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Near Shore Biological Sampling During Fluctuating and Steady Releases in September and October 2005

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U.S. Geological Survey

Introduction & Background

- Temperature and available habitat are two parameters associated with fish growth and survivorship
  - Lees Ferry trout – Korman et al. 2005.
    - Growth response to Sunday steady flows
    - Changes in abundance with changes in release volumes and base flow
  - Native fish – Gorman and Stone 1999, Robinson & Childs 2001, Korman et al 2004

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Purpose

Determine if physical and biological data collected under minor fluctuations varied from data collected under steady releases.

- **Water temperature & other abiotic parameters**
- **Benthic composition & density**
- **Plankton composition & density**
- **Fish composition and abundance**

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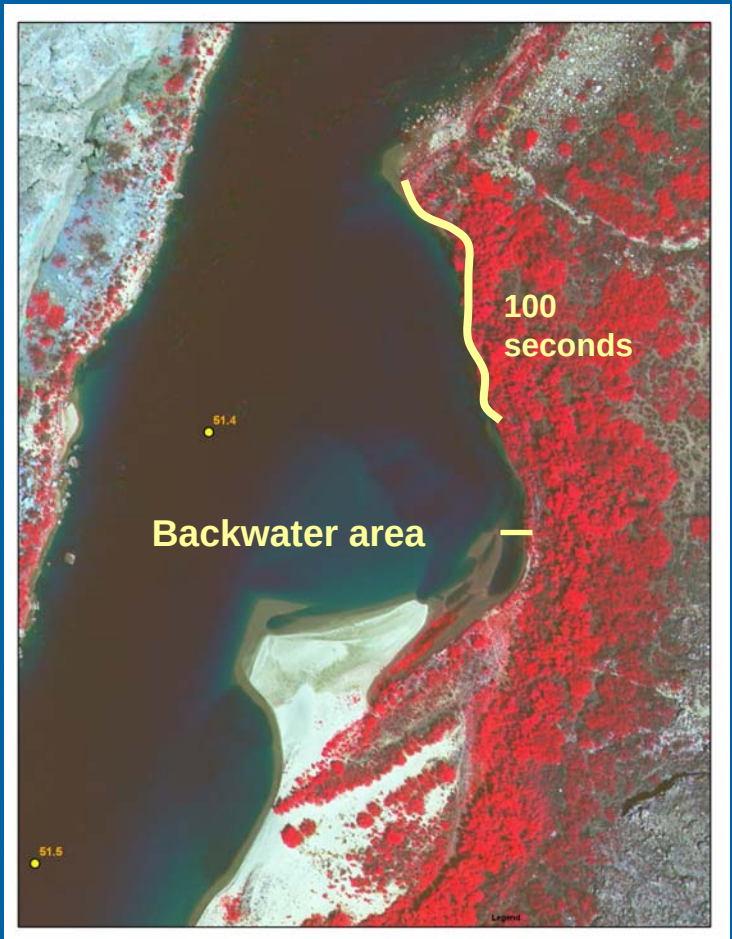
Methods



- Trip dates Sept 4-16, Sept 22-Oct 7, 2005.
- 12 Paired samples during each trip
  - Backwater
  - Shoreline

