

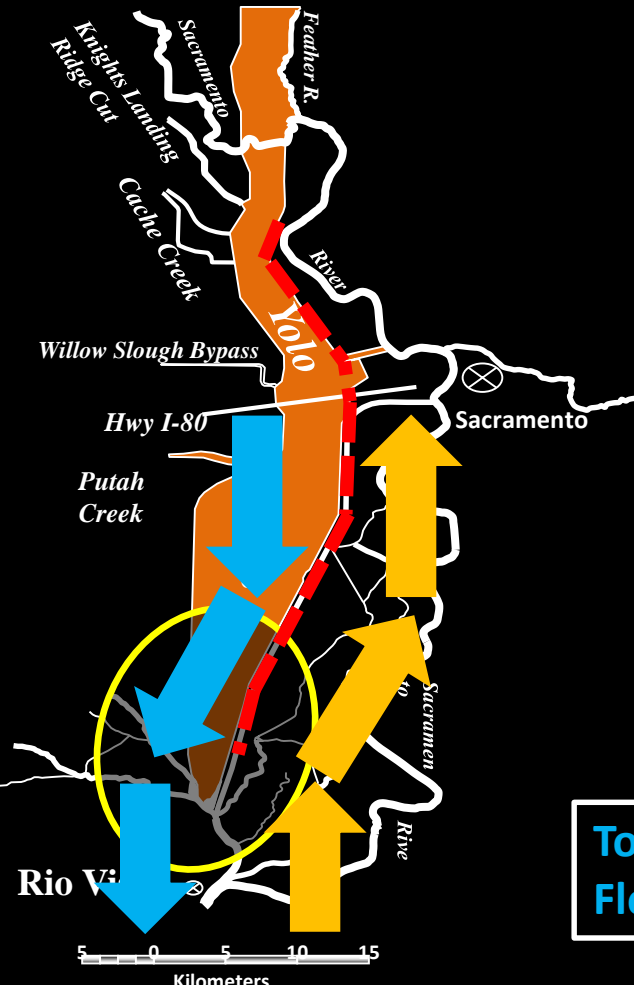


Ecological Importance of Fall and Summer Flows in the Yolo Bypass





Jared Frantzich, Ted Sommer, and Brian Schreier
Department of Water Resources
Division of Environmental Services

Known Region with Enriched Plankton



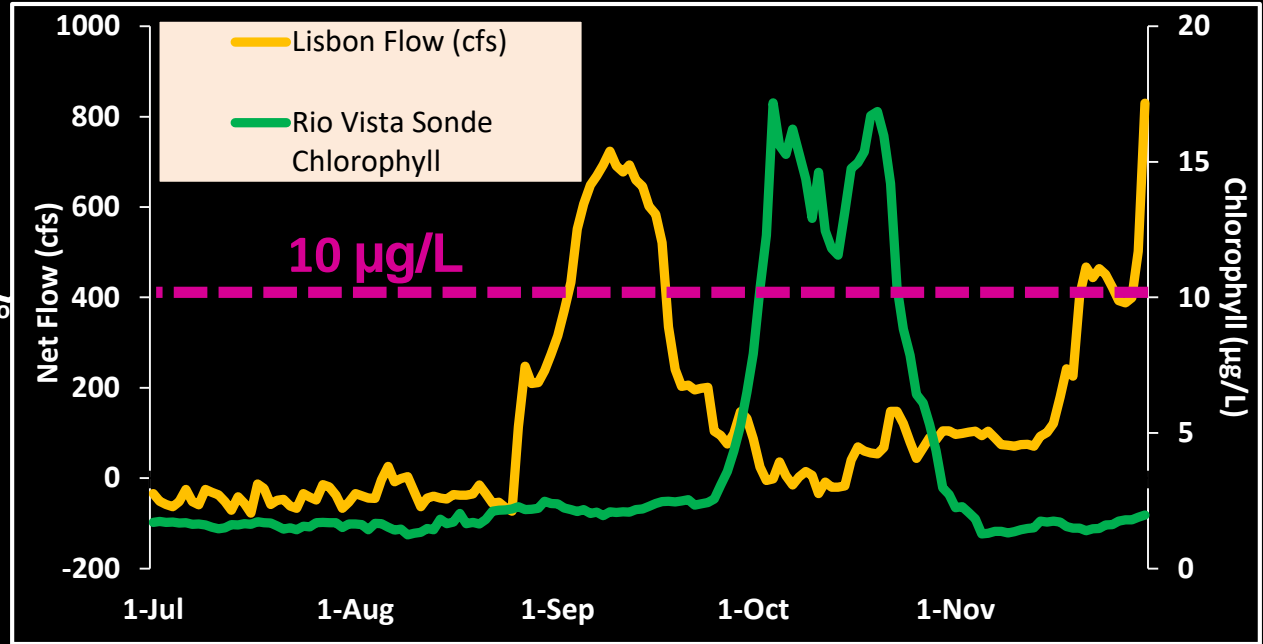
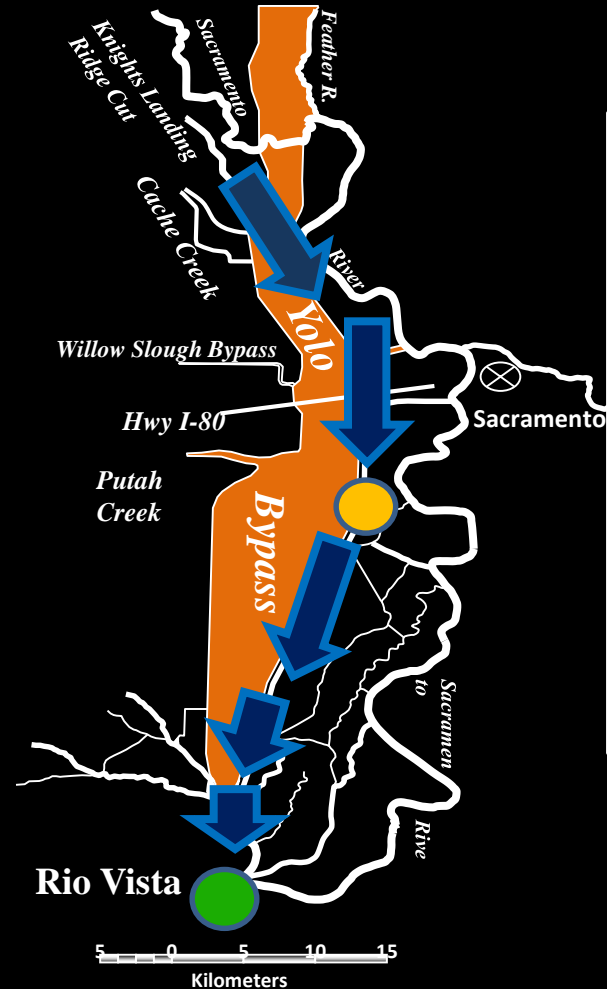
Typical Net Flow

	
Winter Spring	Summer Fall

**Toe Drain +
Floodplain**

Toe Drain

Fall 2012 Unprecedented Delta Phytoplankton Bloom



No comparable Delta bloom for over 20 years!

