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Organic Drift Studies during Fall 2005

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Outline

- Background
- Objectives
- Methods
- Results
- Conclusions
- Future work—using hydroacoustics to monitor organic drift

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Background

- Rainbow trout and humpback chub are drift feeders

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- Rates of *Cladophora* and midge drift positively correlated

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Background

- Rainbow trout and humpback chub are drift feeders
- Rates of Cladophora and midge drift positively correlated
- Therefore, higher amounts of organic drift should = more food

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Background

Type	Typical Concentration (mg/l)	What is it?	Where does it come from?	Who eats it?
Coarse Organic Matter >1 mm	~0.04	Mostly algae, some aq. veg., a few inverts	Glen Canyon Reach	Fish
Fine Organic Matter >0.001 mm	~0.4	Plankton, tiny bits of detritus, etc.	Lake Powell	Filter feeding inverts, juv. fishes
Dissolved Organic Matter <.001 mm	~4	Carbs, fatty acids, humic acids, etc.	Lake Powell	Bacteria

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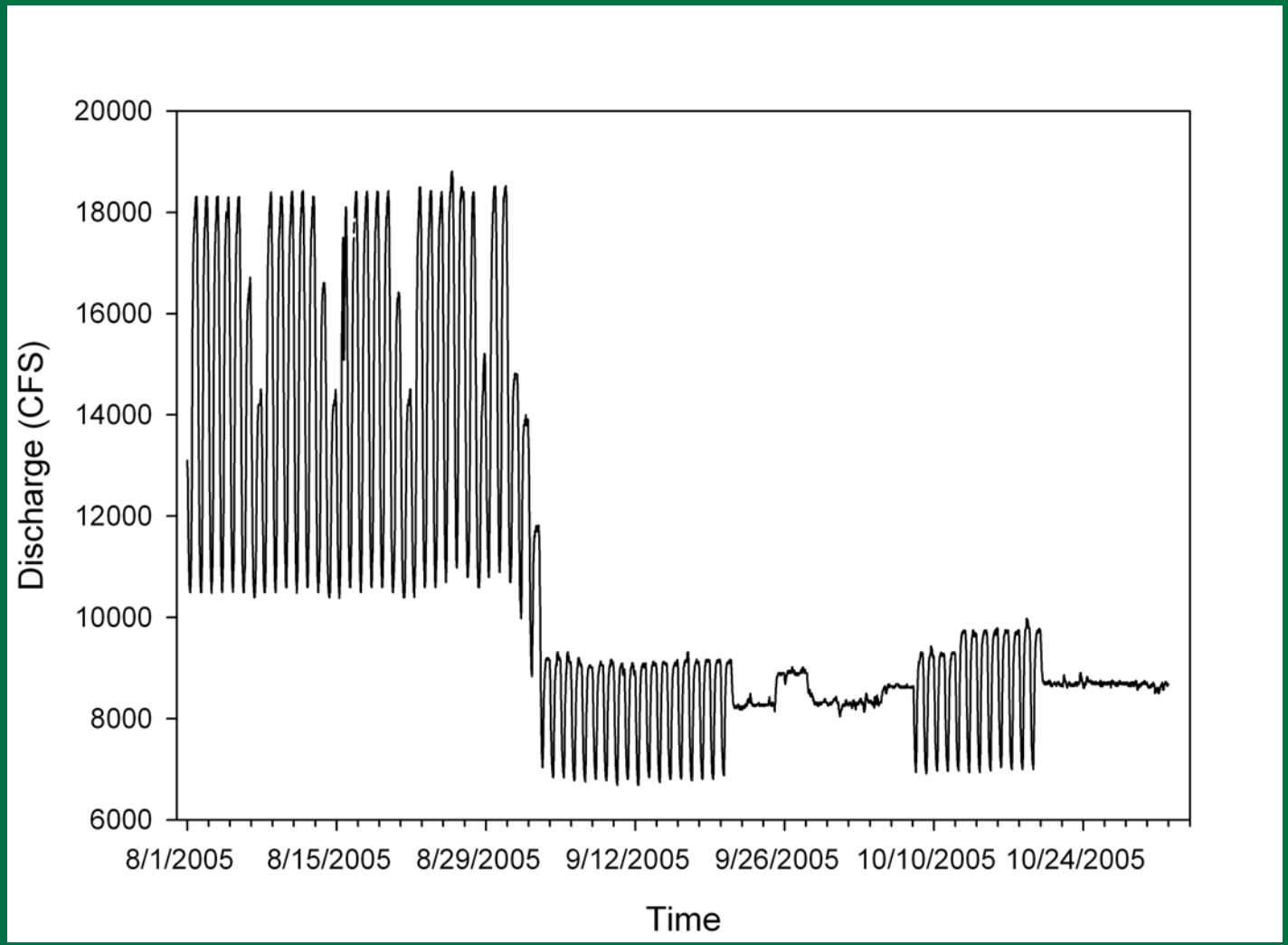
Hydrograph



