

Ecological Indicators

Biology 599f

Winter 2009

GENERAL INFORMATION

Times, Places: W 2-3:50; CB 485

Instructor: David Hooper **Office:** Biology 307 **Phone:** 650-3649 **Email:** hooper@biol.wvu.edu

Office Hours: M 2-3, F 10-11, and by appointment.

Texts: The Heinz Center (2008) *The State of the Nation's Ecosystems* 2008. Island Press.

Additional reading in primary literature.

Web site: <http://fire.biol.wvu.edu/hooper/courses.html>

NATURE OF THE COURSE:

How do you take the pulse of an ecosystem? A variety of different forces are influencing both natural and managed landscapes, including climate and land use change, invasive species and ecological restoration. Conservation of biological diversity and provision of ecosystem services are both critical to maintaining the sustainability of ecological systems. However, sustainable management will require knowledge of which key species and processes to monitor as indicators of how management decisions influence ecosystem condition. Despite the critical need for information on this topic, the science of measuring and monitoring key ecological indicators is still in its infancy. In this seminar style class, we will use two approaches. First, we will use the model developed by the Heinz Center to explore the development of indicators of ecosystem condition, supplemented with reading in the primary scientific literature to better understand knowledge gaps where indicators are still in development. Second, we will collate existing databases applicable to Whatcom County to try to develop an integrated ecological indicator for this area. Classes will meet once weekly for two hours to discuss the readings and present findings.

The goals of this course are to

- 1) **provide a firm understanding** of how human society is altering ecosystems and how to measure those effects;
- 2) improve students' abilities to **lead and participate in discussion** of scientific literature, including **developing skills in critical thinking**;
- 3) **collate existing databases** relevant to Whatcom County;
- 4) **develop an index of ecosystem condition for Whatcom County**, based on available data.

COURSE GRADE:

The grade scale is Satisfactory/Unsatisfactory (S/U). You will need a minimum of 80% of the points to receive an S grade, since this is a graduate class. Points will be based on the following:

a. Discussion attendance and participation. (50 points) Discussion attendance and participation are mandatory and constitute an important component of this class. Failure to attend (without a pre-approved excuse) or to participate in discussion regularly will result in loss of 5 points per discussion missed. Missing more than 5 discussions results in loss of all 50 points.

b. Weekly database assignments. (50 points) For each of weeks 2-6, bring links and metadata for one existing database relevant to that week's indicators. You will be assigned an indicator set each week to be researched for the following week to make sure that we have good distribution of relevant indicators through the class. We will collate this indicator information into a class database for use in the research projects.

c. Indicator research and presentation. (100 points) Using the class database developed during weeks 2-6, plus any additional datasets necessary, you will work in teams to evaluate those data and present the results to the class. You and your teammate will select two of the ecosystem types and 3-5 of the most relevant/tractable indicators from each ecosystem to evaluate. Your presentation should 1) Give a brief synopsis of the data sets evaluated; 2) evaluate the suitability of the datasets relative to the indicators and criteria described in the book; 3) determine a "bottom line" where possible; where not possible elucidate the steps necessary to get to a bottom line; 4) include an annotated bibliography, 6 reference minimum; 5) last ~40 min. so we can have discussion for the remaining class period. Your grade will be based on the clarity of your presentation, the thoroughness of your evaluation, the relevance of the references and clarity of the writing in your annotated bibliography, and the critical thinking applied. (Rubric to be supplied).

BIOL 599f - Class schedule

Day	Topics	Readings*
Week 1		
1/7	Introduction, scope, and goals	
Week 2		
1/14	Core national indicators	Chapters 1 & 2
Week 3		
1/21	Ecosystem extent and pattern	Ch. 3-8, Tech notes: Extent and pattern
Week 4		
1/28	Chemical and physical characteristics	Ch. 3-8, Tech notes: Chem. and phys.
Week 5		
2/4	Biological components	Ch. 3-8, Tech notes: Biological
Week 6		
2/11	Goods and services	Ch. 3-8, Tech notes: Goods & services
Week 7		
2/18	Research, group meetings (Hooper gone)	
Week 8		
2/25	Presentations 1 & 2	
Week 9		
3/4	Presentation 3, Indicator synthesis	
Week 10		
3/11	Indicator synthesis	*examples from primary literature

*Readings from the book may be supplemented with additional reading from the primary literature.

Biology 599f – Ecological Indicators: Assignments

1. Weekly database assignments (50 points total, 10 points/wk)

Please email me your database each week in an Excel file using these common column headings. I'll post a form for downloading on the class website. If you come up with more than one database, you can get bonus points (3 per data set).

Metadata for databases

1. Dataset name
2. Source/agency
3. Contact person
4. Contact phone
5. Contact address
6. Contact email
7. Source URL
8. Sampling protocol (satellite/remote sensing, field – random, field – focused, field – experiment)
9. Time period of sampling (years)
10. Frequency of sampling (years)
11. Area sampled
12. Spatial scale of sampling [pixel size for satellite data (e.g., 30 m), distance between sampling sites, or density of sampling (e.g., number of sites/km or number of sites/km²)]
13. Dataset from Heinz Center 2008? (Y/N)
14. Other comments
15. Your name

2. Indicator Research & Presentation (100 points)

Using the class database developed during weeks 2-6, plus any additional datasets necessary, you will work in teams to evaluate those data and present the results to the class. You and your teammate will select two of the ecosystem types and 3-5 of the most relevant/tractable indicators from each ecosystem to evaluate. Your presentation should 1) Give a brief synopsis of the data sets evaluated; 2) evaluate the suitability of the datasets relative to the indicators and criteria described in the book; 3) determine a “bottom line” where possible; where not possible elucidate the steps necessary to get to a bottom line; 4) include an annotated bibliography, 6 reference minimum; 5) last ~40 min. so we can have discussion for the remaining class period. Your grade will be based on the clarity of your presentation, the thoroughness of your evaluation, the relevance of the references and clarity of the writing in your annotated bibliography, and the critical thinking applied. (Rubric to be supplied).