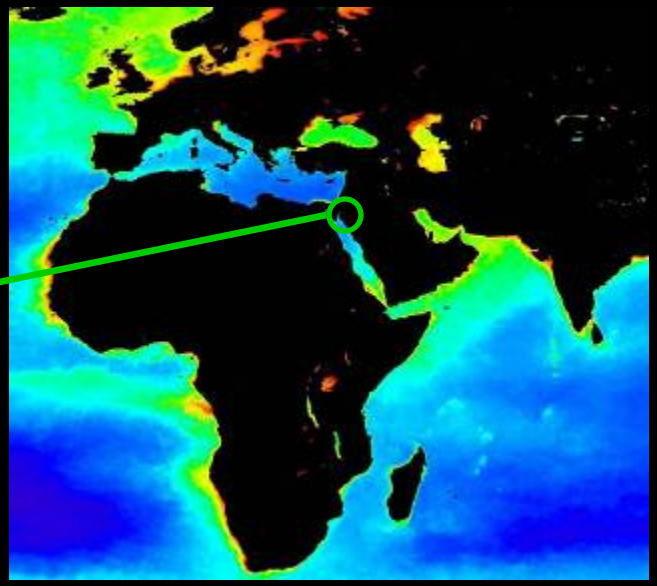
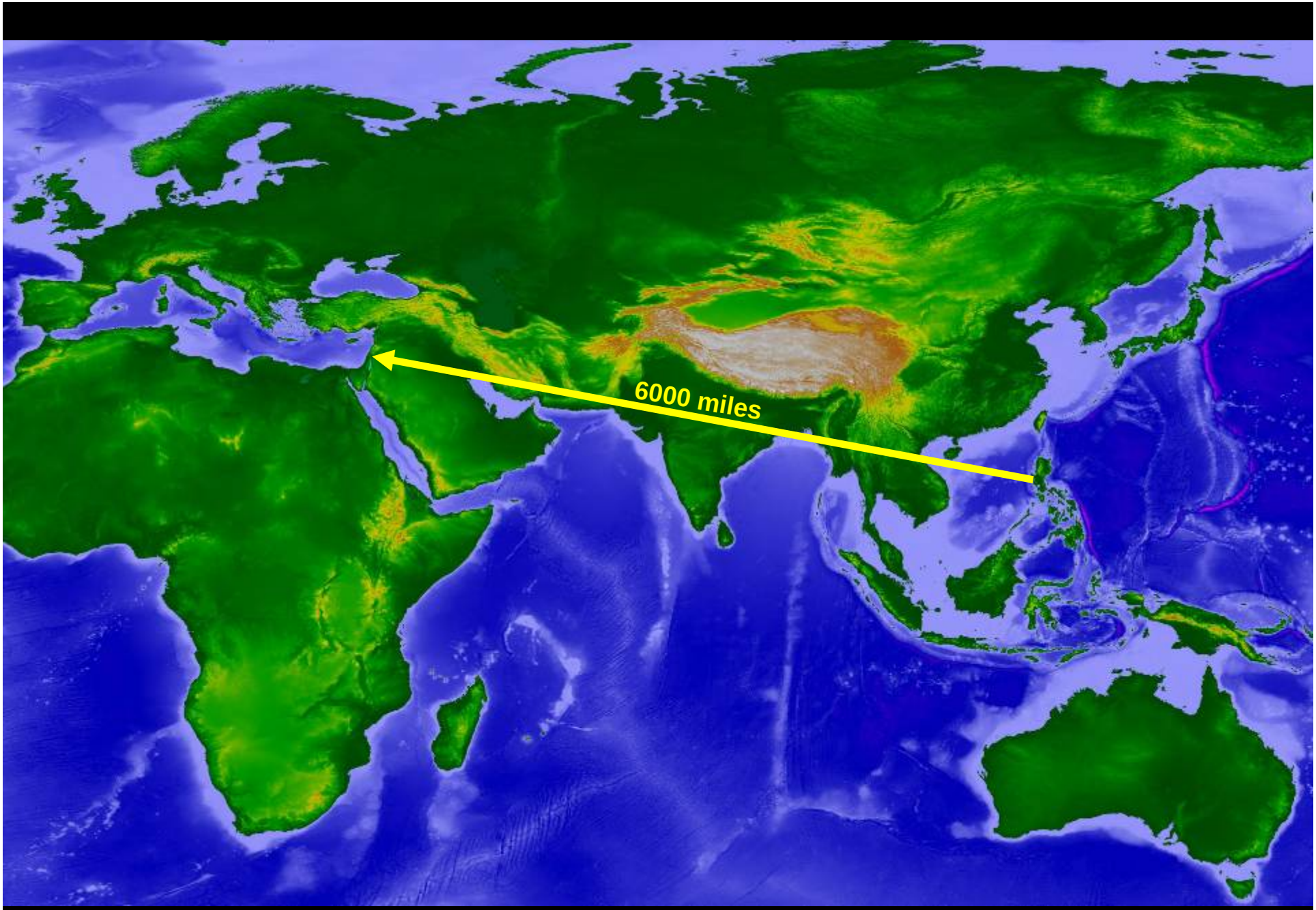


Gulf of Aqaba, Eilat, Israel photo from Amatzia Genin

1992

http://en.wikipedia.org/wiki/Mount_Pinatubo



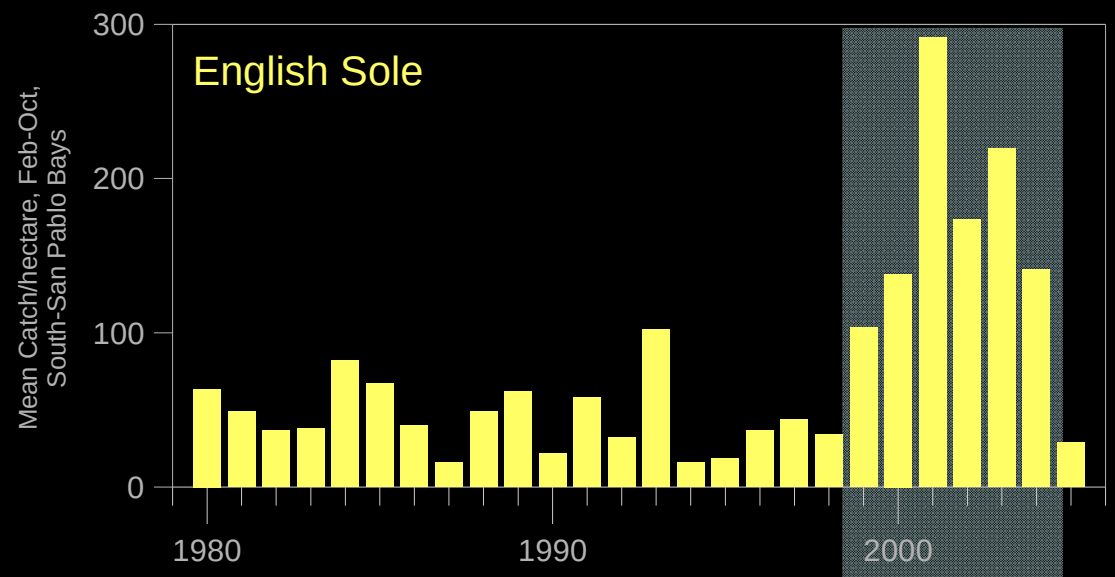
http://www.ngdc.noaa.gov/mgg/topo/pictures/

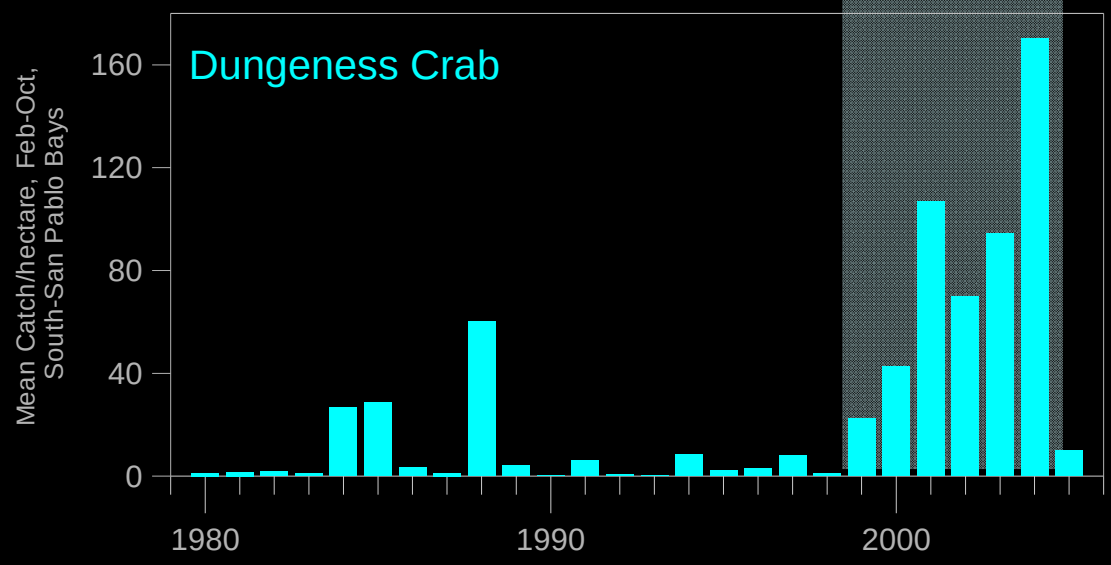
CALFED
BAY-DELTA
PROGRAM

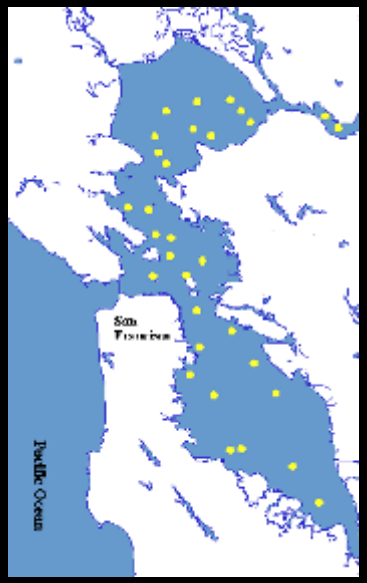
5th Biennial CALFED Science Conference

Global Perspectives and Regional Results: Science and Management in the Bay-Delta System

