Woodland Habitat Study

Purpose

To examine the type of vegetation that exists in this woodland and how it is affected by biotic and abiotic factors.

Overview of Measurements

The following steps will be taken:

1. Define and Sketch the Site
2. Line Transect
3. Soil Characterization

Introduction

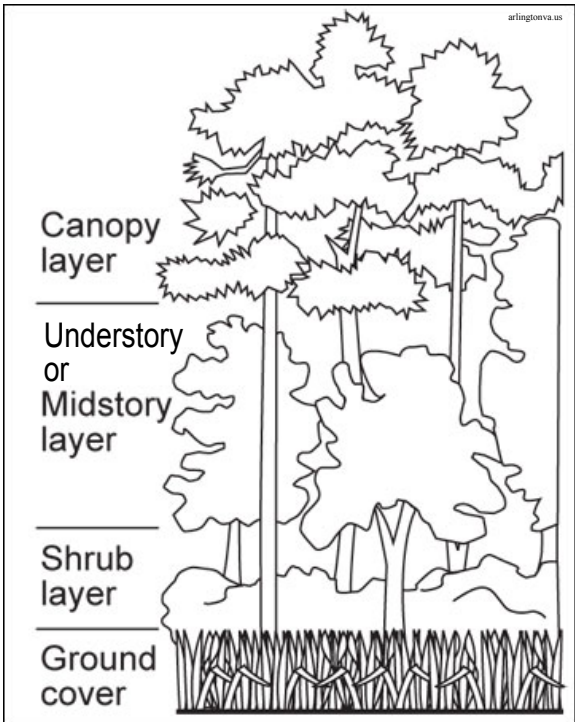
A woodland is more than just a collection of trees. There are shrubs, wild flowers, insects, birds and mammals and also mosses, fungi, lichens and many organisms too small to see with the naked eye. Certain species are dependent on others for their survival.

There are four main layers within a woodland ecosystem. These are the Canopy, the Understory, the Shrub Layer and the Ground Layer. Each of the different layers will contain different species of flora and fauna. For example, the canopy might contain oak and ash trees, the understory, holly and hazel, the shrub layer bramble and rhododendron and the ground layer bluebell and primrose. Associated with these different plants will be a variety of animals and birds.

Documenting Your Site

(1) *Site Sketch*

Lay out your **50m transect tape** across your site and place markers (these can be sticks or stones) at every 10m. Use these markers to help you with spacing in your sketch. Take a few minutes to make a brief sketch of your site. Be sure to include each layer of the habitat in your map. Use symbols to mark the presence of water, rocks, and to distinguish between different species of flora and fauna. Create a key in the margin of your notebook to define what each symbol means. For the different trees and shrubs, note in your key if you found the plant in the Canopy, Understory, Shrub Layer, or Ground Layer.



Line Transect

A line transect is a study which takes place along a particular line, which is usually (but not always) fairly straight.

In this investigation we will use a **50m transect tape** and observe a number of abiotic factors along its length. These are:

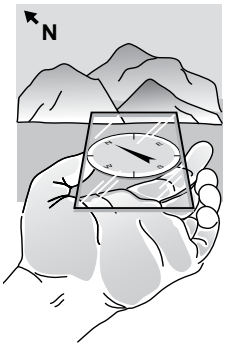
a) The ground cover. b) The canopy cover. c) The humidity. d) The soil pH.

e) The surface temperature.

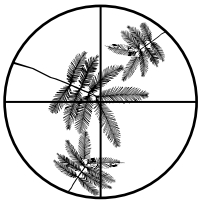
(2) *Set-up*

1. Roll up your **50m transect tape** so that it is only 20 meters long.
2. If your transect is along a hill, determine the slope angle using a **clinometer**.
   a. Two students (A and B) are needed whose eyes are at about the same height to measure the slope. Other students should be the "readers" and "recorders".
   b. Student A holds the clinometer and stands down slope while Student B stands upslope. Students A and B should be about 30m apart (or as far apart as possible). The reader should stand next to Student A.
   c. Looking through the clinometer, Student A sites the eye level of Student B. Reader reads the angle of slope on the clinometer in degrees, and records this reading.

