The Effect of Storm Water Retention Ponds on Macroinvertebrate Community Structure

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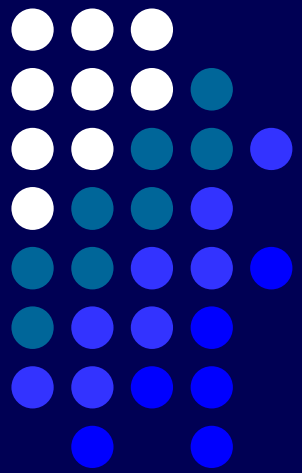
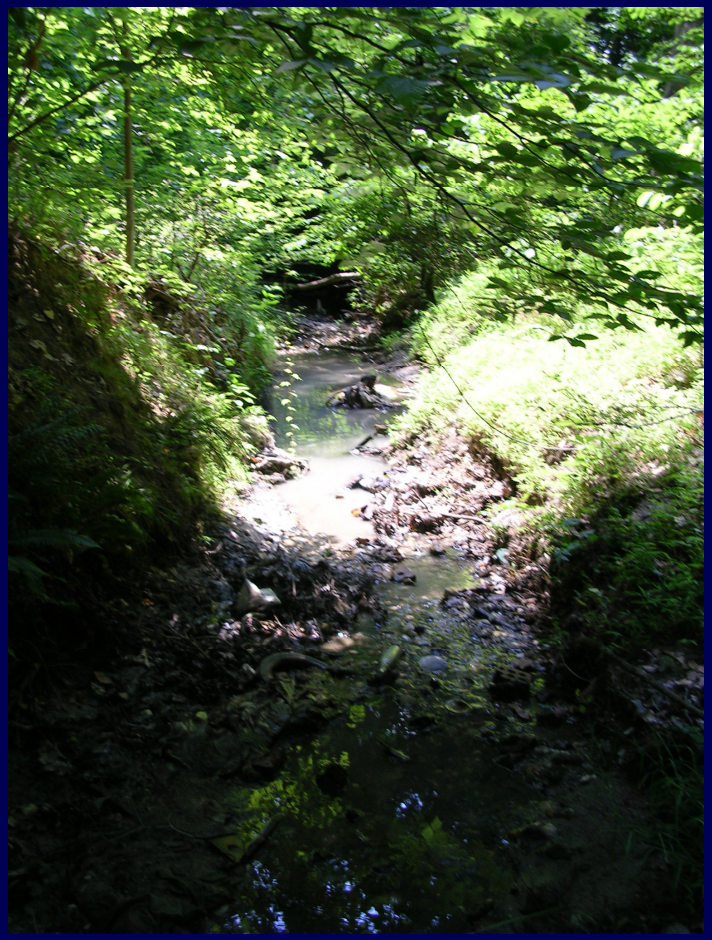


Introduction

- Urbanization impacts natural water ways
- Retention ponds and BMPs are thought to help with nutrient loads and runoff
- Macroinvertebrates are indicators of stream health

A correlation has been shown between urbanization and a decrease in species diversity in freshwater streams (Kemp, S. 1997)



Questions

- Do storm water retention ponds effect the structure of macroinvertebrate communities in freshwater streams?
  - Community Coefficient
- Will the impact storm water retention ponds have on macroinvertebrate communities be negative or positive?
  - Abundance
  - Taxa Richness
  - % Dominate Taxa

Hypothesis 1

- **Storm water retention ponds will affect the community composition of macroinvertebrates in freshwater streams**
  - Coefficient of Community will be significantly lower than 1 for all sites denoting a change in community composition

Hypothesis 2

- **Storm water retention ponds will negatively affect the composition of Macroinvertebrates downstream of them in the following ways:**
  - Abundance will decrease downstream of retention ponds
  - Taxa Richness will decrease downstream of retention ponds
  - % dominate Taxa will increase downstream of retention ponds

Preparation and Procedure

- Five retention ponds
  - Ironbound
  - Mulberry
  - Yates (Health Center)
  - Crim Dell
  - Campus (Library)

