

Ontario Natural History: Species and Patterns



I. Course information

Professor	Brendon Larson, Ph.D.	<u>Office</u> : EV2 2016
Contact	Email is the best way to contact me: blarson "at" uwaterloo.ca.	
Office hrs	Wednesdays 10-10:45 and 2-2:45 (except May 6 and June 17) and by appointment. You need to meet with me at least once before we depart for Cabot Head; you do not need to set an appointment, so just stop by during office hours. If you cannot meet at these times on campus, email me so we can arrange to meet at another time in person, by phone, or on Skype.	
Graduate T.A.	Dianne Watkins	
LEARN	Lessons, readings, quizzes, discussion forums, dropboxes	
Course conflicts	If our mandatory field trip from June 19-27 conflicts with another course of yours, you must obtain a signature from the other instructor on a "resolution of conflict form" (posted in LEARN) in order to accompany us.	
Course readings	Williams, E.H. 2005. <i>The Nature Handbook: A Guide to Observing the Great Outdoors</i> . New York: Oxford U. Press. [Available at the bookstore for ~\$25] Two other mandatory journal articles (available on LEARN, see reference details on p. 2): Fleischner 2005, Willson and Armesto 2006 <u>Additional texts/equipment</u> : You may wish to obtain a field guide or manual (covering Ontario) for collecting/identifying other organisms of interest to you (though I will bring a library for us to use). Many of these are available for loan from my office and/or the Ecology Lab (thanks to WESEF).	

II. Course overview

ERS283 is a study of natural history, which may be broadly defined as the observational study of the natural world. This doesn't have much to do with how we normally think of history, because "history" in this context retains its archaic meaning of "description" or "analytic inquiry." It follows that a naturalist (someone who does natural history) is someone who "studies the world by observing plants and animals directly (Bartholomew 1986, p. 326)." By studying nature carefully over a period of time, naturalists obtain a general knowledge of local biodiversity.

While some biologists might denigrate natural history as a form of inquiry, many increasingly recognize its importance (e.g., Bartholomew 1986; Noss 1996; Dayton 2003; Greene 2005). Natural history undergirds the search for general ecological and evolutionary theories; as such, it has been characterized as the search for order in nature (Farber 2000). Darwin himself is often considered an eminent natural historian because he built careful observations of organisms in nature into a general theory of evolution. Natural history also provides critical knowledge for applied conservation and management because these often rely as much on observing the specifics of locales and their species as on general theories. And perhaps most important of all, naturalists can share their knowledge and appreciation with others, thereby promoting conservation values within society. Many of us who have an interest in biology and/or the environment have encountered an inspiring naturalist in our lives.

The practice of natural history develops a sensitivity to organisms in nature. In this sense, people have always done it because it is simply "a practice of intentional, focused attentiveness and receptivity to the more-than-human world (Fleischner 2005, p. 10)." Unfortunately, it is not something that most of us practice very often.

In ERS283, you should develop an appreciation for Ontario's natural history through first-hand exploration of biodiversity and the lives of other species. During the first six weeks of the course, you will read chapters from our textbook on natural history "patterns" and complete associated assignments and quizzes on a weekly basis on LEARN. You will also prepare for your field project on "pollination" with several readings. During the second part of the course, we will reside together in an Ontario biodiversity hotspot for an eight-day period so that you can apply what you've learned and conduct your project. This year the course will be held from June 19-27 at Cabot Head, an extensive, beautiful, and bio-diverse area at the north-eastern tip of the Bruce Peninsula (see Figure 1). We will reside at Grebe Lodge (http://bpbo.ca/?page_id=551) and make daily forays into nearby natural areas. There is lots to explore: an inventory of its biological features detected "197 vegetation types, 571 vascular plant species, 143 breeding bird species, 21 mammal species and 26 species of reptiles and amphibians (Varga 1995)," but this only puts a dent in its overall diversity once you include fungi, insects, nonvascular plants, and other residents.

Bartholomew, G.A. 1986. The role of natural history in contemporary biology. *BioScience* **36**: 324-329.

Dayton, P.K. 2003. The importance of the natural sciences to conservation. *American Naturalist* **162**: 1-13.

Farber, P.L. 2000. *Finding Order in Nature: The Naturalist Tradition from Linnaeus to E.O. Wilson*. Baltimore: Johns Hopkins University Press.

