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HANSON RIVERWATCH

October 2008 – April 2009



GREG:

Good morning, we are Hanson RiverWatch and this is the 6th year that grade eight students have looked at the water quality of the Indian Head River.

(Greg: you will have to click twice for each person as they introduce themselves)

I'm Greg Mahoney

I'm Amy Hurst

I'm Nick Levesque

I'm Pheobe Deneen

The Indian Head River

- The Indian Head River forms the Northern Border of the Town of Hanson, Other towns that impact the water quality directly in the areas of study include Pembroke to the east and Hanover to the north, northeast. Rockland and Abington also contribute via the Cushing Brook Watershed.
- There are approximately 8 miles between our upstream site near Factory Pond and our downstream site at Ludham's Ford or as other's call it, Curtis' Crossing.
- The river covers about eight acres of land in this area and was most likely used as a fishing and travel spot for the Wompatuck Indians.
- A guide named James Luddam carried Governor Winthrop across the Indian Head River in 1632 in order to get to Weymouth, Massachusetts.
- Though the river is called The Drinkwater River in other towns, we have chosen to refer to it as the Indian Head River in the scope of our study.
- There is a small beaver population and the river is annually stocked with trout. Massachusetts Fish and Wildlife has posted the river in it's entirety from Forge pond in Hanover to route 3 in Norwell and Pembroke including Factory Pond as P6; fishing resources contaminated with mercury. If herring are caught, they must be thrown back into the river. This applies more to the Pembroke side of the river, as there is a fish ladder in Luddams Ford Park.
- The Frenchs Stream Watershed, Cushing Brook Watershed, and Drinkwater River Watershed all flow into the Indian Head River watershed.

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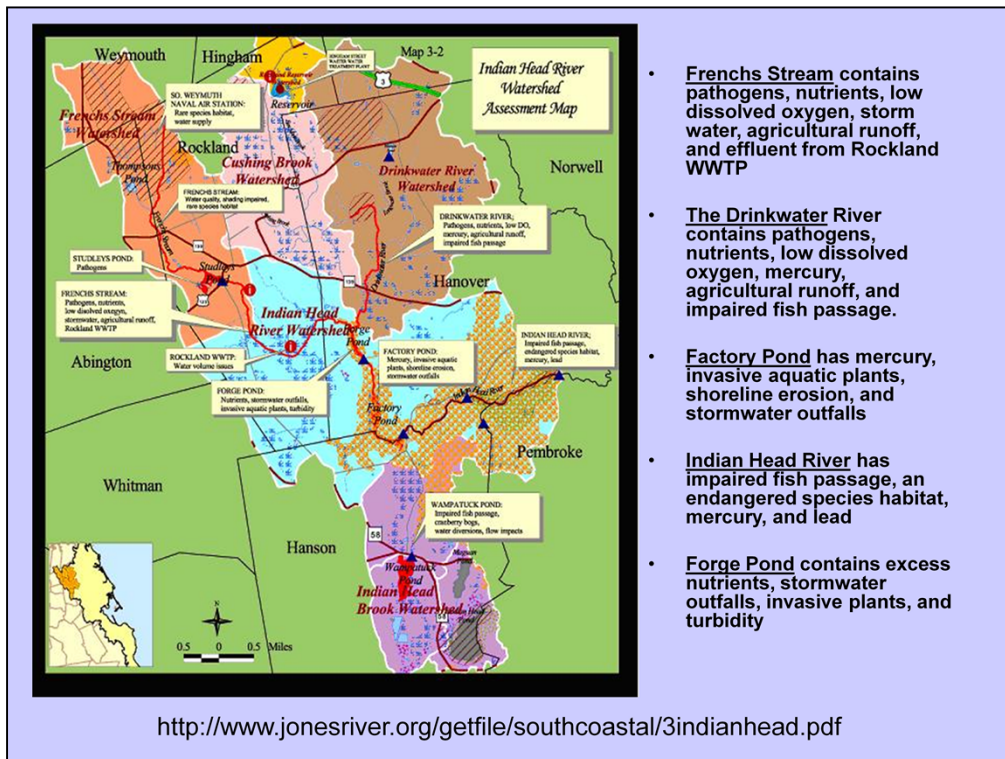
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The Frenchs Stream Watershed, Cushing Brook Watershed, and Drinkwater River Watershed all flow into the Indian Head River watershed



- Frenchs Stream contains pathogens, nutrients, low dissolved oxygen, storm water, agricultural runoff, and effluent from Rockland WWTP
- The Drinkwater River contains pathogens, nutrients, low dissolved oxygen, mercury, agricultural runoff, and impaired fish passage.
- Factory Pond has mercury, invasive aquatic plants, shoreline erosion, and stormwater outfalls
- Indian Head River has impaired fish passage, an endangered species habitat, mercury, and lead
- Forge Pond contains excess nutrients, stormwater outfalls, invasive plants, and turbidity

➤ Nick:

➤ Frenchs Stream contains pathogens, high nutrient levels, low dissolved oxygen, storm water, agricultural runoff, and effluent from Rockland WASTE WATER TREATMENT PLANT

➤ The Drinkwater River contains pathogens, nutrients, low dissolved oxygen, mercury, agricultural runoff, and impaired fish passage.