4 concepts

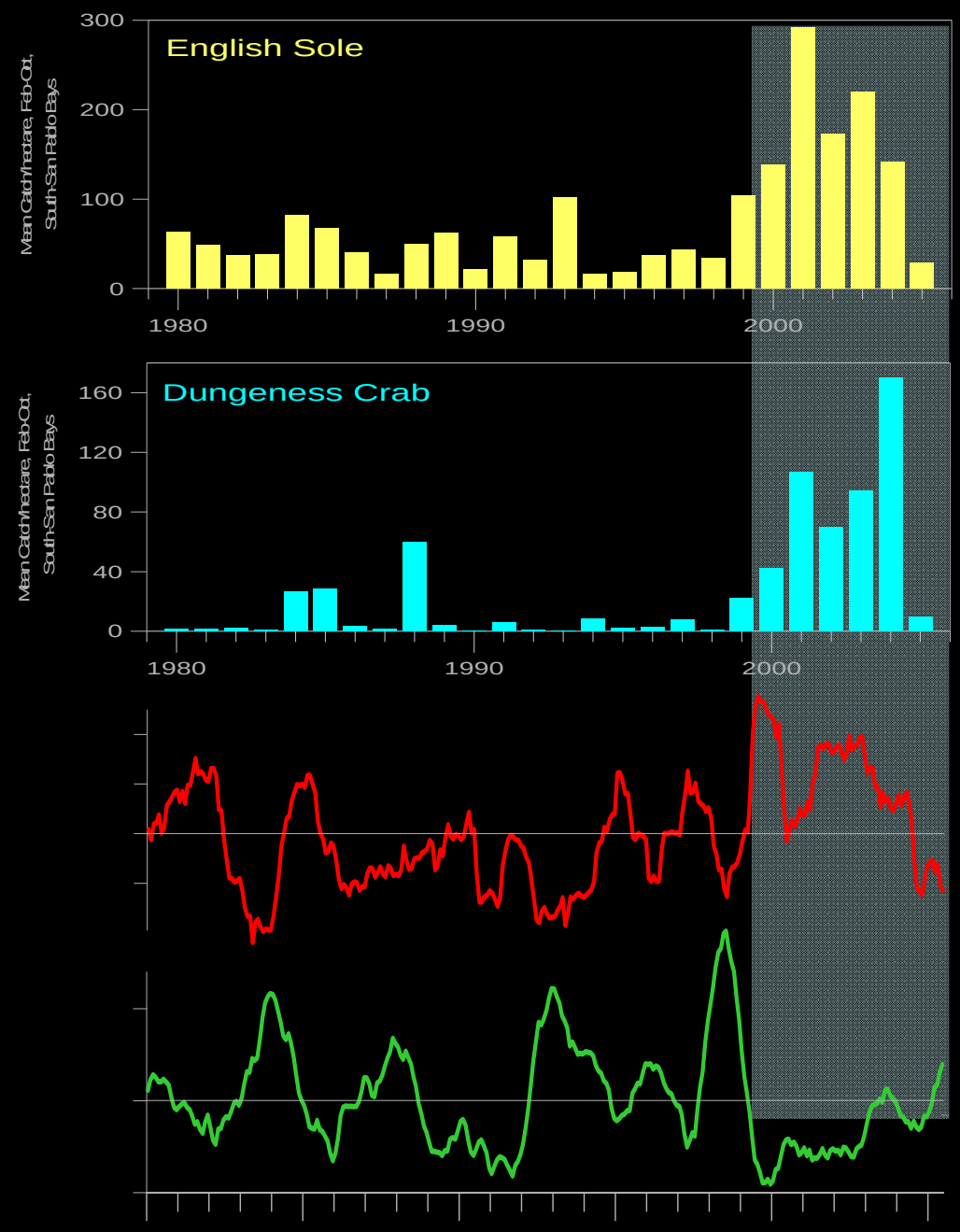






San Francisco Bay Monitoring Program

Kathy Hieb, DFG

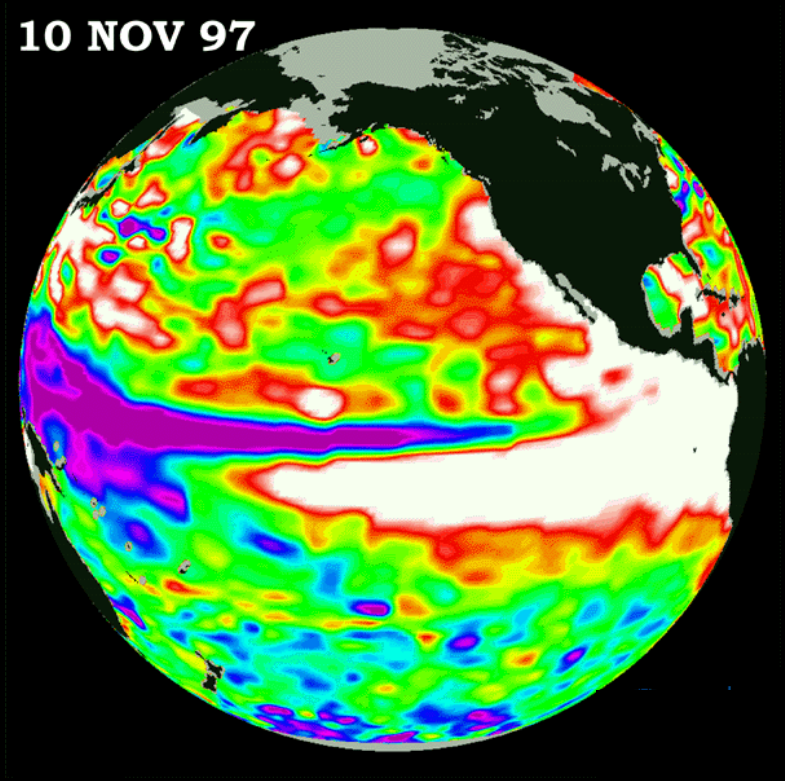


Upwelling Index

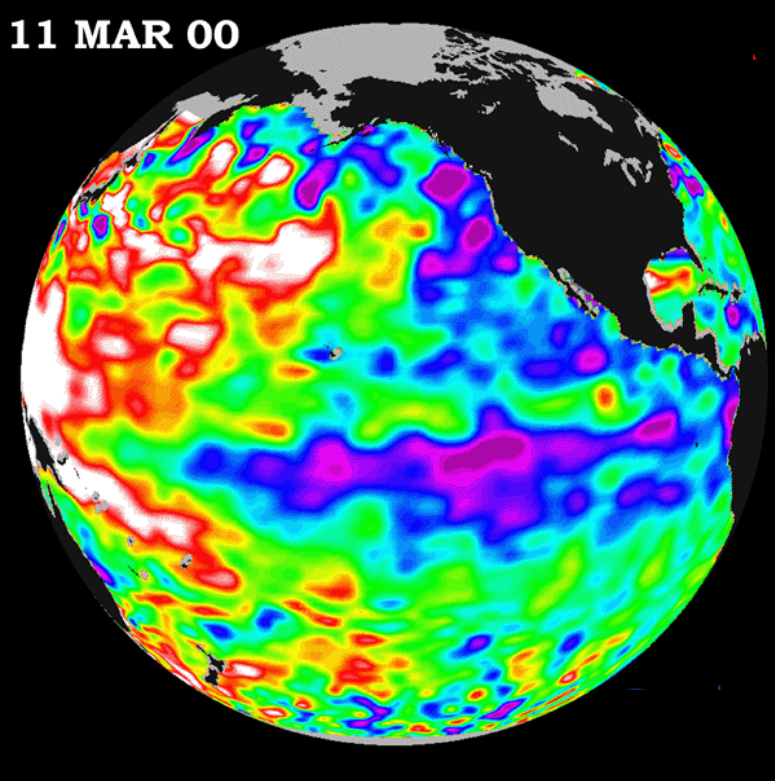
NOAA PFEL

SST Farallons

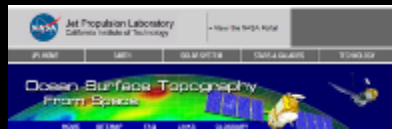
PRBO

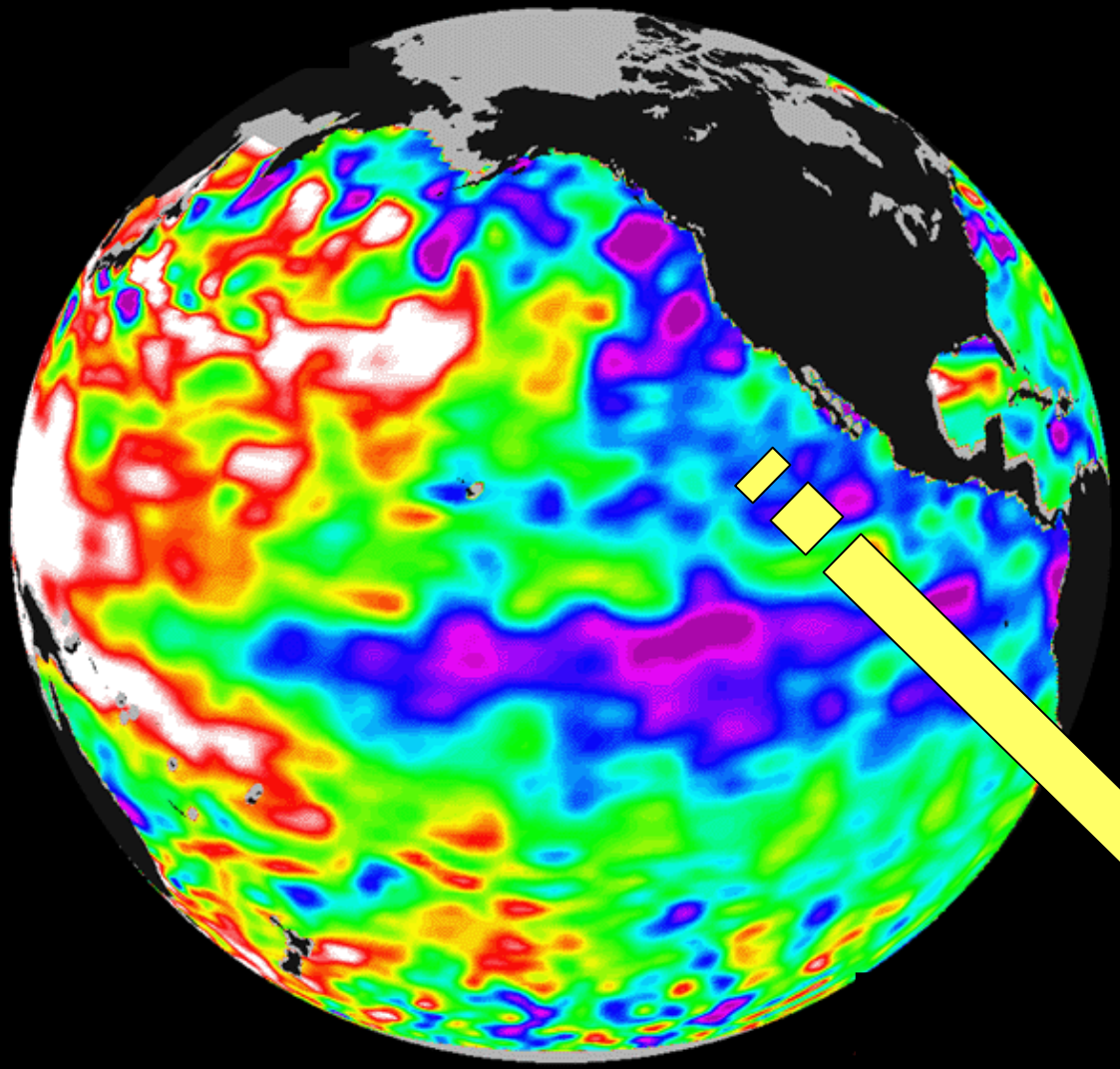


El Niño

