



Influence of Bedload on Macroinvertebrate Community Composition

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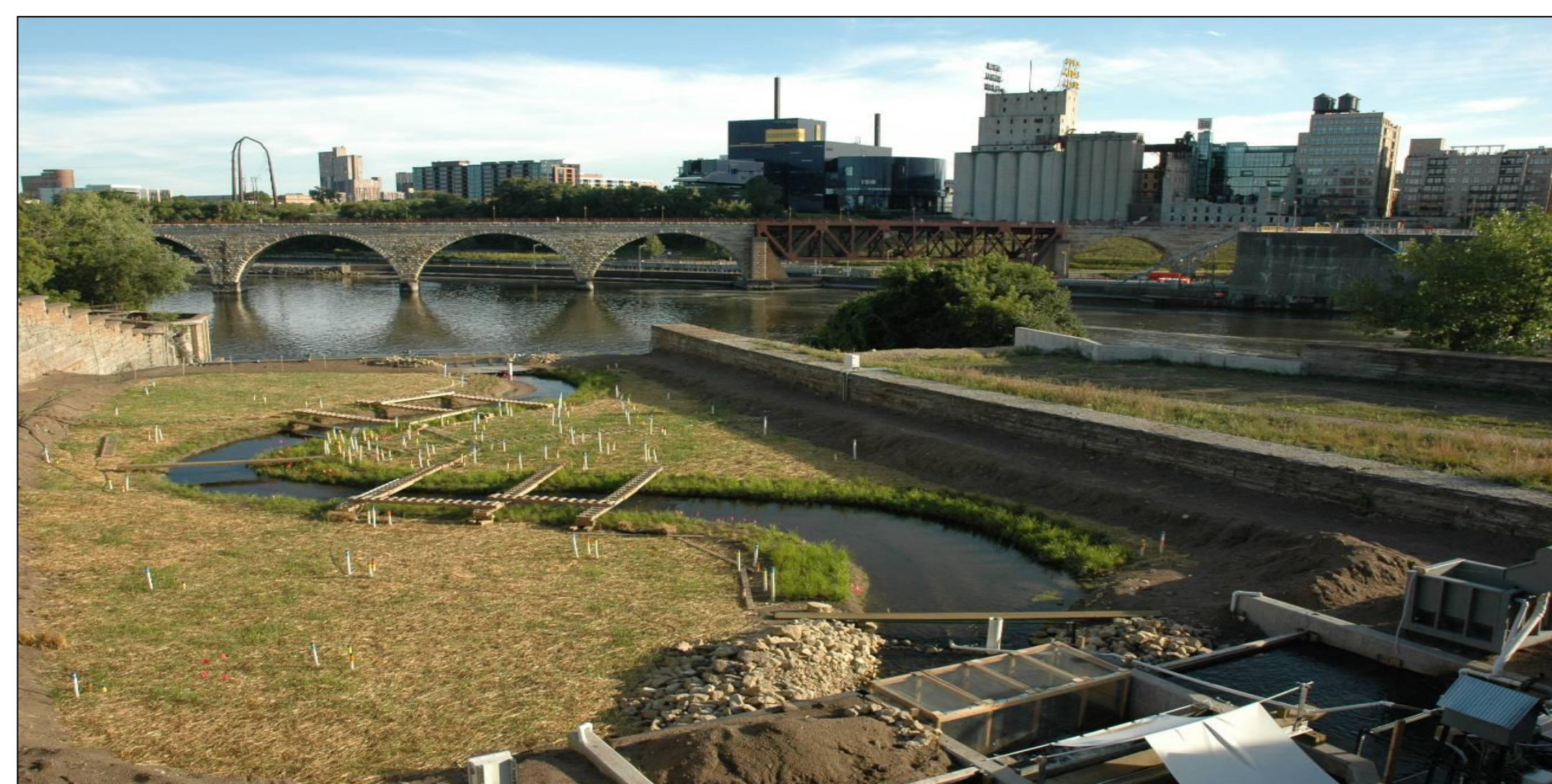
Introduction Hypothesis