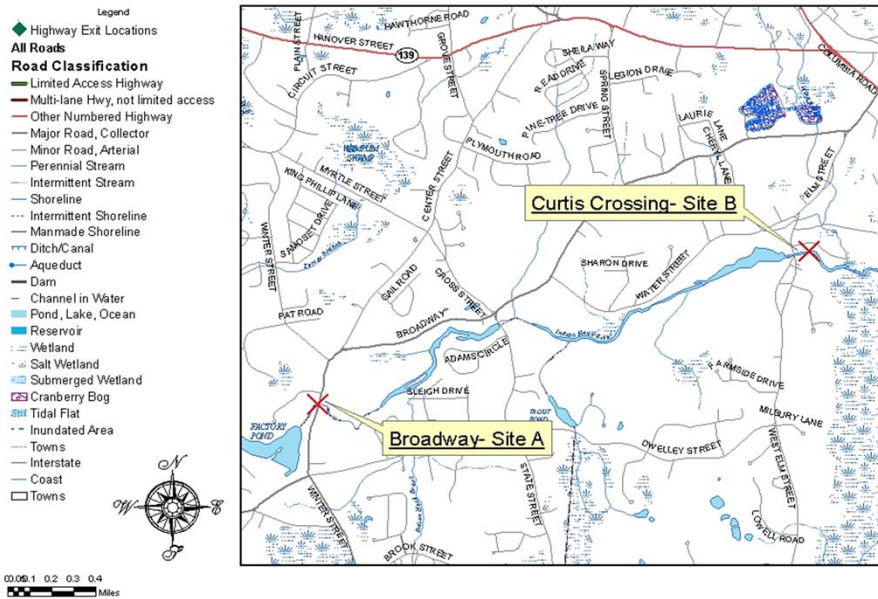
➤ Factory Pond has mercury, invasive aquatic plants, shoreline erosion, and stormwater outfalls

➤ Indian Head River has impaired fish passage, an endangered species habitat, mercury, and lead

➤ Forge Pond contains nutrients, storm water outfalls, invasive plants, and turbidity.

➤ This information is also available from the South Coastal Action Plan available online at the above web address

Test Sites- Hanson Riverwatch 2008-2009



NICK

Our upstream study site is right at the outfall below Factory Pond and the Downstream site is at Curtis Crossing (also called Luddham's Ford) on the Pembroke/ Hanover line.

SITE A

Broadway Hanson



AMY:

This is our site A at Broadway St. We took 24 hour samples for pH, Dissolved Oxygen, Temperature and nutrient levels in October 2008. We also collected macroinvertebrate samples at this time.



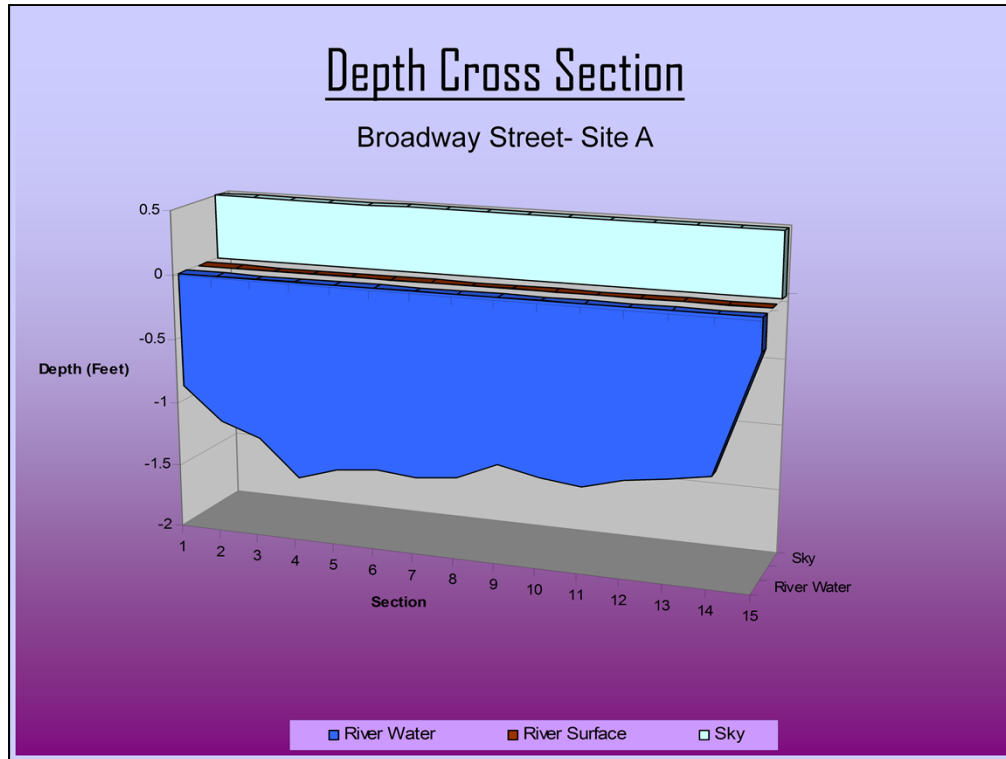
AMY:

This fisherman noted to us in March when we were collecting our samples for bacterial analysis that brook trout had been stocked in the river.

