

Investigating the effects of storm and wastewater treatment inputs on the biouptake and transfer of heavy metals in urban stream food webs

Basic Information

Title:	Investigating the effects of storm and wastewater treatment inputs on the biouptake and transfer of heavy metals in urban stream food webs
Project Number:	2014CT285B
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Descriptors:	None
Principal Investigators:	Bin Zhu, Timothy Vadas

Publications

There are no publications.

CTIWR Project Progress Report

Investigating the effects of storm and wastewater treatment inputs on the biouptake and transfer of heavy metals in urban stream food webs

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Project objectives

In this project, our objectives are: 1) to study the biouptake and transfer of Cu and Zn in macroinvertebrates in urban streams exposed to two different conditions: one with impacts from increased water column concentrations during stormflow and the other with wastewater effluent release of metals; and 2) to investigate how Cu and Zn are transferred in the food webs, i.e. from stormflow and wastewater effluent impacted streamwater to periphyton (algae) and to benthic invertebrate grazers (e.g., mayflies) by setting up laboratory experiments.

Implementations

To achieve our first goal, we studied 20 selected streams in CT. These stream reaches were selected based on wadeable streams that are impacted directly by municipal wastewater effluent discharges or were listed as an impaired water body by CT DEEP. Below we will report some data. Other data such as heavy metal concentration in water, periphyton, and macroinvertebrates are still to be measured at Dr. Vadas' lab.

For our second goal, we will set up a factorial experiment in the summer and fall 2015 to investigate the transfer of heavy metals across the stream food web.

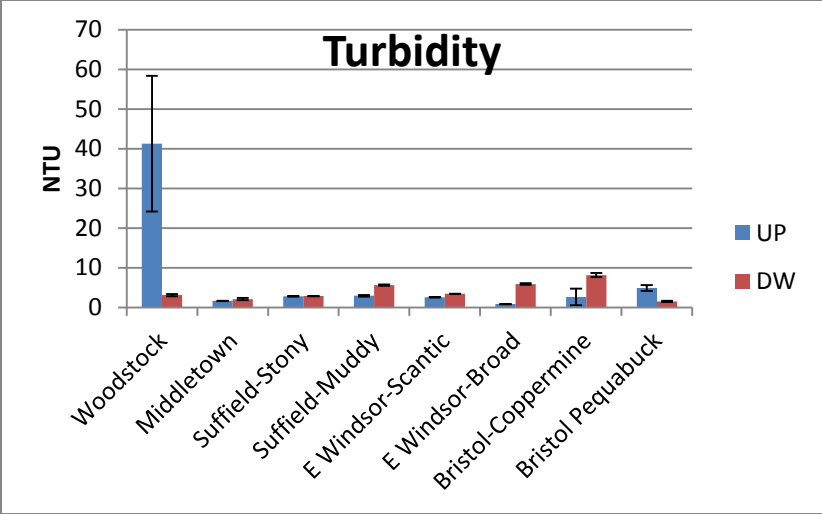
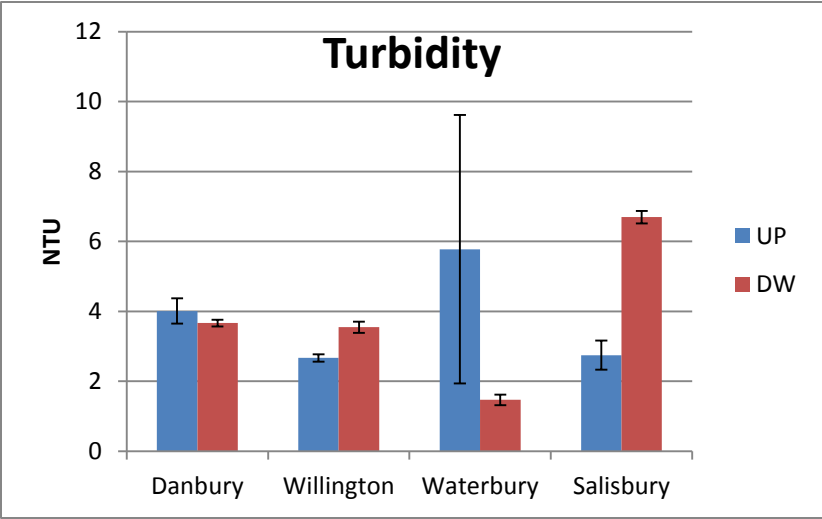
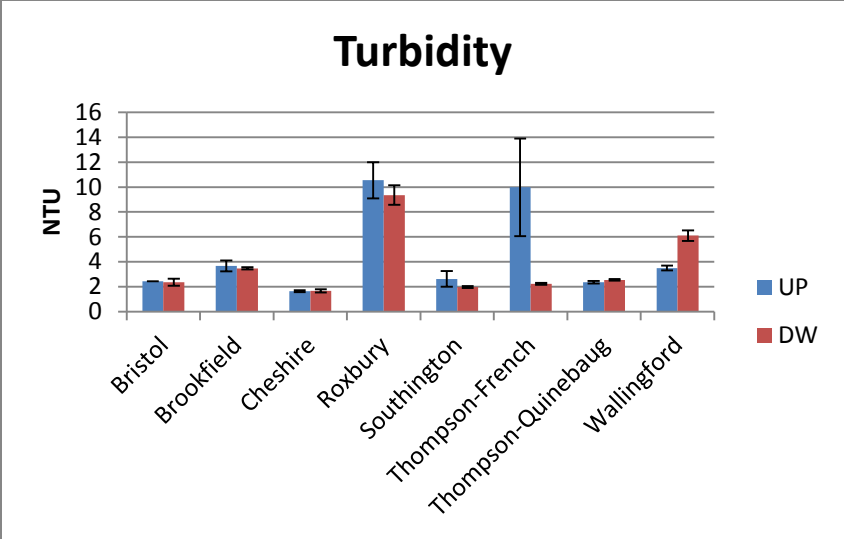
Preliminary results