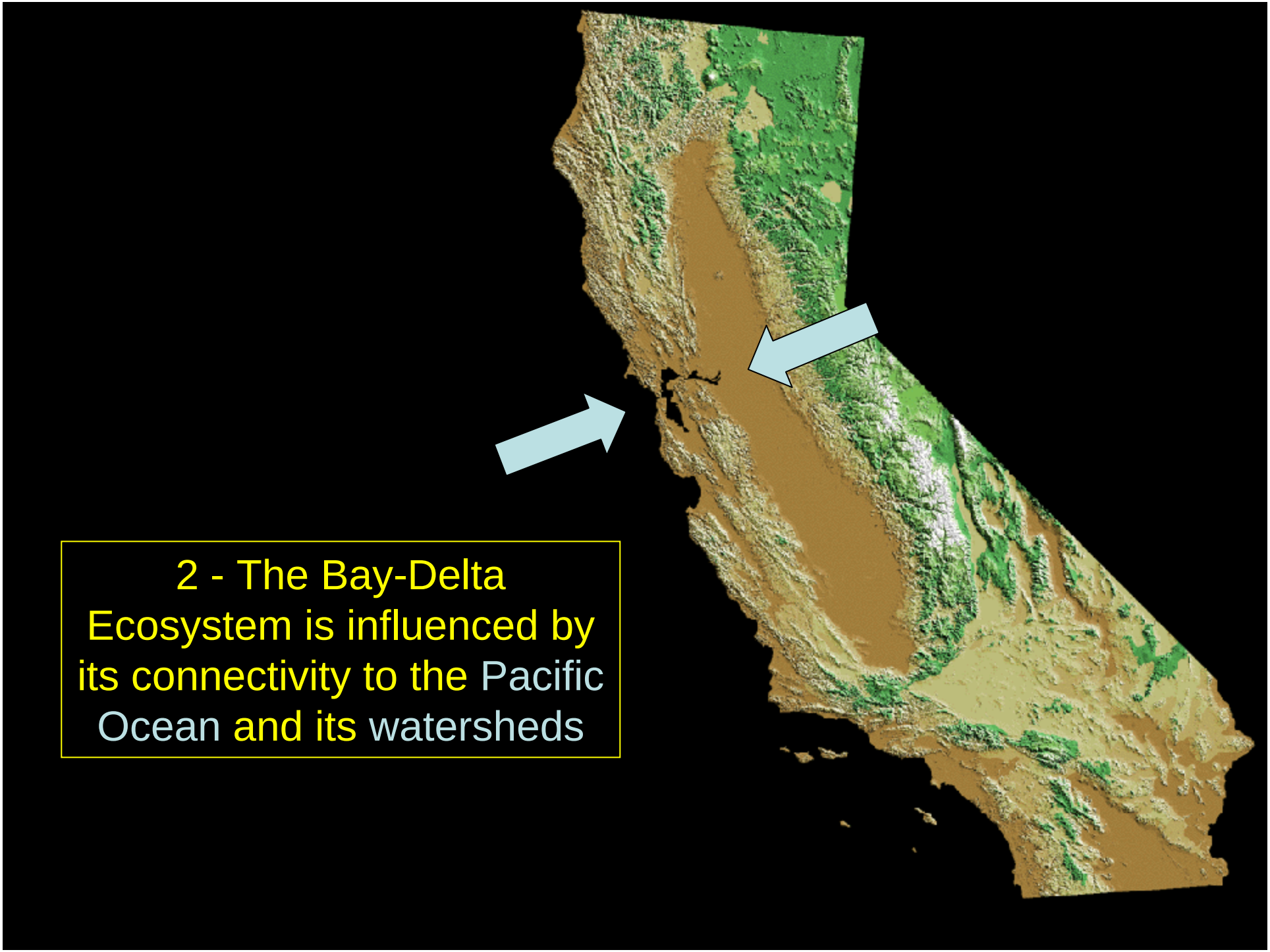


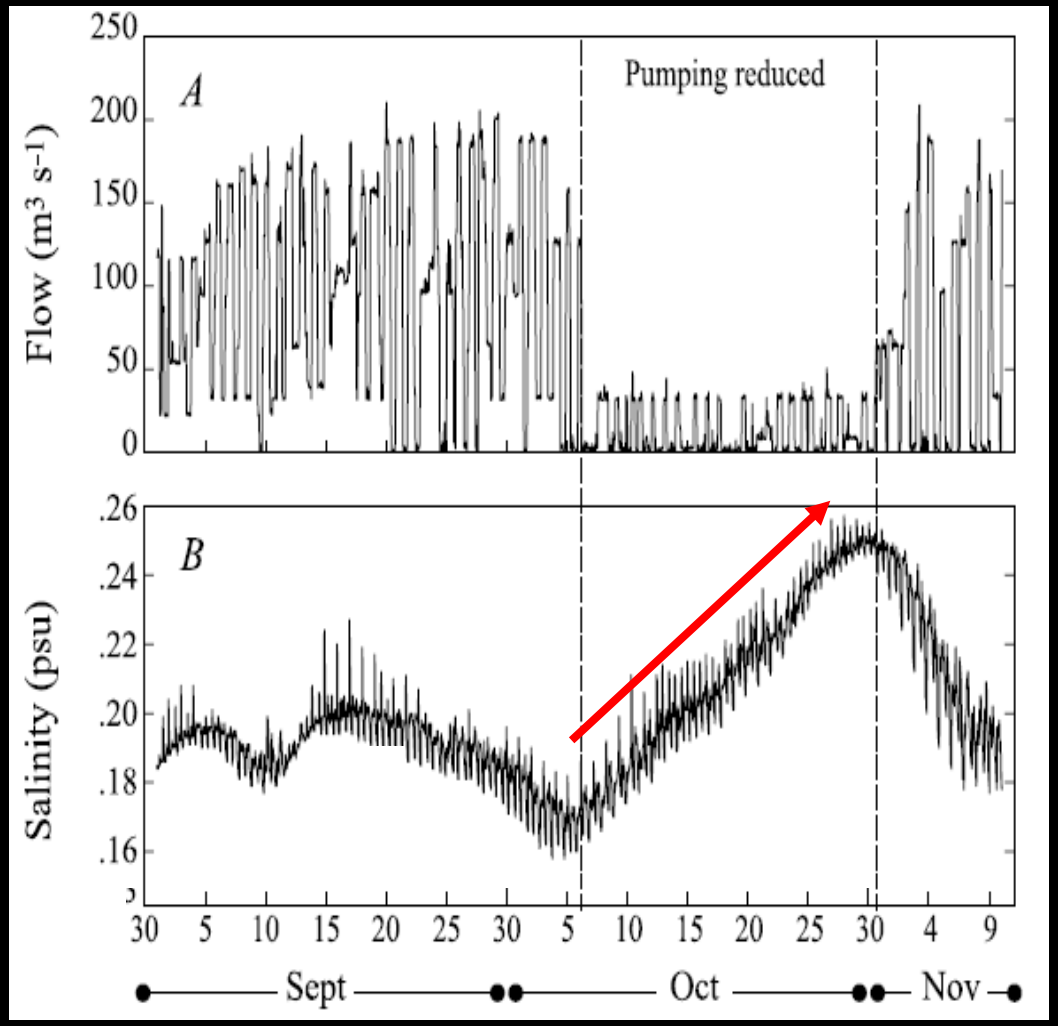
La Niña

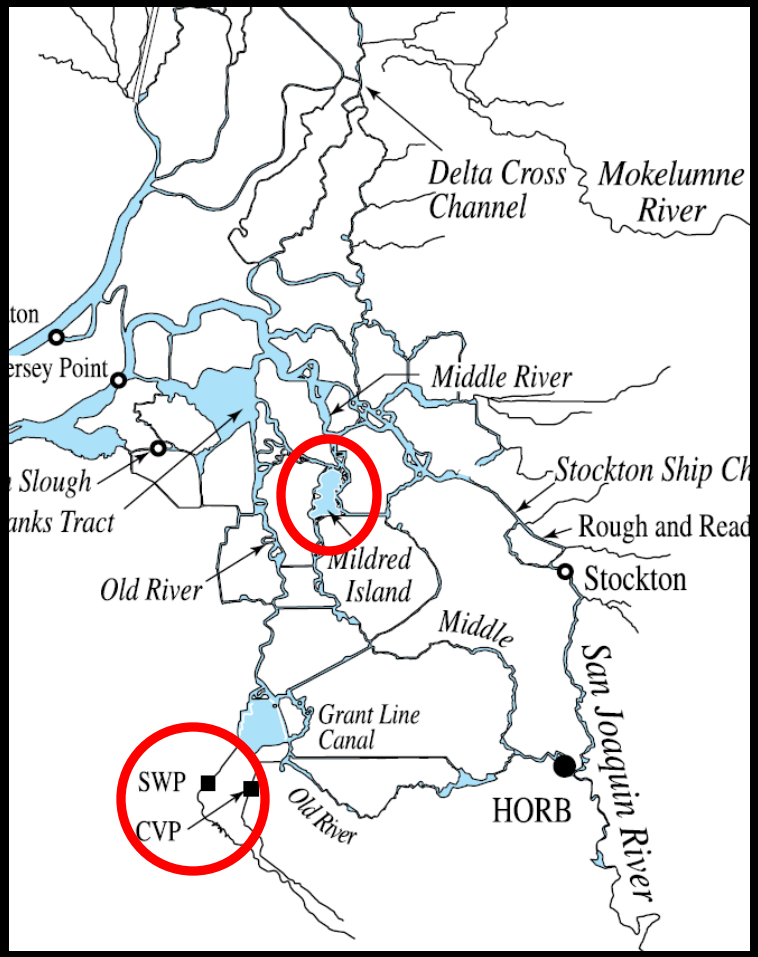




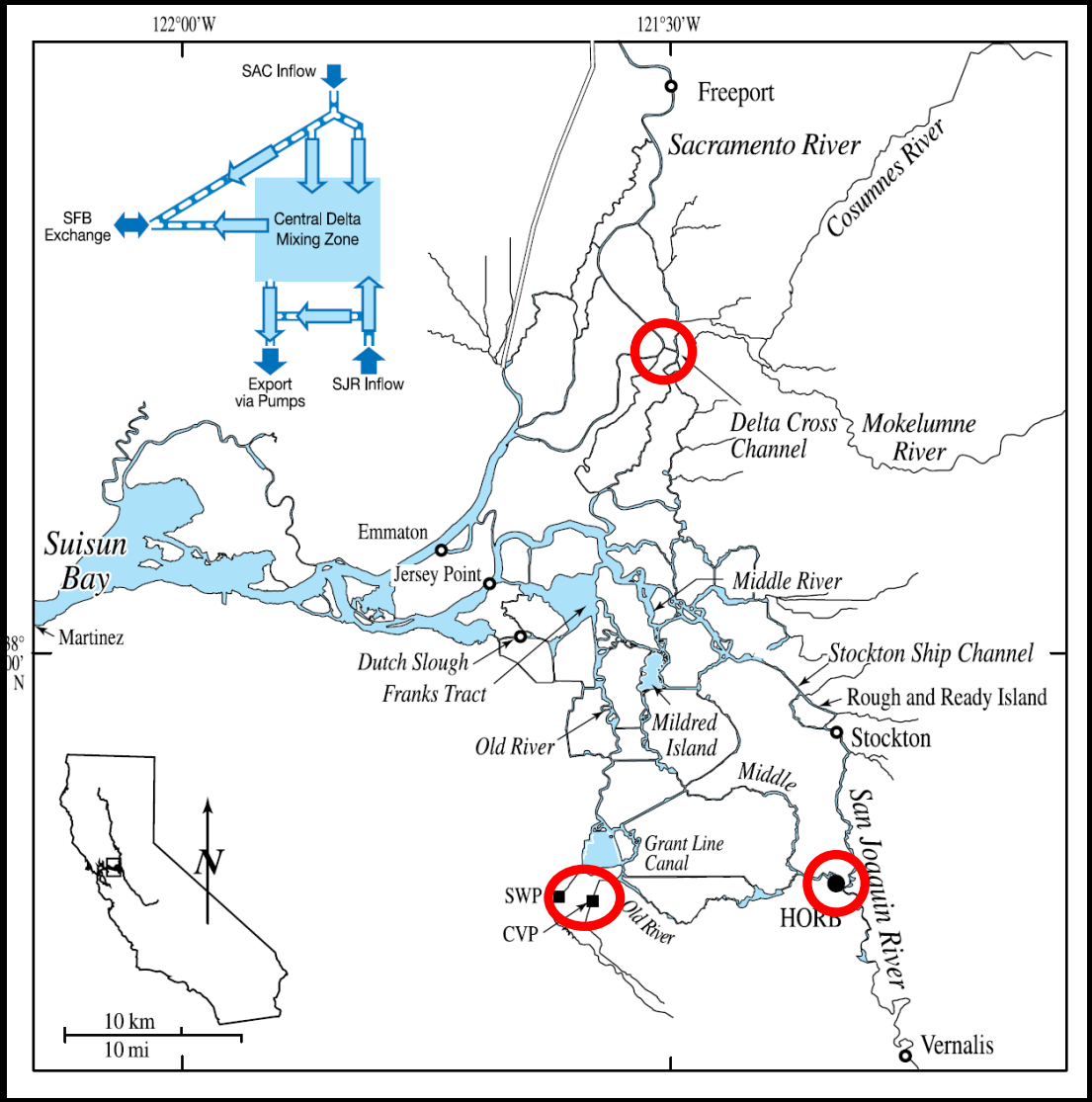
1 - Global processes cascade down to the Bay-Delta Ecosystem


2 - The Bay-Delta Ecosystem is influenced by its connectivity to the Pacific Ocean and its watersheds


A
Pumping reduced
Flow (m³ s⁻¹)
250
200
150
100
50
0
B
Salinity (psu)
.26
.24
.22
.20
.18
.16
30 5 10 15 20 25 30 5 10 15 20 25 30 4 9
Sept
Oct
Nov


Delta Cross Channel
Mokelumne River
Middle River
Stockton Ship Ch
Rough and Read
Stockton
Mildred Island
Old River
Middle
San Joaquin River
Grant Line Canal
SWP
CVP
Old River
HORB