The foamy water indicates the presence of protein decomposition in the water

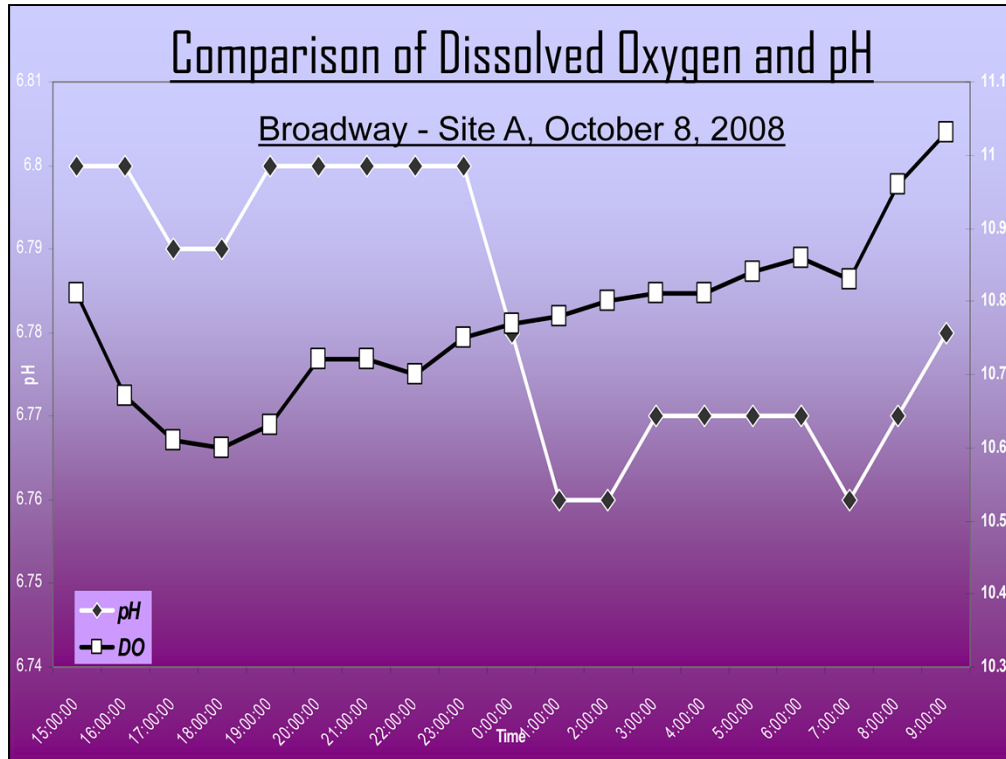
Here is an example of a storm water out fall leading right into the river from the road.

.... And the sign informs fishermen to not eat the fish they catch because of mercury contamination.



AMY:

This is a cross section and depth profile of the river at the point where we took flow data



PHEOBE:

This graph shows the relationship between dissolved oxygen and pH at site A. As you can see: as DO values decrease and Carbon dioxide forms, the pH of the water becomes more acidic. This is partly due to changes in photosynthesis during nighttime hours and daytime hours.

