

Trying to Balance Water for Food Production, Cities, and the Environment in the California Delta

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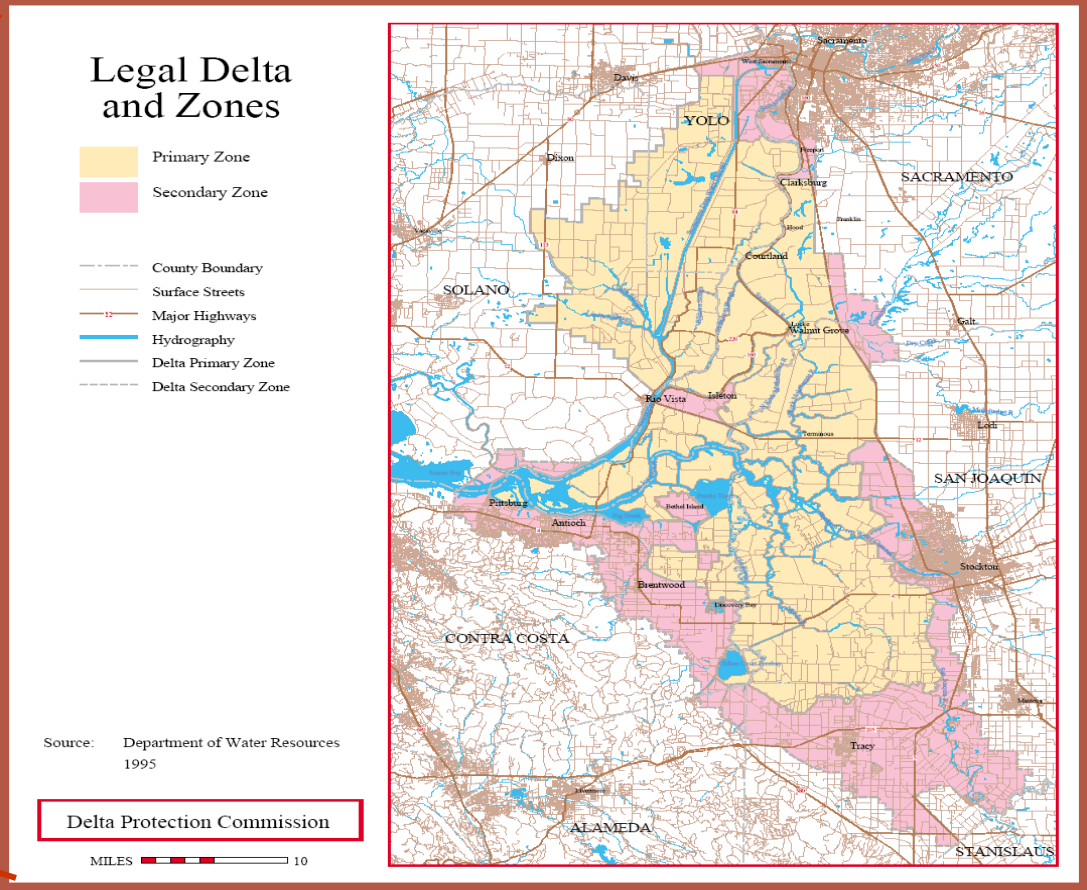
Main Points From Today's Talk

1. Aquatic ecosystems of the California Delta are in peril
2. Multiple stressors – in combination
3. The time to act is now



