NRE 639: Coastal Wetlands of the Great Lakes: Ecology and Management

Fall 2017, 1 credit hour
Class meets Monday 4:00 – 6:00 pm, every two weeks starting Sept 11, 2017 (see the dates for class meetings below). Class meets in Dana 1024.

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Office hours: Tues & Weds, 10:00 – 11:30 am (until 10/18), and by appointment

Thompson's Harbor, Michigan. Photo: Michigan Tech Research Institute

Description

This graduate seminar course will focus primarily on the ecology and management of Great Lakes coastal wetlands. Topics will include ecological community and ecosystem processes together with wetland management and restoration. We will focus on a scientific approach to understanding management decision-relevant issues, including habitat and plant and animal communities (fish, birds, and amphibians), the effects of watershed land use and nutrient runoff, and the ecology and management of invasive plant species in wetlands. To some extent we may also consider coastal wetlands outside of the region, where doing so helps to provide a context for understanding the ecology and management issues related to Great Lakes wetlands.

The class meets once every 2 weeks for a 2-hour discussion. For the first class meeting, Prof. Currie will give a lecture on a broad range of topics related to the ecology and management of Great Lakes coastal wetlands to provide a context for subsequent discussions. Beginning with our second class meeting, for each class we will read two papers from the primary literature. Come to class prepared with questions and critical analysis points you wish to make. For each paper, one student will be assigned as Presenter (See Assignment 1 below). A second student will be assigned as Questioner for each paper (See Assignment 2 below) and will also co-lead the class discussion of that paper with Prof. Currie. In some

weeks we may also have a guest lecturer who will make a brief presentation related to the assigned papers and then join us for the discussion.

Background needed: Students should have some prior coursework in ecology, for example plant ecology, community ecology or ecosystem ecology. Some prior introduction to wetland ecology will be helpful but not required.

Learning goals

Students will gain an introduction to topics related to the ecology, management, and restoration of coastal wetlands, with a focus on the Great Lakes region. The focus on management and restoration will be useful for students with an interest in applied, actionable science. Students will learn terminology and concepts related to wetland ecology, wetland management and restoration issues.

Students will be exposed to some of the primary literature (mainly peer-reviewed journal articles) on coastal wetlands and will gain experience in reading, summarizing, and critically analyzing the primary literature. Give yourself adequate time to read the papers in advance so you can discuss them intelligently in class. In reading journal articles, the goal is not necessarily to read and understand every word (particularly where a paper is longer than 10 journal pages), but to discover and retain the most important points. A useful approach is to skim the entire paper first, then go back and read more deeply in some sections than others. If you do not understand some concept or method, look it up on the internet to learn more about it, or make a note of it to raise in the discussion. For your own notes, a good practice would be to mark up printed copies of the assigned papers and bring them to class. (This will be a laptop-free class – see below).

It is important to consider both negative and positive ideas about each paper that we read. Critical analysis means breaking the paper down for a deeper understanding. If there are key weaknesses or limitations, it is OK to try to uncover them. But "critical" analysis does not mean only criticism, or focusing solely on the limitations of a study. Beware of the trap in thinking that comments about a study's limitations are more insightful than an analysis of its strengths. Be sure to consider what we can learn from the paper that is new, or important, or useful, and how the paper can contribute a greater scientific understanding of coastal wetlands or their management.

Assignments and Grading

Grades will be based 40% on Assignment #1, 40% on Assignment #2, and 20% on broader participation in class discussions. Students will be randomly assigned for the Presenter and Questioner roles (but not for the first class meeting). Check the Canvas site to see the randomly assigned papers and dates.

Assignment #1: Presenter

Each student will be randomly assigned to present a synopsis of about 2 to 4 papers. For each paper you are assigned to present, provide a 1-page bullet list of the objectives, methods, and key results. Bring enough copies to class and pass these out to all students. Verbally present your synopsis of the paper (about 10 minutes). Do not use PowerPoint; just use your own notes, referring to your printed list of bullet points but please do not read them verbatim. When you are the Presenter, avoid questioning or critiquing the paper or talking about its shortcomings; aim simply to accurately present its goals, methods, and what the authors saw as the key results. Also note that the goal is not to cover every point made in the paper or all of its details, but to briefly summarize the main or most important points.

Assignment #2: Questioner

Each student will be randomly assigned to be the "Questioner" for about 2 to 4 papers. For each paper in which you are assigned to be the Questioner, come prepared with 1 page of written critical analysis in the form of questions (ca. 8 to 12 questions). Bring enough printed copies to class and pass these out to all students. Your questions can refer to the objectives, methods, any part of the results including figures and tables and the authors' interpretations, and points made in the paper's discussion section. Your questions can also be rhetorical questions meant to stimulate broader discussion, for example, "Did the authors' use of such-and-such method fit with their goal to draw general conclusions about other coastal wetlands in other regions?" or "How can this information be applied in the real world?" Drawing on this list of questions, co-lead the class discussion of the paper with Prof. Currie.

Class participation in discussions

Learning requires a willingness to examine one's own pre-conceived notions or assumptions and to expand one's foundation or framework to build the conceptual structure for new knowledge. This is demanding. It requires energy, effort, and focus. It requires an interest in engaging with a topic, grappling with new ideas, questioning and challenging others, and striving to think in new ways. Students are expected to show a high level of engagement and participation in the learning process.

After the student Presenter has finished, you may comment on additional points that you think are relevant. When the Questioner poses questions, your job as one of the seminar participants is to verbally engage with the questions and help to answer them. Help to carry the discussion. The goal is for everyone to learn, so ask good questions and give thoughtful responses. Be specific, articulate, and professional in your comments. For example, instead of saying "I liked this paper," point out what you saw as its specific strengths. Use your best scholarly thinking and develop your most penetrating and important questions – do not hold back.

When I meet people who employ our recent graduates, I often ask them, "What should we be teaching our students?" The answers I receive are often along these lines: Real-world problems are messy and complex, not simple like textbook problems; data are often sparse and insufficient but decisions still need to be made; decisions are made in groups and people need to be able to articulate their ideas and work effectively in groups. This seminar is an opportunity to practice the important professional skills of participating in group discussions and critical analysis.

Canvas site

The class Canvas site will have all of the assigned readings, together with a list of the randomly assigned student names and dates for Presenter and Questioner roles. (This list may be updated as students add or drop the course.)

Syllabus and Schedule

Sept 11. Overview of Great Lakes coastal wetland ecology and management

This week there are no assigned readings and no students will be assigned Presenter or Questioner roles. (Students could use this time to get a head start on the assigned readings.) We will go over the class format and assignments, then spend some time getting to know each student – come prepared to talk for 2-3 minutes about yourself and your scholarly and professional interests. Prof. Currie will give about a 60 to 75-minute lecture on coastal wetlands, introducing broad concepts and many of the topics we will be reading about in the primary literature.

Sept 25. Ecological communities
Assigned readings:

Grabas, G. P., and D. Rokitnicki-Wojcik. 2015. Characterizing daily water-level fluctuation intensity and water quality relationships with plant communities in Lake Ontario coastal wetlands. Journal of Great Lakes Research 41:136-144.

Sierszen, M. E., J. C. Brazner, A. M. Cotter, J. A. Morrice, G. S. Peterson, and A. S. Trebitz. 2012. Watershed and lake influences on the energetic base of coastal wetland food webs across the Great Lakes Basin. Journal of Great Lakes Research 38:418-428.

Oct 9. Ecosystem services
Assigned readings:

Hansson, L. A., C. Bronmark, P. A. Nilsson, and K. Abjornsson. 2005. Conflicting demands on wetland ecosystem services: nutrient retention, biodiversity or both? Freshwater Biology 50:705-714.

Hein, L., K. van Koppen, R. S. de Groot, and E. C. van Ierland. 2006. Spatial scales, stakeholders and the valuation of ecosystem services. Ecological Economics 57:209-228.

Oct 23. Impairments
Assigned readings:

Woo, I., and J. Zedler. 2002. Can nutrients alone shift a sedge meadow towards dominance by the invasive *Typha × glauca*? Wetlands 22:509-521.