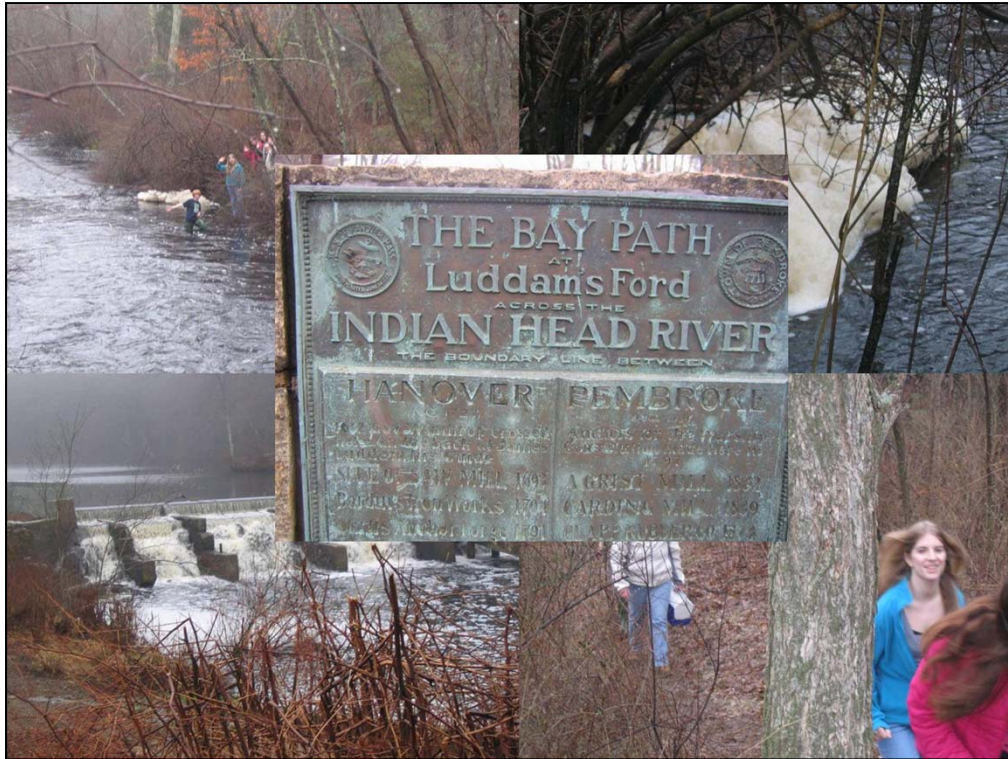
SITE B

Curtis Crossing, Hanover



PHEOBE

This is our site B at Curtis Crossing

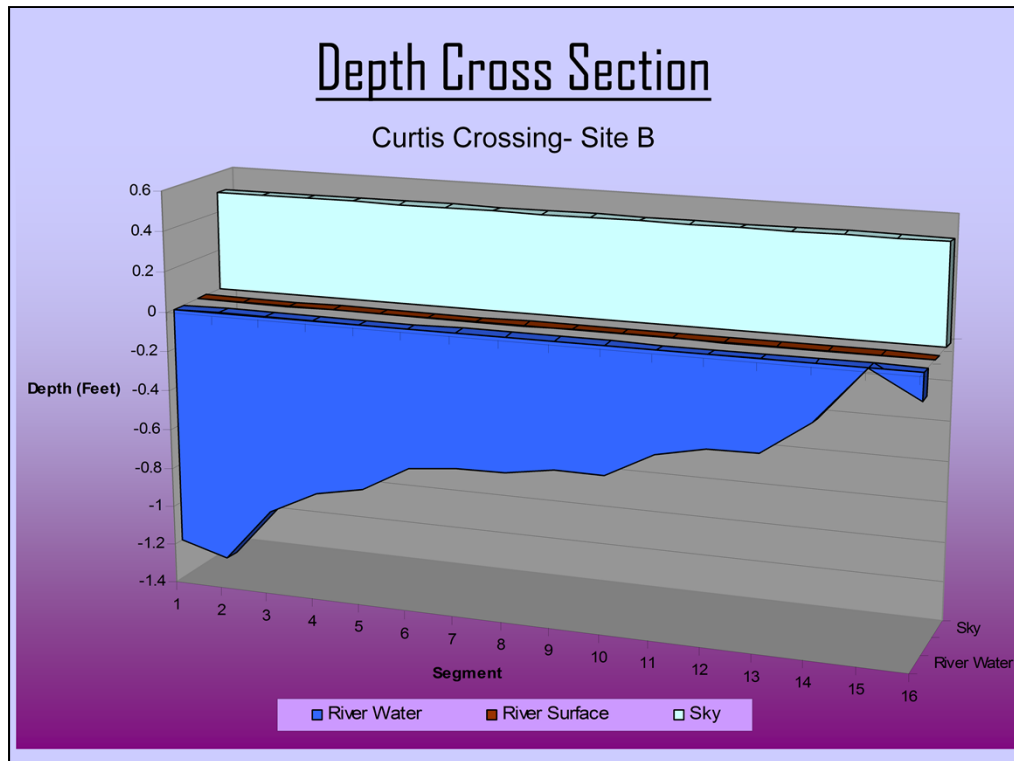


Pheobe

These pictures were taken during our April bacterial sampling.

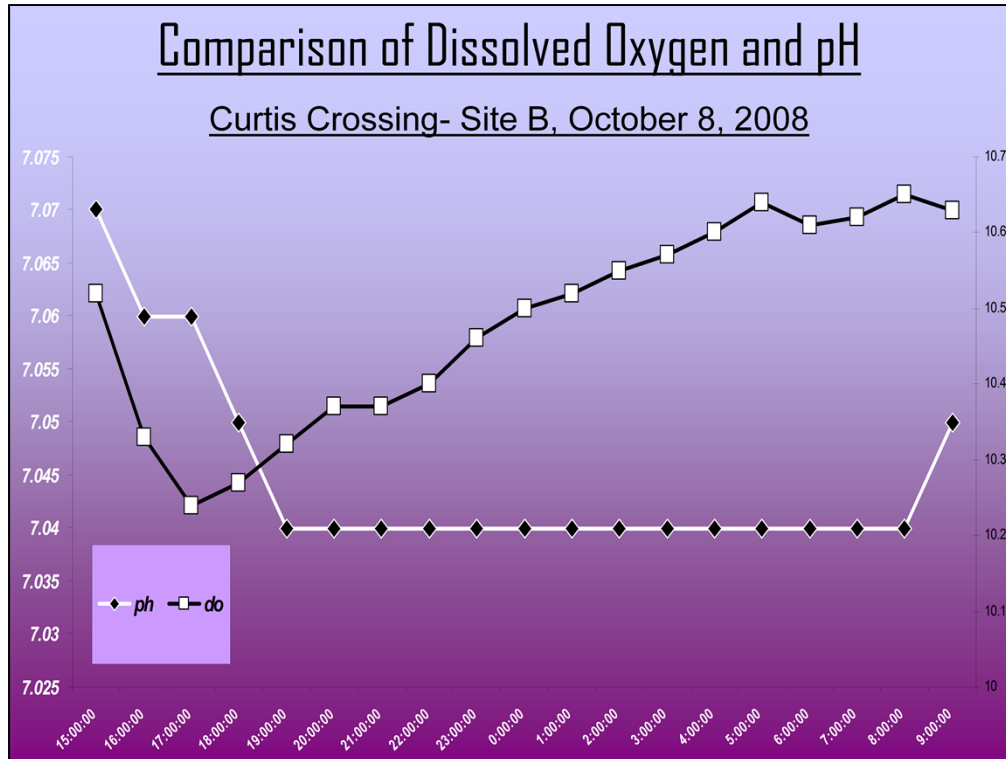
As you can see, the foamy residue is much greater here than at site A. (This photo was taken in March)

This picture shows the impoundment and off to the right is the fish ladder.