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Objectives

- Determine whether organic drift differs during low fluctuations relative to steady flows
  - Previous research indicates:
    - Drift is low during steady flows and higher during fluctuating flows (Leibfried and Blinn 1987)
    - Seasonality of drift is unclear (McKinney et al 1999, Leibfried and Blinn 1987, Shannon et al 1996)
- Test feasibility of using acoustics to monitor organic drift

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Methods

- Data collection
  - Two different plankton nets used—0.063mm mesh & 1mm mesh
  - Nets equipped with flow meter at their mouth Vertically and width integrated sample collection
- Processing
  - Subset of samples sorted (algae, aquatic veg., invertebrates, plankton), weighed, burned
  - Other samples just weighed and burned

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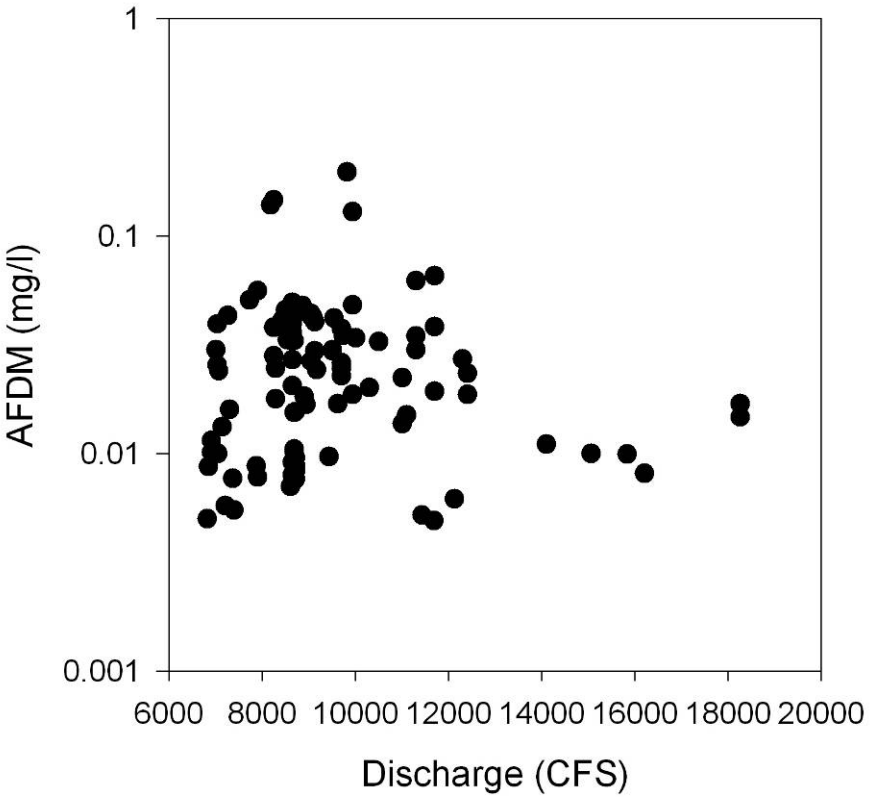
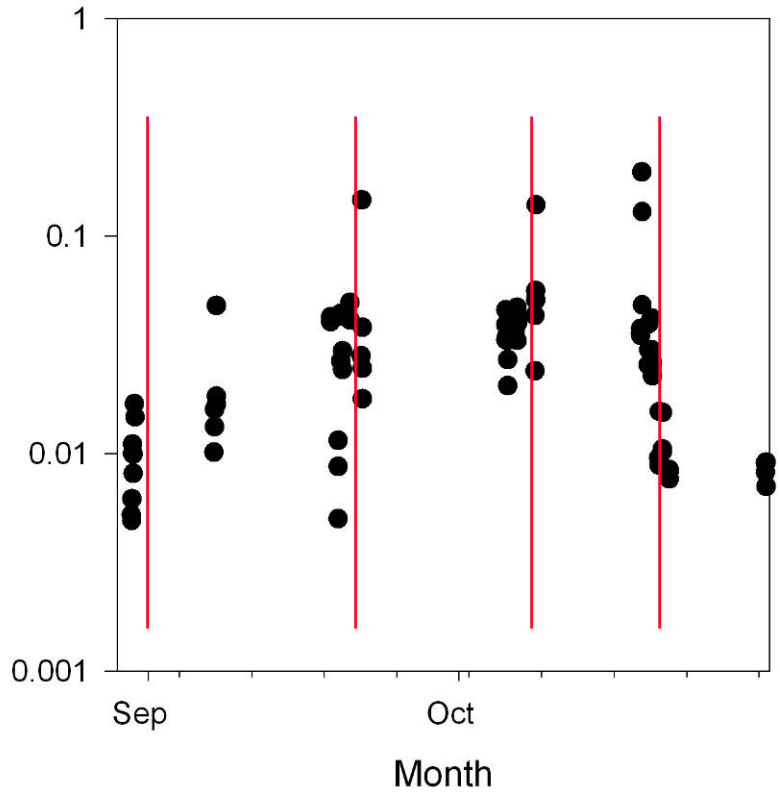
Is There a Relationship Between Discharge and Concentration?