3. Next, identify the aspect of the slope:
   a. Face up the steepest slope across the exposed soil area.
   b. Hold the **compass (or cellphone compass app)** in your hand so that the red arrow is lined up with the North position on the compass.
   c. Read the number on the edge of the compass housing (which can range from 0 to 360) and record answer.



(3) *Canopy Cover and Ground Cover*



Top: vegetation seen in crosshairs. Record plant species, T or S.
Bottom: sky visble at crosshairs, record (-).

1. Starting at the 0m mark on your transect, look up through your **densiometer** at the canopy, making sure it is vertical and that the metal nut/washer is directly below the intersection of the crosshairs at the top of the tube. Look at the highest canopy in your spot.

a. If you see vegetation, twigs or branches at the crosshairs, identify whether the plant you see through the densiometer is a tree or a shrub. Trees are over 5m tall. If the plant is 50cm-5m, it is categorized as a shrub.

b. If you know the type of tree or shrub, record the species name in your journal. The field guide in the last section of your student journal may help you identify the species. Park rangers may also be able to help with plant identification. If you cannot identify the plant, record (**T**) or **Tree** if it is a tree

species and (**S**) or **Shrub** for shrubs. Then, take a picture to help you identify it later.

c. If you see the sky through the crosshairs, record a (-) in your journal.

2. After looking up through the densiometer, look down at your feet (without moving them). The ground cover you will measure is anything that is touching your left foot or lower leg. Do not use densiometer for this.

Figure: Grasses and Graminoids (Meet the Green)

a. If the vegetation is green (alive), try to identify the species name using the field guide in the back of your journal. If you cannot identify the species, record (**G**) or **Graminoid** for grasses or grasslike plants, (**F**) or **Forb** for herbaceous flowering plants other than a grass, (**S**) or **Shrub** for shrubs and dwarf shrub species, and (**OG**) or **Other** for other green vegetation. Then, take a picture to help you identify it later.

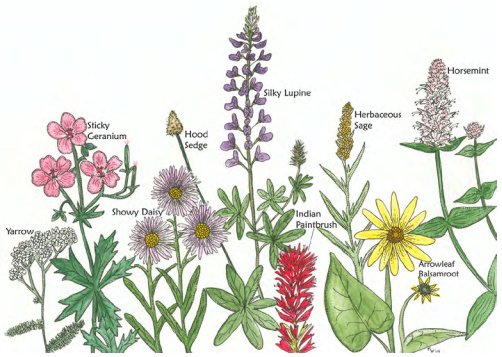


Figure: Forbs (USDA)

b. If the vegetation is brown but still attached, record a (**B**).

c. If there is no vegetation, record a (**-**) in your journal.

3. Repeat steps 1-2 every 5 meters along the transect.

(4) *Relative Humidity*

1. Starting at the 0m mark, use a **sling psychrometer**, also known as a **whirling hygrometer**, to measure the relative humidity.
2. Stand far enough away from other people so you will not hit them with the psychrometer. Stand in the shade if possible with your back to the sun. If there is no shade near the transect, move to a shady spot nearby, but not too close to trees.

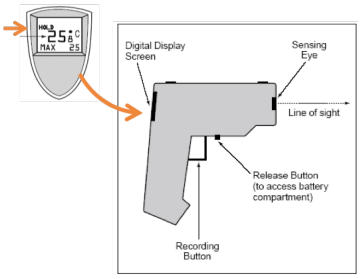
3. Open the sling psychrometer case by pulling out the slider, which contains the two thermometers.
4. Thoroughly wet the wick of the wet blub thermometer with water from a waterbottle or spray bottle. Do not use hot water.
5. Remove any water from the dry bulb by gently blotting it with cloth or paper towel.
6. Holding the case in front of you, so that the psychrometer hangs at a right angle, rotate the frame for 60-90 seconds at between 2-3 revolutions per second.
7. Let the psychrometer stop whirling on its own! Do not stop it with your hand or other object.
8. Quickly read the wet bulb temperature to 0.5˚ C (from the thermometer with the wick attached). Then read and record the dry bulb temperature.
9. Determine the relative humidity using the sliding scale found on the cases of

some psychrometers. Slide the inner frame in to the case until the wet and dry bulb temperatures align. Read the %Relative Humidity from the scale at the location of the arrow.