Fleischner, T.L. 2005. Natural history and the deep roots of resource management. *Natural Resources Journal* **45**: 1-13.

Greene, H.W. 2005. Organisms in nature as a central focus for biology. *Trends in Ecology and Evolution* **20**: 23-27.

Noss, R.F. 1996. The naturalists are dying off. *Conservation Biology* **10**: 1-3.

Varga, S. 1995. Cabot Head (Lindsay Township portion) site summary. Pp. 523-530 in Riley, J.L., J.V. Jalava and S.

Varga. 1996. Ecological Survey of the Niagara Escarpment Biosphere Report. Volume I: Significant Natural Areas. Ontario Ministry of Natural Resources, Southern Region, Aurora. Open File Site Report 9601. v + 629 pp.

Willson, M.F. and J.J. Armesto. 2006. Is natural history really dead? Toward the rebirth of natural history. *Revista Chilena de Historia Natural* **79**: 279-283.

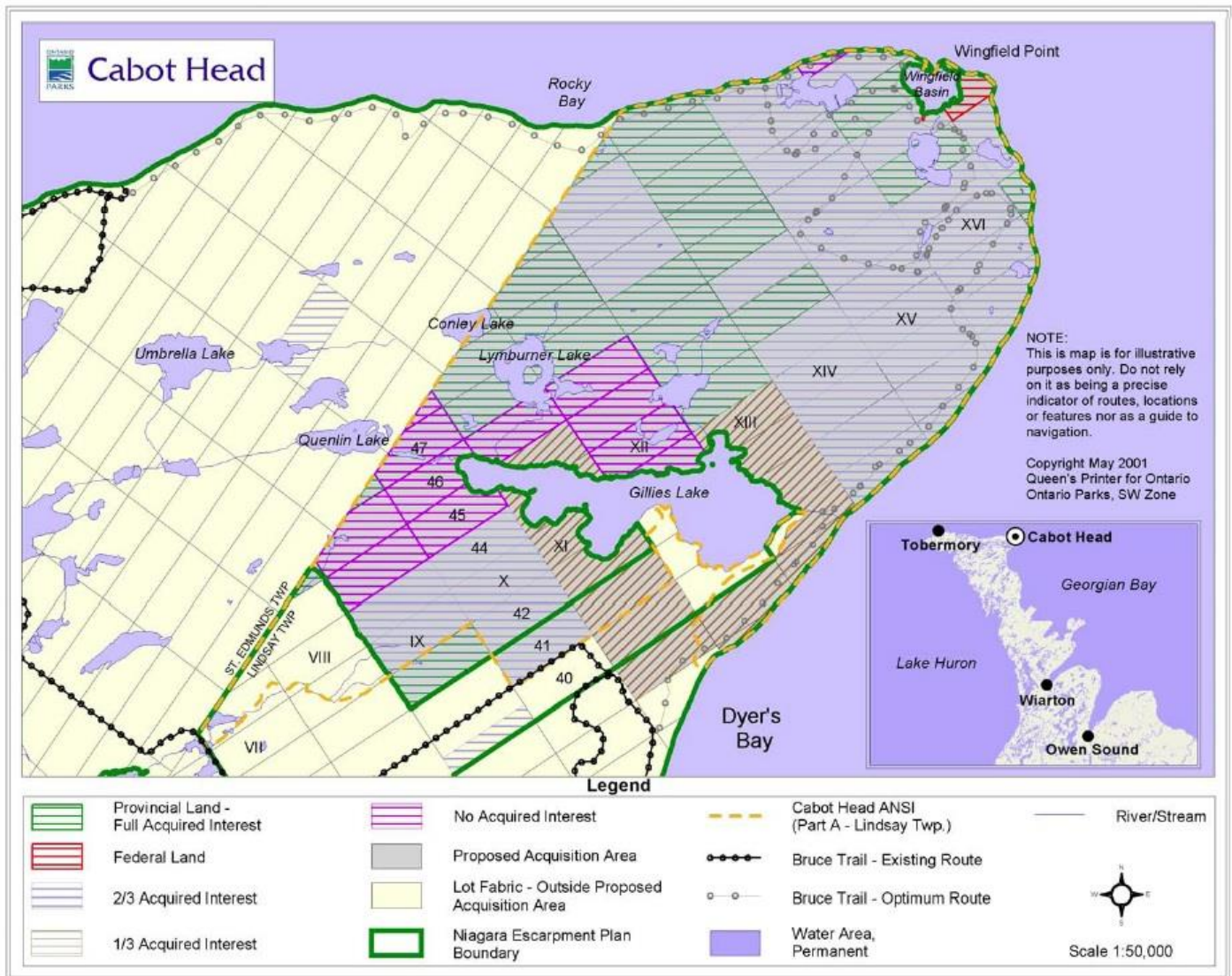


Figure 1: Cabot Head and land ownership in the region. We will be staying in Grebe Lodge (http://bpbo.ca/?page_id=551), located at the northwest corner of Wingfield Basin.

III. Important course dates

Return forms (including “resolution of conflict”)
 One meeting with Professor Larson

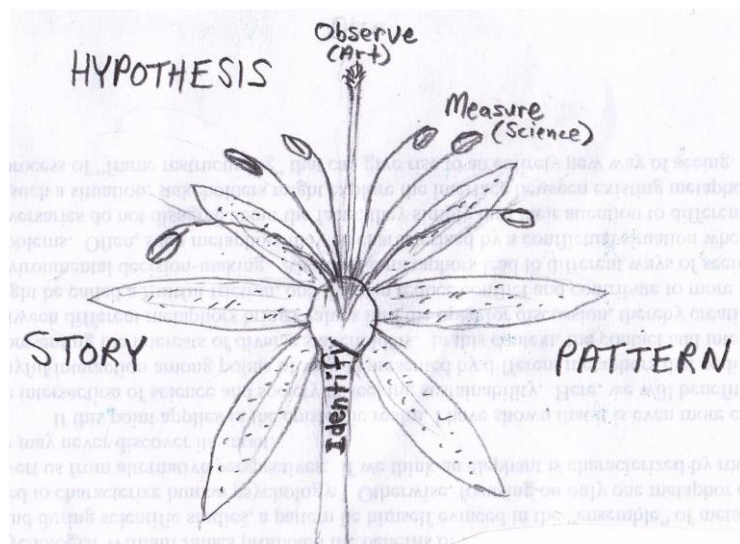
Tuesday, May 19 *in my ERS mailbox*
 Prior to departure for Cabot Head

*****Sign out equipment at the Ecology Lab prior to departure (details TBD)*****

Depart for Cabot Head
 Return to Waterloo
 Final project (due in LEARN)

Friday, June 19, ~1 pm (after lunch)
 Saturday, June 27, ~6 pm
 Friday, July 17, 11 pm

IV. Course learning outcomes



By the end of this course, you should be able to do the following (our course learning outcomes):

- 1) **recognize, describe and explain** common ecological, behavioral and taxonomic patterns in the natural world;
- 2) **apply** taxonomic principles and **use** keys to **discriminate** among species;