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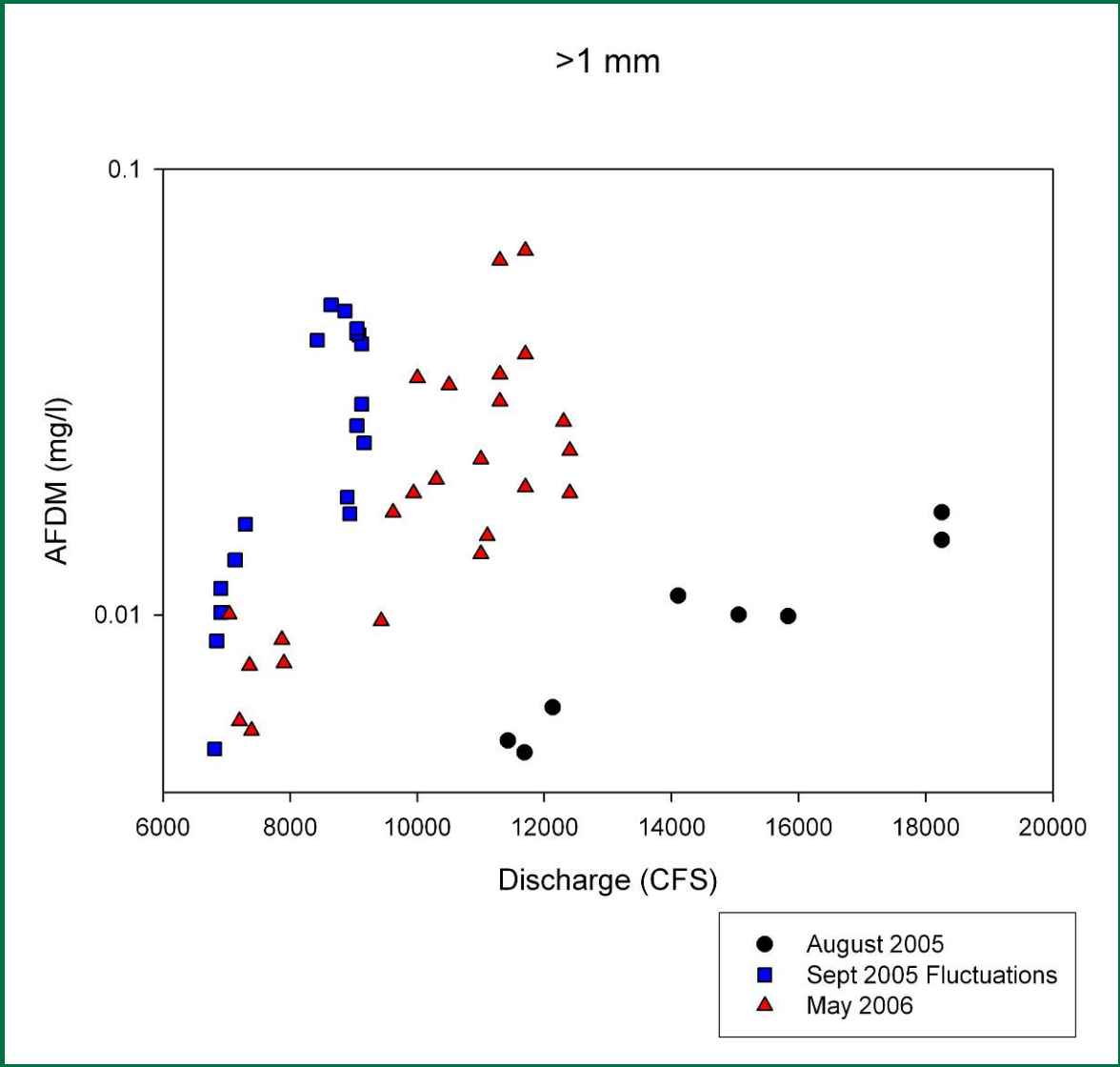
Antecedent Conditions and Discharge Affect Organic Concentrations



