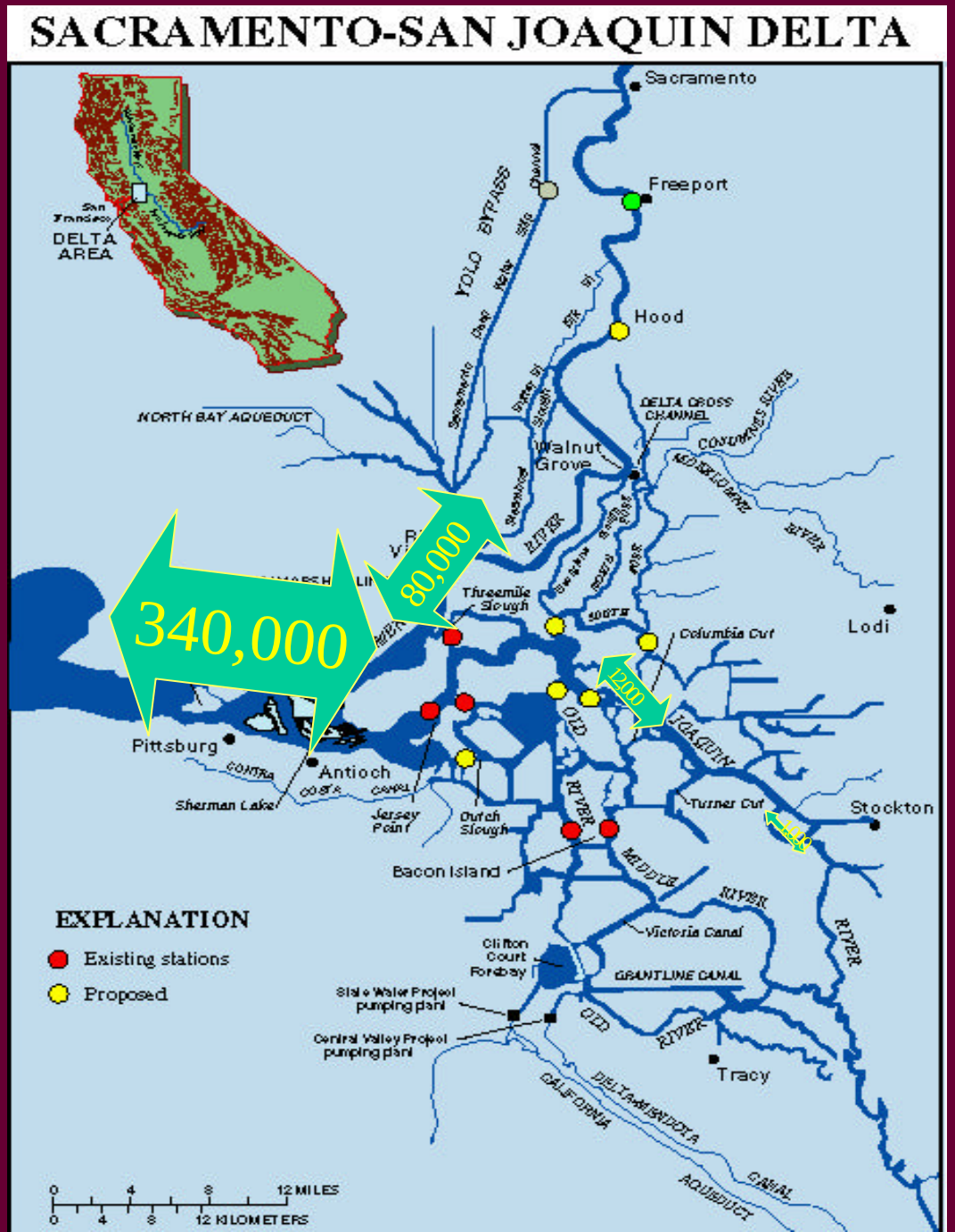
Balancing Fish and Water Quality

Vernalis Adaptive Management Program

and

Delta Cross Channel

Delta Cross Channel Investigations



DCC Gates closed when Sacramento > 25,000 cfs

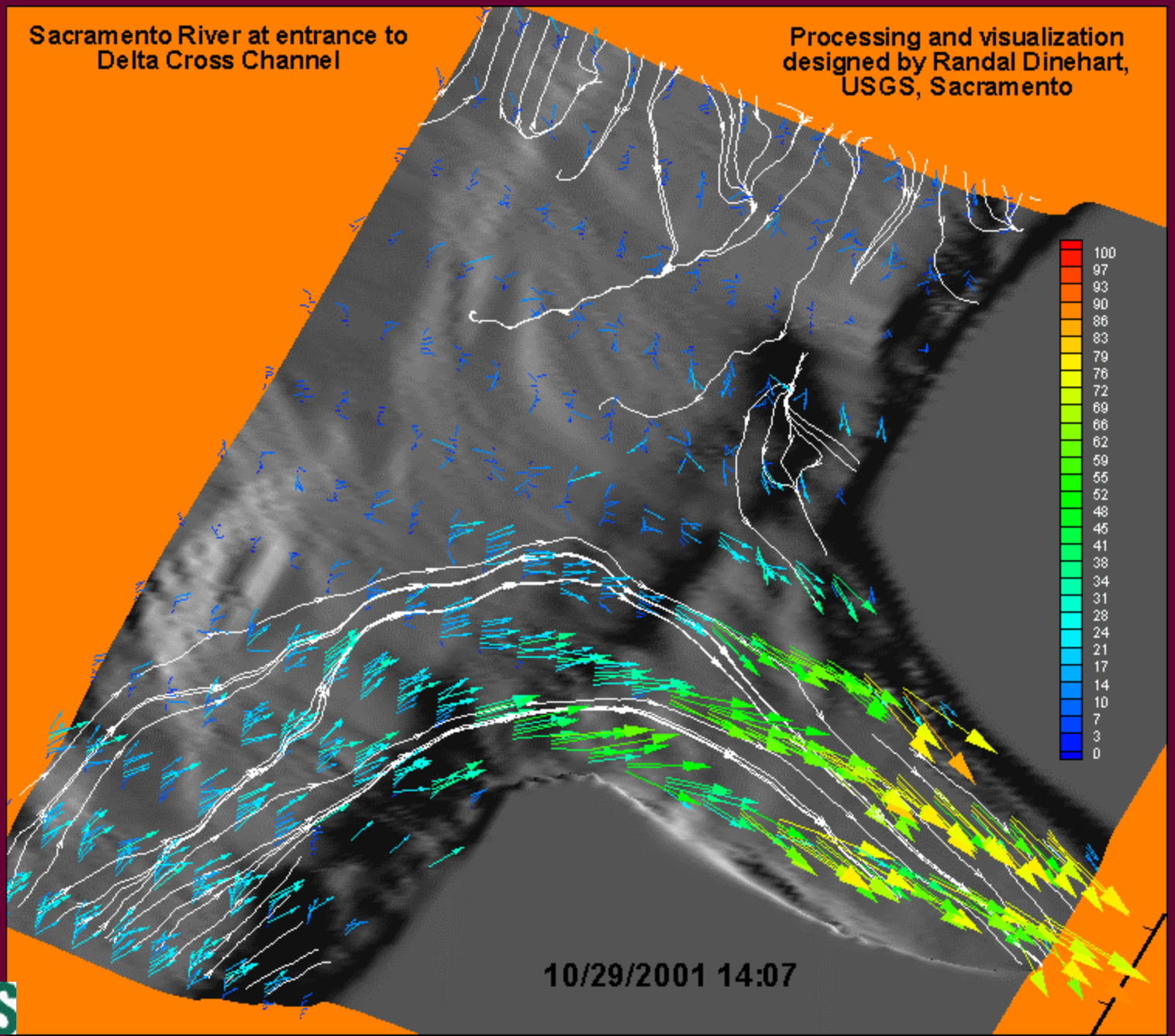
Maximum exports ~ 11,000