10. Different pshychrometers may have slightly different scales, please refer to the directions for accuracy.
11. Repeat the measurement every 5 meters along the transect.

(5) *Surface Temperature*

1. Starting at the 0m mark on your transect, use an **infrared thermometer (IRT)** to measure the surface temperature.
2. Hold the IRT with your arm extended straight out in front of you and point the instrument straight down at the ground.
3. Try not to take the recording in a shadow area, including your own shadow. Make sure your arm is extended so your body heat does not interfere.
4. Hold the IRT as still as possible. Press and release the recording button. [You MUST release the recording button for the instrument to register and hold your spot's surface temperature.]



5. Read and note the surface temperature from the digital display screen located on the top of the IRT. (Note: Surface Temperature is recorded in Celsius to the nearest tenth degree, ie. 25.8)
6. Repeat steps 2-4 two more times. Calculate the average of all 3 recordings and record that number in the table in your Student Journal.
7. Repeat this process every 5m along the transect.

(6) *Soil pH*

Please refer to the directions provided with the soil pH kit for more complete and kit-specific directions. Start at the 0m mark on your transect and take the measurement every 5m along the transect.

(7) Soil Characterization

Soil characterization is a fundamental step in describing and analyzing soil as part of the Earth system. The characteristics you identify will help to explain the role of the soil in exchanging matter and transferring energy with the atmosphere, biosphere and hydrosphere. As well, the types of soil can help determine what type of vegetation can grow in a given area. We will only be doing one characterization per site (not repeated along the transect).

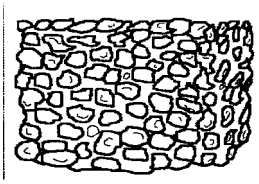
Site Exposure

1. Choose a location along or near your transect.
2. Divide into three groups to dig your holes. Each group should be about 1m apart.
3. Identify a location where the surface of the soil can be exposed.
4. Remove the surface vegetation and scrape away the very top layer of soil.
5. Use a garden **trowel** to carefully remove 10cm of soil from a small area and set it on the ground.
6. Use this soil for your characterization.

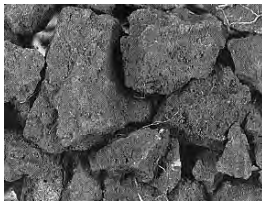
A. *Measuring Structure*

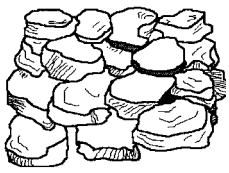
1. Hold the sample gently in your hand and look closely at the soil to examine its structure.
2. Come to a consensus on the type of soil structure of the horizon. Record in your journal. Possible choices of soil structure are:

Granular: Resembles cookie crumbs and is usually less than 0.5cm in diameter. Commonly found in surface horizons where roots have been growing.

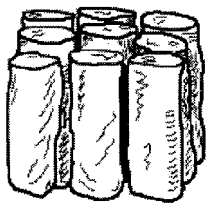


Blocky: Irregular blocks that are usually 1.5 - 5.0cm in diameter.

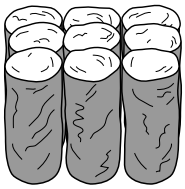




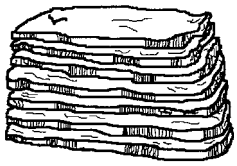
Prismatic: Vertical columns of soil that might be a number of cm long. Usually found in lower horizons.



