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Hanson Riverwater III: Indian Head River Study Year 3

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Continuation of the Indian Head River Study



Introducing Grade Eight Team Hanson Middle School



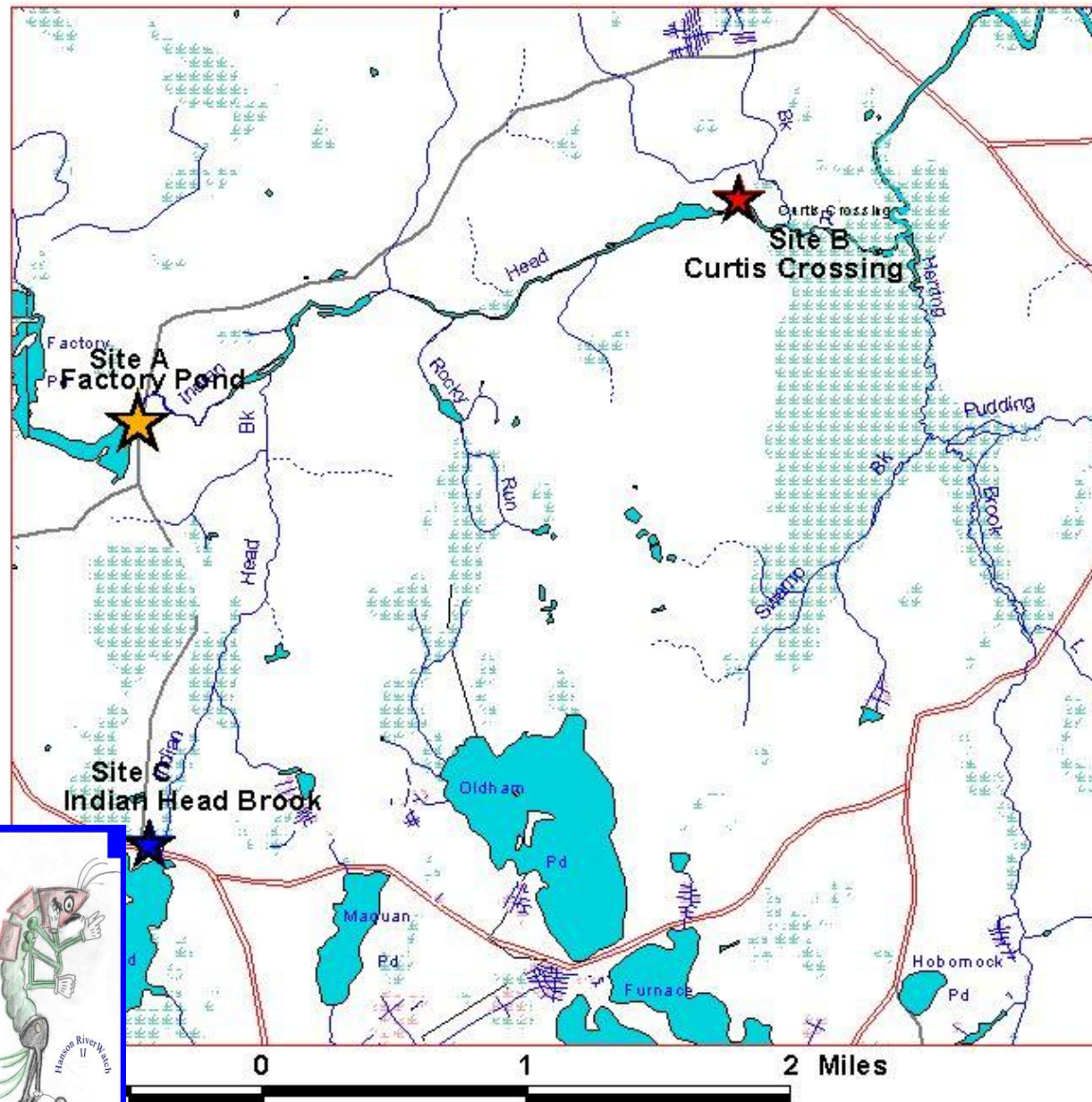
• Sarah McQuinn
• Megan McQuinn
• William McQuinn
• Hanson Middle School



Our Problems

- To continue to monitor conditions and water quality at two sites along the Indian Head River
- To add to our previous study sites a third site.
- To further investigate high nitrogen values at all three sites

Indian Head River: Study Sites



Rivers & Streams

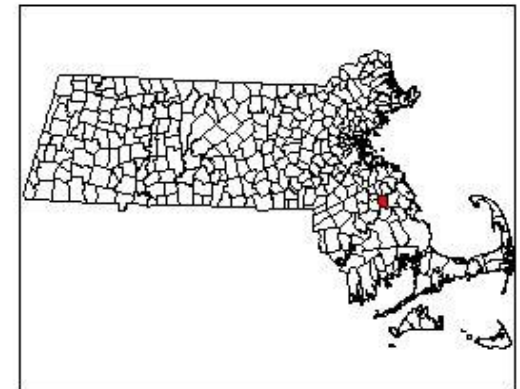
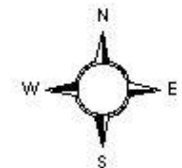
- Stream
- Intermittent Stream

Lakes & Ponds

- Wetland / Salt Marsh
- Cranberry Bog
- Surface Water
- Tidal Flat
- Impoundment
- Dam

Maj MHD Rds by Class - most detailed

- Limited Access Highway
- Multi-lane Hwy, not limited access
- Other Numbered Hwy
- Major Road - Collector
- MA Towns