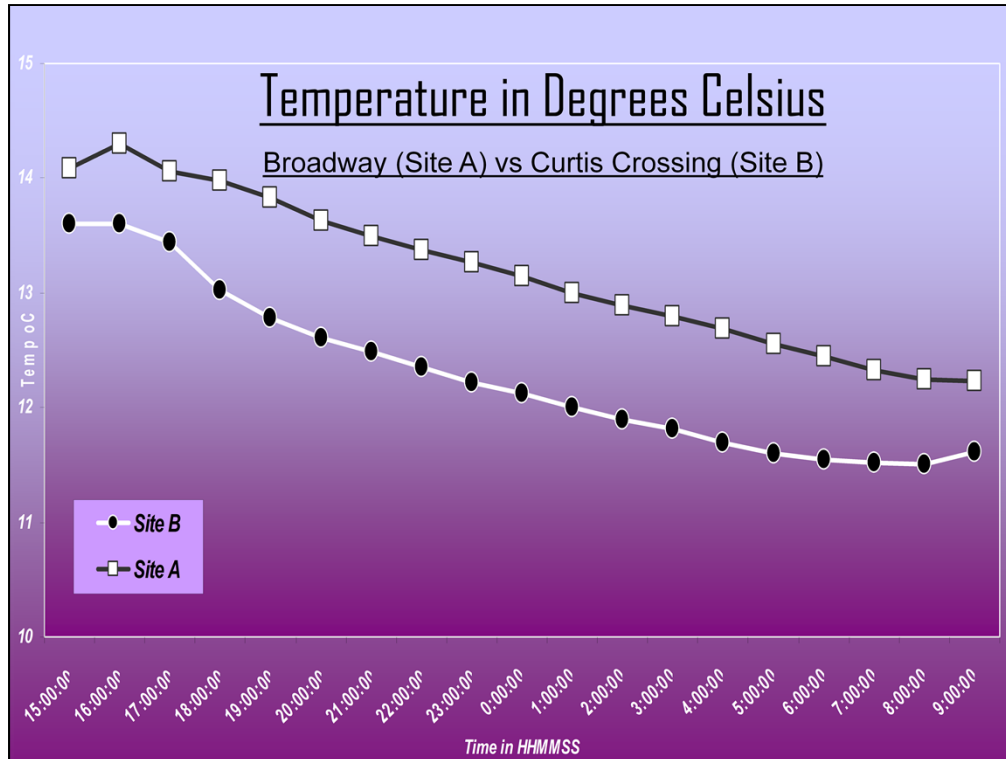
PHEOBE

This is a cross section and depth profile of the river at the point where we took flow data



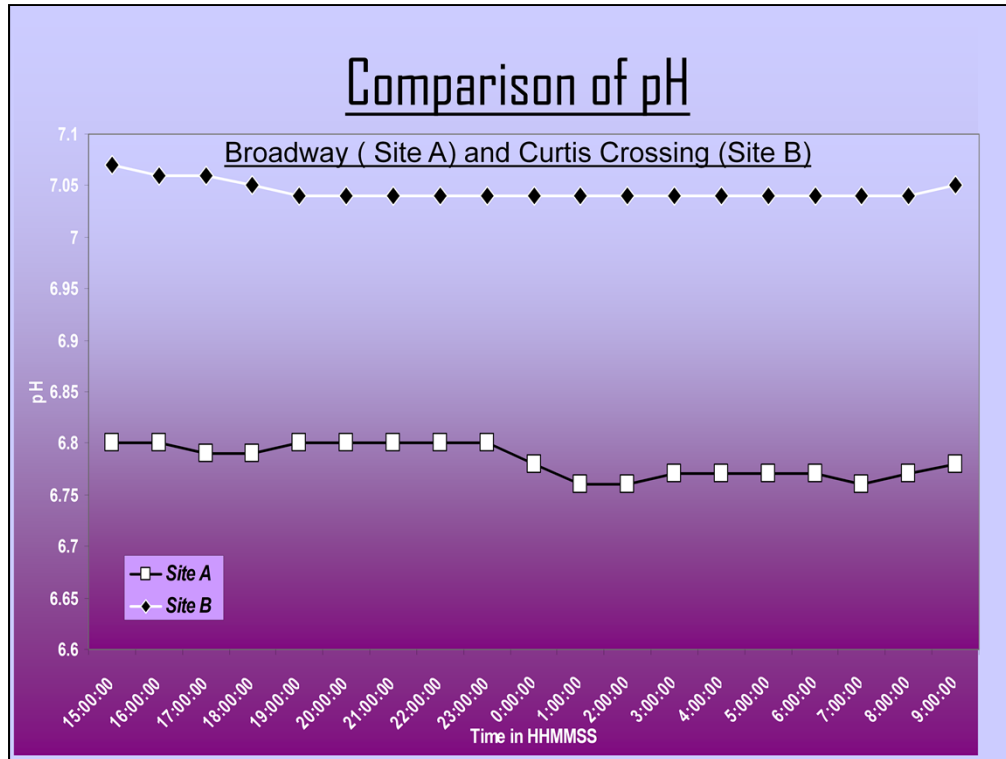
PHEOBE

The graph of Dissolved oxygen and pH shows the same relationship as the graph from Broadway St. That is: as dissolved oxygen decreases, pH levels become more acidic.