So what have we been up to since 2012?

2013 – 2016 Summer/Fall Flow Special Studies



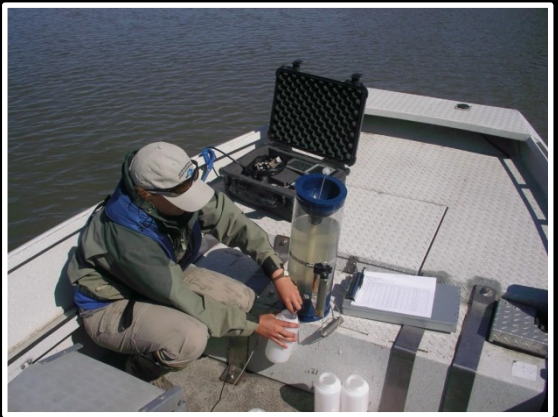
Nutrients



WQ Monitoring



Phyto/Zoop



Key Findings from Fall Flow Special Studies

Positive Downstream Food Web Benefits

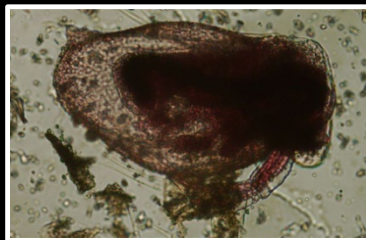
1.) Nutrient Transport

N + P

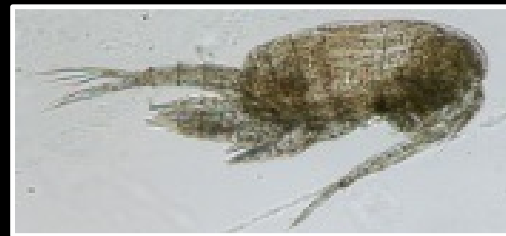
2.) Phytoplankton Transport

69% Diatoms
15% Greens

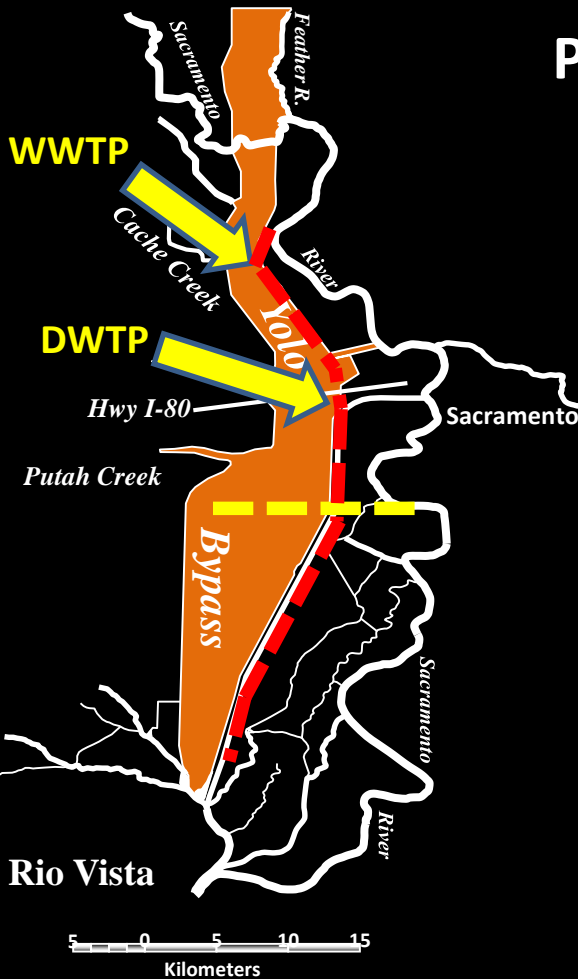
3.) Improved Zooplankton Abundance



Cladocerans

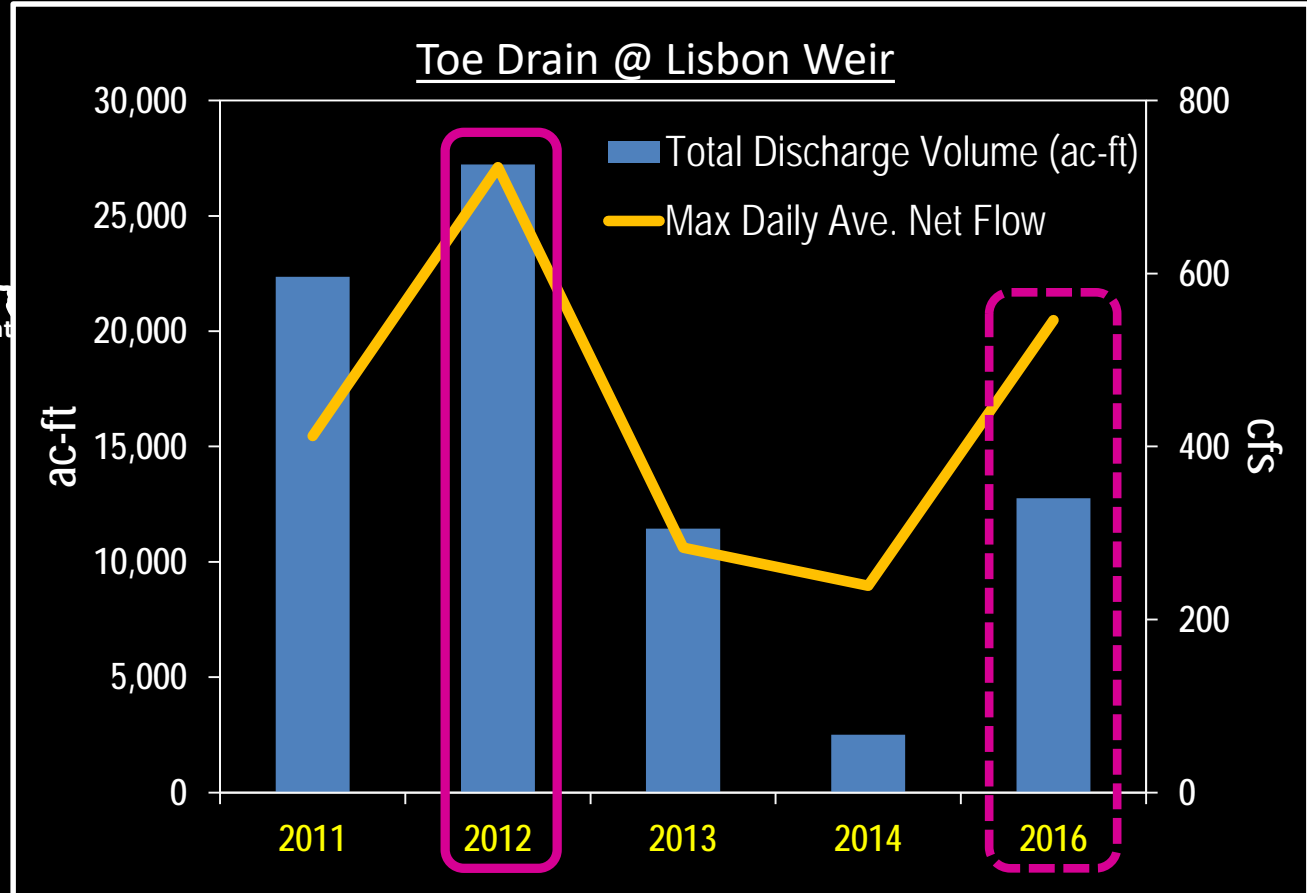
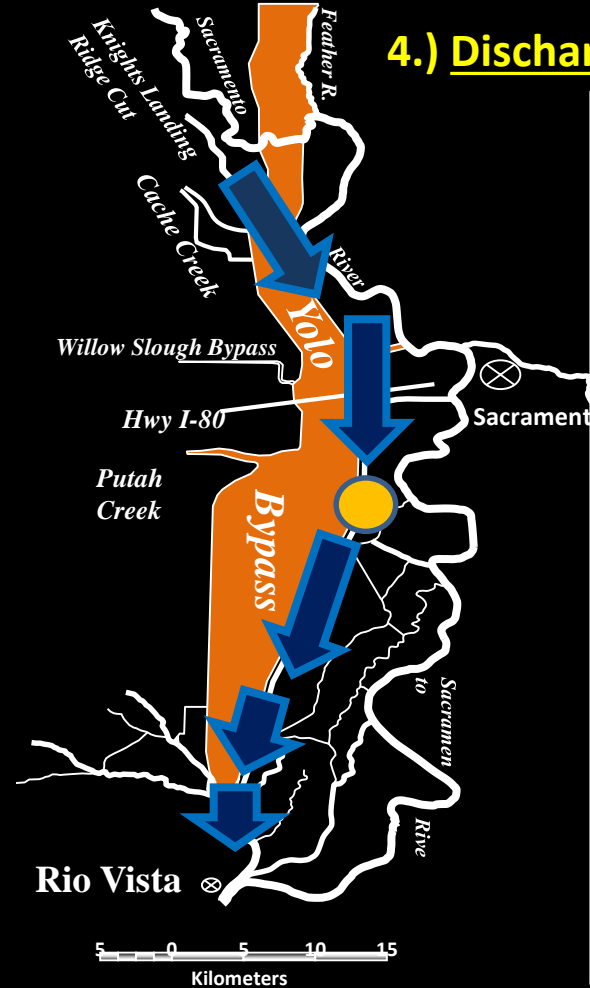


