

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

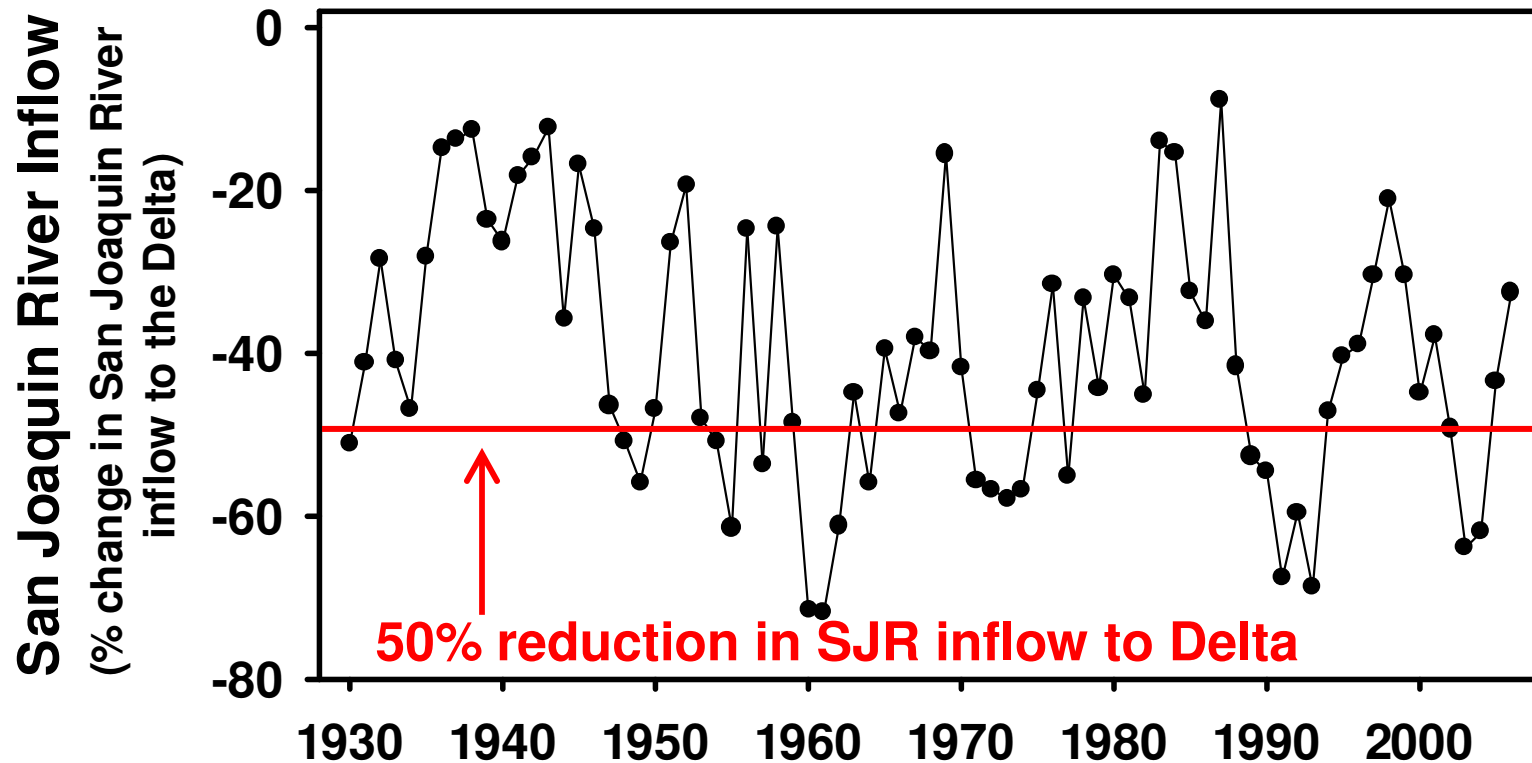
- **Overall flow and water quality conditions in the Delta are deteriorating**
- **Delta smelt and other native species at imminent risk of extinction**
- **Research shows contributing factors are:**
 - **San Joaquin River flows**
 - **Delta outflows**
 - **Exports**
 - **In-Delta channel hydrodynamics**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

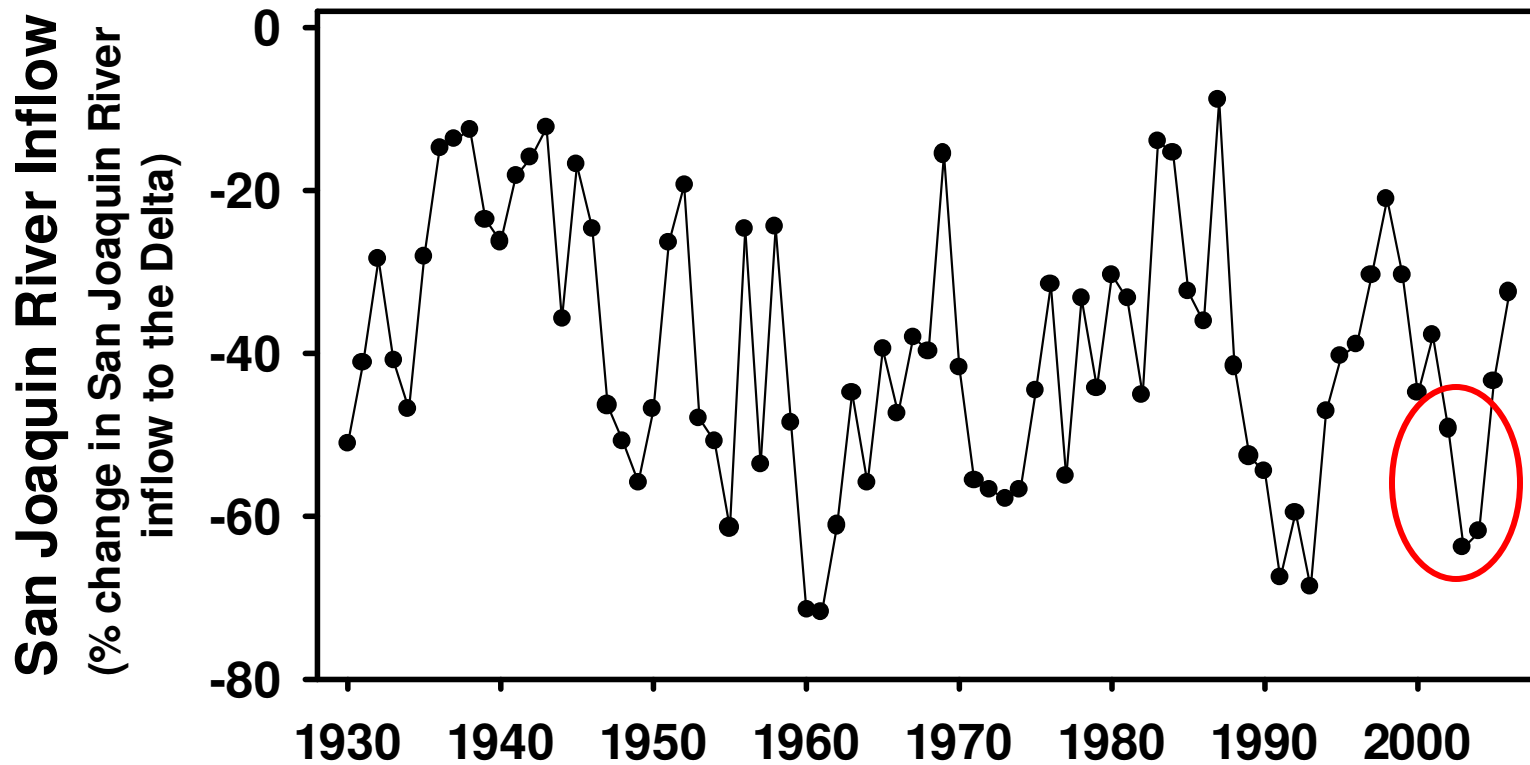
Low San Joaquin River Inflow to the Delta

- 2003 and 2004: 3rd and 4th 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



