

# Impact of Nutrient Loading and Hydrodynamics on Algal Biomass in the Suwannee River Estuary



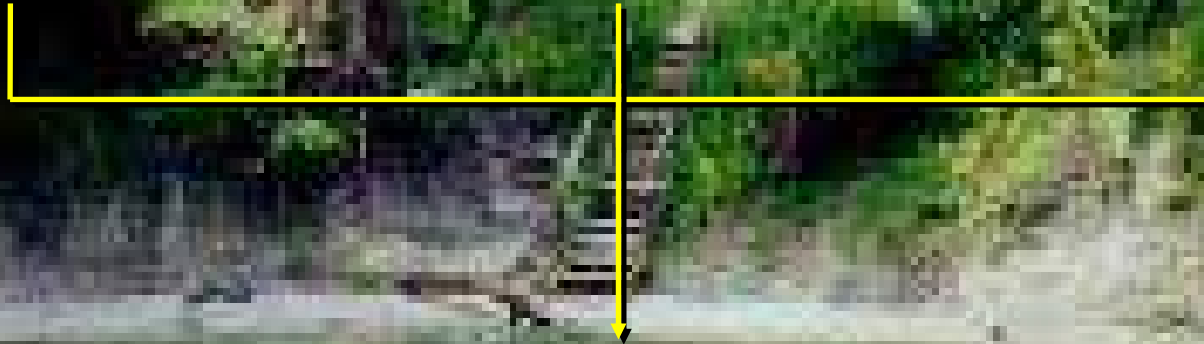
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**High  
Nutrient  
Concentrations**