Calanoid copepods

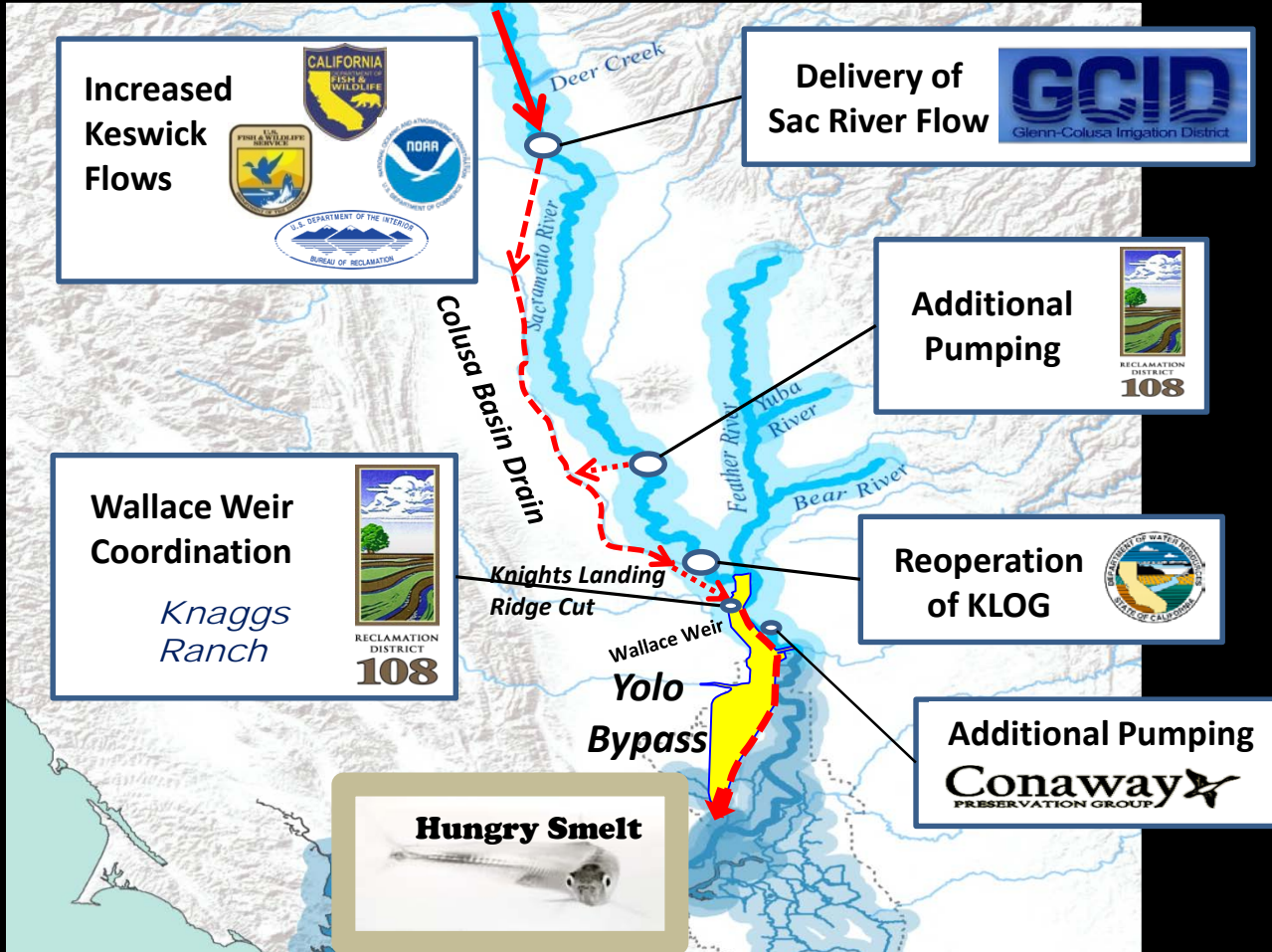


Key Findings from Fall Flow Special Studies


4.) Discharge Volume + Velocity both important for downstream response



2016 Summer Managed Flow Pulse

