

Plant Conservation
NR 491C / NR 595C
2 credit hours
Syllabus: Spring 2005

“We share the earth with at least 5 million – perhaps as many as 30 million – species of organisms. About 235,000 of these species are flowering plants and about 325,000 are nonflowering plants such as lichens, mosses and seaweeds. All are important parts of the web of life, contributing to the fragile green mantle clothing our planet. This mantle is essential to life, and we depend on plants for our survival.”

– David R. Given, *Principles and Practice of Plant Conservation*

Time and location: 11:20 a.m. – 12:10 p.m., Mondays and Wednesdays
2024 Biltmore Hall (Conger Room)

Instructor: Kevin Potter
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Office hours: 1:30-3 p.m. Mondays; 2-3:30 p.m. Wednesdays

Co-instructor: Dr. Gary Blank
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Course Web site: <http://courses.ncsu.edu/nr491c/lec/005>

Course Overview:

The United States hosts a remarkable floristic diversity of roughly 20,000 native species. According to the Center for Plant Conservation, nearly one-fifth of these species are of conservation concern, including 780 likely to be vulnerable to extinction in the next decade. For several of these species, rarity has resulted from natural processes, while others are threatened by exotic pests or pathogens, or by direct human impacts. This course will examine the factors that cause plants to be rare or imperiled, and the strategies employed to improve their long-term viability.

Course Goals:

By the end of this course, students should be able to:

- 1) recognize the natural and human-caused factors that cause plant species to be rare or imperiled, and describe the genetic and ecological implications of rarity in plant species,

- 2) generate a conservation strategy for a rare or imperiled plant species, and
- 3) apply ecological and population genetics principles to evaluate the long-term viability of such a plant species with and without conservation measures.

Course Prerequisites:

This course is designed for upper-level undergraduate students, and for graduate students. No specific prerequisite courses are required, but students should have a basic understanding of botany, forest ecology, forest management, and genetics.

Required text:

Given, David R. 1994. *Principles and Practice of Plant Conservation*. Portland, Oregon: Timber Press. 292 pp. (Available new and used through www.amazon.com, www.bn.com, and www.abebooks.com).

Recommended/useful texts:

Falk, Donald A., and Kent E. Holsinger, eds. 1991. *Genetics and Conservation of Rare Plants*. Oxford, United Kingdom: Oxford University Press. 283 pp.

Falk, Donald A., Constance I. Millar and Margaret Olwell, eds. 1996. *Restoring Diversity: Strategies for Reintroduction of Endangered Plants*. Washington, D.C.: Island Press. 505 pp.

Guerrant, Edward O., Kayri Havens, and Mike Maunder. 2004. *Ex Situ Plant Conservation: Supporting Species Survival in the Wild*. Washington, D.C.: Island Press. 504 pp.

Grading:

Students will earn letter grades for their performance in the five following areas.

Paper: 30%

Class presentation: 20%

Midterm exam: 20%

Class participation/attendance: 15%

Discussion postings: 15%

Class presentation/paper:

A significant learning experience during the course of the semester will be the completion by each student of a conservation strategy for a rare and/or imperiled plant species. This project will 1) briefly describe the species in question, its distribution, and its economic uses and ecological importance, 2) explain the factors that make the species rare and/or imperiled, 3)

outline what, if any, steps are being undertaken to conserve the species in question, and 4) recommend how to ensure the future viability of the species.

This assessment will be presented in two formats: a class presentation near the end of the semester, and a paper due at the end of the semester. The class presentation will be an opportunity for you to hone your presentation skills, and to listen to comments that can be used to improve your paper.

Class discussions:

Students are expected to participate in several class discussions during the course of the semester. Before each class meeting involving a class discussion, I will ask you to submit a response to the reading to the class message board (accessible through the course Web page, at <http://courses.ncsu.edu/nr491c/lec/005>). These responses will take different forms, such as a few paragraphs summarizing the assigned reading, or a set of questions the reading raises for the student.

You will need to post your response by midnight the evening before the class discussion, and I encourage you to respond (thoughtfully and respectfully) to your colleagues' postings. However, I discourage you from reading other students' postings until they've submitted your own. The postings will make up 15 percent of your grade, so they should be thoughtful, well-written, and original.

Attendance:

Students are expected to attend all class meetings and the two class field trips. For the exam and class presentations, students must clear excused absences with the instructor as soon as possible before the class period. The university's attendance policy, including information about excused absences, is available at www.ncsu.edu/provost/academic_regulations/attend/reg.htm.

Field trips:

This class will include will include two field trips to the location of rare or threatened plant populations: one locally, and one to the Coastal Plain. These field trips will be outside the regular class hours. The local trip will require about 3-4 hours, and the Coastal Plain trip will require a full day, including transportation. The timing of the field trips will depend upon the students' and instructors' schedules.

Academic integrity:

The North Carolina State University Code of Student Conduct underscores that "plagiarism and cheating are attacks on the very foundation of academic life, and cannot be tolerated within universities." It is crucial that students honor the letter and spirit of the university's academic integrity regulations. Students are encouraged to review the Code of Student Conduct (www.ncsu.edu/provost/academic_regulations/integrity/reg.htm), and to contact their instructor with any questions.

