Effect of Wastewater Treatment Plant Effluent on Algal Productivity in the Sacramento River, CA Part 2: Transect Results

Alex Parker, Richard Dugdale, Frances Wilkerson, Al Marchi, Jan Drexel-Davidson, Sarah Blaser, and Jim Fuller

Romberg Tiburon Center, SFSU

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Objective

Characterize the nutrients and phytoplankton community in the Sacramento River in the region of the SRWTP.

Provide primary production and N uptake rates for fate and transport models.

Are nutrient concentrations and phytoplankton standing stocks influenced by the presence of SRWTP discharge?

Is phytoplankton activity impacted by the presence of SRWTP? (i.e. is primary production or nitrogen uptake influenced).

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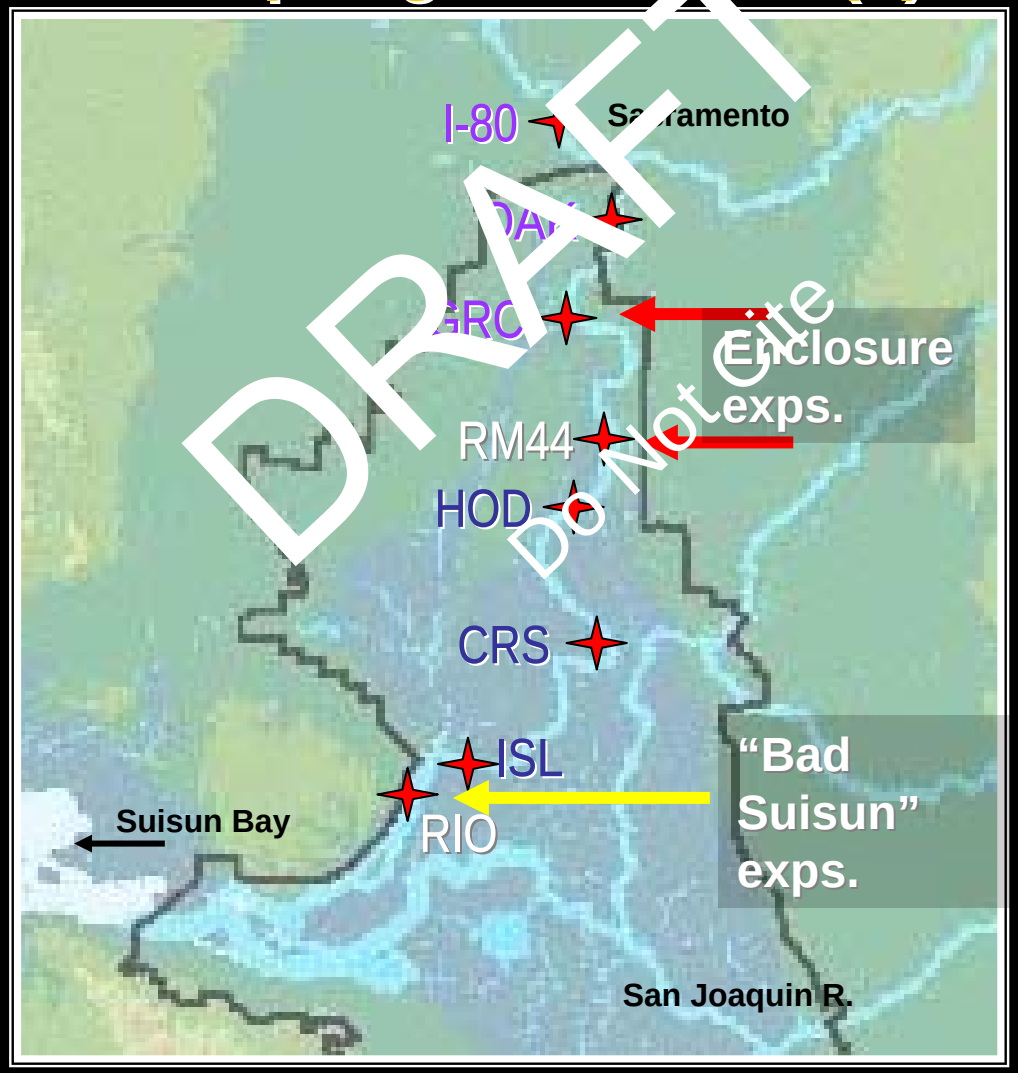
Study Site / Data