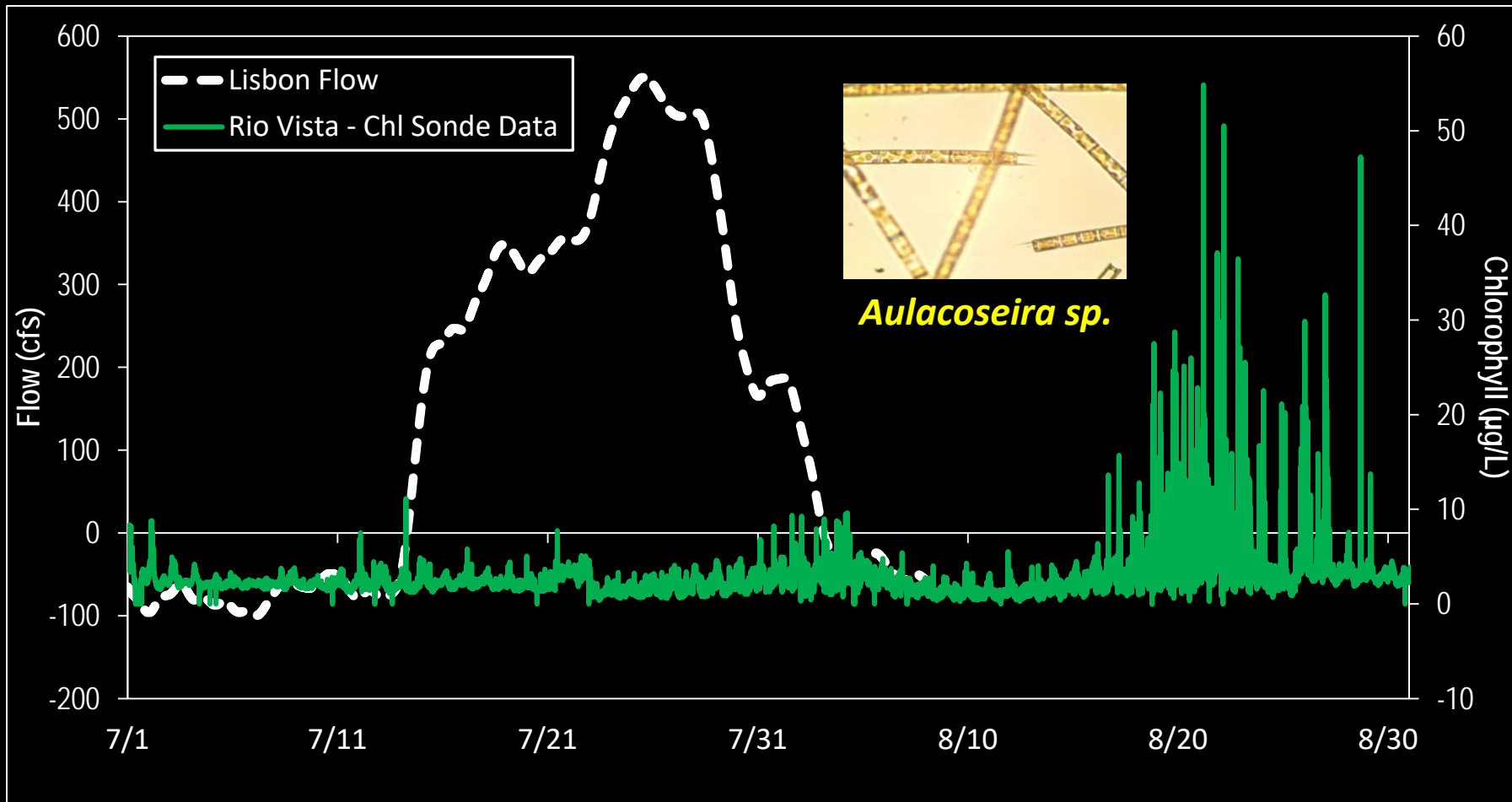


Delta Smelt Resiliency Strategy
July 2016

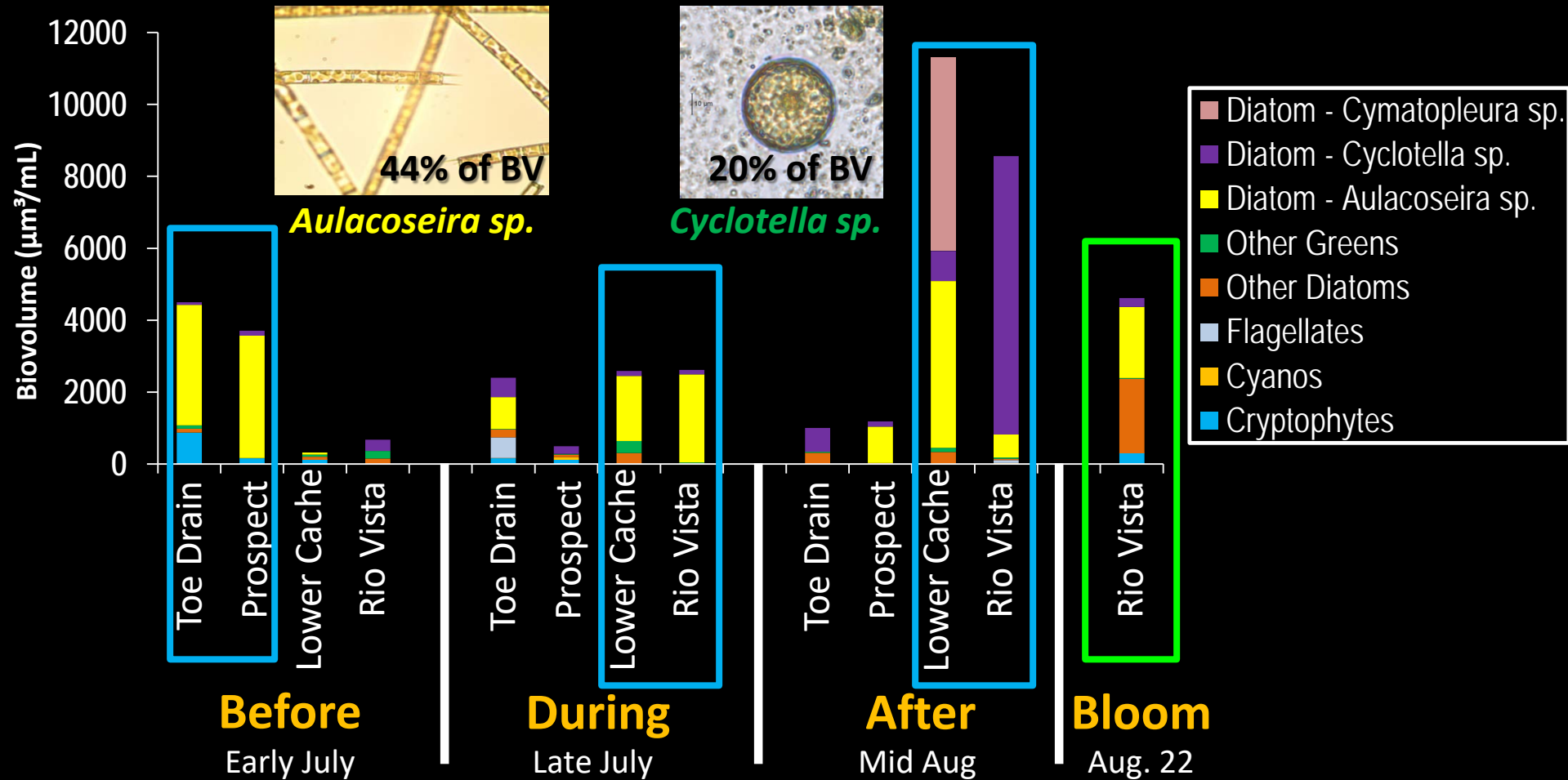


CALIFORNIA natural resources AGENCY

2016 Evidence of Downstream Response

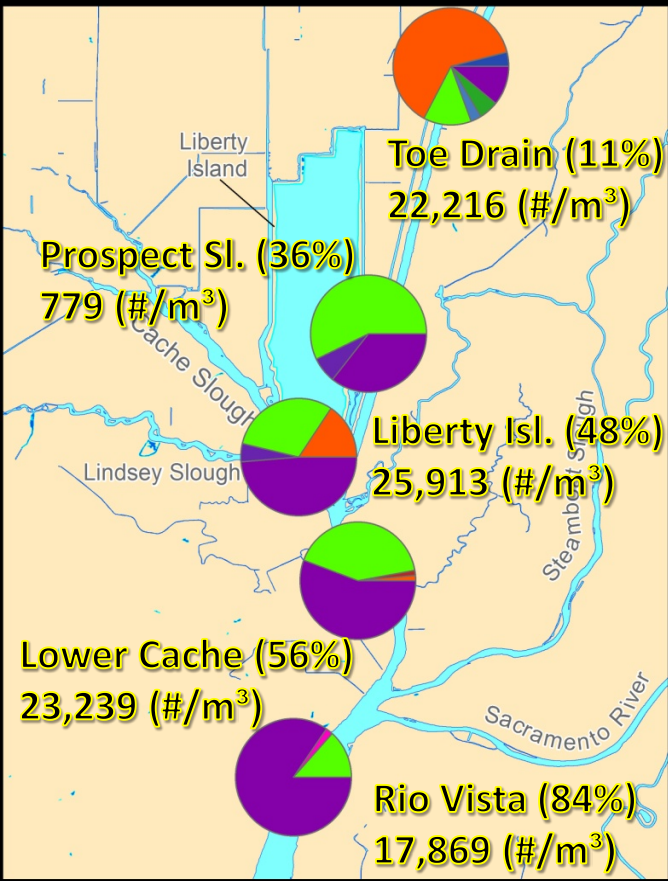