The Next Season – Barbara Coleman

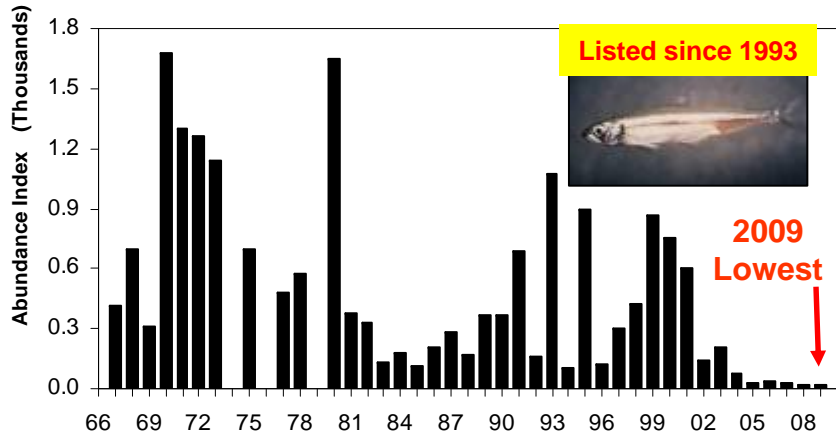
Sacramento-San Joaquin Delta



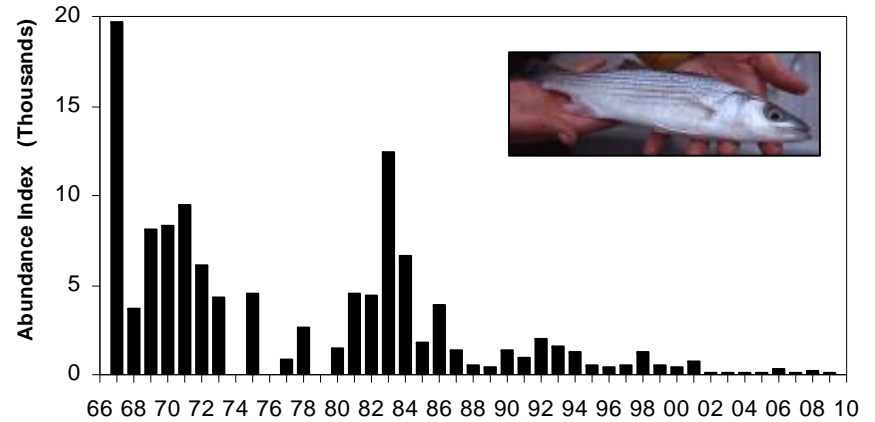
Heart of the California Water Supply System