Sampling Locations (8)



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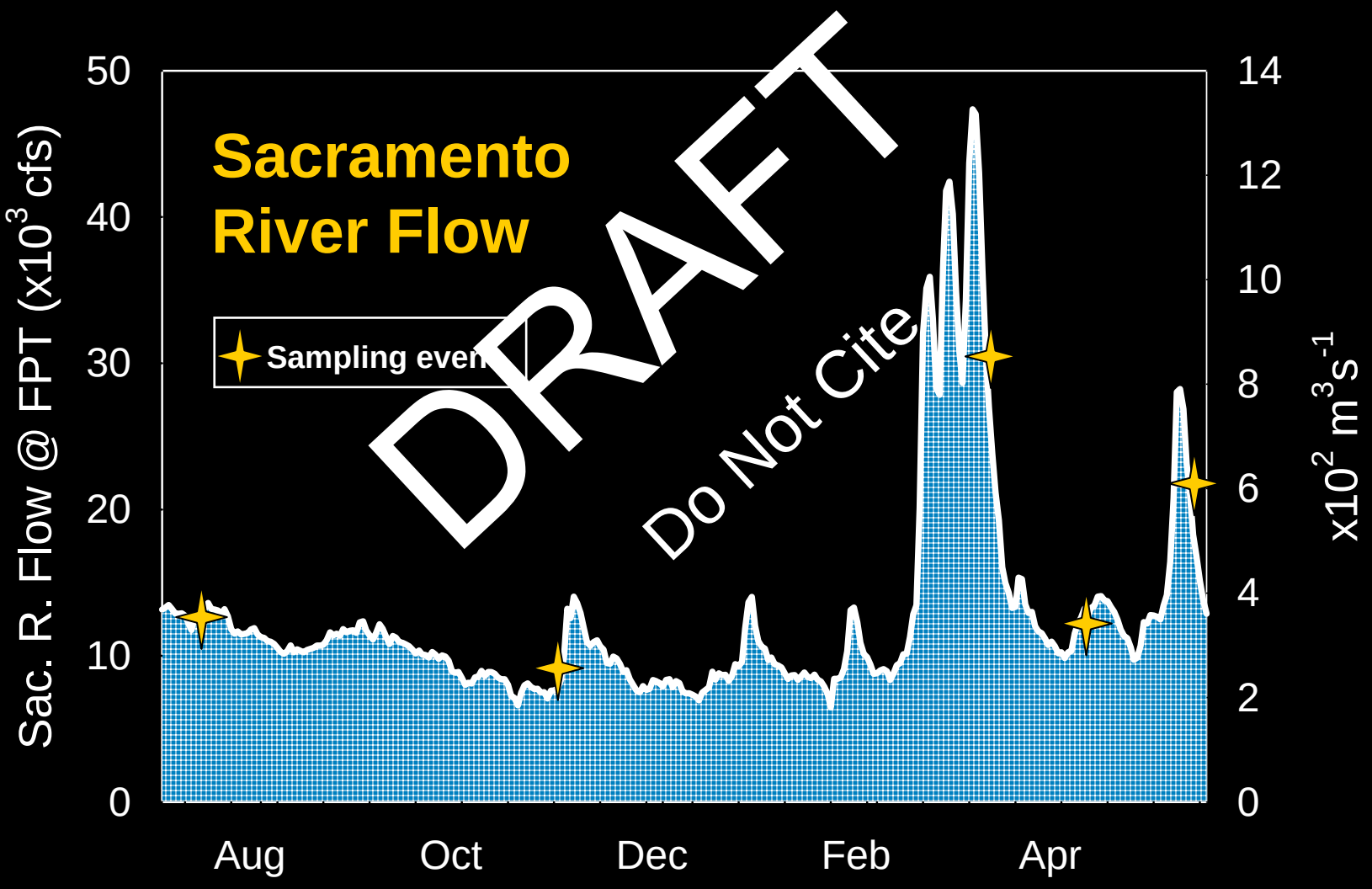
Study Site / Data



