



Harvard LTER Schoolyard Program

Teacher Developed Lessons and Documents that integrate Harvard Forest Schoolyard Ecology Themes into curriculum.

- Lesson Title: **Student Sheets for Buds, Leaves Project Quadrat Study**
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- School: Belchertown High School
- Date: April 9, 2019

Buds, Leaves and Global Warming Quadrat Study Templates and Lesson plan on next 6 pages....

BHS BLG Quadrat Study

Tree # _____ species _____ Group Leader _____

Recorder(s) _____

Study Plot duty roster names	Task	Results			Species observed ... list
	Mark the plot perimeter				
	Site map/Overhead sketch				
	Vertical map/Landscape sketch				
	Age (dbh) class analysis, number of ...	sap	pole	saw	
	Study tree and Sawtimber (big) dbh and height				
	Air and soil temperatures	Air	soil		
	Relative humidity				
	Canopy cover				
	Light intensity				
	Wind, desiccation & Open skies				
	Ground cover density				
Everyone	Observe evidence of wildlife				
Everyone	Observe wildlife directly				

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Mark the plot perimeter: sticks, measuring tape

Set sticks – 3meters (~10') to a side - around your plot area by running the measuring tape around the area with your tree close to the middle of the left edge, except for Tree #2 – right edge

Site map/Overhead/Birds-eye-view sketch: Grid paper, rulers, clipboard, model

On the left edge of the grid paper (right for Tree 2), draw your tree as a scale-sized circle (by dbh) and mark the tree number inside the circle. Also measure/estimate the large trees, small trees, saplings and shrubs. Fill in the information about structures to the North and South.

Vertical map/Landscape sketch: graph paper, rulers, clipboard, model

Draw your study plot as you see it from ground level. Clearly mark your tree and include labels for canopy, substory, understory, and groundcover. Include and label any dead trees, rocks, and logs, or manmade (permanent) structures. Report to your group leader when you are done.

Age (dbh) class analysis: dbh tape

Use the dbh tape and measure your tree at approximately 4 ½ feet above the ground, report the dbh to the Site map team. Count how many Saplings (1-4in dbh), Poletimber(5-7in dbh), and Sawtimber(8+in dbh) trees are in your plot. Report to the group leader.

Study tree and Sawtimber (10+ in) dbh and height: dbh tape, tape measure, clinometer, meter stick

With the dbh tape measure the dbh and height of all of the sawtimber trees

Canopy cover: canopy cover tube, calculator

On a corner-to-corner diagonal, look straight up through the canopy cover tube(it's really a toilet paper tube!) every 1 meter and record whether the sky is clear(0%), obstructed(50%), or fully covered(100%). Calculate the average canopy cover as a percentage for all of your measurements (don't leave out the zero's!!) Report to the group leader.

Ground cover density: a sharp eye

Walk around the plot to determine the types of groundcover in your quadrat and estimate the percent of each type of ground cover – use your best judgement. Report to the group leader.

Observe evidence of wildlife & Observe wildlife directly:

Keep your eyes open! Report to the group leader

Wind speed, desiccation & Open skies: Beaufort scale

Use the Beaufort scale to estimate the intensity and direction of the wind.

Estimate/predict the desiccating (drying) effects of the wind at this location

Examine the area to determine the direction from which your tree gets the most light.

Air and soil temperatures: Soil thermometer

Hold the thermometer still, in the shade, for the air temp.

Insert the thermometer 3 inches into the ground for soil temp. Report to the group leader

Relative humidity: Spark device, weather probe

Use the Spark Weather probe. Report to the group leader

Light intensity: camera, calculator

Use the camera to measure the light intensity in all four directions from the center of the plot.

Take a picture, switch to Playback, press display twice.

On the bottom of the screen reads a red A and F3.3, then a fraction... multiply the denominator

of the fraction by the ISO (ex 1/30 and ISO 300 ... multiply 30 x 300 = 900) that's your estimate of light intensity. Average the 4 light intensities.

Mark the plot perimeter: sticks, measuring tape

Set sticks – 3meters (~10') to a side - around your plot area by running the measuring tape around the area with your tree close to the middle of the left edge, except for Tree #2 – right edge

Site map/Overhead/Birds-eye-view sketch: Grid paper, rulers, clipboard, model

On the left edge of the grid paper (right for Tree 2), draw your tree as a scale-sized circle (by dbh) and mark the tree number inside the circle. Also measure/estimate the large trees, small trees, saplings and shrubs. Fill in the information about structures to the North and South.

Vertical map/Landscape sketch: graph paper, rulers, clipboard, model

Draw your study plot as you see it from ground level. Clearly mark your tree and include labels for canopy, substory, understory, and groundcover. Include and label any dead trees, rocks, and logs, or manmade (permanent) structures. Report to your group leader when you are done.

Age (dbh) class analysis: dbh tape

Use the dbh tape and measure your tree at approximately 4 ½ feet above the ground, report the dbh to the Site map team. Count how many Saplings (1-4in dbh), Poletimber(5-

7in dbh), and Sawtimber(8+in dbh) trees are in your plot.
Report to the group leader.

Study tree and Sawtimber dbh and height: dbh tape, tape measure, clinometer, meter stick

With the dbh tape measure the dbh and height of your Study Tree & all of the sawtimber(10+ in) trees

Canopy cover: canopy cover tube, calculator

On a corner-to-corner diagonal, look straight up through the canopy cover tube(it's really a toilet paper tube!) every 1 meter and record whether the sky is clear(0%), bstructed(50%), or fully covered(100%). Calculate the average canopy cover as a percentage for all of your measurements (don't leave out the zero's!!) Report to the group leader.

Ground cover density: a sharp eye

Walk around the plot to determine the types of groundcover in your quadrat and estimate the percent of each type of ground cover – use your best judgement. Report to the group leader.

Observe evidence of wildlife & Observe wildlife directly:

Keep your eyes open! Report to the group leader

Wind speed, desiccation, & Open skies: Beaufort scale

Use the Beaufort scale to estimate the intensity and direction of the wind.

Estimate/predict the desiccating (drying) effects of the wind at this location

Examine the area to determine the direction from which your tree gets the most light.

Report to the group leader.

Measure plot perimeter: sticks, string

Set the sticks 10' apart in the area marked off in the classroom, tie the string to your sticks, leaving one corner open. Set up your plot area by inserting the sticks into the ground, with your study tree no closer than 3 feet from one corner (3 feet from that one stick), and being sure to include the edge of the wooded area

Overhead sketch: Graph paper, rulers, clipboard, model

On graph paper, start with a 20x20cm square and sketch in the large trees, small trees, saplings and shrubs, following the model. Draw a key and a scale directly on the graph paper

Vertical structure sketch: graph paper, rulers, clipboard, model

Draw a representative "slice" of your study plot, following the model like a landscape, with labels for canopy, substory, understory, and groundcover. Include and label any dead trees.

Age (dbh) class analysis: dbh tape

Use the dbh tape. Count how many Saplings (1-4in dbh), Poletimber(5-9in dbh), and Sawtimber(10+in dbh) trees are in your plot

Study tree and Sawtimber dbh and height: dbh tape, tape measure, clinometer, meter stick

With the dbh tape measure the dbh and height of your Study Tree & all of the sawtimber(10+ in) trees

Air and soil temperatures: Soil thermometer

Hold the thermometer still, in the shade, for the air temp.

Insert the thermometer 3 inches into the ground for soil temp.

Relative humidity: Spark device, weather probe

Use the Spark Weather probe

Canopy cover: canopy cover tube, calculator

On a corner-to-corner diagonal, look straight up through the canopy cover tube(it's really a toilet paper tube!) every 5 feet and record whether the sky is clear(0%), obstructed(50%), or fully covered(100%). Calculate the average canopy cover as a percentage for all of your measurements (don't leave out the zero's!!)

Light intensity: camera, calculator

Use the camera to measure the light intensity in all four directions from the center of the plot. Take a picture, switch to Playback, press display twice.

On the bottom of the screen reads a red A and F3.3, then a fraction... multiply the denominator of the fraction by the ISO (ex 1/30 and ISO 300 ... multiply 30 x 300 = 900) that's your estimate of light intensity. Average the 4 light intensities.

Wind speed: Beaufort scale

Use the Beaufort scale to estimate

Ground cover density: a sharp eye

Walk around the entire plot to estimate the ground cover density as a percentage

Observe evidence of wildlife

Keep your eyes open!

Observe wildlife directly
Keep your eyes open!!