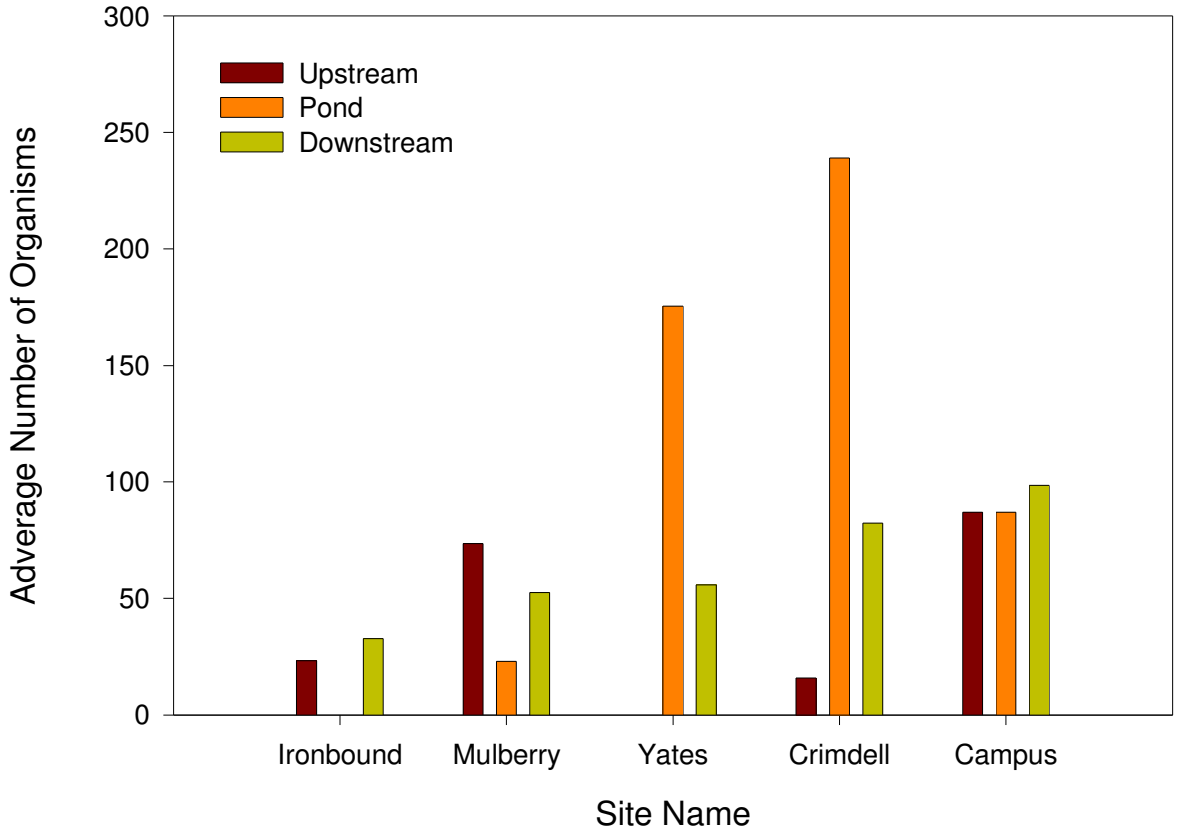
Preparation and Procedure

- Leaf Litter Bags
- Two Week and Five Week collection times