Long-term Monitoring Shows Fish Declines

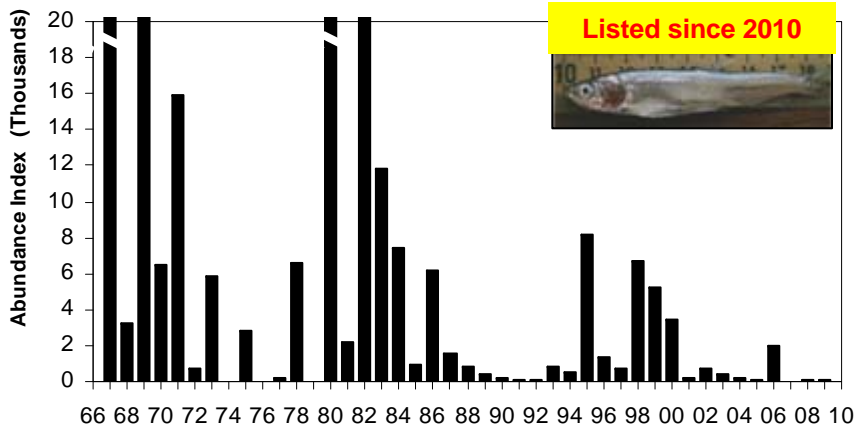
Delta Smelt



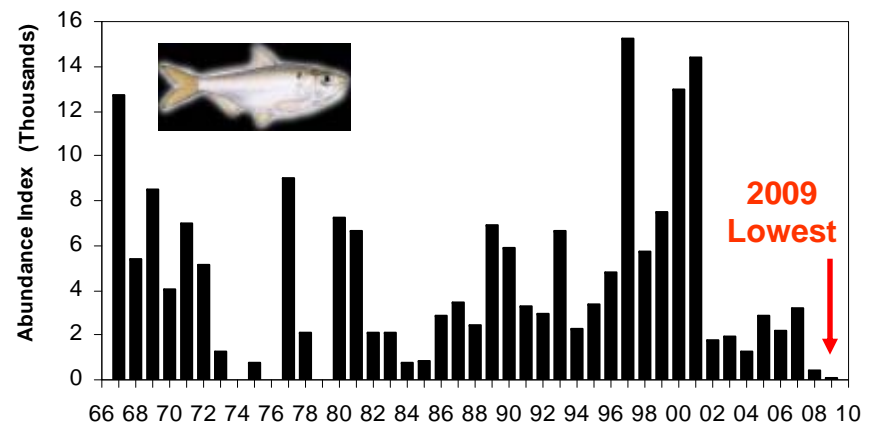
Striped Bass



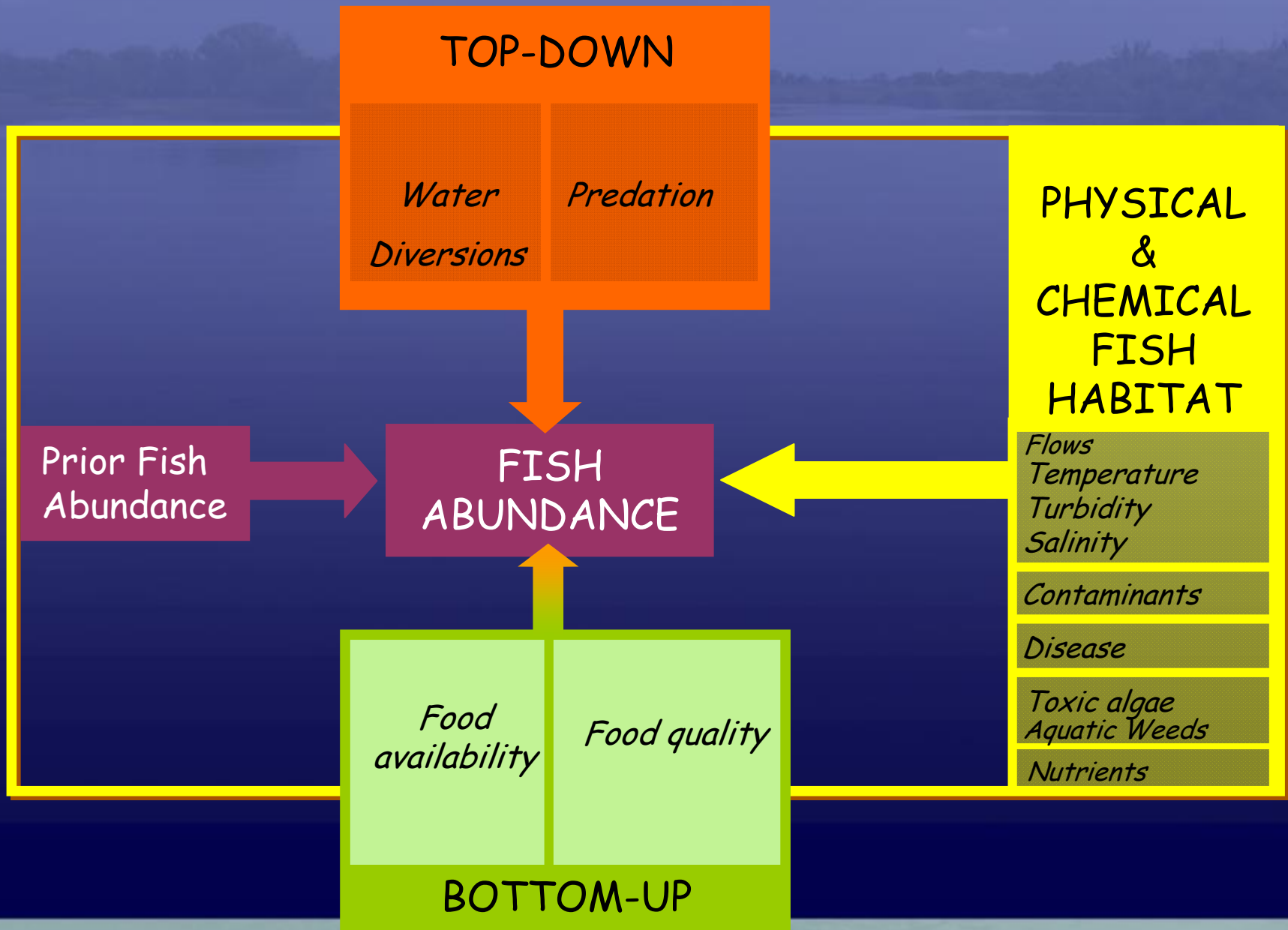
Longfin Smelt



Threadfin Shad



Multiple Stressors... in Combination!



Changes in Environment Lead to Changes in Organisms

Then

Now

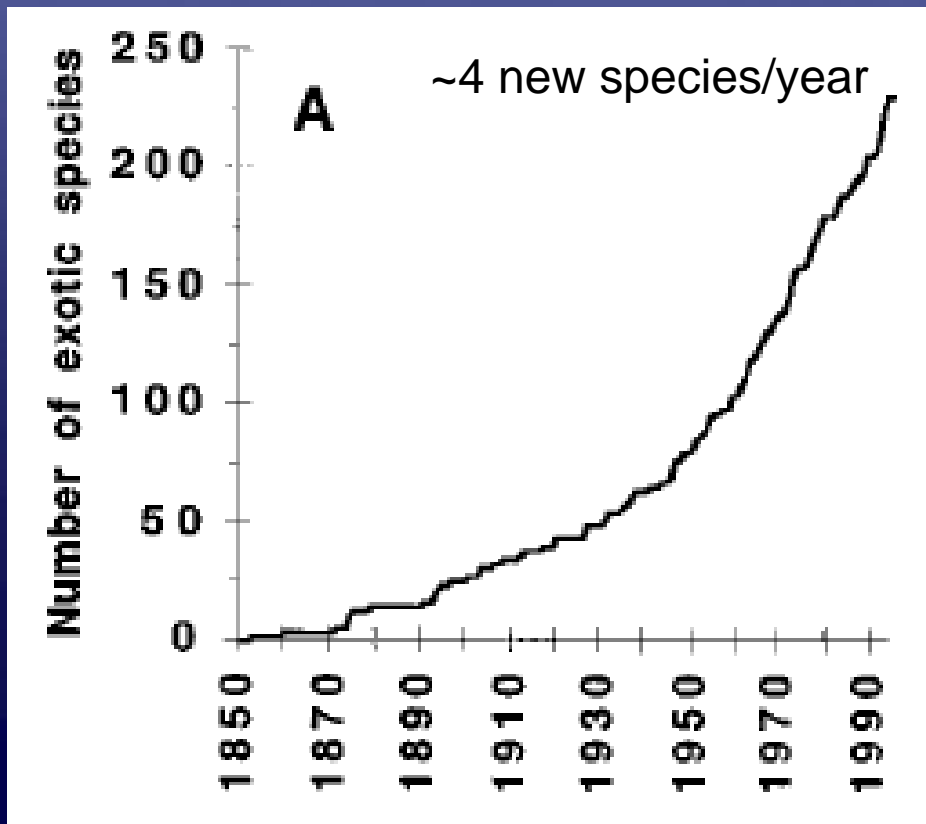
Little	Ammonium	Lots
Low	Contaminants	High
Highly variable	Outflow	Constant, low
Low	“Harvest”	High
Lots	Phosphorus	Limited
Cool	Temperature	Warm
High	Turbidity	Low

Natives dominate
Open water fish
Large zooplankton
Diatoms

Invasives dominate
Edge & benthic fish, jellyfish
Clams, small zooplankton
Microcystis aquatic weeds

Ecosystem Winners: Non-Native & Nuisance Species

“...the most invaded aquatic ecosystem in the world.”
(Cohen & Carlton, Science 1998)



Ecosystem Losers: Native Species, Unique Natural Heritage

Delta smelt



Listed since 1993

Longfin smelt



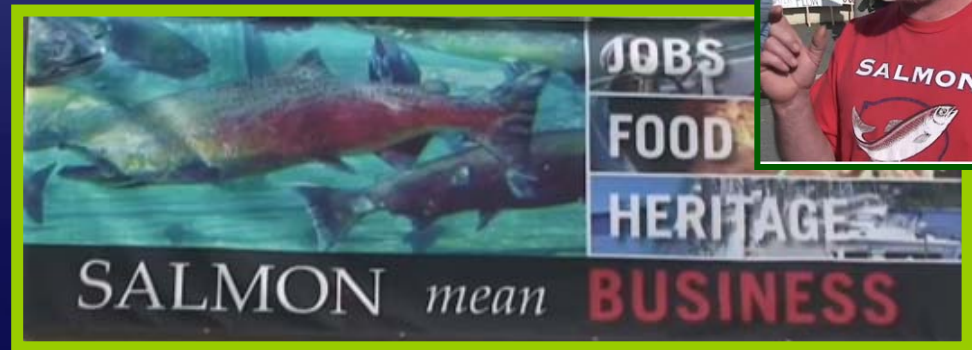
Listed since 2009

Green Sturgeon



Listed since 2006

Salmon



Listed since 1989(+)

Science Informing Solutions

Focus on Multiple Drivers of Change

Jared Diamond, 2005

Collapse - How Societies Choose to Fail or Succeed

“People often ask, “What is the single most important environmental problem facing the world today?”

The single most important problem is our misguided focus on identifying the single most important problem!

... because any of the dozen problems, if unsolved, would do us great harm and because they all interact with each other.

We have to solve them all.”

We know enough to act now!