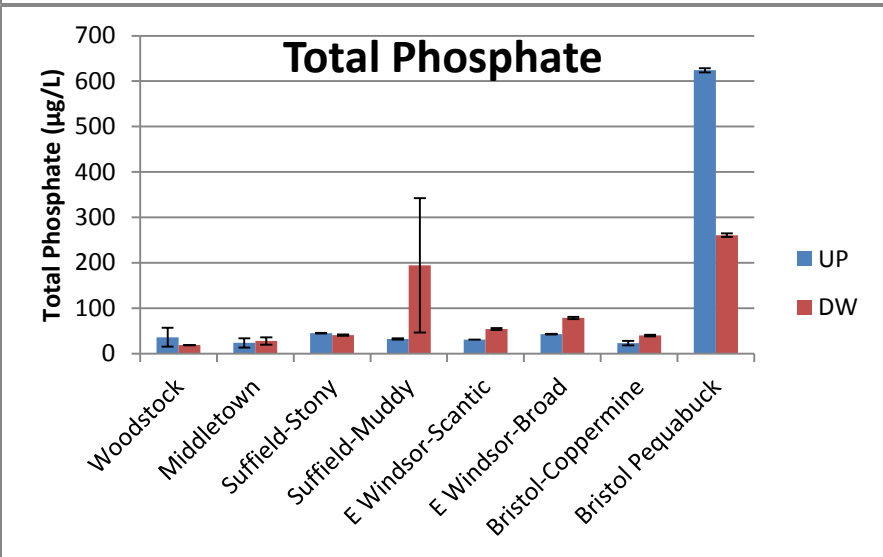
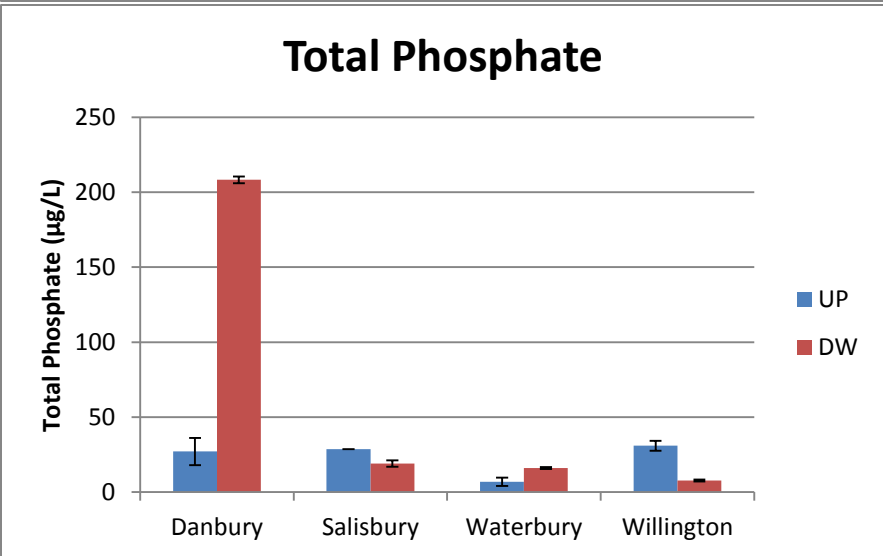
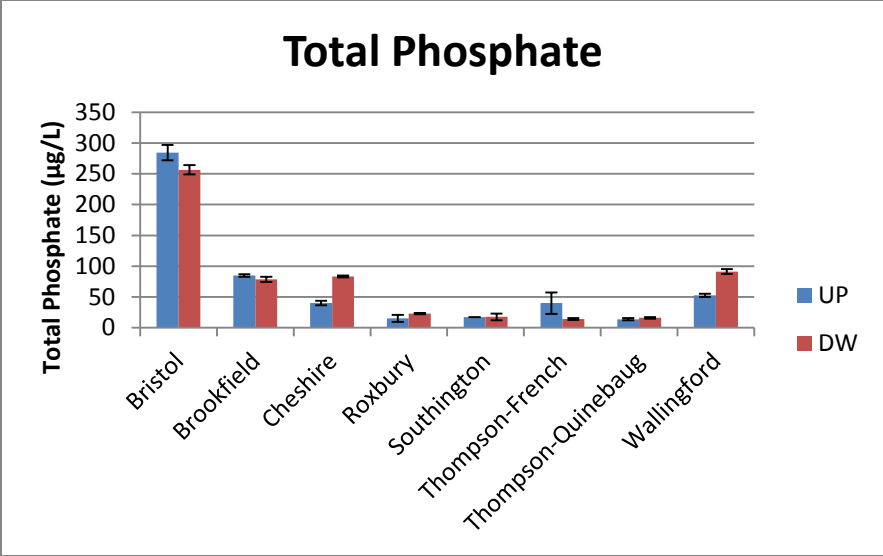
We divided the 20 streams into three groups:

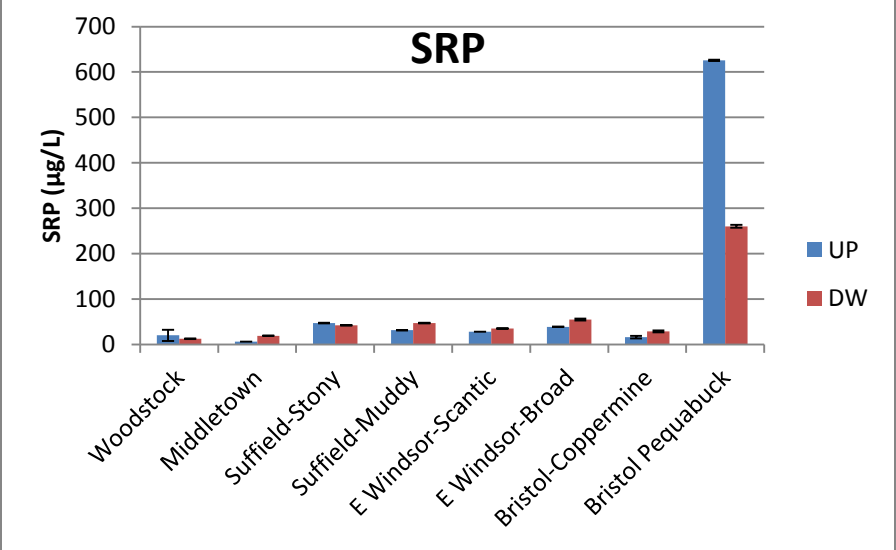
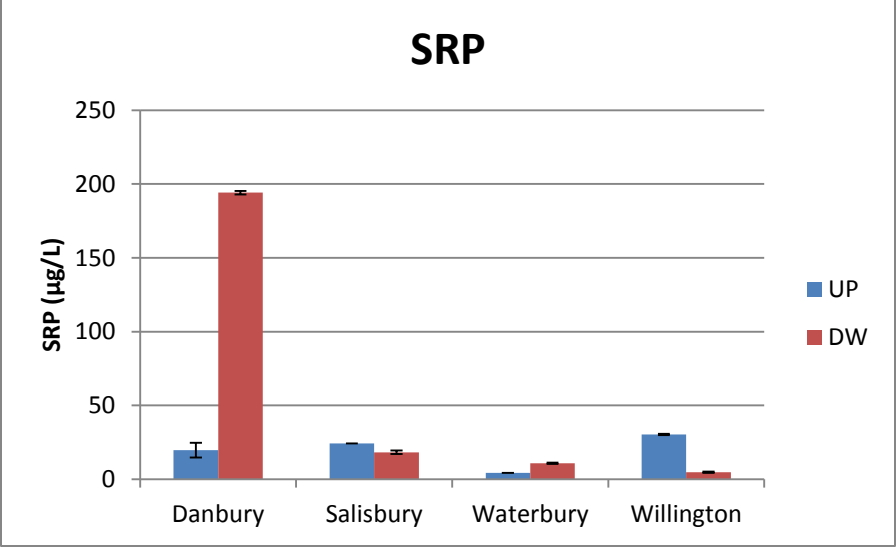
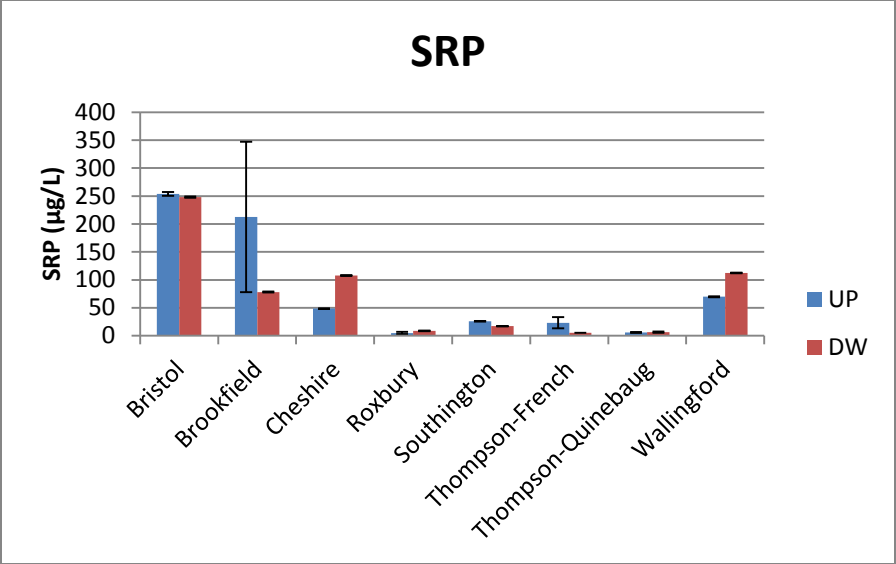
1. Wastewater sites (8 sites from DEEP algal sampling sites)
2. Sites with approved TDML (only four sites can be located and made a mistake in identifying one stream; so there are only three sites).
3. Sites with unidentified problems (8 sites selected from the page you sent to me)