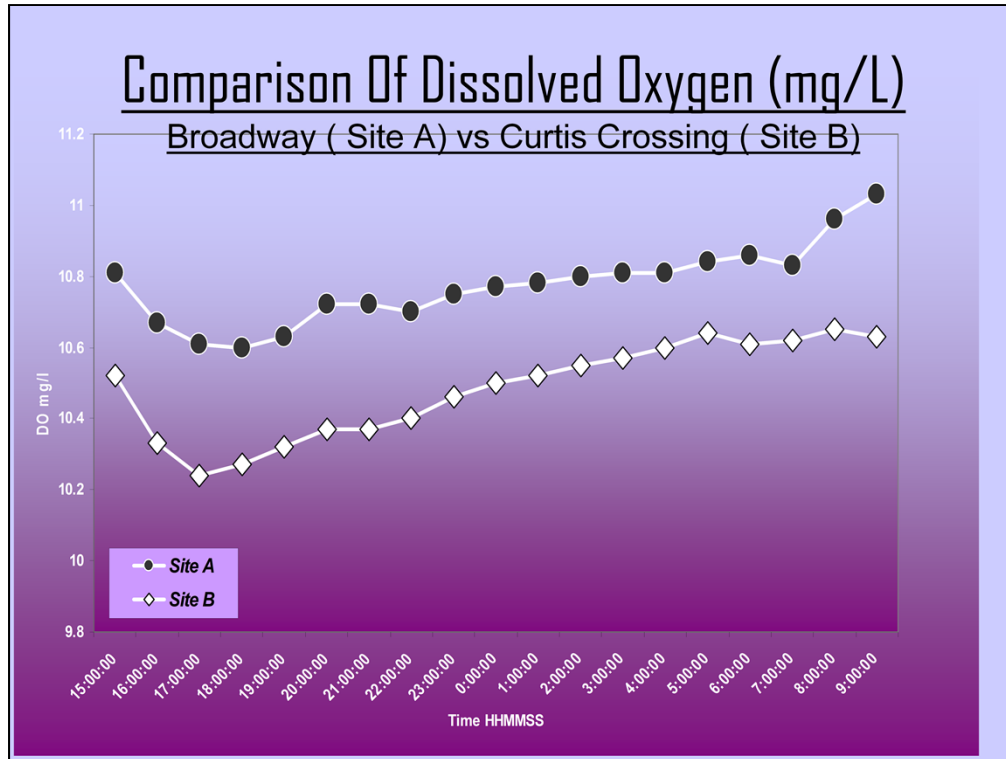
GREG:

The Twenty Four hour temperature samples at site A were slightly warmer than those at site B.



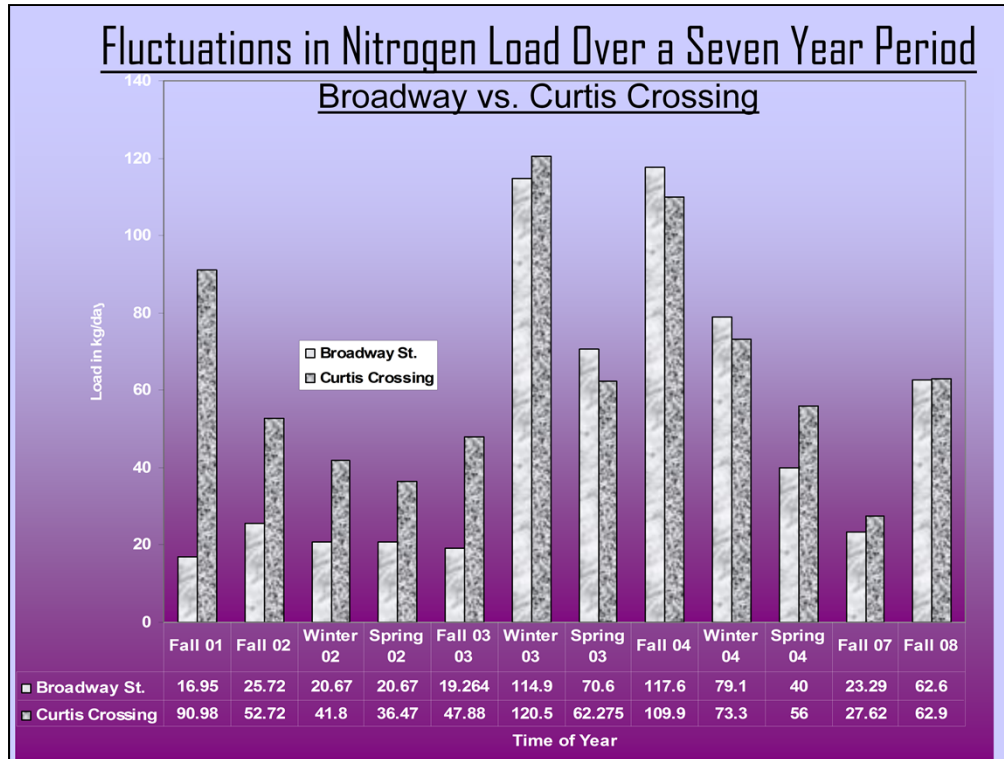
GREG:

This is a comparison of the pH at the two sites. pH at Site B may be a little bit higher (or more basic) due to the crumbling cement bridge that spans the river at this point.



GREG:

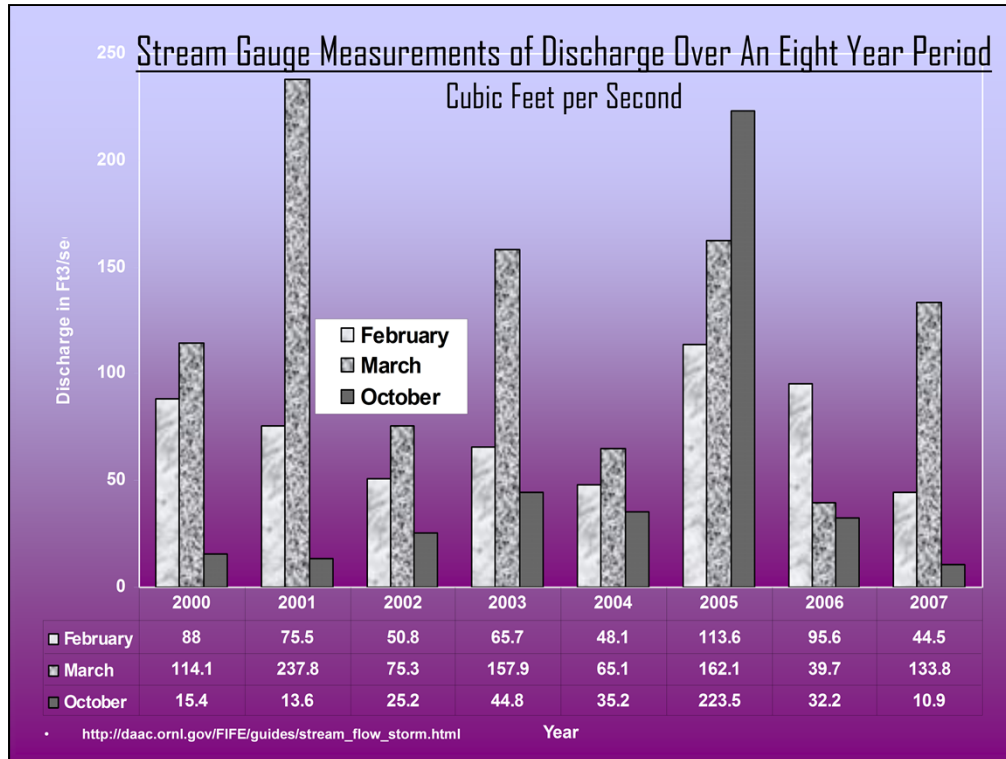
In a comparison of Dissolved Oxygen for the two sites we found that the DO is slightly lower at site B than at site A. We're not sure why this is the case because the water is deeper, cooler and runs faster here.