Columnar: Vertical columns of soil that have a white, rounded salt “cap” at the top. Found in soils of arid climates.

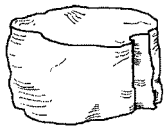


Platy: Thin, flat plates of soil that lie horizontally. Usually found in compacted soil.



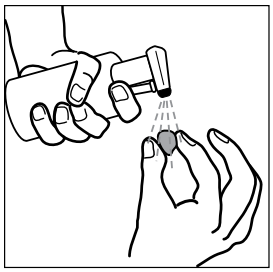
In certain cases, soil samples may have no structure. These would be classified as either:

Single Grained: Soil is broken into individual particles that do not stick together. Always accompanies a loose consistence. Commonly found in sandy soils.

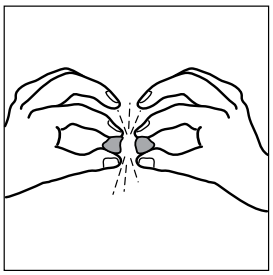


Massive: Soil has no visible structure, is hard to break apart and appears in very large clods.

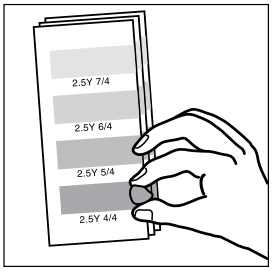
B. ***Measuring Main Color and Second Color***



1. Take a ped (a clump of soil) from the horizon being studied and note whether it is moist, dry, or wet. If it is dry, moisten it slightly with water from your water bottle.
2. Break the ped and hold it next to the color chart.
3. Stand with the sun over your shoulder so that sunlight shines on the color chart and the soil sample you are examining.



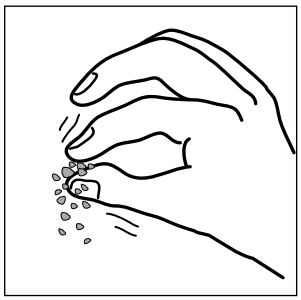
4. Find the color on the color chart that most closely matches the color of the inside surface of the ped.
5. Record in your Student Journal the symbol of the color on the chart that most closely matches the soil color that covers the largest area of the ped (dominant or main color). Sometimes, a soil sample may have more than one color. Record a maximum of two colors if necessary, and indicate (1) the dominant (main) color, and (2) the sub-dominant (second) color.



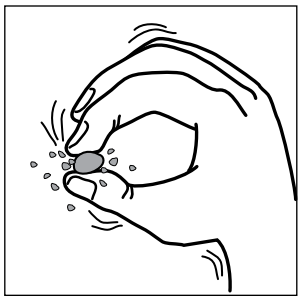
C. *Measuring Soil Consistence*

1. Take a ped from the soil horizon being studied. If the soil is very dry, moisten the face of the profile by squirting water on it, and then remove a ped for determining consistence.
2. Holding the ped between your thumb and forefinger, gently squeeze it until it pops or falls apart.
3. Record one of the following categories of soil ped consistence in your Student Journal.

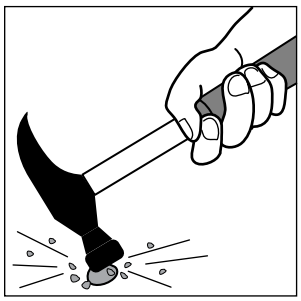
Loose: You have trouble picking out a single ped and the structure falls apart before you handle it. **Note:** Soils with **single grained structure *always have*** **loose consistence**



Friable: The ped breaks with a small amount of pressure.