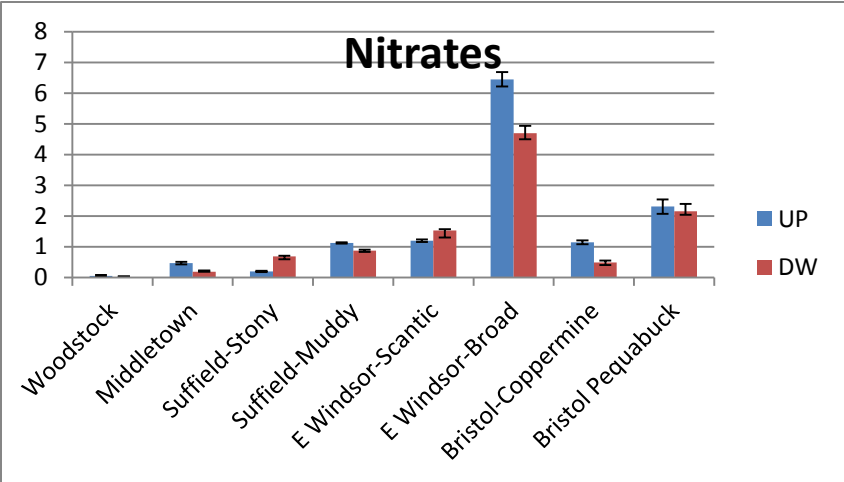
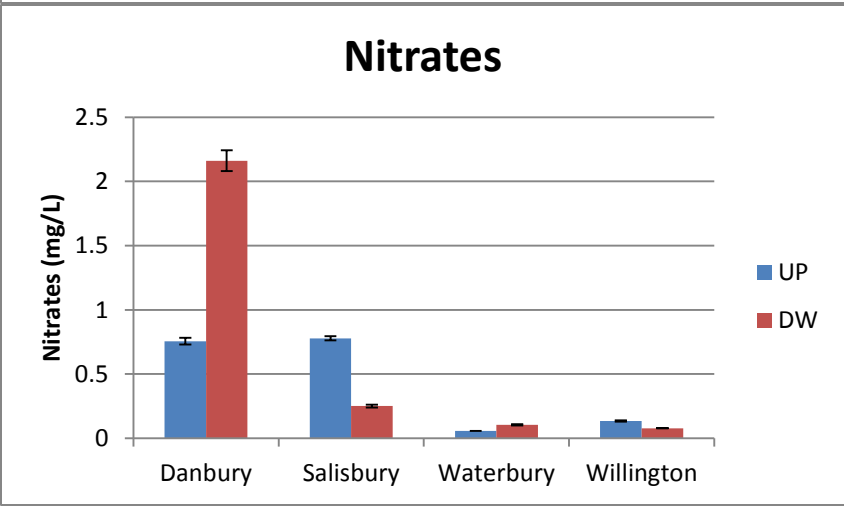
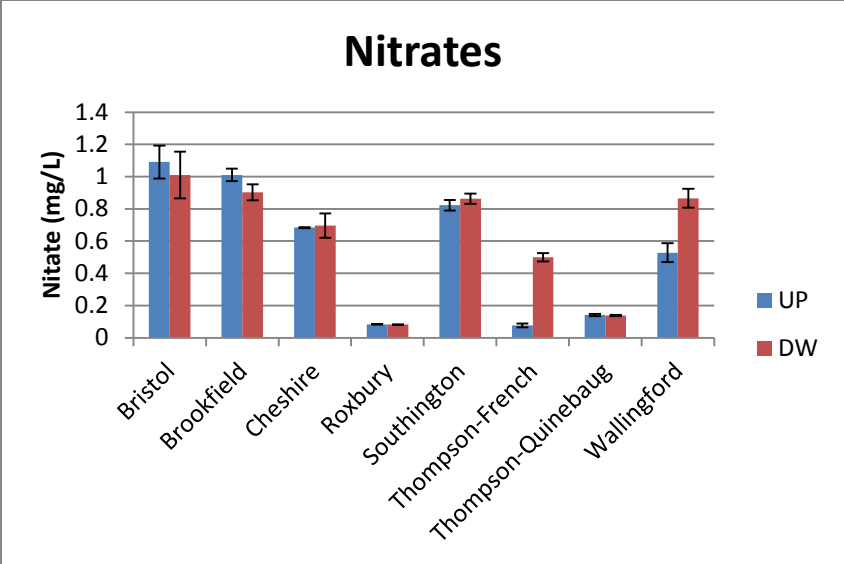
I. Turbidity and nutrients in water

