

# Woodland (Shady Garden) Species Selection

## Activity Overview

Students create a list of species using an electronic database for their school restoration site as determined by environmental, ecological, aesthetic, and educational criteria.

## Objectives

Students will:

- Use electronic sources (web site and database) to research woodland plants and communities
- Identify criteria for selecting woodland species that will grow in their restoration site
- Choose species based on ecological and aesthetic considerations
- Justify the choices of species selected for the site
- Learn about native woodland plants and forest structure

## Subjects Covered

Science and Media and Technology

## Grades

6 through 12

## Activity Time

2 hours total (15 minutes Introduction, 15 minutes to develop criteria, 45 minutes to select species, 30 minutes to compile species into a class list)

## Season

Any

## Materials

Internet access to the World Wide Web, woodland species selection worksheet, woodland community model fact sheets, field guides (optional, see following bibliography)

## State Standards

### Science:

Decide which collected data is pertinent to new problems (A.4.2)

Decide which data should be collected (A.4.3)

Develop themes for questions (A.8.1)

## Background

At this point in the restoration process, you have mapped your school grounds, conducted a site analysis and located a planting site on your school grounds. Now you are ready to select species native to your region that are suited to the soil, moisture, and light conditions of your schoolyard. Selecting species appropriate for your school restoration site helps insure survival of the plants you choose. Keep in mind natural communities are dynamic and complex. A community planted by human hands will not attain the same diversity and complexity as a natural ecosystem that has taken thousands of years to evolve. Through time and natural processes the restored community will flourish in its own direction.

To begin the process of species selection, identify your soil type, soil moisture, topography, light conditions, etc., in order to determine which plants will grow on your site. Go to “Study the Site” at [http://uwarboretum.org/eps/woodland/study\\_the\\_site.htm](http://uwarboretum.org/eps/woodland/study_the_site.htm) if you need to obtain this information.

Once you know your site conditions, identify the type of woodland community that will grow on your school site using the Earth Partnership for Schools activity, “A Good Fit” at [http://uwarboretum.org/woodland/a\\_good\\_fit.htm](http://uwarboretum.org/woodland/a_good_fit.htm).

Next, review the following criteria to guide your species selection, then follow the activity directions using the “Woodland Restoration for Wisconsin Schools” Website at <http://uwarboretum.org/eps/restoration/>.

## Criteria and Guidelines for selecting woodland species on the school grounds.

### A. Woodland Structure

- Choose species for each vertical layer - Canopy (upper and lower canopy trees), Understory layer (large to small shrubs), and Groundlayer. Within each layer include dominant and associate species.

### B. Pioneer Species

- Pioneer species, or sometimes called early successional species, are typically the hardiest and fastest growing species in a community. In restorations, they are often planted to lay the foundation for later successional species.
- Choose pioneer species to function as a nurse crop for the shade tolerant, longer-lived canopy and groundlayer species and to create a closed canopy quickly. Pioneer species include white birch, white pine, pin cherry, black cherry, the poplars - trembling aspen, large tooth aspen, balsam poplar and cottonwood. For the boreal forest, plant balsam fir as a pioneer species. Choose pioneer species that grow naturally in the woodland plant community you are restoring.

### C. Woodland Edge Species

- Woodland edge communities form a boundary between a shady forest

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## Woodland (Shady Garden) Species Selection (cont.)

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Use scientific sources & resources (B.4.1)

Select multiple information sources (C.4.3)

Communicate results (C.4.6)

Support conclusions with logic (C.4.7)

Identify data and sources to answer questions (C.8.2)

State learning from investigations (C.8.6)

Present a scientific solution to a problem (H.8.2)

Use scientific knowledge & reasoning (H.12.7)

### Media and Technology:

Realize everyone is a technologist (A.4.2)

Explain purposes of objects (A.4.4)

Show how science and technology work together (A.8.1)

and sunny field or prairie and typically contain a mix of species from each community. A woodland edge functions as a buffering zone to lessen the harmful effects of drying winds and hot sun. The diversity of bird species attracted to the woodland edge habitat is an added benefit.

- Choose woodland edge species to plant along the perimeter of the woodland. Some possible woodland edge species to consider are hazelnut, sumac, hawthorn, prairie crab apple, elderberry, serviceberry, and the dogwoods and viburnums.

### **D. When choosing individual plants think about:**

1. Mature size relating to the forest structure: Consider the ultimate size of the plants and their position in the woodland. For example, in some forests two layers of trees are present, an upper canopy with the tallest trees and a lower canopy made up of smaller trees. Other forests may have only one layer of trees. A shrub or understory layer may or may not be present. Depending on the woodland type you are re-creating, choose appropriate species to fill each layer. Go to “Characteristics of Forest Ecosystems” at [http://uwarboretum.org/eps/woodland/characteristics\\_of\\_forest\\_ecosystems.htm](http://uwarboretum.org/eps/woodland/characteristics_of_forest_ecosystems.htm) to learn more about the vertical structure or layers in a woodland.
2. Mature size and site location: Plants should be to scale with their surroundings. For example, a small court yard would need small-sized trees. Where utility lines are present, plant a tree that will not grow into the utility lines. These measures save on maintenance and promote the health and beauty of your plantings.
3. Light: Each plant tolerates different light conditions. Plants that tolerate full sun should be planted first. Shade tolerant plants are planted later because they are intolerant of full sun and may not survive an exposed site.
4. Phenology (time of bloom): The peak of bloom in most woodlands is in the spring. Summer and fall blooming plants are also an integral part of the woodland community. Studying the guilds (point #4- see “Advanced Criteria: Guilds” at the bottom) will help you to select a natural ratio of blooming groundlayer plants for each season.
5. Flower type and color: As an optional aesthetic consideration, look for color combinations and contrasts to aesthetically accent your woodland.
6. Fruit type, color and season: Choosing species based on fruit type, maturity (when ripe) and desirability for wildlife invites a diversity of wildlife to your woodland. You may consider selecting species based on fruit type if planning for wildlife or visual interest beyond flowering.
7. Food, nesting and cover for insects, birds and other wildlife: Planting a diversity of native herbaceous (wildflowers, ferns, grasses and

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## Woodland (Shady Garden) Species Selection (cont.)

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sedges) plants, shrubs and trees provides maximum habitat and opportunity to attract a variety of wildlife for cover, nesting and diverse food sources. Wildlife in the schoolyard adds life, beauty, discovery, and educational opportunities.

8. Leaves and fall color: You can look at these features for aesthetics and to learn taxonomy.
9. Plants to avoid: Avoid overly aggressive, weedy, poisonous, or species difficult to obtain or grow. Examples of weedy or aggressive native species include box elder and black locust. Poisonous plants include poison ivy and poison sumac. Endangered or threatened species such as several orchids may be difficult to obtain or grow.
10. Educational potential—lessons, activities, and research: A woodland offers many opportunities for education and research. You may select plants Native Americans used for food and medicinal uses, taxonomy lessons, plant adaptations, interactions, plant growth and/or decomposition investigations.
11. Availability: Think about the costs involved and whether the plants being considered are available from a native plant nursery.

### E. Advanced Criteria

Some students or groups may choose to have a more scientifically accurate planting and therefore should use the following criteria. These considerations are optional.

1. *Species Importance Values*: Importance values measure the significance of a plant in a community. The higher the importance values the more influence that species has in terms of numbers of individuals, size and where it is located in the canopy. All species that may live in a particular plant community are included on the woodland community list, even those that are marginally present. For example, beech is found in six communities in the database, but in reality it is important, that is, has significant importance value, in only two. Use the Importance Value and other related statistics as a guide to selecting a mix of species that is an accurate representation of the community you are planting. Go to “Glossary of Wisconsin Woodland Species Characteristics” in the woodland database for more information about importance values for trees and shrubs.
2. *Guilds*: Choose groundlayer species according to their membership to the guilds outlines in the database. Guilds refers to the proportions of specified groups that make up the groundlayer. Each group is assembled by how they respond to light availability at the forest floor. Guilds for each woodland type are listed on the your woodland community model fact sheet. Match the proportions of blooming plants in your groundlayer mix to the proportions of guilds on the fact sheet.

### Activity Description

1. List the site conditions such as soil type, soil moisture, and topography on the woodland species selection worksheet.
2. As a group, review the site characteristics and identify criteria that fit your site characteristics and goals for your project. List these site characteristics and your criteria on woodland species selection worksheet.
3. Begin the process of developing a list of appropriate species for your woodland restoration.
4. Connect to the internet. Type in <http://uwarboretum.org/eps/woodland/welcome.htm>

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Go to:

- a. “Wisconsin Woodland Communities and Woodland Plant Database”
  - b. Then go to “Wisconsin Woodland Communities”
  - c. Go to “Woodland Community Models”
  - d. Go to your specific woodland community model.
5. Print your specific woodland community model fact sheet. Using the fact sheet, fill in the dominant and common trees, shrubs and groundlayer species, and species density on your worksheet.
  6. Go to the “Woodland Plant Database” at [http://uwarboretum.org/education/woodland\\_db](http://uwarboretum.org/education/woodland_db)
  7. Type in your woodland community in the search box to view a list of species that grow in that community.
  8. Look up each species to determine which species to select based on your criteria.
  9. Please note when choosing species to exercise restraint. It is not possible to include every species on the community lists. These lists are a collection of species growing in several stands in Wisconsin. The goal in developing a plant list, is to mimic a natural level of biodiversity and patterns of a woodland community on your site. Click on a woodland community to see the Woodland Community Model Fact Sheet. Look at the species density on the fact sheet to use as a guide for selecting the number of species to plant in your woodland. Refer to E.1. “Species Importance Values” in the background section for information on how to choose appropriate species for your woodland.
  10. Fill out the woodland species that you select on the woodland species selection form using the plant data sheets and field guides (if desired).
  11. Re-group; “go in the round” and “share out” the species you chose and why.
  12. Compile all species selected on a master woodland species selection form.
  13. The next step is determining quantities and a budget for the species you selected.

### Extensions

- Research plants selected using the Earth Partnership for Schools activity, “Up Close and Personal.”
- Visit a natural area and locate the trees that you are planting at your school. Learn about these trees by making bark rubbings, pressing leaves, taking measurements, etc.
- Invite a nursery person or horticulturist to your classroom to learn how these professionals propagate woody plants.
- See Earth Partnership for Schools activity, “Navigating the Woodland Web Site” for an introduction to this activity, woodlands and using the internet to obtain information.

### Additional Resources

- Brockman, Frank. (1968). *A guide to field identification: trees of North America*. Golden Press. Racine, WI.
- Curtis, John T. (1959). *The vegetation of Wisconsin*. The University of Wisconsin Press. Madison, WI.

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- Fassett, Norman. (1976). *Spring flora of Wisconsin*. The University of Wisconsin Press. Madison, WI.
- Henderson, Carrol. (1987). *Landscaping for wildlife*. Minnesota Department of Natural Resources. St. Paul, MN.
- Rosendahl, Carl. *Trees and shrubs of the Upper Midwest*. University of Minnesota Press. Minneapolis, MN.
- Swink, Floyd & Wilhelm, Gerald. (1979). *Plants of the Chicago region*. The Morton Arboretum. Lisle, IL.
- (1990) *Forest trees of Wisconsin: How to know them*. Department of Natural Resources. Madison, WI.

### **Assessments**

- Explain why it is important to match species to your site conditions.
- Choose three criteria and explain why you think they are important for selecting plant species for your school site.
- Give 2 –3 examples of plants for each forest layer.

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## Woodland (Shady Garden) Species Selection Worksheet

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Directions: Using the woodland community model fact sheet, write the type of woodland you are planning to restore and the existing site conditions.

1. Woodland type: \_\_\_\_\_
2. Soil type: \_\_\_\_\_
3. Soil moisture range: \_\_\_\_\_
4. Topography: \_\_\_\_\_

Directions: As a group, brainstorm the goals and objectives for your woodland to use as a guide for selecting plants.

5. Criteria for Selecting Woodland Species:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

Directions: Using the Woodland Community Model Fact Sheet, write down the dominate and common trees, shrubs, vines, groundlayer species, pioneer and woodland edge species. Also, write the species density or the average number of species found in typical woodland. Hint: the some of the pioneer and woodland edge species are listed in the background section of the activity.

6. Species density: \_\_\_\_\_ (average number of species found in a typical woodland.)
7. Dominant trees: \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_
8. Common trees: \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_
9. Shrubs and vines: \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_
10. Groundlayer: \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_
11. Pioneer species: \_\_\_\_\_, \_\_\_\_\_
12. Woodland edge species: \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_