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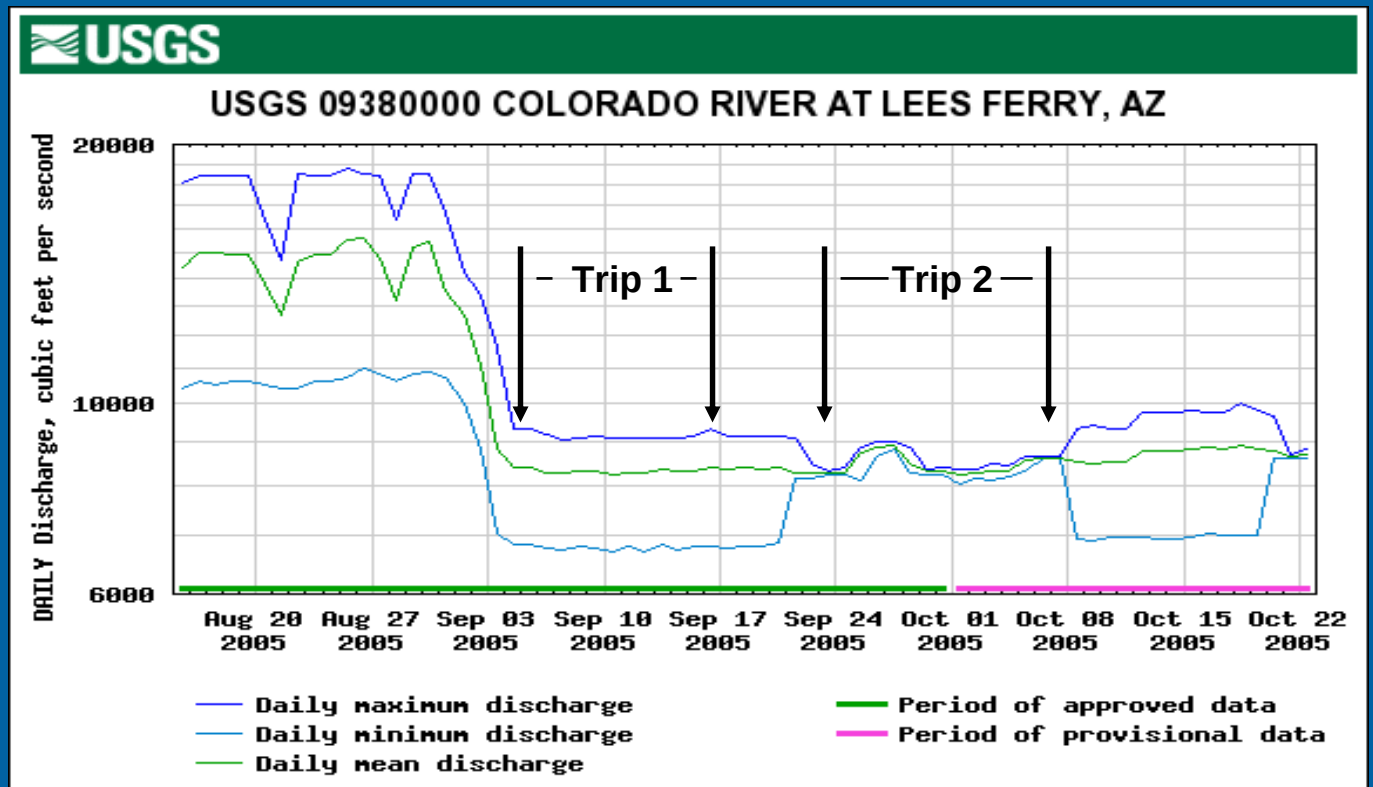
Hydrology



Collection Dates	Maximum Releases (ft^3/s)	Minimum Releases (ft^3/s)	Range (ft^3/s)	Median Release (ft^3/s)
Sept. 4 - 16, 2005	9310	6690	2620	8830
Sept 22 – Oct 7, 2005	9010	8040	970	8360

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Results – Physical parameters

	Fluctuating BW	Steady BW	Fluctuating Shoreline	Steady Shoreline
Surface water temp (°C)	19.5 ± 0.5 s.e.	18.4 ± 0.4 s.e.	18.1 ± 0.3 s.e.	17.3 ± 0.5 s.e.
Dissolve Oxygen (mg/L)	9.2 ± 0.1 s.e	9.7 ± 0.2 s.e	9.5 ± 0.1 s.e	9.4 ± 0.2 s.e

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Results – Physical parameters

	Fluctuating BW	Steady BW	Fluctuating Shoreline	Steady Shoreline
Turbidity (NTU)	21.6 ± 2.4 s.e.	5.6 ± 0.4 s.e.	25.3 ± 3.3 s.e.	3.9 ± 0.4 s.e.
Velocity (m/s)	0.04	0.02	0.13	0.17

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Physical parameter conclusions

- No statistical difference between flows within habitats
- Temperatures declined between trips
  - Possibly due to changes in day length/solar radiation
- Shoreline and backwater temperatures differed by 1°C with shorelines significantly colder (t-test $p<0.05$)
- Shoreline velocities varied between trips
  - Associated with stage elevation of sample period
- Turbidity decreased between trips
  - Spates from Paria, LCR during first trip