We measured turbidity and nutrients (total phosphate, soluble reactive phosphate [SRP], and nitrate) in upstream and downstream of these streams (labelled as UP and DW in the figures). There were no general trends.





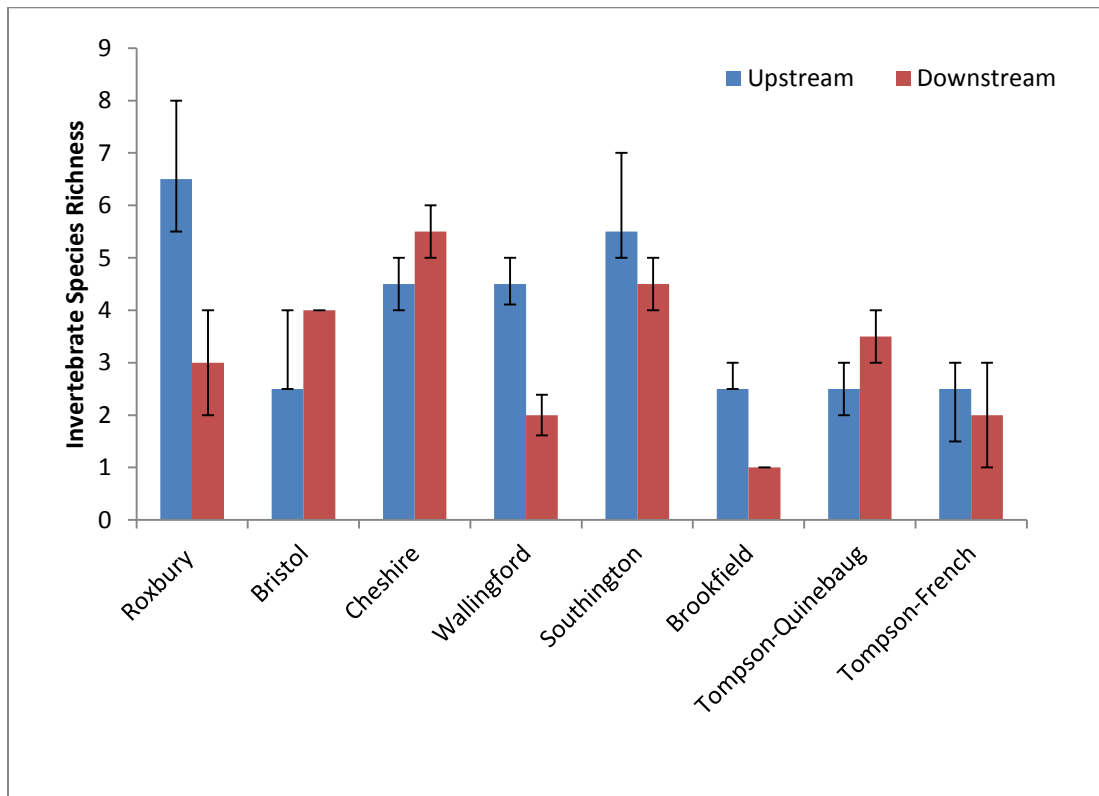


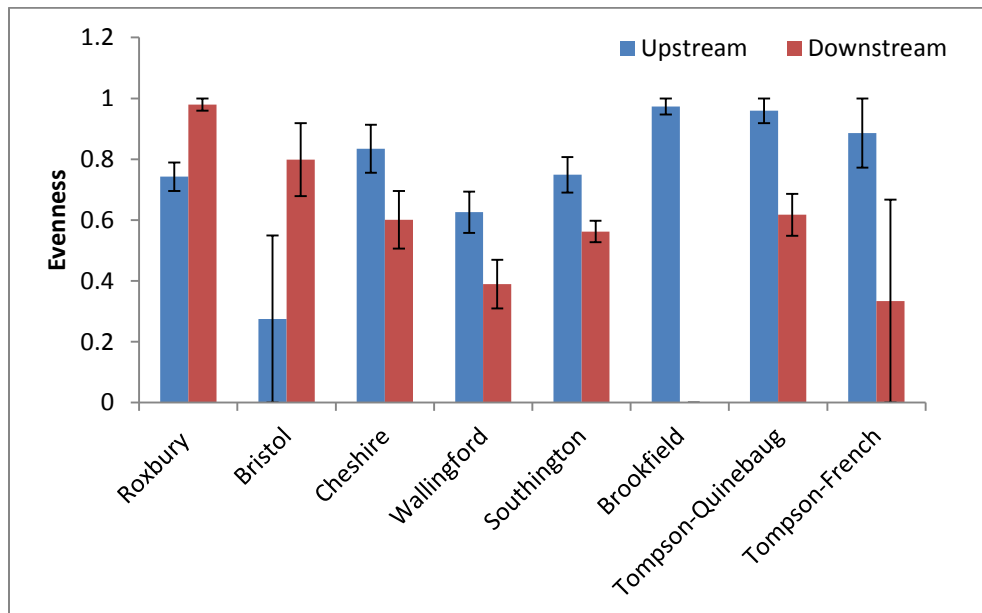
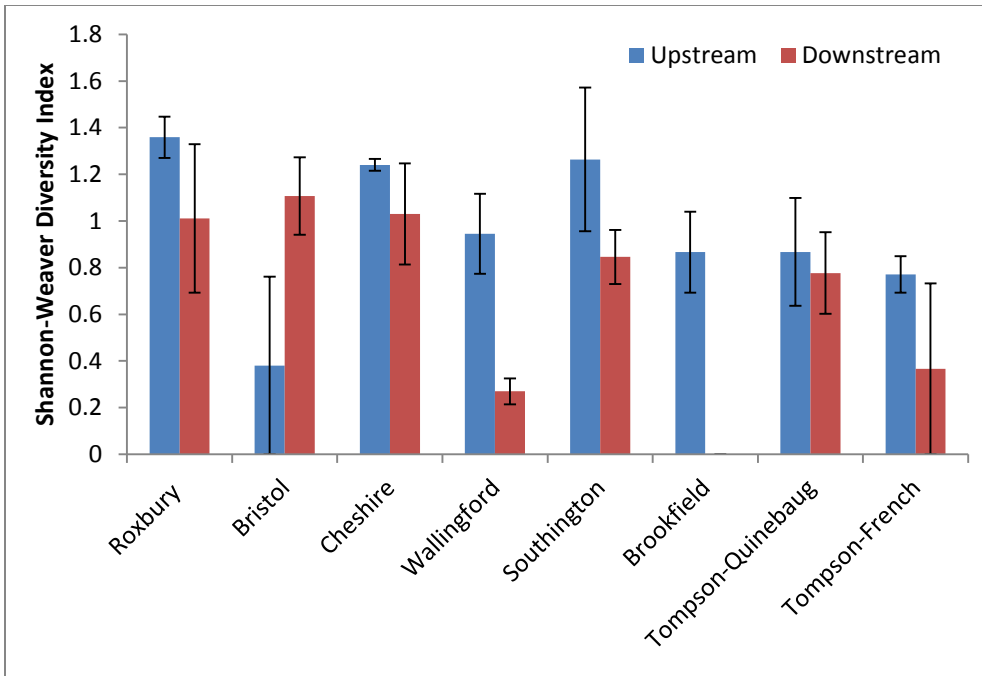