San Joaquin flow enhancements

3,200 - 7000

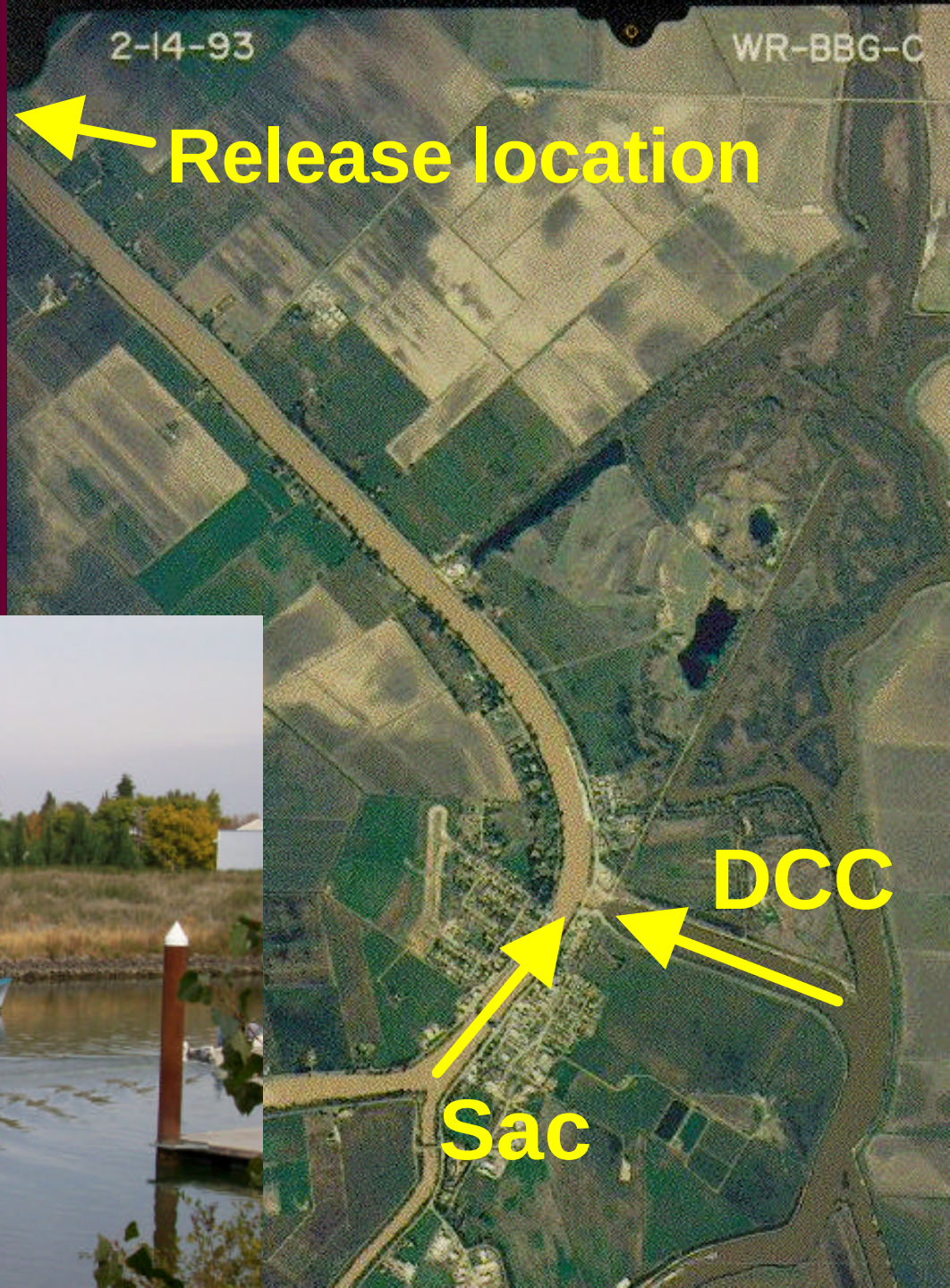

2-14-93
WR-BBG-C
3-8
DCC
(gates closed)

Flow Mapping results

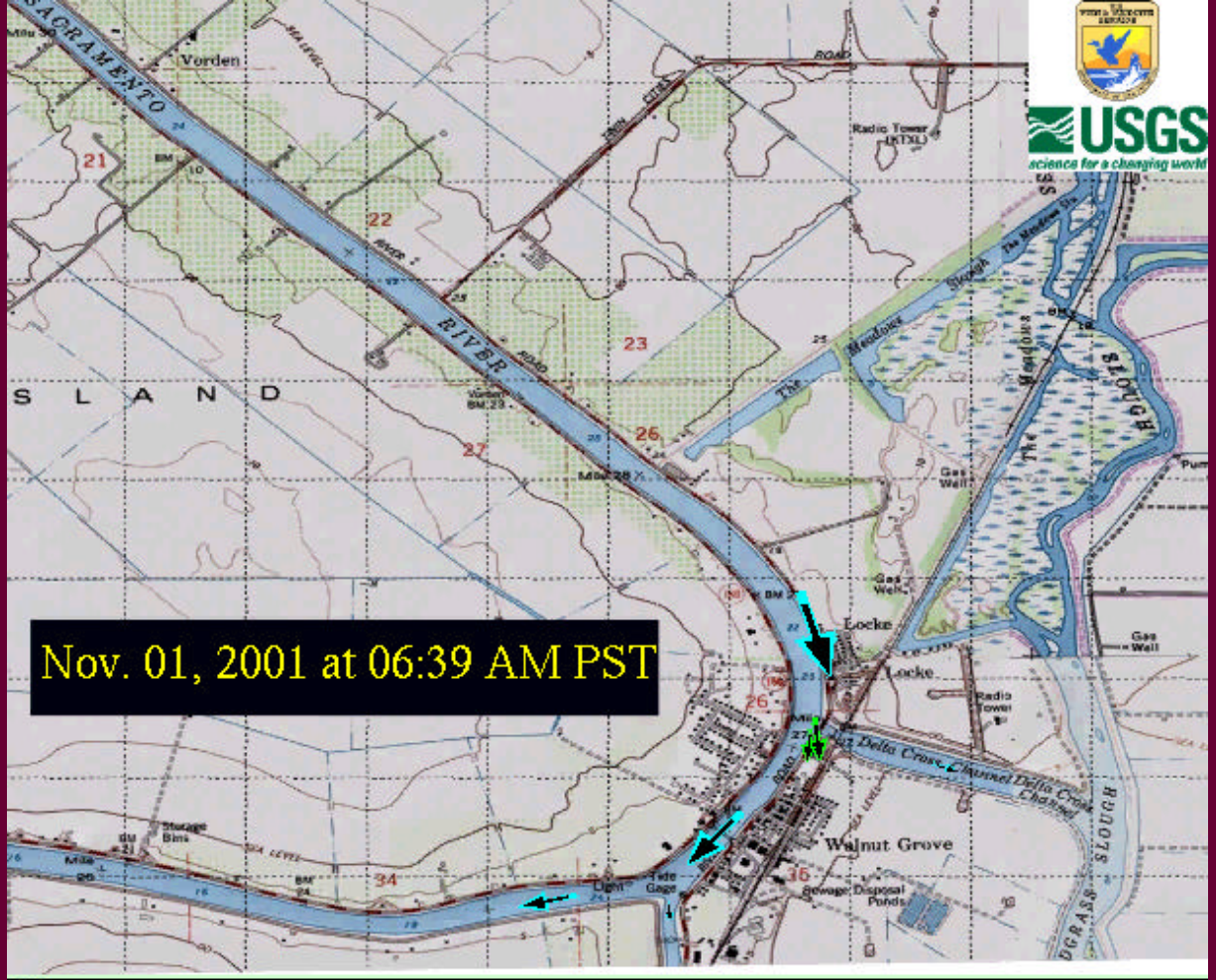


Logistics

Recovery effort:
Continuous MWT w/ Chipps Is. nets (larger, 10’ x 30’)