**Short  
Residence  
Time**

**Low  
Light  
Availability**



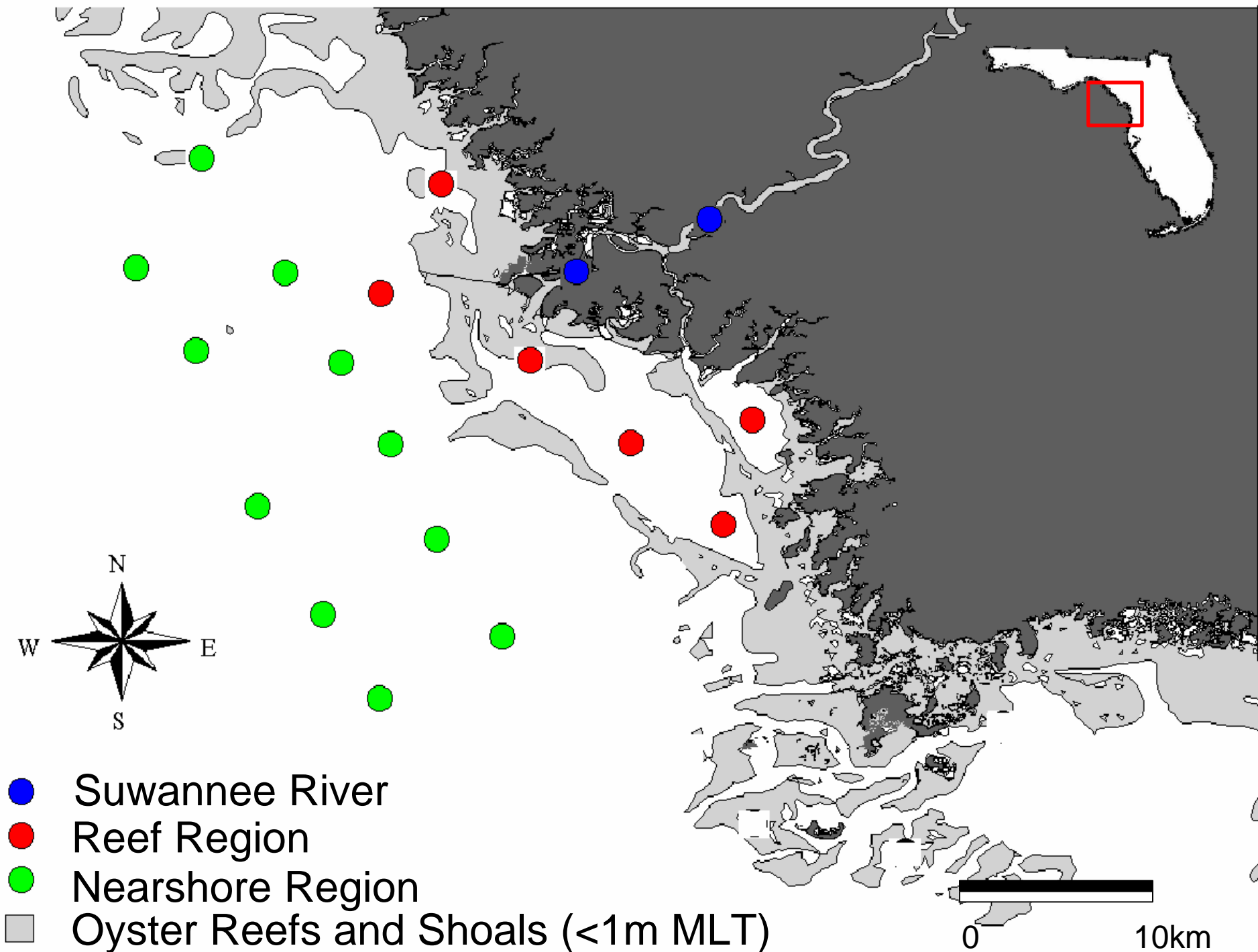
**Low Phytoplankton Biomass**

**High Nutrient Potential**

**Estuary**

## GOALS:

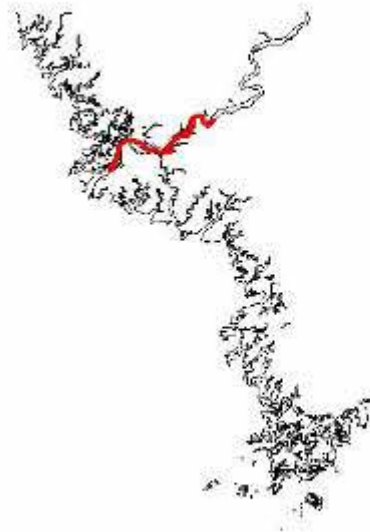
- to determine the relationship between spatial and temporal patterns of nutrient loading and the concentration and distribution of phytoplankton standing crops
  - Nutrient Loading
  - Bioavailable Nutrients
  - Light Availability
  - Hydraulic Flushing
  