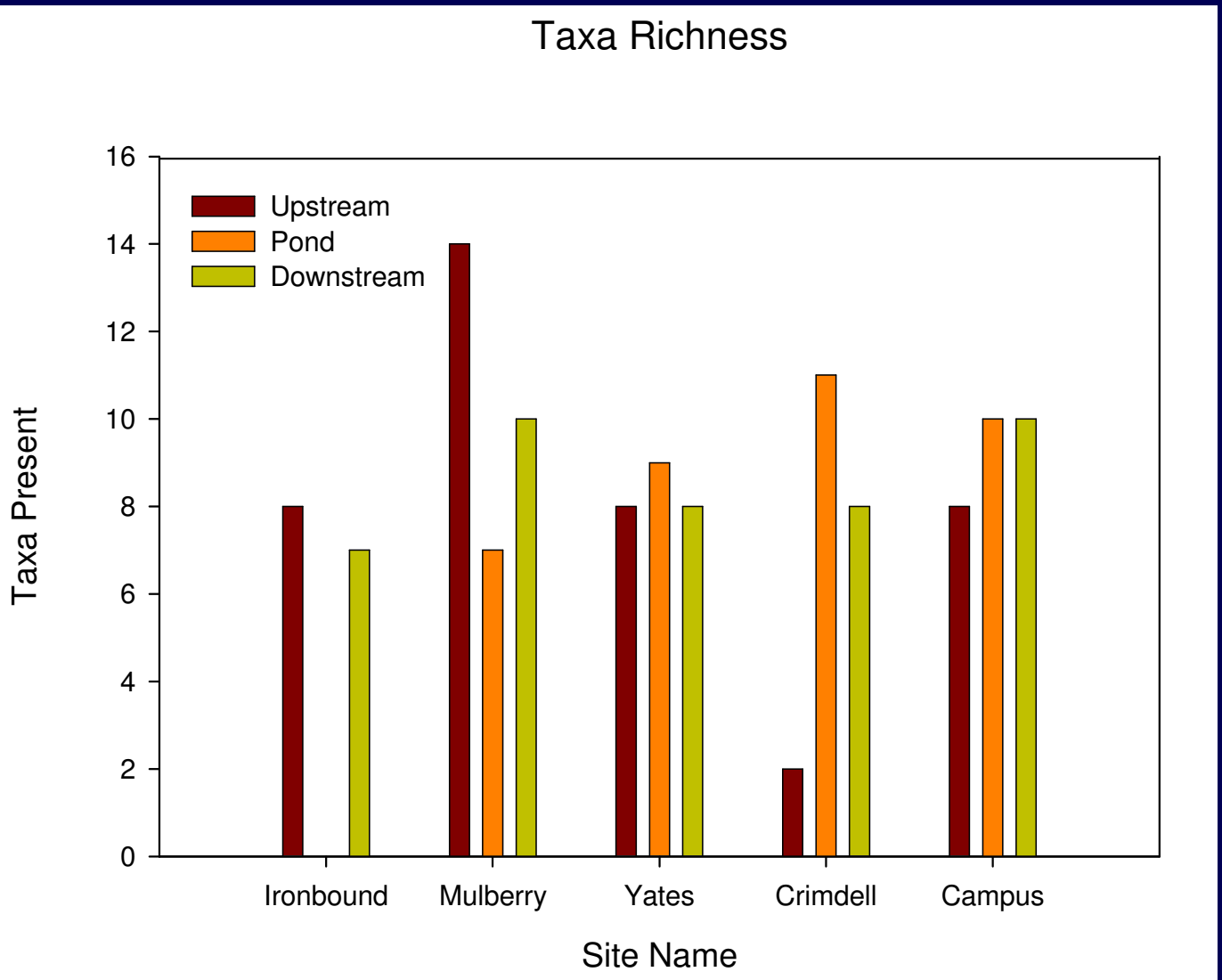
- 46 bags collected and sorted
- 12,809 Organisms counted and identified

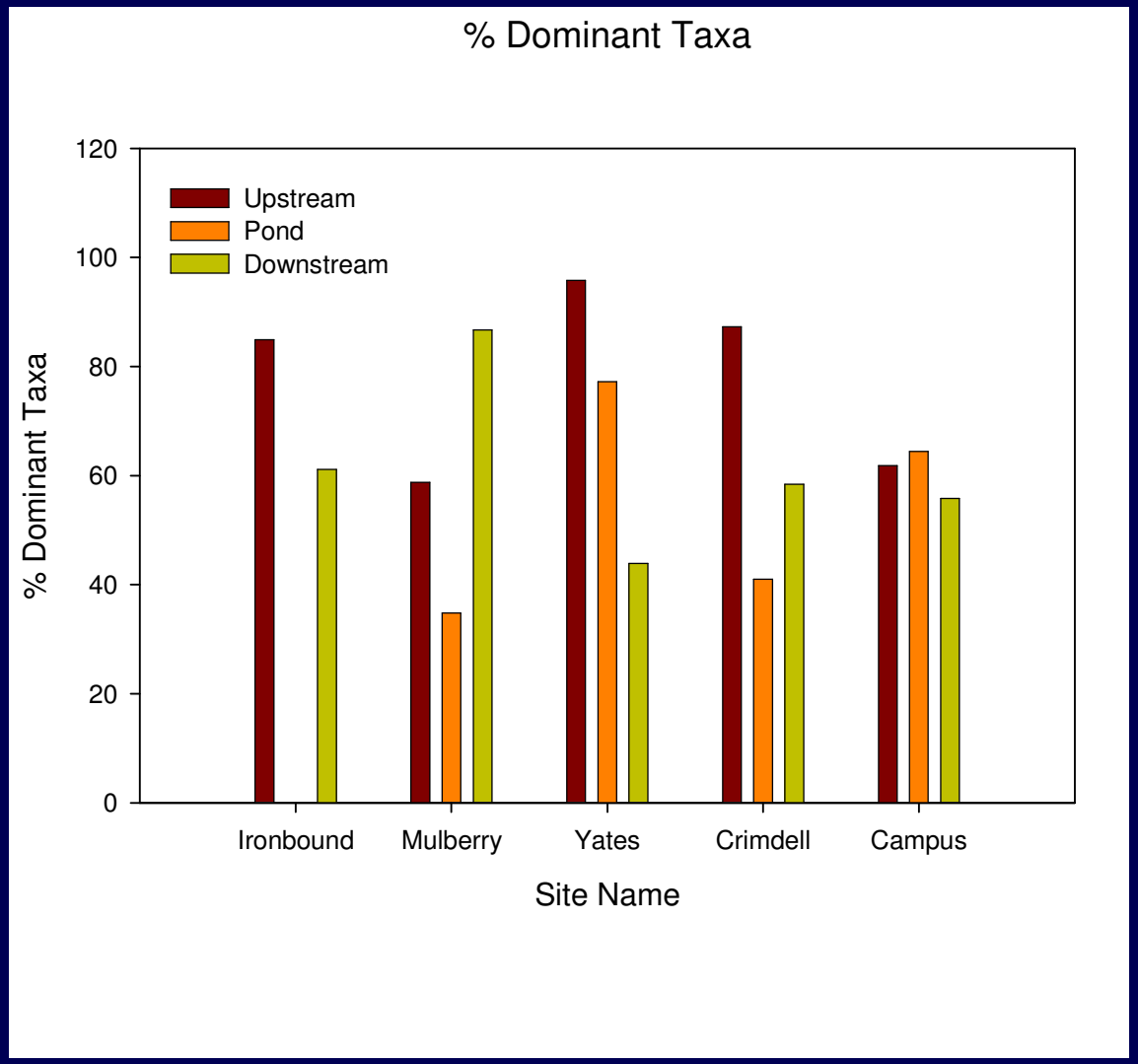
- 32 Families of invertebrates present among the sites