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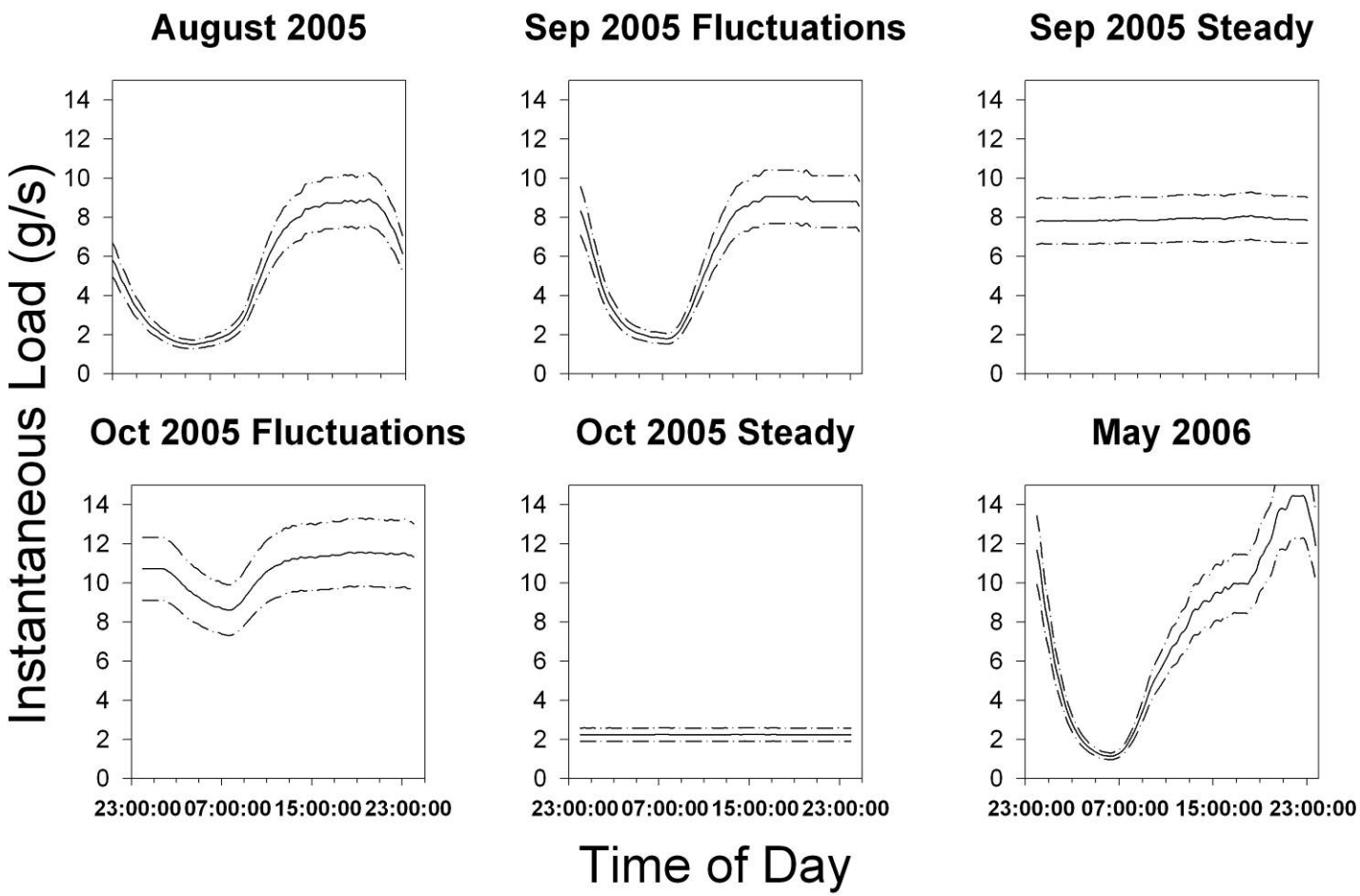
Is it Just More *Concentrated?*



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Results

Time	Avg Conc. (mg/l)
August 2005*	0.0099
Sept 2005 Fluctuate*	0.027
Sept 2005 Steady	0.033
Oct 2005 Fluctuate	0.044
Oct 2005 Steady	0.0092
May 2006*	0.026

*= Load calculated based on rating curve

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Results

Time	Avg Conc. (mg/l)	Discharge Range (cfs)
August 2005*	0.0099	11,000-18,500
Sept 2005 Fluctuate*	0.027	6,750-9,050
Sept 2005 Steady	0.033	8,210-8,500
Oct 2005 Fluctuate	0.044	6,950-9,310
Oct 2005 Steady	0.0092	8,640-8,720
May 2006*	0.026	6,900-12,100

*= Load calculated based on rating curve

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Results

Time	Avg Conc. (mg/l)	Discharge Range (cfs)	Daily Volume (liters)
August 2005*	0.0099	11,000-18,500	3.60B
Sept 2005 Fluctuate*	0.027	6,750-9,050	1.95B
Sept 2005 Steady	0.033	8,210-8,500	1.95B
Oct 2005 Fluctuate	0.044	6,950-9,310	2.00B
Oct 2005 Steady	0.0092	8,640-8,720	2.04B
May 2006*	0.026	6,900-12,100	2.39B

*= Load calculated based on rating curve

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Results

Time	Avg Conc. (mg/l)	Discharge Range (cfs)	Daily Volume (liters)	Daily Load (kg) +/- 15% error
August 2005*	0.0099	11,000-18,500	3.60B	455 387-523
Sept 2005 Fluctuate*	0.027	6,750-9,050	1.95B	535 454-616
Sept 2005 Steady	0.033	8,210-8,500	1.95B	683 580-785
Oct 2005 Fluctuate	0.044	6,950-9,310	2.00B	916 778-1053
Oct 2005 Steady	0.0092	8,640-8,720	2.04B	195 166-224
May 2006*	0.026	6,900-12,100	2.39B	641 545-737

*= Load calculated based on rating curve

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Conclusions

- **Antecedent Conditions have a Larger Effect on Drift Concentration than Fluctuations**
- **What determines antecedent conditions?**
  - **Seasonality of algae growth?**
  - **Lower flows led to desiccation and entrainment of *Cladophora* growing between 7-9k stage elevation**
  - **Lower fluctuations allowed for higher rates of algae growth?**

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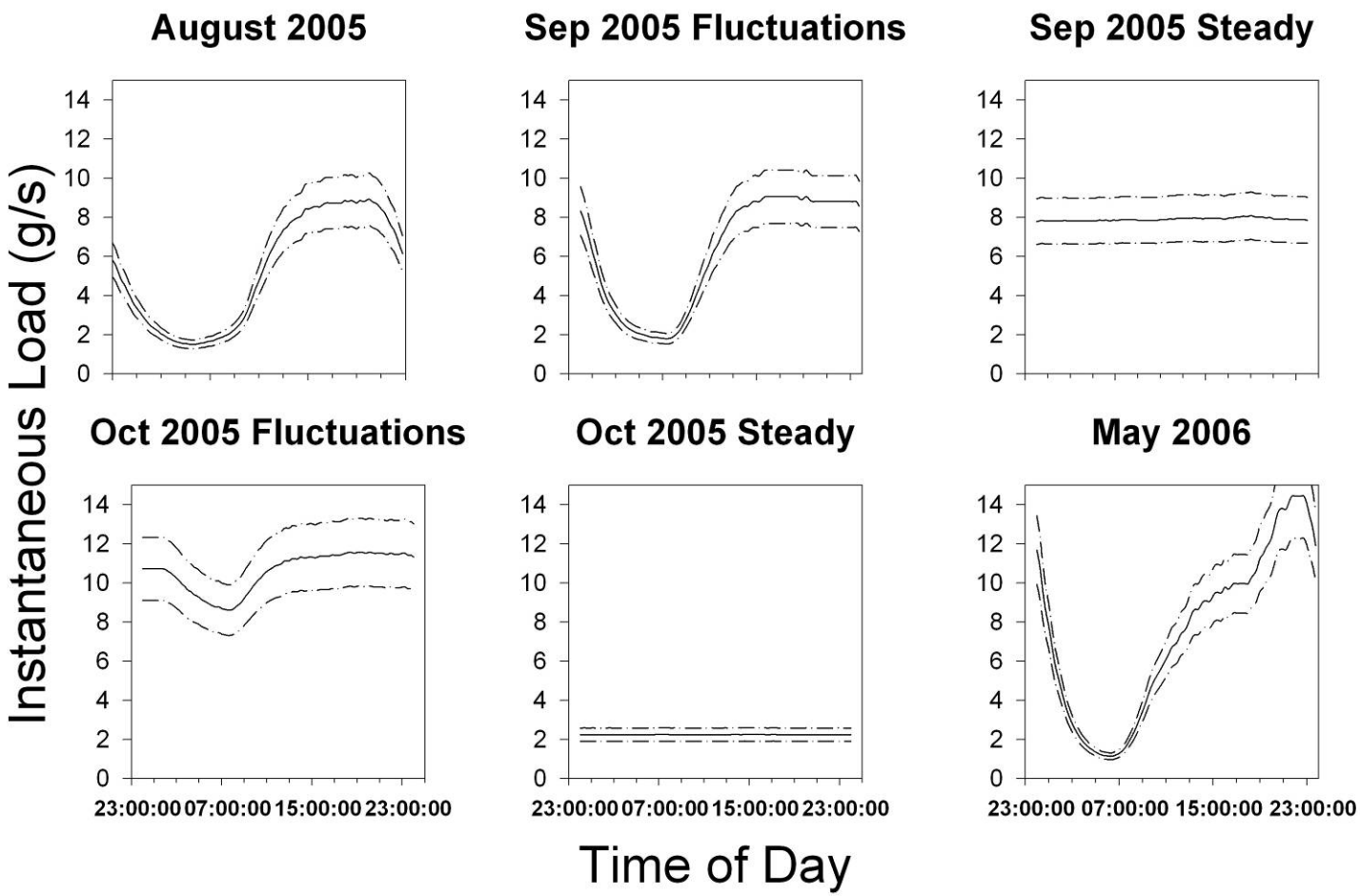
What makes for good fishing?



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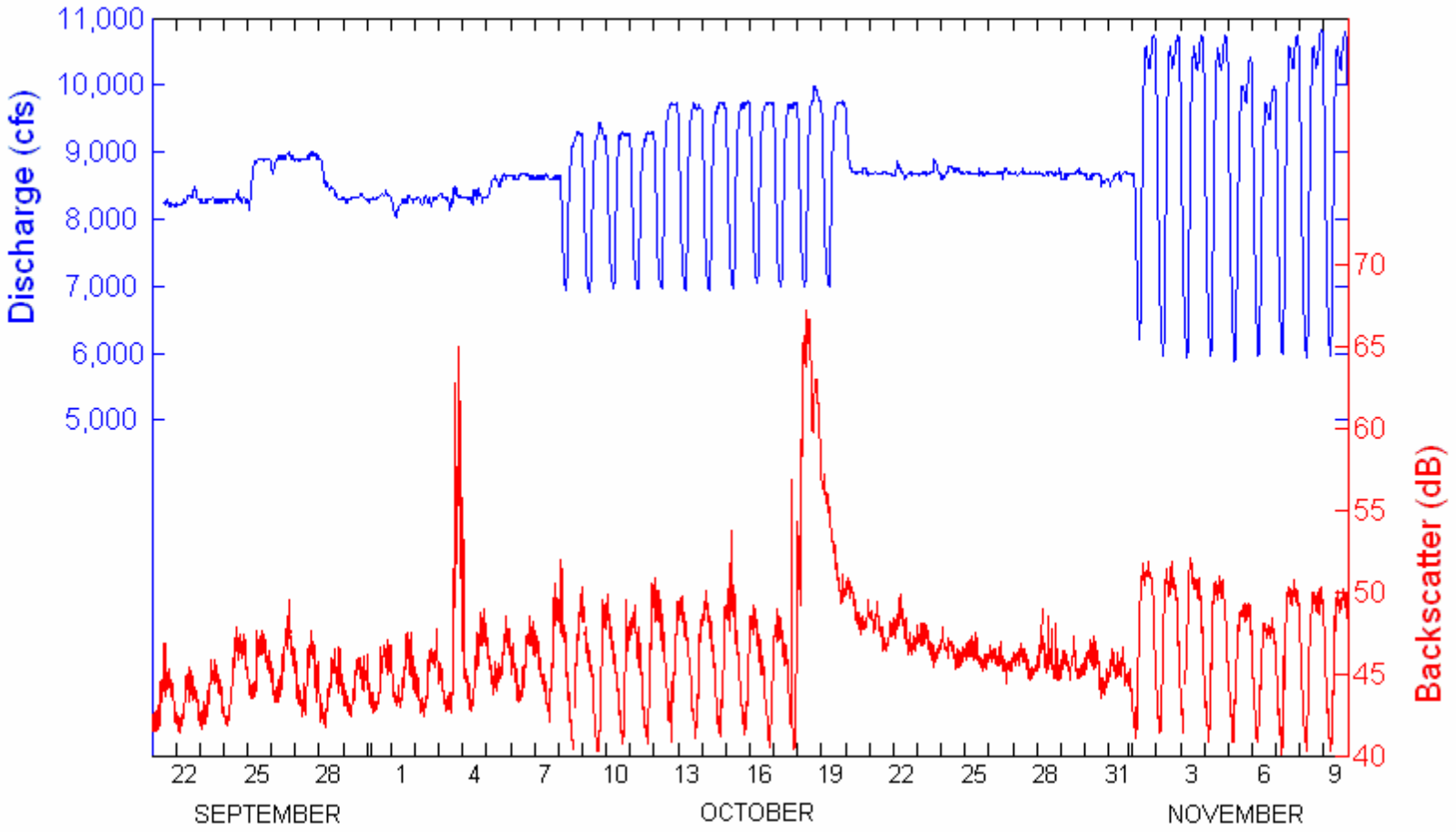
Using Acoustics to Monitor Drift