- Macroalgal Distribution and Abundance
- Micro-zooplankton Grazing



# POTENTIAL LIGHT LIMITATION

Average Discharge  
April 1998 - March 1999

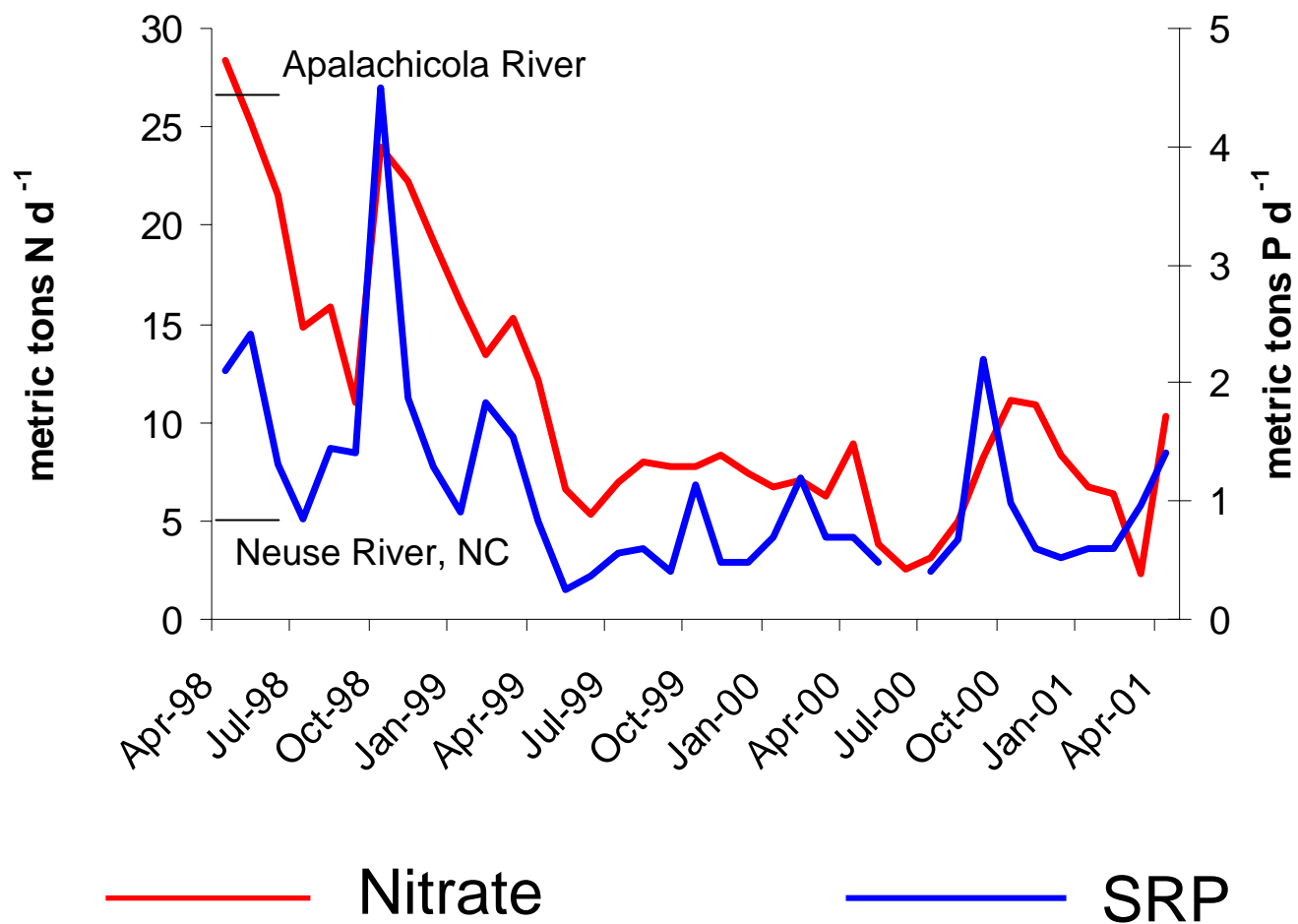
Low Discharge  
April 1999 - April 2001



**$I_m$ , Mean Irradiance in the Mixing Zone**  
**2 to 4 mol photon  $m^{-2} s^{-1}$**

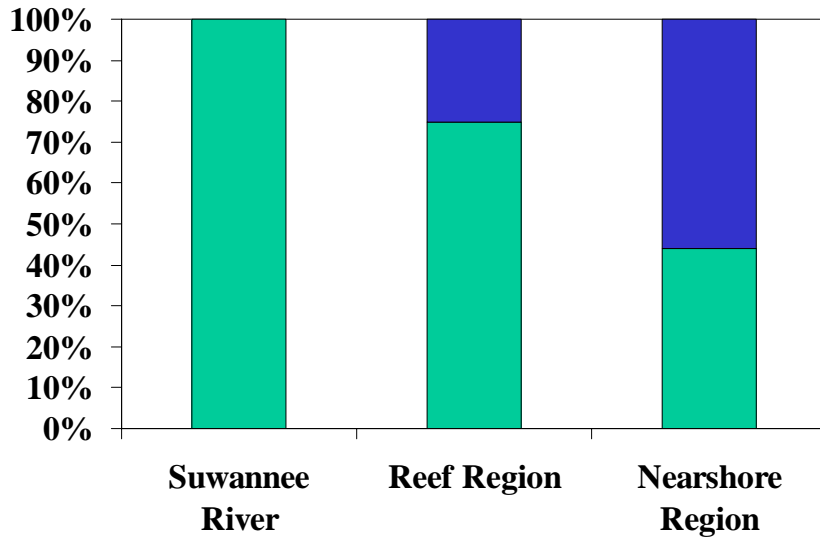


# ESTIMATED SUWANNEE RIVER LOADING RATES

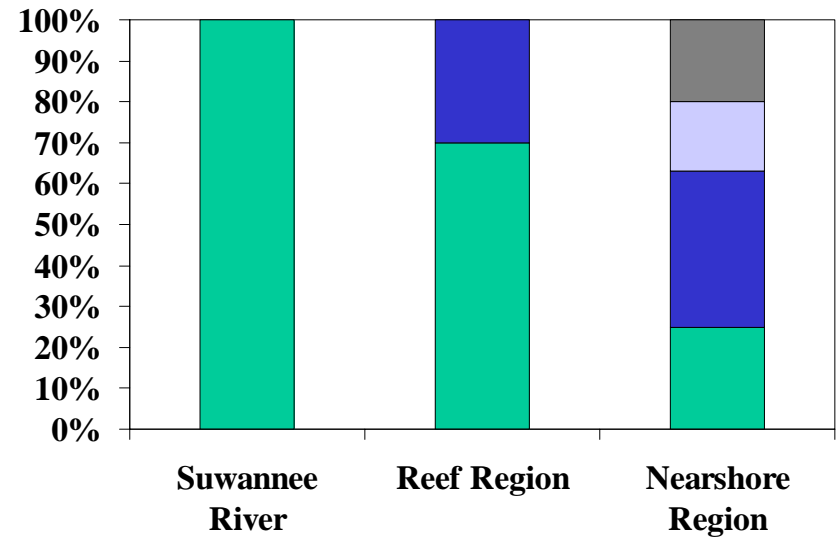






# NUTRIENT LIMITATION BIOASSAYS

Average Discharge  
April 1998 - March 1999



Low Discharge  
April 1999 - April 2001



-  No Nutrient Limitation
-  N Limitation
-  P Limitation
-  N and P Co-Limitation

# EFFECTS OF NUTRIENT LOADING ON PHYTOPLANKTON BIOMASS

Year	Reef chl a $\mu\text{g L}^{-1}$	Nearshore chl a $\mu\text{g L}^{-1}$	TN Load $\text{g N s}^{-1}$	TP Load $\text{g P s}^{-1}$	Discharge
4/98-3/99	18.0 (2.1)	9.8 (0.84)	320 (150)	35 (28)	Medium-high
4/99-3/00	13.0 (1.5)	3.3 (0.27)	110 (24)	11 (4.0)	Low
4/00-4/01	11.0 (1.1)	3.1 (0.27)	130 (58)	14 (10)	Low