Study Site / Data

Data Acquired

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Light attenuation
salinity

ADCP

Flow cytometer
fluoroprobe

preserved samples

NO_3 + NO_2, NH_4,

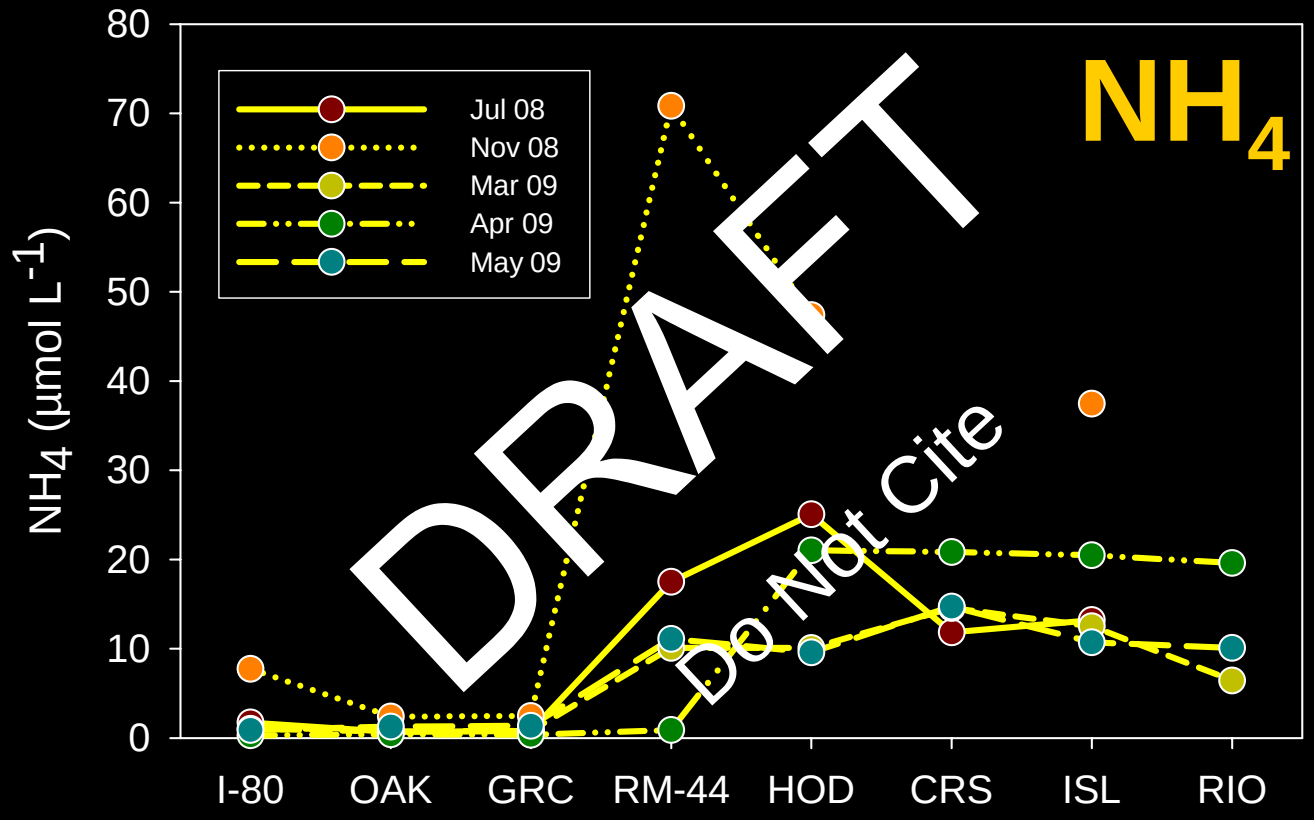
Urea,

PO_4, Si.

chl-a, POC/PON

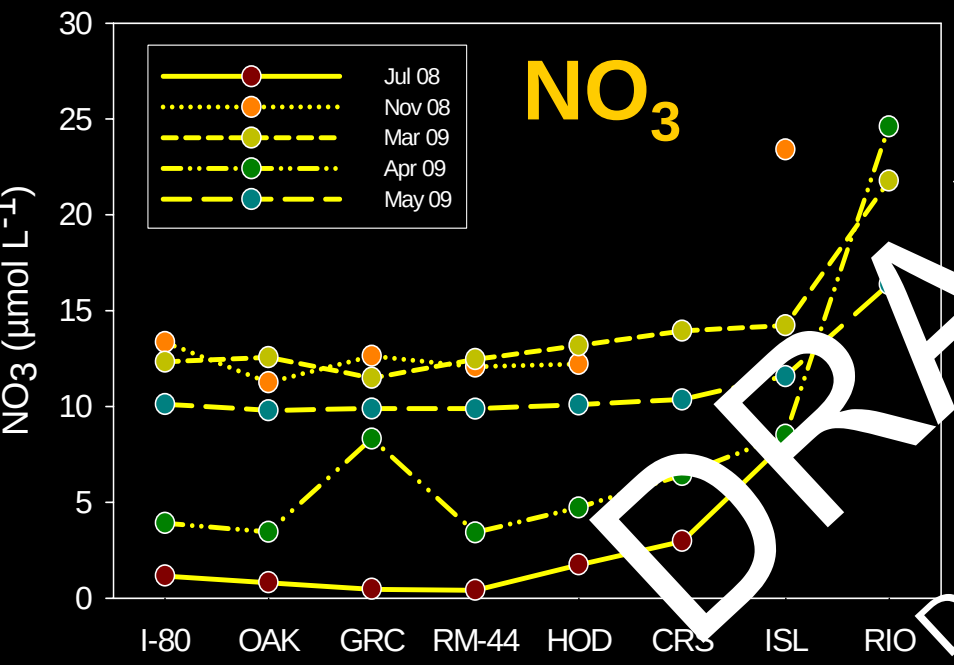
^{13}C, $^{15}NO_3$, $^{15}NH_4$
(except Jul).

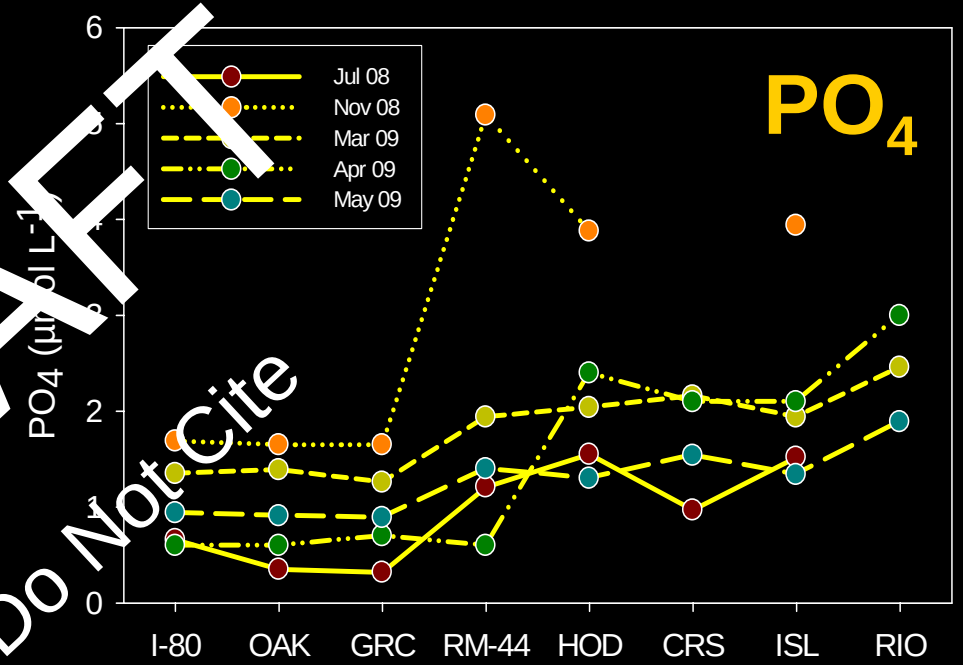
Nutrient Distributions



- River NH_4 variable - <1 to >70 µM.
- Elevated NH_4 always found downstream of RM-44 (10 to 100-fold increase in NH_4).
- Highest NH_4 not always at RM-44.

Nutrient Distributions





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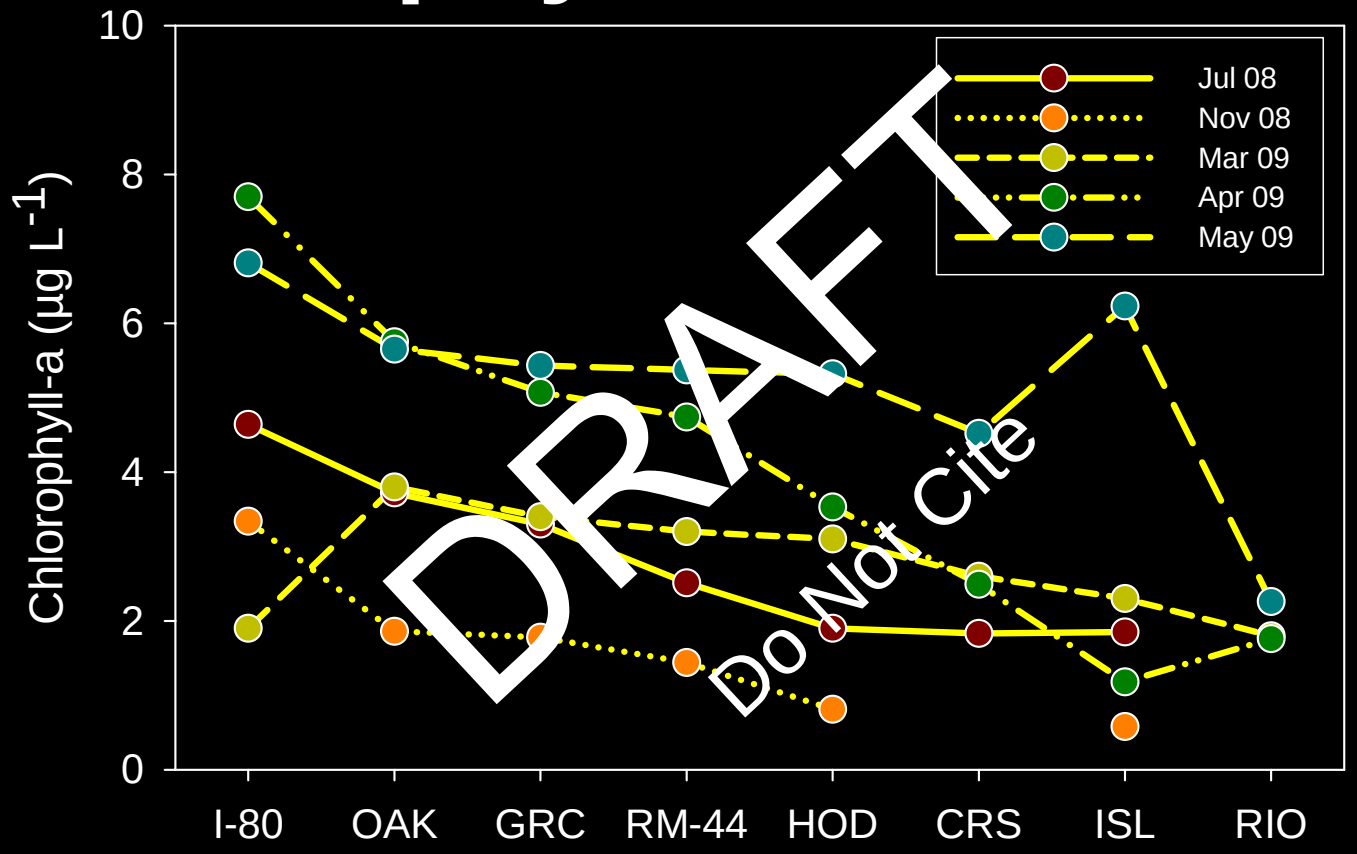
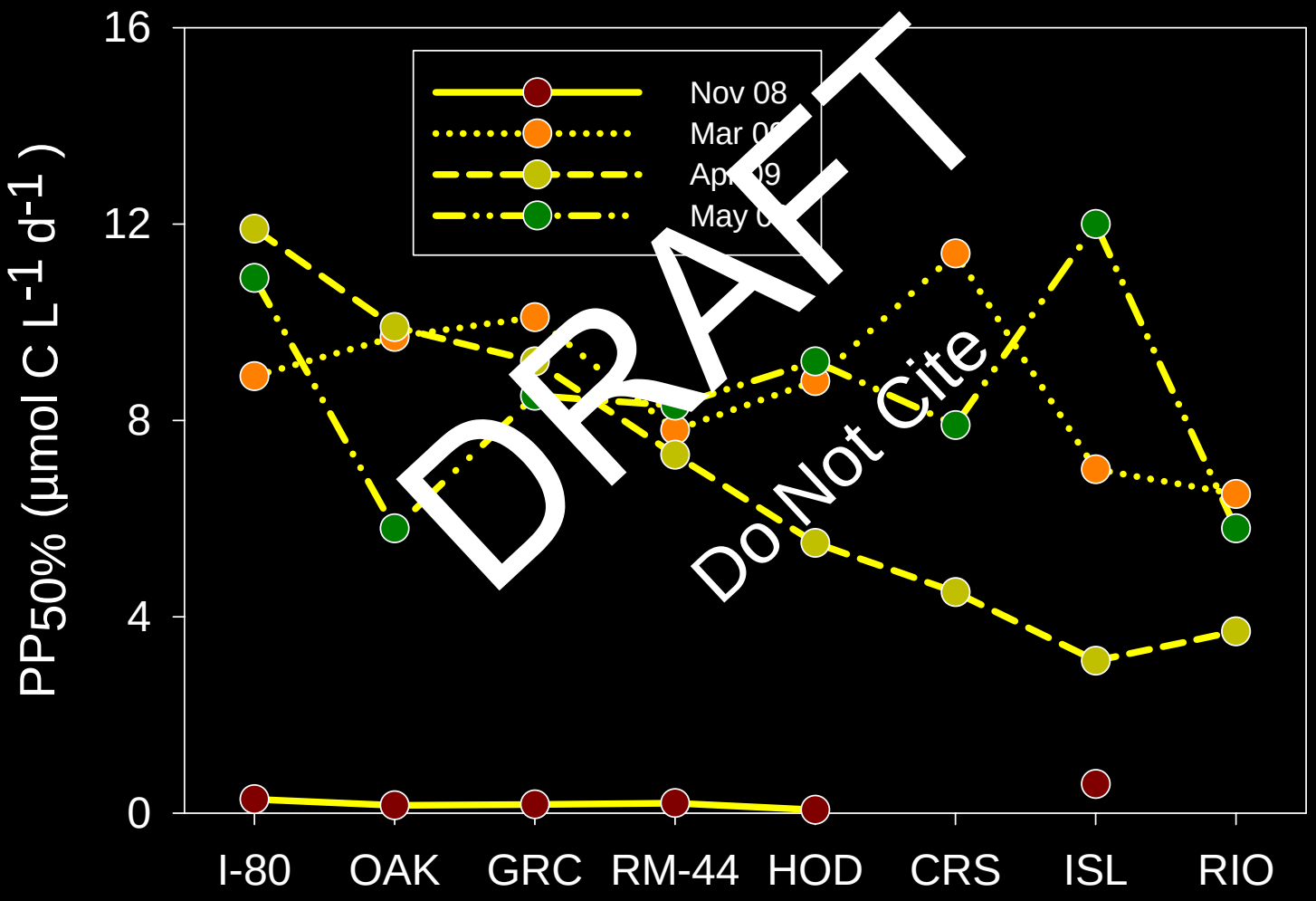
- NO_3 increases primarily at ISL and RIO
- PO_4 loading apparent at RM-44

Chlorophyll Distributions



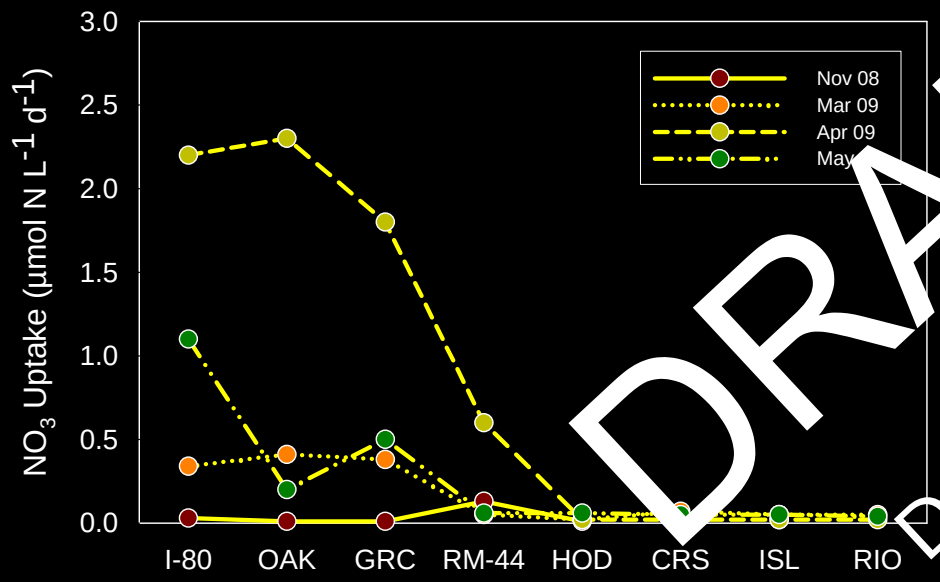
- **Consistent decline in chl-a from north to south.**
- **>5 µm cells account for the majority of chl-a.**
- **Flow cytometer and fluoroprobe suggest some shift in community structure – but too early to tell.**

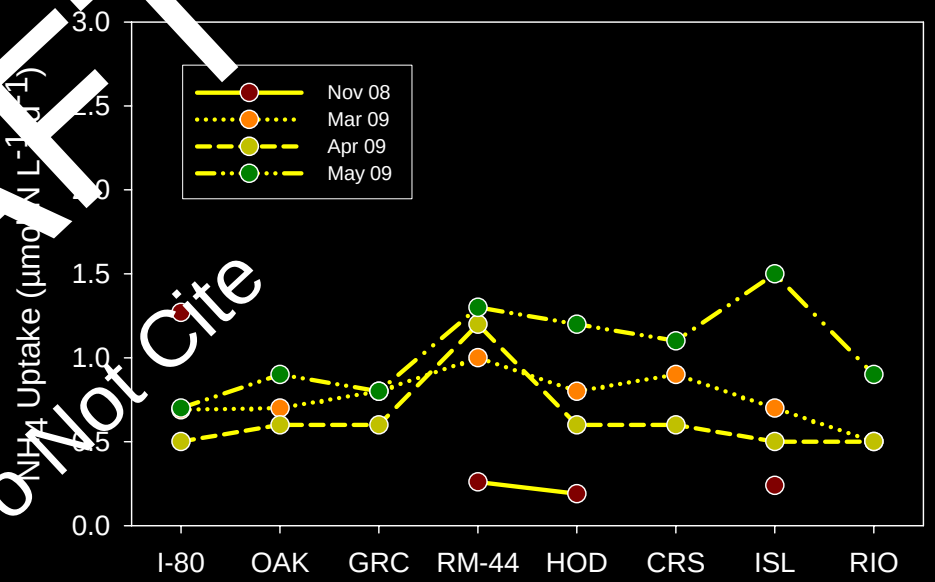
Primary Production



- **Like chl-a, consistent decline in PP from north to south.**

Phytoplankton N Uptake





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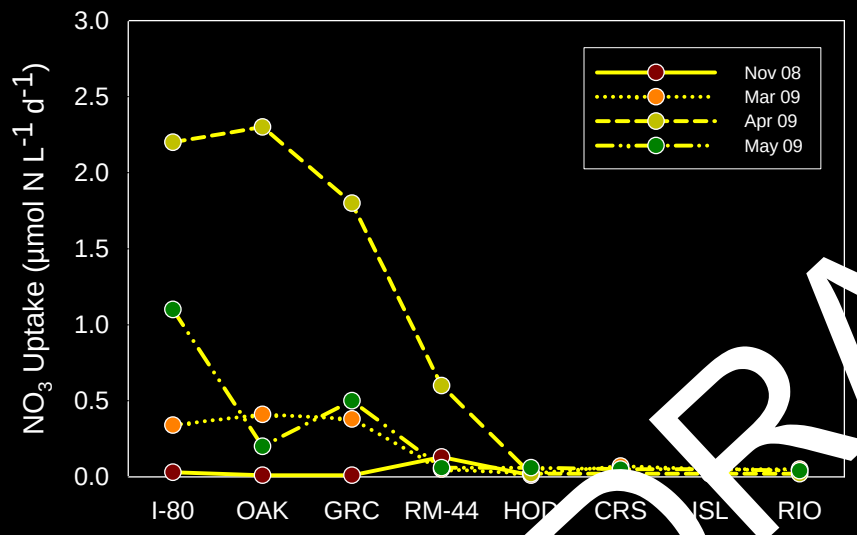
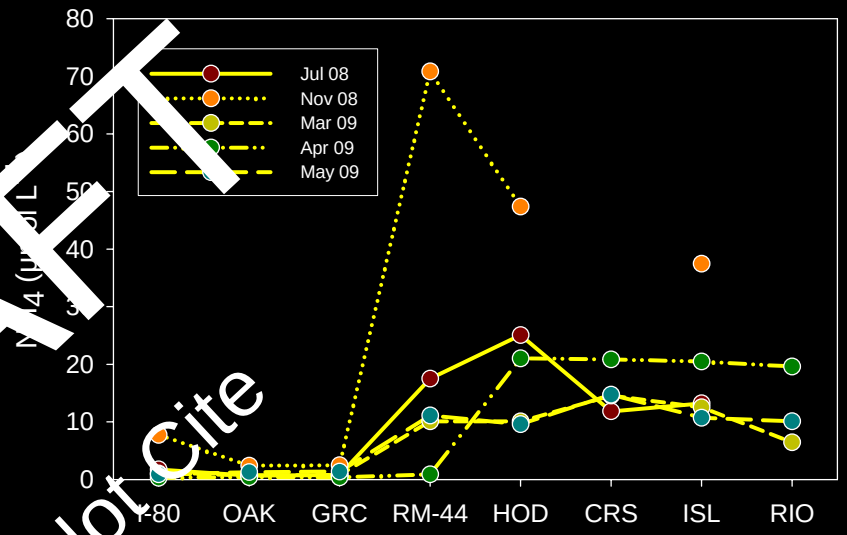
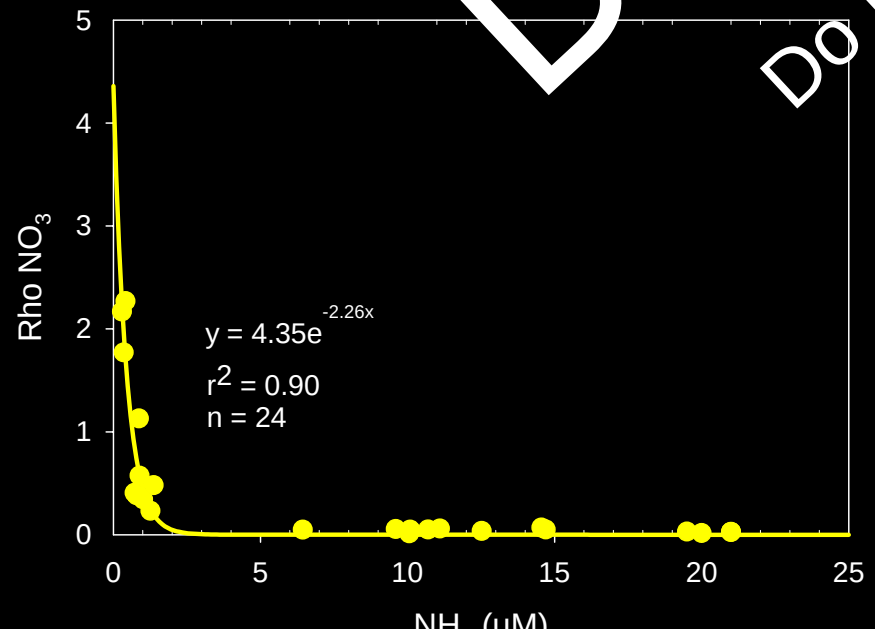
- **NO_3 uptake only observed at upstream stations.**
- **NH_4 elevated downstream compared to upstream.**

Phytoplankton N Uptake







NO_3 uptake sensitive to NH_4 concentrations >1 µM.

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Summary Conditions

Spring 2009

River Region	NO_3 (µM)	NH_4 (µM)	ρC µM C L^{-1} d^{-1}	ρNH[illegible] µM N L^{-1} d^{-1}	ρNO_3 µM N L^{-1} d^{-1}	f-ratio	ρN (µM N L^{-1} d^{-1})	ρC:ρN
Upper River	8.96	0.79	9.22	0.70	1.03	0.53	1.73	5.94
RM-44	8.65	7.49	[illegible].83	[illegible].16	0.23	0.14	1.16	6.97
Lower River	10.32	14.93	[illegible]99	0.89	0.04	0.04	0.89	8.87
Rio Vista	21.24	11.61	5.[illegible]4	0.64	0.04	0.06	0.64	7.95

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Crew RV Questuary

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