Summer Flows Transport Phytoplankton



Zooplankton Community Shift to Calanoids

During – Late July

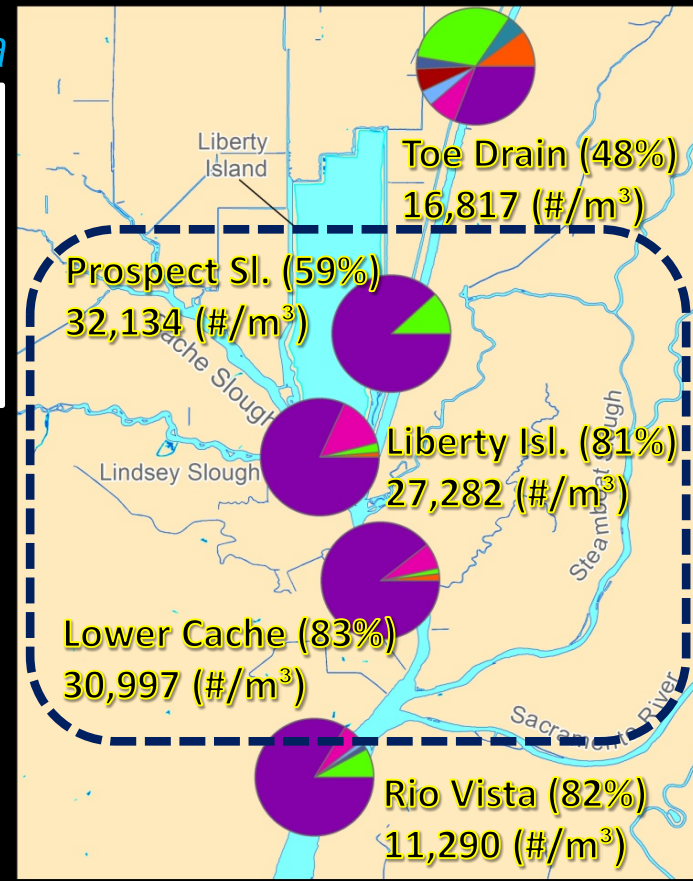


4 Most Dominant Zoop Taxa

- Calanoid copepodids
- Bosmina
- Cyclopoide copepodids
