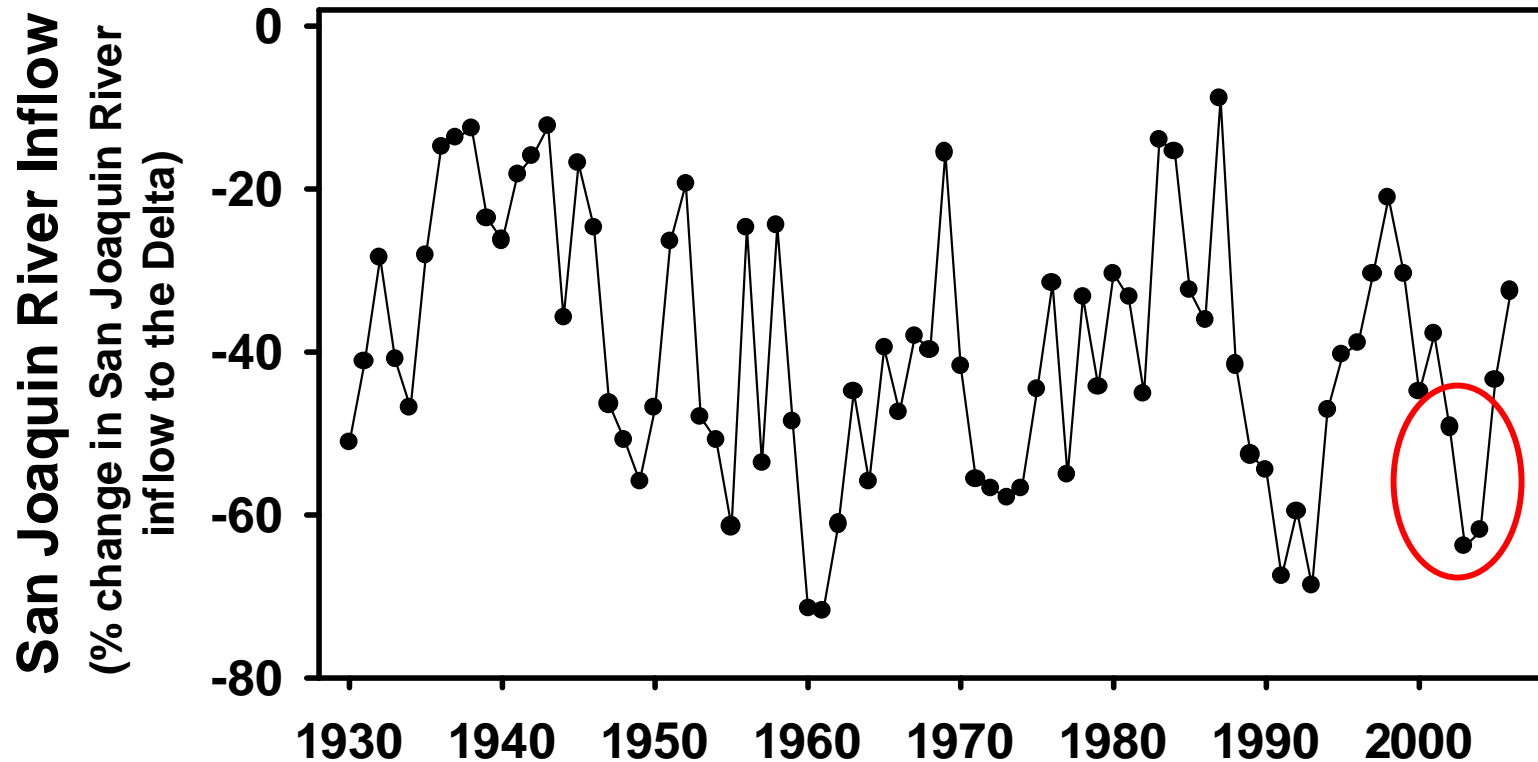
# Low San Joaquin River Inflow to the Delta

- 2003 and 2004: 3<sup>rd</sup> and 4<sup>th</sup> lowest in 77-year period
- San Joaquin inflow to Delta cut by more than 60%
- Worse than most years 1987-1992 drought
- 2002, 2003, and 2004: Vernalis flow objective violated multiple months



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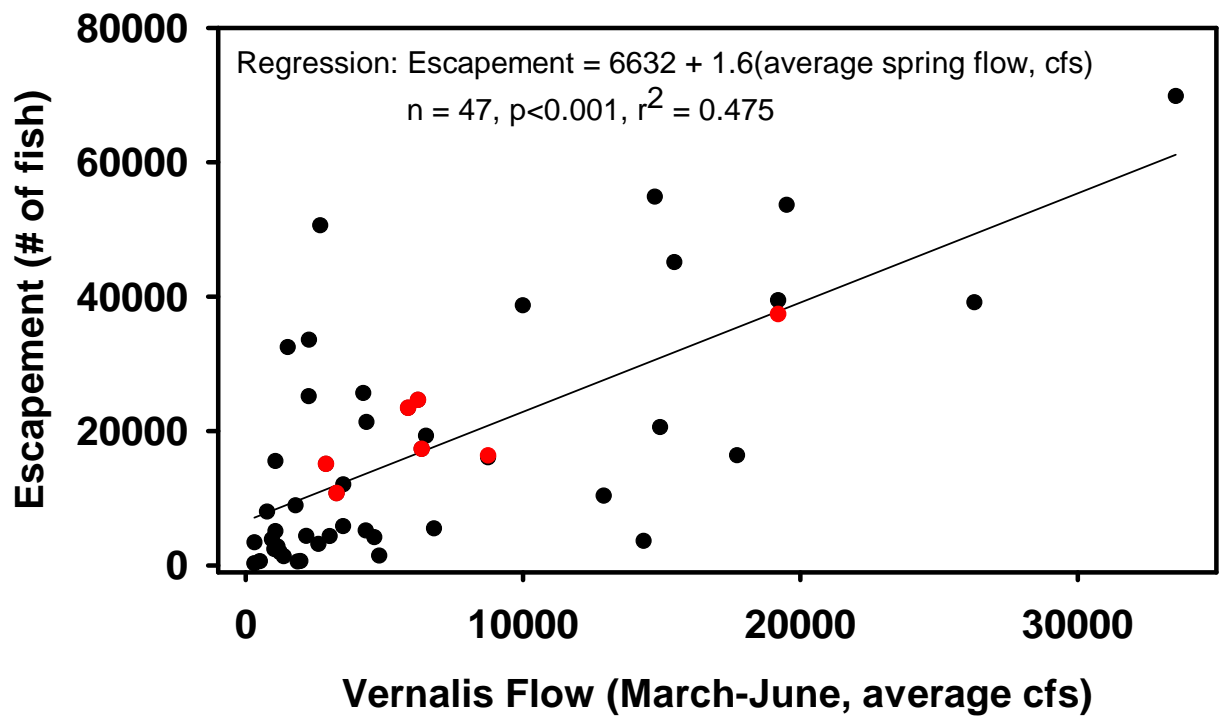