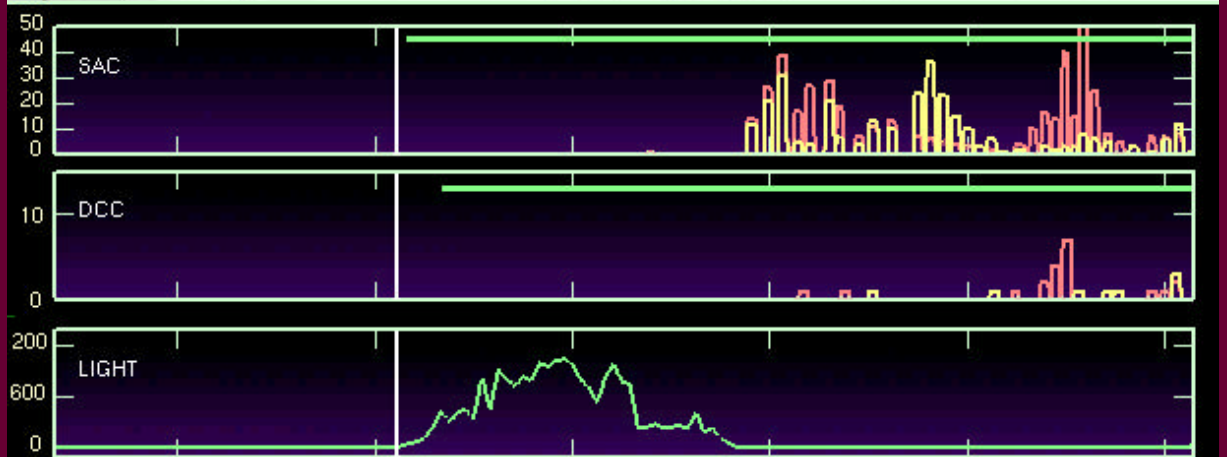
Nov 1-2

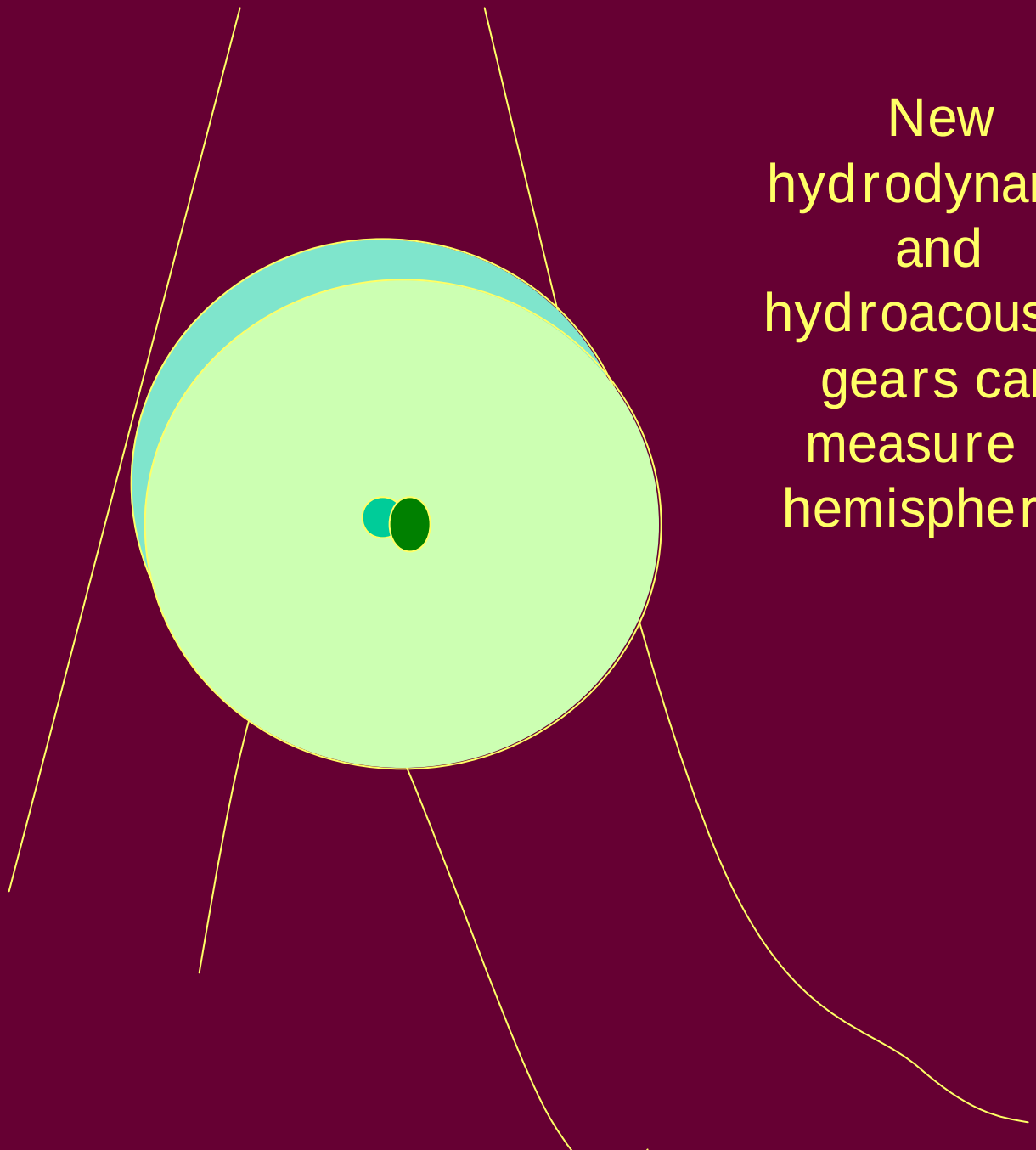


SAC Trawl

DCC Trawl

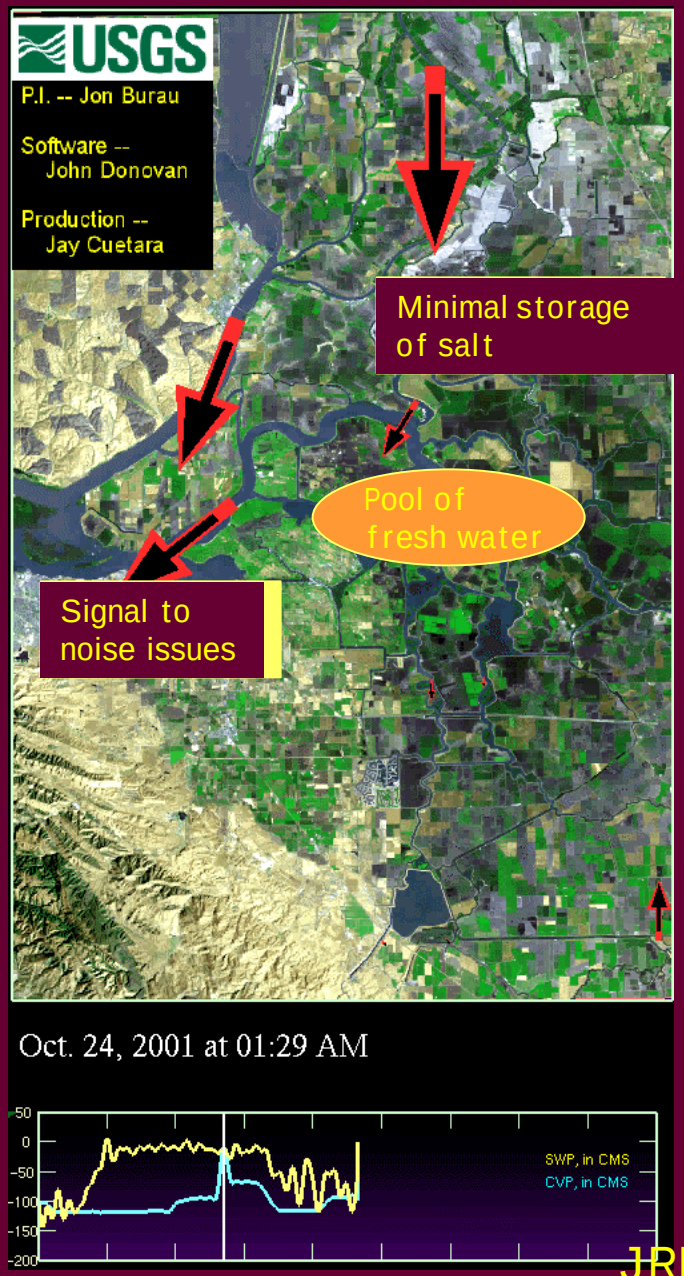
Light



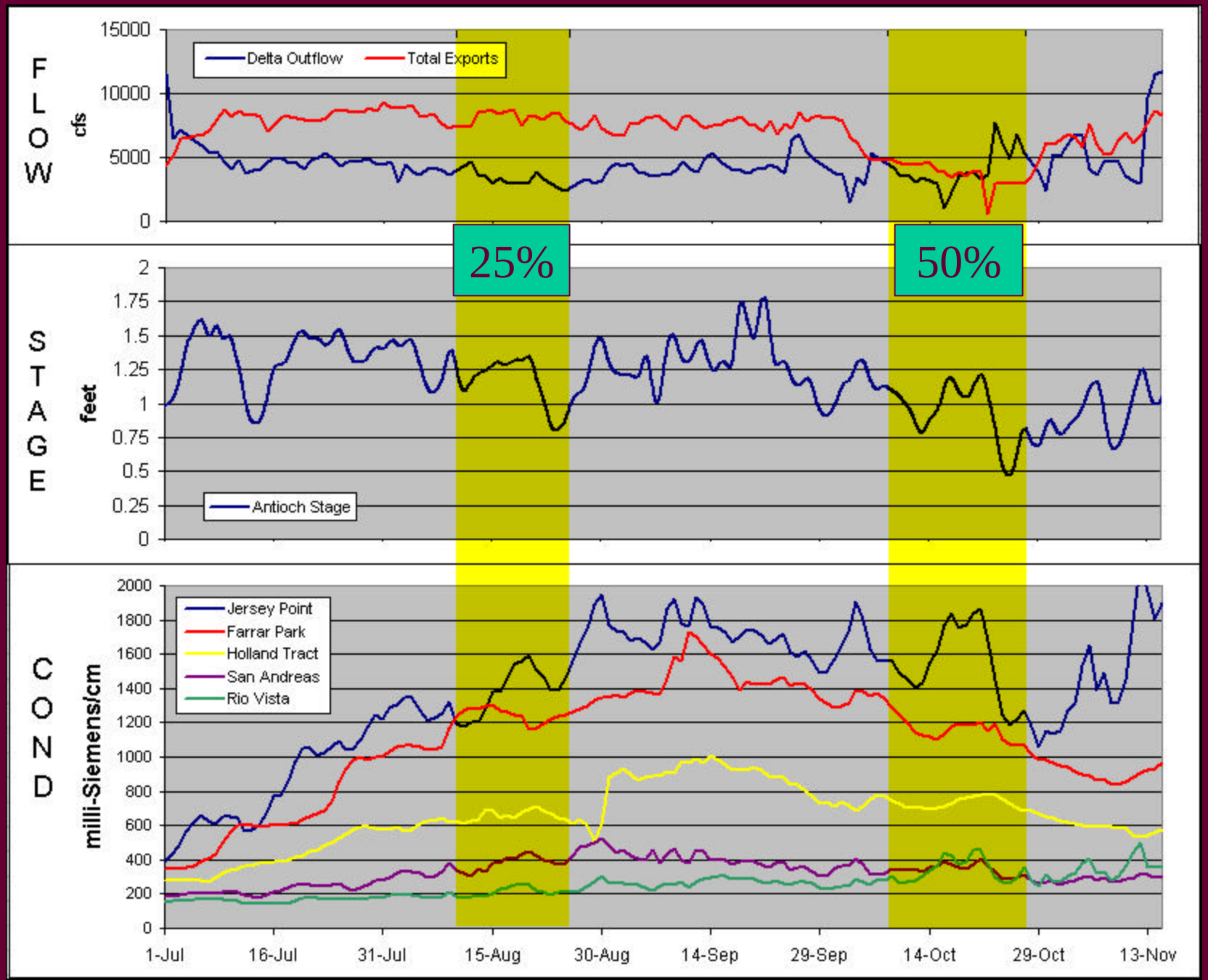


New hydrodynamic and hydroacoustic gears can measure in hemispheres

Water quality – Conceptual model/experimental design



JRB


FLOW
cfs
15000
10000
5000
0
Delta Outflow
Total Exports
25%
50%
STAGE
feet
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
Antioch Stage
COND
milli-Siemens/cm
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Jersey Point