- P. Forbesi adults

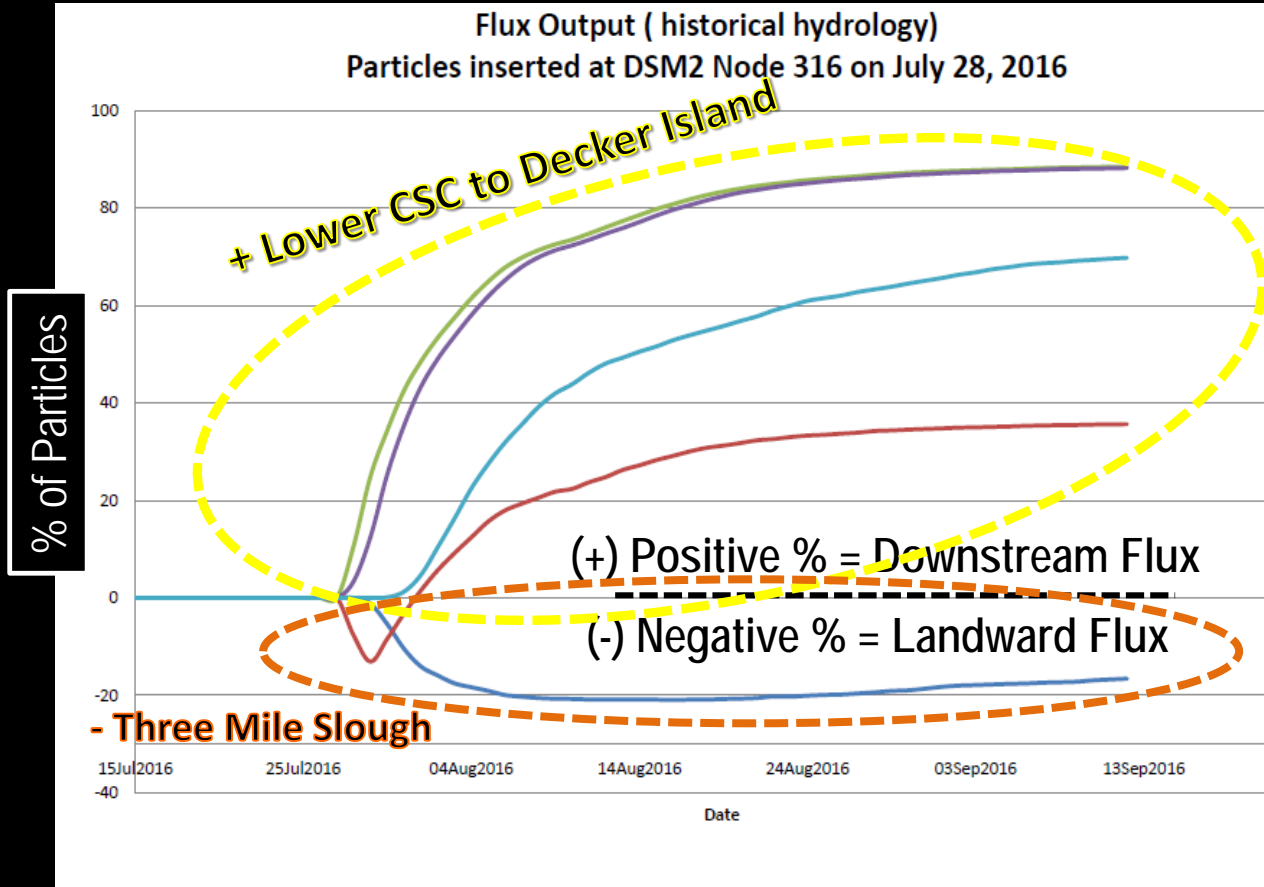
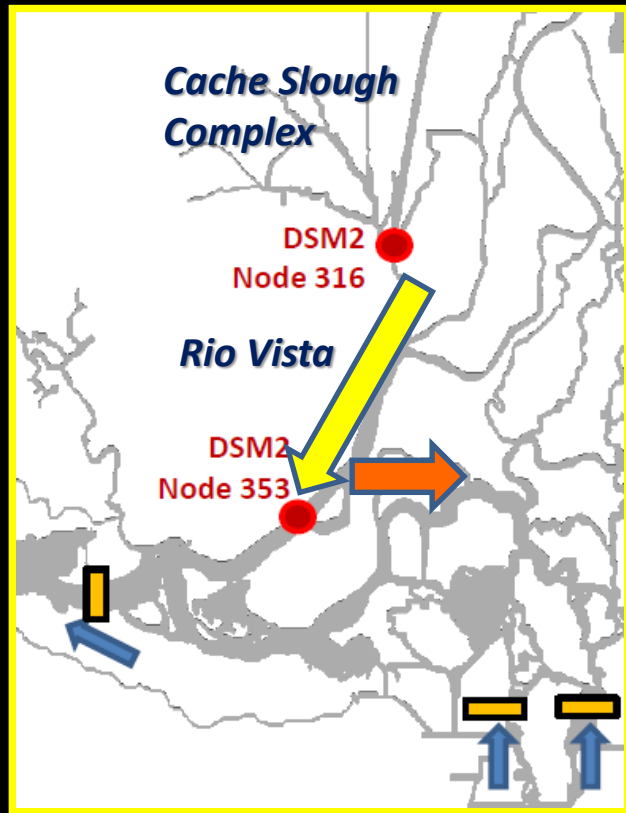


After – Early Sept



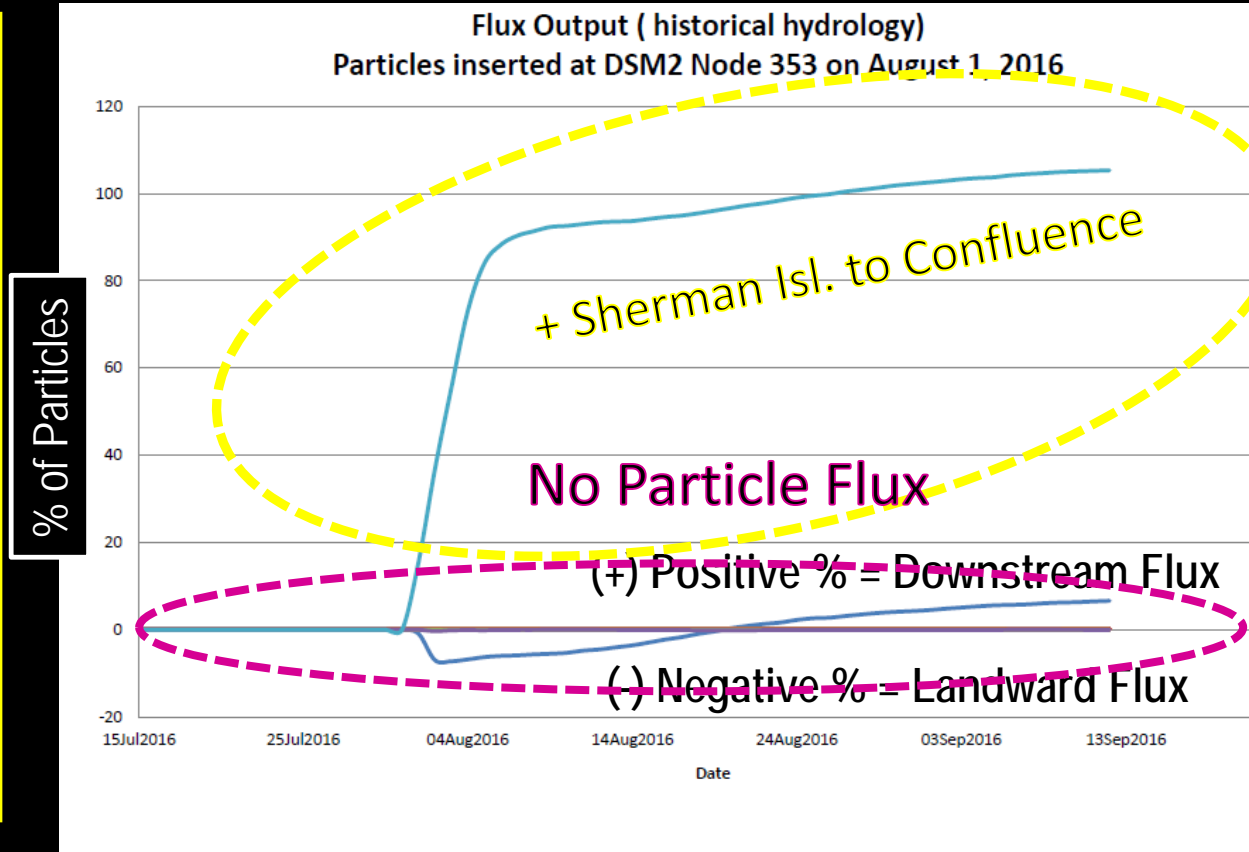
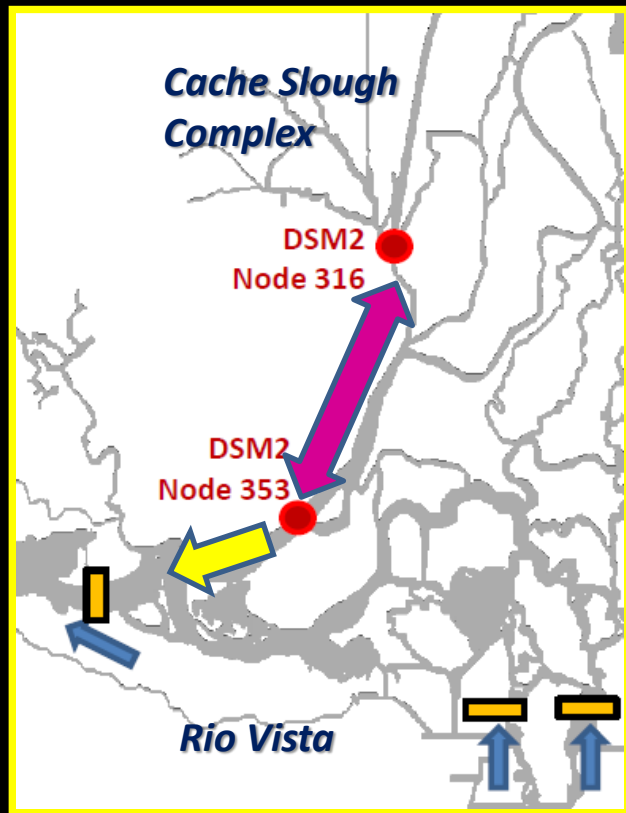
Summer and Fall Flow Dynamics