# Ecological and Fisheries Consequences of Low San Joaquin River Flows

- **Reduced survival and abundance San Joaquin basin Chinook salmon**

- **Frequent low dissolved oxygen in lower San Joaquin River**

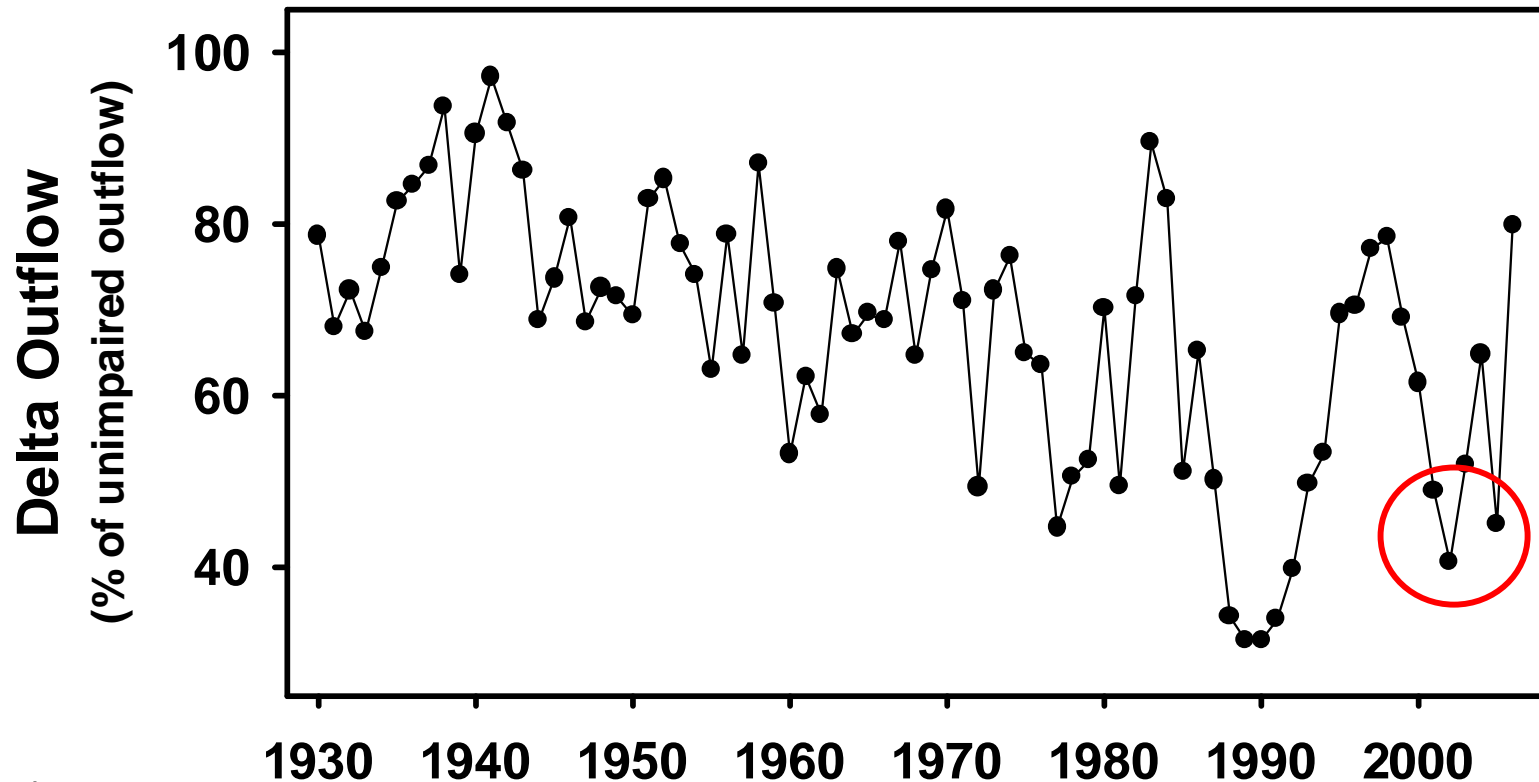
- **Reverse flows in lower San Joaquin River and Delta channels**



From: TBI comments on Vernalis Flow Objective, March 15, 2005

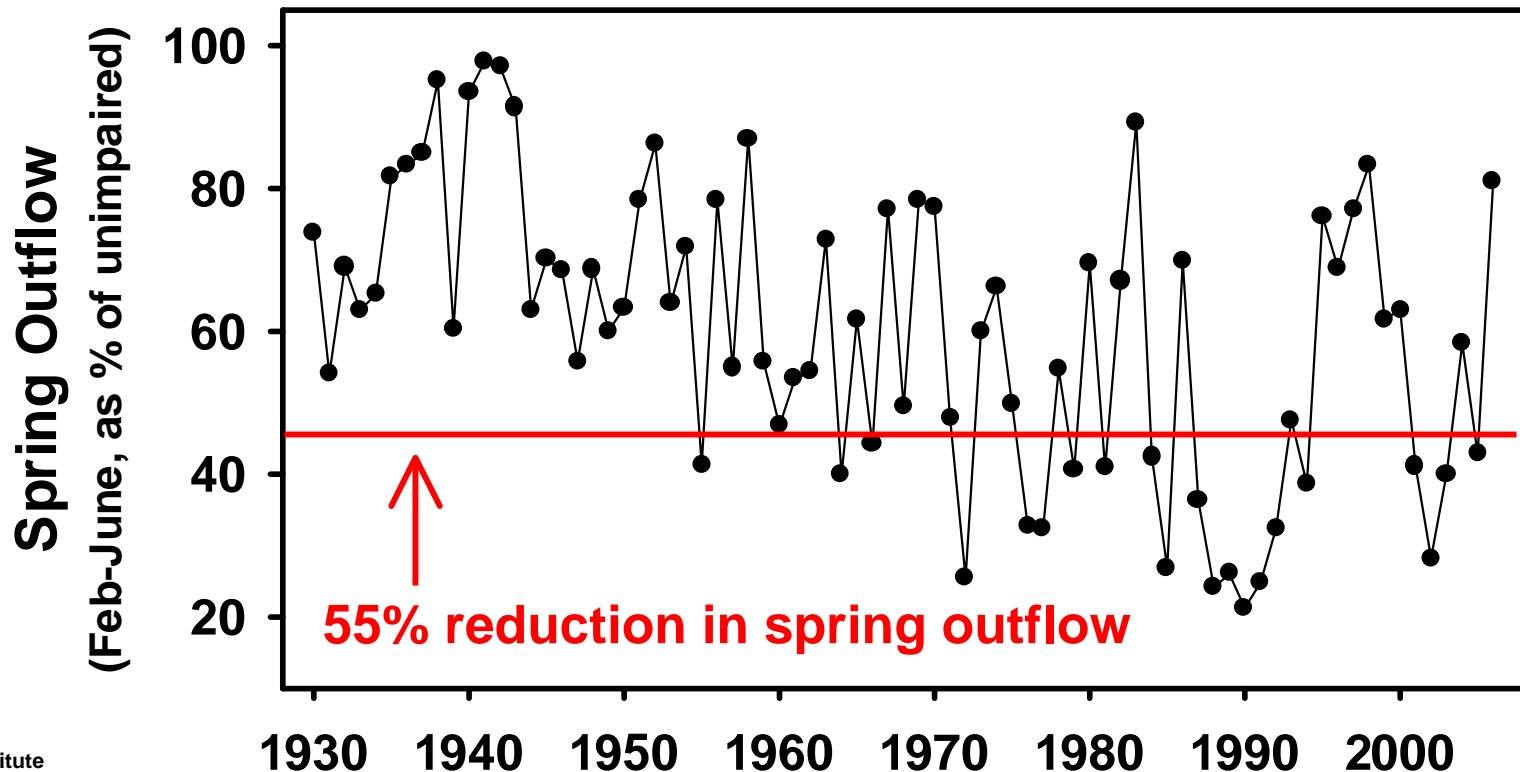
# Reduced Delta Outflow

- 2002 and 2005: 6<sup>th</sup> and 8<sup>th</sup> lowest in 77-year record
- Annual outflow cut by more than 50% in 2001, 2002, 2005
- 2005 was an “above normal” year
- Worse than all years except 1987-1992 drought



# Greatest Outflow Reductions in Spring

- Spring outflow cut by more than 57% in 2001, 2002, 2003 and 2005
- Spring outflow cut by 72% in 2002
- Very poor spring X2 conditions in 2001 and 2002
- Reductions comparable to outflows during the 1976-1977 and 1987-1992 droughts





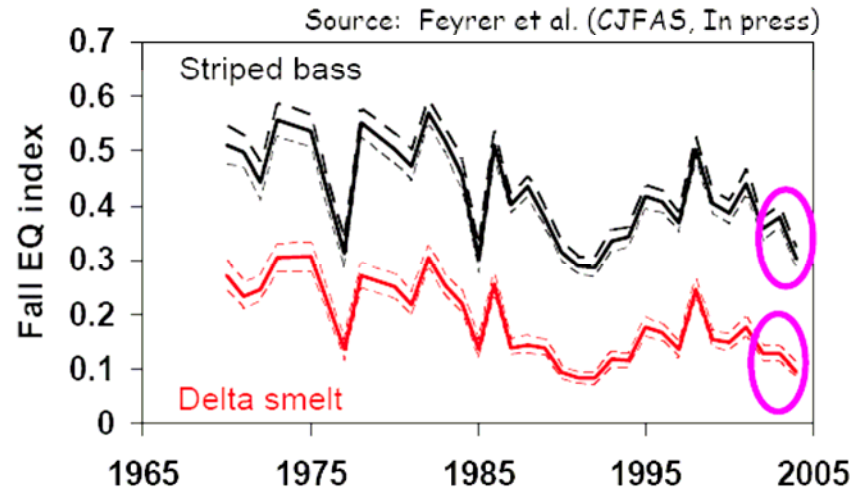
# Ecological and Fisheries Consequences of Reduced Delta Outflows

## Reduced Fall outflow:

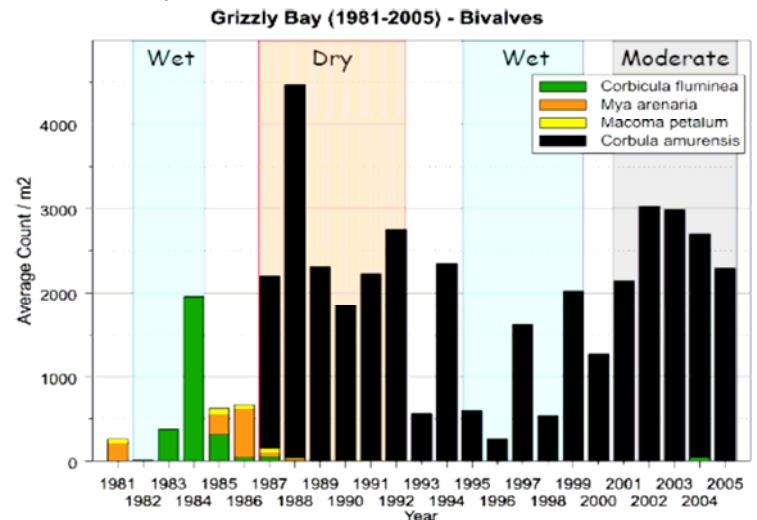
- Declining habitat quality
- Increased range and abundance of harmful invasive species
- Low abundance juvenile Delta smelt