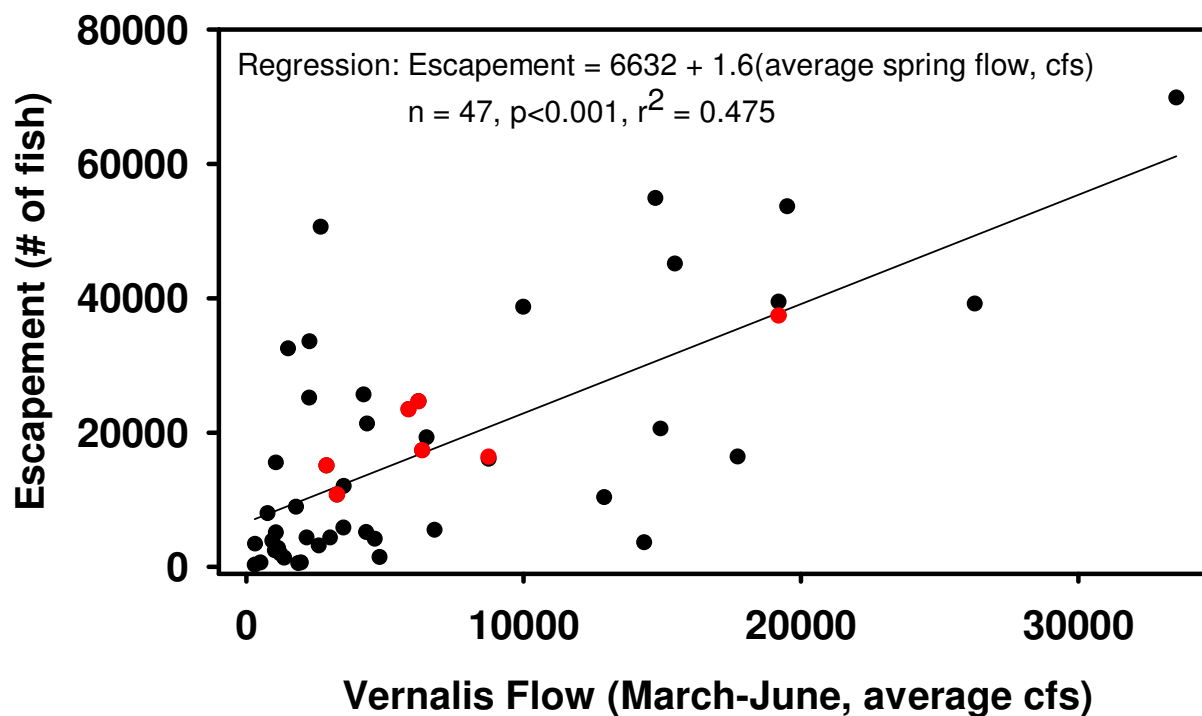
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Ecological and Fisheries Consequences of Low San Joaquin River Flows

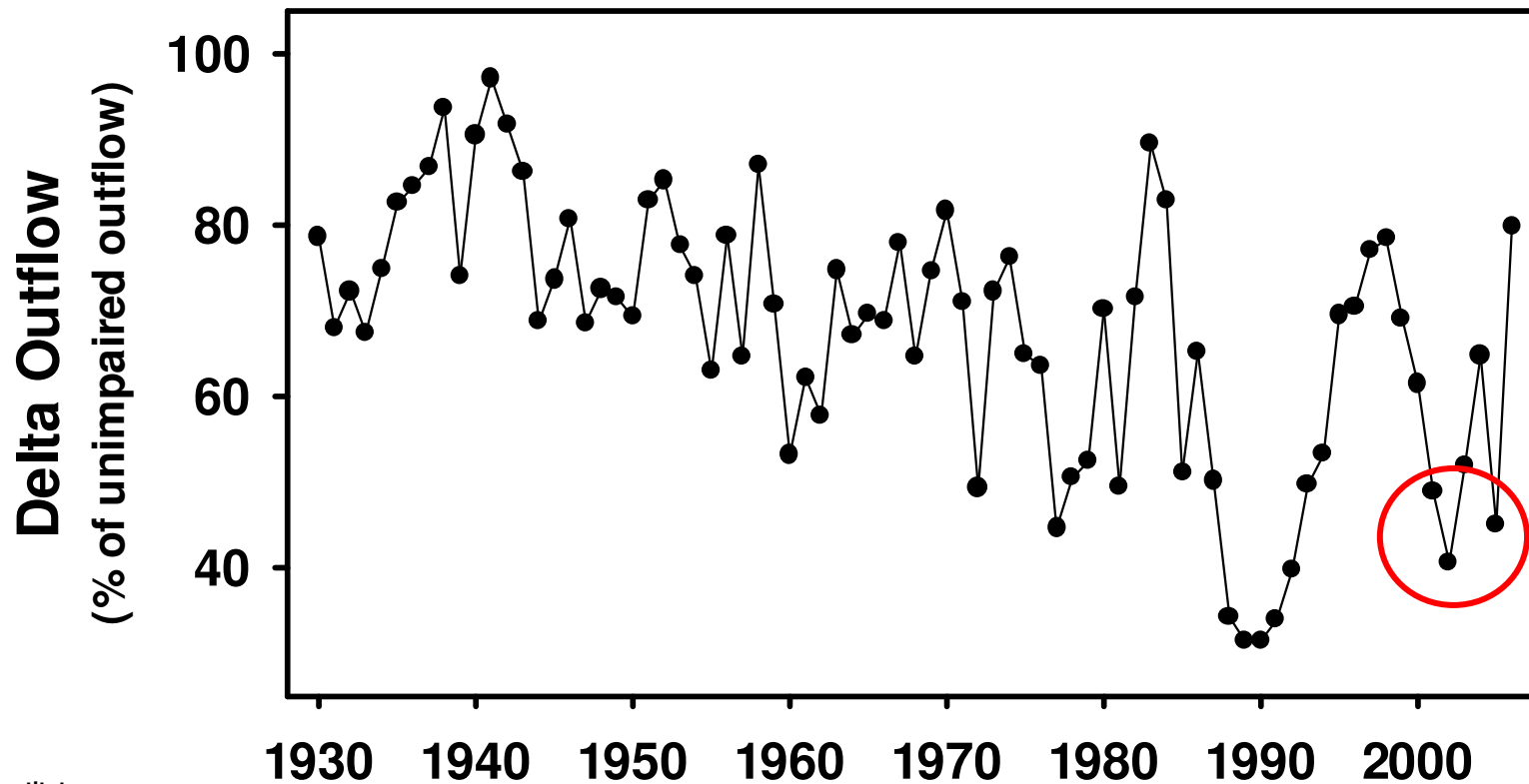
- **Reduced survival and abundance San Joaquin basin Chinook salmon**
- **Frequent low dissolved oxygen in lower San Joaquin River**
- **Reverse flows in lower San Joaquin River and Delta channels**



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

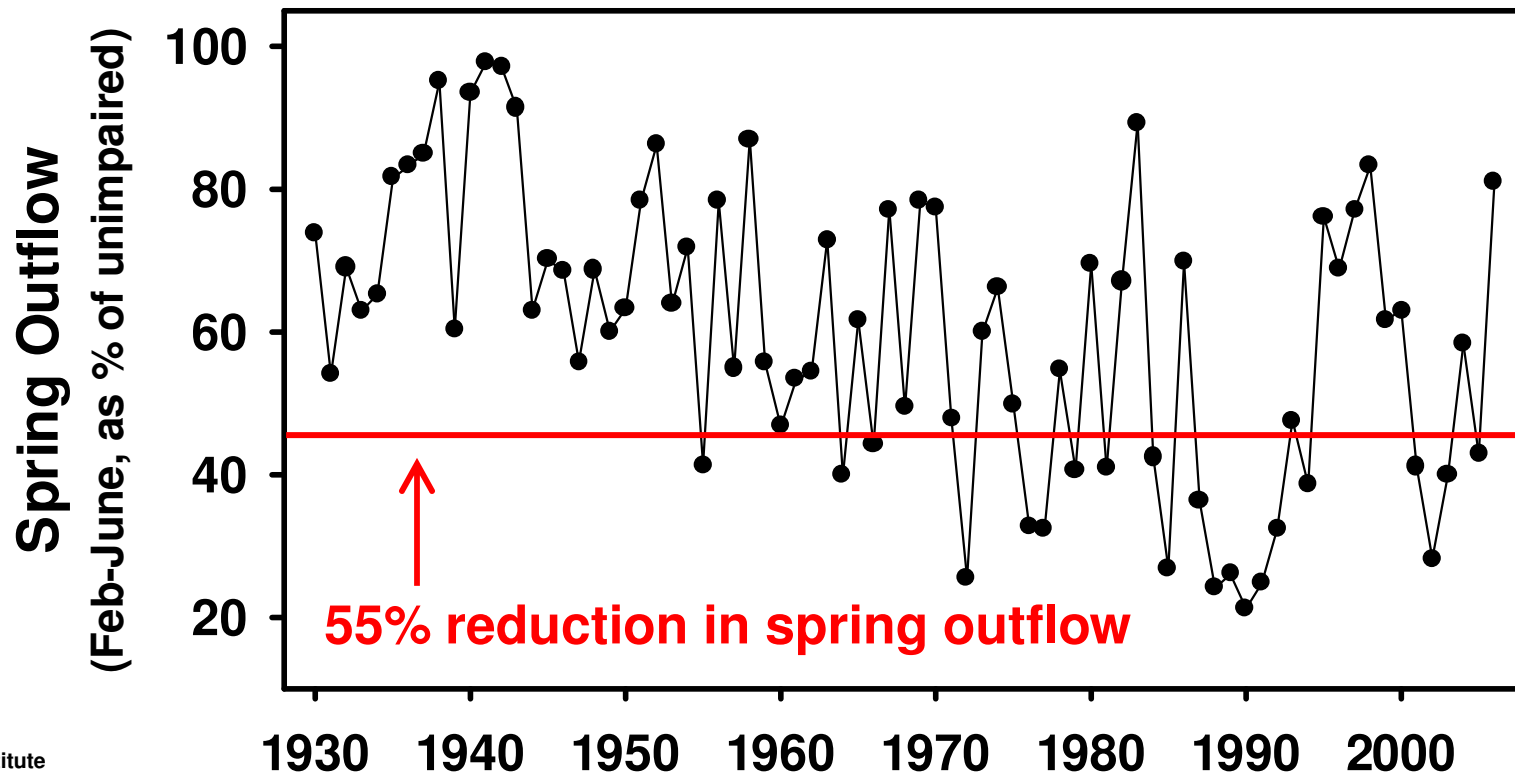
Reduced Delta Outflow

- 2002 and 2005: 6th and 8th 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