Farrar Park
Holland Tract
San Andreas
Rio Vista
1-Jul
16-Jul
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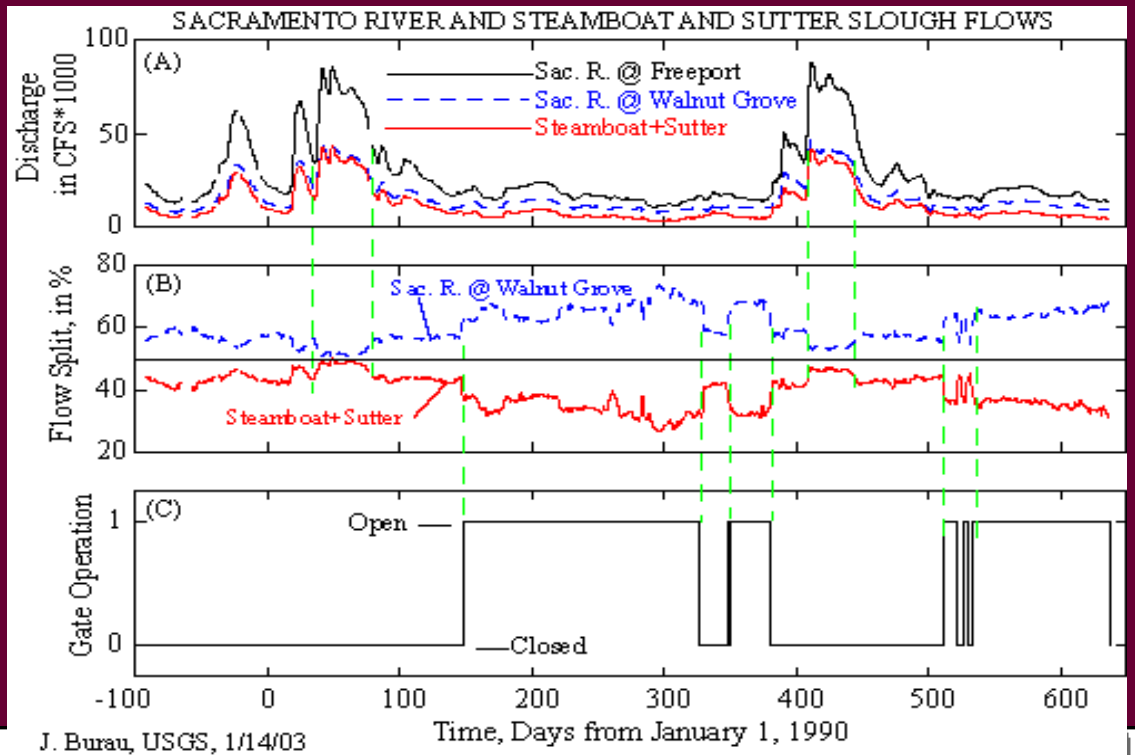
Water Quality Studies

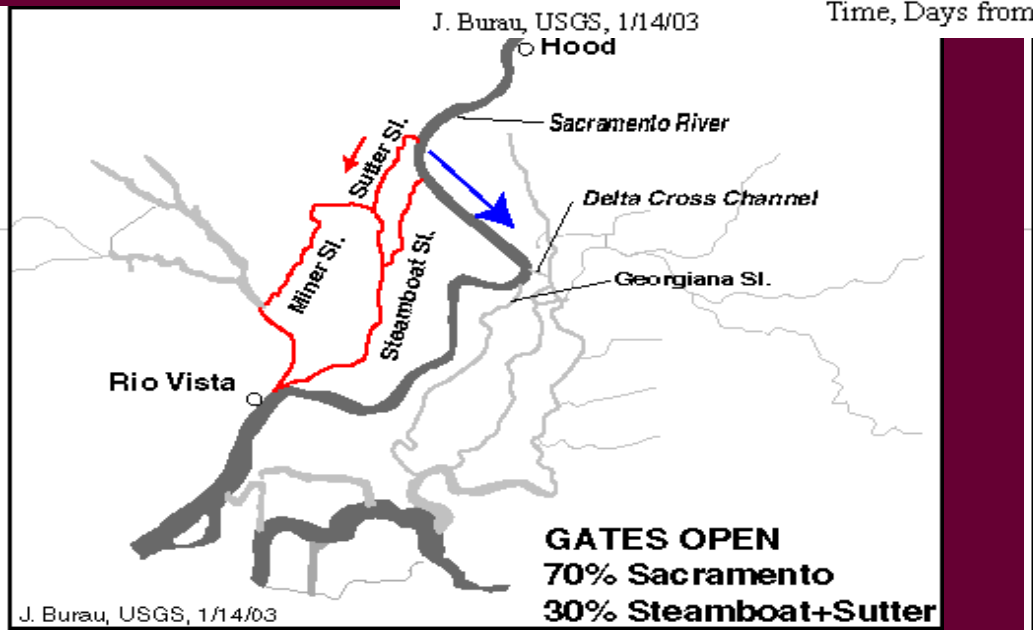
- Gear in place or quickly deployed
- Need salinity response in central delta
- Need level flows and pumping
- Need two three-four day periods
- Ideally operate below balanced conditions to allow salinity to rise without violating standards
- Water costs prohibitive

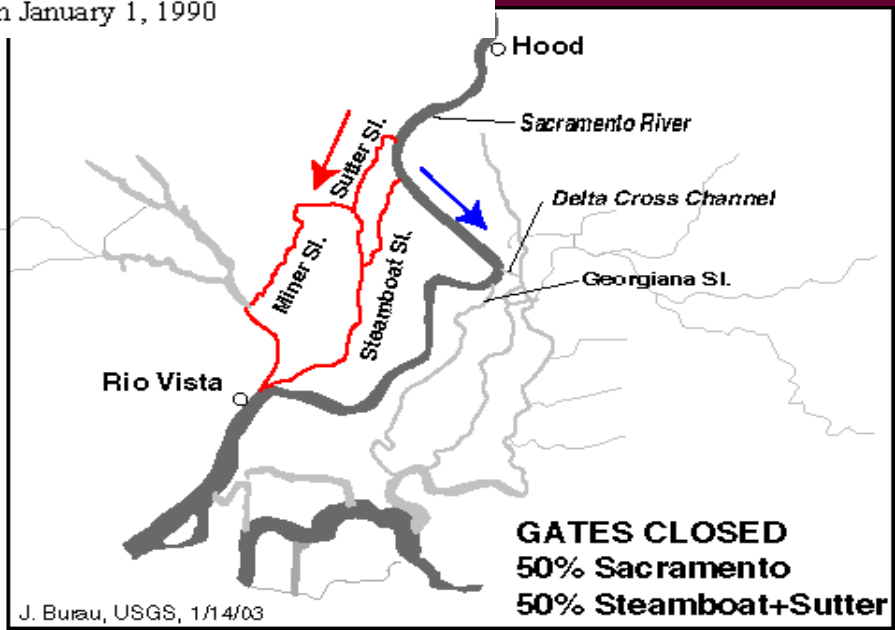
DCC Gate operations affect upstream flow splits