3 - Local processes propagate up

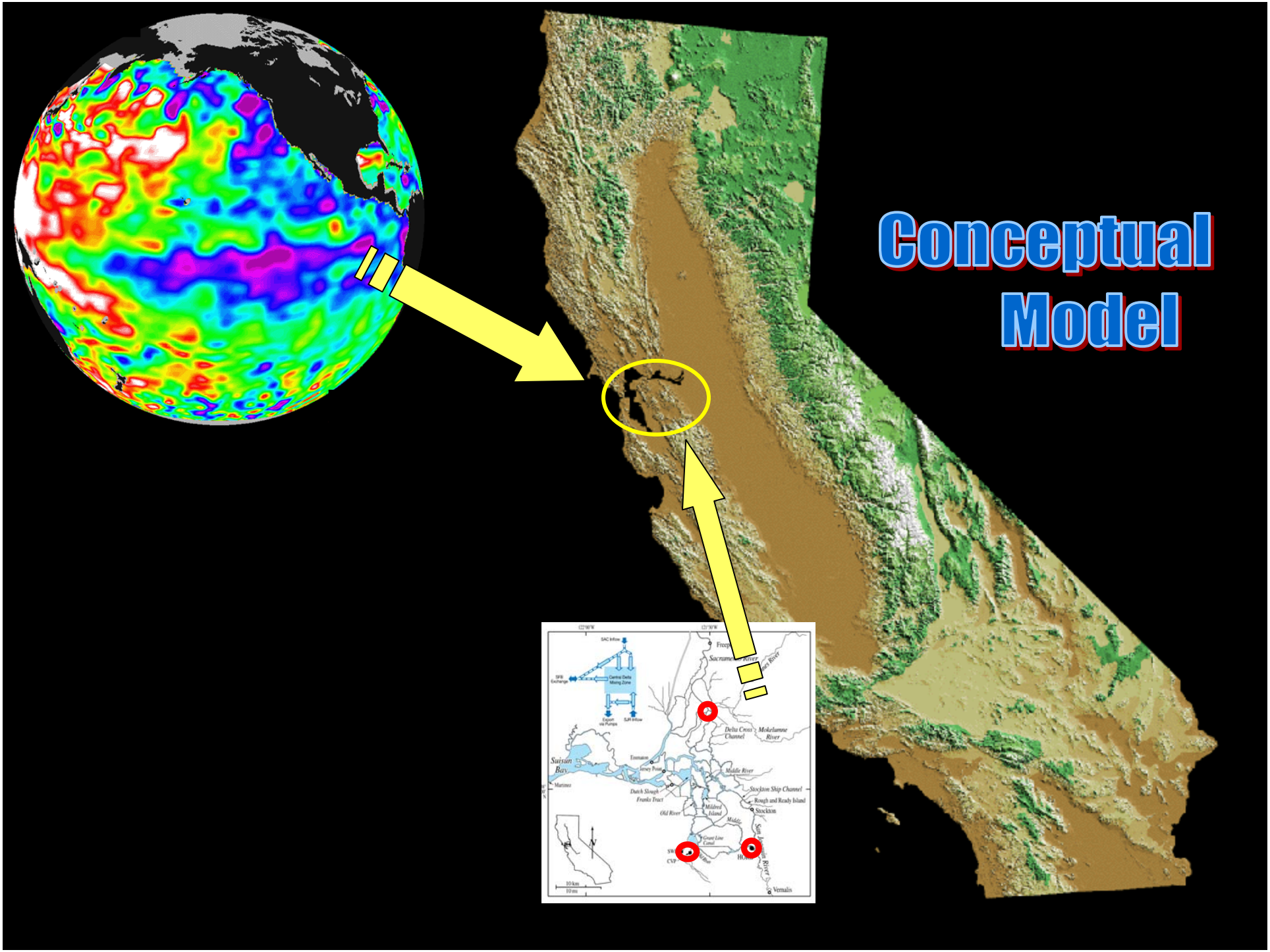


JULY 2007

SAN FRANCISCO ESTUARY & WATERSHED SCIENCE

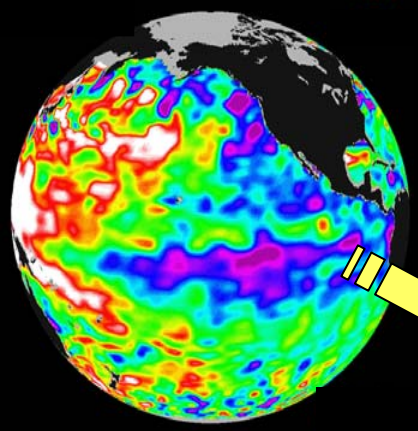
Effects of Flow Diversions on Water and Habitat Quality: Examples from California's Highly Manipulated Sacramento-San Joaquin Delta

Nancy E. Monsen*
James E. Cloern
Jon R. Burau
U.S. Geological Survey

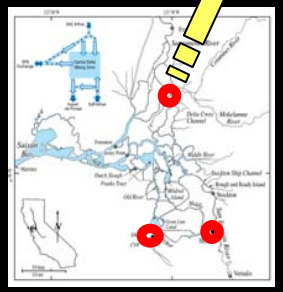

Conceptual Model
Suisun Bay
Martinez
Emmaton
Jersey Point
Dutch Slough
Franks Tract
Old River
Mildred Island
Middle River
Delta Cross Channel
Mokelumne River
Stockton Ship Channel
Rough and Ready Island
Stockton
Grant Line Canal
SWP
CVP
Vernalis
10 km
10 mi

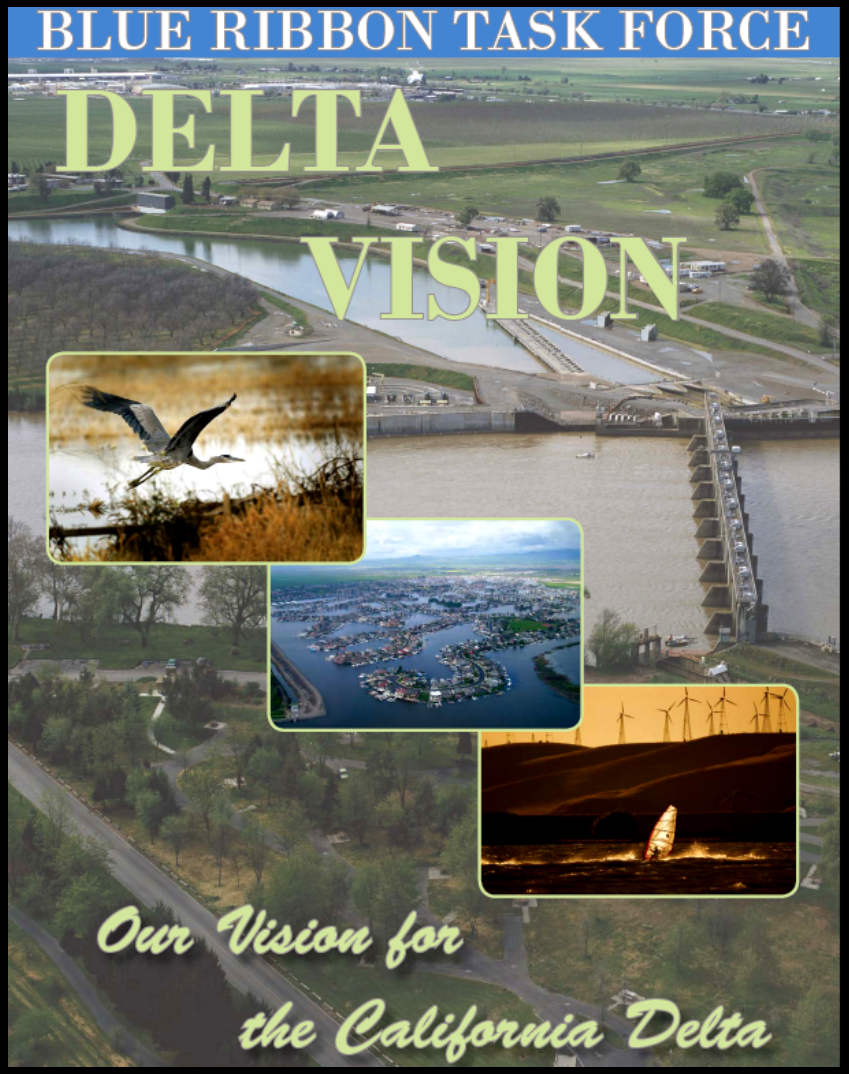
4 – Global and local processes change continuously

Climate change & sea level rise
- heat waves
- droughts
- snow pack
- seasonal hydrology
- winter storms
- altered wind patterns
- migratory species



New conveyances
Subsidence
Earthquake
Levee breaches
San Luis Drain
New storage
Landscape changes
Habitat restoration
Reservoir operations
Quagga invasion
Flow diversions
Herbicide applications





Big Challenge

How can we integrate

- global processes that cascade down
- local processes that propagate up
- connectivity across all the Delta's boundaries
- future changes at local to global scales

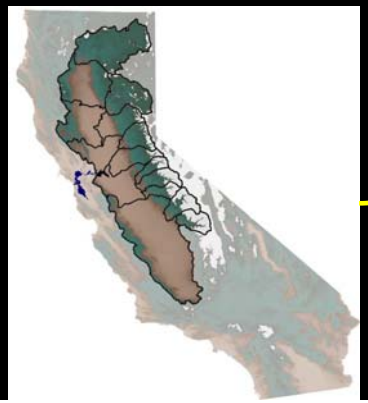
?