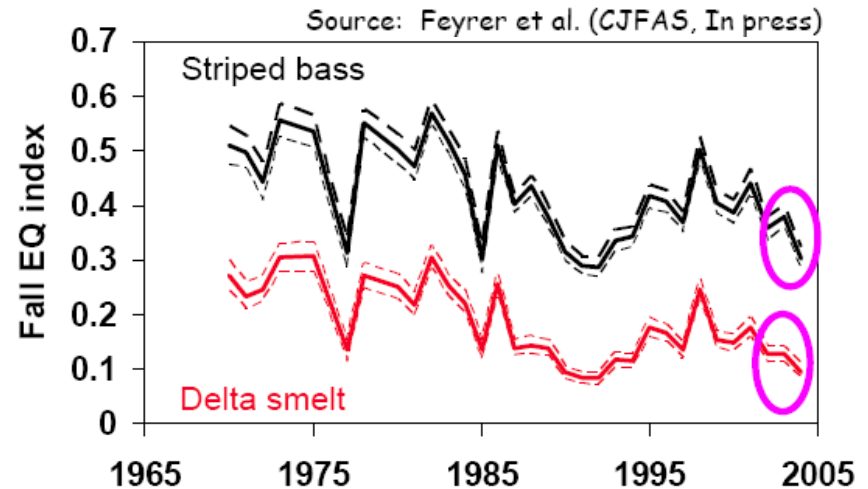
Ecological and Fisheries Consequences of Reduced Delta Outflows

Reduced Fall outflow:

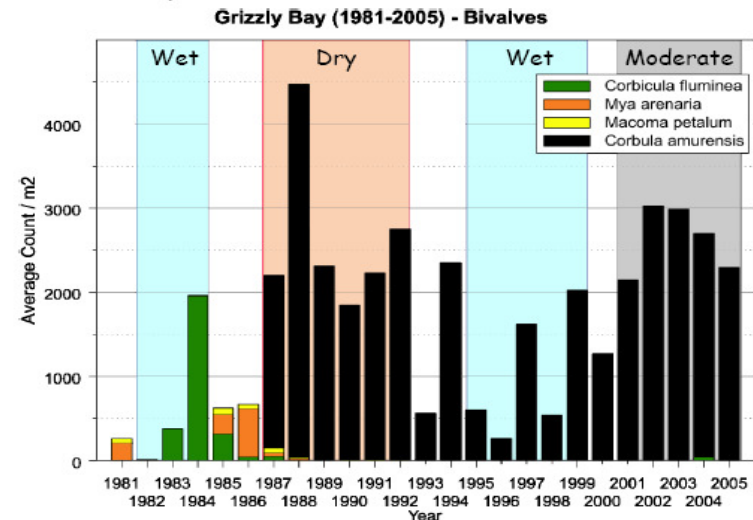
- Declining habitat quality
- Increased range and abundance of harmful invasive species
- Low abundance juvenile Delta smelt

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



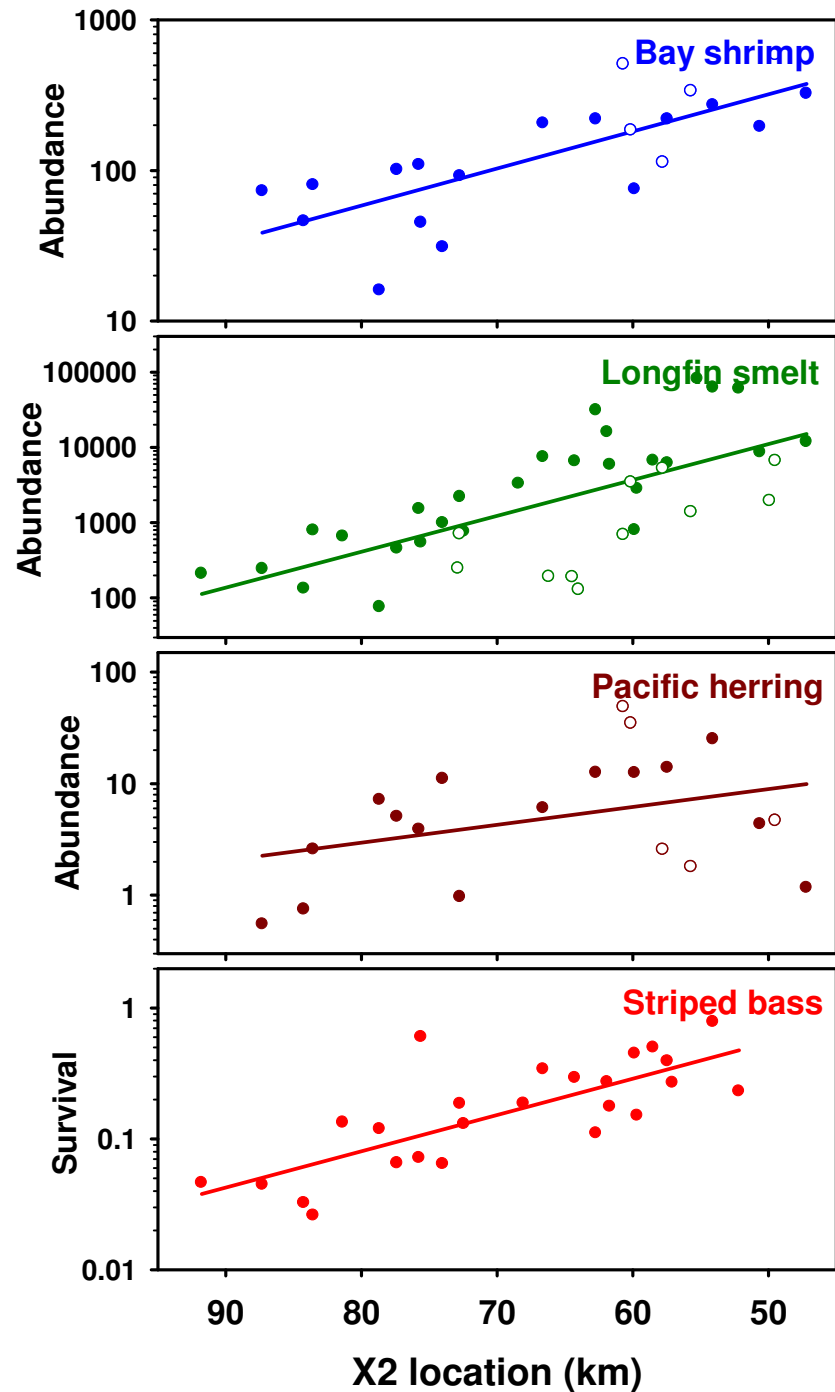
Source: Marc Vaysierres and others (DWR)

Ecological and Fisheries Consequences of Reduced Delta Outflows

Reduced Spring outflow:

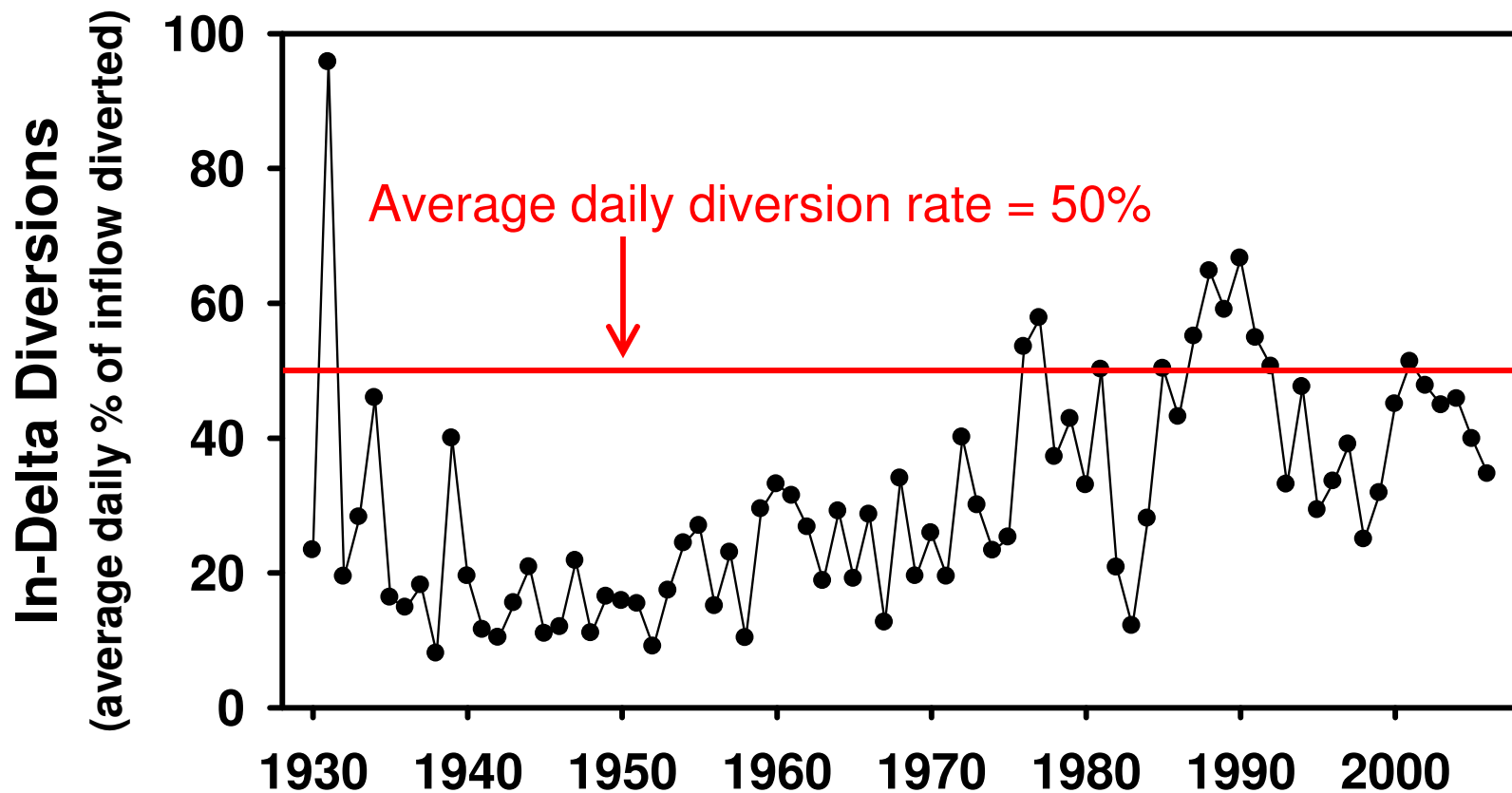
- Low abundance estuary-dependent fish and invertebrate species

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

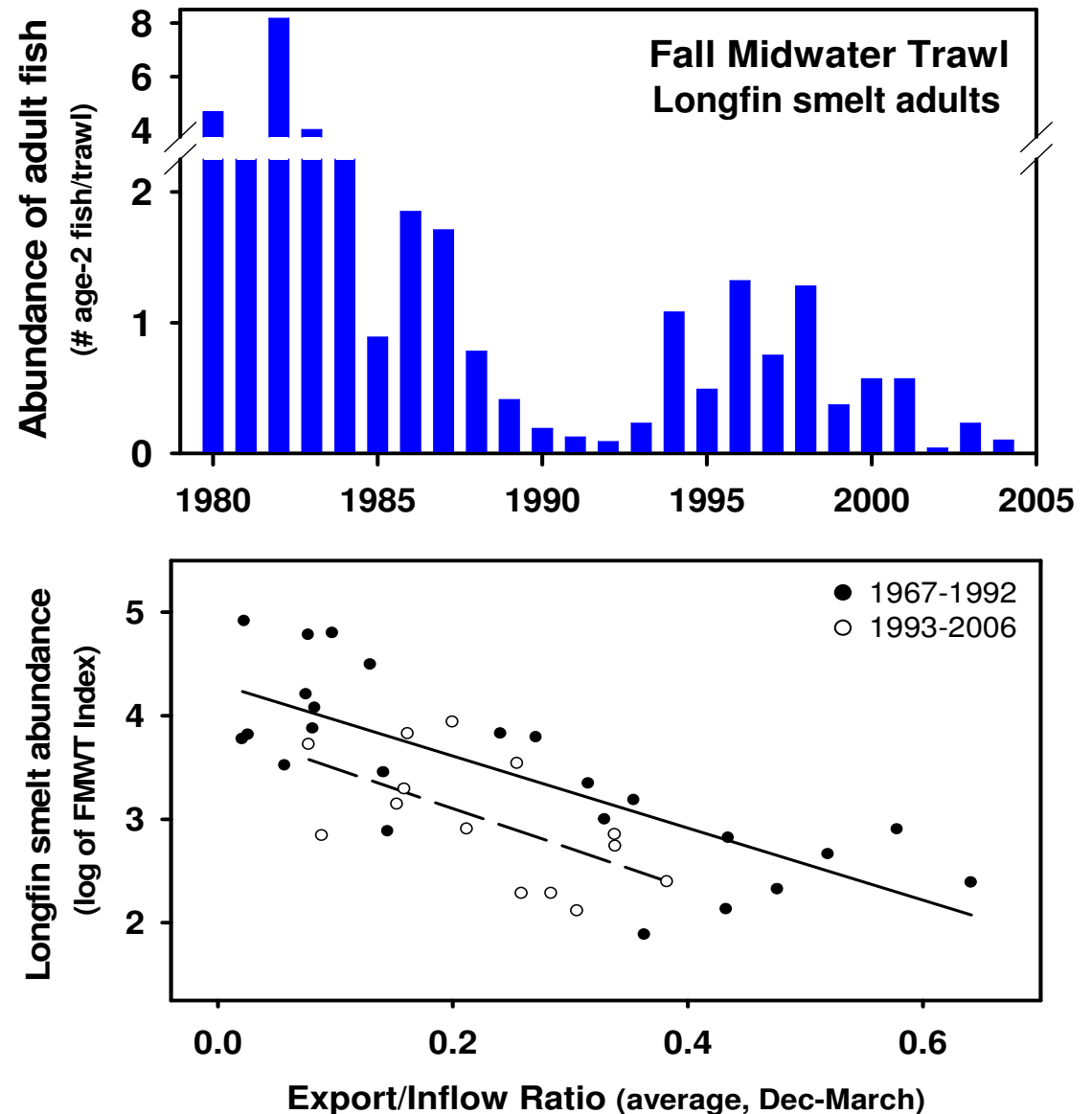
- 2001 = 9th highest in 77-year period
- 2000-2004 average = 47%
- Worse than nearly all years except severe droughts