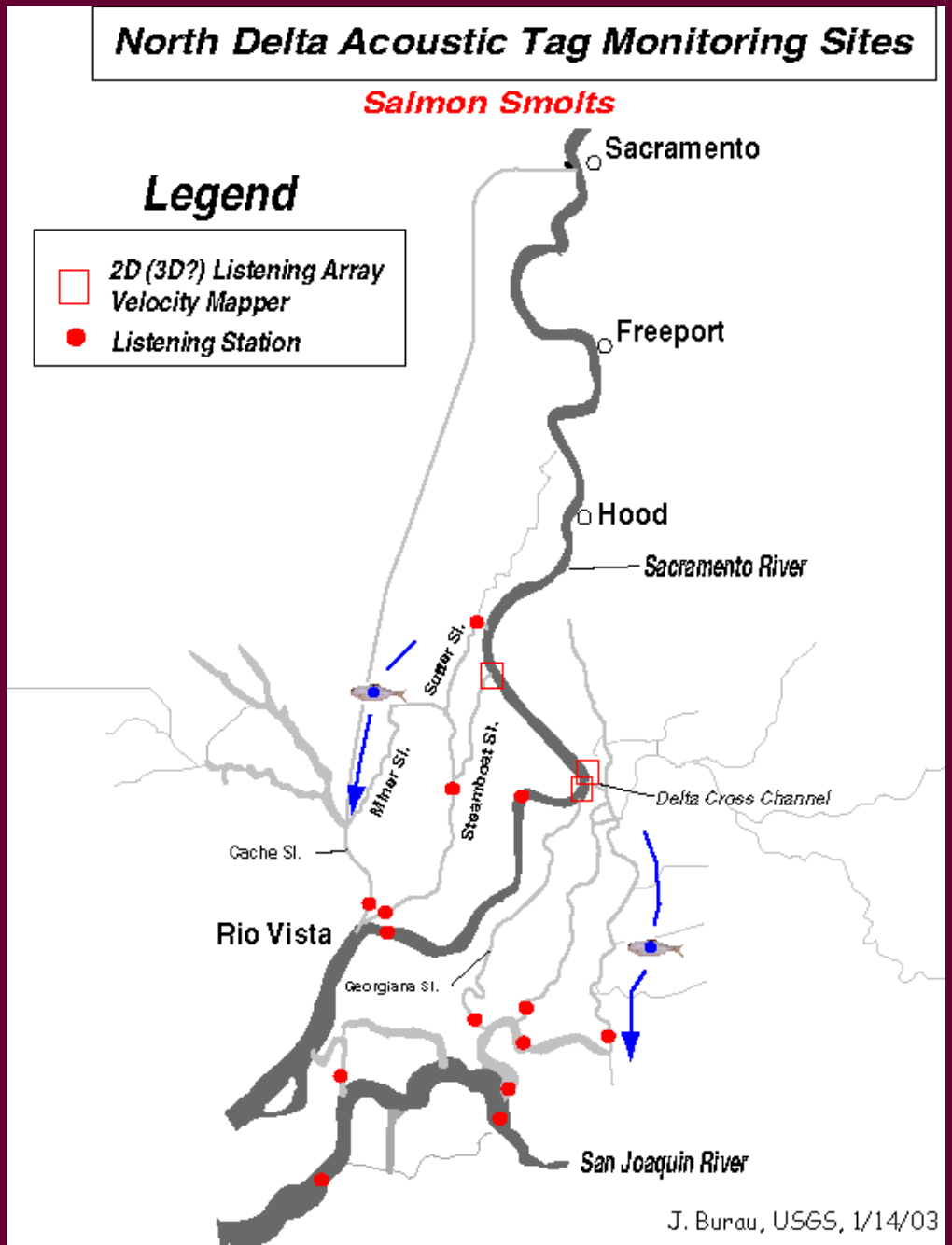
USGS

JRB





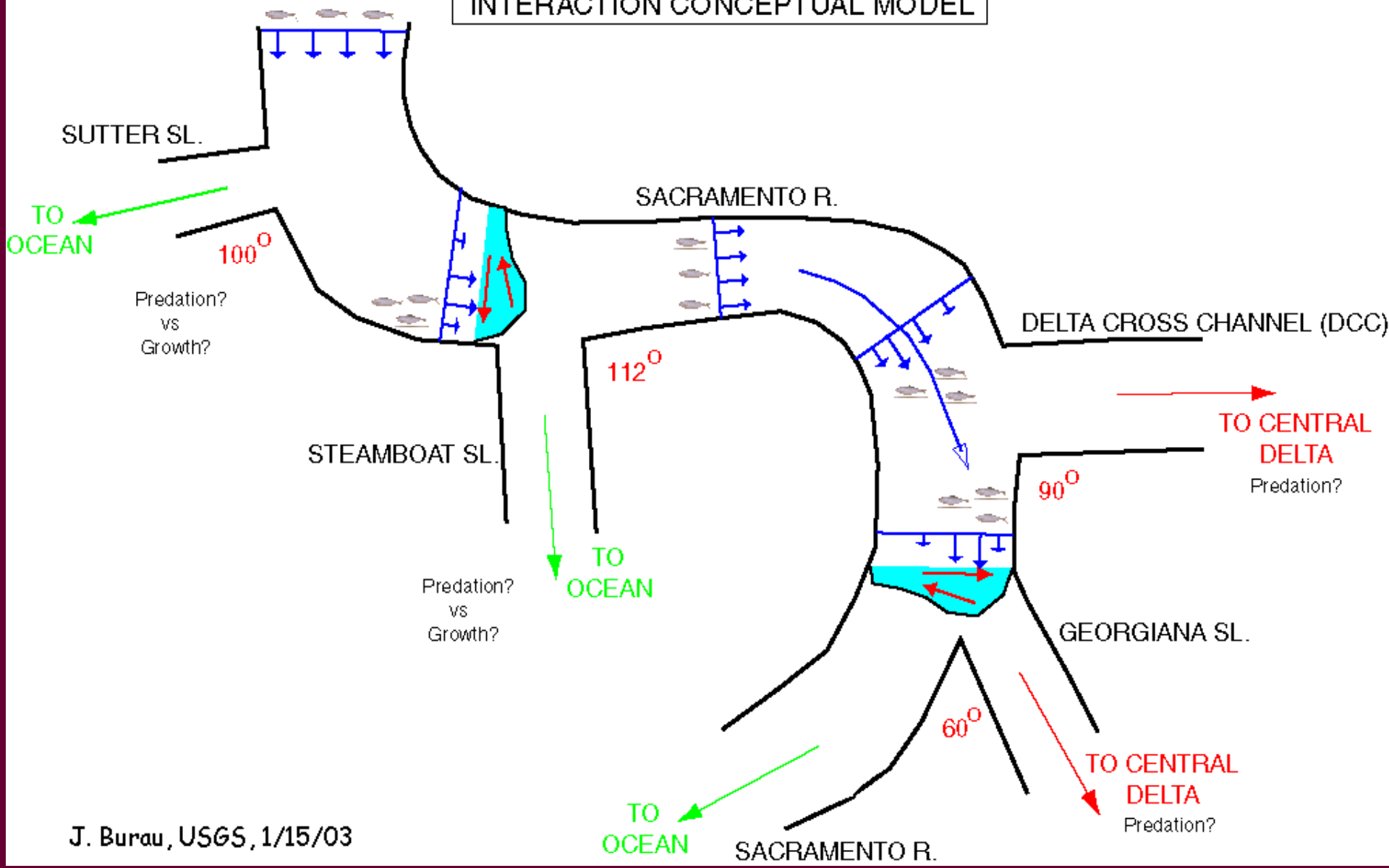
Experimental design for smolts - Regional