Stryszowska, K. M., M. R. Twiss, and T. A. Langen. 2016. Evaluating Beneficial Use Impairments in wetlands of the Massena Area of Concern using biotic, water quality, and landscape indicators. Journal of Great Lakes Research 42:708-716.

Nov 6. Remote Sensing for decision support
Assigned readings:

Massicotte, P., A. Bertolo, P. Brodeur, C. Hudon, M. Mingelbier, and P. Magnan. 2015. Influence of the aquatic vegetation landscape on larval fish abundance. Journal of Great Lakes Research 41:873-880.

Bourgeau-Chavez, L. L., K. P. Kowalski, M. L. Carlson Mazur, K. A. Scarbrough, R. B. Powell, C. N. Brooks, B. Huberty, L. K. Jenkins, E. C. Banda, D. M. Galbraith, Z. M. Laubach, and K. Riordan. 2013. Mapping invasive *Phragmites australis* in the coastal Great Lakes with ALOS PALSAR satellite imagery for decision support. Journal of Great Lakes Research 39:65-77.

Nov 20. Restoration
Assigned readings:

Boers, A. M., R. L. D. Veltman, and J. B. Zedler. 2007. *Typha × glauca* dominance and extended hydroperiod constrain restoration of wetland diversity. Ecological Engineering 29:232-244.

Elgersma, K. J., J. P. Martina, D. E. Goldberg, and W. S. Currie. 2017. Effectiveness of cattail (*Typha spp*.) management techniques depends on exogenous nitrogen inputs. Elementa. Science of the Anthropocene 5:19.

Dec 4. Synthesis

Assigned readings:

Uzarski, D. G., V. J. Brady, M. J. Cooper, D. A. Wilcox, D. A. Albert, R. P. Axler, P. Bostwick, T. N. Brown, J. J. H. Ciborowski, N. P. Danz, J. P. Gathman, T. M. Gehring, G. P. Grabas, A. Garwood, R. W. Howe, L. B. Johnson, G. A. Lamberti, A. H. Moerke, B. A. Murry, G. J. Niemi, C. J. Norment, C. R. Ruetz, A. D. Steinman, D. C. Tozer, R. Wheeler, T. K. O'Donnell, and J. P. Schneider. 2017. Standardized Measures of Coastal Wetland Condition: Implementation at a Laurentian Great Lakes Basin-Wide Scale. Wetlands 37:15-32.

Zedler, J. B., and S. Kercher. 2004. Causes and Consequences of Invasive Plants in Wetlands: Opportunities, Opportunists, and Outcomes. Critical Reviews in Plant Sciences 23:431-452.

Additional Course Expectations

Computers and phones

1. This class will have a no-laptop computer policy. When students are looking at a laptop screen, the lack of eye contact makes it harder for them to engage in question-driven active learning and tends to make students act more like passive onlookers. Keyboard clicking is also distracting to others. If you would like to have a copy of the papers we will discuss, please print them prior to class.
2. Phones should be silenced and put away at the start of class.

Attendance and assignments due dates

Attendance in class is expected. Students are responsible for material covered and information given in class. Missed classes will be counted against class participation and the class exercises from that day.

It is the student's responsibility to know the dates assigned to them for class assignments and to be prepared to do the assignments on those class dates. If a student misses class on the day he or she is scheduled, no make-up will be allowed and a zero grade will be given for the assignment. Students may switch assignment dates with other students; if so, please work that out yourself.

Academic and professional integrity

Students are expected to understand and follow Rackham guidelines for academic and professional integrity. Take a few moments to familiarize yourself with these rules, outlined here: https://www.rackham.umich.edu/policies/academic-policies/section11

Students should pay particular attention to rules regarding plagiarism and original work. Students may work together on assignments, may ask for help from students or others outside the class, and may draw on any information in the library or on the internet. However, the assignment that you present and turn in must be your own individual work in your own words. **You may not borrow from published work in any assignments without clearly attributing it to the authors.** The way to attribute ideas or results in published work is to cite the source. If you copy a source word for word, cite the source and *also* put the text in quotation marks. Similarly, cite work that you find on web pages (list the URL and the date as you would a citation). You may not borrow text, figures, or other graphics from a web page without clearly attributing it to the source.