Ecological and Fisheries Consequences of High Delta Diversion Rates

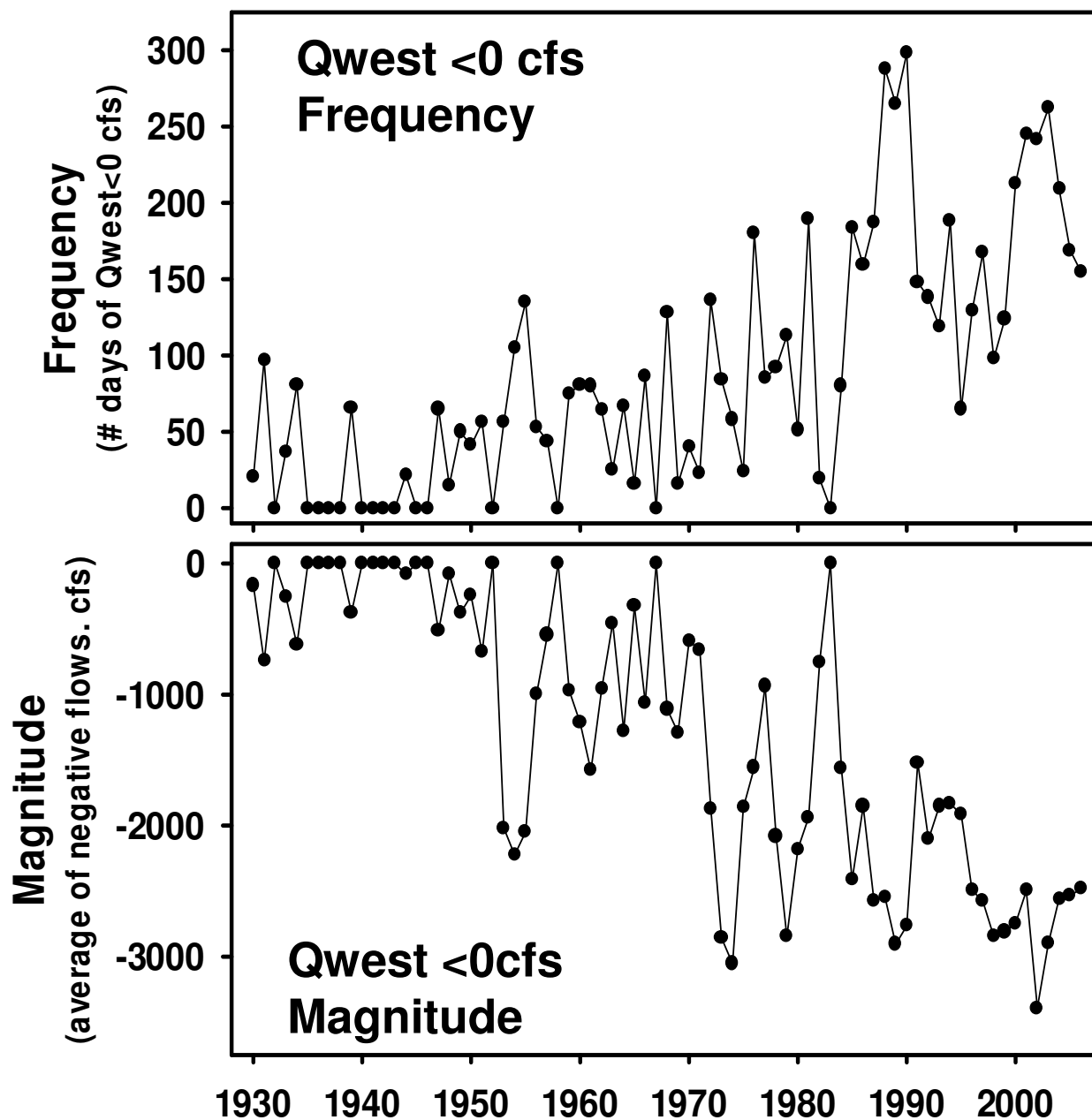
- Altered in-Delta hydrodynamics (reverse flows)
- Reduced Delta outflow
- Loss of nutrients, plankton and fishes
- Population-level effects (longfin smelt)

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



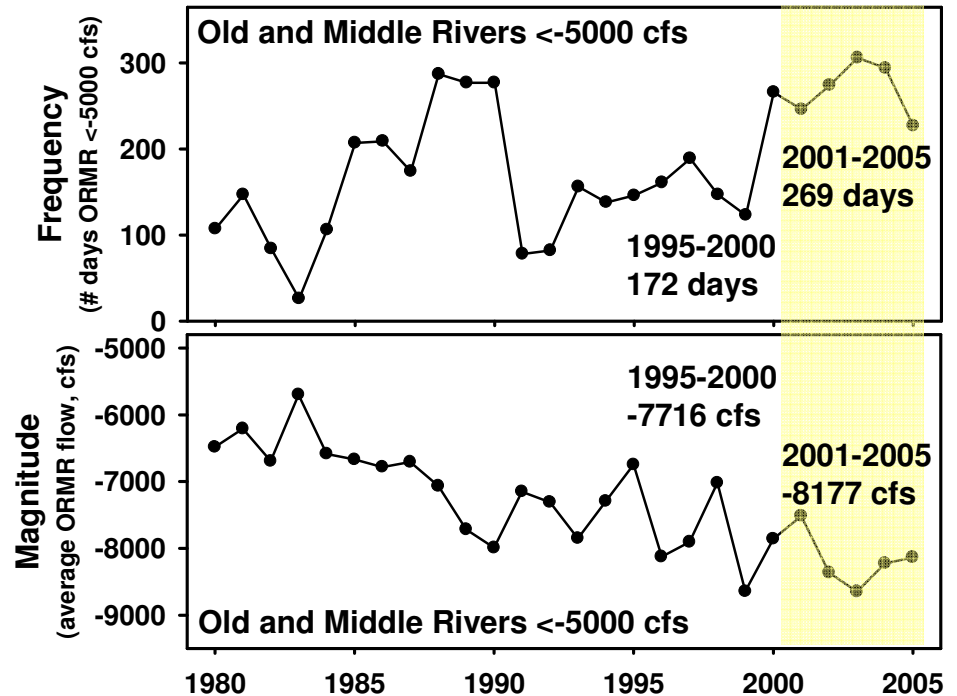
Reverse Flows Worsening

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

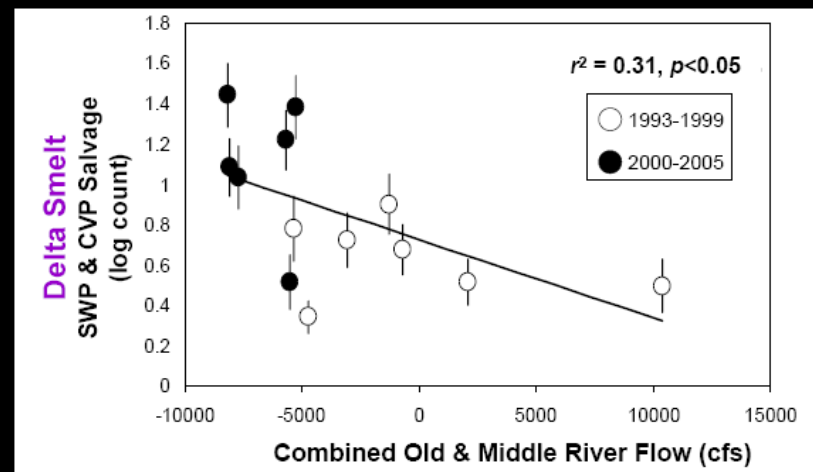


Ecological and Fisheries Consequences of Reverse Flows

- 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

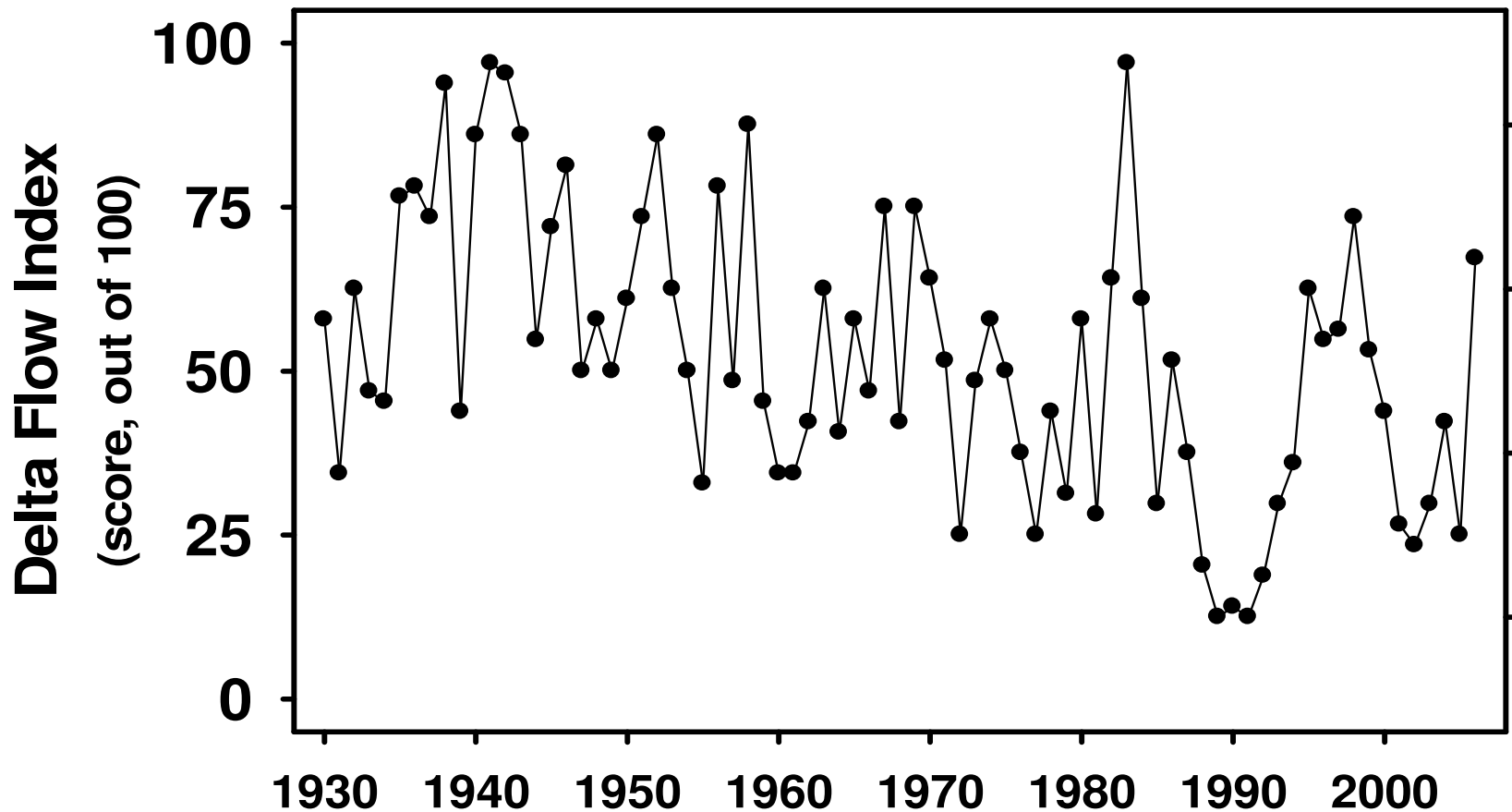


Mean Values for December-March 1993-2005

Source: Adapted from Pete Smith (USGS)