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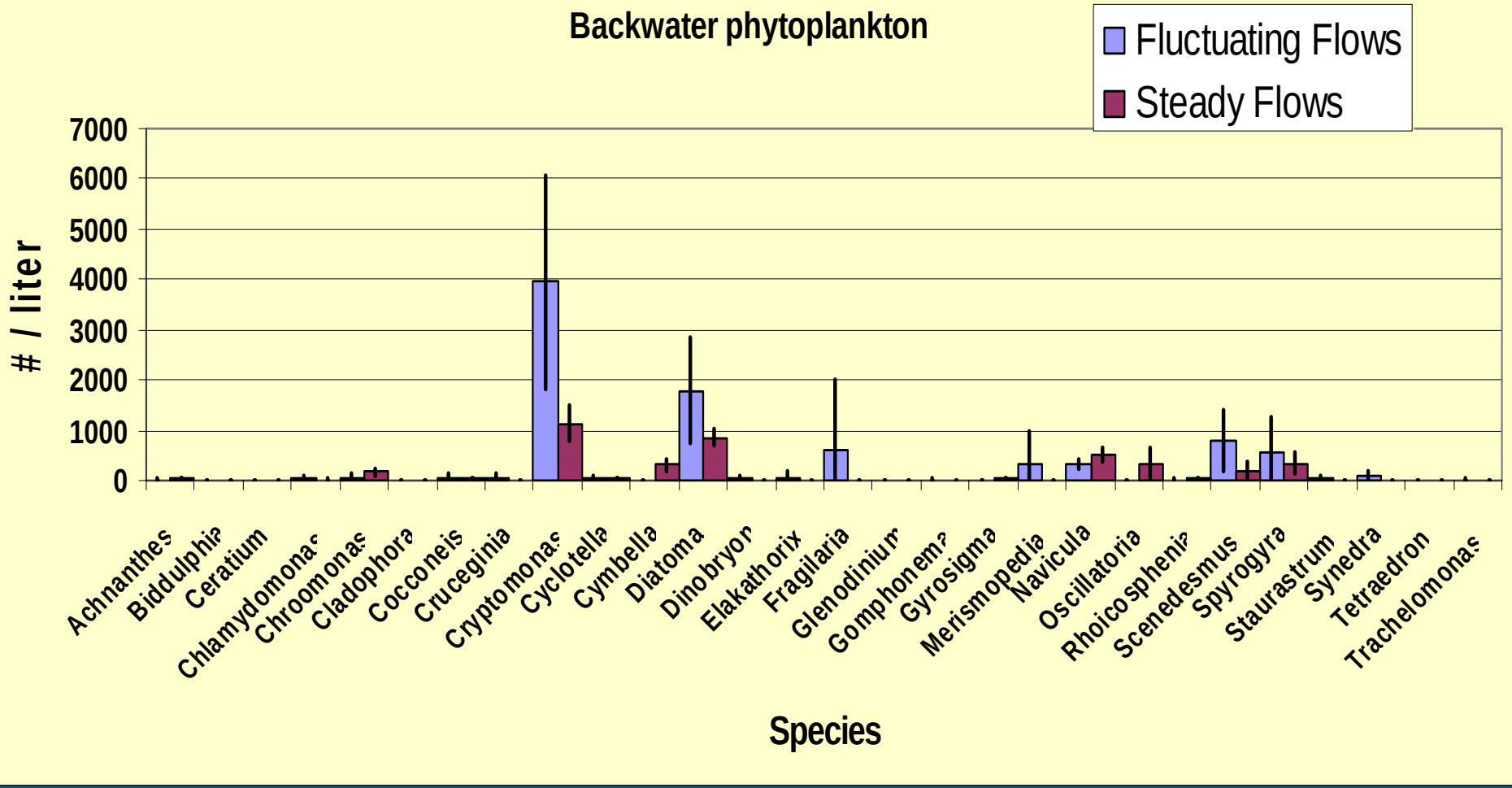
Results – Backwater Phytoplankton



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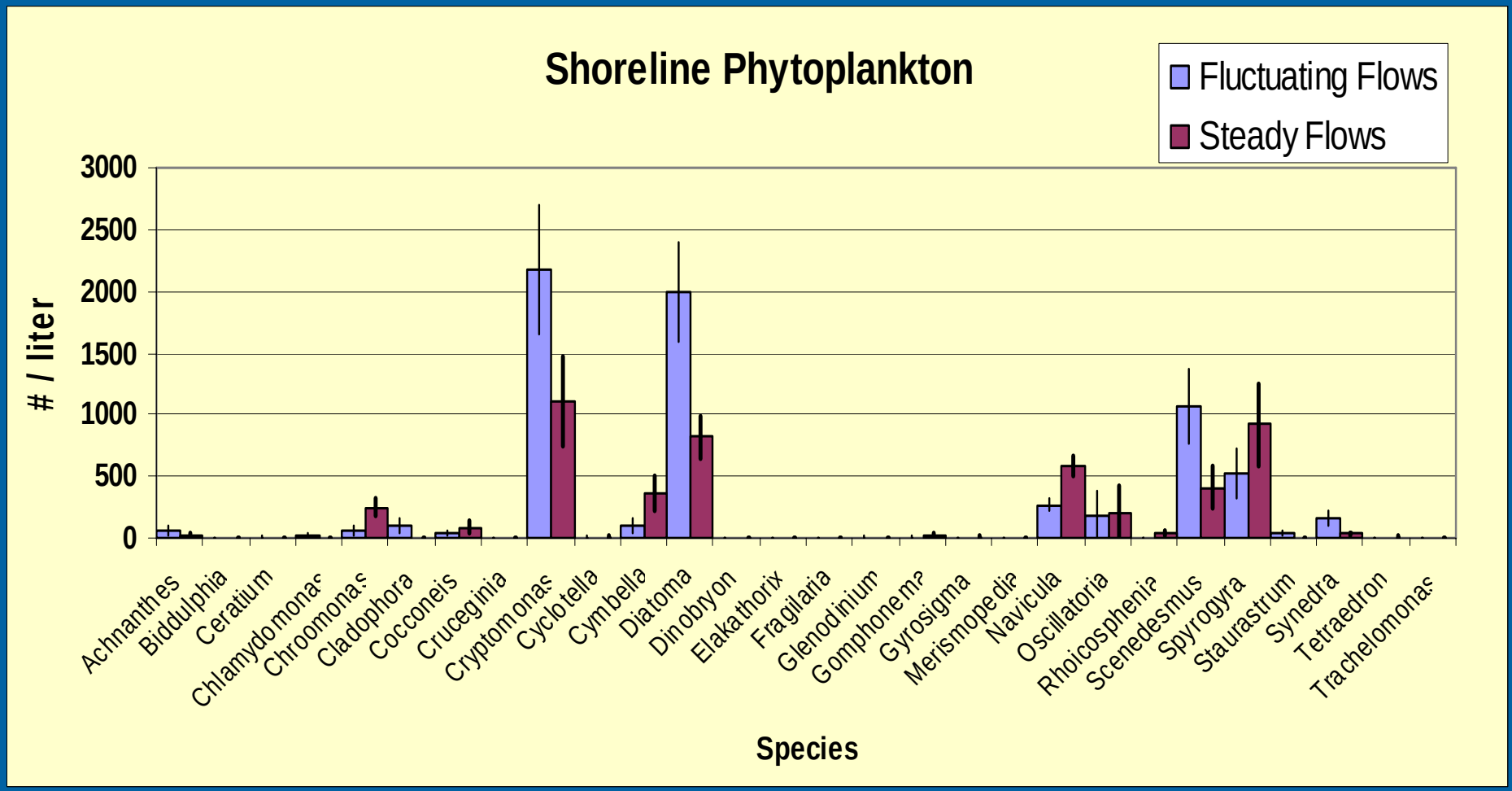
Results – Shoreline Phytoplankton



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Phytoplankton conclusions

- Plankton densities were significantly different between trips in both habitats (t-test $p<0.05$)
  - Associated with antecedent flows & tributary inputs
- Plankton densities between habitats were not significantly different during either flow

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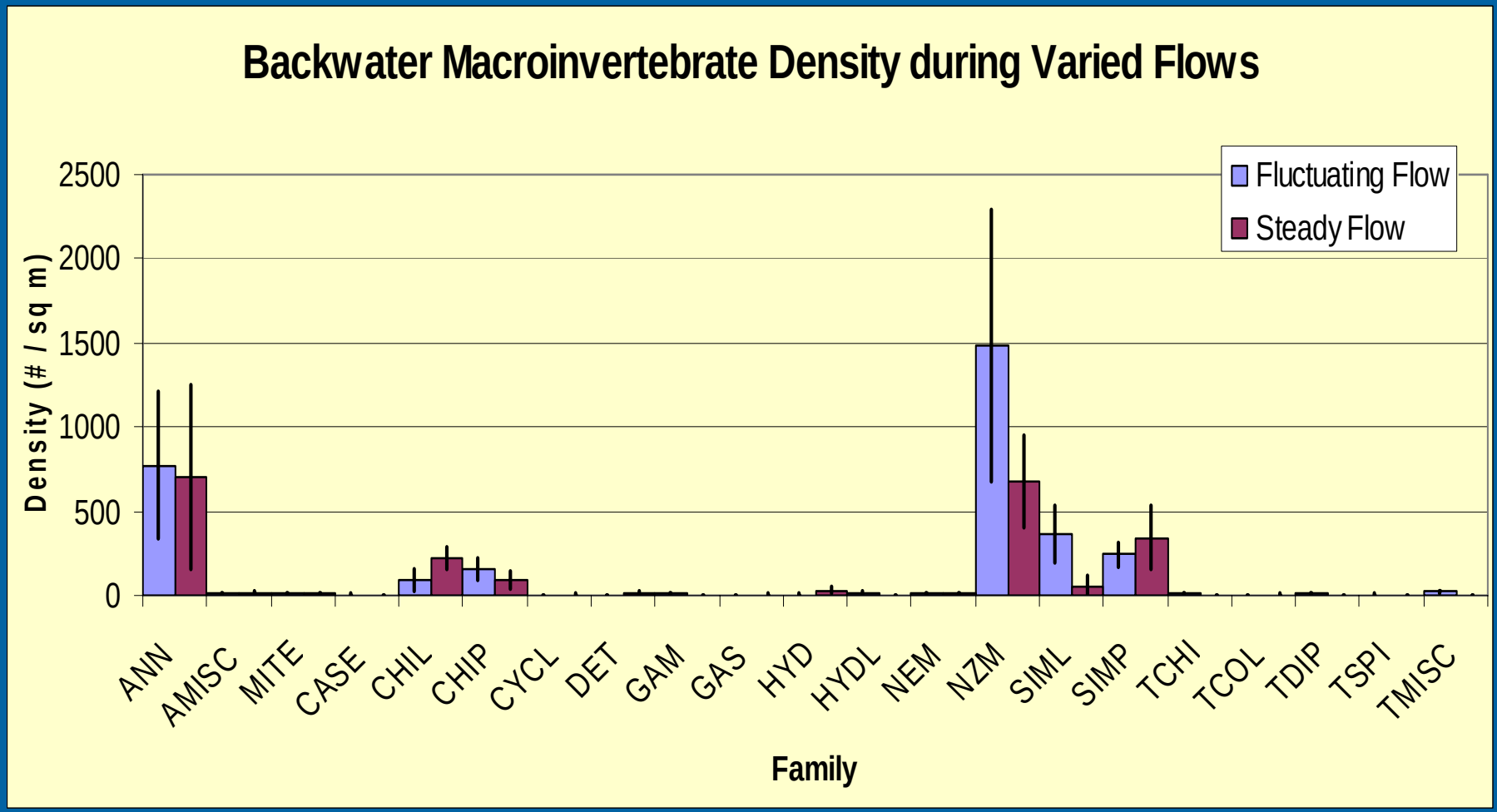
Results – Backwater Macroinvertebrates



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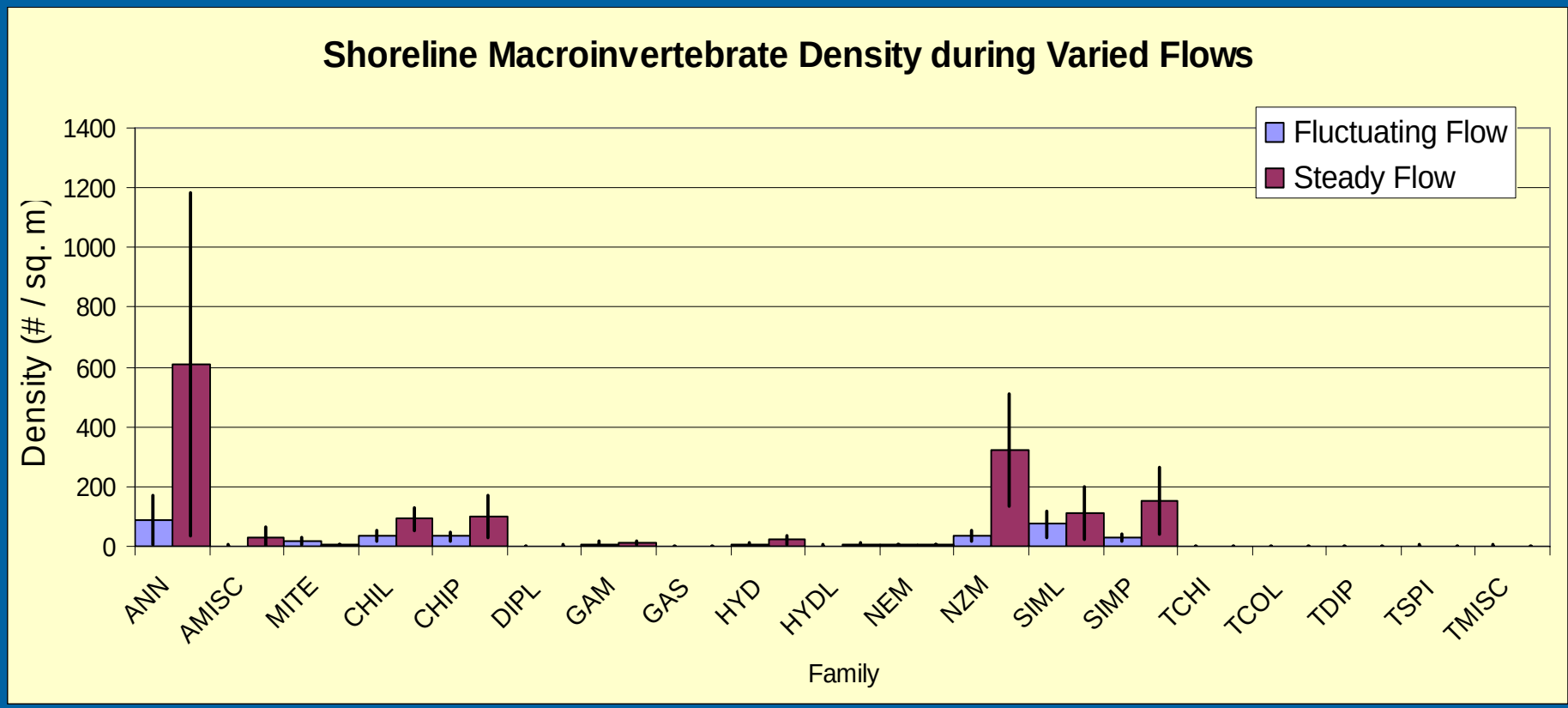
Results – Shoreline Macroinvertebrates



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Macroinvertebrate conclusions

- Total Macroinvertebrate densities were not significantly different between trips in both habitats.

- Total Macroinvertebrate densities between habitats also did not differ significantly between trips.
  - Observed changes in densities may be due to turbidity during first trip and antecedent conditions.

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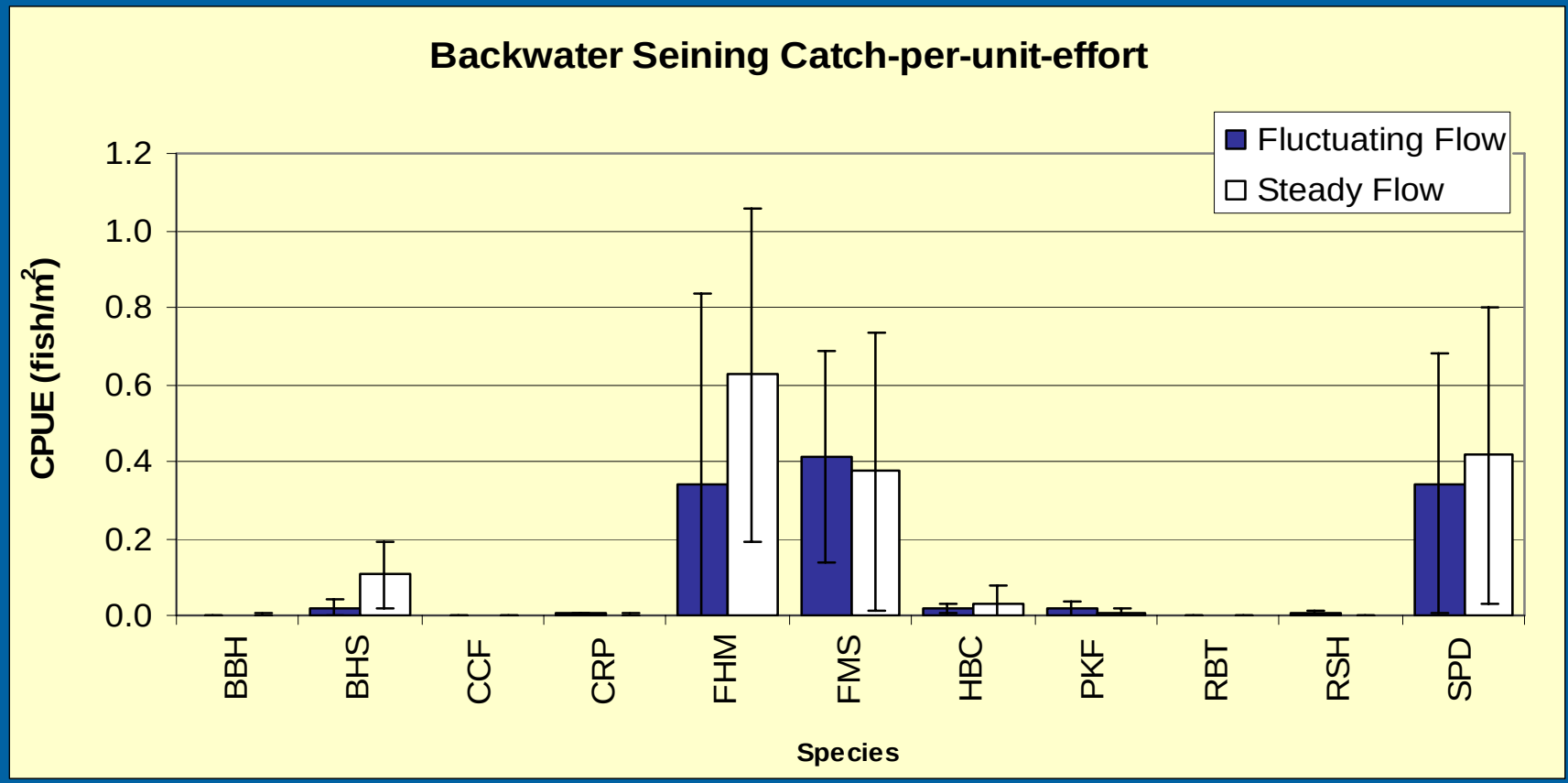
Backwater fish abundance