Graphs from: Comments of T. Sommer, DWR, IEP POD Management Team, at SWRCB Pelagic Organism Decline Workshop, March 22, 2007

Fall "habitat quality" has deteriorated



Salinity variation also affects clams



Source: Marc Vaysierres and others (DWR)

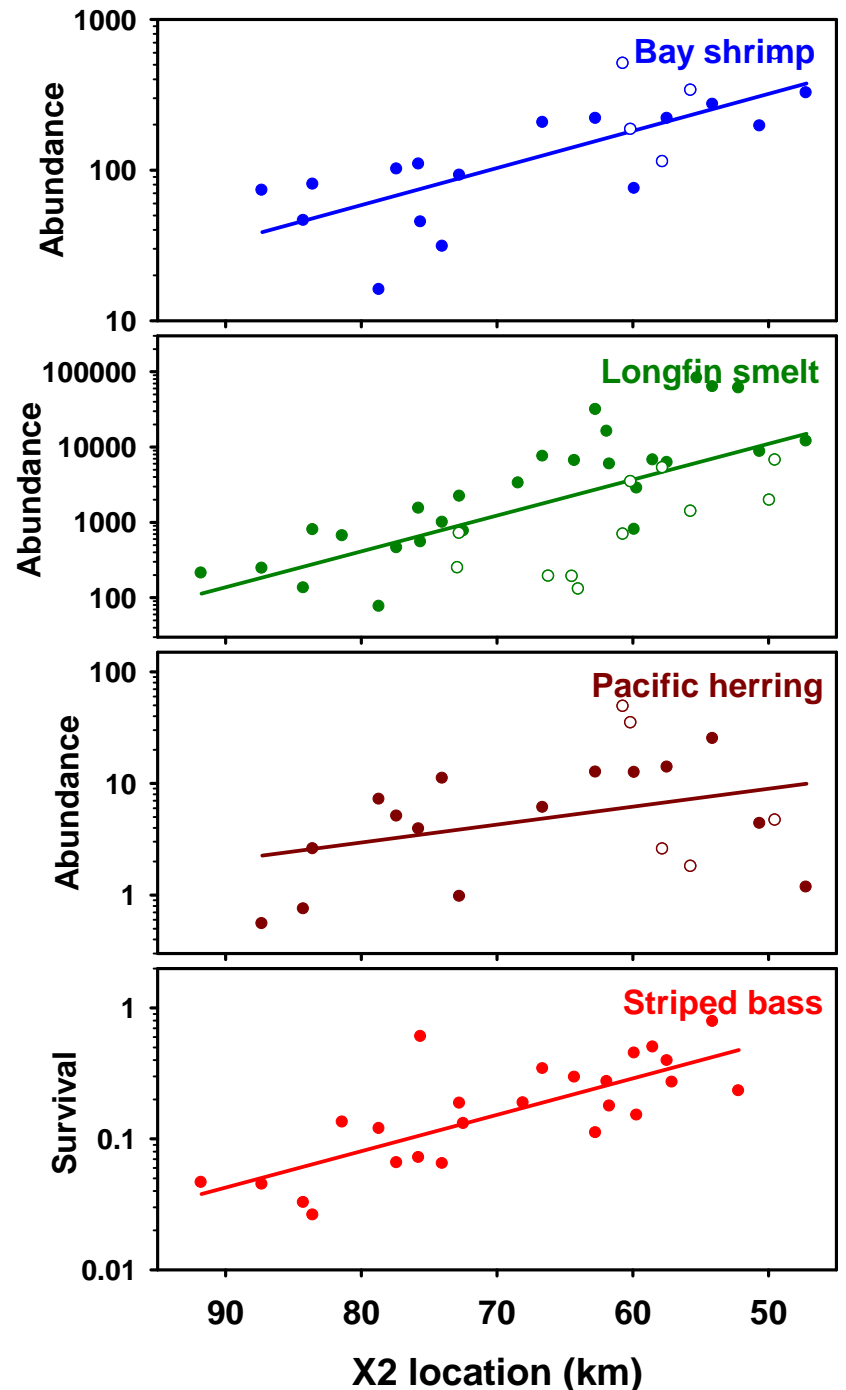
# Ecological and Fisheries Consequences of Reduced Delta Outflows

Reduced Spring outflow:

- Low abundance estuary-dependent fish and invertebrate species

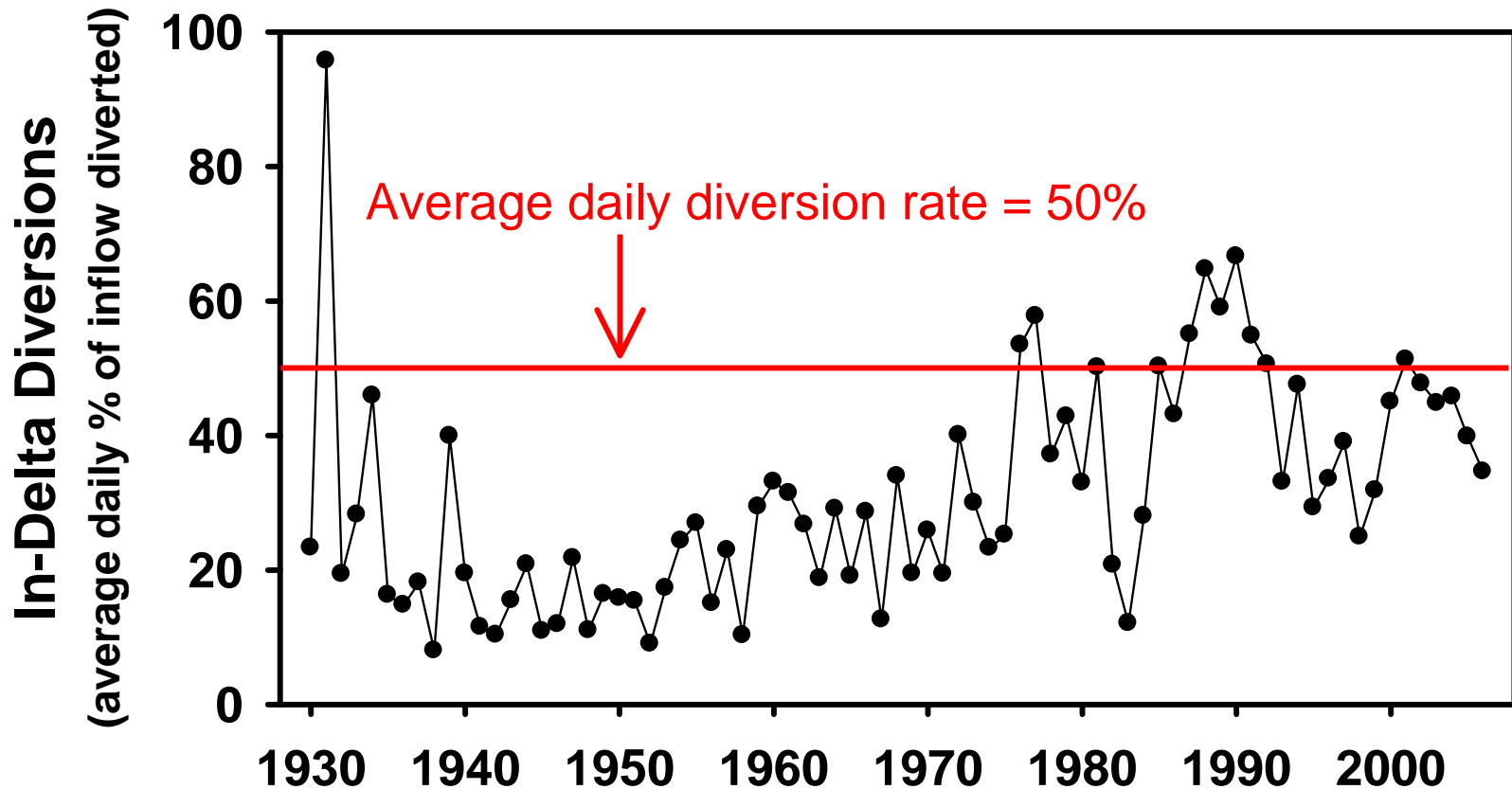
From: TBI comments on Spring Outflow Objective, Jan. 12, 2005, and Pelagic Organism Decline Workshop, March 22, 2007