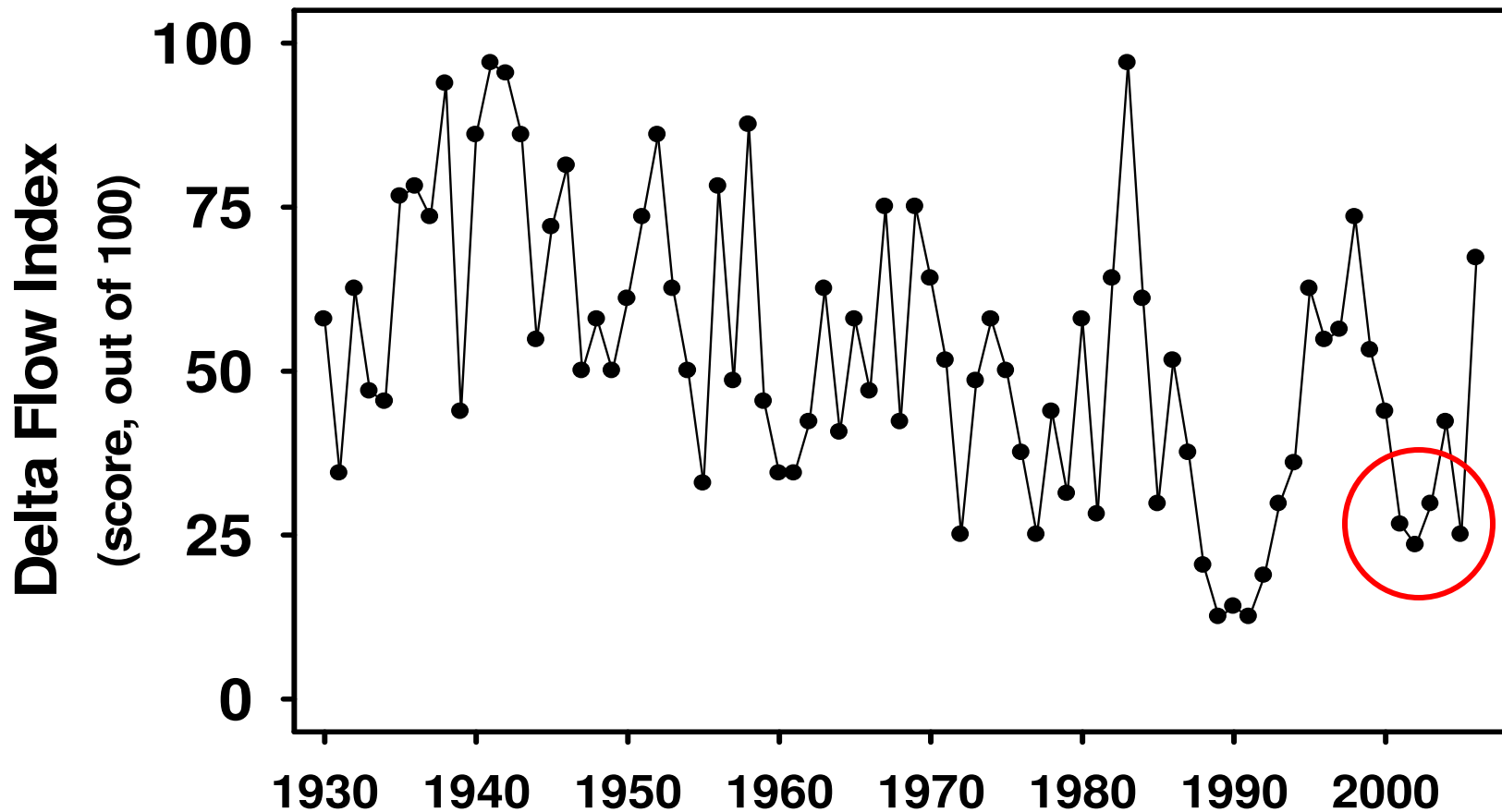
The Bay Institute's Delta Flow Index

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



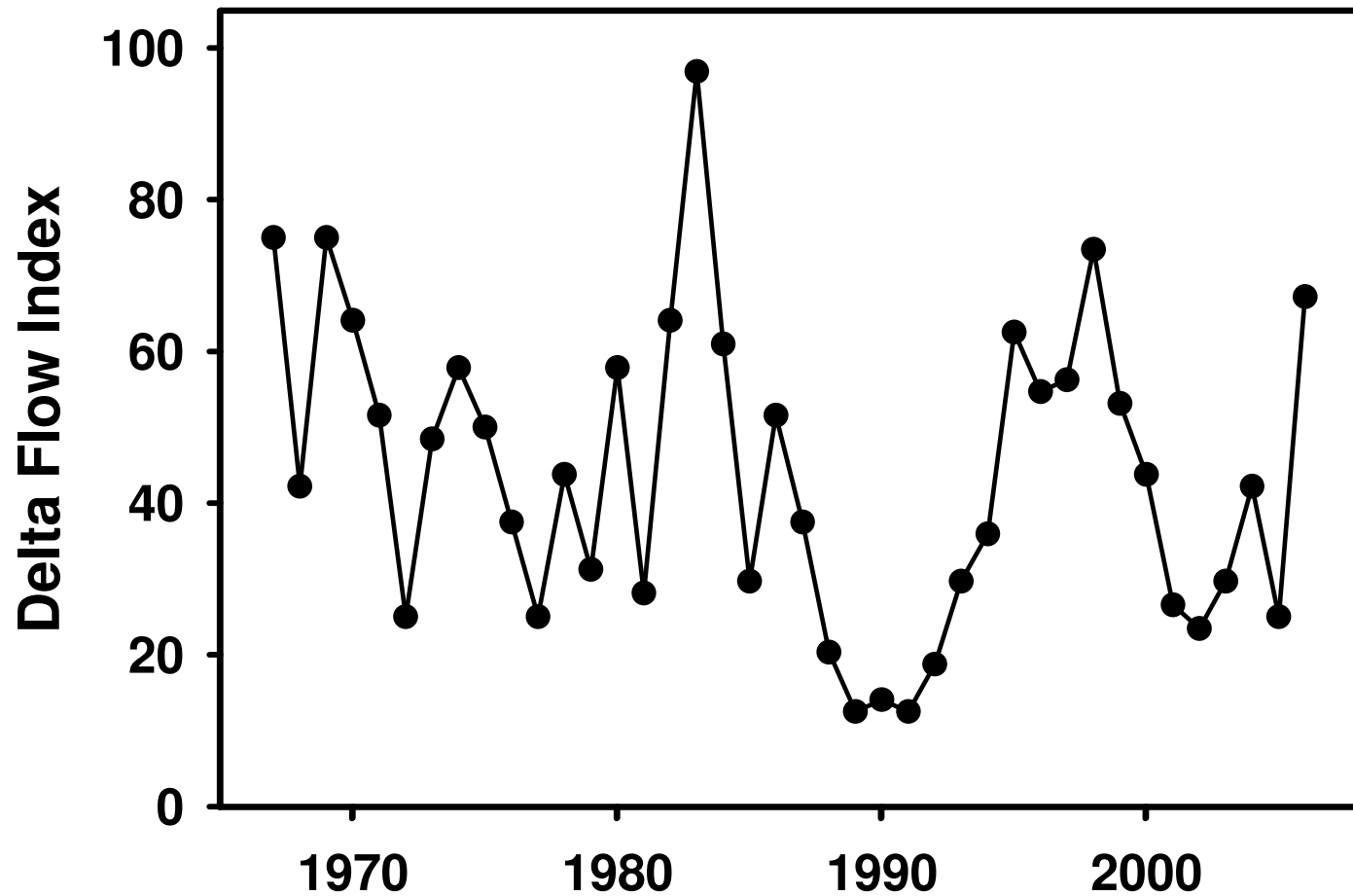
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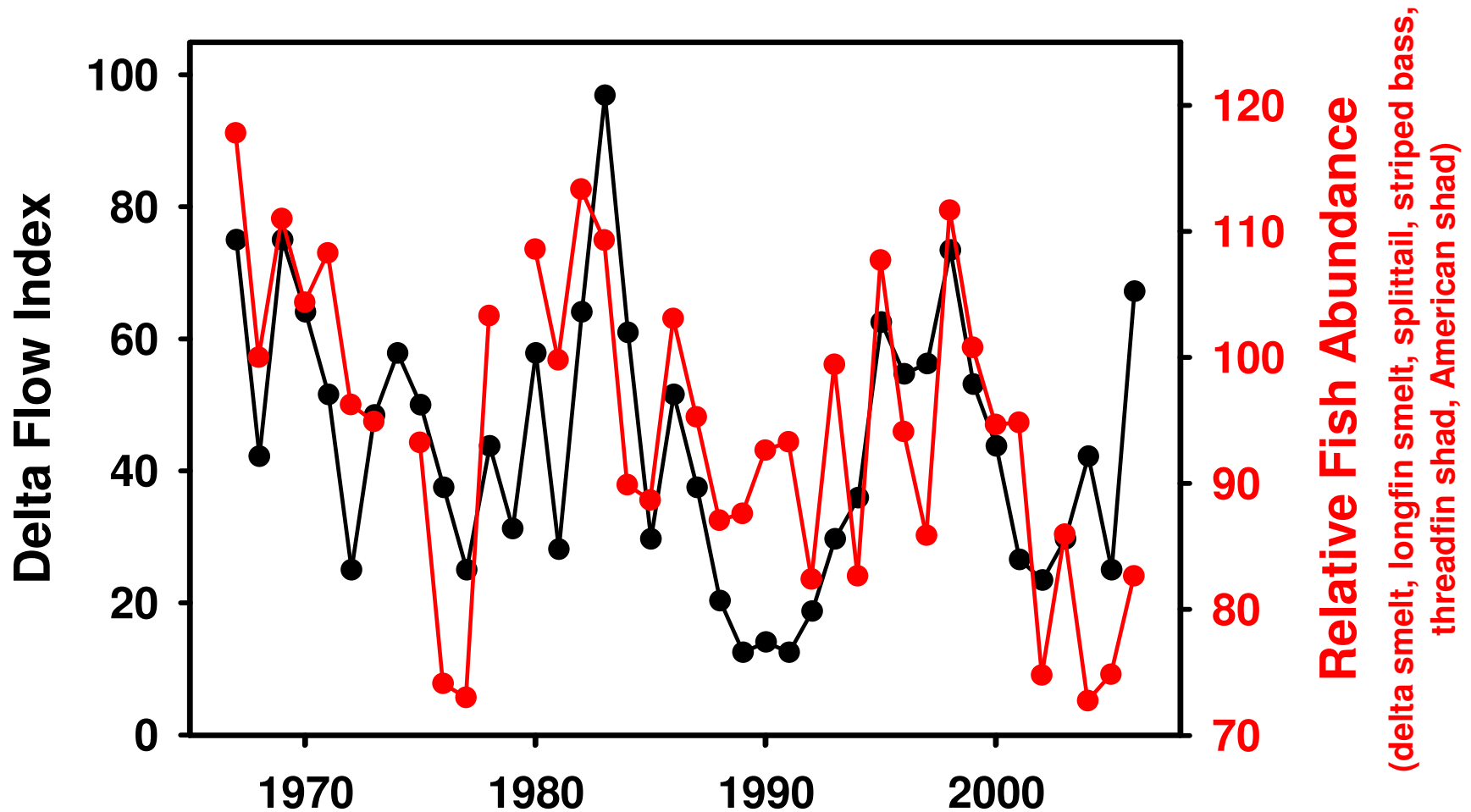
Delta Flow Index and Fish Abundance

