LAKEHEAD UNIVERSITY
WETLAND ECOLOGY
Fall 2017

Professor: Dr. P.F. Lee

June 29, 2017

Wetlands are not conventional wild areas. They do not cater to established, classical concepts of vista, horizon, and landscape. By comparison with the Smokies or the High Sierra, wetlands are claustrophobic. They force you inward, both upon yourself and upon the nonhuman world. They do not give you grand views; they humble you rather than reinforce your delusions of grandeur.

-P.A. Fritzell

...snakes hang thick from the cypress trees like sausage on a smokehouse wall; where the swamp is alive with a thousand eyes and all of them watching you...

-Jim Stafford

Cover image: Among the wild rice *Zizania palustris* on Whitefish Lake.

Contents

1 Introduction to Wetland Ecology Labs 2017

1.1 Syllabus

1.1.1 Required materials

- **This lab manual is required.**
- The 5th edition of **Wetlands** published by Wiley (Mitsch & Gosselink, 2015). Older versions will suffice and are on reserve at the library. Note the 4th edition is missing relevant chapters which are online at http://bcs.wiley.com/he-bcs/Books?action=resource&bcsId=3998&itemId=0471699675&resourceId=11452&chapterId=35222.
- **Wetland Plants of Ontario** published by Lone Pine Publishing Newmaster et al. (1997) is highly recommended and is an excellent field guide. Bring it with you on all field trips! May not be available since out of print.
- **Field Guide to the Common Forest Plants in Northwestern Ontario** Baldwin & Sims (1997) is also recommended, especially if you cannot obtain a copy of Newmaster et al. (1997) for a reasonable price.
- Resources on MyCourseLink. Additional plant identification books are available during the lab periods.
- A **field notebook** for field trips. Make notes as you gather plants for your collection. A waterproof book and pencil are ideal for wet conditions, but not essential.
- **Scrap paper** on field trips is useful for making temporary plant tags that can be coded and placed in your collection bag. Use pencil since inks rub off when wet.
- **Printed herbarium sheet labels** for your plant collection (Bookstore $1.50).

- **Mounting paper** (Bookstore; 25 sheets per pack, $12.50). It's a thicker quality and larger size (11.5×17 in). Herbaria typically use an even higher quality paper (thicker, acid free) for mounting plants.
- **Glue**. Elmer's school glue is perfect. Some available during work periods.
- Weighted objects for holding specimens flat while glue is setting. The herbarium has a supply for use during work period.

1.1.2 Suggested materials

- Rubber boots.
- Rain gear.
- Plant press, foam, cardboard, newspapers, blotting paper.
- Other plant identification books.

1.1.3 Course review

It is likely some time since you enroled in Plant Biology! Review some basic botany, including nomenclature, taxonomy and terminology (e.g. parts of a plant). Any first year plant biology textbook will suffice. Botany Illustrated (free if logged into library system) may help: http://www.springerlink.com/content/w3107p/?MUD=MP (Glimn-Lacy & Kaufman, 2006) The sections on "Names and Terms", "Root Types and Modifications", "Stem Modifications", "Leaf Types and Arrangement" and "Leaf Modifications" would aid in plant identification. Plant families for the plants in the study sets are also of value.

During Lab 1 will go out on a scavenger hunt which should help you in reviewing some key terms!

1.1.4 Lecture topics

Professor: Peter F. Lee
Office: CB4022
Email: peter.lee@lakeheadu.ca

Lectures are scheduled for Mondays and Wednesdays at 1:30 pm in CB3013.

The following topics are to be covered:

1. Importance and classification of wetlands.
2. Sediment chemistry of wetlands: Redox, N, P, organic matter.
3. Water chemistry: Carbonate cycle, N, P.
4. Production and adaptation of aquatic plants.
5. Secondary production.
6. Decomposition processes.
7. Succession in wetlands.
8. Sampling of wetlands.
9. Survey of wetland types: Salt marshes, tidal freshwater marshes, freshwater marshes, southern swamps, bogs.
10. Management of wetlands: Case studies.

Midterm Exam Date: TBD

Final Exam Date: As per scheduling.

1.1.5 Lab dates and topics

Technician: Susanne E. Walford
Office: CB3014A
Email: swalford@lakeheadu.ca

Teaching Assistant: Kristi Dysievick
Office: CB3033A
Email: kedysiev@lakeheadu.ca

Table 1.1: Laboratory schedule for fall semester 2017: Mondays 2:30-5:30 pm and a Saturday field trip. All mandatory. Dress appropriately (Section 1.1.7.) **NO lectures** on field trip days if we leave at 1:30 pm (assemble in CB3013). Expect to return to campus by 5:30 pm, but please don't schedule anything prior to 6:30 pm. DON'T ASSUME WE WILL BE BACK EARLY!

Lab	Date	Description	Location
Lab 1	Sept. 11	Introduction, Safety, Scavenger Hunt	CB3013
Lab 3	**SAT. SEPT. 16**	FIELD TRIP: Inland lake and adjacent wetlands	Whitefish Lake
Lab 2	Sept. 18	Plant mounting & initiate group project	CB3013
Lab 5	Sept. 25	FIELD TRIP: Lake Superior wetlands	Hurkett Cove
Lab 4	Oct. 2	FIELD TRIP: Bog, fen, marsh	Boreal Rd.
READING WEEK		NO LECTURES OR LABS THIS WEEK	
Lab 6	Oct. 16	ECOTYPES: Swamps	CB3013
Lab 7	Oct. 23	ECOTYPES: Marshes	CB3013
PLANT TEST 1	**Oct. 30**	**Labs 6, 7**	CB3013
Lab 9	Nov. 6	ECOTYPES: Fens	CB3013
Lab 10	Nov. 13	ECOTYPES: Bogs	CB3013
PLANT TEST 2	**Nov. 20**	**Labs 9, 10**	CB3013
ANNOUNCEMENT	**Nov. 24**	Public notice for project (1 page)	CB3013
GROUP PROJECT	**Due Nov. 27**	STUDENT PRESENTATIONS	CB3013
PLANT COLLECTION	**Due Dec. 4 NOON**	Individual collection	CB3027

1.1.6 Mark breakdown

- Lecture component
  - Midterm exam: 15%
  - Final exam: 35%
- Lab component
  - Wetland plant identification tests (two): 15%
  - Wetland plant collection and field notebook: 15%
  - Wetland group project: 15%
  - Participation and peer review: 5%

1.1.7 Field trips

Attendance

Field trips are an integral part of this course and are mandatory! Students failing to attend a field trip for any reason will be provided with an alternative assignment. The 3-4 hr field trip alternative assignment will consist of an essay (≈1000 words plus references and diagrams) on the hydrogeomorphic classification of a selected wetland. Students missing an all day field trip are required to write an essay (≈2000 words plus references and diagrams) on the development of wetlands in Northwestern Ontario. The mark on these alternative assignment(s) will factor into 50% of the total lab component.

All day (Sat or Sun) field trip

We will depart Lakehead University from the Agora at 9 am and return at approximately 5 pm. Exact times TBD. You will need to bring a lunch and dress for the weather (which can change quickly). Plant collecting and potential wild rice harvesting will be done with First Nation peoples either by canoe and/or airboat. Details pending at time of lab manual printing.

Safety

Students will be given a safety orientation for the biology labs. You must know the location of eye wash stations, safety showers, fire exits, fire pull stations, fire blankets, first aid kits, emergency phones and security services.

The complete biology safety and accident reporting procedures can be found on the Department of Biology homepage (https://www.lakeheadu.ca/academics/departments/biology/safety).

All students MUST complete the Field Trip Waiver form. If you are allergic to things we may encounter in the field (e.g. bees), bring your required medication. Students are asked to follow some simple rules.

- Wear appropriate clothing and footwear for the weather. You will be traversing uneven and wet terrain.
  - Boots, especially tall rubber boots are highly recommended. Hiking boots may be too short. Some waders (hip or chest) are available and will allow you to collect specimens from shallow waters.
  - Long pants and long sleeves will prevent scratches and biting insects (mosquitoes, ticks, wasps).
  - Rain gear should be donned as required. Even if its not raining, such clothing will keep you dry when we wander through damp areas.
- No horseplay. Twisted ankles make for a painful walk over rough terrain.
- Bring appropriate medical supplies for allergies.
- Alcohol, drugs (banned, OTC, etc.) that would impair your judgement or would cause drowsiness are prohibited.

Supplies

Since some supplies are provided and students are asked to help with loading and unloading the bus.

- Plastic bags (variety of sizes) will be provided.
- Small shovels. Some available
- Pruning shears optional. Some provided, return after trip.

- Trowels (digging tools). Some provided, return after trip.
- Lab notebook, preferable water proof. Any size will suffice.
- Pencils and scrap paper to label material in the field (ink may run).
- Sharpies/permanent markers to label bags. Some provided, return after trip.

1.1.8 Plant collection

A WETLAND plant collection of 20 specimens is required from EACH student in BIOL 4430. Details are presented in the next section.

1.1.9 Plant identification tests

There are two plant identification "bell ringer" tests this term. Each has 25 stations and a bonus. A rest station is also provided. You will have 90 seconds per station. If required, a hand lens will be at the station. Although the majority of questions are identification based, a few word questions are included. Therefore, know something about the ecology of the plants you study (wetland classes, wetland ecosites). When viewing study specimens, ask yourself: Are you looking at a typical fen plant or an open water plant? Is it emergent or submergent?

Take your time during plant identification labs and EXAMINE specimens rather than just "looking at them". DO NOT just take pictures and assume you will make time later to study (you won't)! Observe them in detail, make notes, pick out the characteristics of the family. You may find it helpful to sketch specimens as since this forces you to note details on the roots, rhizomes and stems as well as the arrangements of branches on the stem, arrangement of leaves on the stem, arrangement of fruiting bodies and details of leaf architecture. Don't just memorize colours and sizes of specimens! Specimen mounts for tests WILL BE DIFFERENT from those viewed in class; you need to be able to ID plants based on their morphological features!

BRING THE BLANK TEST PAGE FROM THIS MANUAL TO EACH TEST!
Test 1 is Lab 8 and Test 2 is Lab 11.

1.1.10 Wetland project

This culminating project is to be completed in groups, with each member equally contributing to each aspect. The objective is to present an important wetland topic with enough impact to catch

the attention of a general public audience. In a "real-world" situation, you have limited time to make your "pitch"!

Your project must consist of three aspects:

1. An oral presentation (length TBD) with five minutes of questioning. Students generally choose to use PowerPoint, but any audio/visual technique you think will get your point across are perfectly acceptable. Be creative!
2. A single page advertisement that outlines the question/objective being examined, logistic(s) of solving the problem (i.e. action plan) and the implications/benefits of your project. THIS IS DUE ONE WEEK BEFORE THE PRESENTATION! This page should convey your idea to the general public and entice them to attend your presentation.
3. Supporting reference materials (references) which verify your claims are to be provided as a hard copy the day of the presentation. One page should suffice.

Ideally your topic will be of local interest, but it can be any subject provided it is important to wetlands and would need public support to implement. Possible topics include:

- Impact and control of geese within Thunder Bay wetlands.
- Remediation of the Chippewa wetland complex.
- Remediation of Mission Marsh.
- Rusty crayfish impact on local wetlands and methods of control.
- Importance and management of wetlands for local fisheries.
- Purple loosestrife (*Lythrum salicaria*)–problem or not?
- Reed canarygrass (*Phalaris arundinacea*)–problem or not?
- Wetland remediations/enhancements to increase local waterfowl populations.
- Measures to mitigate impacts of the expanding housing development adjacent to Williams Bog.
- Wetland systems to improve municipal wastewater discharged from small communities (e.g. First Nations).
- The potential for cranberry production in northwestern Ontario.
- Peat mining as a biofuel for northwestern Ontario citizens.
- Rehabilitation of regional mine effluents with wetlands.

- Impact of road and rail infrastructure on wetlands within the "Ring of Fire".
- Impact of diamond mines on the wetlands in the Hudson Bay lowlands.
- Impact of oil pipeline leakages in northern Ontario wetlands.

Please confirm your group and topic prior to September 30!

1.2 Plant collection details

A WETLAND plant collection of 20 specimens is required from EACH student in BIOL 4430. One of the best ways to learn plant identification is to collect specimens and press them! Every plant identified and listed in your future research papers or thesis should be backed up with a **voucher specimen**. If your committee members doubt your identification of a particular plant, you can defend yourself by referring them to your pressed collection, which can be verified by a plant taxonomist.

- Your collection must contain a total of 20 species.
- Collect specimens from ALL wetland classes. The Canadian Wetland Classification System (National Wetlands Working Group, 1997) recognizes five:
  - Bog
  - Fen
  - Marsh
  - Swamp
  - Shallow water
- Collect specimens from plant families as specified during the first lab.
- Ideally, specimens possess all parts of the plant: roots, stem, leaves, and flowers and/or fruits. Sometimes this is not possible.
- Ensure some (3-8 plants) of your collection are submerged, floating-leaved, and emergent aquatics.
- Limit your collection to vascular plants (tracheophytes) and avoid "lower" plants such as mosses, liverworts, and algae, which are too labourious to identify at this point in your education. You may include *Chara* if you can find (smell) it!
- Your specimens for this course must be pressed and mounted according to standard herbar-