- 3) **carefully observe and evaluate** an ecological relationship, the pollination mutualism, **using** appropriate methods of natural history **inquiry**.

The image of a flower above presents these learning outcomes visually, showing how identification allows a melding of observation and science in the interest of interpreting broader patterns, which you might think of as stories about the natural world or even as scientific hypotheses (see Willson and Armesto 2006).

Ultimately, I would like this course to provide a building block for your life-long love of learning about the place(s) where you live and their inhabitants. It is meant to instill a sense of appreciation and knowledge of *how* to inquire that you can apply anywhere. The course will help create a basis for subsequent inquiry within nearly any realm of nature study from art to biological science.

I have designed the course so that our learning outcomes align with teaching and learning activities (both prior to and during the field portion), and with course assessment, as follows:

Learning outcome (above)	Teaching and learning activities before the field (largely online)	Teaching and learning activities in the field	Assessment methods
1.	-Course textbook and readings -LEARN discussion forum -LEARN lessons	-Group hikes -Individual exploration	-LEARN quizzes -LEARN discussion forum -Field quizzes
2.	-LEARN lessons	-Group hikes -Taxonomic tutorials -Project with partner	-LEARN quizzes -Field quizzes

3.	-Course textbook -Assigned readings	-Project with partner -Meetings with professor -Group meetings	-Informal presentations -Final paper
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V. Course activities prior to our field trip

Our course textbook is a pleasure to read and previous students in ERS283 thoroughly enjoyed it. The following table outlines weekly readings and activities prior to our field trip.