Students with disabilities:

Whenever possible, the instructor will make arrangements to accommodate the needs of students with disabilities. Students may contact Disability Services for Students staff (www.ncsu.edu/provost/offices/affirm_action/dss) for assistance.

Class Schedule:

Part 1 – Overview of plant diversity, conservation biology, and population genetics

Objectives: At the end of this section of the class, students should be able to **1)** discuss whether it is important to conserve plant species and why, **2)** explain central concepts of conservation biology and conservation genetics, and **3)** describe the genetic impacts of small population size.

- Jan. 10: Introductions, administrative business, overview of North American floral diversity
- Jan. 12: Why do we care about conserving plants?
Reading assignment: Given, Chapter 1
- Jan. 17: Martin Luther King Jr. Holiday
- Jan. 19: What do we mean by conservation? (Introduction to conservation biology and conservation genetics)
Reading assignment: Soule 1985*
- Jan. 24: Genetic impacts of small population size and fragmentation
- Jan. 26: Genetic impacts of small population size and fragmentation
Reading assignment: Brigham 2003 (Chapter 3 in Brigham and Schwartz, pp. 59-73)*

Part 2 – Reasons plants are rare and imperiled

Objectives: At the end of this section of the class, students should be able to **1)** explain the natural and human-related reasons that plants are rare and imperiled, and **2)** give examples of rare or imperiled plants and to discuss the reason for their rarity or endangerment.

- Jan. 31: Natural causes of plant rarity

* Reading accessible through course e-reserve (www.lib.ncsu.edu/rbr).

Reading assignment: Morse 1996 (Chapter 1 in Falk *et al.*)*

- Feb. 2: Human causes of plant rarity (overview)
Reading assignment: Given, Chapter 2
- Feb. 7: Exotic invasives
Reading assignment: Liebhold *et al.* 1995, pp. 1-19, 37-38*
- Feb. 9: Guest speaker (Dr. Fred Hain, NC State Department of Entomology)

Part 3 – Conservation of rare or imperiled plant species

Objectives: At the end of this section of the class, students should be able to **1)** determine how to structure a conservation strategy for a rare or imperiled plant species, and **2)** explain the details of on-site and off-site approaches to plant conservation.

- Feb. 14: Management of plant populations
Reading assignment: Given, Chapter 4
- Feb. 16: Population viability analysis for plants
Reading assignment: Menges 1991 (Chapter 3 in Falk and Hosinger)*
- Feb. 21: How do we decide what to conserve?
Reading assignment: Holsinger 1992 (*Rhodora*)*
- Feb. 23: On-site conservation and management
Reading assignment: Given, Chapter 5
- Feb. 28: Off-site conservation
Reading assignment: Maunder *et al.* 2004 (Chapter 1 in Guerrant *et al.*)*
- March 2: **Mid-term exam**
- March 7: Spring break
- March 9: Spring break
- March 14: No class (compensation for Coastal Plain trip)
- March 16: Endangered plant species searches (lecture by Dr. Gary

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Topic for plant conservation project due (by e-mail)

Part 4 – Plant restoration, recovery, and regulation

Objectives: At the end of this section of the class, students should be able to **1)** describe plant restoration and recovery strategies, **2)** discuss plant regulatory efforts at the state and national level, and **3)** assess the success of plant restoration and regulatory efforts.

- March 21: Rare and threatened plant restoration and recovery
Reading assignment: Given, Chapter 7
- March 23: Guest speaker (Dr. John Frampton, NC State Department of Forestry, on American chestnut)
- March 28: Regulatory protections for rare and endangered plants
Reading assignment: Given, Chapter 9
- March 30: Regulatory protections for rare and endangered plants
Reading assignment: Robbins' cinquefoil delisting notice in the Federal Register (go to http://ecos.fws.gov/species_profile/SpeciesProfile?sPCODE=Q20V, click on "Federal Register documents," then on "Final Delisting, Recovered" PDF link)
- April 4: Guest speaker (Rob Evans, N.C. Plant Conservation Program)

Part 5 – Future of rare and imperiled plants

Objectives: At the end of this section of the class, students should be able to **1)** outline a conservation strategy for an imperiled or rare plant species, and **2)** discuss ways in which to target plant conservation efforts in the light of future climate change and other threats.

- April 6: Gene conservation plans
Reading assignment: Fraser fir gene conservation Plan (distributed by e-mail)
- April 11: No class (compensation for local field trip)
- April 13: Class presentations
- April 18: Class presentations

- April 20: Class presentations
- April 25: Balancing conservation and human use of plants
Reading assignment: look over CAMCORE Web site (www.camcore.org), especially “Overview,” “Gene Conservation,” and “Tree Domestication”; read Dvorak *et al.* 2000*
- April 27: Climate change and plant conservation; class wrap-up
Reading assignment: Kutner and Morse 1996 (Falk *et al.* Chapter 2)*
- May 9: **Paper due**