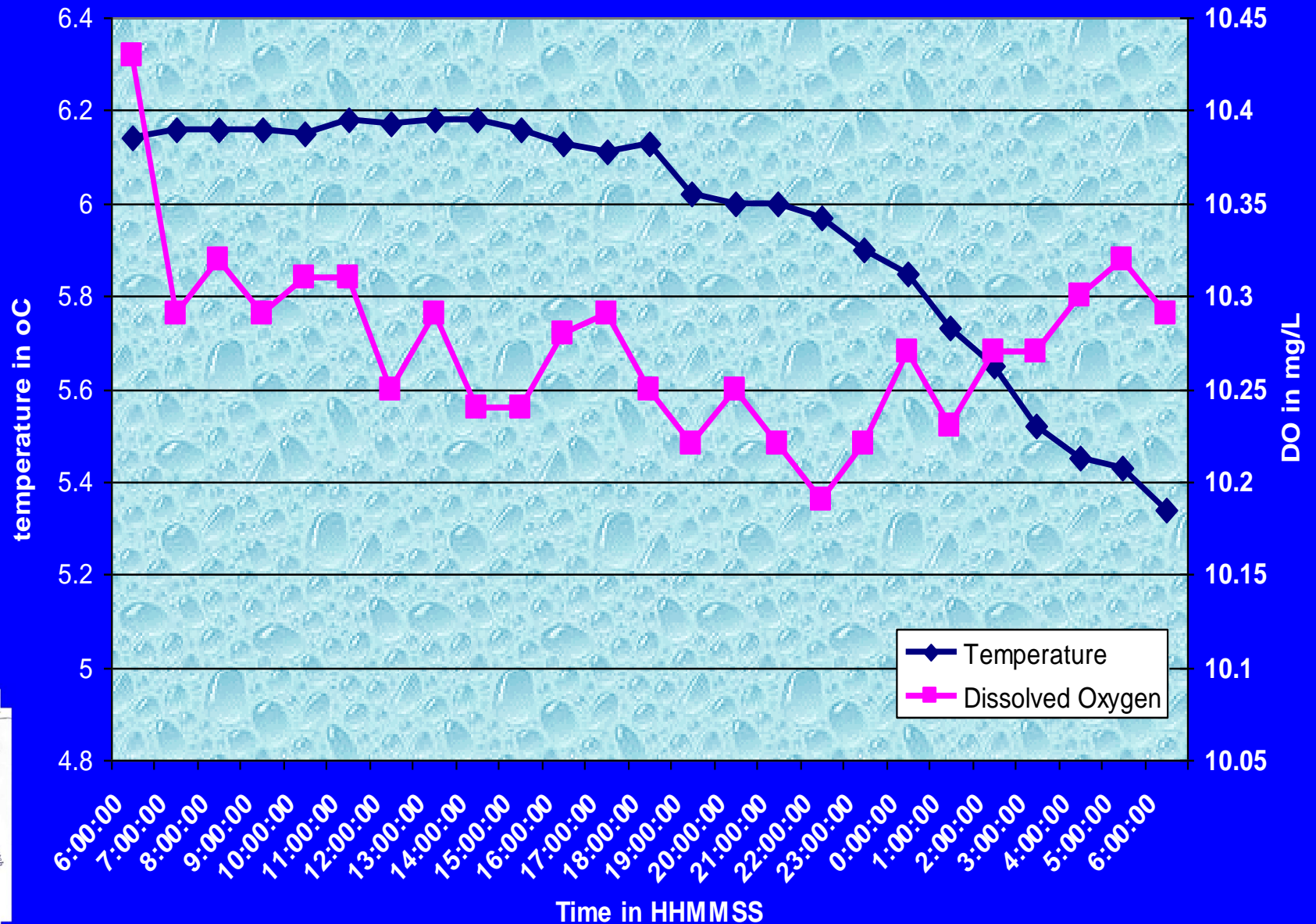


Comparison of Temperature And Dissolved Oxygen

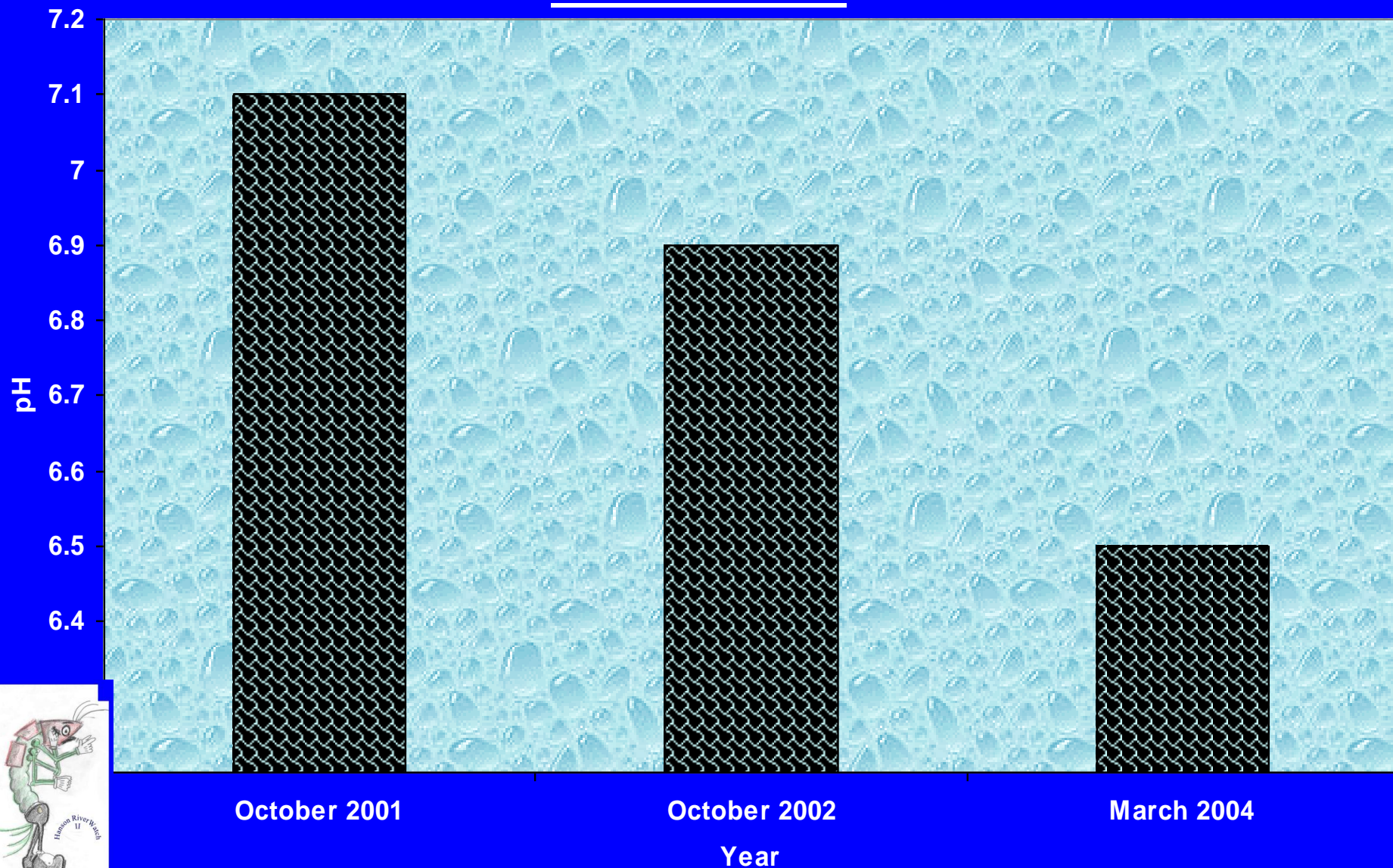
Site A: Outflow at Factory Pond

Indian Head River

March 31, 2004



Average pH Values Taken Over A Three Year Period
Site A: Outflow At Factory Pond
Indian Head River

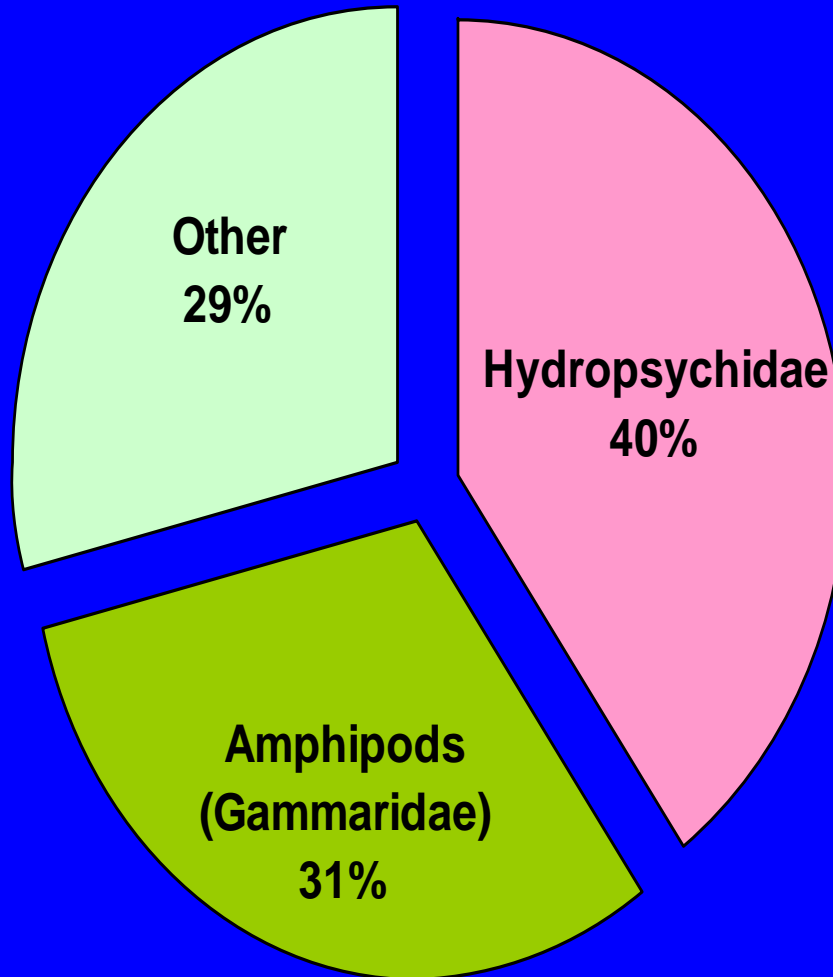


Dominant Macroinvertebrate Representatives

Indian Head River

Site A: Curtis Crossing

October, 2003



Distribution of "Other" Macroinvertebrates

Indian Head River

Site A: Outflow At Factory Pond

October 2003

Philopotamidae

84%

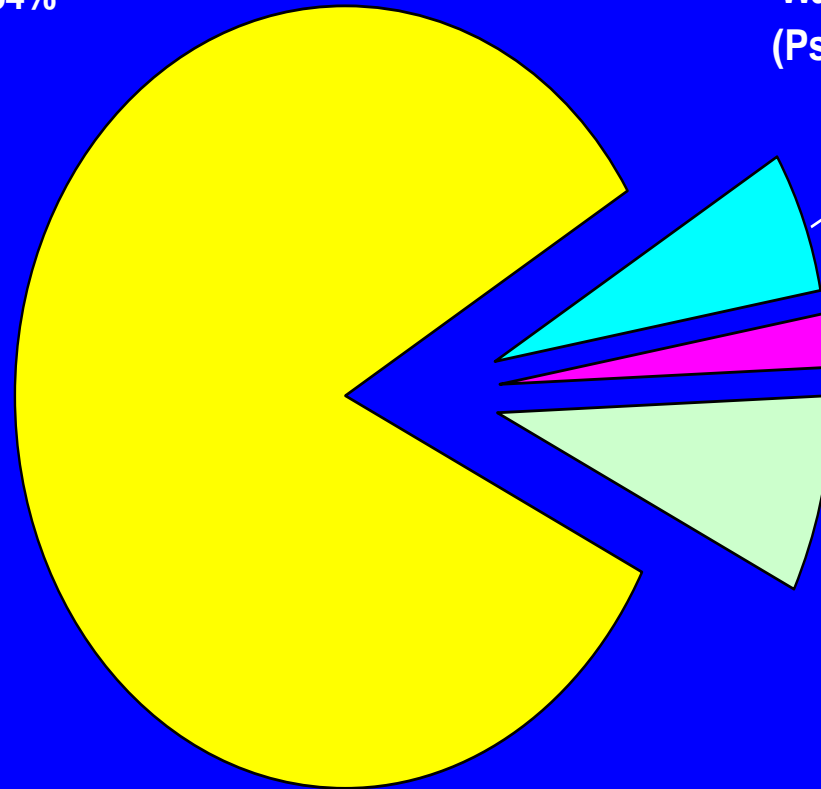
Water Pennies
(Psephenidae)

6%

Riffle Beetle
(Elmidae)

2%

Bivalves
8%





Amphipods

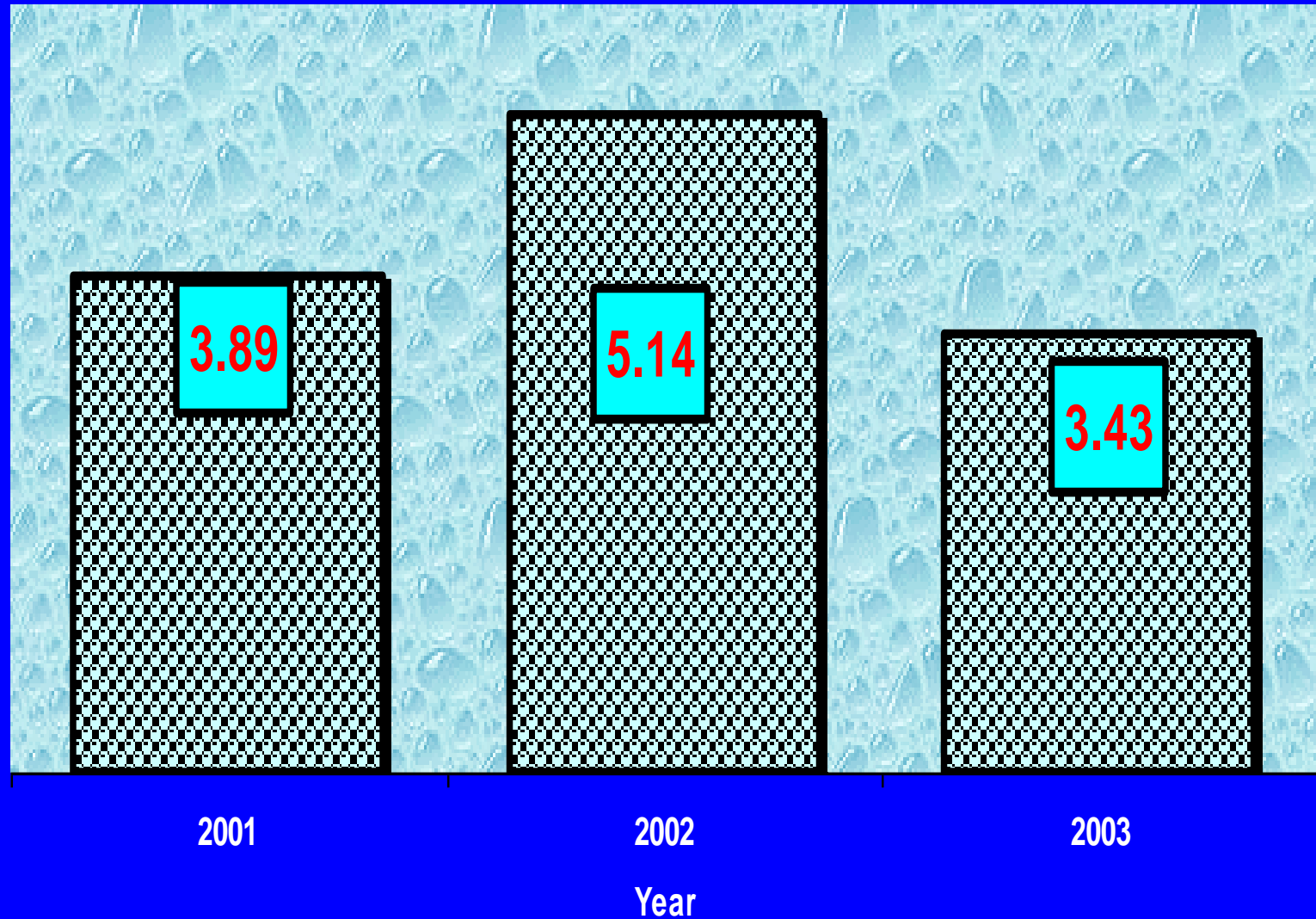


Hydropsychidae

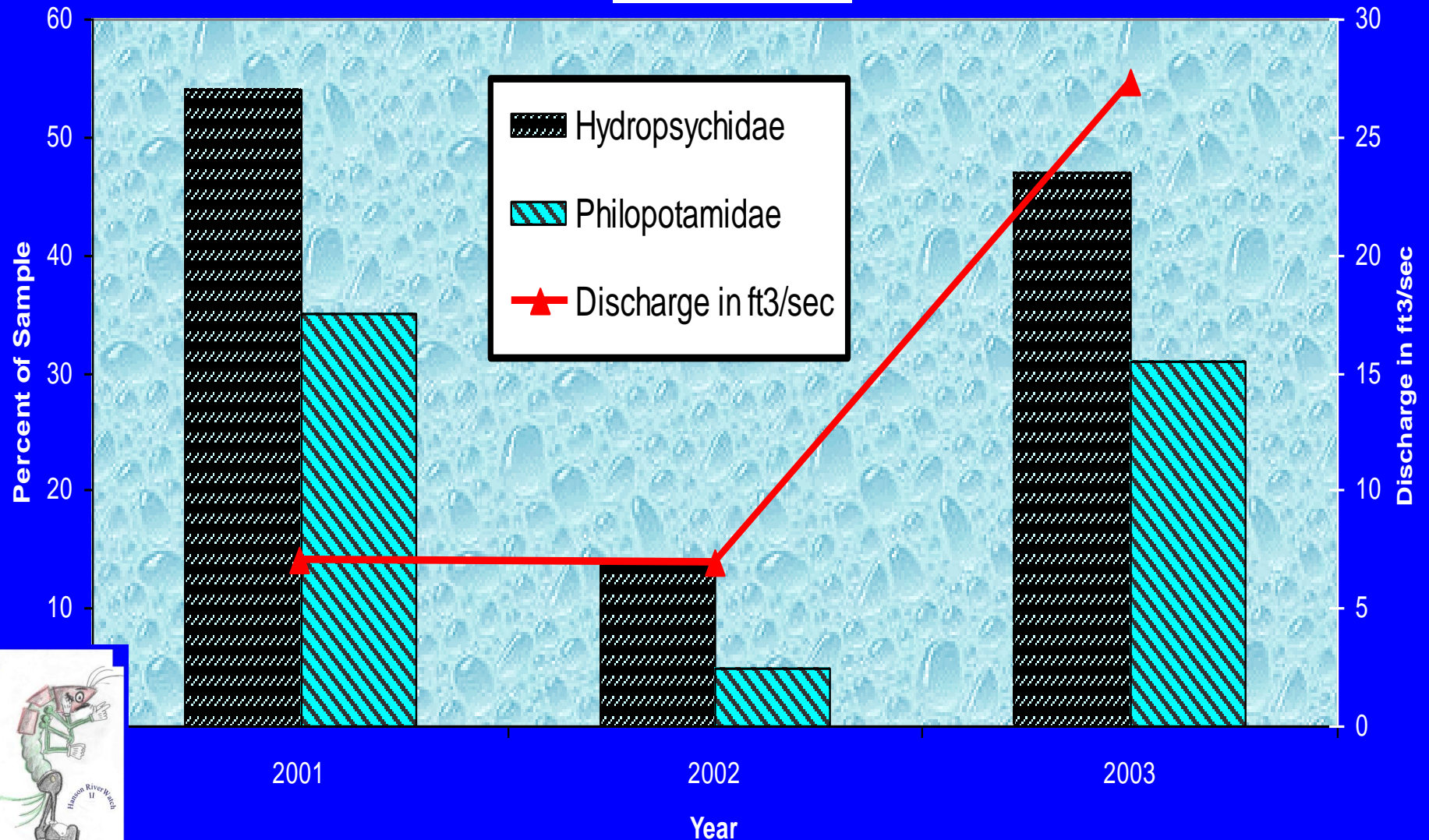


Riffle Beetle

Site A: Changes in Biotic Indices
Over A Three Year Period
2001 - 2002 - 2003



Changes in Representatives Of Family Trichoptera
Over Three Years
Site A: Outflow At Factory Pond
Indian Head River



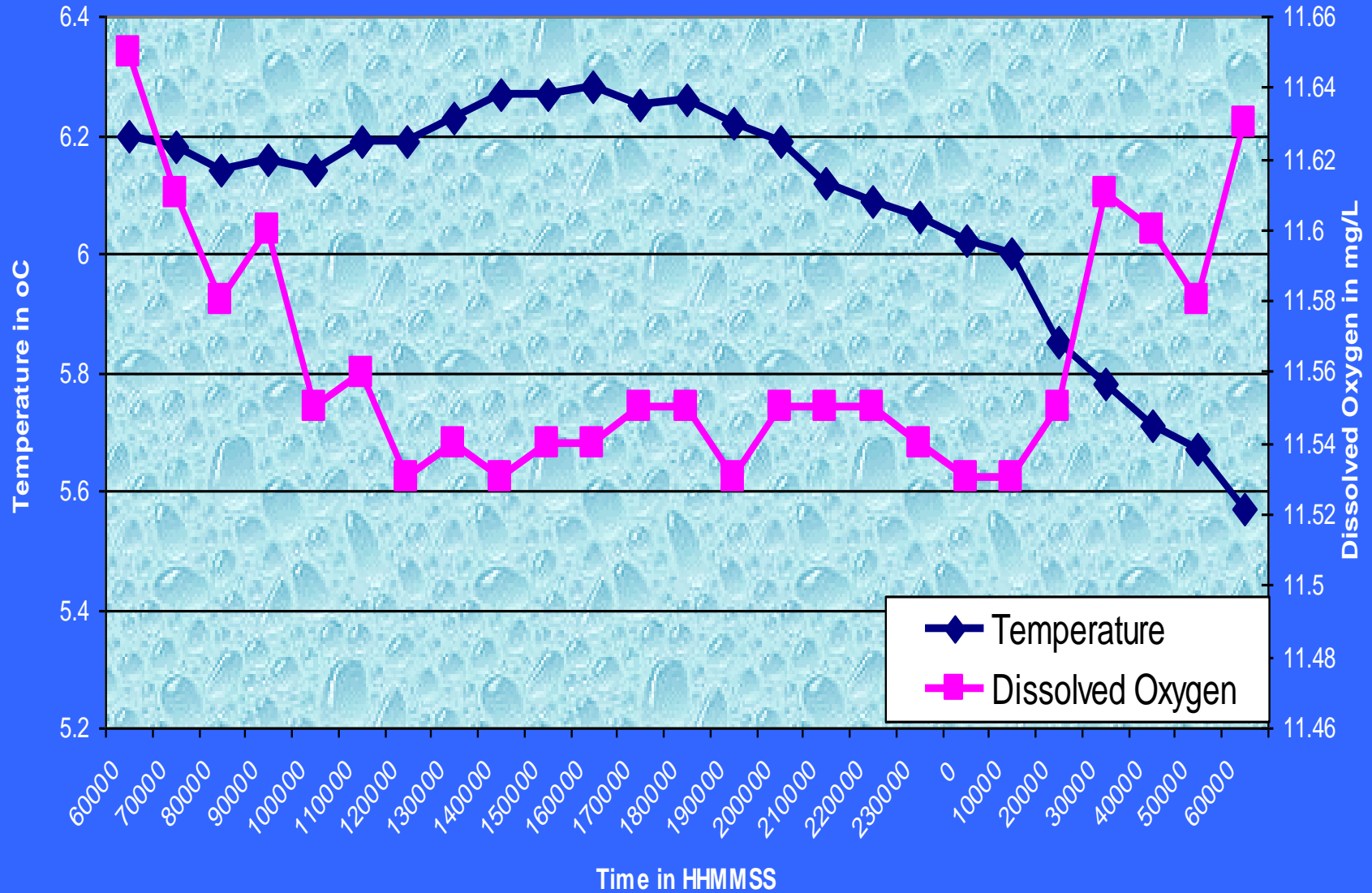


Comparison of Temperature And Dissolved Oxygen

Site B: Outflow at Factory Pond

Indian Head River

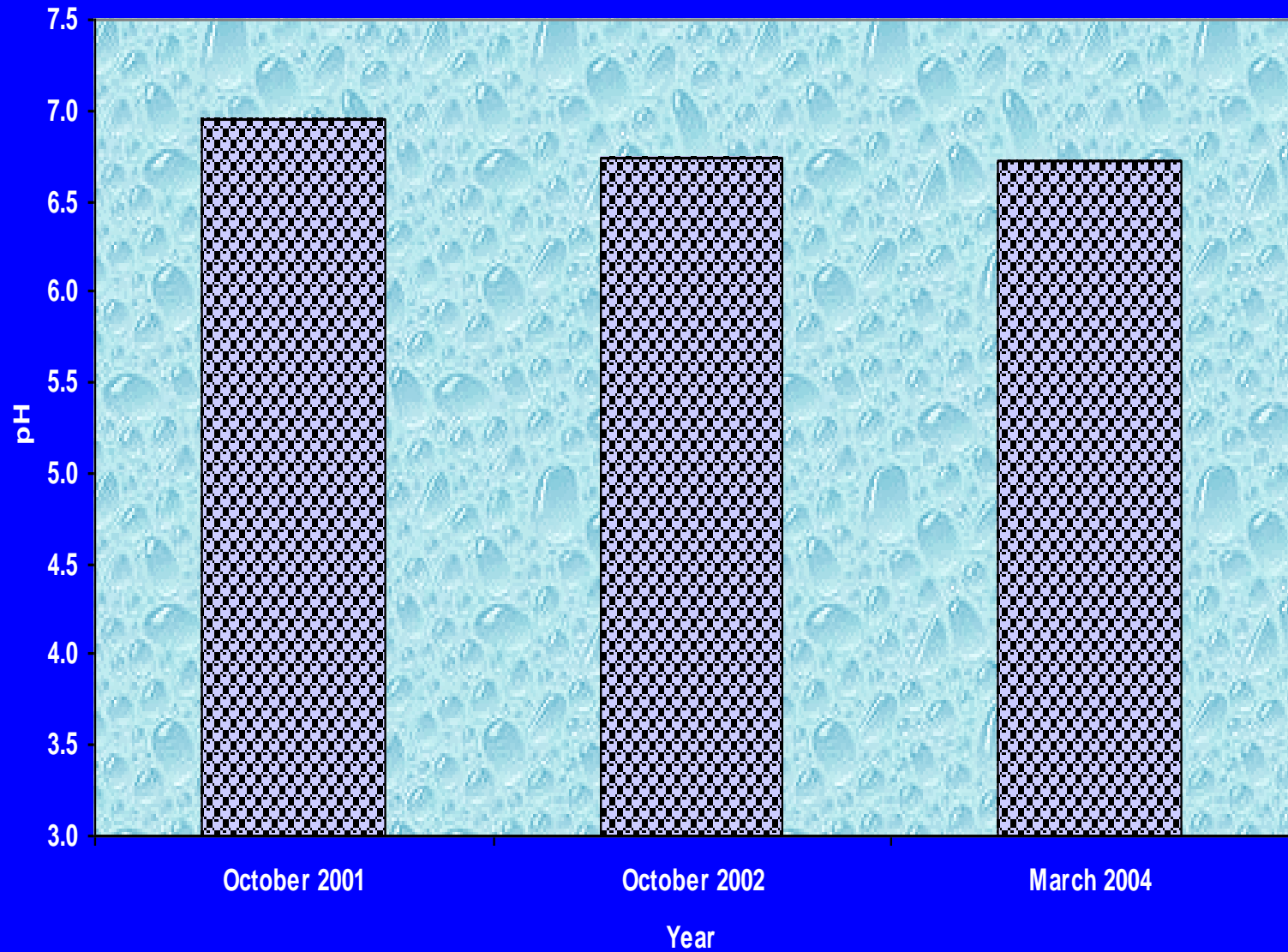
March 31, 2004



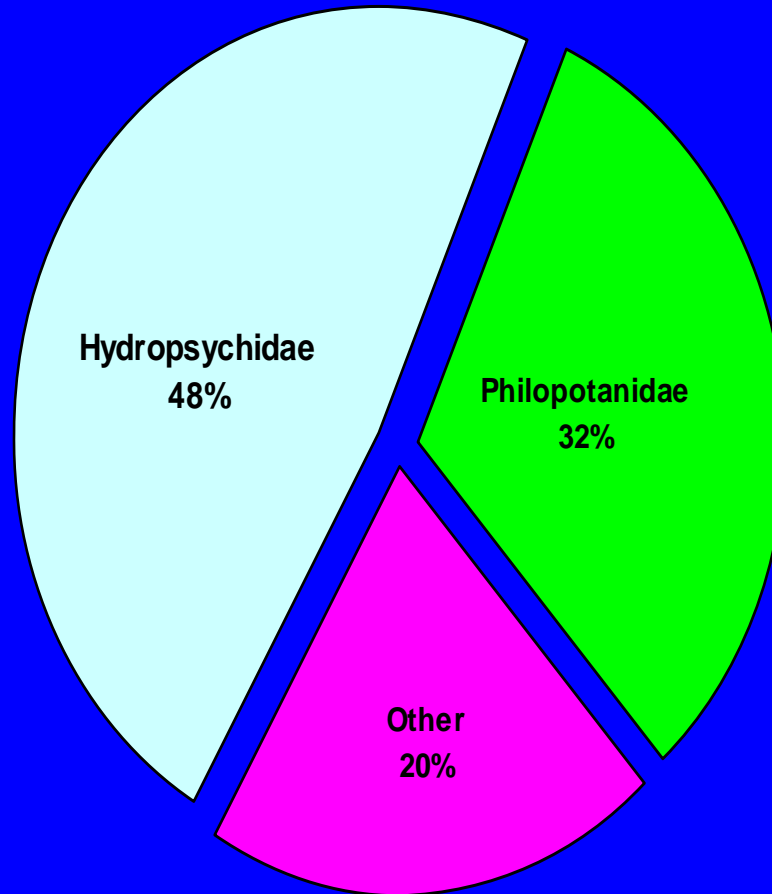
Average pH Values Taken Over a Three Year Period

Site B: Curtis Crossing

Indian Head River



Dominant Macroinvertebrate Representatives
Indian Head River
Site B: Outflow of Factory Pond
October, 2003

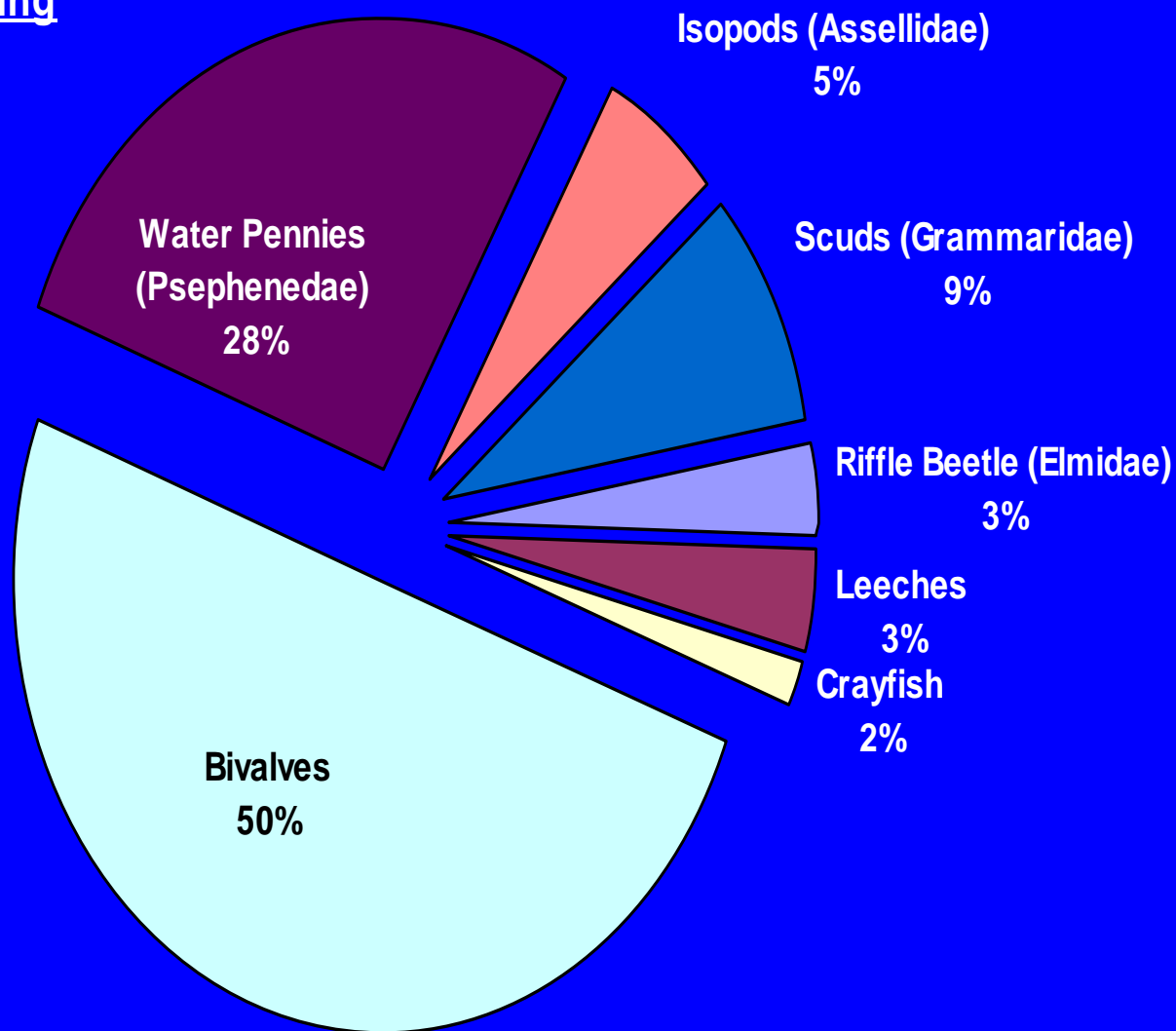


Distributions of "Other" Macroinvertebrates

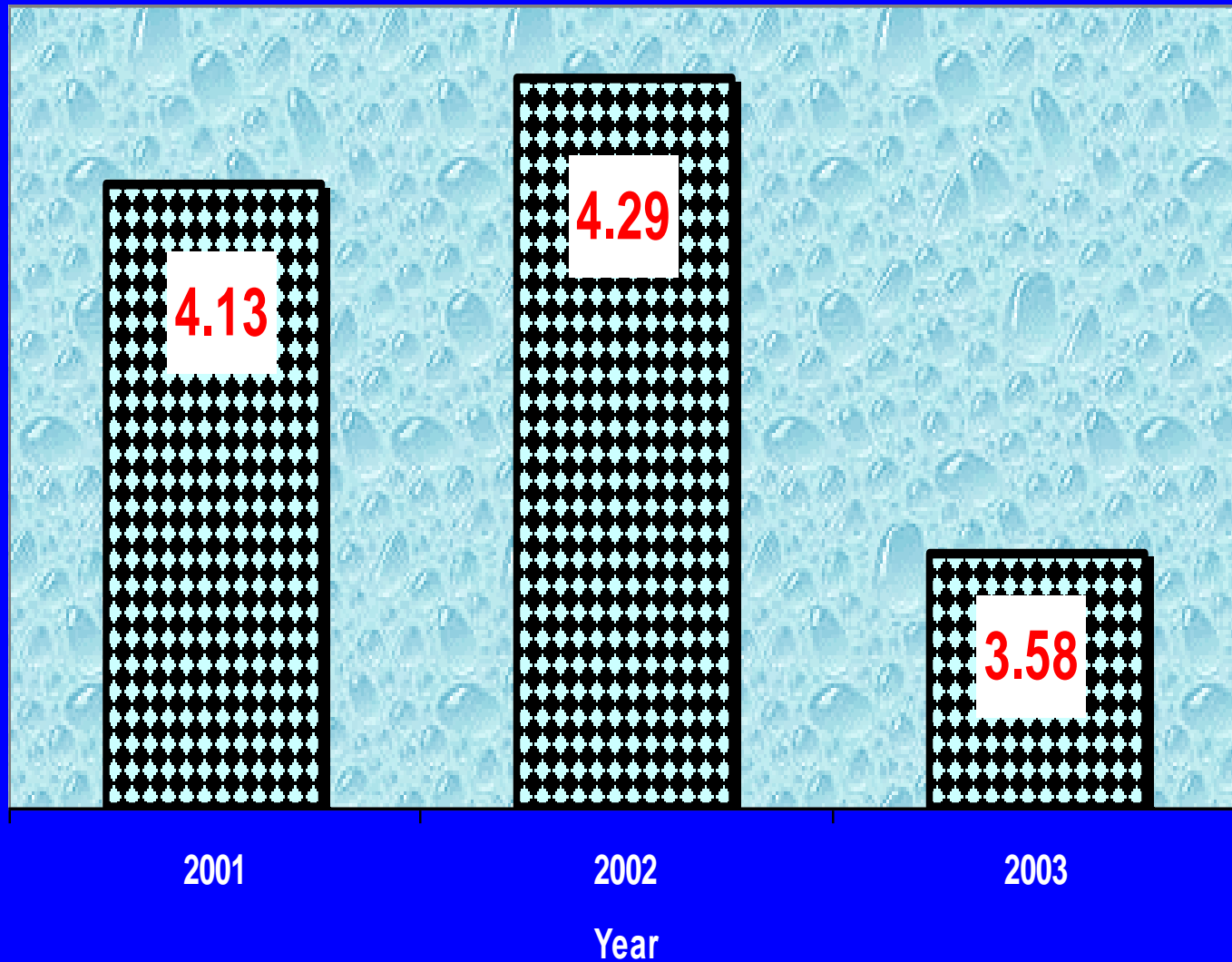
Indian Head River

Site B: Curtis Crossing

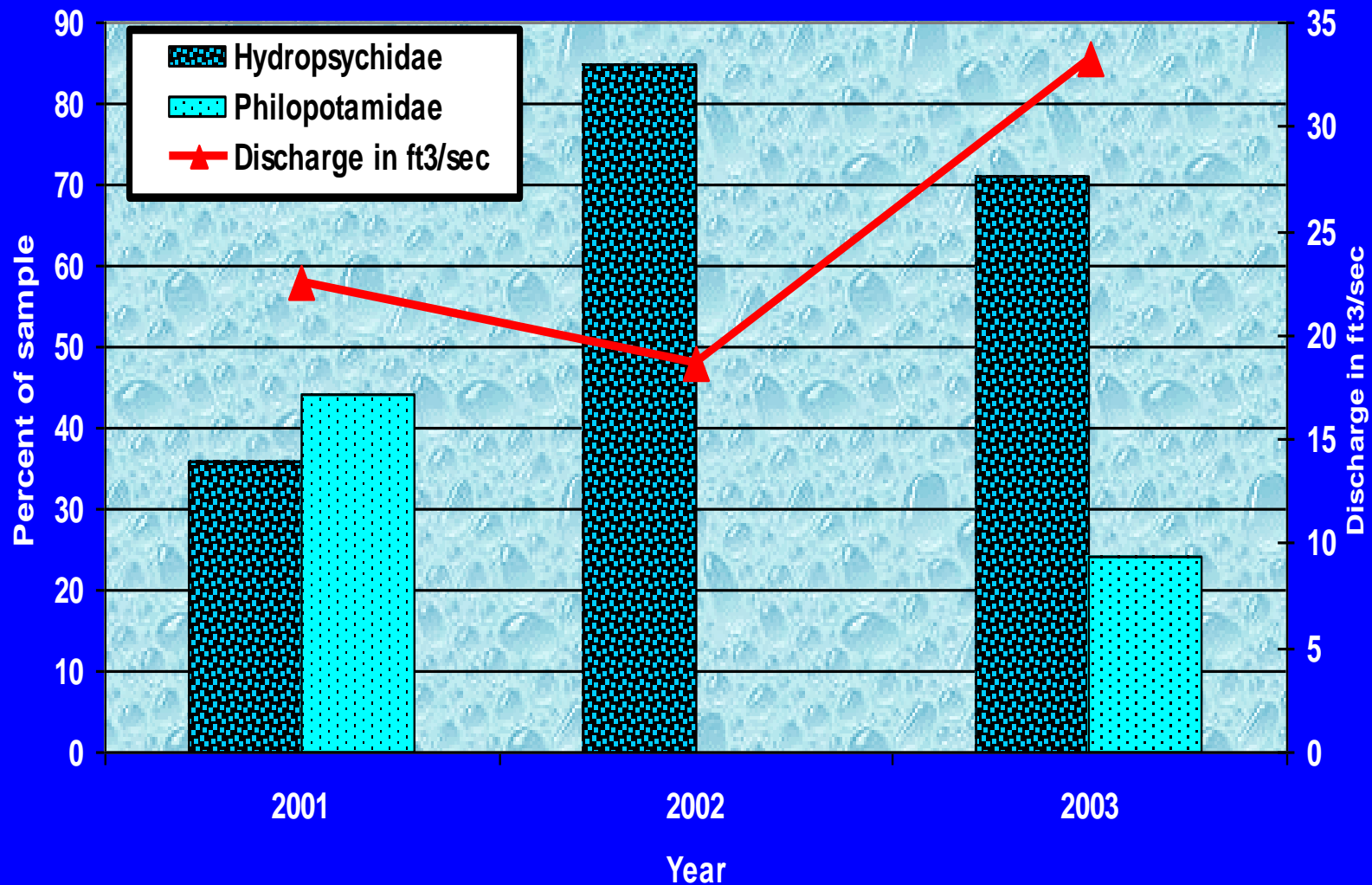
October 2003



Site B: Changes In Biotic Indices
Over A Year Period
2001 - 2002 - 2003



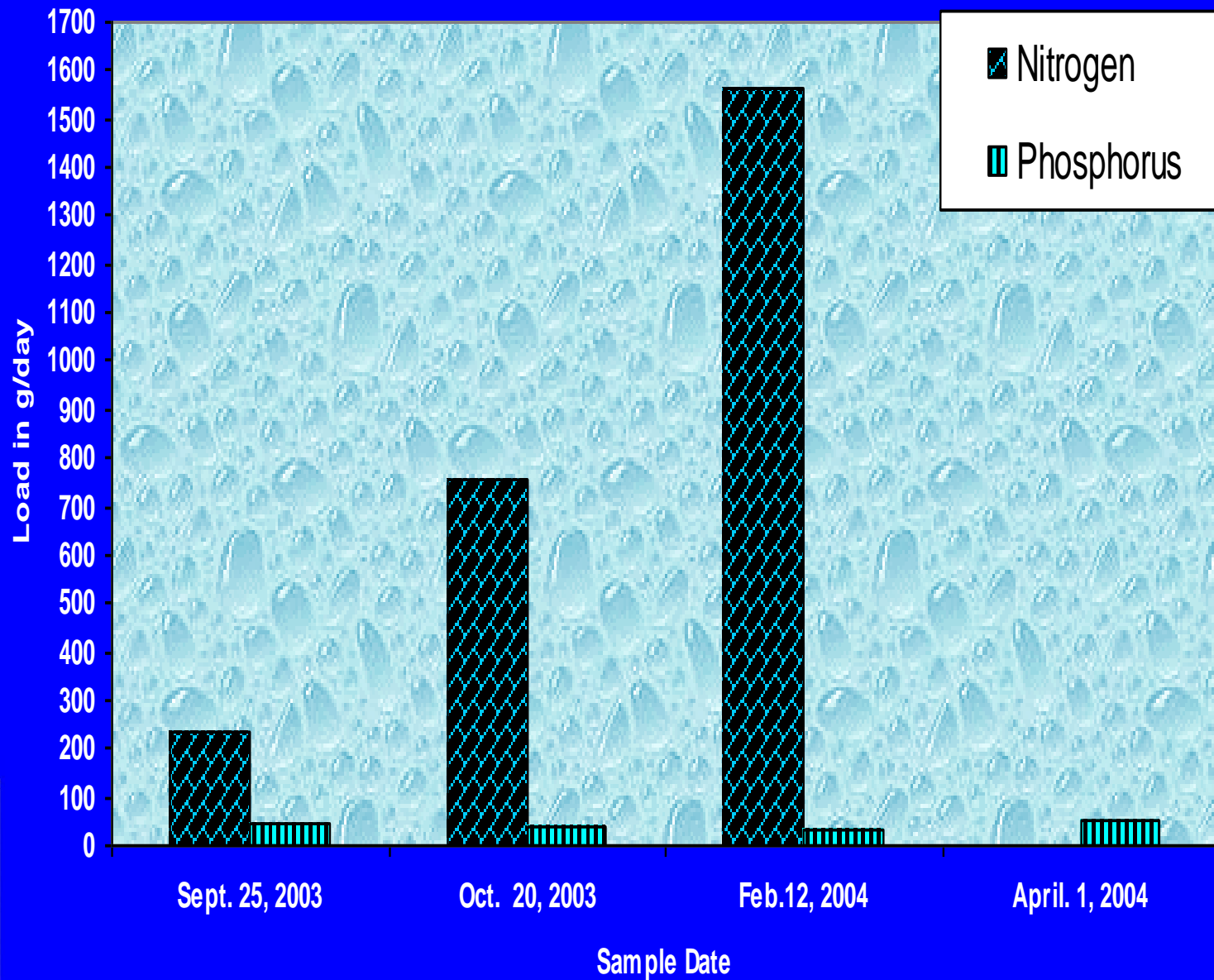
Changes in Representatives Of Family Trichoptera
Over Three Years
Site B: Curtis Crossing
Indian Head River





•SITE C

Comparison of Nitrogen and Phosphorus Load For Site C:
Indian Head Brook



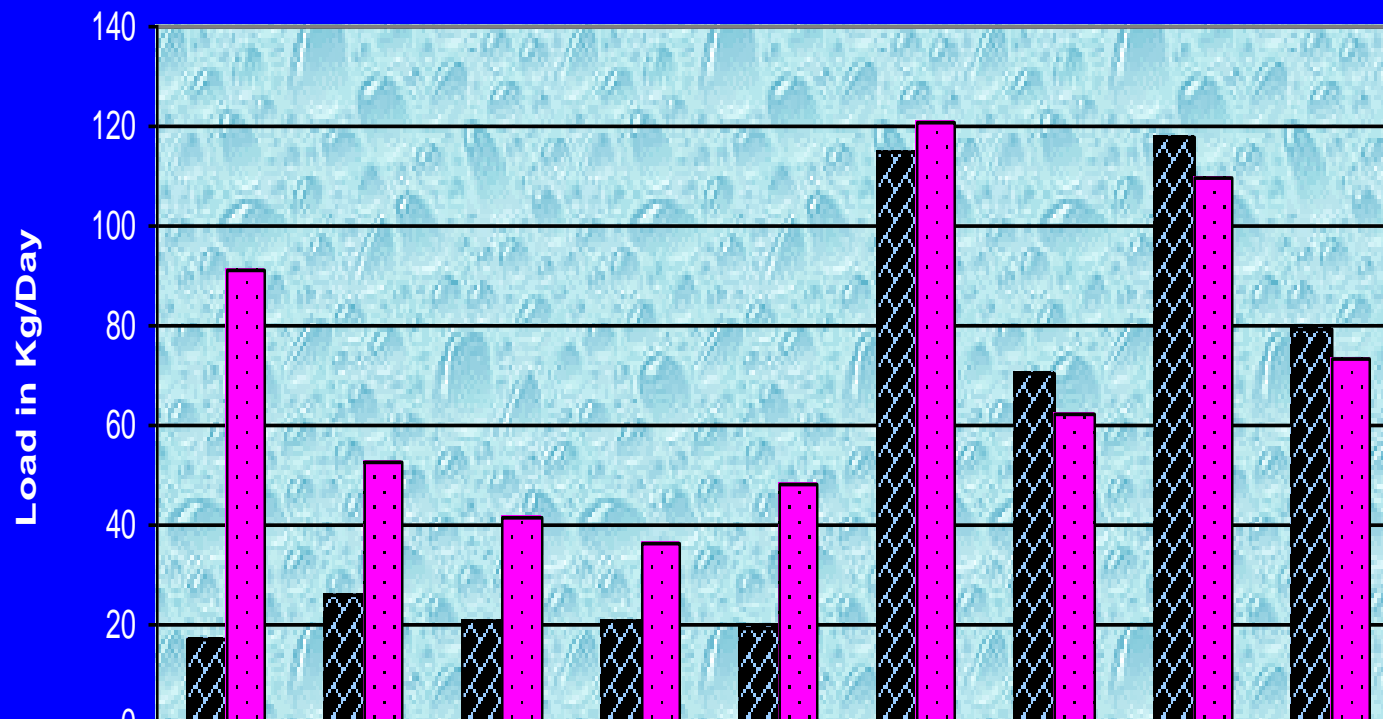


*Do you see
what I see?*

*I'm not
touching it!*

*I don't
see anything*

Nitrogen Load Calculations For Two Study Sites:
2001 - 2004
Indian Head River



	Oct. 20, 2001	Oct. 9, 2002	Oct. 24, 2002	Dec. 18, 2002	March 16, 2003	Sept. 25, 2003	Oct. 20, 2003	Feb. 12, 2004	April. 1, 2004
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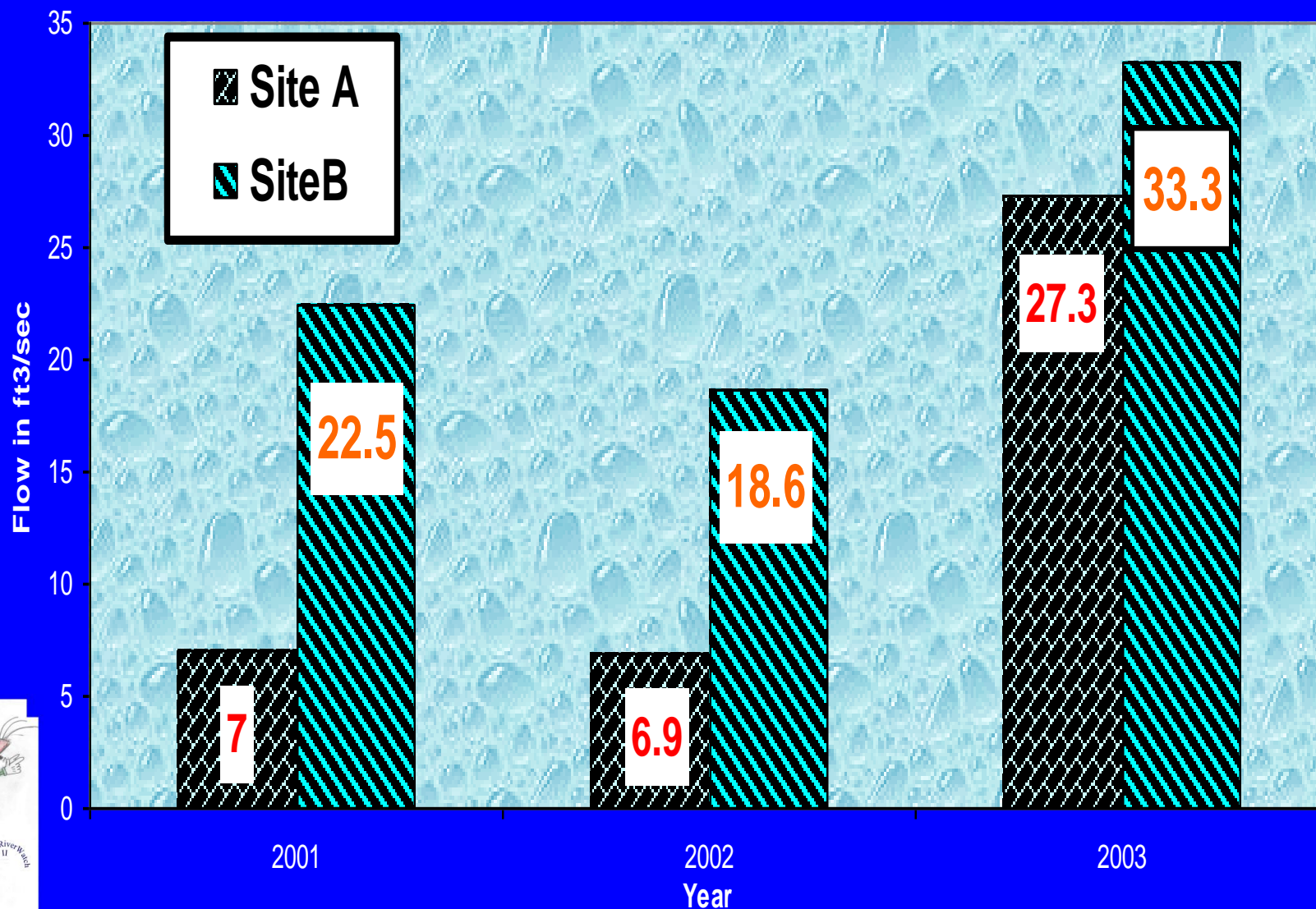
■ Factory Pond	16.95	25.72	20.67	20.67	19.264	114.9	70.6	117.6	79.1
■ Curtis Crossing"	90.96	52.72	41.8	36.47	47.88	120.5	62.275	109.9	73.3

Date Sampled



Changes in Flow Measurements Over a Three Year Period

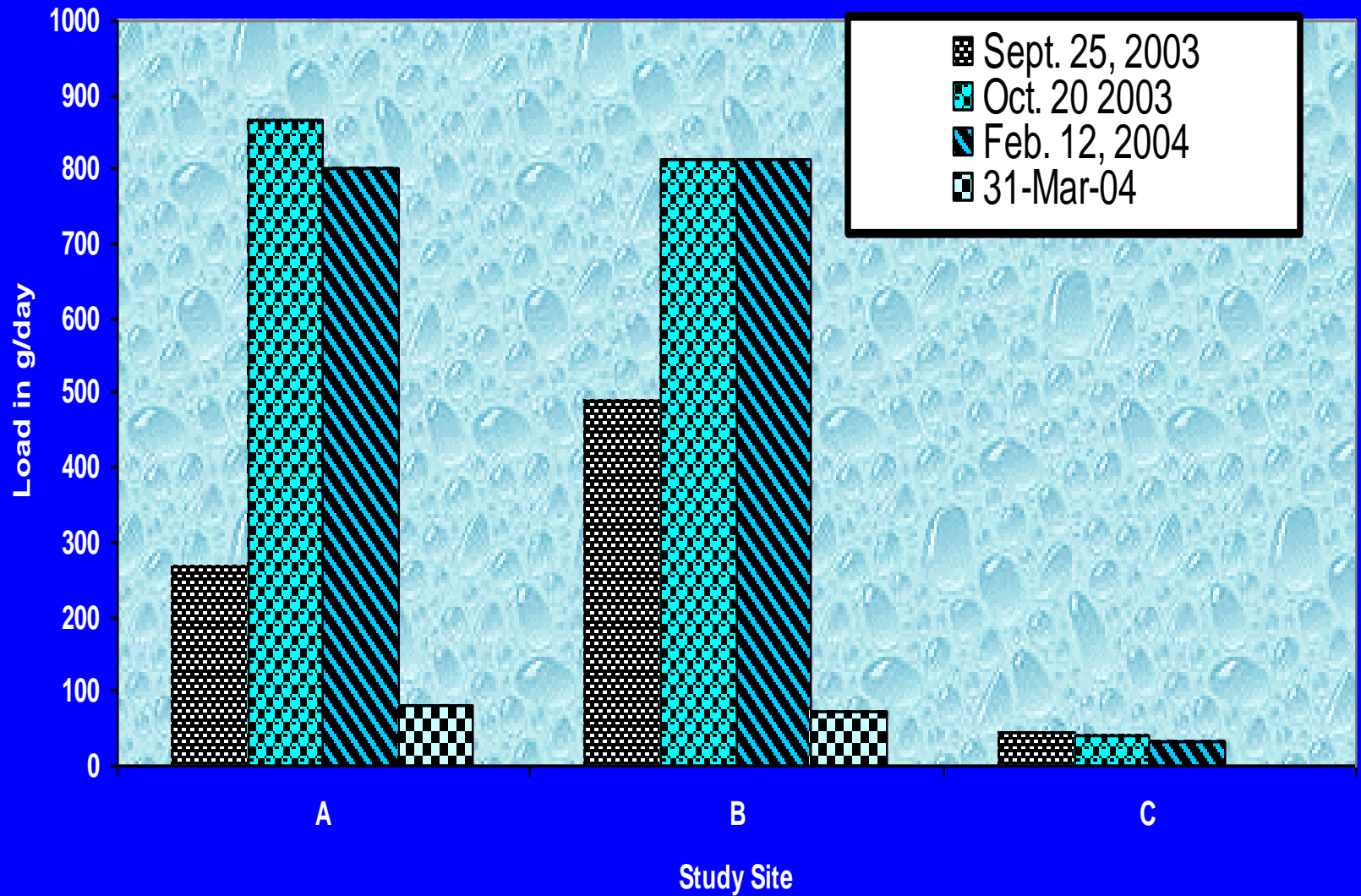
Factory Pond vs. Curtis Crossing



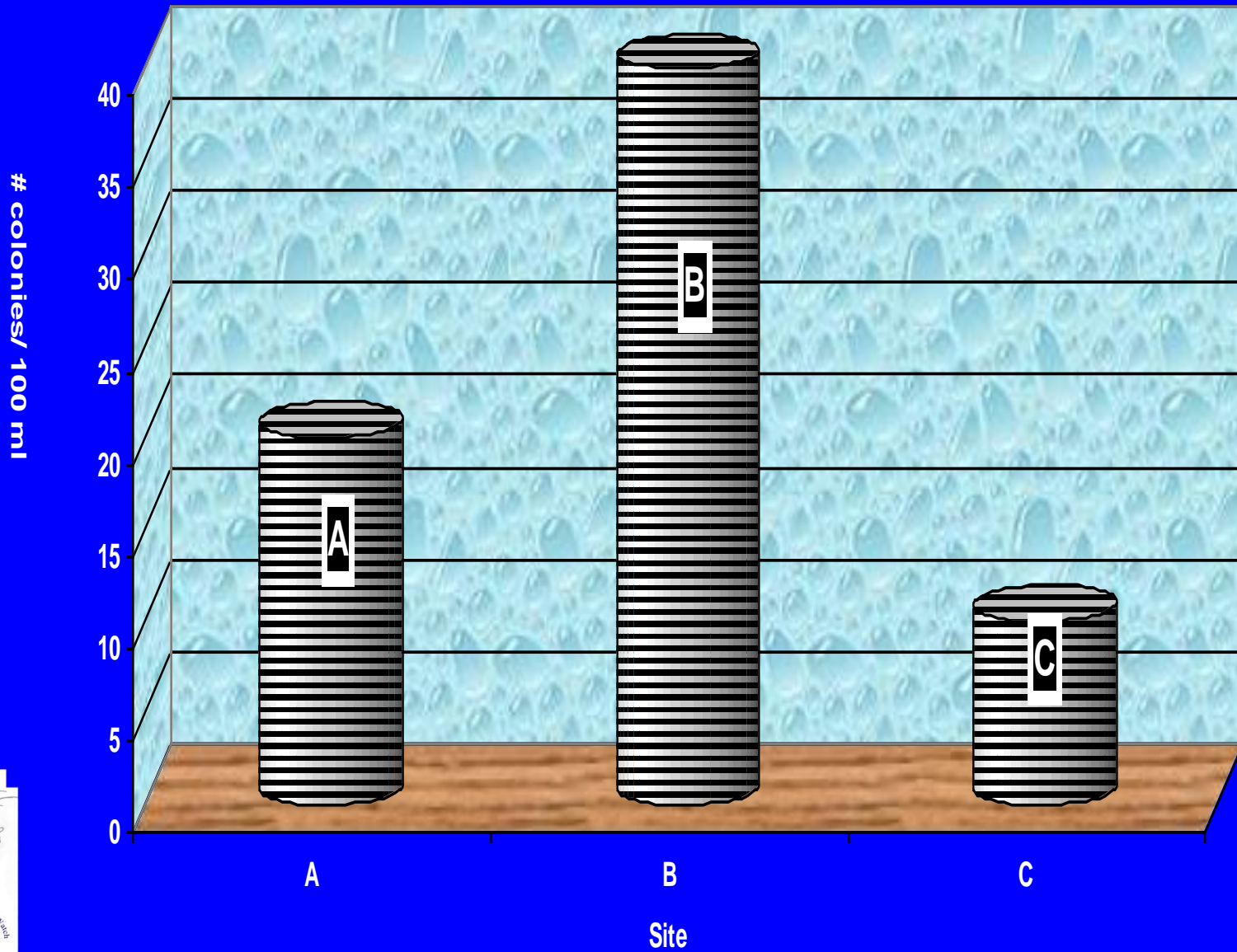
Comparison of Phosphorus Load For Three Study Sites

Indian Head River

2003 - 2004



Fecal Coliform Analysis For Three Study Sites
Samples Collected April 1, 2004



CONCLUSIONS



Although high nitrogen levels at both study sites remain constant, there does not seem to be evidence that this is due to any specific source of pollution. Rather, these levels may be purely organic in origin.