Week starting ...	Textbook readings	Other readings/ activities	Quiz and forum posting due on LEARN ...
May 4 <u>and</u> May 11	Introduction Chapter 1, <i>Plants</i> – Flowers and seeds Chapter 2, Trees	Syllabus ¹ ; Fleischner 2005	May 17 @ 11 pm
May 18	Chapter 3, Plant features (<i>not</i> 3.14,15) Chapter 4, <i>Animals</i> – Color and pattern	Trees and plant families (LEARN); Willson and Armesto 2006	May 24 @ 11 pm
May 25	Chapter 5, Ecology and behavior Chapter 6, Birds	Bird songs (LEARN)	May 31 @ 11 pm
June 1	Chapter 7, Insects Chapter 9, <i>Habitats</i> – Forests (<i>not</i> 9.1,2,16,17)	Common insect orders (LEARN)	June 7 @ 11 pm (longer quiz)
June 8	Chapter 10, Fields and meadows Chapter 12, Water and wetlands (<i>not</i> 12.12, 12.13)	Keying assignment (LEARN)	June 14 @ 11 pm
June 15	N.A.	Pollination readings (LEARN)	Quiz at Cabot Head on Saturday, June 20

You'll demonstrate what you're learning and thinking about each week in the two following ways:

1. An open-book quiz. I will post this quiz on LEARN at noon on Thursday each week. It will include multiple-choice, matching, fill-in-the-blank, and occasionally short-answer questions. You will have one hour to complete the quiz and it will be due on Sunday night at 11pm (so begin it by Sunday at 10pm). You must complete it on your own (see section on "academic integrity" below).

2. A posting in our LEARN discussion forum. For this assignment, which is limited to 250 words, you must share a personal experience of yours that relates to a pattern you read about in one of the sections in the text during the week (and please indicate which section). For example, I might write about my research with buzz-pollination by bumblebees in the Muskoka region (corresponding to section 1.1 in text), or about what my daughter and I learned by watching Californian scrub jays hide the peanuts we fed them each morning (section 1.10). For this component, I'd like you to demonstrate precisely how your experience relates to and perhaps expands upon the particular pattern and powerfully convey your experience with as much detail and visual imagery as you can. Please see "model response" and rubric on LEARN.

¹ It is your responsibility to read the syllabus carefully. I will not reply to emails concerning questions that are addressed in the course syllabus.

VI. Your course project

Your major project will concern the relationship between a flowering plant species and its insect visitors and pollinators. There are five main reasons for this focus:

- First, this topic integrates what you'll learn about both insects and plants during the course—as well as patterns related to their ecological interaction (specifically, the first pattern discussed in your textbook, the implicit “pollination syndromes” discussed on p. 2).
- Second, based on my experience guiding student projects in ERS283 for the past six years, it is much more feasible to investigate interesting patterns for this topic during our relatively short time in the field than many other topics that we've tried. Furthermore, we gain some efficiencies with this common focus so that we have plenty of time to explore other aspects of natural history at the northern tip of the Bruce Peninsula.
- Third, different student projects are quite equitable if they each concern the common theme of pollination, not least because I can give “mini-lectures” on different pertinent themes.
- Fourth, I have particular expertise in the study of pollination biology, so I can guide your projects effectively.
- Fifth, and perhaps most important, you will have a lot of fun observing the role of insects in the sex lives of plants.

In the week prior to our arrival at Cabot Head (June 15-19), you will prepare for the course project with a few assigned readings, which will be covered in a quiz on Saturday, June 20 at Cabot Head. By then, I will know what will be flowering at Cabot Head during our visit this year (because it varies from year to year depending on the weather). Thus, that same day, we will determine who will study which plant species, and I will provide you with a specific reading (or readings) concerning your species to help initiate your project. I will also provide a common protocol that you can use to answer some basic questions about your plant and its pollinators. However, this will just be the basis for “creative” directions you may take. Further details will be provided later.

Importantly, you will conduct your major project with a partner because this will i) provide safety in the outdoors, ii) allow you to bounce ideas off one another, and iii) simplify your monitoring—as a team—of the plants' pollinators. You will also meet with me regularly and obtain input from your classmates, who will be addressing related questions. Your final paper, 10 pages in length, will be due three weeks after we return to Waterloo.