Substrate and its movement across the streambed, or “bedload”, can affect patterns of benthic macroinvertebrate distribution and abundance (Runde & Hellenthal, 2000, Schofiel et al. 2004). I investigated the influence of bedload and stream discharge on macroinvertebrate abundance and richness in a controlled, artificial stream. Special attention was given to functional feeding guilds, or groups of macroinvertebrates that feed in the same manner and on similar food (Merritt et al. 2008). I focused on filter feeders, which feed on suspended organic particles, and collector-gatherers, which feed on organic matter in benthic deposits.

Hypothesis

As bedload increases, filter feeder abundance will decrease due to streambed abrasion, whereas collector-gatherers will increase due to decreased competition from filter feeders.

Materials and Methods

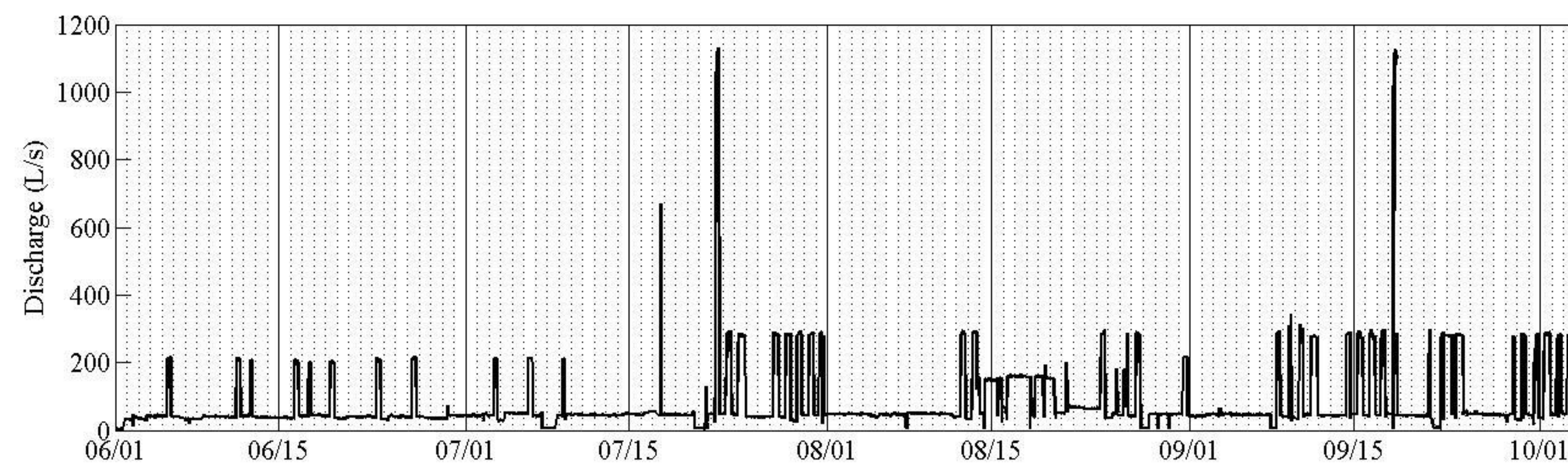


Fieldwork was conducted in summer 2009 at the Outdoor Stream Lab, at the St. Anthony Falls Laboratory (SAFL) in Minneapolis, MN. Macro-invertebrates were sampled bi-weekly using a mini-Surber sampler (100 cm²) on five dates.

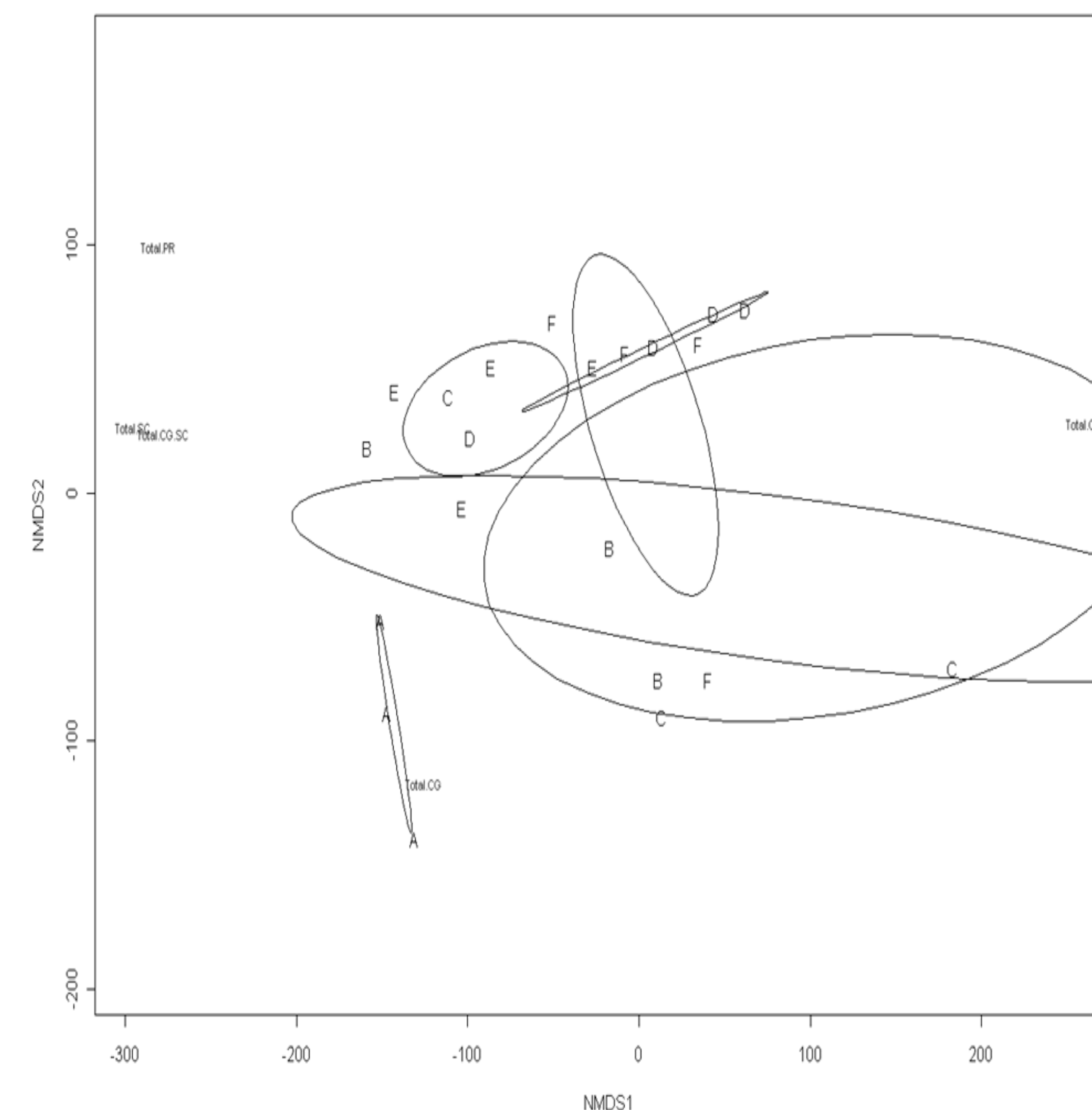


In the lab specimens were sorted and identified to the lowest taxonomic level feasible.

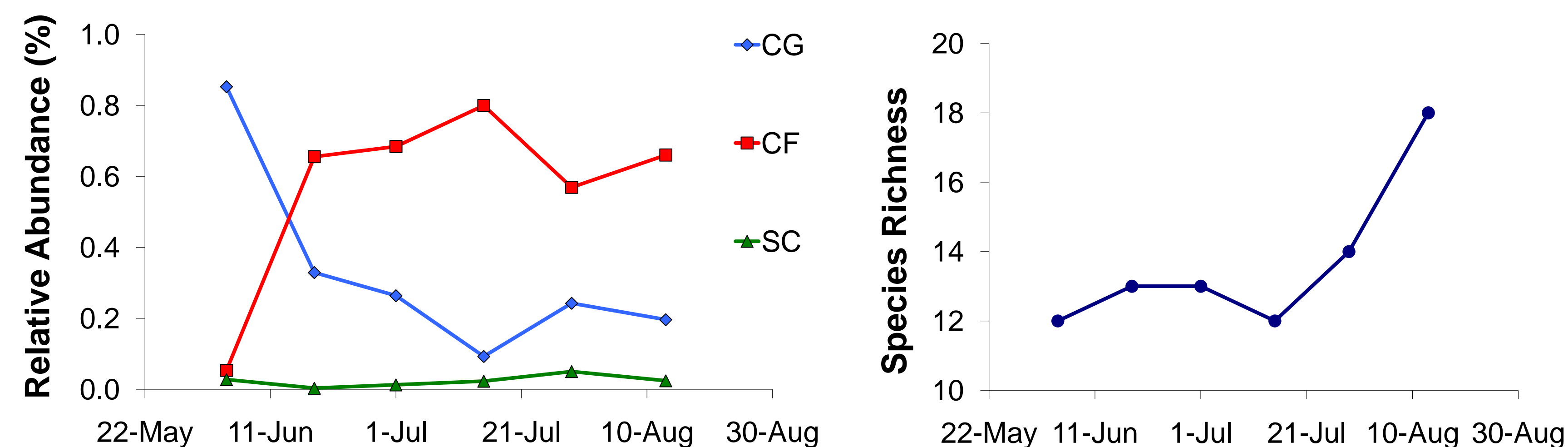
Results



The discharge was minimal prior to June 5th, after which SAFL manually controlled discharge while maintaining a strong relationship between discharge and bedload.



The composition of the macroinvertebrate community in the first sampling period (A), was significantly different from any of the other periods.



LEFT: Between June and August, abundance of filter feeders (CF) increased relative to collector-gatherers (CG), primarily due to the increase of *Simulium* blackfly larvae relative to *Gammarus* amphipods. Scrapers (SC) and other feeding groups made up very small percentage of the assemblage.

RIGHT: Overall species richness increased over the study period.

Conclusions

- ✓ Collector-gatherers and filter feeders did not increase and decrease as hypothesized.
- ✓ Initially high *Gammarus* and low *Simulium* abundances were correlated with low discharge and bedload at the beginning of the study .
- ✓ After the first sample period, discharge and bedload increased, reversing the relative abundances of *Gammarus* and *Simulium*.

Discussion

The macroinvertebrate community was initially dominated by *Gammarus* and Chironomidae; these two organisms spend much of their time within stream sediments. Once a measurable flow was added to the stream and sediments were transported via bedload, *Gammarus* and Chironomidae were likely scoured from many areas of the stream (Schofield et al. 2004).

Aside from scouring, increased flow brings more food into the system. The increase in filter feeders, especially *Simulium*, seen after the first sampling period may be explained by this increased food availability. Recolonization of the stream also seems to have taken place, as both species richness and Shannon diversity increased during the course of the study.

Literature cited

- Merritt R., K. Cummins and M. Berg. (2008). *An Introduction to the Aquatic Insects of North America*. 4th edition. Kendall/Hunt Publishing Co.
- Runde, J. and R. Hellenthal. (2000). Behavioral responses of *Hydropsyche sparna* (Trichoptera: Hydropsychidae) and related species to deposited bedload sediment. *Environmental Entomology* 29: 704-709.
- Schofield, K., C. Pringle and J. Meyer. (2004) Effects of increased bedload on algal- and detrital-based stream food webs: Experimental manipulation of sediment and macroconsumers. *Limnology and Oceanography* 49: 900-909.

Acknowledgments

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