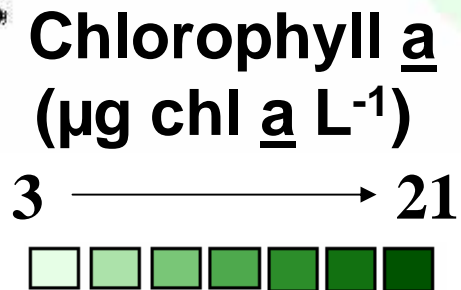
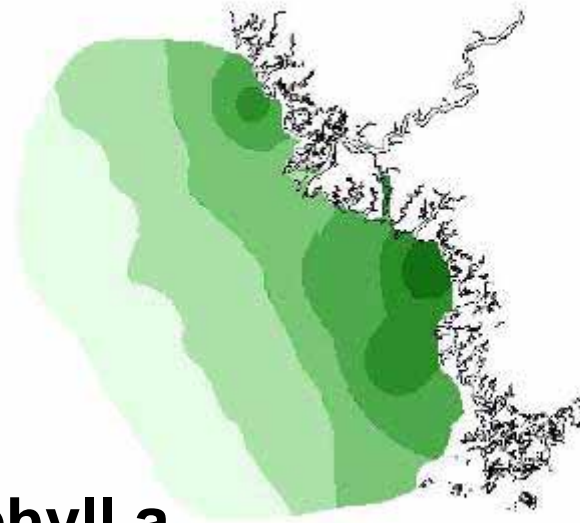
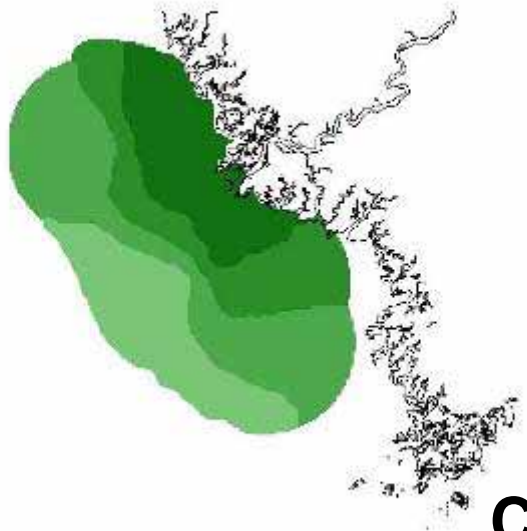
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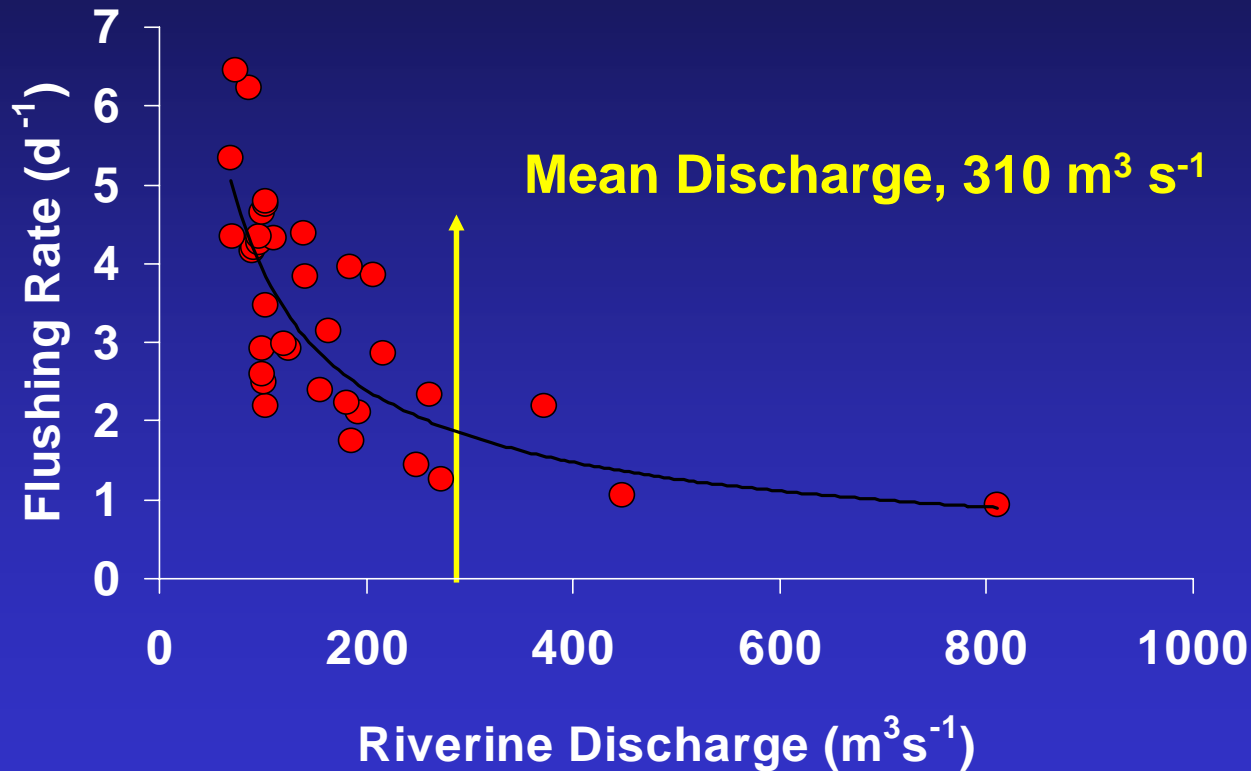
# MEAN PHYTOPLANKTON BIOMASS