Computational
Assessments of
Scenarios of
Change in the
a
Delta
Ecosystem

Global Climate Models

Downscaled To Region

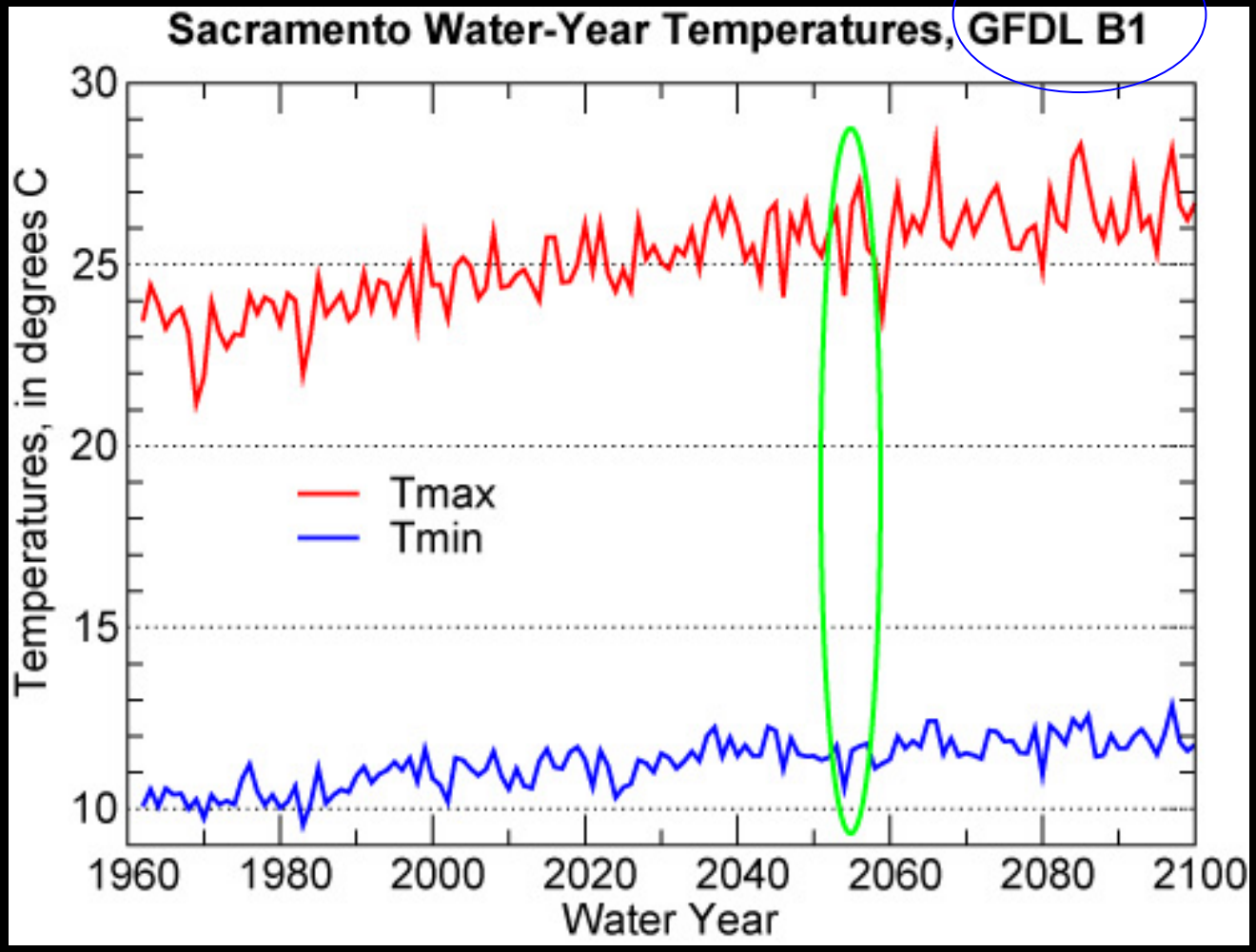
Watershed Model



Delta Model

Air Temperature (+ wind, humidity, solar radiation)

