

# YOLO BYPASS AS A SOURCE OF DELTA PHYTOPLANKTON: *NOT JUST A LEGEND OF THE FALL?*



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# 2013 Study Collaboration

## Special thanks to:



**Chris Foe** – *SWRCB – Central Valley Region*



**Randy Dalhgren** – *UCD – Dept. of Land, Air, Water Resources*

**John Durand** – *UCD – Dept. of Watershed Sciences  
North Delta ARC Study*



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**Louise Conrad** – *DWR – Program Manager II – Office of Water Quality*

**Naoaki Ikemiyagi** – *DWR – Aquatic Ecology - Yolo Bypass Lead Scientist*

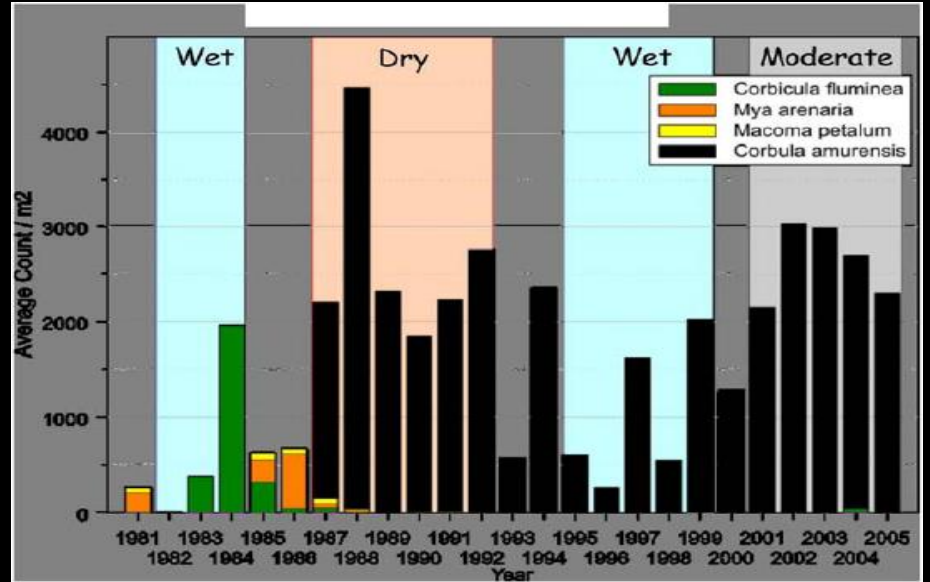
**Jasmine Shen & Haley Carlson** – *DWR – Fish and Wildlife Sci-Aides*

**Bryte Lab** – *Sid Fong, Allan Wong, Marilyn Caroll, Gary Munoz, etc.*

# Why do we care?



*Corbula & Corbicula*



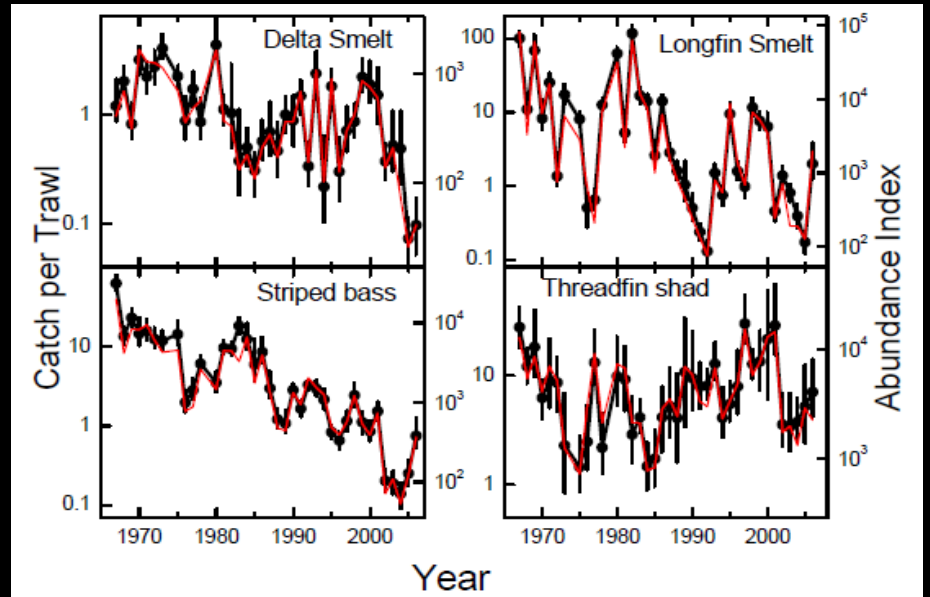
Peterson et al. 2005



Zooplankton

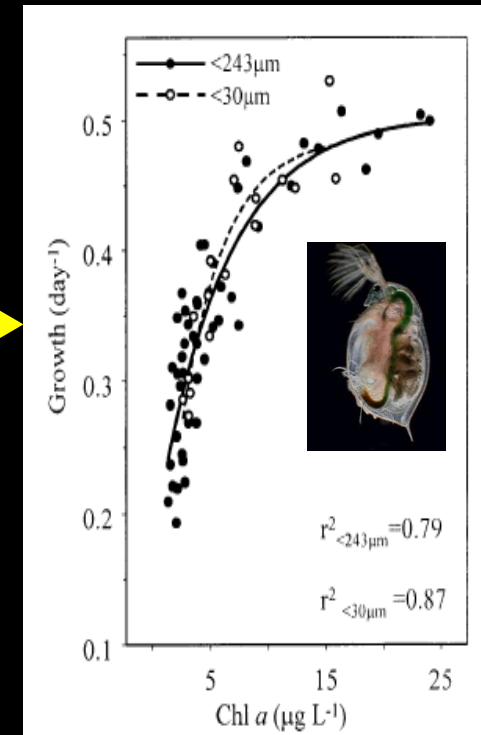
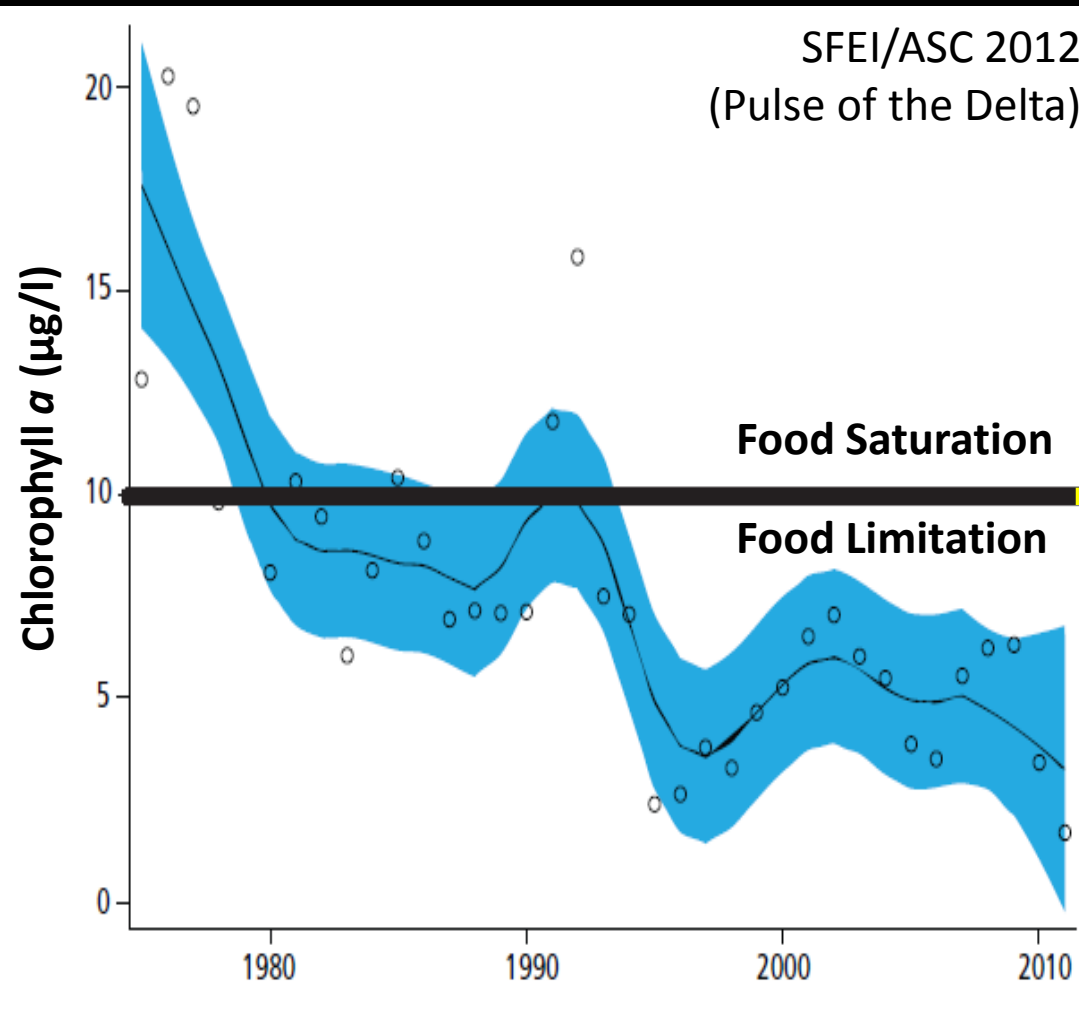