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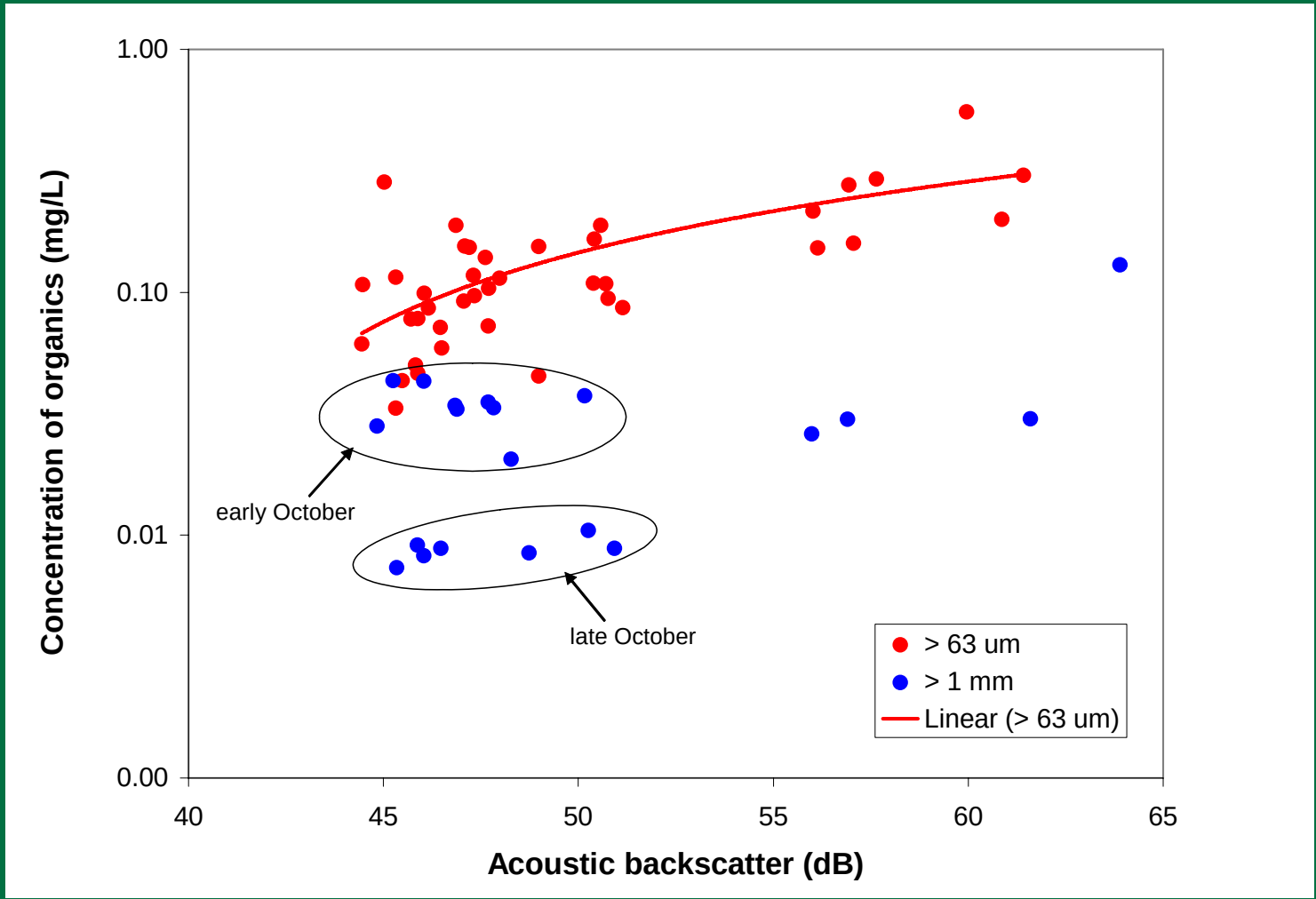
Backscatter is a Predictor of Fine Organics



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