Abundance

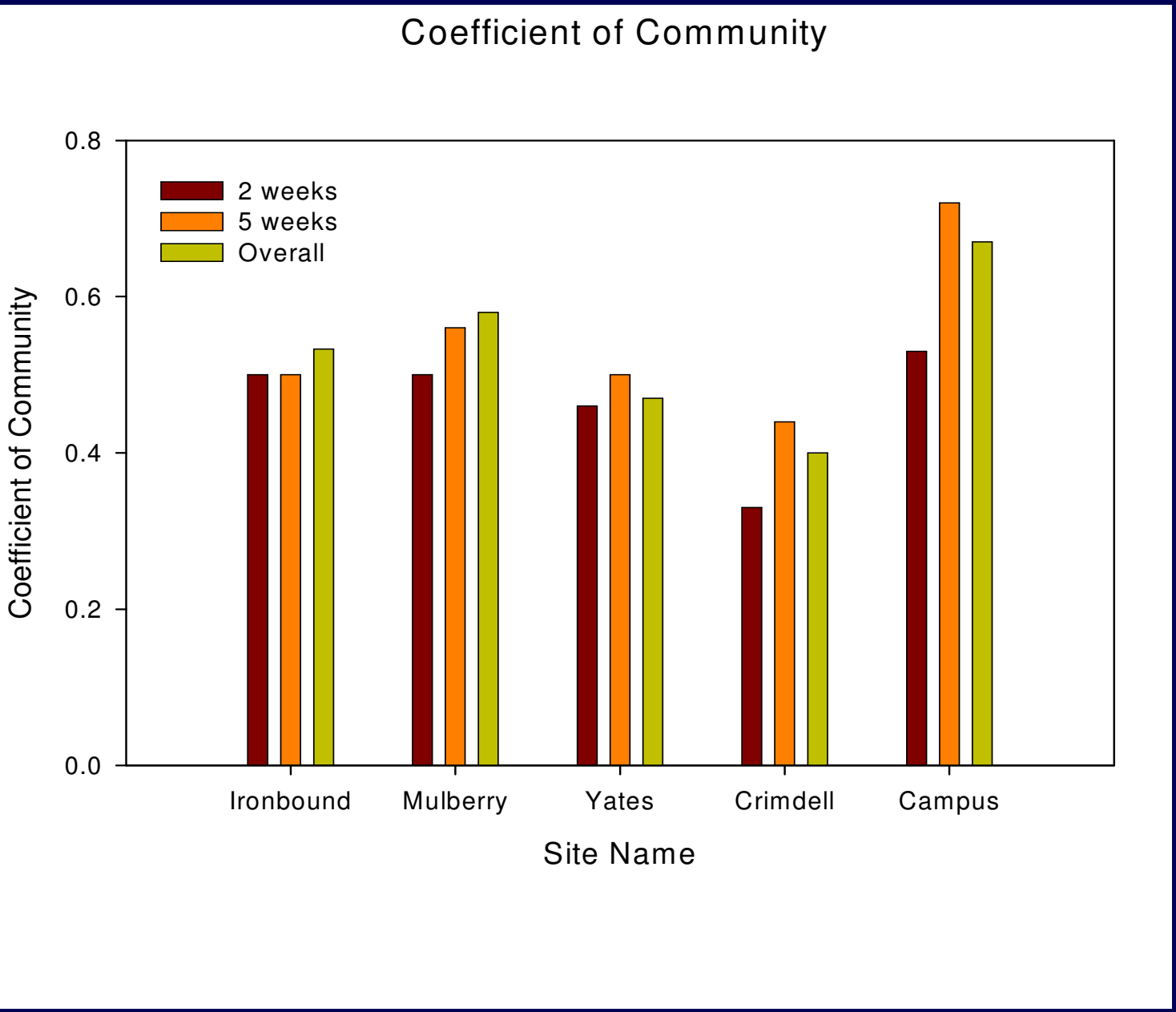


*note Yates Upstream has been removed to allow easier viewing of changes between sites. The value for yates upstream is 2446.3

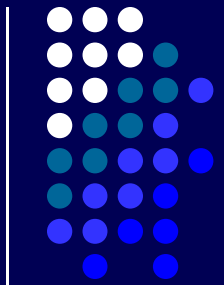

Taxa Richness
Upstream
Pond
Downstream
Taxa Present
16
14
12
10
8
6
4
2
0
Ironbound
Mulberry
Yates
Crimdell
Campus
Site Name



Site Name	Dominant Taxa
Ironbound Upstream	Chironomidae
Ironbound Downstream	Chironomidae
Mulberry Upstream	Chironomidae
Mulberry Pond	Chironomidae
Mulberry Downstream	Chironomidae
Yates Upstream	Asellidae
Yates Pond	Analid Worms
Yates Downstream	Chironomidae
Crimdell Upstream	Chironomidae
Crimdell Pond	Asellidae
Crimdell Downstream	Chironomidae
Campus Upstream	Chironomidae
Campus Pond	Asellidae
Campus Downstream	Amphipoda


Coefficient of Community
2 weeks
5 weeks
Overall
Coefficient of Community
0.8
0.6
0.4
0.2
0.0
Ironbound
Mulberry
Yates
Crimdell
Campus
Site Name

Conclusion (Hypothesis 1)



- The Coefficient of Community for all sites is less than 1 and under most circumstances is .6 or below
- In instances where the CC was above .6 a change in the dominate Taxa was reported.
- In addition there are recorded differences in abundance, % dominant taxa, and taxa richness upstream and downstream of 4/5 sites

This supports the hypothesis that retention ponds effect macroinvertebrate community composition

Summary

Site Name	Abundance	Taxa Richness	% Dominant
Ironbound	Increased	Decreased	Decreased
Mulberry	Decreased	Decreased	Increased
Yates	Decreased	No Change	Decreased
Crim Dell	Increased	Increased	Decreased
Campus	Increased	Increased	Decreased

Conclusion (Hypothesis 2)

- Three of Five sites suggested higher water quality/habitat suitability downstream
- Yates offers no definitive answer
- Mulberry suggests lower water quality in line with hypothesis

- This does not support the hypothesis that storm water retention ponds have a negative affect on invertebrate community structure downstream
- It does however suggest that each pond may be evaluated individually

Possible Complications

- The upstream of Ironbound was already heavily impacted
- The upstream of Crim Dell consists of infiltrated water from the sunken gardens
- The upstream of Campus receives Runoff from construction
- Yates, Crim Dell, and Campus retention ponds are flow through designs
  - physical barrier

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