4 scenarios

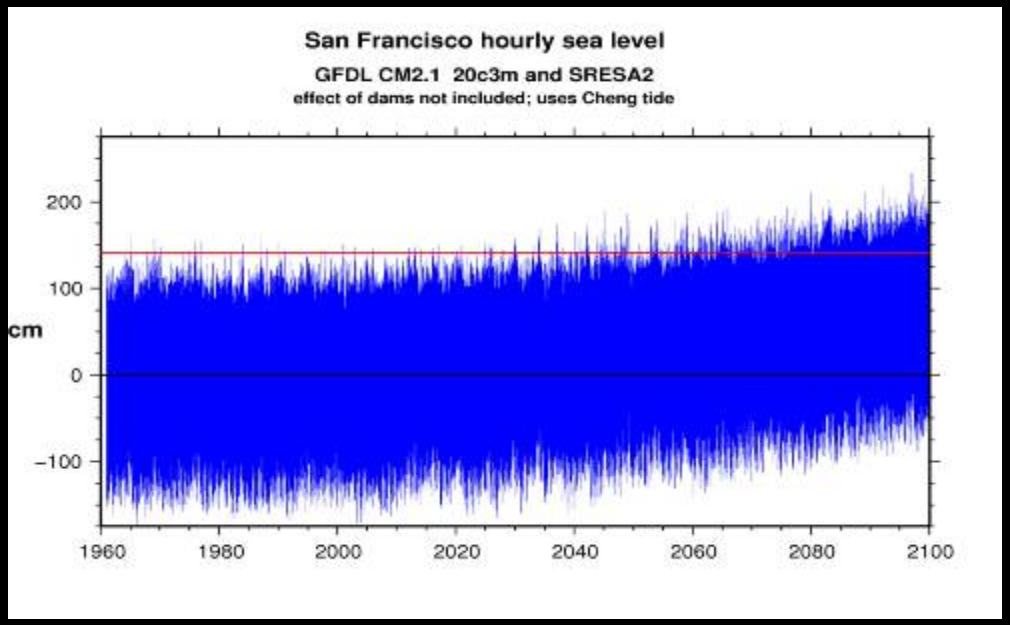


Mike Dettinger

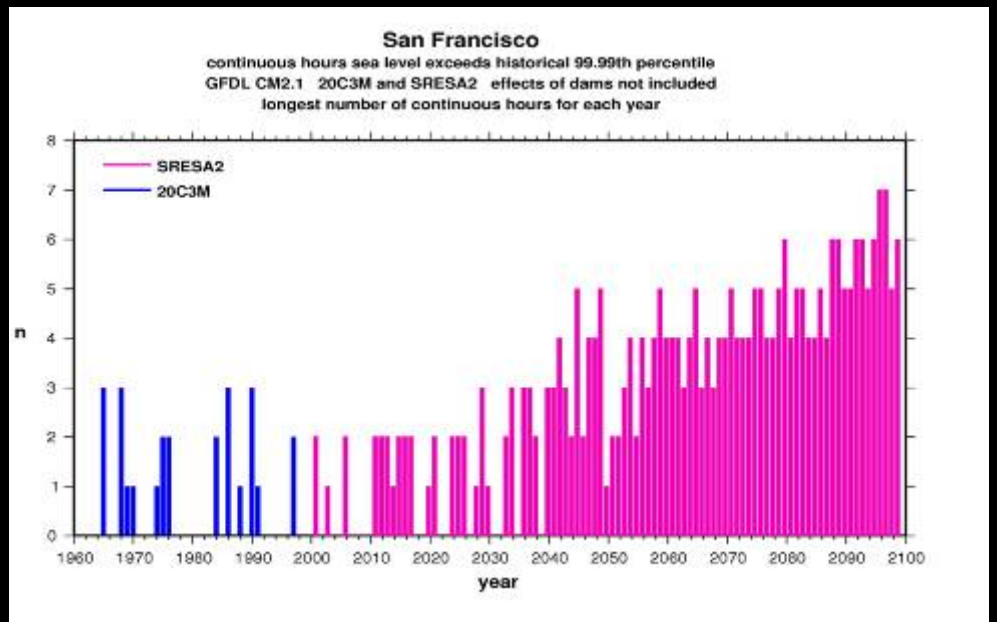
Global
Climate
Models

Sea Level & Storm Surges

GFDL A2
+ 0.9 m

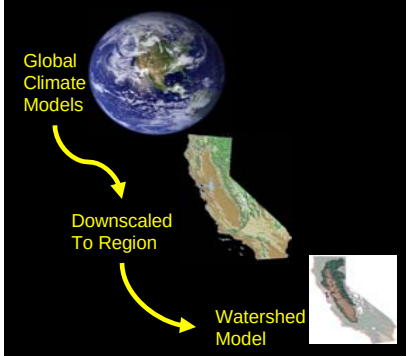


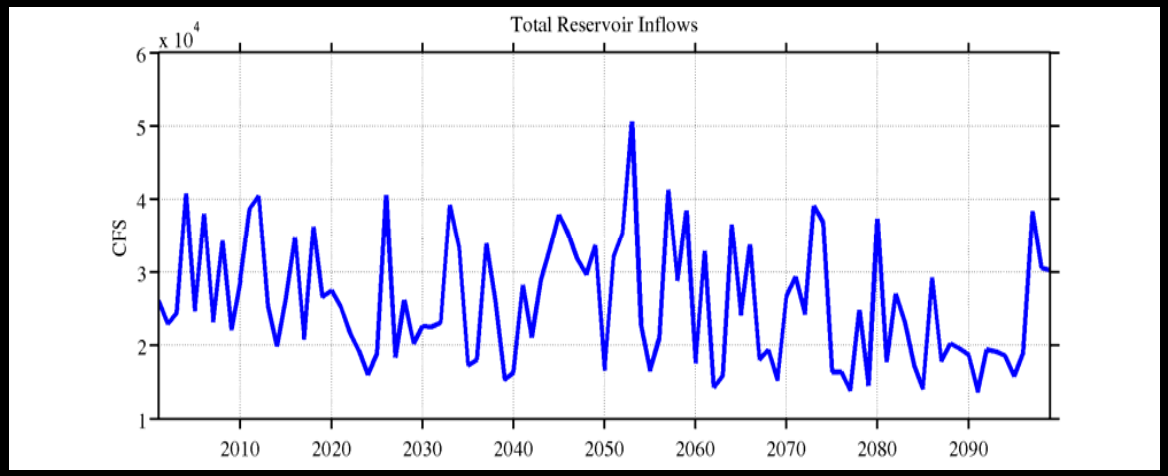
Extreme
events



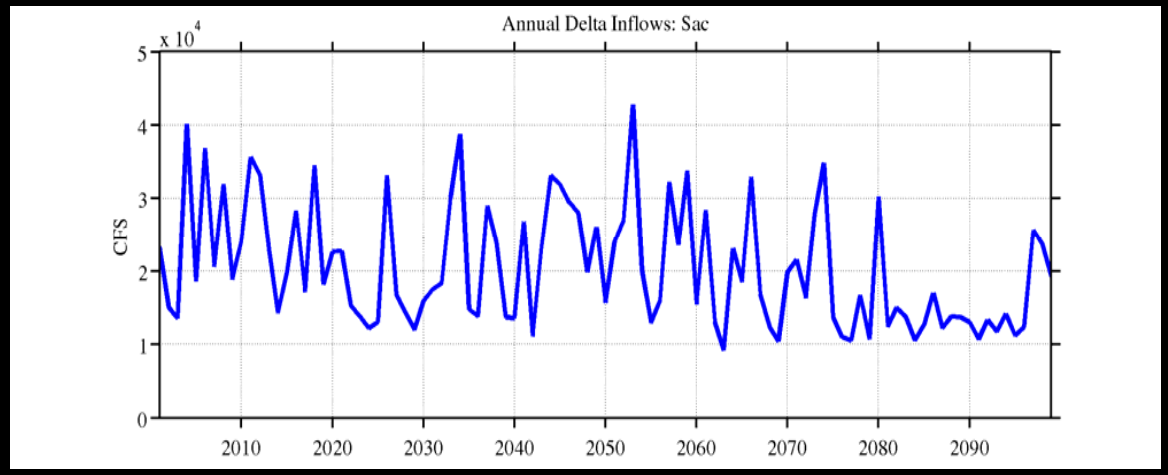
Dan Cayan

Runoff, River Flow, Reservoir Storage, Delta Inflow



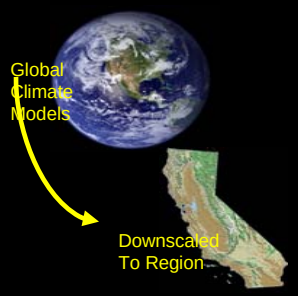


Reservoir Inflow

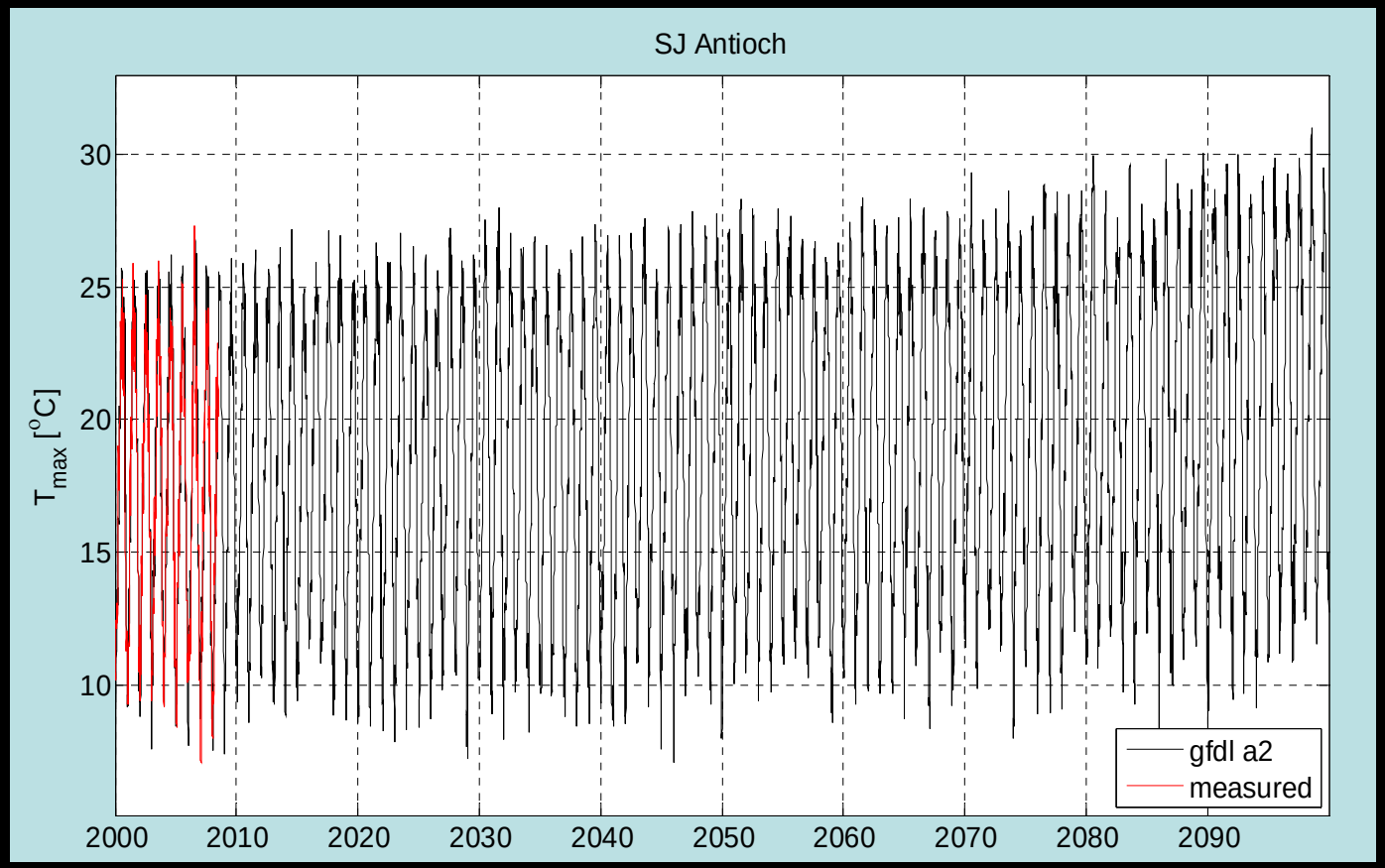


Delta Inflow

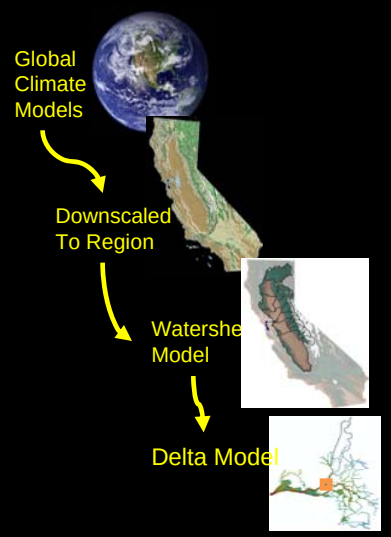
Noah Knowles



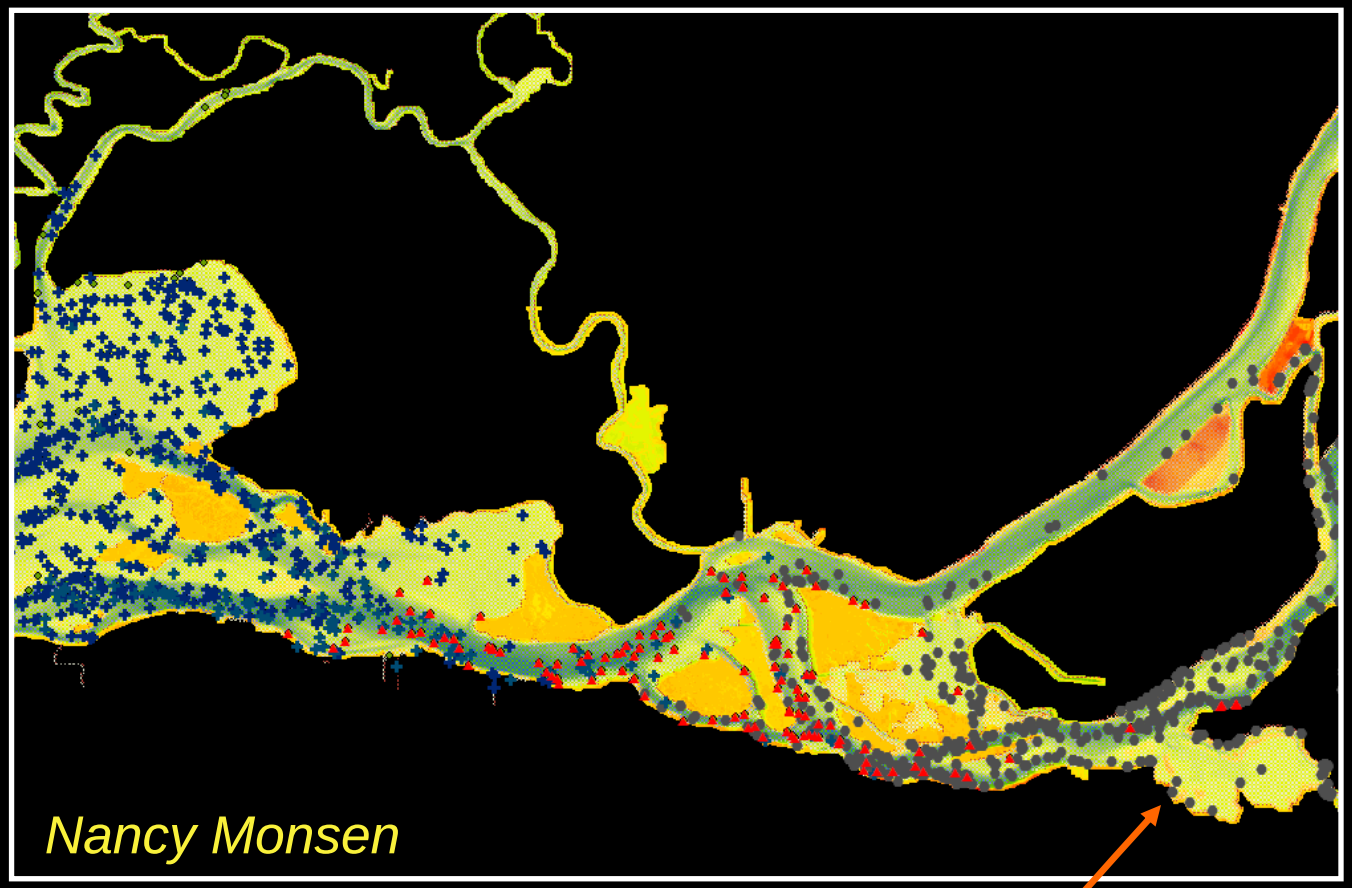
Delta Water Temperature

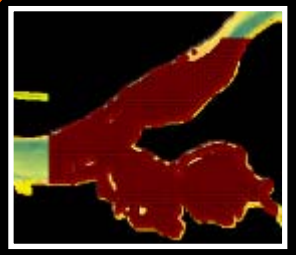


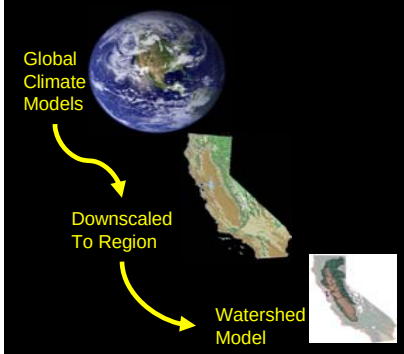
Wayne Wagner, Mark Stacey



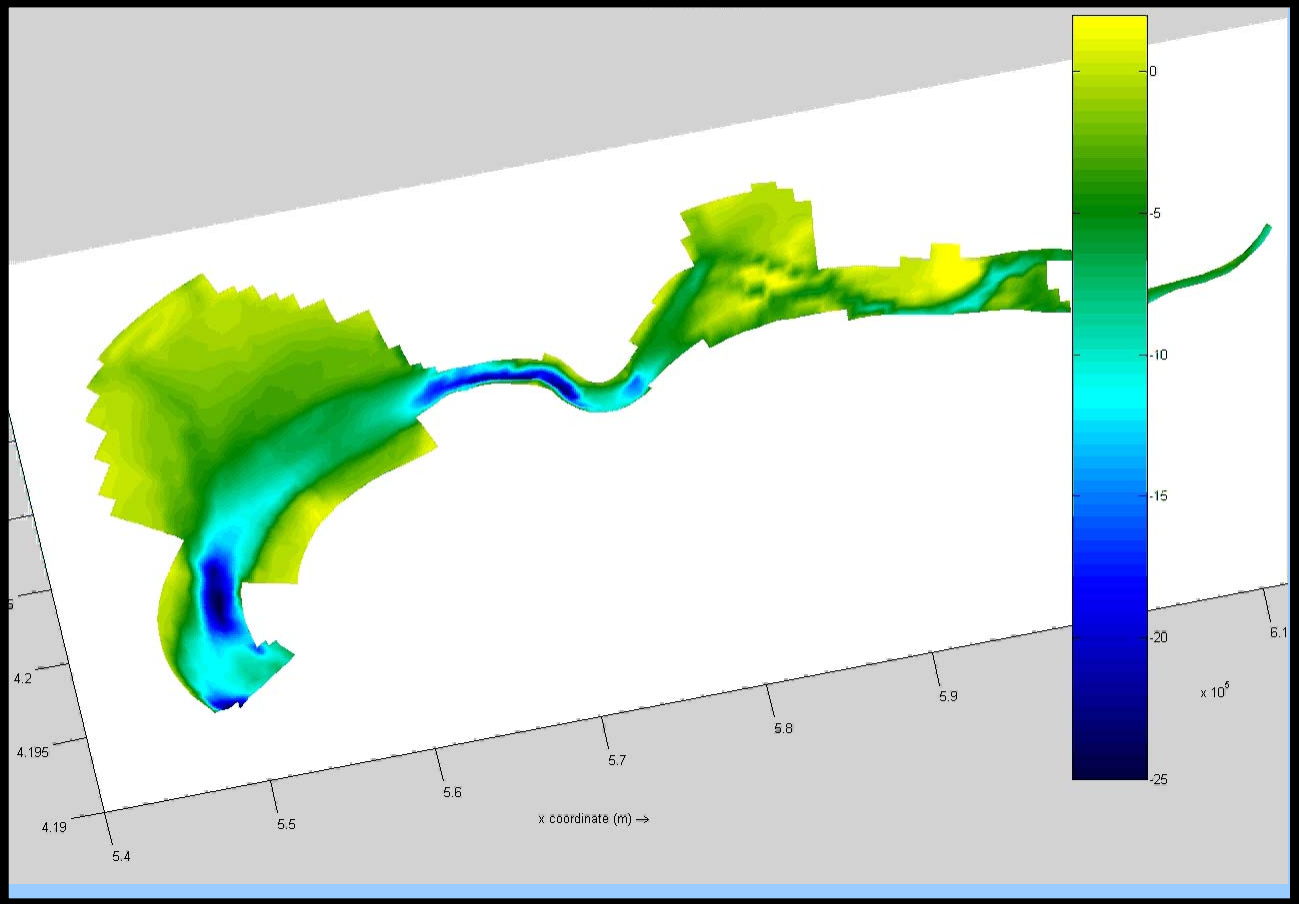
Particle Trajectories & Residence Time





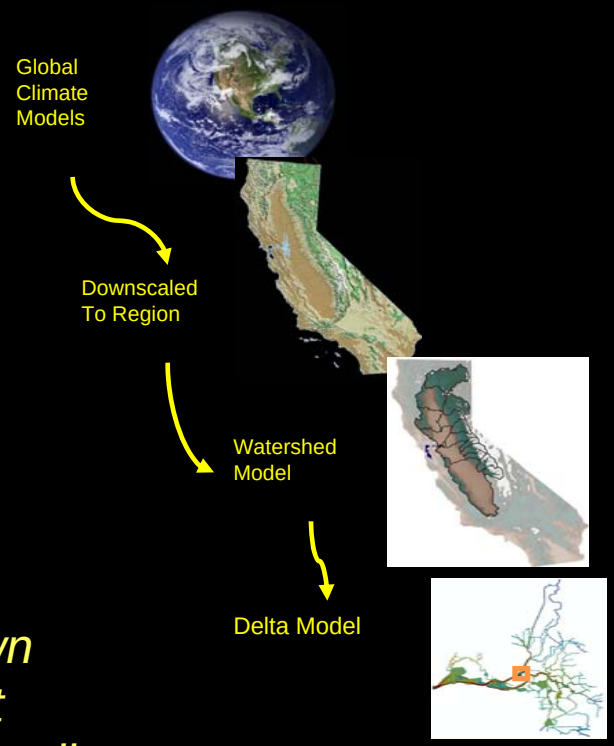


Sediment Inputs & Transport, Turbidity, Bathymetry



Mick van der Wegen, Dave Schoellhamer, Neil Ganju, Bruce Jaffe, Dano Roelvink

Ecological Changes in the 21st century



Fish
Larry Brown
Bill Bennet
Christa Woodley

Phytoplankton
Lisa Lucas

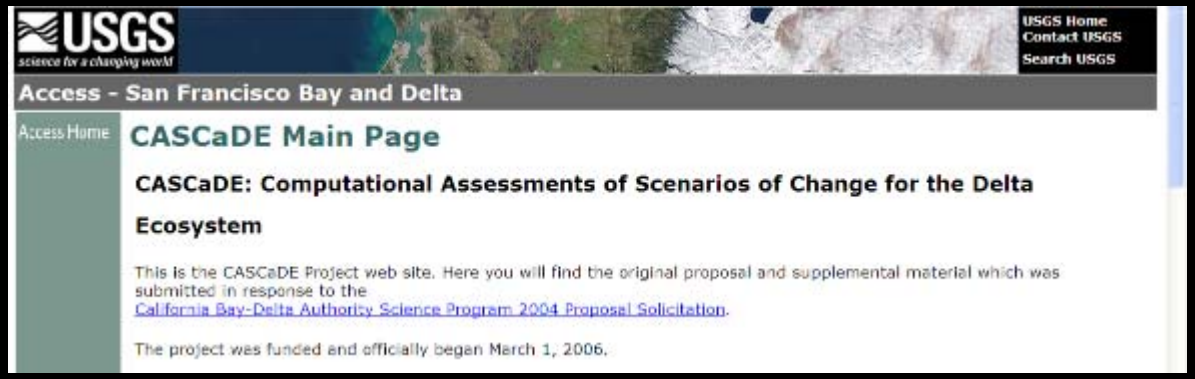
Mercury & Selenium
Robin Stewart
Sam Luoma

Invasive Species
Jan Thompson
Francis Parchaso

To Learn More .....

Friday, October 24

CASCaDE Studies (I)
Michael D. Dettinger, USGS

CASCaDE Studies (II)
Michael D. Dettinger, USGS

http://sfbay.wr.usgs.gov/cascade/