VII. Daily schedule during our field trip

At our meeting before the trip, I will distribute a detailed document outlining what you need to bring on the course, community rules, cooking arrangements, and other information. I will also provide a detailed itinerary, which will include a few excursions together.

We will get an early start each day, reaching a waking time of ~5am on at least one morning to go bird-watching (birds rise early). We will go for hikes together on several mornings to orient and to observe patterns in nature. There will be break time at each meal (breakfast around 7am, lunch at noon and dinner at about 5pm). Quiet lights-out time will begin at 10pm.

During the first half of our trip (Saturday through Tuesday), you will spend time getting to know the area and in lectures/discussions/activities about taxonomic groups (birds, plants and insects, in particular), as well as developing your project, but the focus will fully shift towards your project in the second half of the trip.

VIII. Course grading scheme

Prior to trip to Cabot Head

- 10% LEARN *discussion forum posts (5 @ 2% each)*. See above, and the rubric on LEARN.
- 10% *Participation*. I really value your enthusiasm and participation. Thus, I assume that you will attend all class activities (including a meeting with me prior to our departure for Cabot Head), unless we have agreed otherwise in advance. After two unexcused absences, you must leave the course. Your grade here will be based on your positive contributions to the group and everyone's ability to learn, passion for your project (including informal group presentations about it), and keen participation in learning about natural history at Cabot Head.
- 20% *Pre-trip quizzes (5 quizzes in LEARN @ 4% each)*. These are "open-book" quizzes.

At Cabot Head

- 10% *Arrival quiz*. On Saturday, June 20, you will be quizzed on the basics of pollination biology (from assigned readings the previous week), as well as the names and diagnostic features/structures of insect orders, plant families, and tree species (i.e., review of material tested in earlier quizzes in LEARN). This is a "closed-book" quiz.
- 25% *Field "practical."* On Friday, June 26, you will be tested on your ability to identify bird songs, insect orders, plant families, and tree species (including diagnostic features). I will provide further details beforehand. This is a "closed-book" quiz.

After our return from Cabot Head

- 25% *Final paper on your course project*. Further details and a rubric will be provided.

IX. Weather contingency plan

Important: In past years, we have typically had at least a few rainy days at Cabot Head. Thus, we all need to be flexible and our itinerary is subject to change. I may need to make quick adjustments to our plan, for example to take advantage of good weather, and I will communicate such changes to you as soon as possible. If we have a lot of rain, it may even be necessary to adjust the contours of your course project, though the projects will be selected in part so that they are relatively immune to the weather.

X. Assignment submission policies

Assignments must be submitted using LEARN. I will only accept late assignments/projects/quizzes if you arrange late submission with me at least three days in advance of the due date (or if you have a doctor's note or documented family emergency). Otherwise, your grade will be 0.

Each of your assignments must be double-spaced with Times New Roman font and have 1" margins all around, page numbers in the bottom right corner, and your name in the top right corner of p. 1. I will expect you to have thoroughly proof-read them so that they are free of typos and major errors; I strongly encourage you to have a close and trusted friend edit your final paper before you submit.

XI. Assistance for students with disabilities

If you require special assistance, please ensure that I am aware of your needs through the Office for Persons with Disabilities (<http://www.studentservices.uwaterloo.ca/disabilities>).

XII. Plagiarism and academic integrity

You will be held responsible for adhering to UW policy on academic integrity, as outlined in the following guidelines from the office of the Associate Dean of Undergraduate Studies. Plagiarism and other violations of academic integrity will not be tolerated. **This includes the LEARN quizzes**, which must represent your own work. **If you wish to quote material in your assignments, you must place it in quotation marks (or paraphrase it in your own words) and cite the source; otherwise, it would be plagiarism.** If you have any questions about what is appropriate, please come and talk with me. Also examine the following tutorial: <http://www.lib.uwaterloo.ca/ait>.

Academic Integrity: To create and promote a culture of academic integrity, the behaviour of all members of the University of Waterloo is based on honesty, trust, fairness, respect and responsibility.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/policies/policy70.html>

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.html>

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student

Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.html>

Turnitin: Plagiarism detection software (Turnitin) will be used to screen assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented.