

# Bioscene

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# Bioscene

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next issue.



**Cover Illustration:** One of the  
first prairie plants to flower,  
Prairie Smoke (*Geum triflorum*)  
is easily recognized by its  
reddish, feathery fruit. This  
specimen was photographed in  
mid-June during a field trip to  
the Newark Prairie in Rock  
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# Bioscene: Journal of College Biology Teaching

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Suggestions for manuscripts include: announcements, book reviews, labs/field studies that work, course development, technological advice, software reviews, curricular innovation, history of biology, letters to the editor, undergraduate research opportunities, professional school, funding sources, current issues, etc.

### Deadlines for Submissions

January 15, 1999 February 2000 Issue

March 15, 2000 April 2000 Issue

# Connecting Student Learning with Real Problems: the Biocore Prairie Project

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**Abstract:** Students in Biocore's Evolution, Ecology, and Genetics course learn ecological principles and methods by contributing to research involved in restoring an old agricultural field at the edge of campus to mesic prairie. The opportunity to be involved in a project that is real has greatly enhanced student motivation and interest.

**Key words:** ecology, restoration, prairie, service learning

## Introduction

The Biology Core Curriculum (Biocore) is a four semester laboratory-intensive, writing-intensive introductory honors sequence at the University of Wisconsin-Madison. 160 sophomores begin the program every fall. One of the goals of the program is for students to experience the process of science and to deal with the complexity of real-world problems. This paper describes our experience with a long-term project we have undertaken as part of the first course in the sequence, Evolution, Ecology, and Genetics. We are attempting to turn an old agricultural field on the west end of campus into mesic prairie (Howell and Jordan, 1991) and in the process are involving Biocore students in planning and carrying out restoration research. Successive groups of students will be working on this project for the foreseeable future (10 years at least). They not only will learn ecology in a very realistic way, they also will be leaving a legacy of a beautiful and healthy community for future generations.

## Accomplishments to Date

We began planning this project during the spring of 1997. Our intent from the beginning was to specify the overall goals for the project and then to involve Biocore students in planning the specific research that will be carried out as part of the restoration. The Fall, 1997 class laid the groundwork with surveys of plants and insects at the site to establish a baseline for future comparison (Figure 1). Students collected these data during their normal laboratory periods. A description of the method they used for plant surveys is given in Table 1. It is quite feasible for beginning students to learn to identify the limited number of species found in an old agricultural field such as this. An example of one team's data is shown in Table 2. Students also

participated in seed collection at nearby remnant and restored prairies, seed cleaning, individual library research projects on various restoration issues, and group discussions concerning recommendations for research to be carried out at the site.



**Figure 1.** Students determining the plant composition of the field at the beginning of the project (September, 1997) using stratified random quadrats.

Our initial study compares three procedures for getting rid of the aggressive and persistent non-native problem species at the site (e.g., brome grass and Canada thistle) before planting prairie species (Packard and Mutel, 1997). We divided the research area (approximately 0.6 acre) into nine plots and randomly assigned one of three methods to each. The three treatments are: (1) mulching with layers of newspaper, anchored with netting and staples, from June until just before planting (one of the plots was mulched with black plastic); (2) mowing every few weeks (June-September) and treating with glyphosate herbicide

(Roundup) once in early October; (3) rototilling every few weeks (June-October). Figure 2 is an aerial photo showing the plots in September, 1998. That fall students collected prairie seeds at nearby prairies and in early November hand broadcasted the same seed mixture of 61 prairie species on all nine plots (Henderson, 1995). This is shown in Figure 3. Some of the seeds were purchased from a prairie nursery, which was our biggest expense. (We were able to fund this through a small grant program made possible through the Kemper K. Knapp bequest to the university.) Students also surveyed and characterized the woody vegetation along the edges of the site. They found many invasive species (such as honeysuckle, buckthorn, and black locust) that we need to control if our prairie is to thrive.

**Table 1** Instructions for Vegetation Sampling

<b>Objectives:</b>	To determine the plant species composition of the site and the species frequency (fraction of quadrats that contain each).
<b>Procedure:</b>	When we arrive at the site, the staff will help you to identify the common species there. We will be sampling using stratified random quadrats. We have placed gridlines on the site to divide it into 20 subdivisions, each labeled with a number. Each team will analyze 6 quadrats, 2 in each of 3 subdivisions (do more if you have time). First, draw 3 chips out of the <i>Subdivision</i> box to determine the 3 subdivisions you will work in. Then, draw 6 sets of 2 random numbers from the <i>Random Number</i> box and write them down. Start at the southwest corner of your subdivision: the first random number in each set tells you the number of paces north and the second tells you the number of paces east to go. Place the lower left corner of your quadrat at the indicated spot and record the presence of each species whose stem at ground level lies within the quadrat. If you encounter plants you cannot identify, make a sketch in your notebook and save a sample in a plant press until you can identify it using the guides in the lab.
<b>Data summary:</b>	List the species present in each of your quadrats and the number of quadrats that include each species.

Future classes of Biocore students will monitor the growth of prairie plants and non-native weeds to see which site preparation method gives the best results. Since it would be very difficult for beginners to be able to identify all possible species (especially when they are not in flower), we will select a subset of prairie indicator species to monitor in the vegetation assays. Students will also help to decide on future research as we expand the project each year into the adjacent field. The land available totals about eight acres.



**Figure 2.** Aerial photograph from September, 1998 showing the preparation procedures. White plots were mulched with newspapers; striped black plot was mulched with plastic; rough-textured plots were repeatedly mowed and then later treated with herbicide; gray plots were repeatedly rototilled.



**Figure 3.** Students planting the same density of 61 prairie species in the nine treatment plots in November, 1998.

### Project Evaluation

We need to evaluate the Biocore Prairie restoration project on two levels. First, are we successful in recreating a prairie community? Students will be assessing this by surveying the plants (and eventually the animals) present at the site over the coming years. Second, are we successful in teaching ecology, methods for obtaining and analyzing

ecological data, and an appreciation for the natural world and the interconnectedness of life? Preliminary evidence is very encouraging. Students are able to use transects and quadrats to obtain plant composition data that are consistent among laboratory sections. They struggle with drawing conclusions from data as complex as those we deal with but are able to do so with help from their teammates and the Biocore staff. We know from student course evaluations that these projects engage students because they are real. Here are a few quotes:

- *Actually going to the marsh and prairie sites helped me tremendously in learning about the biological relationships we studied. I found that I remembered much more when put in an actual situation rather than reading it in a textbook.*
- *I found the prairie restoration to be very worthwhile. What we did with it really mattered, which caused people to take it seriously and to find it rewarding.*
- *I love going into the marsh. Ecology is not one of my favorite areas and the lab really made it fun*

*by going into the marsh and prairies and doing hands on analysis.*

- *I loved the Biocore prairie restoration! That made me take info I learned in class and apply it to the real world.*

We observe much more enthusiasm than students in previous years had for our former projects, which involved somewhat artificial model systems that ended as soon as the semester was over. Class discussions of issues relating to site preparation and planting were very lively, with students arguing with each other over the best methods to use and the reasons for their opinions. Several students have undertaken or have indicated an interest in pursuing research projects in the Biocore Prairie restoration site during the summer. We think that many will want to keep track of *their* prairie's progress, even when they become alumni.

Information about our prairie project is available through Biocore's web site: <http://polyglot.lss.wisc.edu/biocore/prairie.html>

**Table 2** Species found in subdivisions 9, 10, and 16 (based on two 0.25 square meter quadrats from each) at the Biocore prairie restoration site, September 30, 1997.

Scientific Name	Common Name	Family	Frequency
<i>Poa pratensis</i>	Kentucky bluegrass	grass	1.00
<i>Bromus inermis</i>	smooth brome grass	grass	0.83
<i>Cirsium vulgare</i>	bull thistle	composite	0.17
<i>Taraxacum officinae</i>	dandelion	composite	0.17
<i>Erigeron sp.</i>	daisy fleabane	composite	0.83
<i>Plantago major</i>	common plantain	plantain	0.17
<i>Plantago lanceolata</i>	English plantain	plantain	0.83
<i>Trifolium pratense</i>	red clover	legume	0.83
<i>Viola sp.</i>	violet	violet	0.33

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## Call for Nominations

### President-Elect, Secretary, & Steering Committee Members

ACUBE members are requested to nominate individuals for the office of President-Elect and Secretary as well as for two at large positions on the ACUBE Steering Committee. If you wish to nominate a member of ACUBE for a position, send a Letter of Nomination to the chair of the Nominations Committee: Dr. Nancy Sanders, Division of Science, Truman State University, Kirksville, MO 63501-0828, Voice -- (816)785-4619 FAX (816)785-4045, E-mail -- [sc26@nemo.mus.edu](mailto:sc26@nemo.mus.edu)



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*AMCBT Newsletter (1964-1974)*

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