*DWR DSM2 Flow Model Support



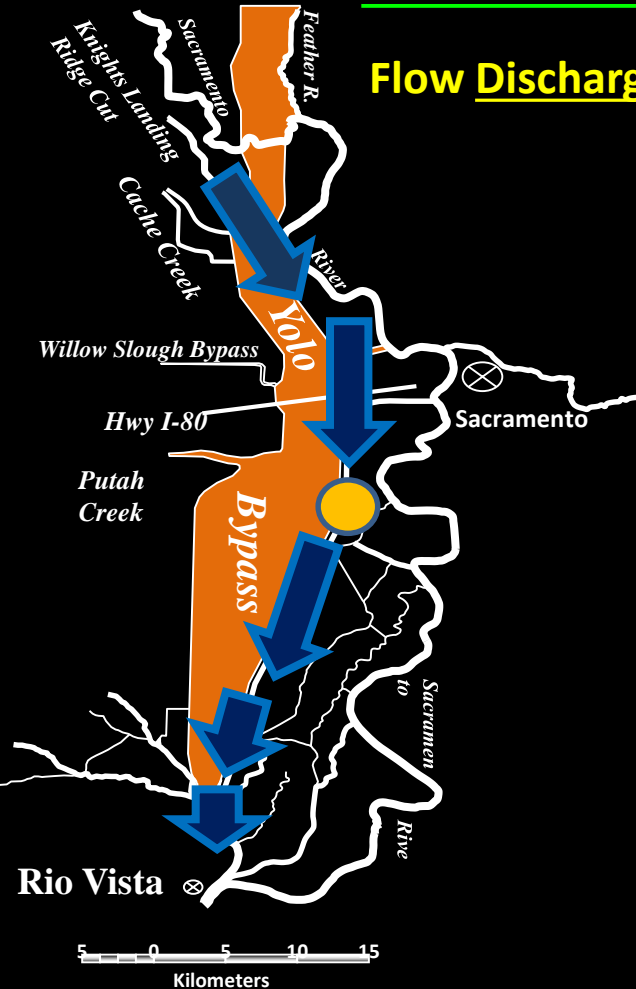
Summer and Fall Flow Dynamics

*DWR DSM2 Flow Model Support



Summer and Fall Flow Dynamics

Flow Discharge Volume + Velocity both important for downstream response



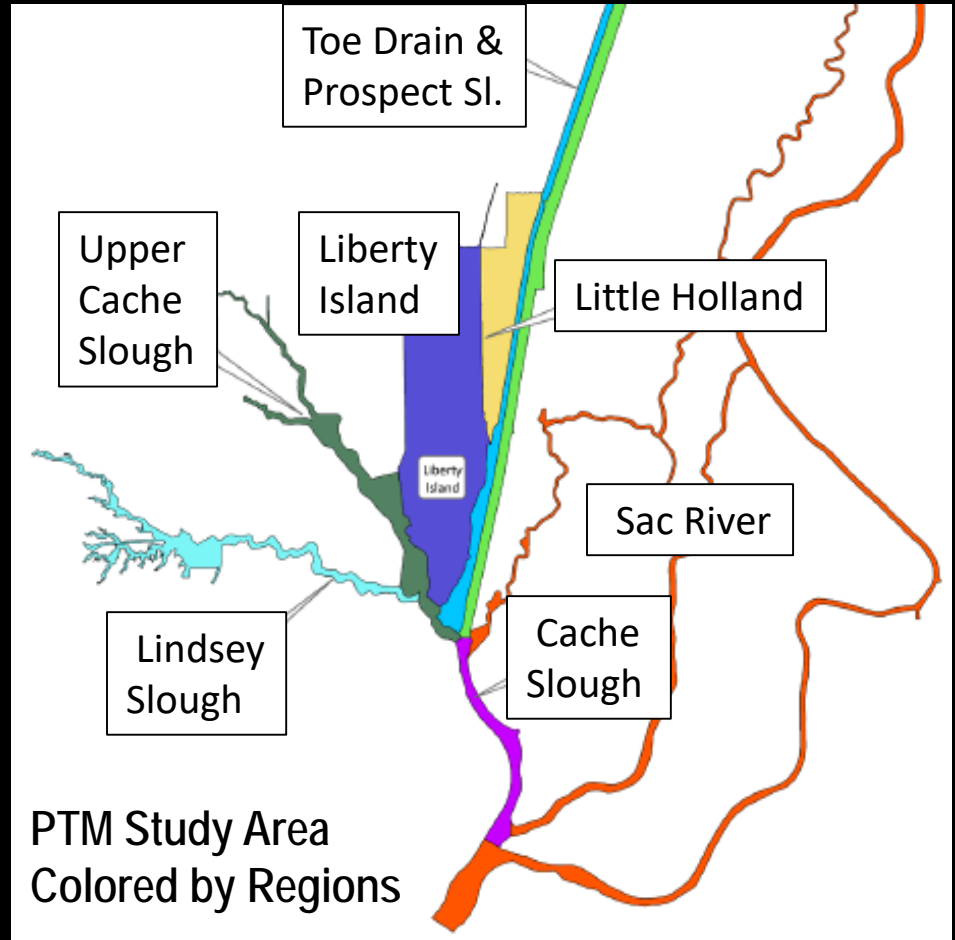
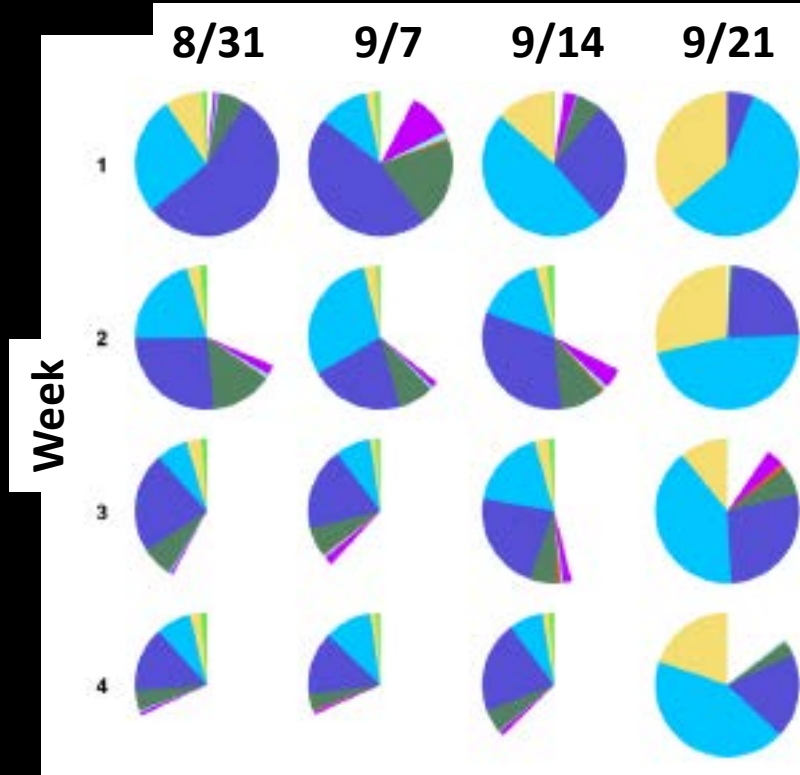
Year	Lisbon Max Daily Ave Net Flow (cfs)	Lisbon Total Average Net Volume (ac-ft)
2011	412	22,356
2012	723	27,224
2013	283	11,437
2014	239	2,503
2015	383	17,909
2016	546	12,752

*Summer Flow Pulse

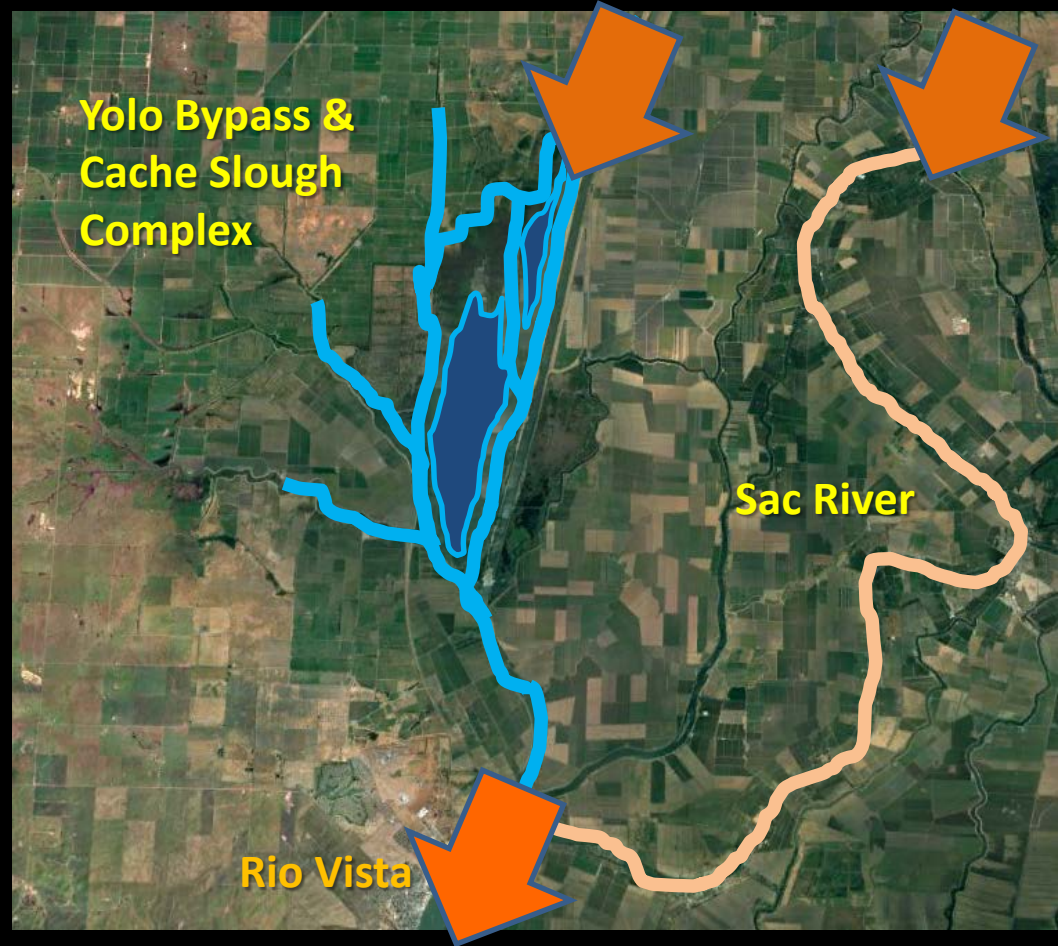
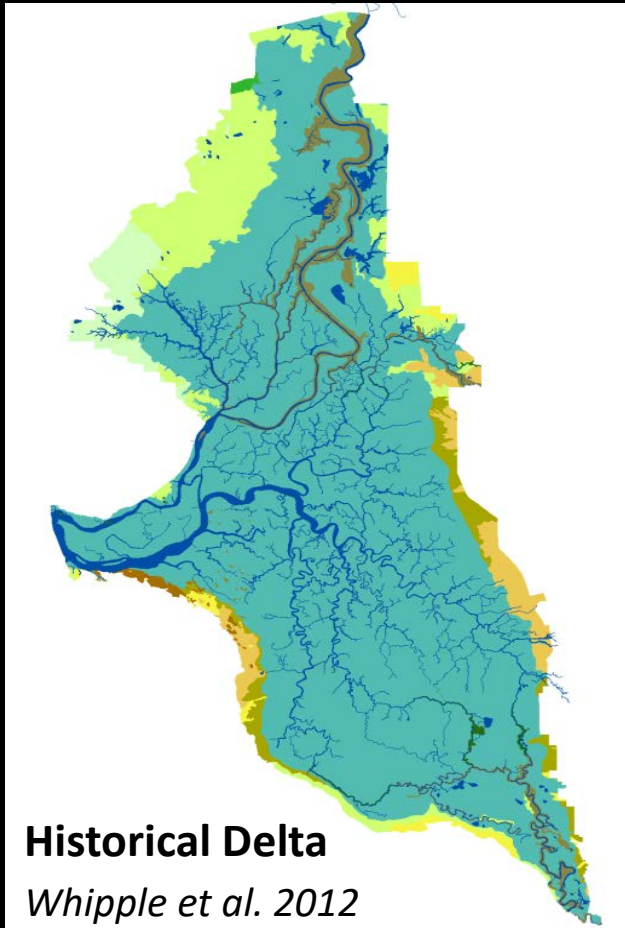
Summer and Fall Flow Dynamics

*CBECE MIKE21 Historical Flow Modeling

2012 Fall Particle Release Fate



Flow Pathways Are Important Too



Future Plans

➤ Planning Efforts for 2017 Summer/Fall Flow Pulse



➤ Increased Project Funds for FY 2017 and 2018



- **SFSU Kimmerer Lab: Zooplankton Growth and Reproduction**
- **SFSU Dugdale/Wilkerson Lab: Measure Primary Productivity and Nutrient Uptake Rates**
- **Biological Modeling and Contaminants Analysis - USGS**

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