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**

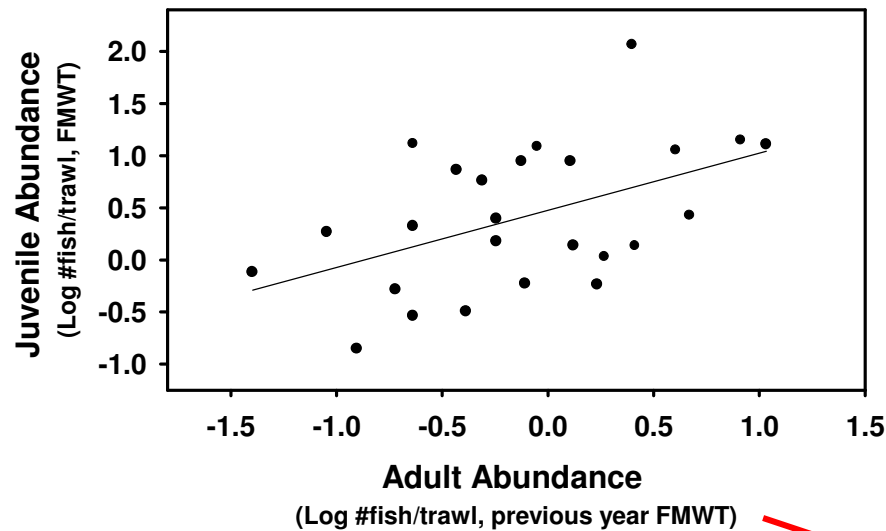
Harmful Invasive Species

- **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?

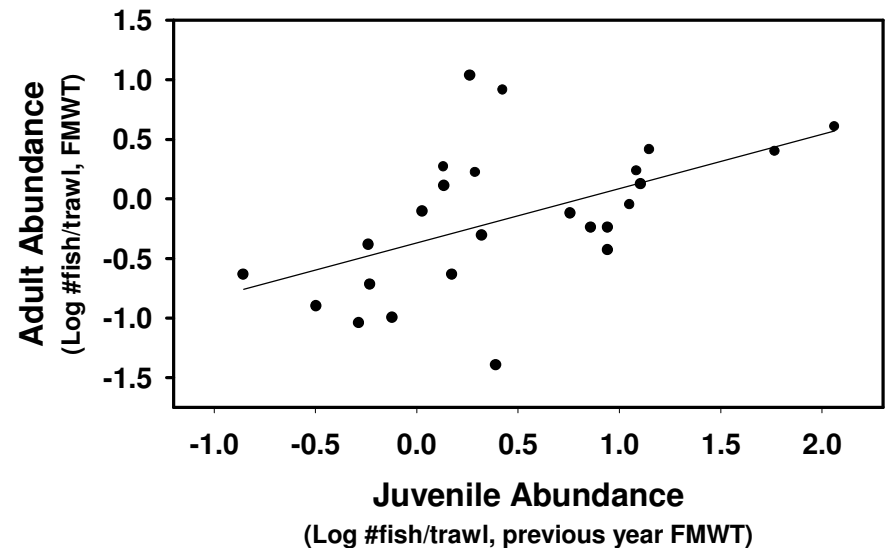
1. Imminent risk of extinction for several species

