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EESC 33 Field School. Physical and biological coupling in the coastal waters of the Toronto region.

Dates: August 17-28, 2009

Course instructors: Prof. **Mathew Wells** [contact person]
Department of Physical and Environmental Sciences, U of T Scarborough campus

Prof. **Hélène Cyr**, Department of Ecology & Evolutionary Biology, U of T St George

Evaluation:

Participation in field and lab activities (individual): 20%

Group presentation of class data: 15%

Individual presentation of independent project: 15%

Final paper (individual, due 1 month after end of course): 50%

Schedule for EESC33 fro August 17th until August 28th

Most days will run from 8:00-4:30 and people should bring their own lunch, drinking water, rain gear, sun hat and sun cream. You will want some sturdy shoes that can get dirty. You will need to bring your own note-book to record field measurements and a pocket calculator to do some simple exercises in the field.

It is important that student be punctual for the start of the field trip each day, as we have a tight schedule for the first few days and we have to do most things as a group.

Mathew Wells will have his cell phone during the field course, the number is 416 271 2168

Monday - Tommy Thomson -meeting at 8am.

If you are coming on public transit the 83 bus leaves the Donlands TTC subway station and comes quite close to the corner of Unwin Ave and Leslie St. We have permission to enter this site during working hours from the TTC, however we must enter the site as a group after signing a waiver to the TRCA, so I ask that everyone be there promptly at 8

am as students coming late will not be able to enter individually, so make sure you are early.

The exact location I want to meet is on this link to Google maps.

http://maps.google.com/maps?f=q&source=s_q&hl=en&geocode=&q=ttc+map&sll=43.658185,-79.330902&sspn=0.040114,0.086432&ie=UTF8&ll=43.652333,-79.322888&spn=0.00241,0.005402&z=18

During this day various groups will set up a weather station, make measurements of water quality, look at abundance of nuisance species such as zebra mussels and Cladophora. We will take some water samples around the park and look at the water chemistry. We will set up thermistor chains and leave overnight. There are some very different habitats within the park and we will look at how different the thermal fluctuations they experience.

Tuesday On Lake Ontario on a boat. The exact location I want to meet at 8 am is at the Bluffers Marina at

http://maps.google.com/maps?f=q&source=s_q&hl=en&geocode=&q=ttc+map&sll=43.658185,-79.330902&sspn=0.040114,0.086432&ie=UTF8&ll=43.706353,-79.23166&spn=0.004816,0.010804&z=17

The boat charter will depart from bluffers Marina from 8.30 -12, then 12.30 -3.30 pm. The boat can take 11 people so the group of 15 students will be split in two. Half go out in the morning for a few hours and the other half in the afternoon. On the water we plan to look at the large difference in water clarity and temperature as you move off shore. We have an underwater video camera so that students will also record see the spatial variability of the lake bed.

While half the group is on the boat the other group will look at water quality around the bluffers Marina. There is an interesting large constructed wetland at the base of the Scarborough bluffs where a combined sewer overflows during storms. This wetland is divided into 4 distinct parts and it will be interesting for students to measure differences in water quality between them.

Wednesday 8am to 4.30 Return to Tommy Thomson park to collect thermistors that have been left since Monday. On return take water samples in the Don River, and look at suspended sediment, Secchi depth and salinity.

Thursday 9am-5pm. Meeting in the Ramsay Wright building in room RWZL at the St George campus. Students will look at water samples that have been collected under microscope and try and measure some of the properties of the water quality. Students will go through an exercise to predict what the potential changes in water temperature might have been in the ponds and what the other estimates we can get from the metrological data.

Friday 9am -5pm. In room RWZL 124at St George campus working up data from the week. In the afternoon student groups will present a summary of the weeks observations.

Weekend

Monday - 8.30 am to 4.30 pm measure water quality in the Frenchmans bay wetland. We will meet the Frenchman's Bay Yacht club that is located on Breezy Drive at this location.

<http://maps.google.com/?ie=UTF8&ll=43.813805,-79.096048&spn=0.002404,0.005402&t=h&z=18>

There is a bus schedule from the Pickering GO station at <http://www.durhamregiontransit.com/app/wa/doc?docId=1704>

Students will make water measurements around the edge while another group goes out in a boat. There are striking differences in salinity, temperature, dissolved and turbidity between the bay and the waters of Lake Ontario. These waters are highly eutrophic so we will try and measure the oxygen demand of sediment to explain the low oxygen level in the bay. We will set up a meteorological station and a thermistor chains in the bay, as well as a DO probe to see changes in temperature and oxygen.

Tuesday - 8.30 am to 4.30 pm. More field work in Frenchmans bay. Possibly gets some samples from the Rouge River and Highland Creek as well, then compare salinity with Don River water.

Wednesday 9 – 5. Looking at the water samples in the lab at UTSC. Location at UTSC to be advised.

Thursday 9 – 5. At UTSC. Work up data collected and start talking about reports the students would write up.

Friday 9 – 5. At UTSC. Finish up any ongoing analysis and make second group presentations the data we collected in the second week.

One month later - students hand in research paper, which will combine some basic measurements we made as a group with reading of the literature. Possible topics are included as an attachment. This paper is mainly intended as a literature review rather than original research, and we will discuss topics of interest to the students during the course.

Possible questions for a research paper for EESC33.

Other topics are possible, but for the topics below there is a large amount of published literature that would make writing a literature review easier.

- 1) Why is water at the Toronto beaches often so cold in summer? Discuss the upwelling of cold lake water.
- 2) How does the Deep Lake Water Cooling plant work? Discuss the depth of the intake and the potential for cooling the city.
- 3) The Pickering Nuclear power station takes a large amount of lake water to cool down the reactor. What happens to this warm water when it is released back into the lake? Discuss the thermal plume.
- 4) What events lead to poor water quality that results in beach closures in Toronto?
- 5) Every year thousands of tonnes of road salt is used in Toronto to de-ice roads. Where does all the salt go when it washes off the roads? What influence does this have on wetland ecology?
- 6) The Great Lakes Water Quality Agreement identified 43 Areas of Concern (AOCs) identified in the Great Lakes Region. What are the problems in the Toronto harbour and what does the Toronto Remedial Action Plan hope to achieve.
- 7) The Great Lakes Water Quality Agreement identified 43 Areas of Concern (AOCs) identified in the Great Lakes Region. What are the problems in the Hamilton Harbour and what does the Hamilton Harbour Remedial Action Plan hope to achieve.
- 8) What influence have zebra and quagga mussels had on the ecosystem of the GTA foreshore?
- 9) How is the invasive Spiny water flea affecting the ecology of Lake Ontario?
- 10) Where is PCB contamination a problem in the sediments of Lake Ontario.
- 11) How is the invasive Round Goby affecting the ecology of Lake Ontario?
- 12) What is the VHS - viral hemorrhagic septicemia, and how is it damaging recreational fishing?
- 13) Discuss the water quality of drinking water, in particular why we can drink water from Lake Ontario despite also dumping all of our sewerage in the lake.
- 14) Why is the alga Cladophora becoming a problem in Lake Ontario?
- 15) The water level in Lake Ontario fluctuates by as much as a meter year to year. What effects do these long term water level changes have upon species diversity in wetlands?