Phosphorus is a limiting factor at all three study sites. At site C, the N:P ratio in February was 50 to one. This could indicate sources from agricultural fertilizers, however, not enough data has been collected to confirm this.

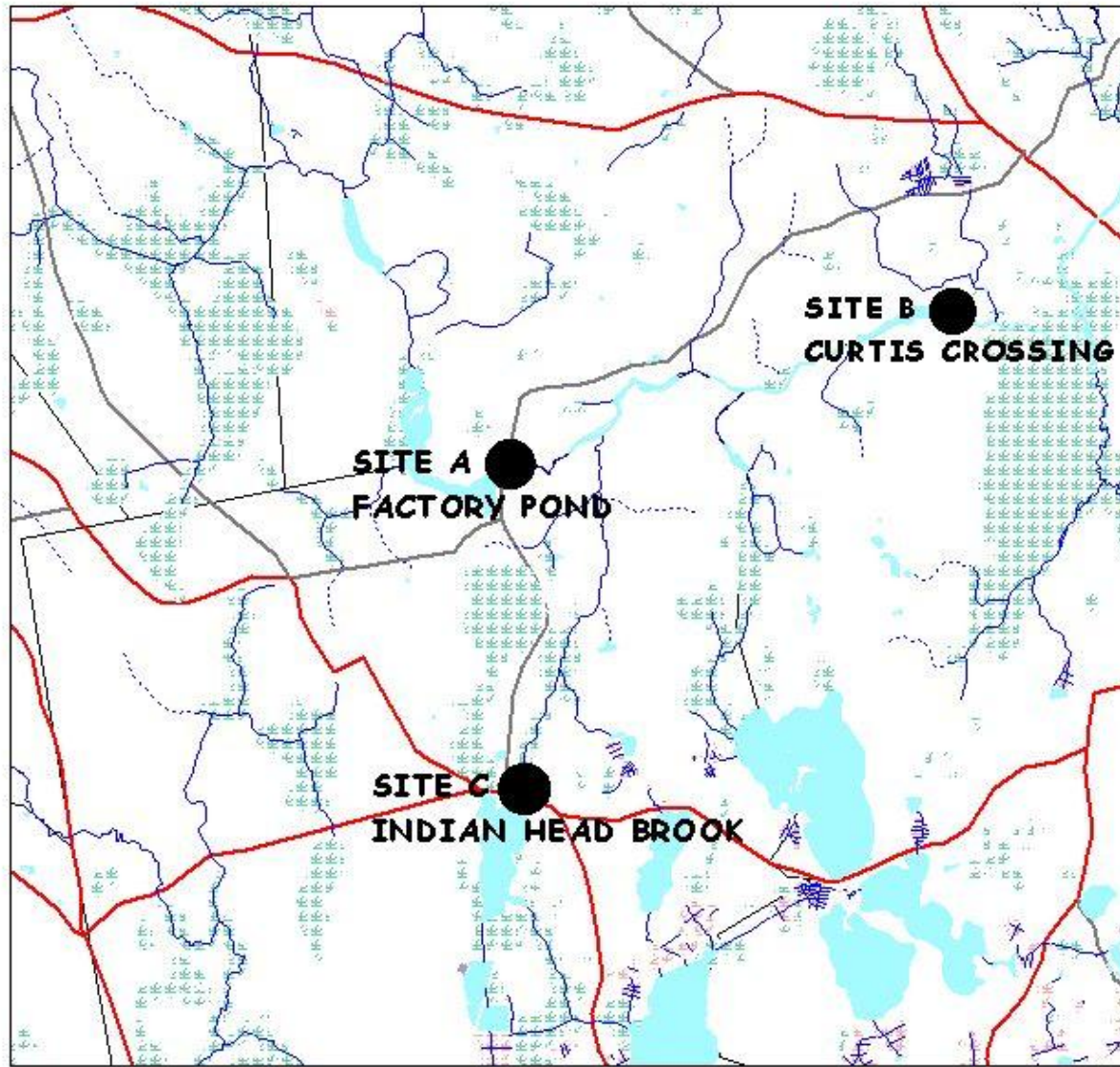


Three years of low to no results on fecal coliform cultures do not point to any source or sources of septic contamination at either Site A or Site B. This year's assessment at Site C also shows low coliform counts.



Drought conditions, changes in nutrient load and/or substrate changes effect macroinvertebrate populations and indicate water quality impairment reflected in biotic indices. These indices appear to rise and fall dependant upon total discharge. Fluctuations in depth and force of flow affect habitat area and the character of dominant organisms as well as species diversity any given year.

Indian Head River: Study Sites



Rivers & Streams

Stream

Intermittent Stream

Lakes & Ponds

Wetland / Salt Marsh

Cranberry Bog

Surface Water

Tidal Flat

Impoundment

Dam

Maj MHD Rds by Class - most detailed

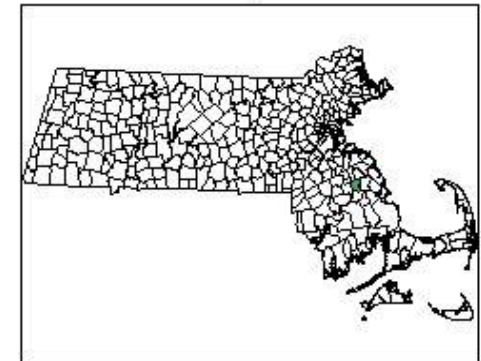
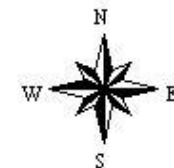
Limited Access Highway

Multi-lane Hwy, not limited access

Other Numbered Hwy

Major Road - Collector

MA Towns



1 0 1 2 Miles

RECOMMENDATIONS



High nitrate loads at both the upstream and the downstream sites should be continually monitored. Having found no correlation between fecal coliform counts and high nitrogen, it seems that septic contamination of the water should be ruled out. And, although feeder brooks carry both nitrogen and phosphorus into the river, it does not appear that there is enough contribution to account for the unusually high concentrations we have found in the river test sites.



Test Site C, The Indian Head Brook, should be monitored as well in order to develop a better profile of nitrogen and phosphorus levels and their relationships.



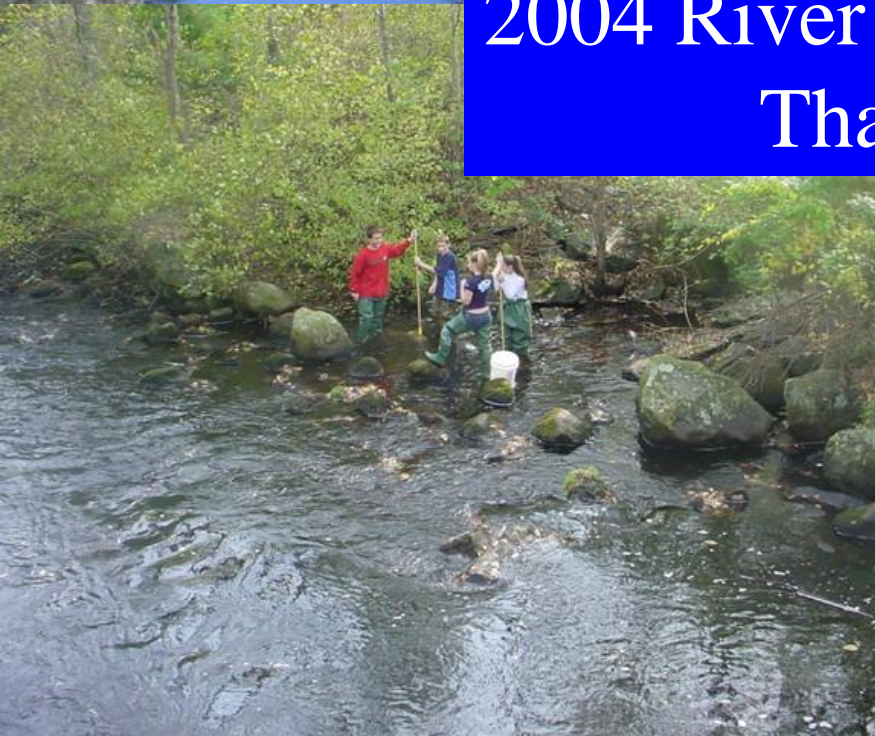
Dr. Curry has suggested that we look at organic breakdown of leaf litter and conduct an experiment to measure nitrogen release in water over time.



Lastly, students should look into measuring nitrogen levels in Factory Pond using both 24 hour sampling methods and monthly grab samples to determine if standing water reflects the fluctuations and high nitrogen concentrations found in the sampling sites downstream.



2004 River Watch Memories Thank You



A photograph of two male students in a chemistry laboratory. They are both wearing safety goggles and white lab aprons over their t-shirts. The student on the left is wearing a dark blue t-shirt and blue gloves, leaning over a lab bench. The student on the right is wearing a white t-shirt and blue gloves, also leaning over the bench. They are positioned in front of a sink with a chrome faucet. In the background, there are various pieces of laboratory equipment, including a large white machine and a sink with multiple faucets. The image has a cyan border.

*Did you
get it?*

I think so...

That's All

folks

Executive Summary