LRES 569: Ecology of Invasive Plants in the Greater Yellowstone Ecosystem
Syllabus, Schedule and Assignments

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Class meets in 208 Leon Johnson Hall (LJH) for lecture in mornings.

Course Objectives:

1.   Familiarize students with the most current theories on what characteristics make species invasive and what ecosystem conditions invite or resist non-indigenous plant species.
2.   Place students in the field where invasion is occurring to gain an appreciation for the complexity of judging a species to be invasive or having ecosystem impact.
3.   Learn field sampling techniques, data summarization, statistical analysis, interpretation and results presentation.

Schedule: [*Changes to the schedule may occur, therefore information on the D2Lsite takes precedence over this document*]

Monday July 6, 2009

8:30 am   Introduction of Course

9:00 am   Introduction to Invasive Plant Ecology Lecture

11:00 am   Discussion on Readings

12:00 am   Lunch

1:30 pm   Field Trip to Burke Park (Meet just West of LJH in driveway)

3:30 pm   Meet in room 208 LJH to become familiar with Excel calculations

Assignment 1:

Write a paper (no more than 3 double spaced pages) that summarizes the conflict between Davis and Thompson and Rejmanek et al. over invasive species terminology ("naturalized", "invasive", etc.). Include your opinion on the value of this type of dialog in science and how you may portray it to students so that they are not turned-off by conflict dialog in science.

Tuesday, July 7, 2009

The objective of this class and field trip is to clearly demonstrate interpretation of field observations. Field data will be collected and analyzed to test the hypothesis that a notorious invasive plant species (leafy spurge) reduces native plant community species diversity. The following quotes from scientific journals and web sites clearly give the impression that leafy spurge displaces native vegetation and thereby reduces species diversity.

"Leafy spurge is kept under control by regular tillage, but it spreads easily in untilled land such as CRP land. Once established, leafy spurge will displace desirable replanted grasses and convert CRP.s diverse cover of vegetation to a leafy spurge monoculture. " S. A. Hirsch and J.A. Leitch. 1998. JRM 51:614-620

"Leafy spurge is a major concern to ranchers and environmentalists because left unchecked, leafy spurge can quickly out compete native vegetation in pastures, rangelands, and native habitats." J.V. Anderson, D.G. Davis, M.E. Foley and D.P. Horvath. 1999. Proceedings: Leafy Spurge Symposium, Medora, ND. June 29, 1999. p. 6.

 "Leafy spurge causes significant problems in the northern Great Plains by invading grazing lands for cattle and horses, reducing rangeland productivity and plant diversity, degrading wildlife habitat, displacing sensitive species and drastically reducing land values." Team Leafy Spurge, USDA-ARS http://www.team.ars.usda.gov/v2/leafyspurge.html

Before Class Read:

Watson, A.K. 1985. Introduction to the leafy spurge problem. Reprinted from: Leafy Spurge,
        Monograph series of the Weed Science Society of America. ed. Alan K. Watson, 1985.
        Chapter I (3):1-6. Published by: Weed Science Society of America.
Levine, J.M. 2000. Species diversity and biological invasions: relating local process to
        community pattern. Science 288:852-854.

8:30 am	Introductory Lecture on Attributes of invasive plants and their impact **[325 LJH]**
9:30 am	Field Trip to "M" **[Meet in driveway West side of Leon Johnson Hall]**
1:30 pm	Return to campus and meet in Computer Room to analyze field data in Excel. **[208 LJH]**
3:30 pm	Discuss results

Assignment 2:

Submit an error-bar graph that you make in Excel that shows the mean and standard deviation of species richness in and outside of leafy spurge patches. Conduct a two-tailed *t*-test to statistically ask the question if the species richness is lower in the leafy spurge patch. Write a sentence or two about the conclusion that you draw from the data and analysis. Write a final paragraph about how you might design the experiment differently to more conclusively test the hypothesis. *Due at beginning of class Wednesday*

Wednesday, July 8, 2009

The objective of this class and field trip is to examine the question of how one might objectively determine if a species is invasive in a given environment.

The questions that we will examine are:

1. Can we detect change in non-indigenous plant populations that will allow us to judge them as invasive?
2. What should be the criteria for determining if a non-indigenous species is invasive?
3. What should be the criteria for determining if a non-indigenous plant species can have a significant impact on the ecosystem?

Before Class Read:

Bernd Blossey. 1999. Before, during, and after: the need for long-term monitoring in invasive plant species management. Biological Invasions 1: 301-311.

Maxwell, B.D. and L.J. Rew. Monitoring for Invasion Potential of Non-indigenous Plant Populations. *Not submitted for publication yet*.

8:30 am	Lecture: Detecting changes in density and spatial extent **[208 LJH]**
9:30 am	Field Trip to Mt Ellis State Land. [**meet W of LJH in driveway**]
1:30 pm	Return to campus
2:00 pm	Computer Lab Analysis [**Meet in 208 LJH**]

Assignment 3:

Conduct analysis on patch data from Mt Ellis State Land. With the data that you collected and the data from previous years would you conclude that the sulfur cinquefoil populations (patches) are growing, shrinking, or show no trend? Present a table showing the area of each patch in each year using the Tape Measure Triangles Methods and the GPS patch perimeter method? Calculate the growth rate for each patch? Present a table showing the change in density of the samples from each patch and each year from the Mt Ellis data. Do you conclude that these invasive species are invasive? Explain your answer in a paragraph and turn in your assignment on Thursday at beginning of the field trip.

Thursday, July 9, 2009.

All day field trip to Greater Yellowstone Ecosystem. Meeting time and place to be announced.

We will examine invasive species in the context of a greater ecosystem with many land management objectives.

Before Class Read:

Sakai, A.K., F.W. Allendorf, J.S. Holt, D.M. Lodge, J. Molofsky, K.A. With, S. Baughman, R.J. Cabin, J.E. Cohen, N.C. Ellstrand, D.E. McCauley, P. O'Neil, I.M. Parker, J.N. Thompson and S.G. Weller. 2001. The population biology of invasive species. Annu. Rev. Ecol. Syst. 32:305-332.

Friday, July 10, 2009

Before Class Read:

8:30 am   Meet in 208 LJH

Discussion

3:00 pm Final Exam is Due [Bring to my Lab 717 LJH]