USGS

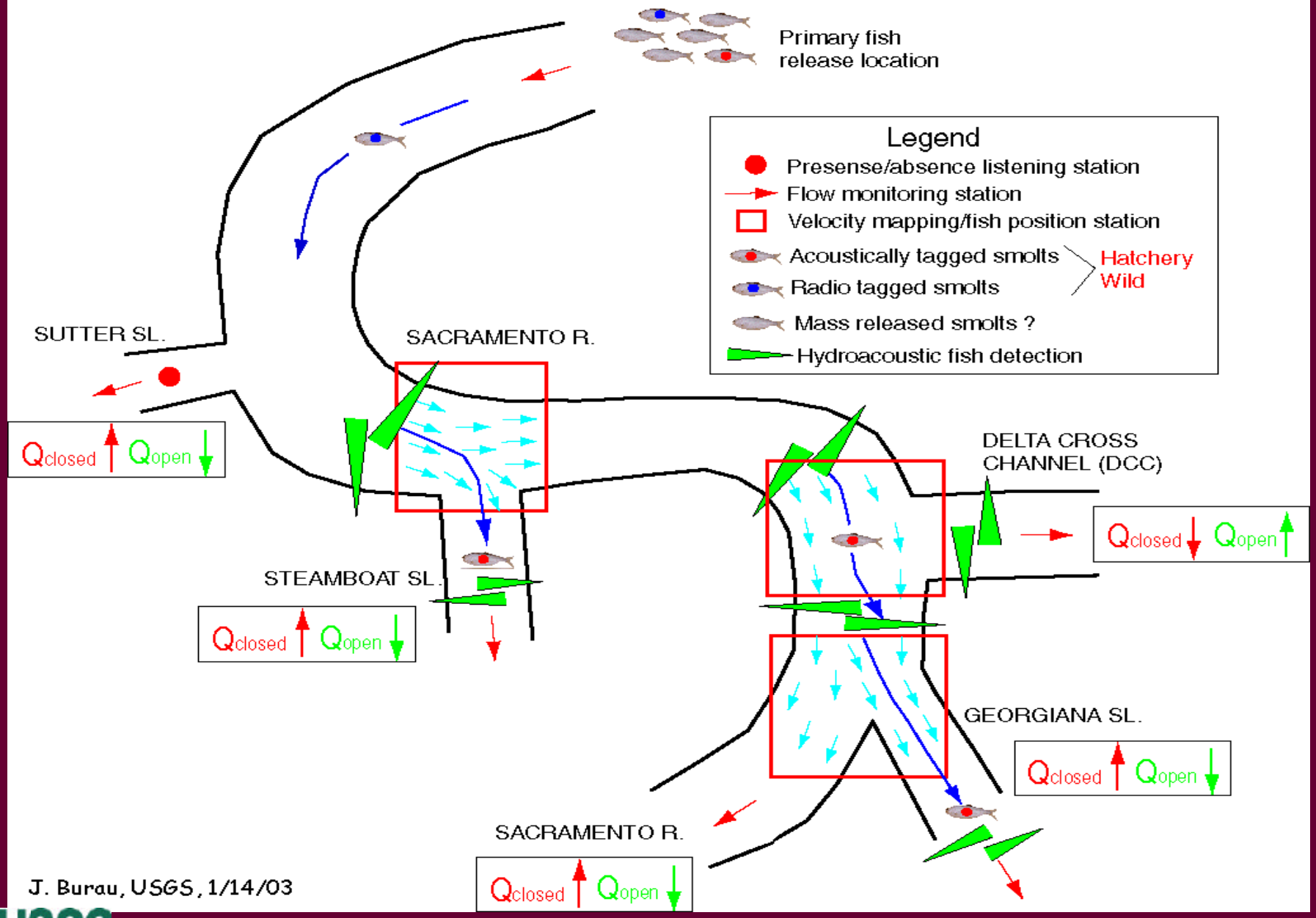
JRB

NORTH DELTA FLOW/SALMON SMOLT INTERACTION CONCEPTUAL MODEL



J. Burau, USGS, 1/15/03

Experimental Design - Local
-Quick Attack-

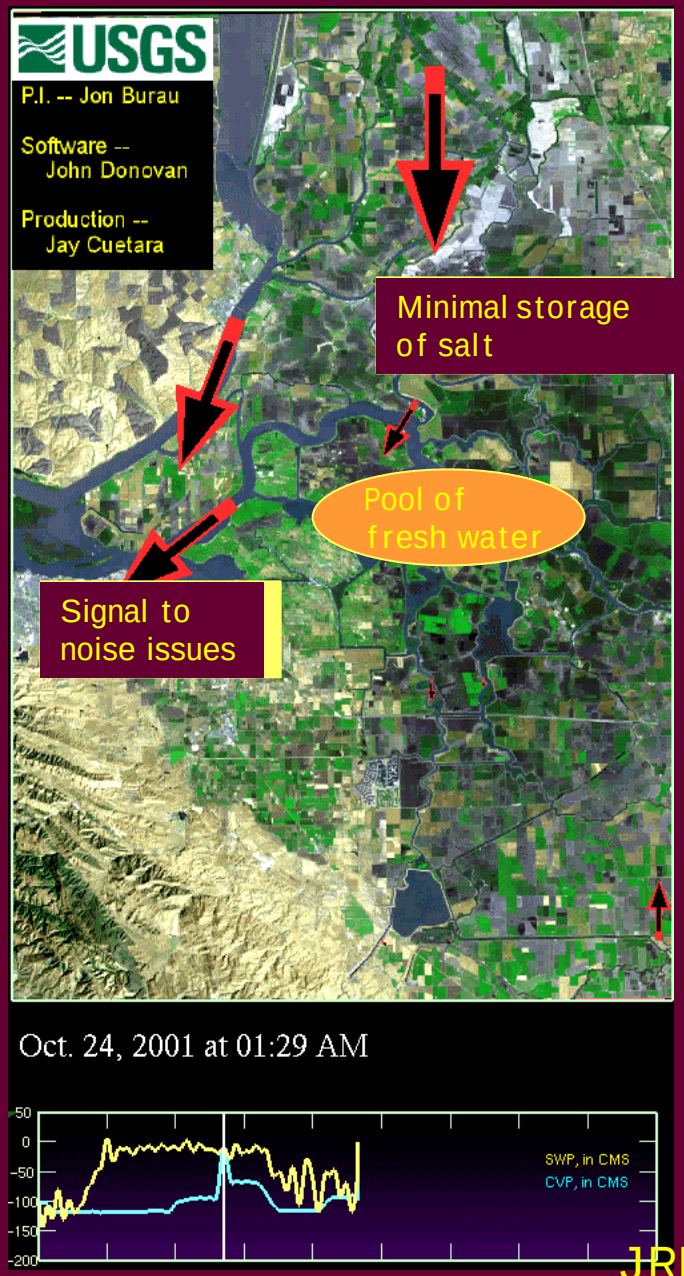


J. Burau, USGS, 1/14/03

USGS

JRB

Water quality – Conceptual model/experimental design



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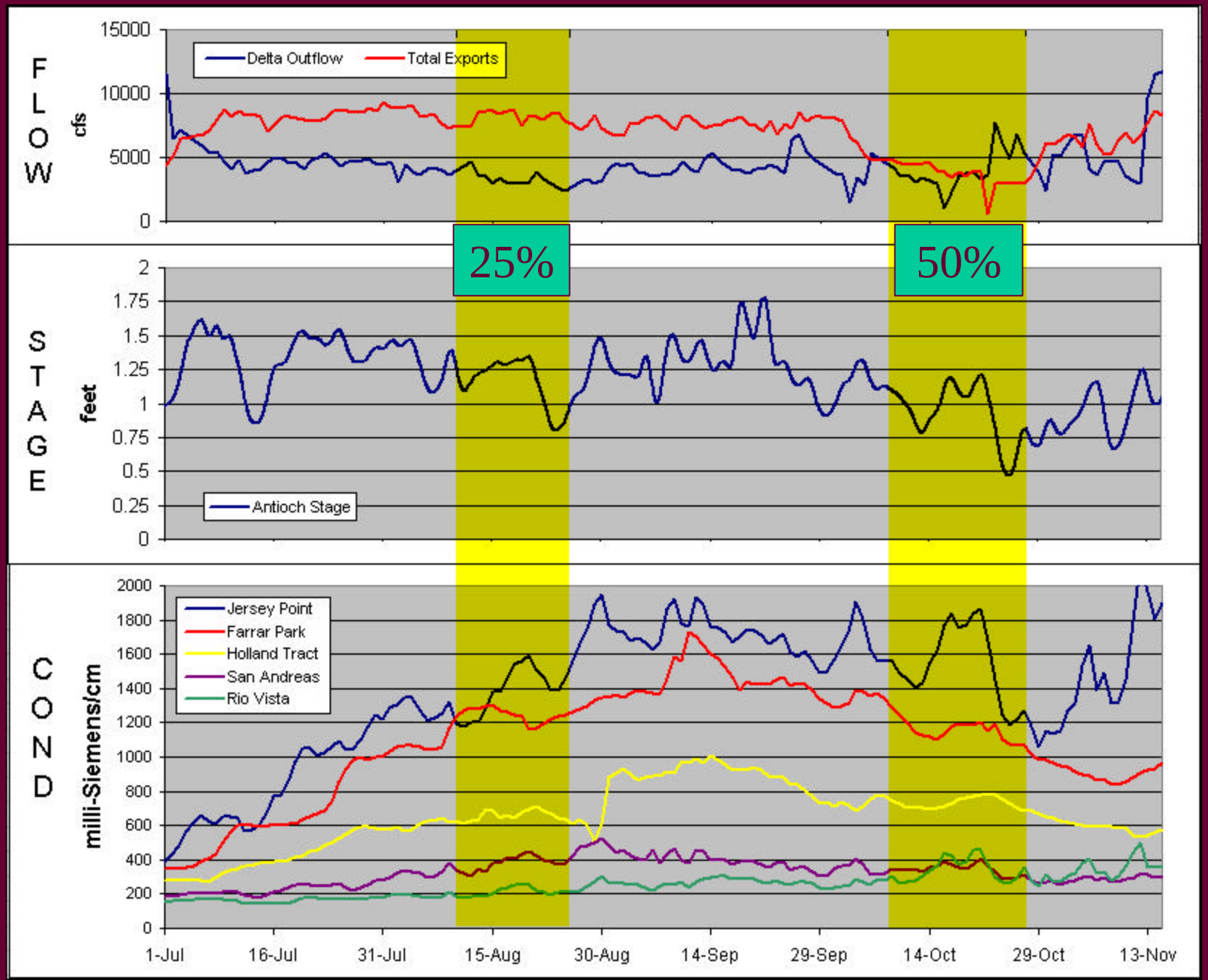
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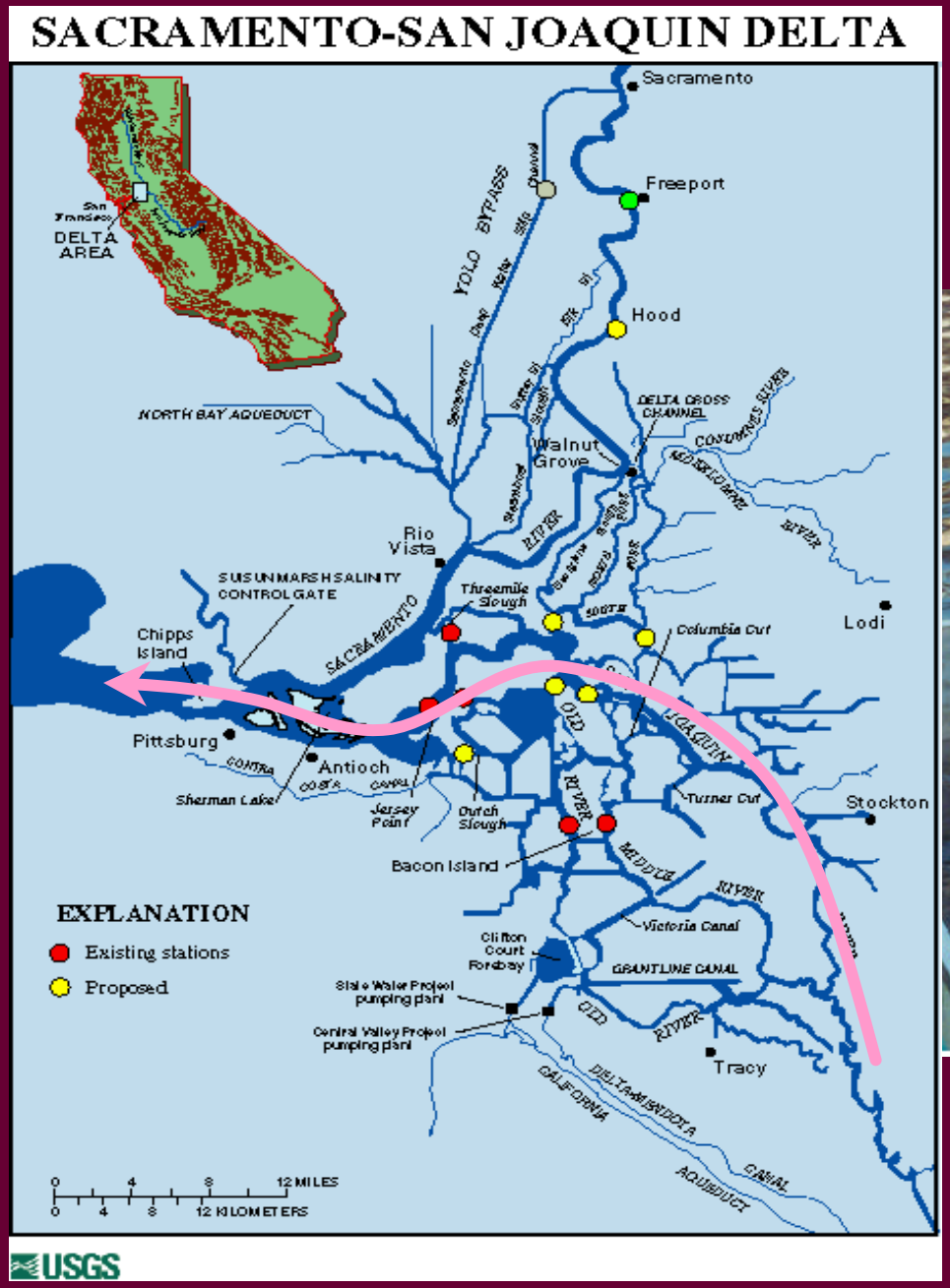
Likely Future Applications