Average Discharge  
April 1998 - March 1999

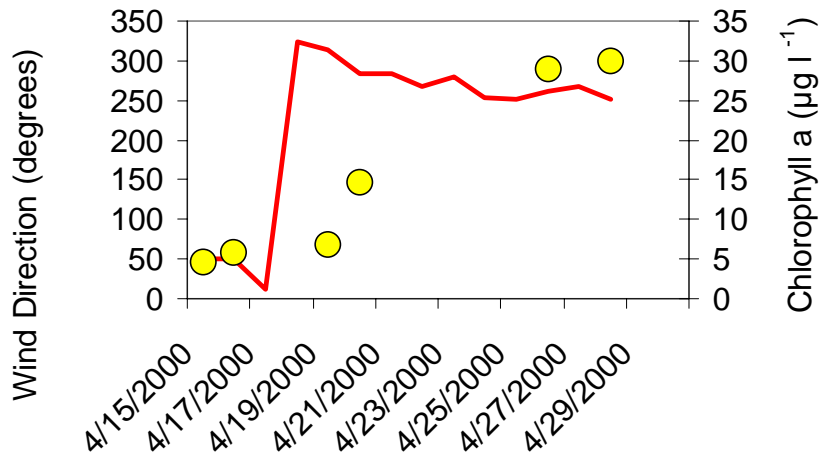
Low Discharge  
April 1999 - April 2001



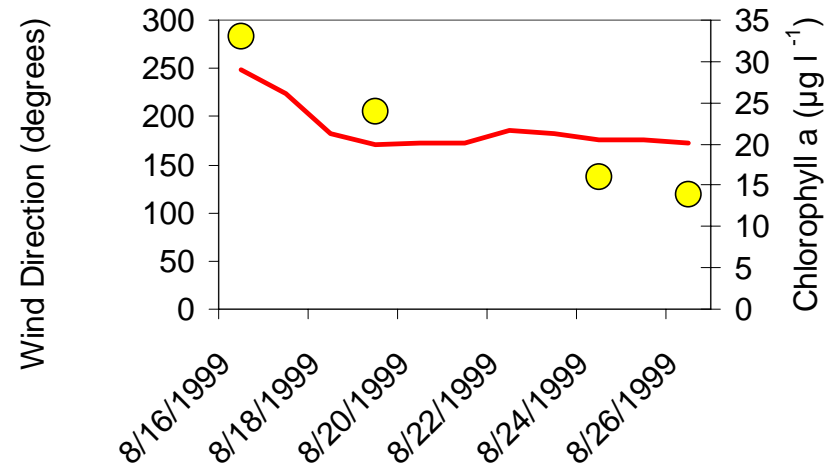
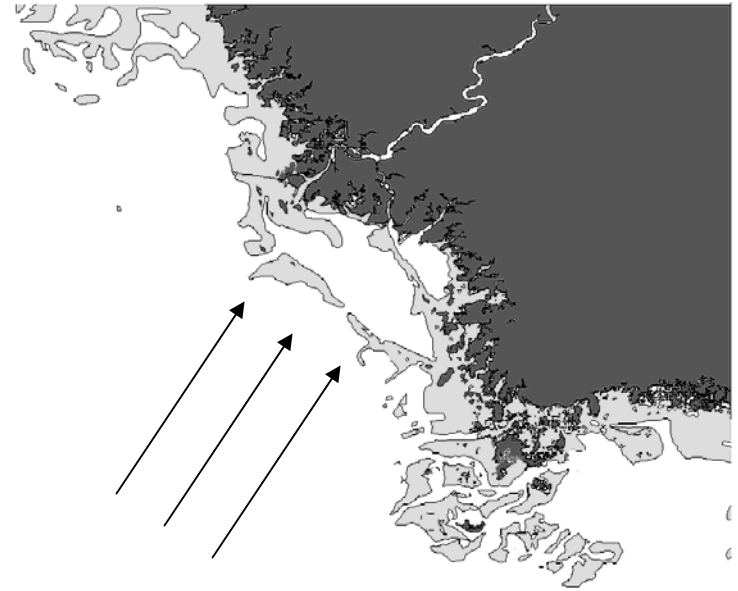
# FLUSHING RATE IN THE REEF REGION BASED ON RIVERINE DISCHARGE



# WIND DYNAMICS



— Wind Direction ● Chlorophyll a



— Wind Direction ● Chlorophyll a

## SUMMARY

Meteorological changes in rainfall-related nutrient loading and wind-driven circulation play a significant role in defining the abundance and distribution of phytoplankton in the Suwannee River and its estuary

- Light limitation (river region)
- Flushing time (river region and reef region)
- Nutrient limitation (nearshore region)
- Wind-forcing (reef region)

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