Data source: W. Kimmerer, SFSU; DWR, Dayflow



# Delta Diversions Continue to Increase

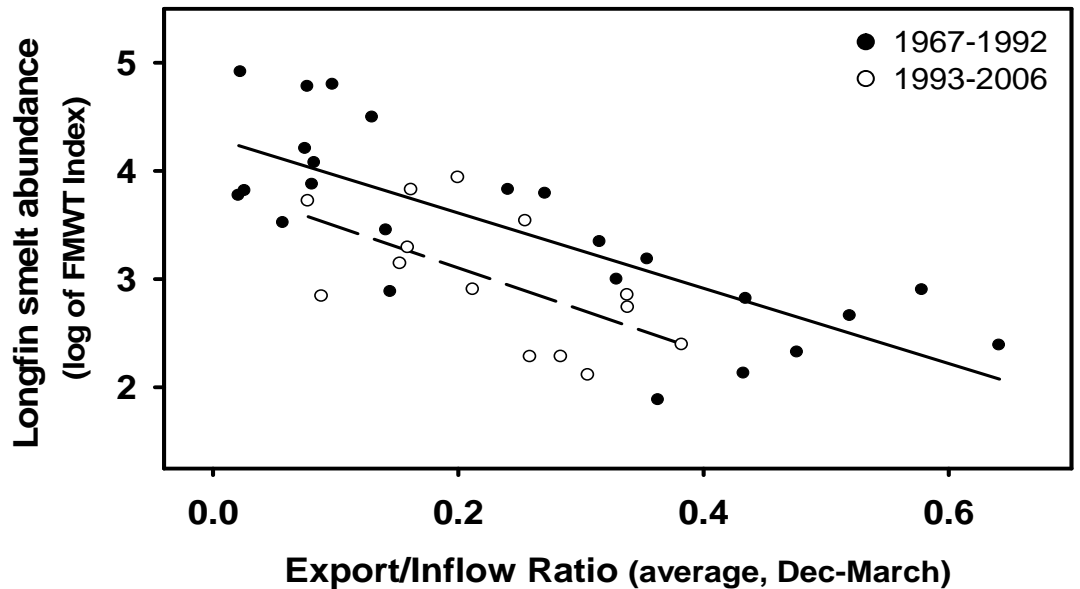
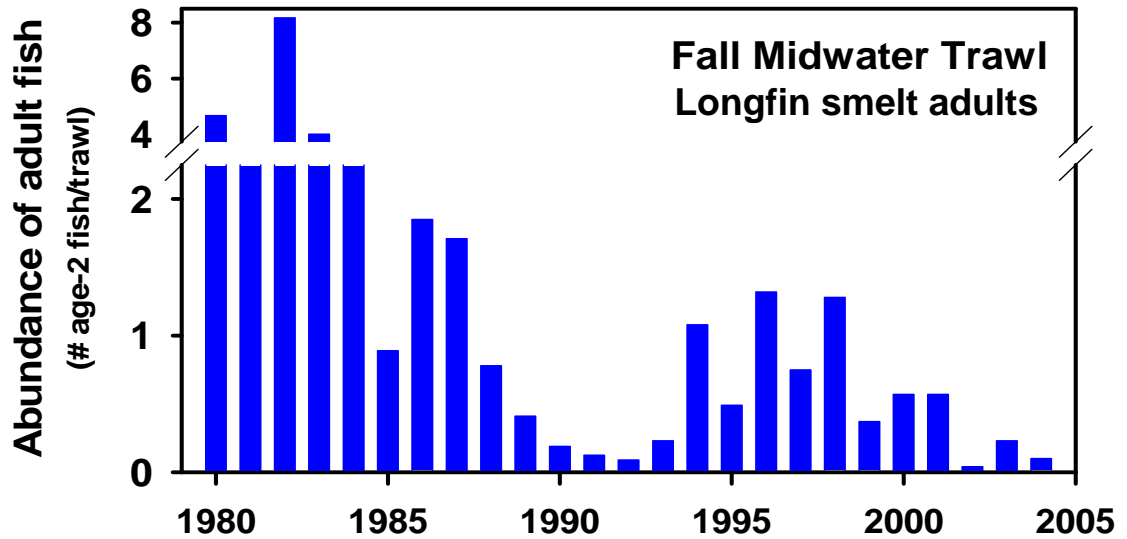
- 2001 = 9<sup>th</sup> highest in 77-year period
- 2000-2004 average = 47%
- Worse than nearly all years except severe droughts



# Ecological and Fisheries Consequences of High Delta Diversion Rates

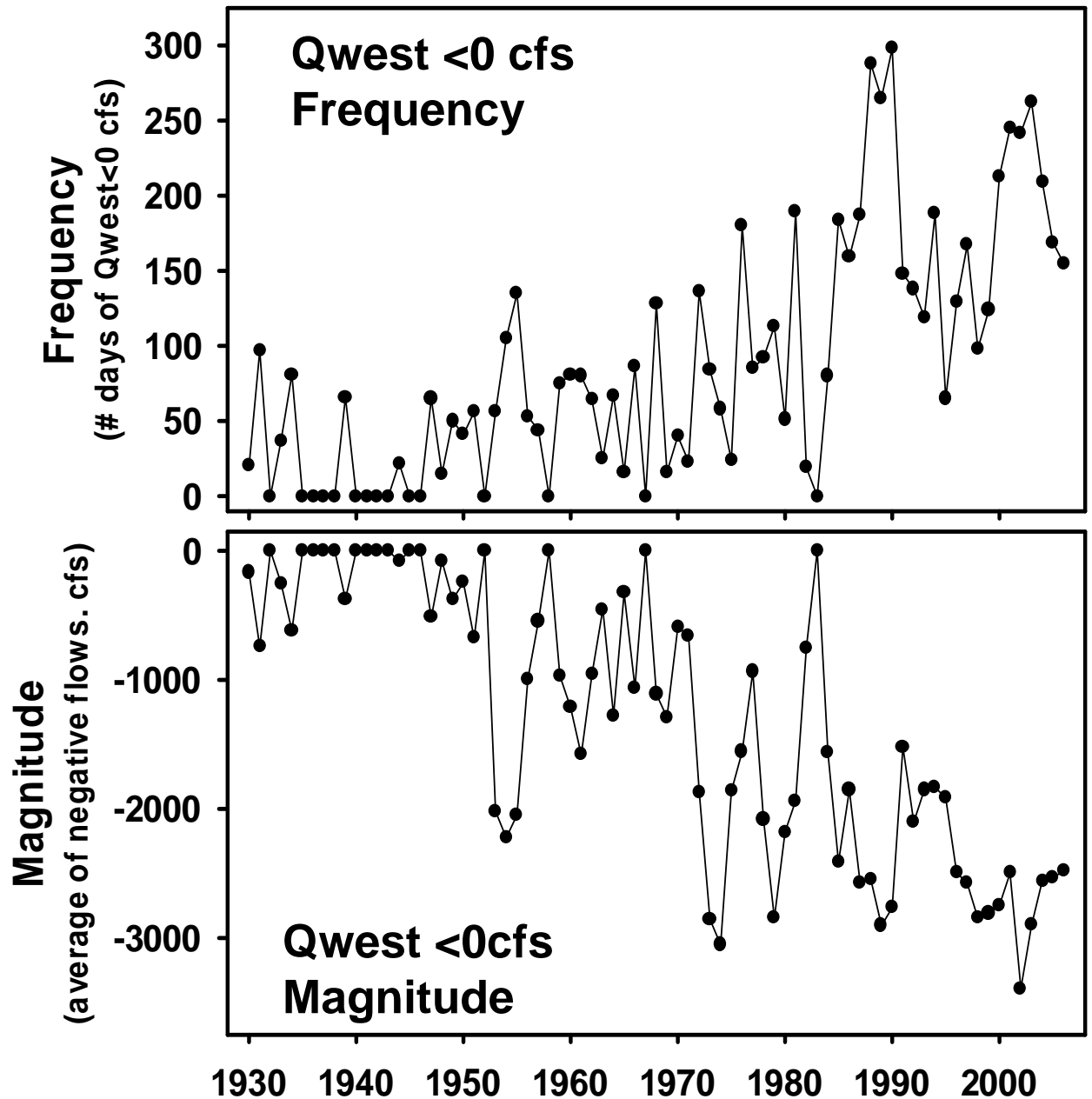
- Altered in-Delta hydrodynamics (reverse flows)
- Reduced Delta outflow
- Loss of nutrients, plankton and fishes
- Population-level effects (longfin smelt)