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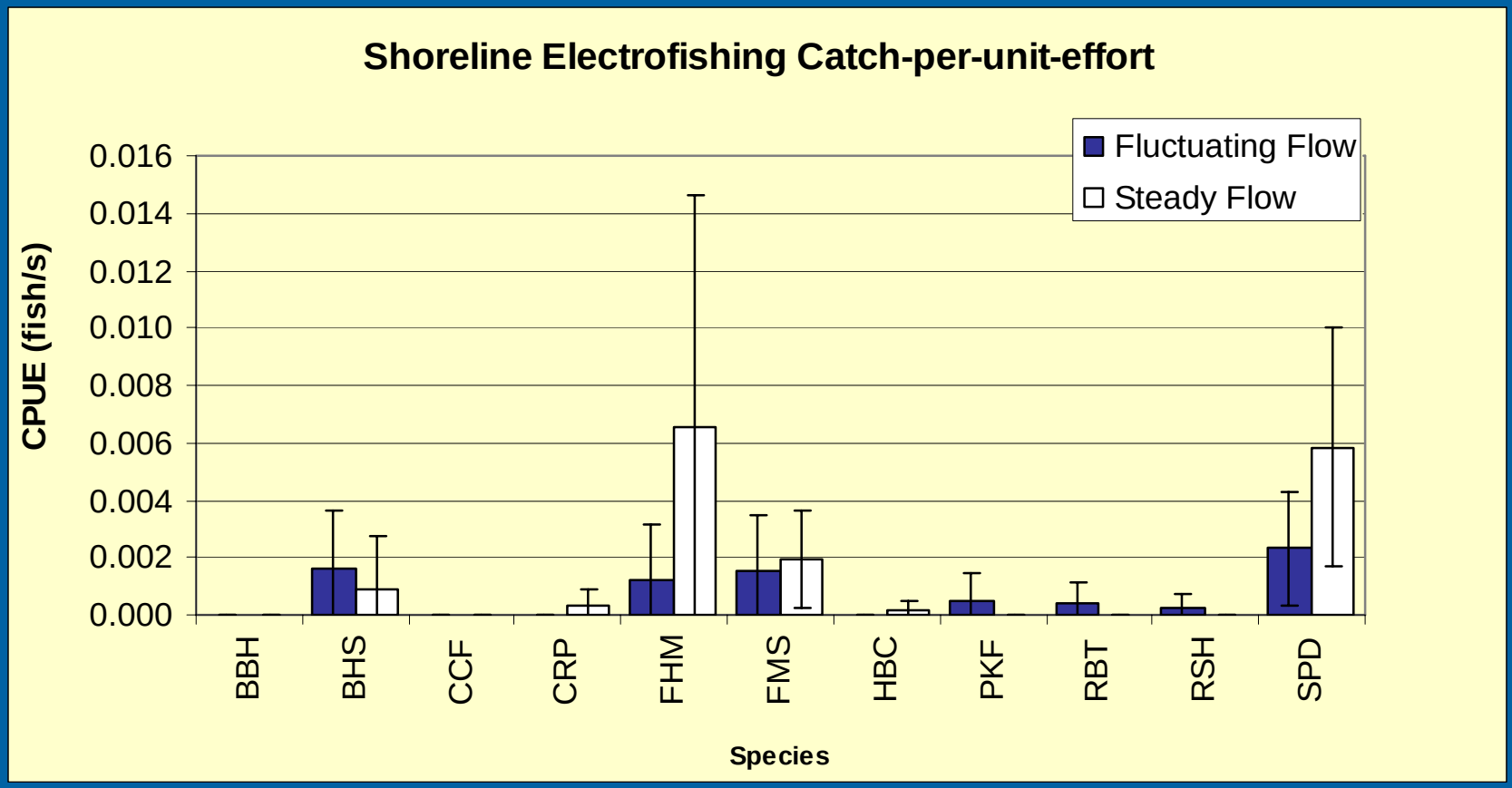
Shoreline Fish Abundance



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Fish Abundance conclusions

- Mean Catch effort for all fish did not differ between flows except for Bluehead Suckers.
  - Bluehead sucker catch effort increased during the second trip in backwaters (t-test$_{(1\text{-tailed})}$ $p<0.05$).

- Differences in catch effort may be associated with turbidity values during first trip and fish being flushed into mainstem.

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Overall Conclusions

- Biological and physical parameters measured were comparable between flows
  - Temperatures varied between habitats
  - Plankton densities varied between trips
- Limited conclusions can be made about physical and biological variables.
  - Antecedent conditions
  - Local weather
  - Time between treatments likely too short
- Recommend studying in lab situation first

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