Pheobe:

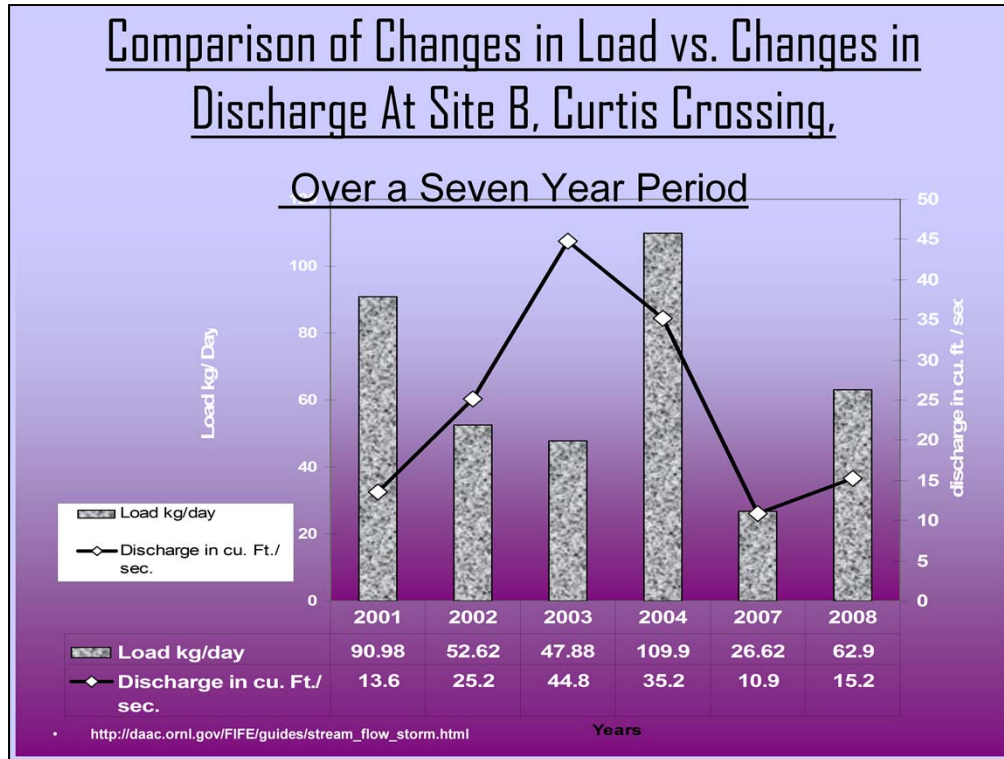
We are lucky enough to have several years worth of data now collected in regards to nitrogen loading at the two study sites. As a rule, phosphorus is a limiting factor in this system and has not been recorded due to mostly *"below detectable readings"*.

Nitrogen, however, is a problem here and in no year since data collection began has the load been calculated in anything less than kilograms per day. The average load for site A for this time period (calculated based on the fall readings) is 44.23 kg per day. The average for Site B for the time period is 96. kg per day.



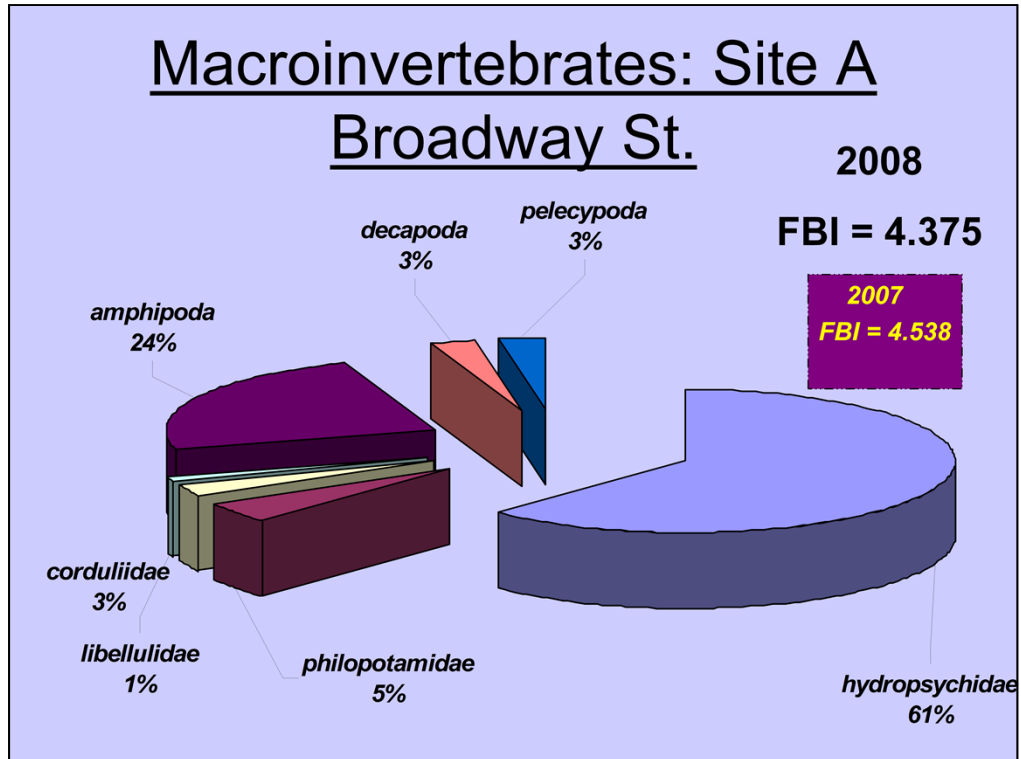
Phoebe:

There is a stream gauge monitoring station at Curtis Crossing and data is available at the above web address. Here we have shown some fluctuations in discharge for a seven year period focusing on a fall, a winter and an early spring month.



Amy:

We tried to show, with this graph, any connection between discharge and Nitrogen load at Site B. The only possible connection we might make is that the flooding event in 2004 could have acted like a "flushing" effect, reducing load values for the next few years. Are we now seeing a rise in Nitrogen load as discharge values increase?



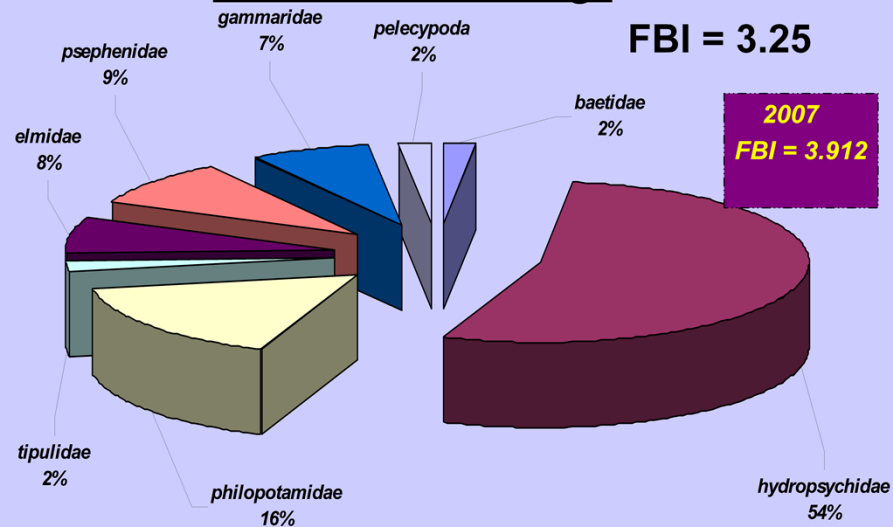
Greg:

We counted 300 Macroinvertebrate organisms for both the Broadway St. Site and the Curtis Crossing Site. The netspinners; members of the caddisfly group, hydropsychidae, make up the largest percentage of the sampling. This number is up from last year's 16 %.

The family biotic index is close to last year's (click) of 4.538

Macroinvertebrates: Site B

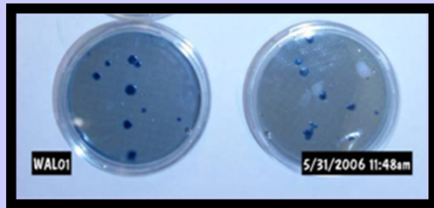
Curtis Crossing.



Greg:

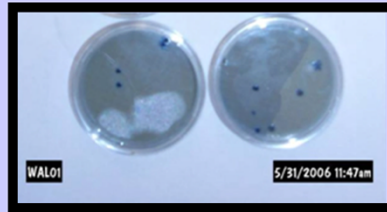
The hydropsychidae also make up the largest group at site B. This year the family biotic index is similar to the biotic index from last year of (click) 3.912.

Fecal Coliform



SITE A: BROADWAY ST.
9 TO 10 COLONES PER 100 ML

SITE B: CURTIS CROSSING
4 – 6 COLONIES PER 100 ML



Nick:

These are the results for coliform bacteria. Samples were taken in March. Numbers of colonies this year are down by about 33 percent compared to last year.

CONCLUSION

Hanson Riverwatch: October 2008 - April 2009

- *In conclusion, we have found that these two river testing sites have changed very little during the time that Hanson Middle school students have been collecting data.*
- *Even though discharge amounts fluctuate both yearly and seasonally, Nitrogen load remains significant and measureable in kilograms over the span of seven years*
- *Dominant macroinvertebrate groups like the hydropsychidae reflect high concentrations of organic matter because of their feeding strategies.*
- *Despite multiple signs of impairment such as higher pH, high nitrogen load and storm run-off, conditions remain good and biotic indices show fairly stable populations of a variety of macroinvertebrates.*
- *We would like to thank our teacher; Ms. Kofton and Mr. Geoghan; our principal for making this experience possible for us this year. We would also like to thank Mrs. Levesque for driving us around. Special thanks to Kim McCoy and Dr. Curry for their tireless devotion in bringing these experiences to students and their teachers.*

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click