Data Sources: J.A Rosenfield; DFG, FMWT Index; and DWR, Dayflow



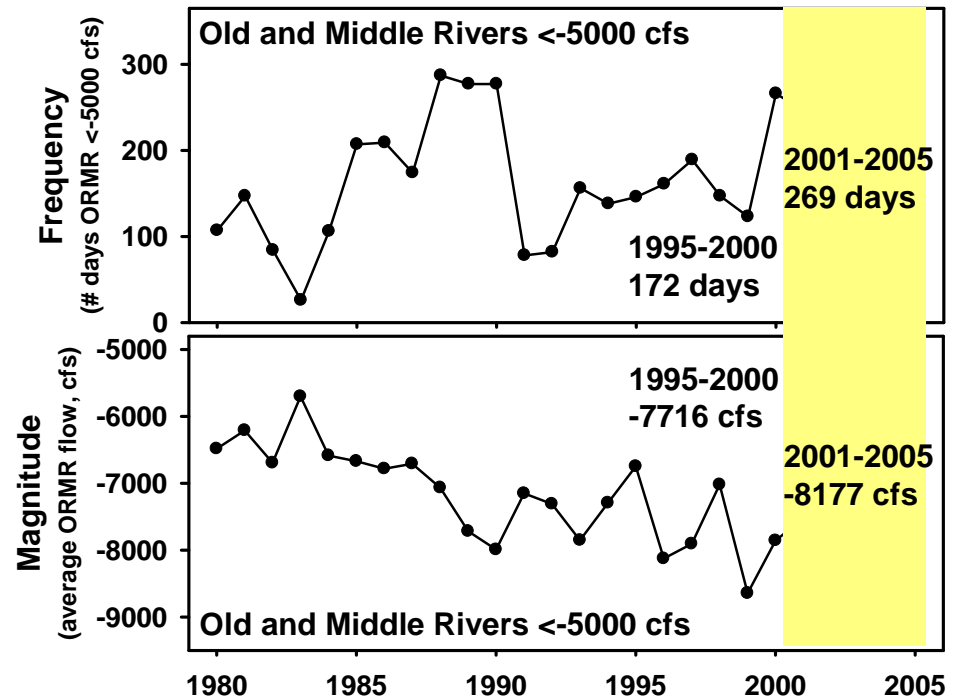
# Reverse Flows Worsening

- **2001-2005:**  
Combined  
frequency and  
magnitude of  
negative Qwest  
worse than any  
period in 77  
years

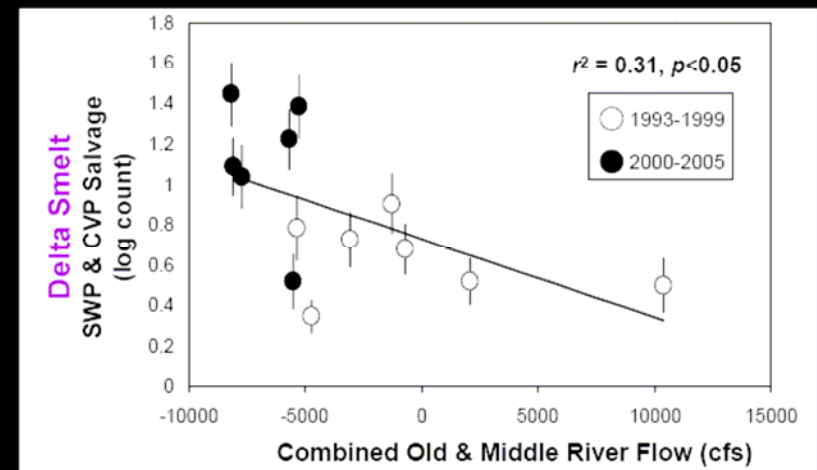


# Ecological and Fisheries Consequences of Reverse Flows

- Increased entrainment and incidental take at export facilities
- Reduced transport of nutrients, plankton, and fish downstream



## Negative Old & Middle River Flows Apparently Increase Adult Delta Smelt Entrainment

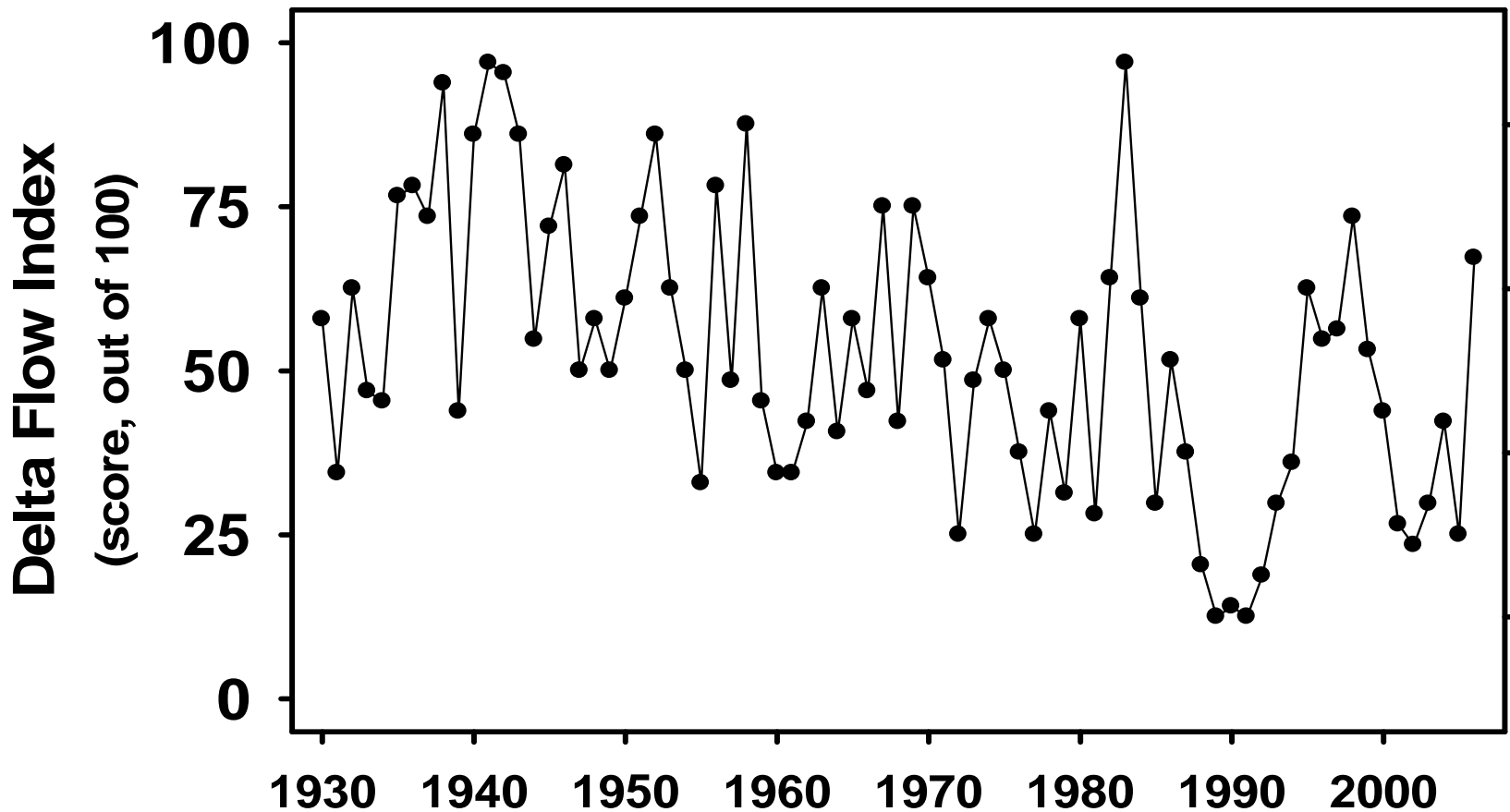


Mean Values for December-March 1993-2005

Source: Adapted from Pete Smith (USGS)

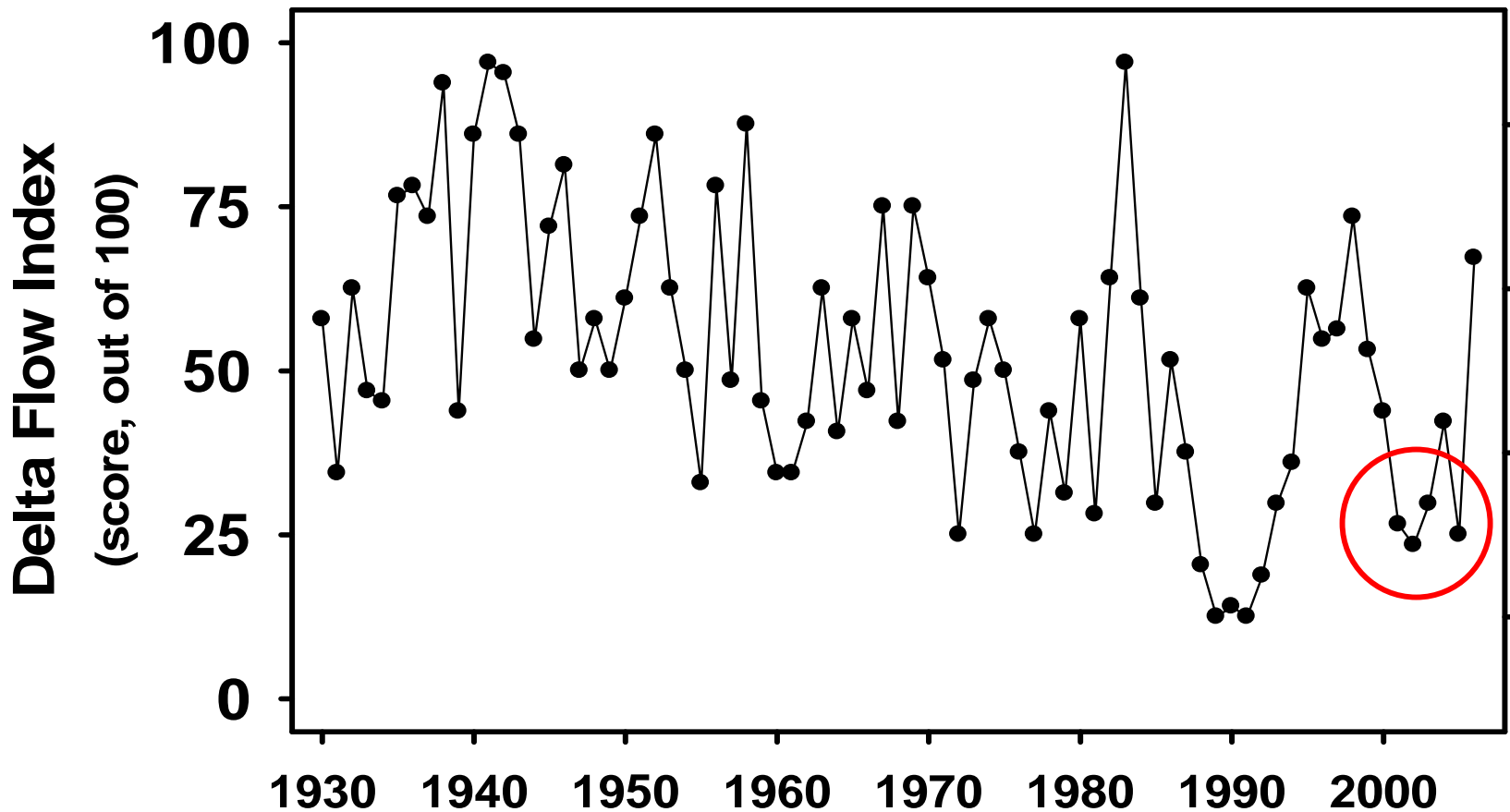
# The Bay Institute's Delta Flow Index

8 Quantitative Indicators (Delta inflows, outflows, in-Delta hydrodynamics, and flow-related ecological conditions)



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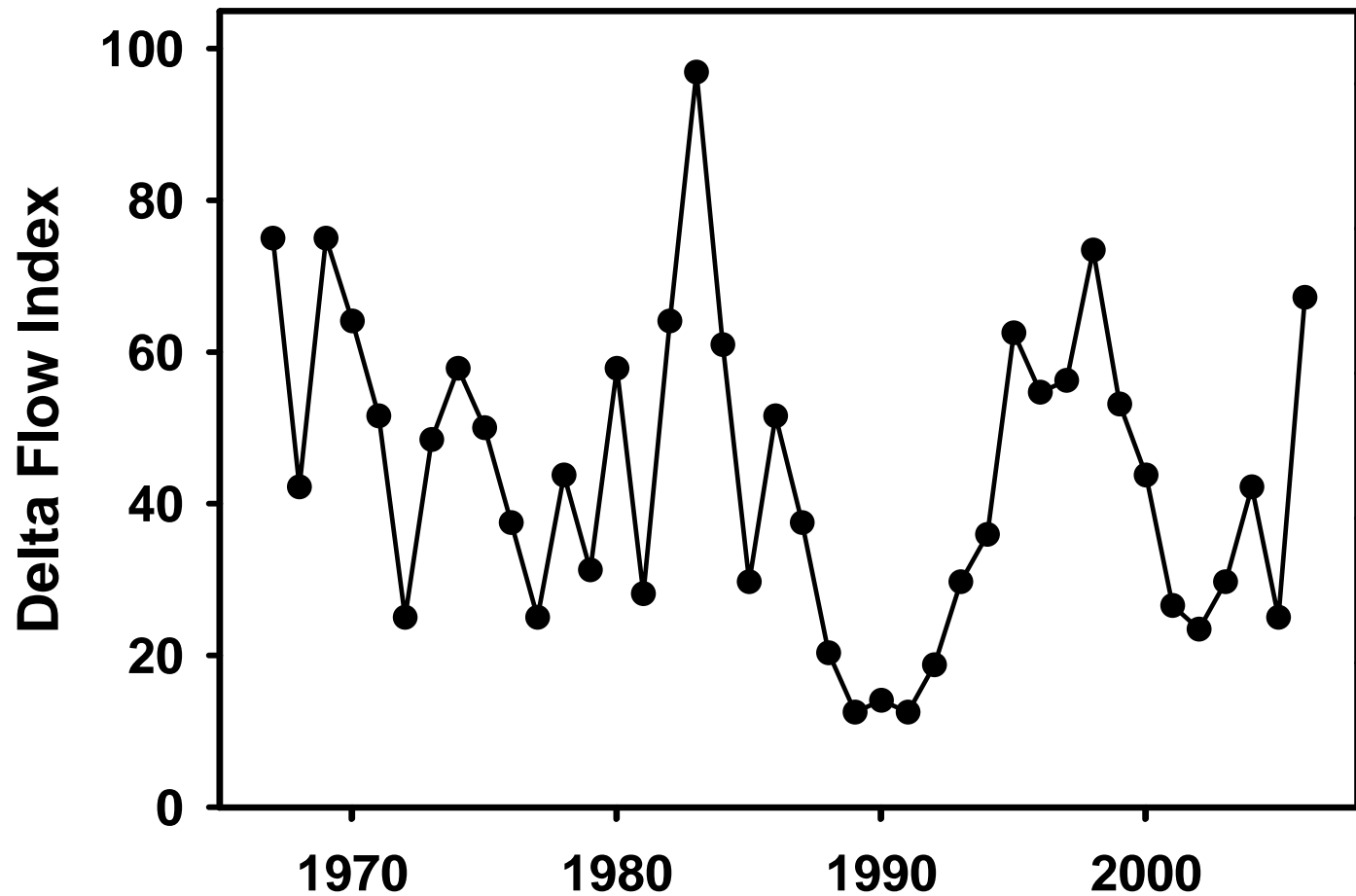
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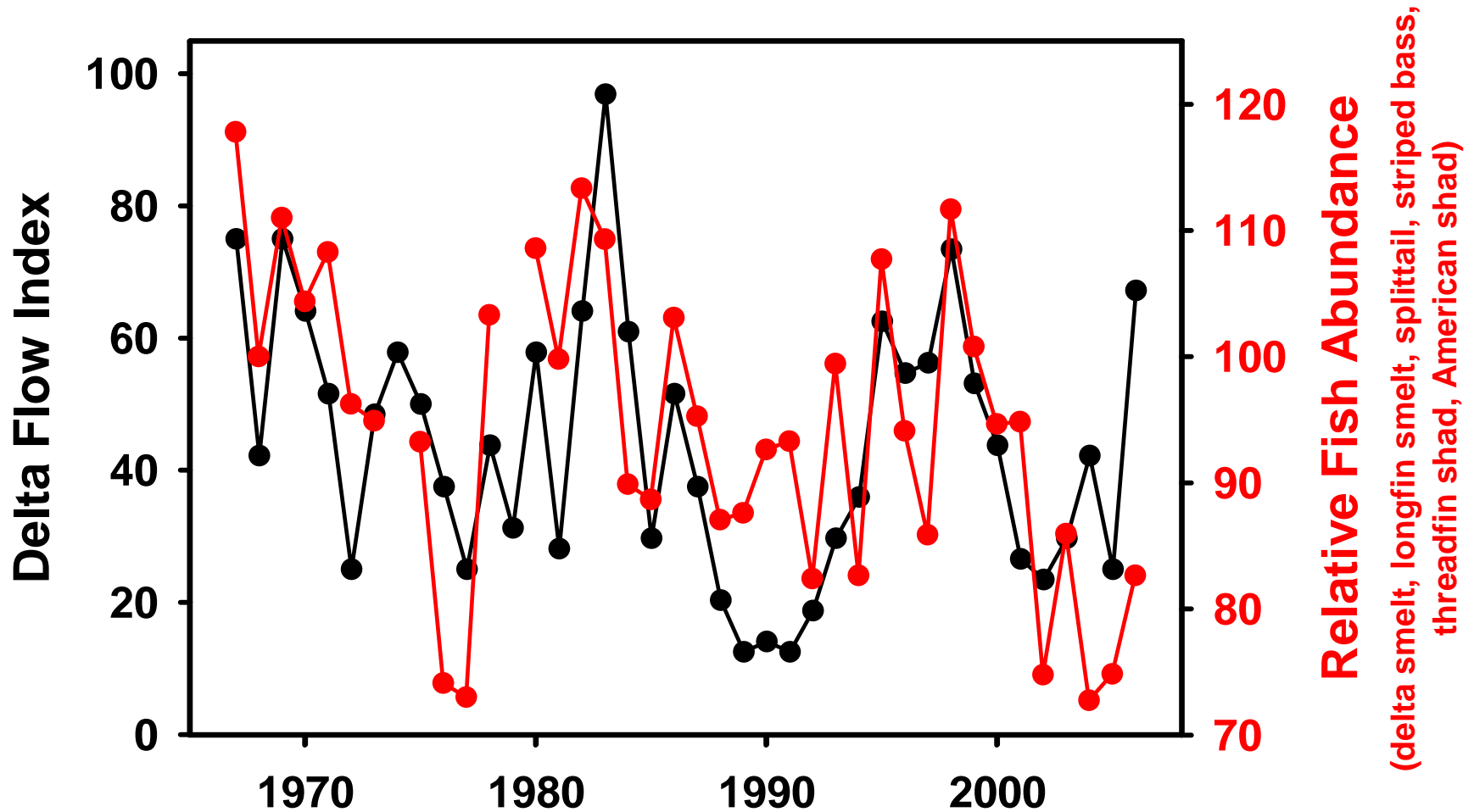
# Delta Flow Index and Fish Abundance

## 1967-2006



# Delta Flow Index and Fish Abundance

- Highly correlated with DFG Fall Midwater Trawl Survey results for 6 Delta pelagic species



# **Other Contributing Factors to Poor and Declining Delta Conditions**

## **Episodic Toxicity**

- **Point and Non-point source pollution**
- **Agricultural discharges**

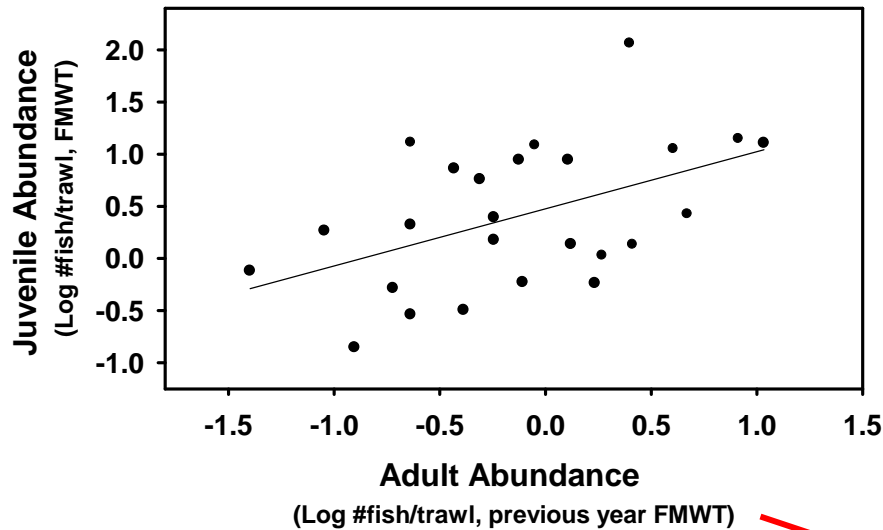
## **Harmful Invasive Species**

- **Adversely affect native species**
- **Symptom of poor ecological, flow and water quality conditions**
- **Control of harmful invasives will require addressing flow and water quality stressors**

# Why should the SWRCB act?

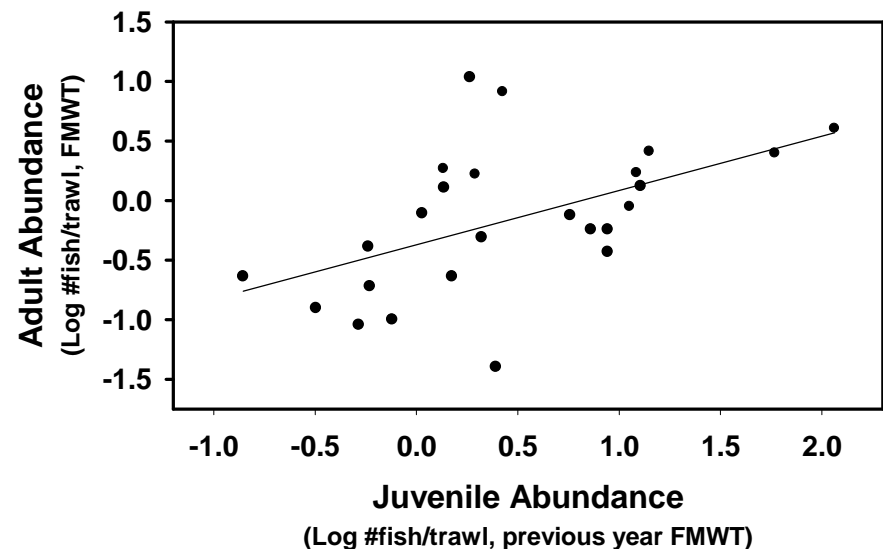
## 1. Imminent risk of extinction for several species

Delta ecosystem and fisheries in critical condition  
(POD, low population abundance, reduced resiliency)



### Longfin smelt

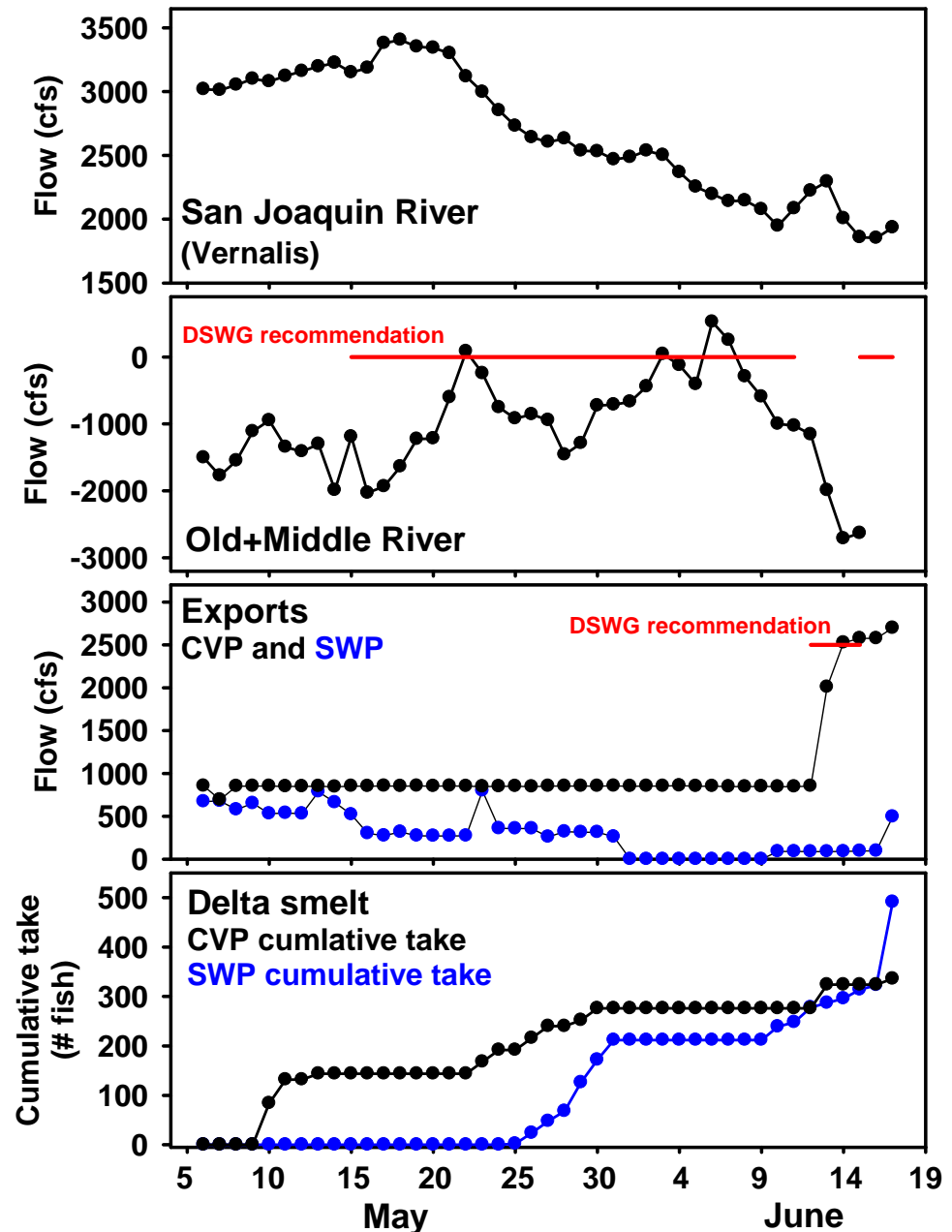
- Record low abundance (2002-2006)
- Significant stock recruitment relationships



# Why should the SWRCB act?

## 2. Protective measures have not been implemented by federal and state agencies

- DSWG recommendations not implemented
- Tier 3 not invoked after Environmental Water Account assets exhausted



# Why should the SWRCB act?

## 3. No valid ESA permits for project operations

- **No CESA permit ever issued for CVP and SWP (in violation of water rights permits from SWRCB)**
- **Federal ESA biological opinion for delta smelt declared unlawful in May 2007 for ignoring data that indicated species was in jeopardy from project operations**
- **New biological opinions will not be completed until late 2008 or later**