II. Benthic macroinvertebrate comparisons

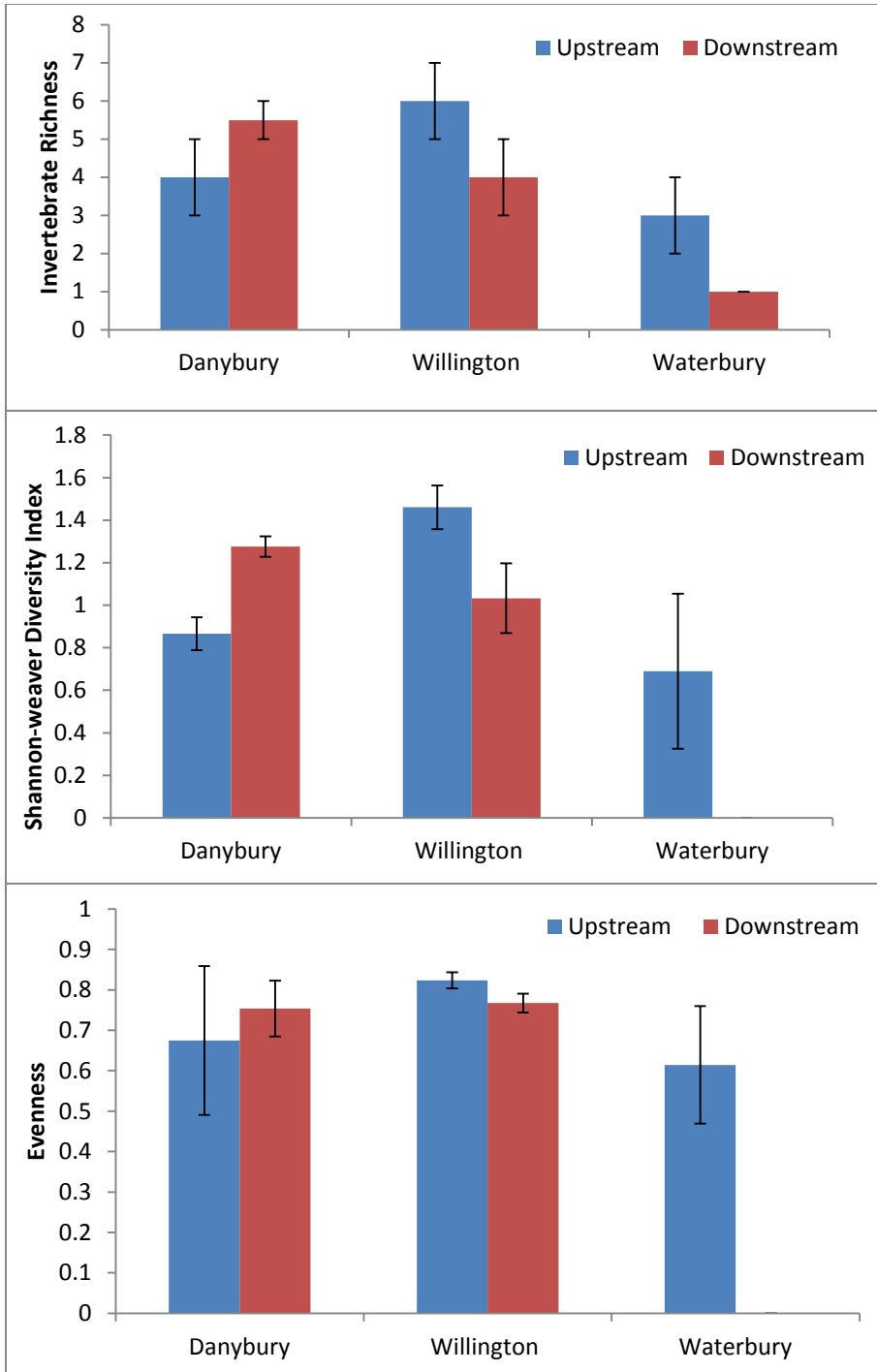
Three indices were measured: species richness- how many species at each site; Shannon-Weaver Diversity Index – a standard diversity measure; and evenness – how much abundance difference between species. ANOVA analysis showed upstream and downstream differed in diversity and evenness at wastewater sites and sites with unidentified problems but not at the sites with approved TDMLs. This suggests wastewater negatively affect benthic macroinvertebrates downstream of the discharging locations.

1. Wastewater Site.





2. Sites with TDMLs



3. Sites with unidentified problems