- Nighttime trawls
- Nighttime closures
- Closures to protect fry (?)
- WQ studies done piecemeal
- Habitat investigations and restoration
- Predation, growth, survival studies

DCC Different from VAMP

- Late-fall run and spring run yearlings
- 120-150 mm
- Late Oct-Nov
- Water clarity >1.5 m
- Small geographic, hourly focus

- Fall-run smolts
- 40-60 mm
- April-May
- Water clarity 25-50 cm
- Delta-wide, multiple year focus



Vernalis Adaptive Management Program

VAMP

- 12 year study on delta survival of San Joaquin salmon; 4 years done
- 5 experimental flow/export combinations
- Midwater trawl, Kodiak trawl and adult ocean captures supply data

The San Joaquin & Old Rivers

Head of Old River Barrier

VAMP Target conditions

Exports (cfs) \ Flow at Vernalis (cfs)	3200	4450	5700	7000
1500	A	B		C
2250			D	
3200				E

Setting the targets

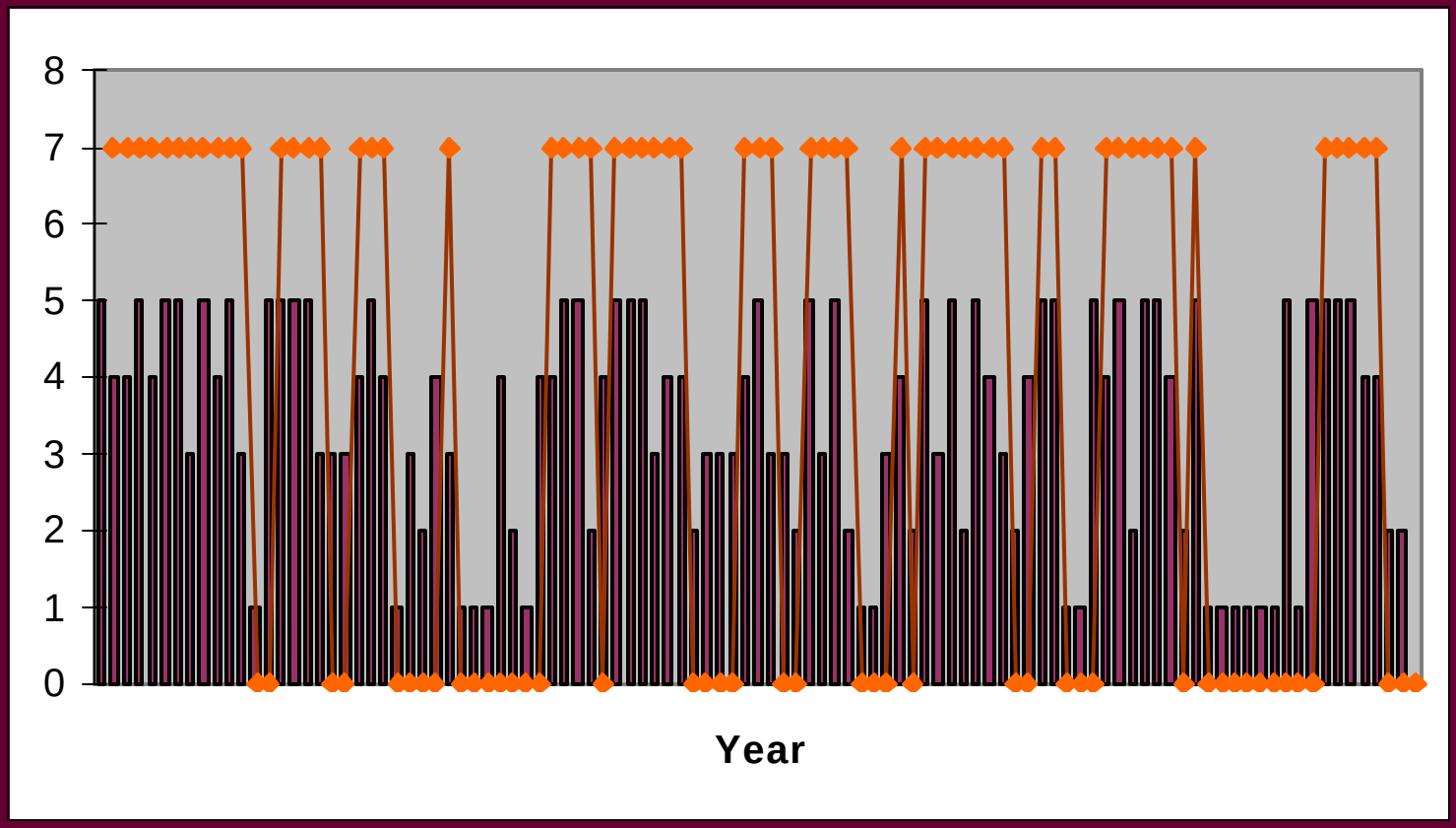
- Estimate baseline flow for April 15
- If dry, use flow target one step above baseline
- If normal to wet, use “double step”
- In third year of drought no additional water required
- When target 7000, alternate export levels

VAMP Conditions (so far)

Flow at Vernalis

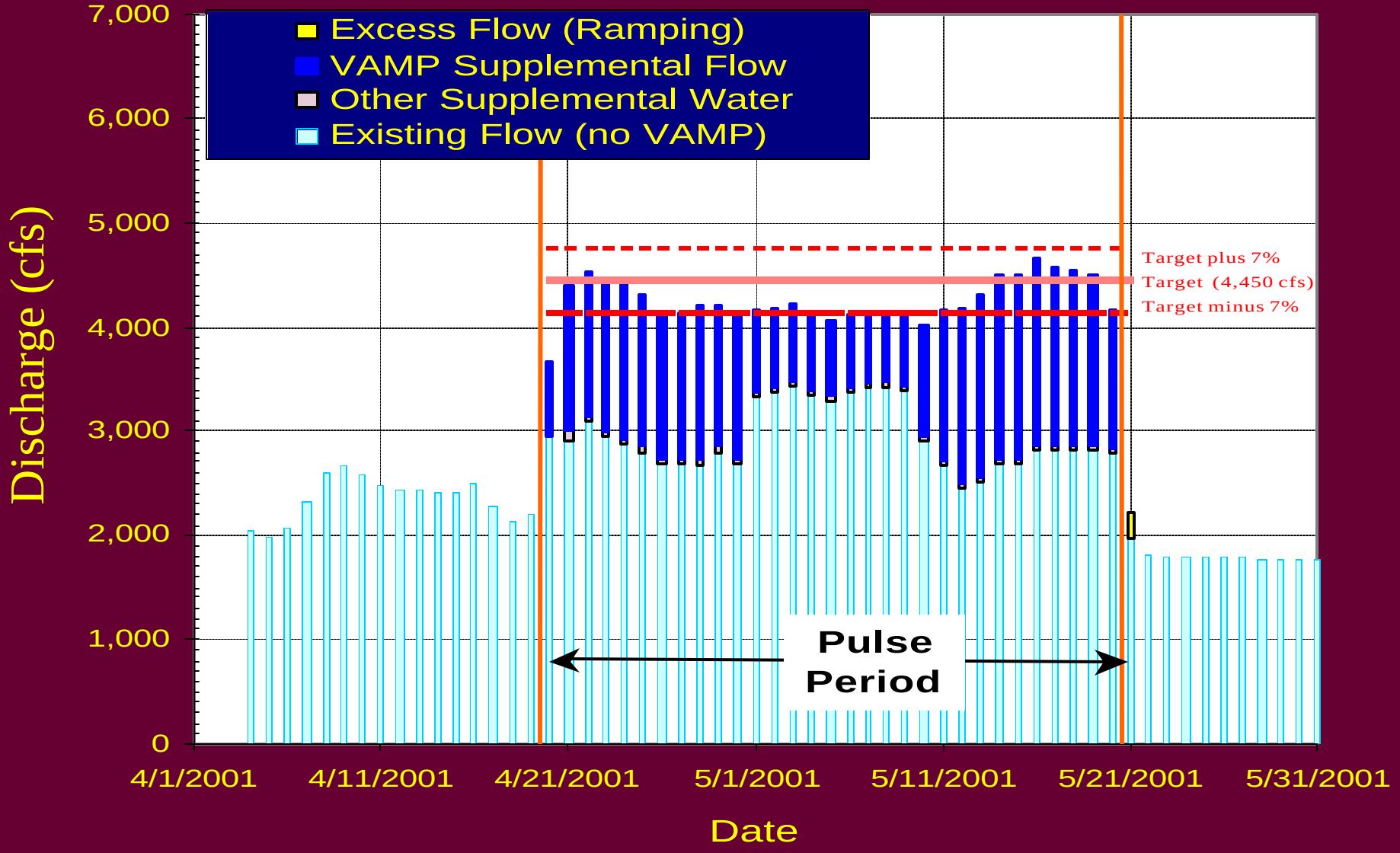
Exports	3200	4450	5700	7000
1500	2002 2003	2001		C
2250			2000	
3200				E

Historical Doubling Frequency



Actual VAMP flows

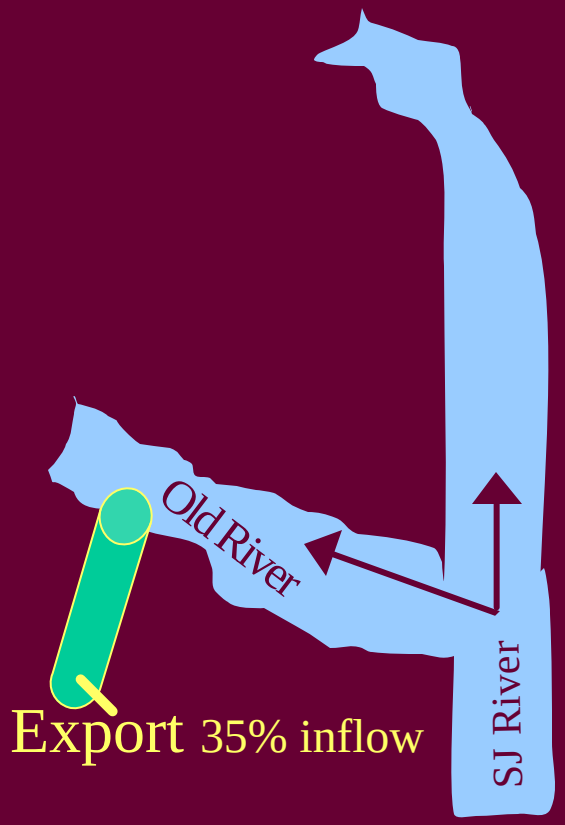
San Joaquin River near Vernalis



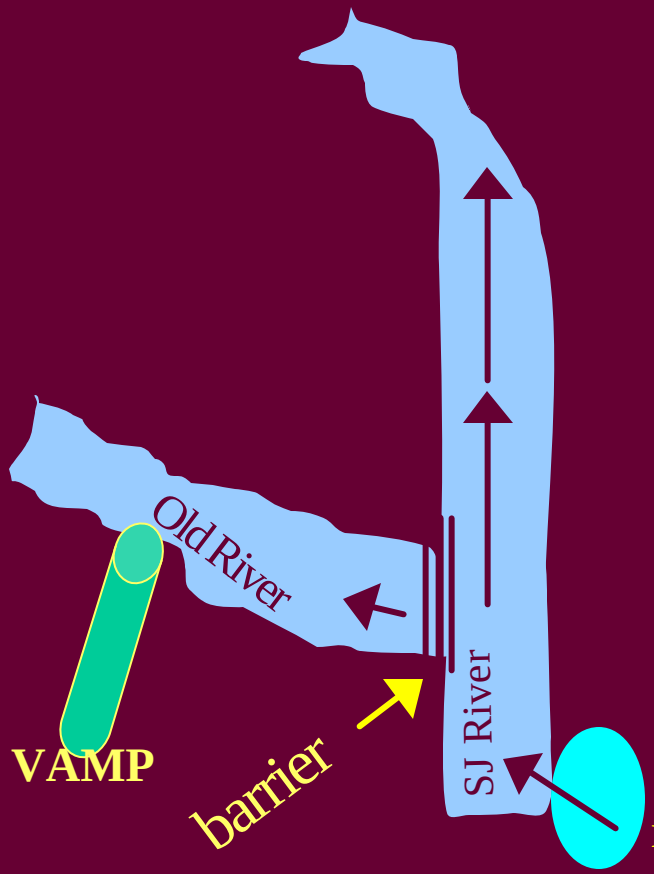
Channels are small, large withdrawals and returns.

VAMP & Regulation of SJR flows

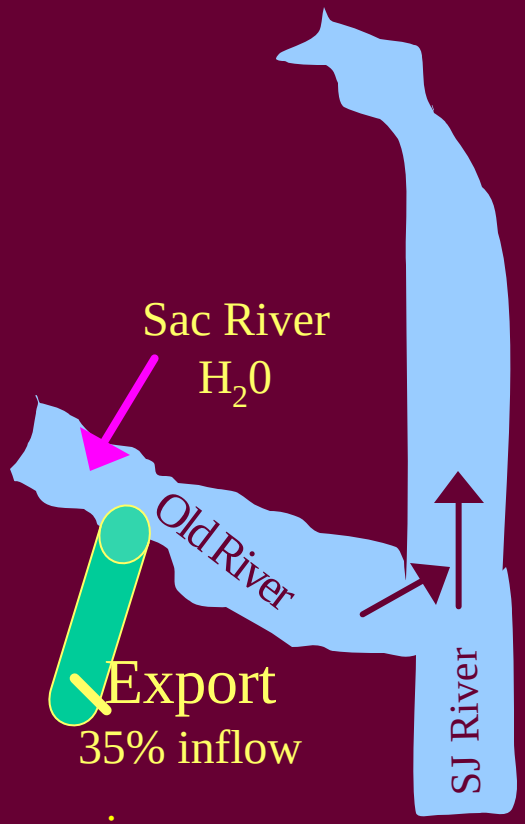
Flow Regime 1
(Before April 15)



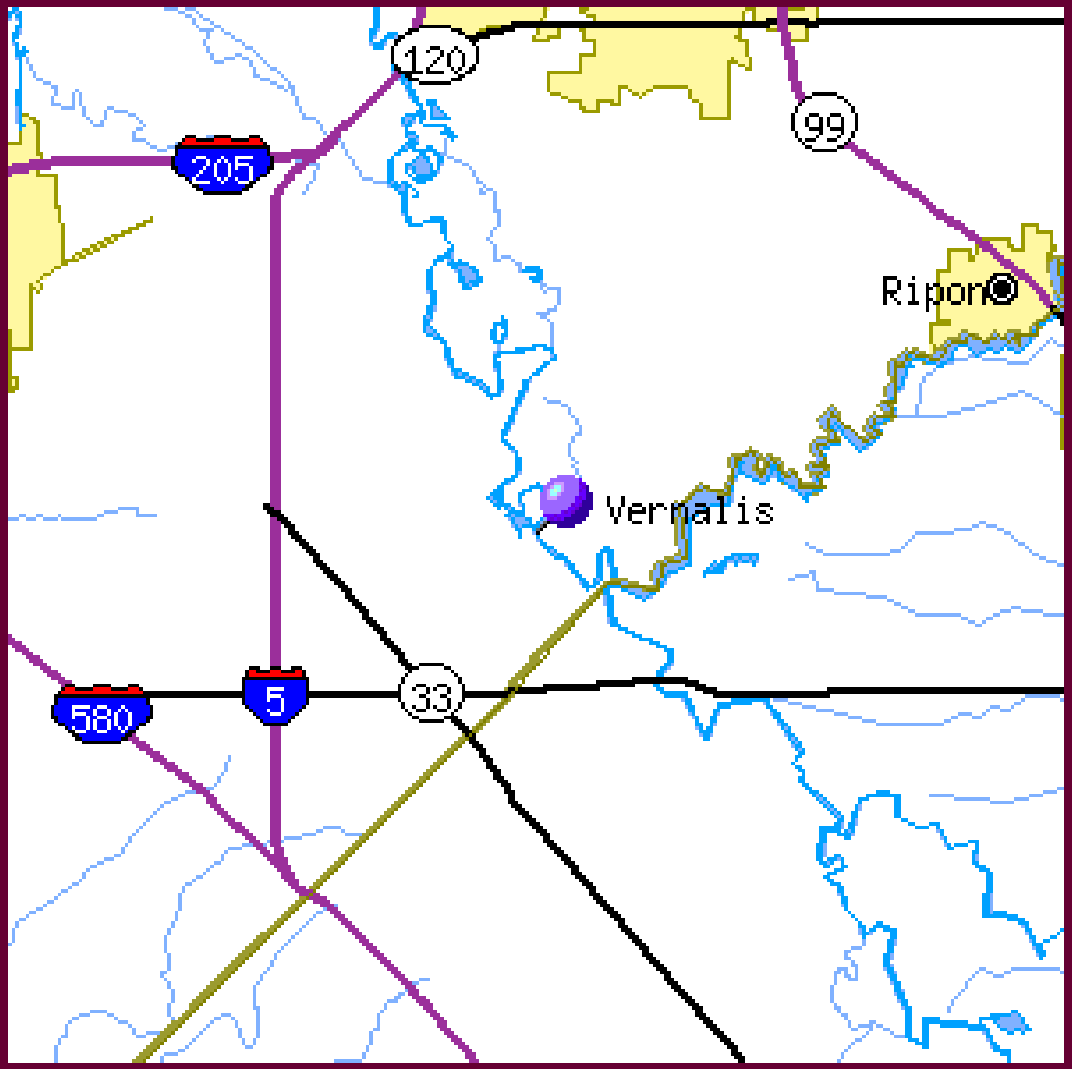
Flow Regime 2 (VAMP)
(~April 15-May 15)



Flow Regime 3
(After May 15)



Bends and Holes



What VAMP doesn’t examine

- Time scales of flow variance
- Velocities or Volumes?
- Water quality
- Predators?

South Delta Studies

- Near and far field
- VAMP conditions
- Hydroacoustics, seining, traps.

Management Implications

- Only adaptive management program
- Best conditions at usual height of SJ salmon and delta smelt sensitivities
- Produces large experimental conditions