# Why should the SWRCB act?

**4. Long term planning efforts (Bay-Delta Conservation Plan and Delta Vision) are not timely enough to address imminent risk of extinction:**

- **Completion dates for planning phase in 2008 or later**
- **Plans will require subsequent NEPA/CEQA review**
- **Plans likely to propose major changes in Delta that will require legislative and voter approval as well as permits from SWRCB and other regulatory agencies**

# **What should the SWRCB do to prevent extinction?**

## **1. Issue cease and desist orders against CVP and SWP until actions taken to:**

- Reduce direct and indirect mortality associated with project operations**
- Improve outflow conditions for estuarine habitat and primary and secondary plankton production**
- Facilitate transport of food organisms and fish from south and central Delta to confluence and Suisun Bay**
- Reduce episodic toxicity from areas serviced by CVP and SWP deliveries**
- Modify operations to reduce range and abundance of invasive species**



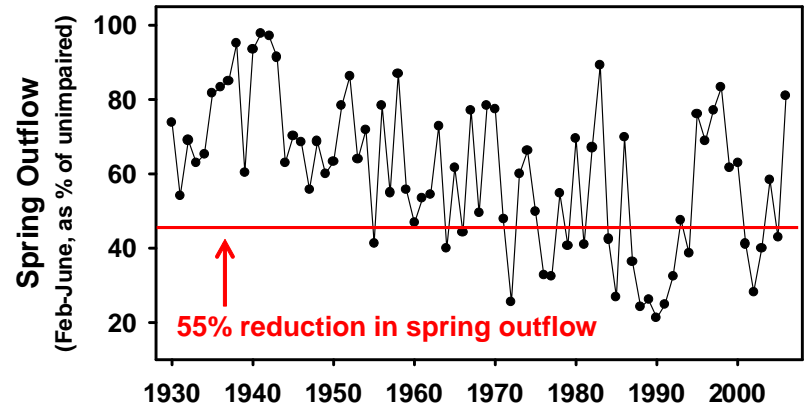
# **What should the SWRCB do to prevent extinction?**

- 2. Require in-Delta diverters to cease diversions when POD species are nearby as determined by surveys and/or salvage results**
- 3. Require non-project diverters upstream of the Delta to make releases for extended Vernalis pulse flows and improved Delta outflows**
- 4. Require dischargers upstream of the Delta to reduce or eliminate toxic discharges that can cause episodic toxicity**

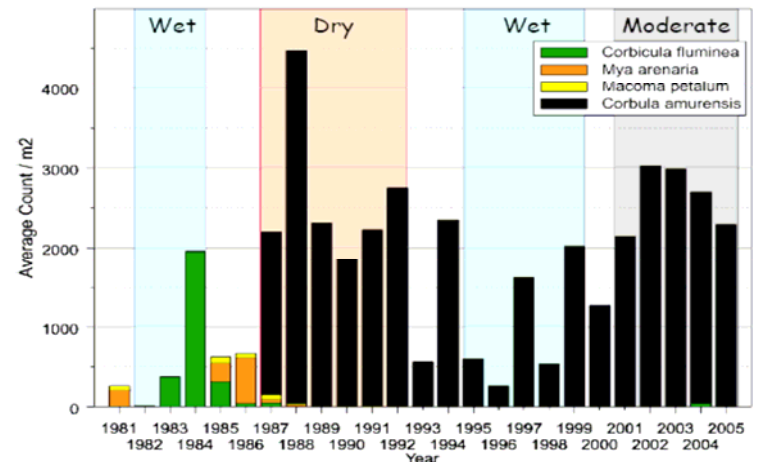
# What should the SWRCB do to prevent extinction?

## 5. Establish new criteria/permit conditions to Improve Delta outflow conditions:

- Improve February-June outflows to maintain a 1956-1962 level of protection
- Maintain fall (October-December) X2 downstream of 80 km to improve estuarine habitat quality and reduce the abundance and distribution of the invasive clam *Corbula*



Salinity variation also affects clams  
Grizzly Bay (1981-2005) - Bivalves



# What should the SWRCB do to prevent extinction?

## 6. Establish new criteria/permit conditions to improve San Joaquin River conditions

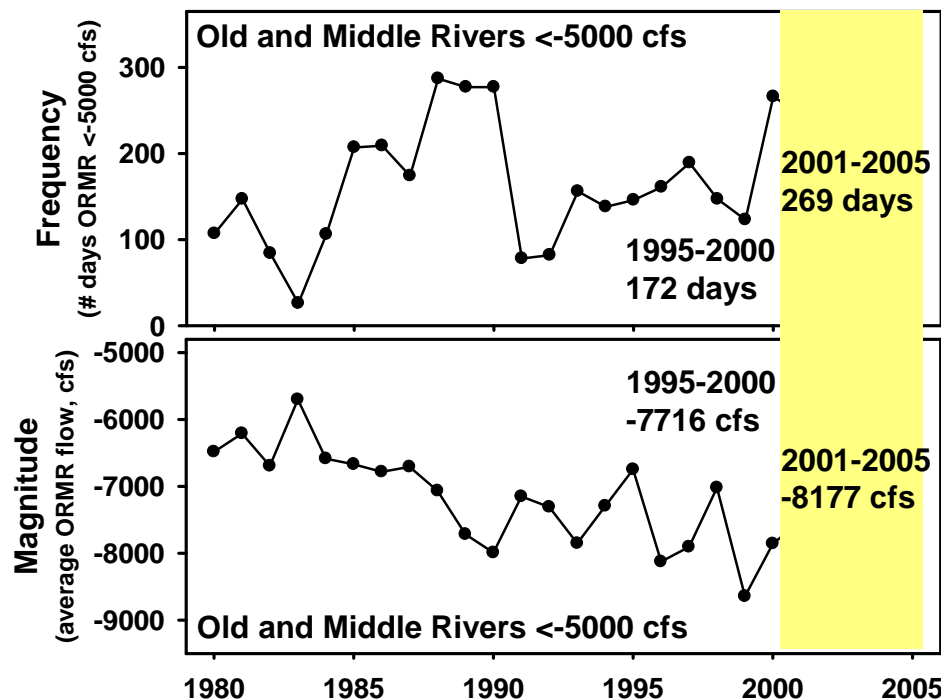
- Decrease or eliminate negative flows on Old and Middle Rivers to reduce entrainment mortality and facilitate downstream transport of plankton and fish

➤ 0 cfs February-April 15 and May 16-June

➤  $\geq -4000$  cfs July-October

➤  $\geq -4000$  cfs during winter

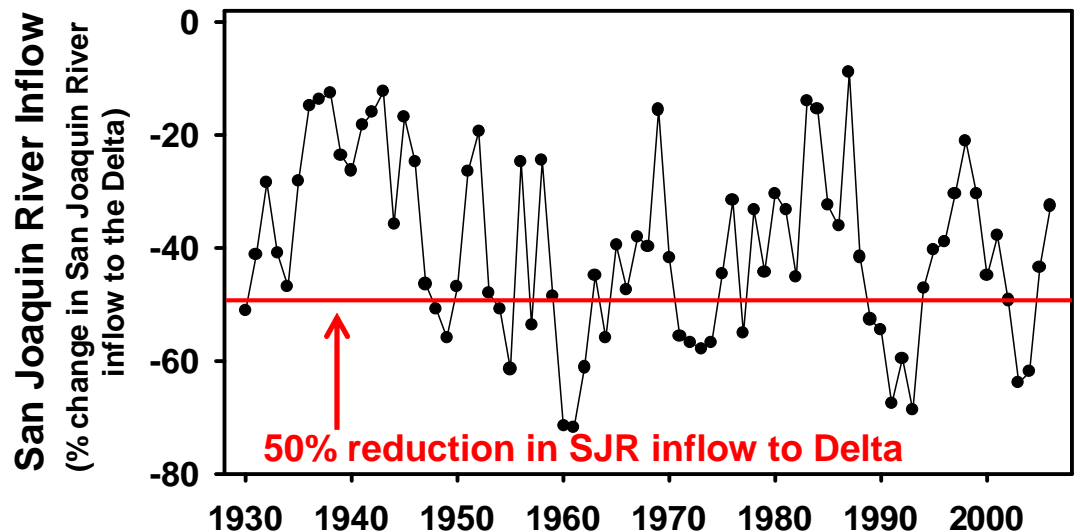
**flood pulses**



# What should the SWRCB do to prevent extinction?

## 6. Establish new criteria/permit conditions to improve San Joaquin River conditions (cont.)

- Ramp up Vernalis pulse flows and initiate export restrictions starting in March and continue until >95% of delta smelt are downstream of Sacramento-San Joaquin confluence



# **What should the SWRCB do to prevent extinction?**

**7. Prohibit installation of HORB and agricultural barriers until >95% of delta smelt are downstream of Sacramento-San Joaquin confluence (as determined by survey and salvage results)**