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



Longfin smelt

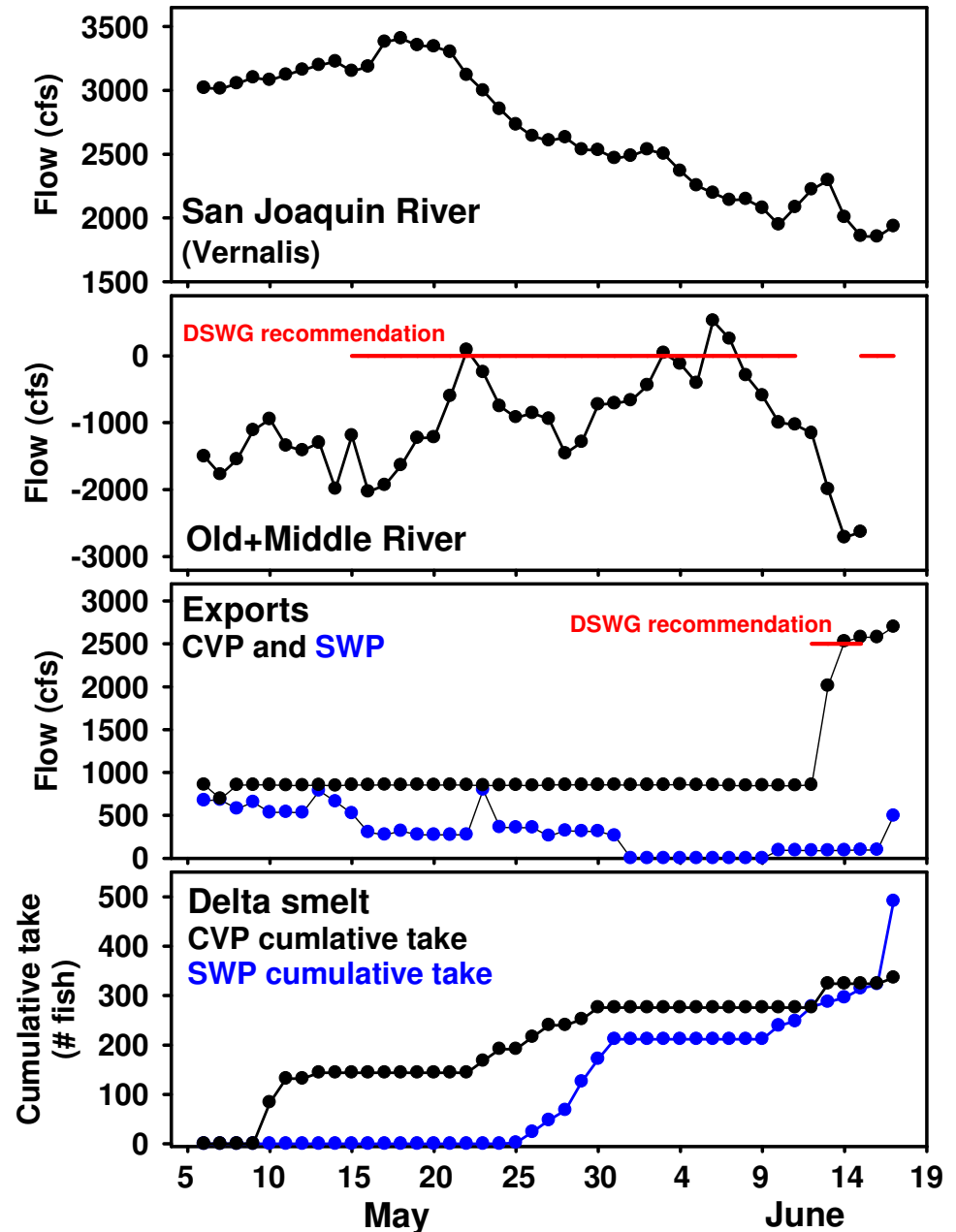
- Record low abundance (2002-2006)
- Significant stock recruitment relationships



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**

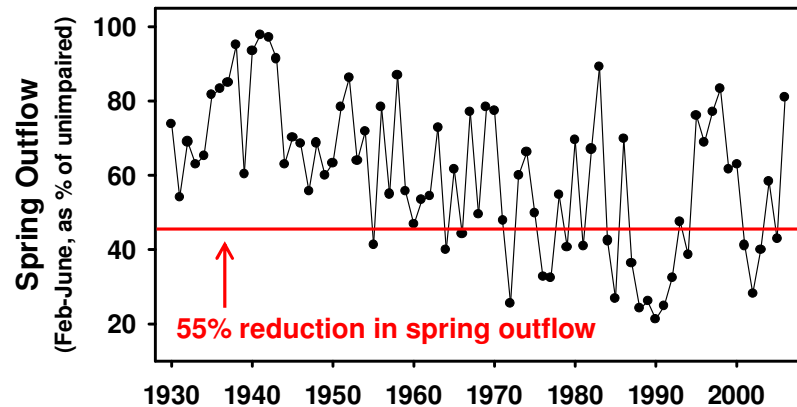
What should the SWRCB do to prevent extinction?

- 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**

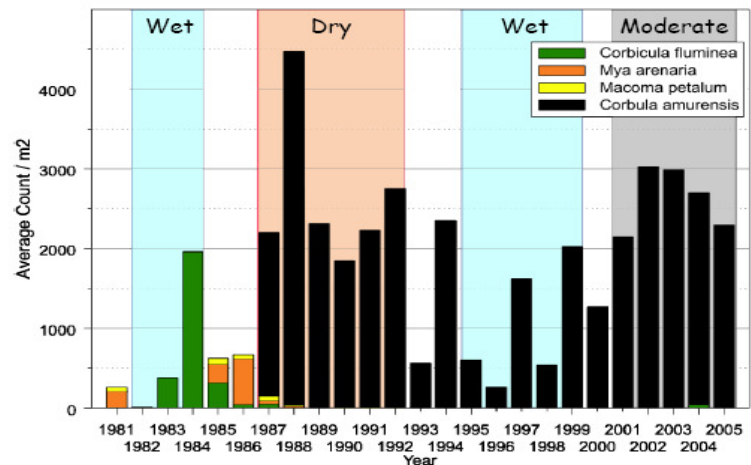
What should the SWRCB do to prevent extinction?

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

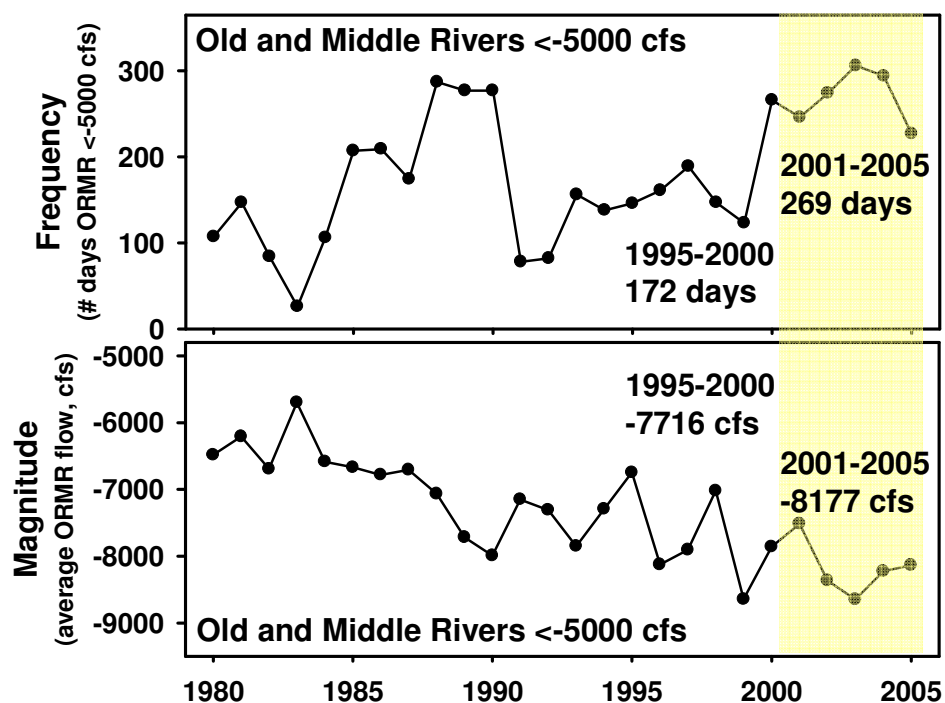
- Decrease or eliminate negative flows on Old and Middle Rivers to reduce entrainment mortality and facilitate downstream transport of plankton and fish

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

➤ ≥ -4000 cfs July-October

➤ ≥ -4000 cfs during winter

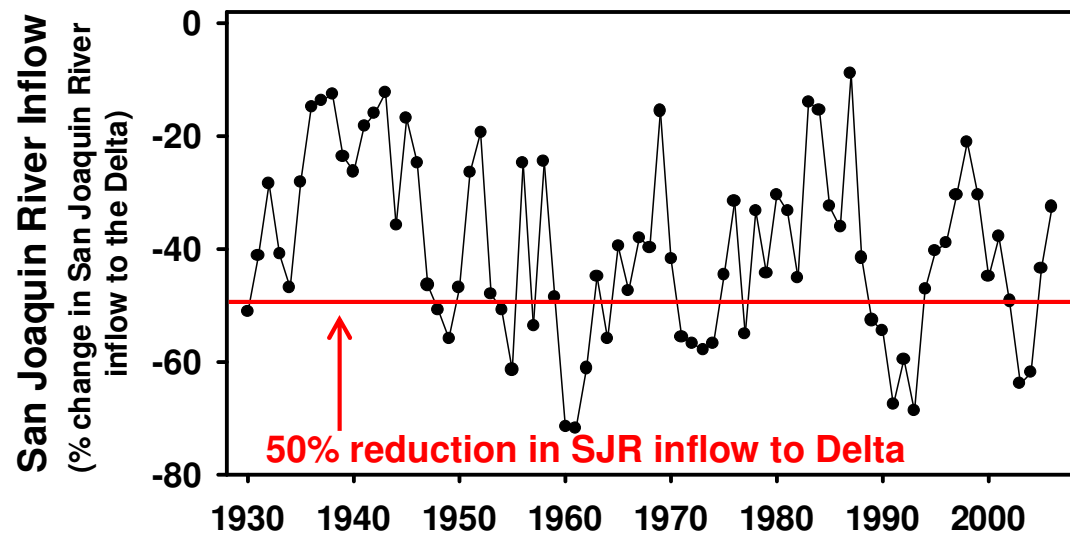
flood pulses



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)