Keys to the Forest: Woody Plant Identification & Management
AAPS Environmental Education Program High School Field Trip

Overview

In a 2-4 hour visit to the Freeman Environmental Education Center, high school environmental science classes will go into the woodlot to practice tree identification and flag invasive woody plants for subsequent removal. A brief orientation presentation will introduce students to the history of the 40-acre site and explain the protocol for the field activity. After guided practice in the classroom, students will head outdoors to a designated 100 square foot quadrat in the woodlot. Students will use a dichotomous Michigan tree identification key (and other ID resources, as necessary) to practice identifying tree species, and compare their identification to a professional tree inventory database for immediate feedback. Students will practice measuring the diameter at breast height (DBH) and also estimate the approximate height and age of each tree. Finally, students will work together to identify invasive woody plants and mark them with colorful flagging tape for removal at a later date, as part of ecological restoration efforts at the site.

Objectives

Students will:
- Learn about the historical and current land use of an AAPS natural area and consider implications for ecological restoration and habitat enhancement planning.

- Use a tree identification key and other resources to practice identifying Michigan tree species.

- Measure the circumference of trees to calculate the diameter at breast height (DBH) and use a Biltmore stick to estimate the approximate height of trees.

- Estimate the age of trees using the DBH and a species-based growth factor.

- Identify and tag woody invasive shrubs.

Materials

Writing utensils, student recording sheets, clipboards, copies of a Michigan tree identification guide and woody invasives information pages, marking flags, measuring tapes, trash bags, measuring tape and calipers for measuring circumference, additional identification tools (iNaturalist app, copies of 'Michigan Trees' book), binoculars**,** copies of the quadrat map and tree inventory database, Biltmore sticks, cut branches for guided classroom practice

Activities:

- Greet students and orient them to the site (bathrooms, water bottle filling station, etc.). Share slideshow, explaining the history of land use (pre-European settlement, agricultural record and subsequent ecological succession) and providing context for ecological restoration and habitat enhancement plans. Walk students through the protocol for the field activity. Pass out recording sheets and clipboards.

- Look at the quadrat map and identify which section the class will survey. Record the quadrat code on the student recording sheet and point out the relevant tree ID numbers from the quadrat map.

- Introduce key vocabulary for leaf characteristics and have students add sketches onto the chart on the back of the student recording page.

- With cut branches, practice naming the leaf characteristics using the dichotomous key (guided practice with gradual release).

- Have students form small groups and distribute sets of tools for field work. Move to the field east of the classroom to practice the full protocol on nearby trees (e.g. Cottonwood, Sugar Maple, Black Cherry) and recording findings.

- Show the [historical photos](#) of the Dixboro School Nature Center sign, demonstrating sites changes and ecological succession over time. Then, bring students and supplies into the woodlot. Locate the quadrat (corners will be flagged).

- Support students groups in using tree identification key to identify each tagged tree. Students can use binoculars to observe leaves if there are no low hanging branches. Students can strengthen identification by using other clues, such as bark color and texture, form and size (habit), seeds/fruit, consulting text or digital tools as needed. Students should list clues on the recording page, and periodically check the tree inventory (instructors will have copies) for feedback on their identification accuracy.

- Note any circumstances that might have affected your work today, or other relevant observations.

- If time allows, students record animals or animal signs (amphibians, arthropods, birds, mammals, reptiles) observed in the study plot.

- Work in small groups to identify and flag any Buckthorn, Autumn Olive, Honeysuckle, or Oriental Bittersweet growing in the quadrat.

- Gather supplies and return to parking area to prepare for departure. Prompt students to share something they learned or something they want to remember or study further. Thank students for their participation!

Additional Resources:

[Pre-trip Orientation](#) (Shared by classroom teacher 1-2 days before field trip)
[Day-of Slideshow to Prepare for Field Activity](#)
[Freeman Quadrat Map](#)
[Freeman Tree Inventory Database](#)

Identification Resources:

- [MSU Extension 'Identifying Trees of Michigan' Guide](#)

- Midwest Invasive Species Information Network species description sheets for 7 common species found in the Freeman woodlot:
    - http://www.misin.msu.edu/facts/detail/print.php?id=12
    - http://www.misin.msu.edu/facts/detail/print.php?id=13
    - https://www.misin.msu.edu/facts/detail/print.php?id=8
    - https://www.misin.msu.edu/facts/detail/print.php?id=10
    - https://www.misin.msu.edu/facts/detail/print.php?id=11
    - https://www.misin.msu.edu/facts/detail/print.php?id=6
    - https://www.misin.msu.edu/facts/detail/print.php?id=19

- Copies of <u>Michigan Trees: A Guide to the Trees of the Great Lakes Region</u> by Burton Barnes and Warren Wagner

- [Simple visual ID guide](#) for species commonly found in Freeman woodlot

- iNaturalist or Seek App

Freeman EE Center Tree Identification Survey
Student Recording Page

1. **Student Name** _____

2. **Date of Study** _____

3. **School Name** _____

4. **Teacher Name** _____

5. **Quadrat Code** _____

We will attempt to identify all trees within the quadrat that have a diameter at breast height (DBH) of 6 inches or more. To calculate DBH:
- Measure 4 ½ feet from the ground on the trunk of the tree.
- Wrap a string around the trunk at that point and measure the circumference.
- Divide the circumference by pi (3.14) to calculate the diameter.

Tree #	DBH (Inches)	Approx. Age (Years)	Approx. Height (Feet)	Your Species Identification	Clues You Used to Determine Species	Species Listed in Professional Inventory
217	8"	36 years	45 feet	Black Walnut	Compound leaf, alternating on branch; Green fruit	Black Walnut Juglans nigra

Key Vocabulary

	Needlelike		Scalelike		
	Broadleaf		Simple		Compound
	Opposite		Alternate		Palmate
	Oblong		Ovate (or Spade)		Elliptical (Or Lance)
	Smooth		Toothed		Lobed

If time allows, record animals or animal signs (amphibians, arthropods, birds, mammals, reptiles) you observed in your study plot.

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Share a reflection on today's learning activity. What is something that you want to remember or study further?

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Estimating tree age with DBH

Multiply diameter in inches by the tree's growth factor using the chart below.
(Source: Purdue University)

Example: A red oak has a diameter of 30 inches. Multiply the diameter (30 inches) by the growth factor for red oak. The estimated age is **120 years**.

Tree species	Growth factor
Red maple	4.5
Silver maple	3.0
Sugar maple	5.0
River birch	3.5
White birch	5.0
Shagbark hickory	7.5
Green ash	4.0
Black walnut	4.5
Black cherry	5.0
White oak	5.0
Red oak	4.0
Pin oak	3.0
Linden or basswood	3.0
American elm	4.0
Ironwood	7.0
Cottonwood	2.0
Dogwood	7.0
Redbud	7.0

Chart from Purdue University, Indiana