POD Species



Sommer et al. 2007

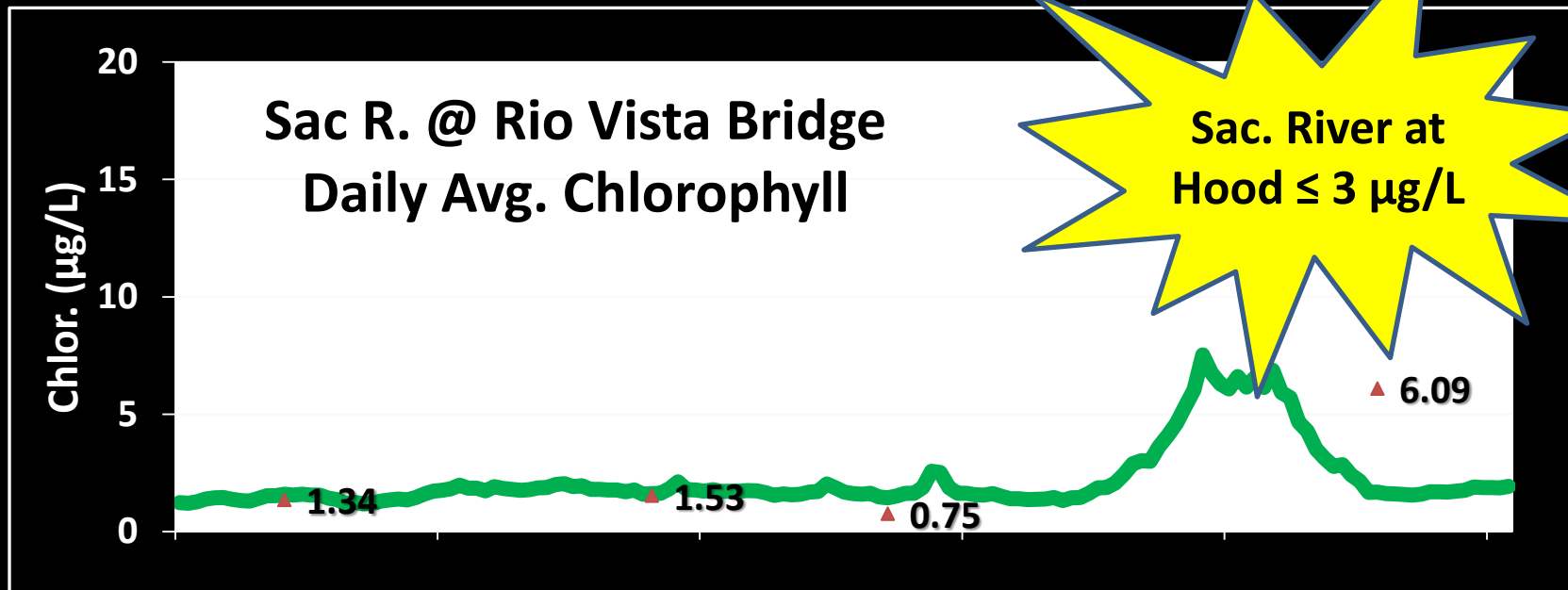
# No comparable Delta bloom for over 20 years!



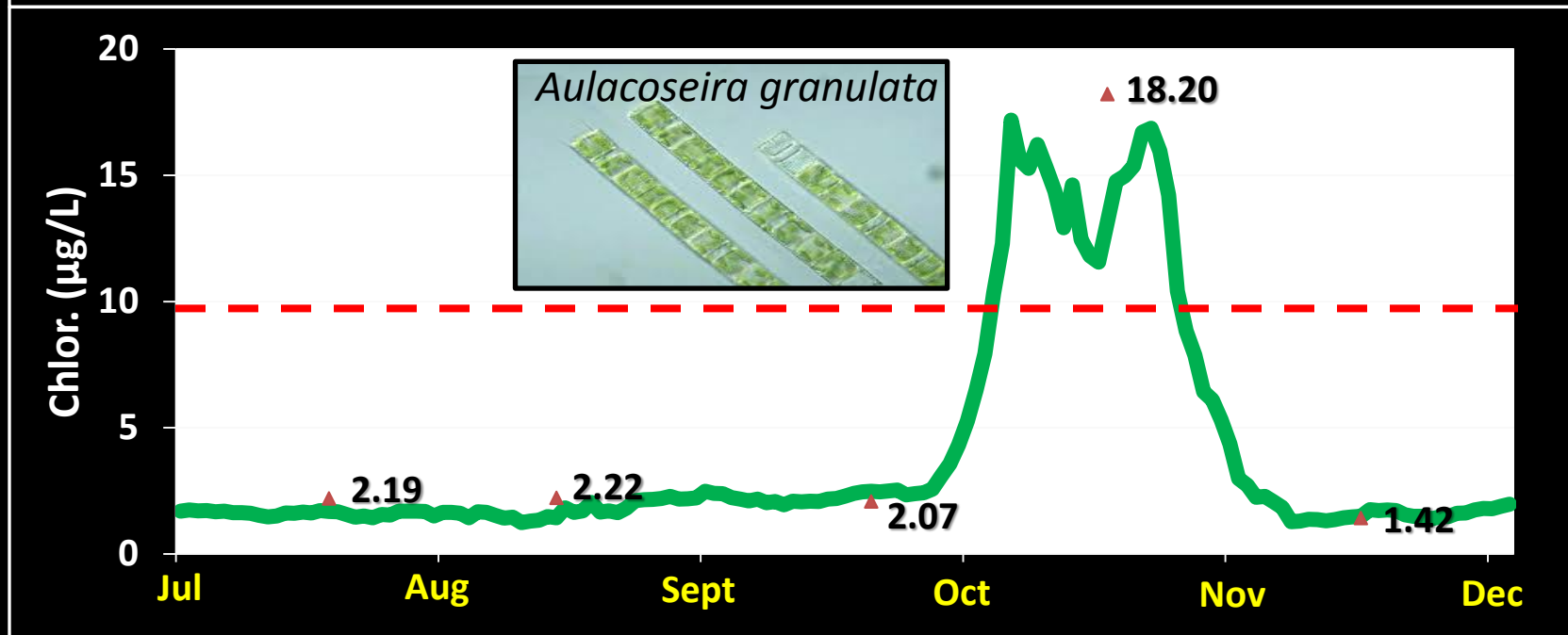
Mueller-Solger et al. 2002

# 2011 and 2012 Fall Bloom in North Delta

2011

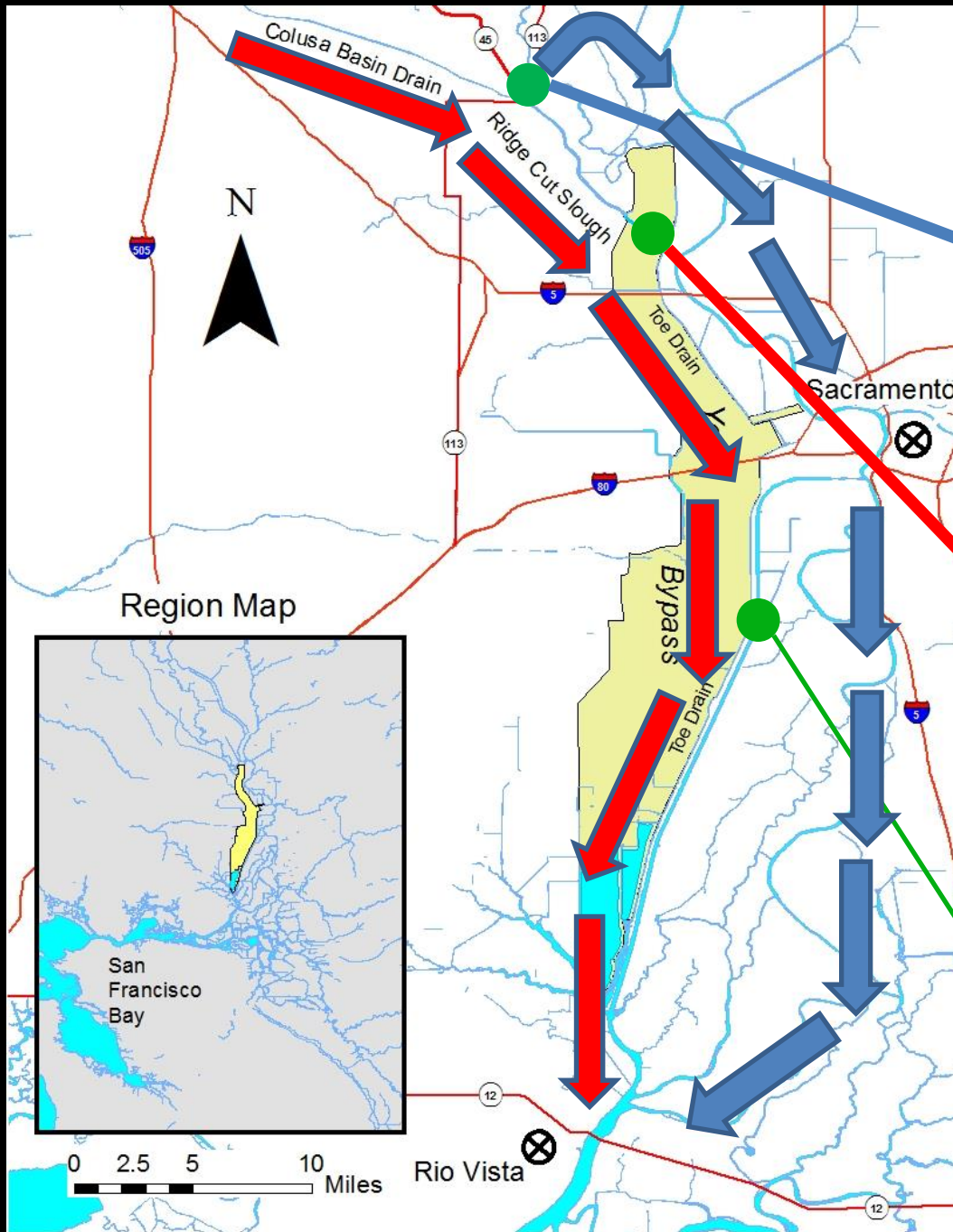


2012





# Where?...Yolo Bypass?



1



***Knight's Landing Outfall Gates***

2



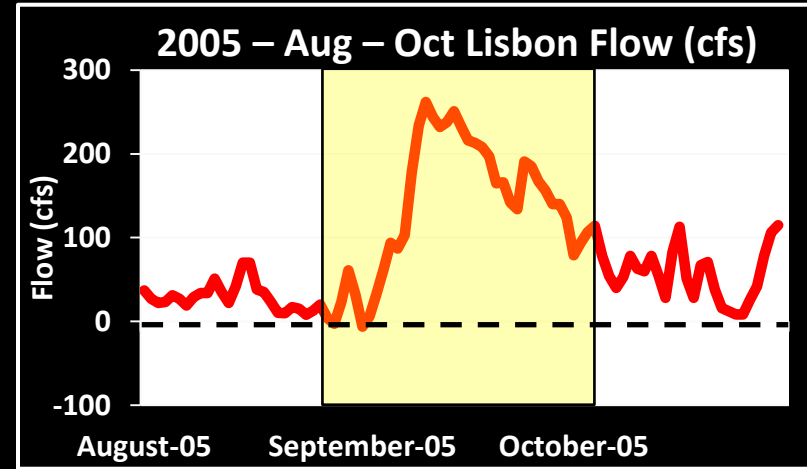
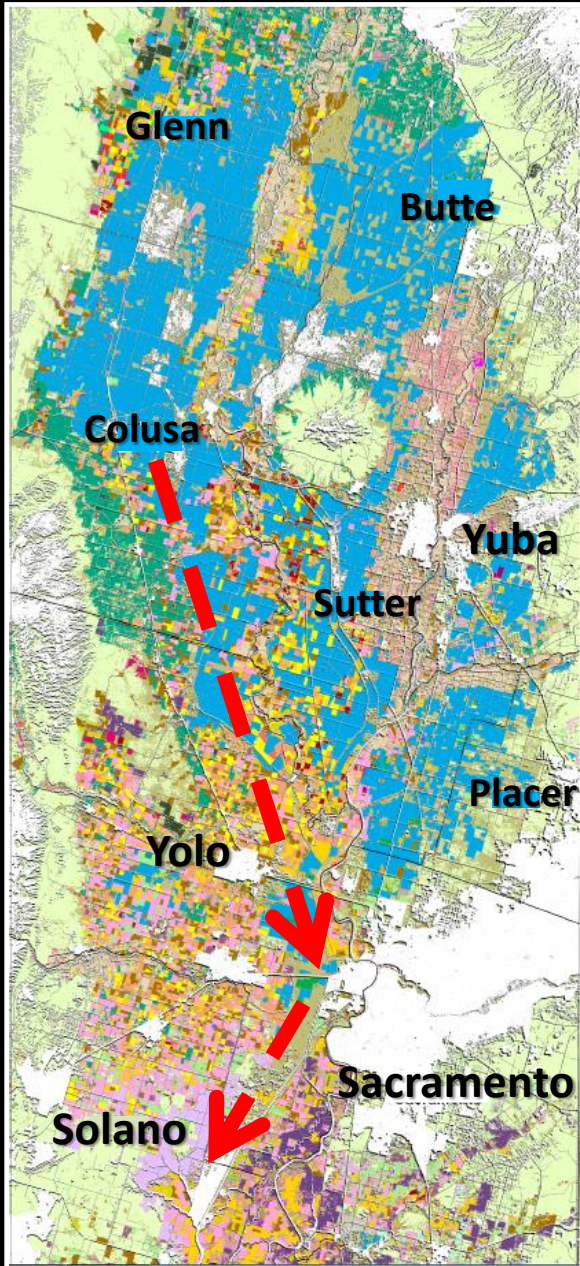
***Wallace Weir***



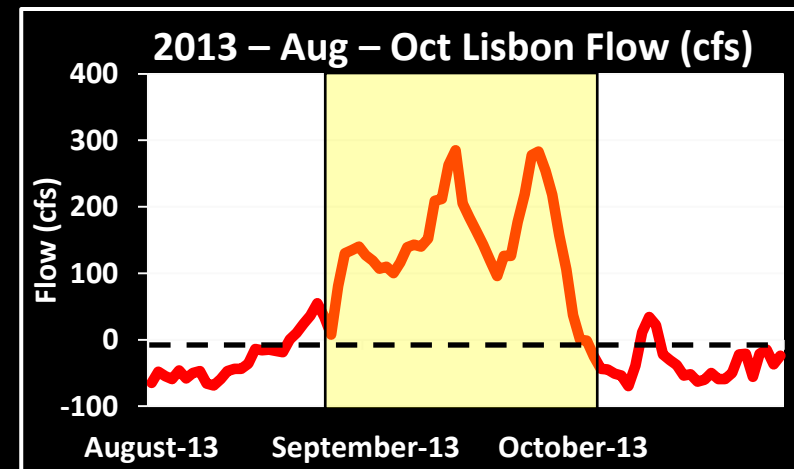
***Lisbon Weir***



# Rice fields and phytoplankton blooms...What's the connection?

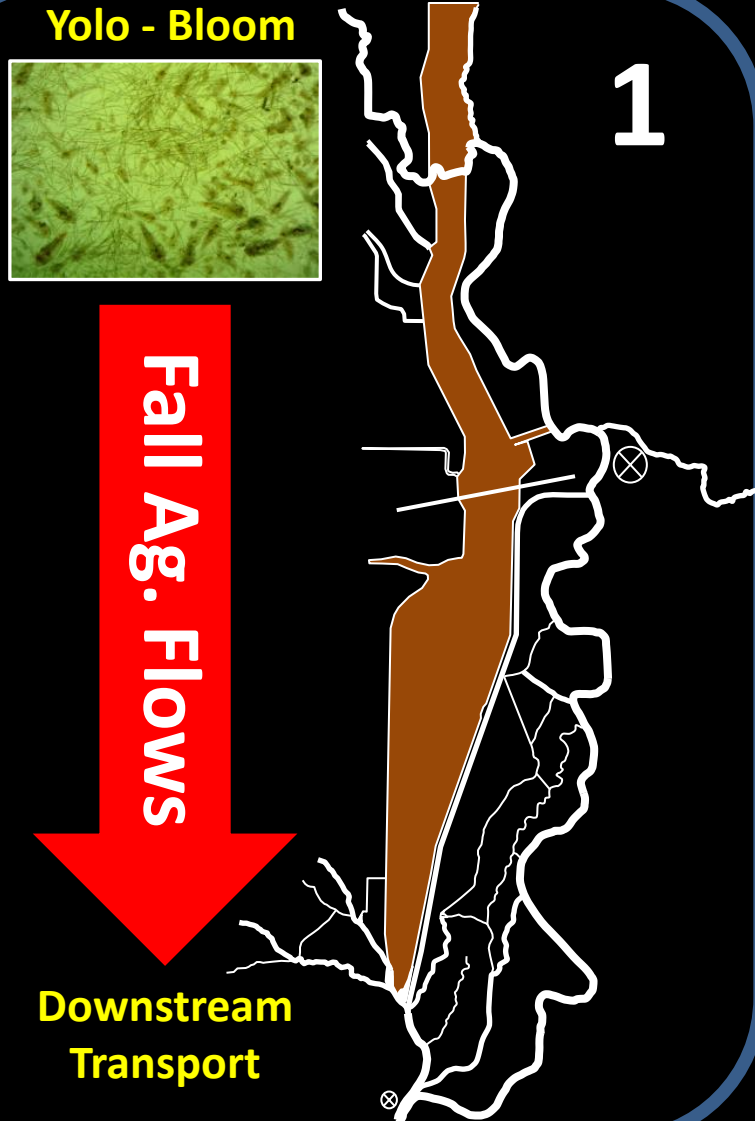


**Rice Field Drainage = Fall Flow Pulses**

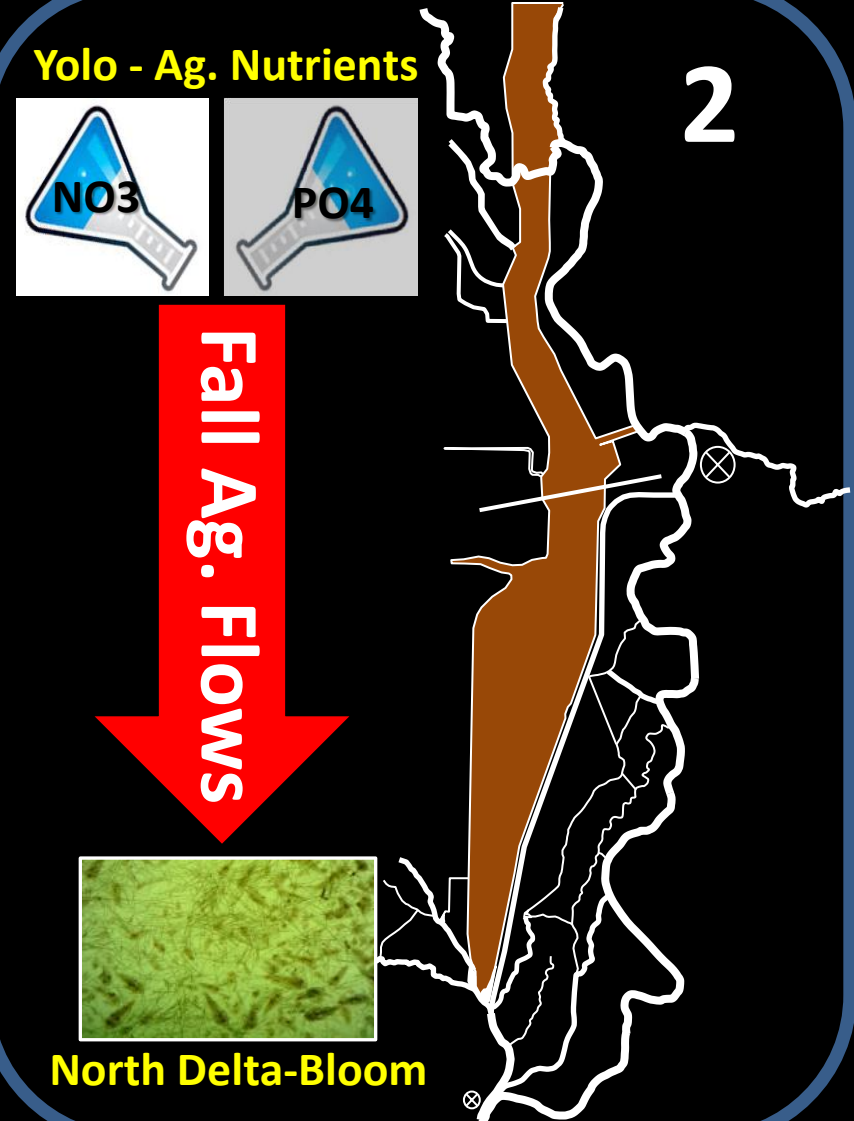


# What causes fall blooms downstream at Rio Vista?

## Biomass Transport ?



## Nutrient Input ?





# Methods

- 11 sampling sites (July 2013 – October 2013)

▲ Ridge Cut Slough south to Rio Vista Bridge

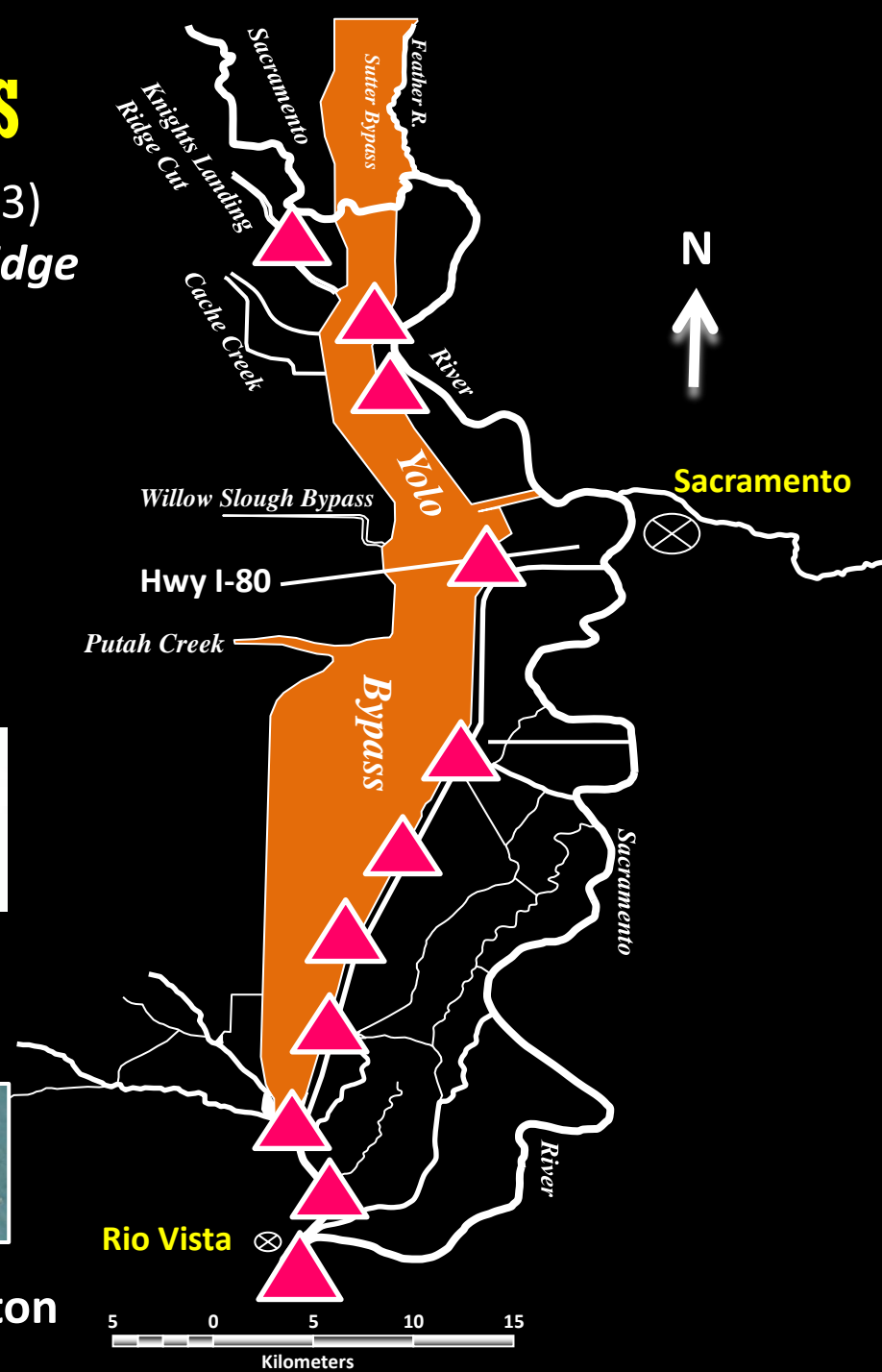


▲ Continuous WQ Monitoring



Nutrient / Chlorophyll-a

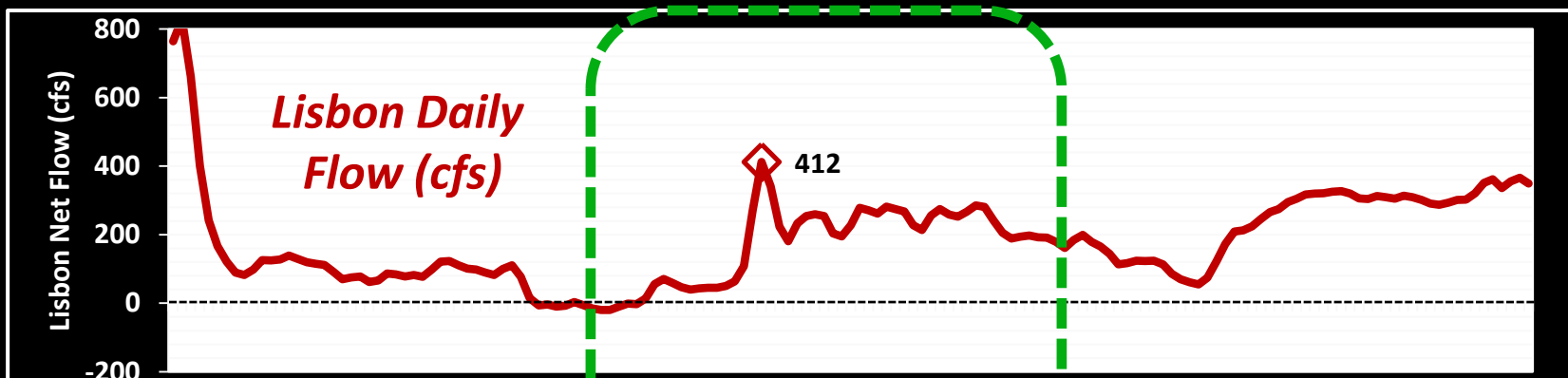
Phyto / Zooplankton



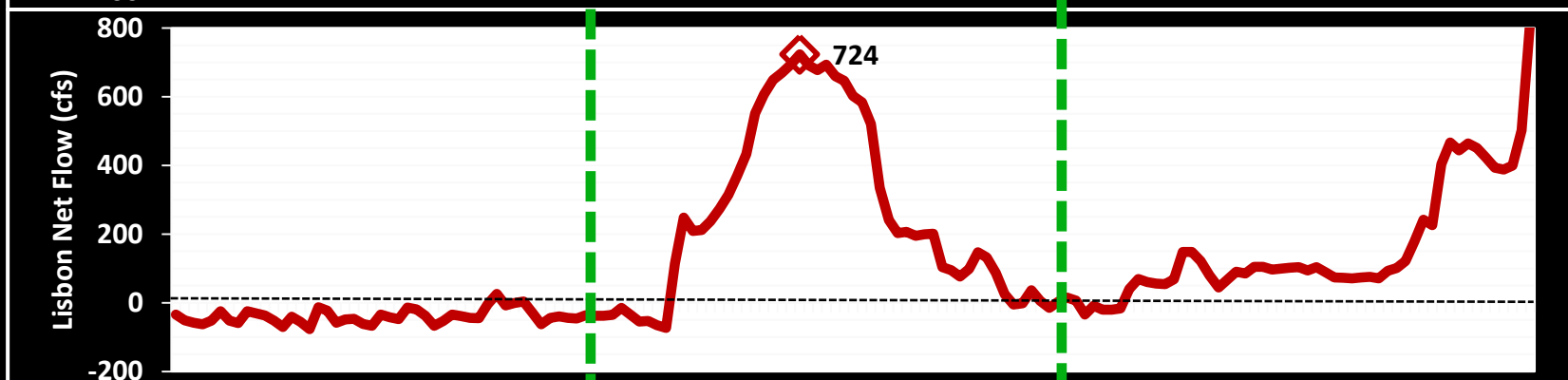
# Results:

# Weak flow pulse in 2013!

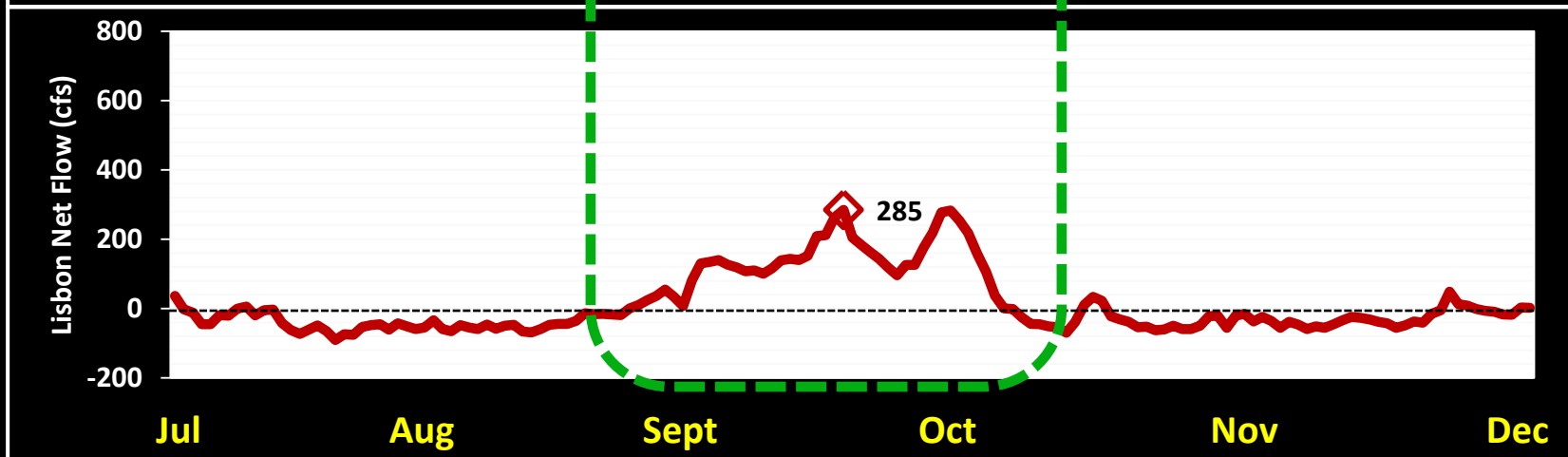
2011



2012

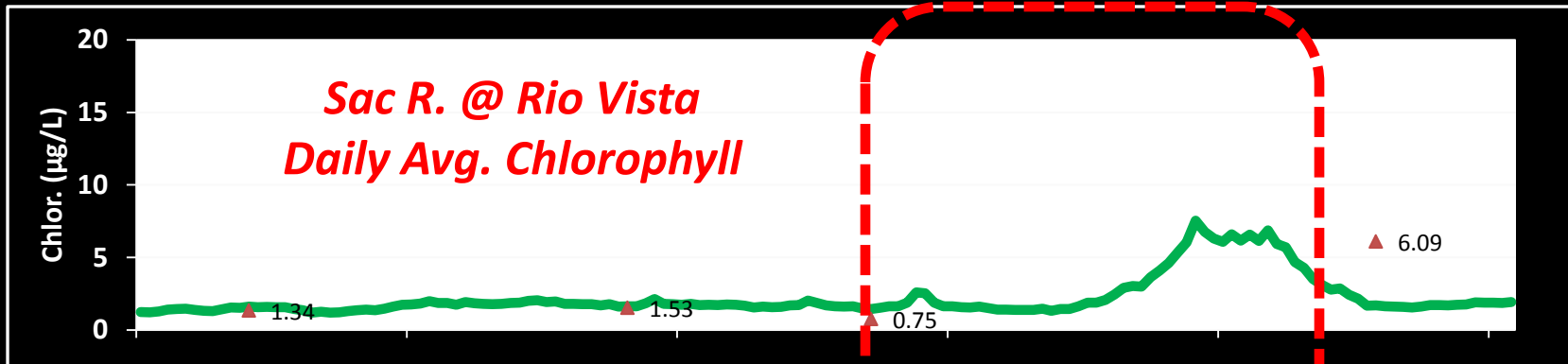


2013

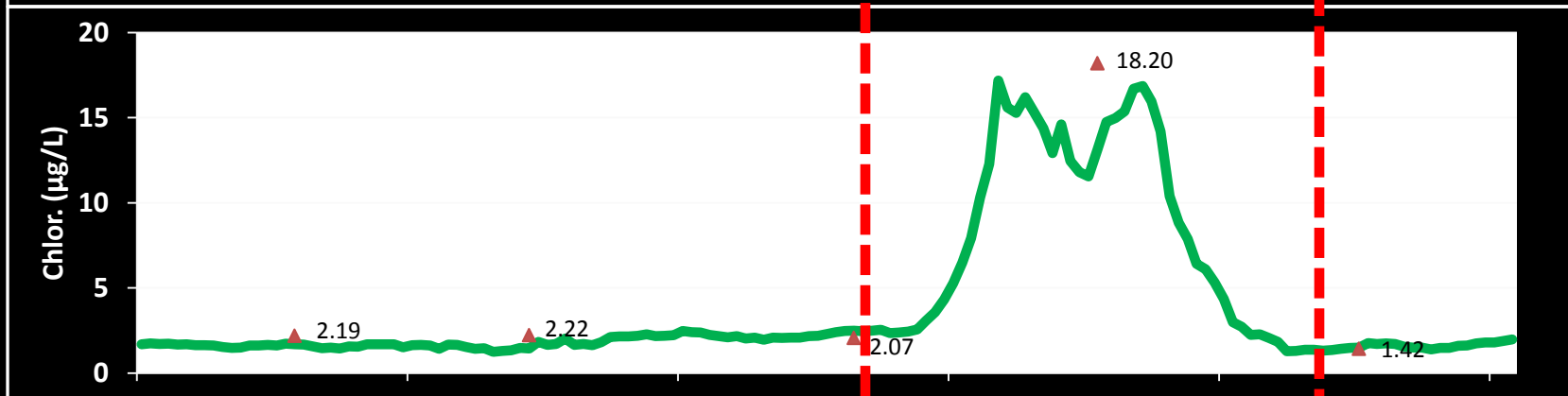


# NO Fall bloom at Rio Vista in 2013...#\$\$%@!

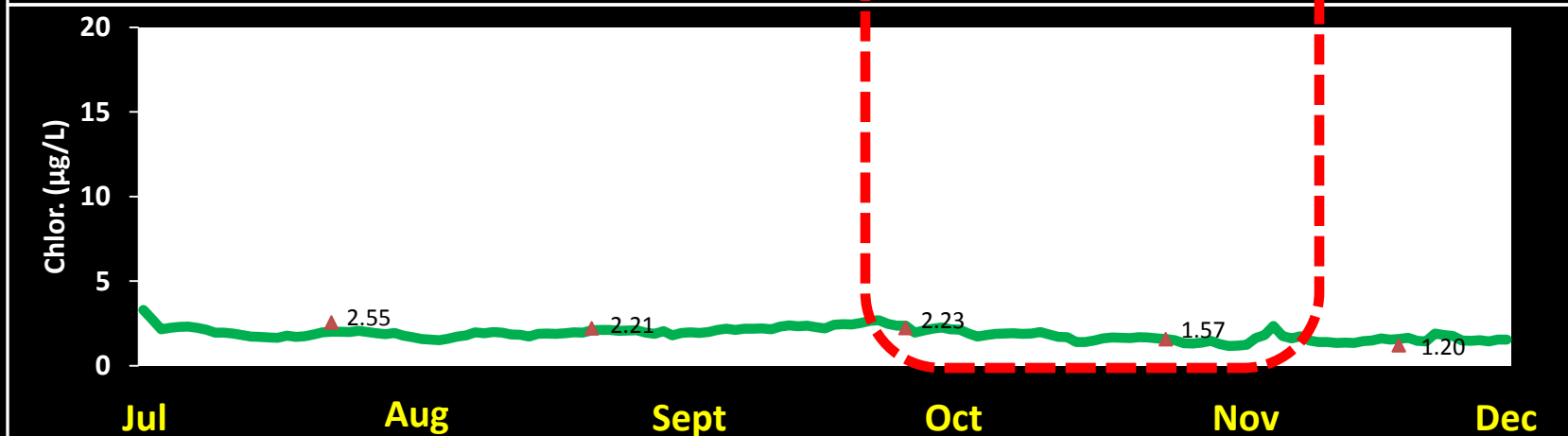
2011



2012



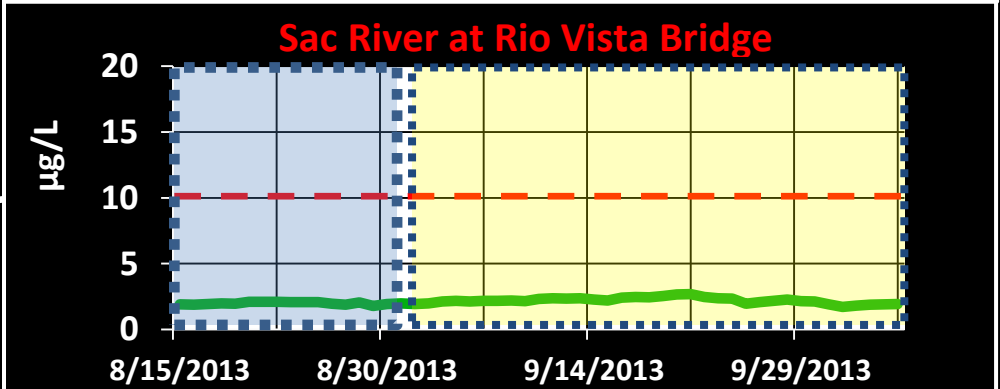
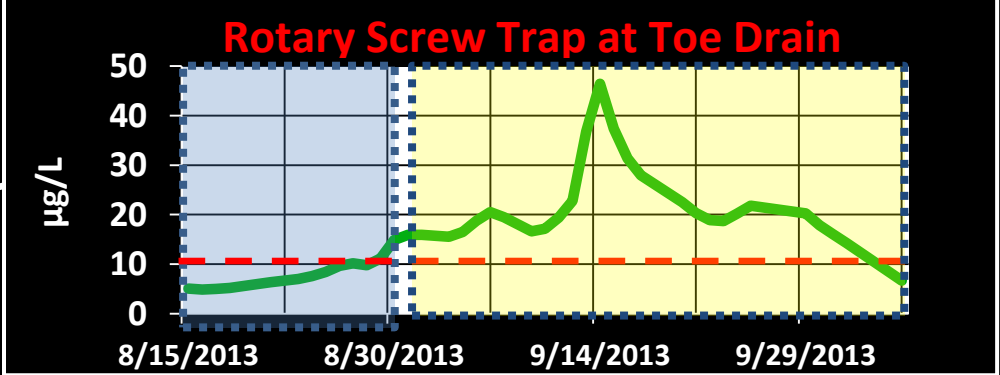
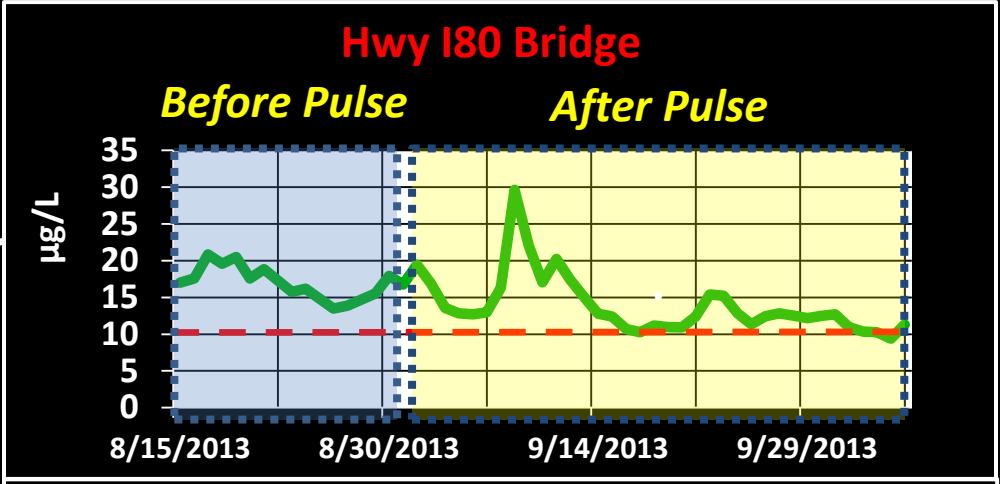
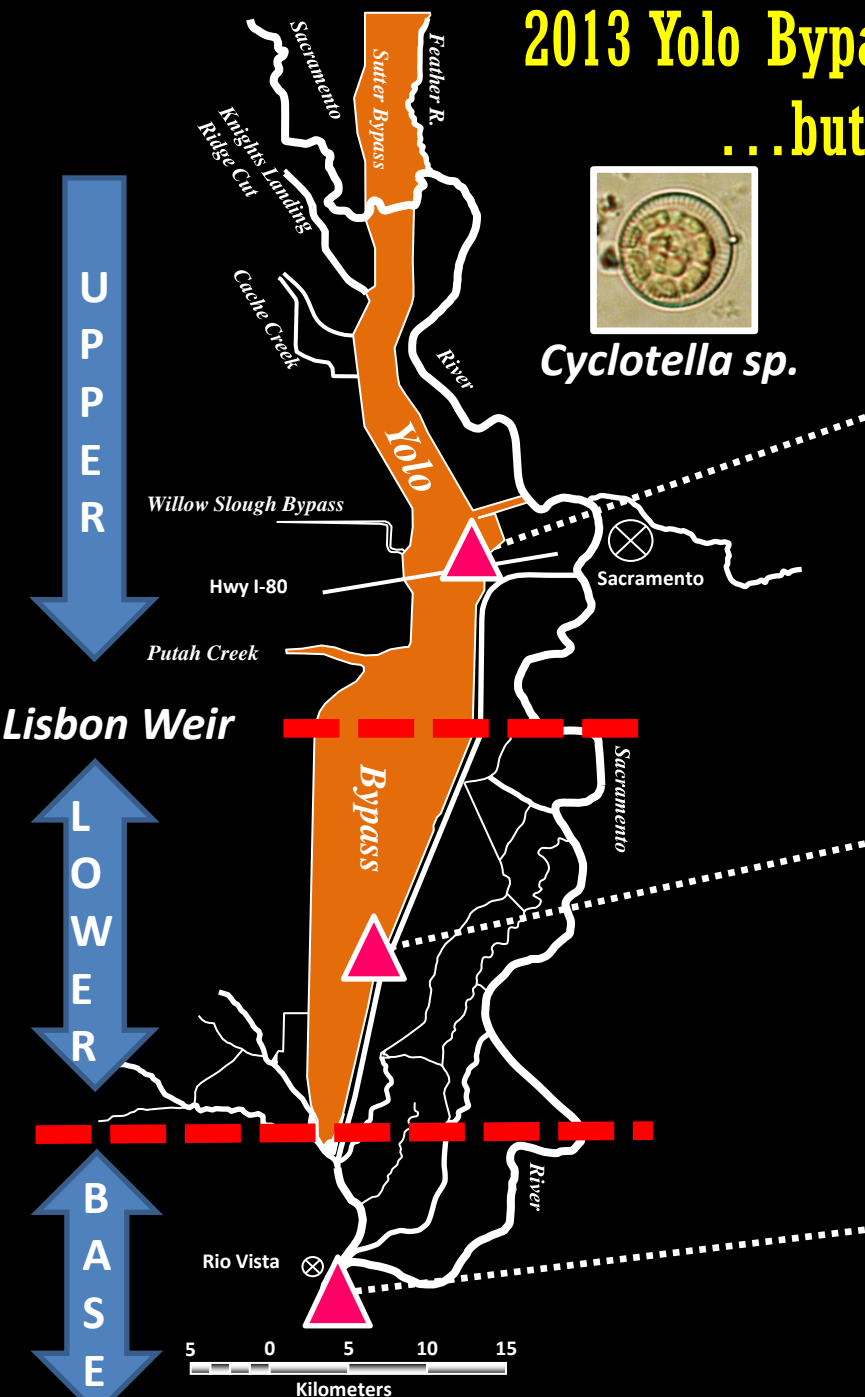
2013



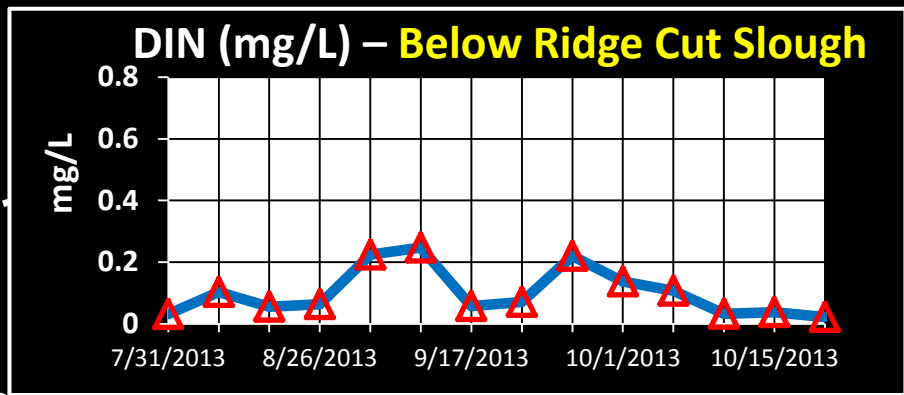
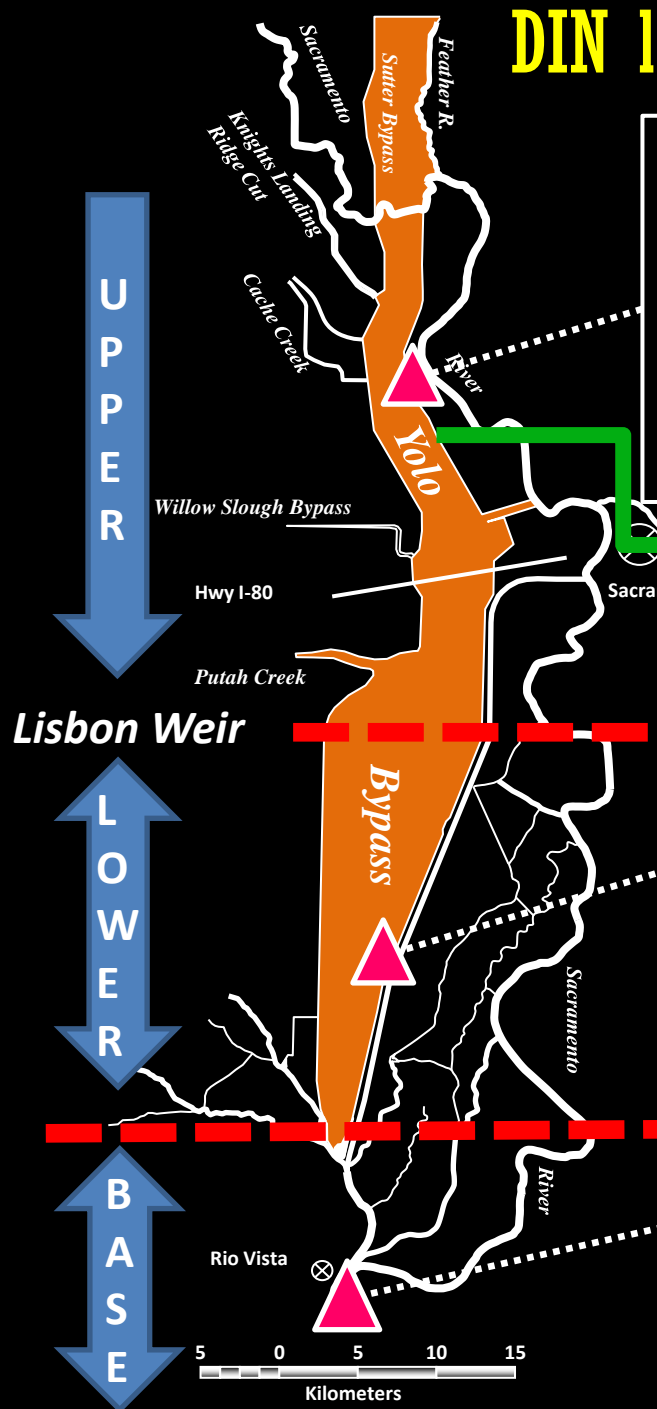


# 2013 Yolo Bypass...Chlorophyll – YES

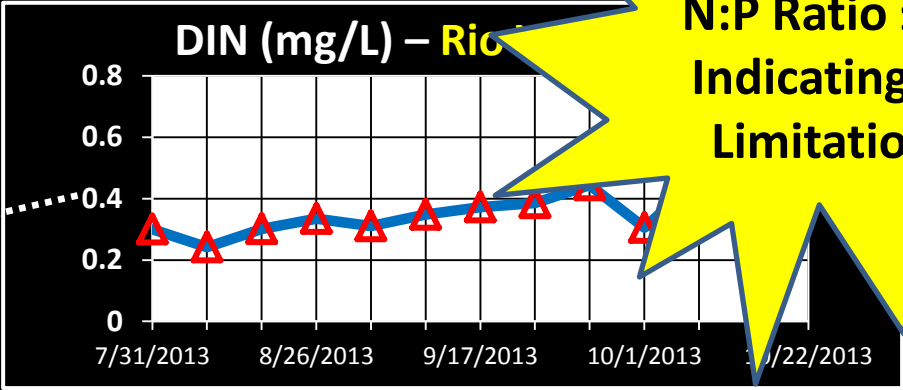
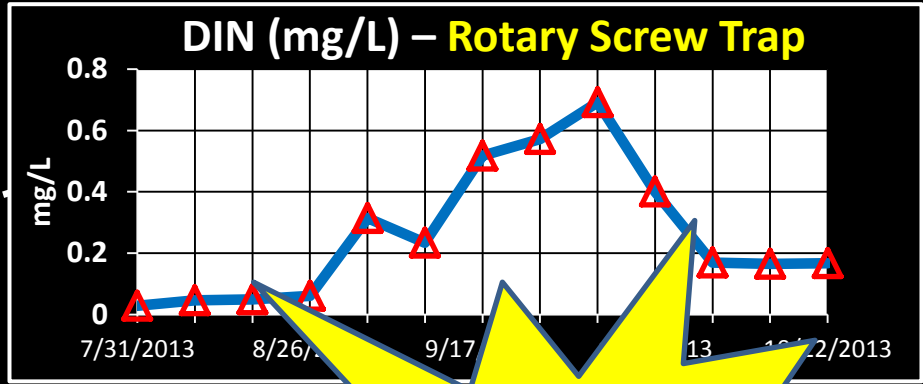
## ...but NO biomass transport to Rio Vista



# DIN low in rice drainage...low nutrient input

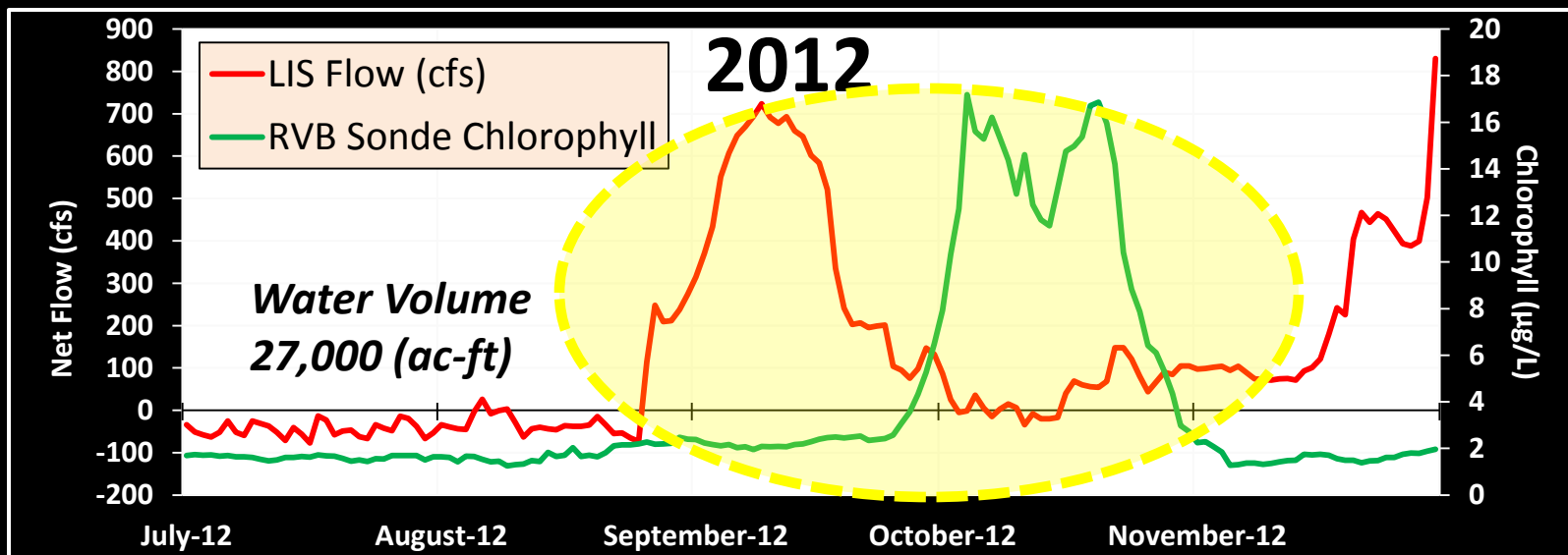


**Woodland WWTP**



**N:P Ratio ≤ 8  
Indicating N  
Limitation**

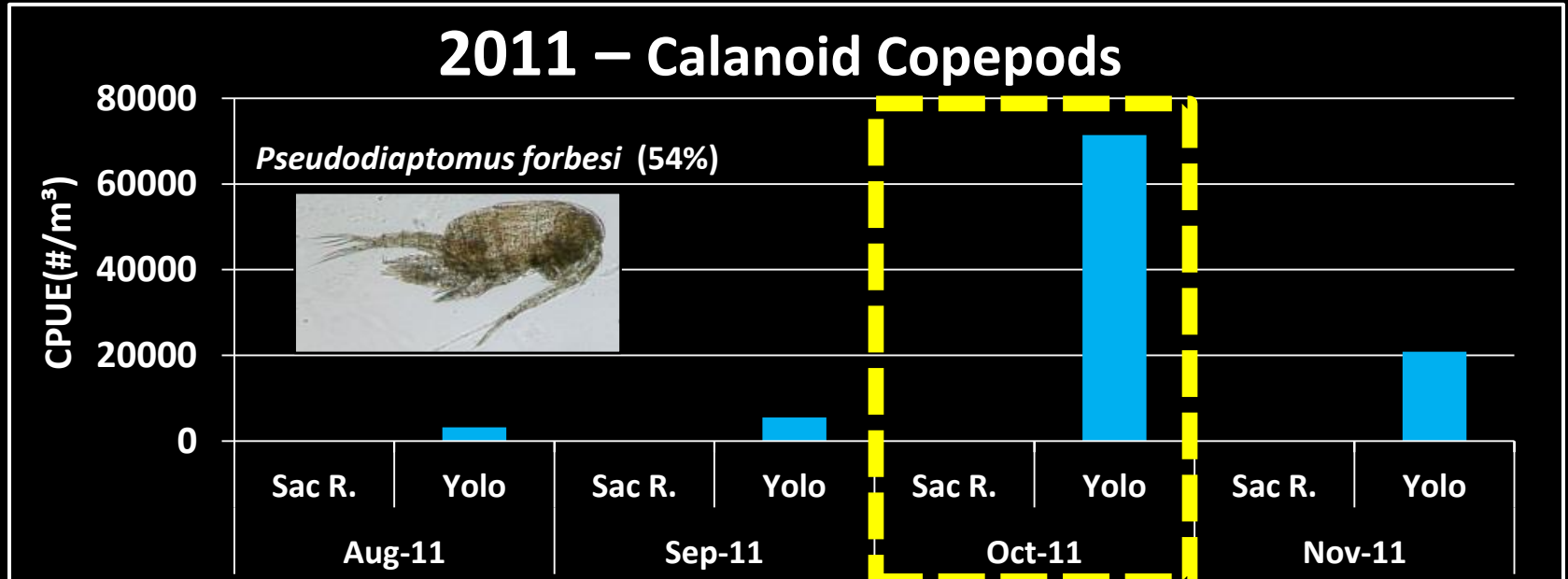
# Why no bloom in 2013?....Is there a flow threshold?



Year	Max Chlorophyll at Rio Vista (µg/L)	Max Flow at Lisbon (cfs)	Water Volume at Lisbon (ac-ft)
2013		284	10,800
<b>2012</b>	<b>17</b>	<b>724</b>	<b>27,000</b>
2011	8	400	21,400
2010		423	9,000
2009	7	183	3,000
2008		111	3,500

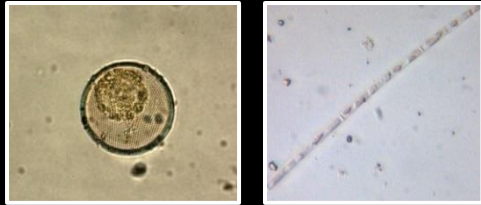


# What about top-down effects? ... Zooplankton response



# What's next?

*More analysis of 2013 data*



*Phytoplankton*



*Water Quality*



*Nutrients*



*Flow and Tide*



*Larger effort in 2014*



**Hydro &  
+ Biological  
Modeling**



*Possible experimental manipulations...Can we replicate 2012?*



# Questions?

***Yummy!!***