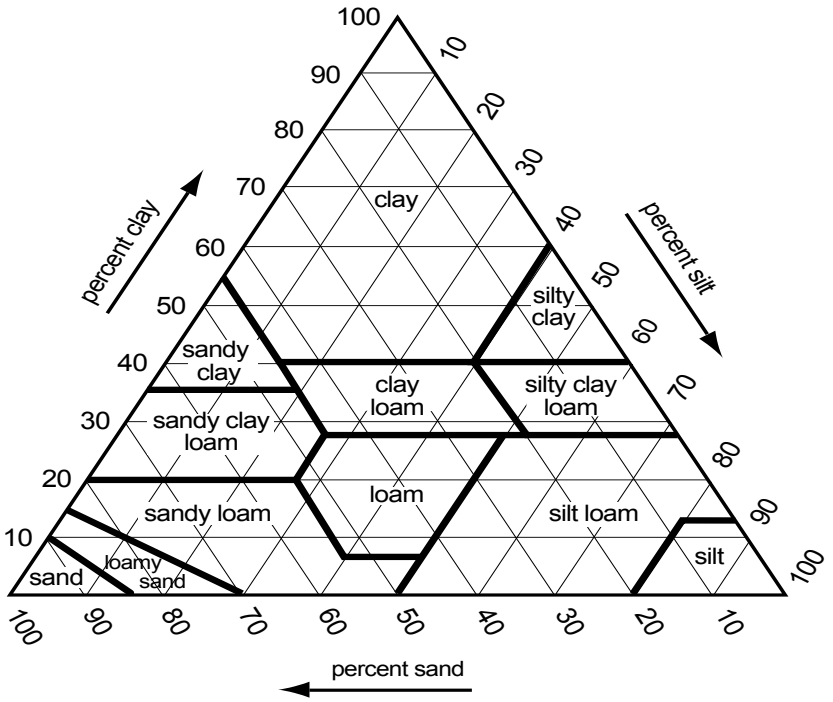


Firm: The ped breaks when you apply a larger amount of pressure and the ped dents your fingers before it breaks.



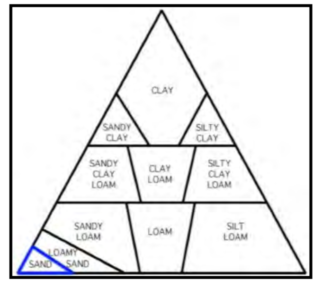
Extremely Firm: The ped can't be crushed with your fingers (you need a hammer!) (To test for Extremely firm, try hitting it with a rock, waterbottle, or shoe.)

D. *Measuring Soil Texture* *(for help with this category, refer to the Textural Triangle*



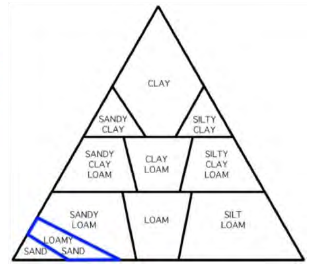
Step 1

- Place some soil (about the size of a small egg) in your hand and use the spray mist bottle to moisten the soil. Let the water soak into the soil and then work it between your fingers until it is thoroughly moist. Once the soil is moist, try to form a ball.
- If the soil forms a ball, go on to **Step 2**. If the soil does not form a ball, call it a **sand**. Soil texture is complete. Record the texture in your Student Journal.



Step 2

- Place the ball of soil between your thumb and index finger and gently push and squeeze it into a ribbon. If you can make a ribbon that is longer than 2.5 cm, go to **Step 3**. If the ribbon breaks apart before it reaches 2.5 cm, call it a **loamy sand**. Soil texture is complete. Record the texture in your Student Journal.



Step 3

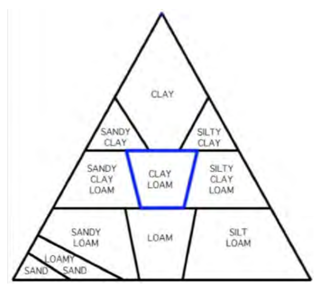
- If the soil:
  - Is very sticky
  - Hard to squeeze
  - Stains your hands
  - Has a shine when rubbed
  - Forms a long ribbon (5+cm) without breaking,

Call it a clay and go to Step 4.

Otherwise, if the soil:

- Is somewhat sticky
- Is somewhat hard to squeeze
- Forms a medium ribbon (between 2-5cm)

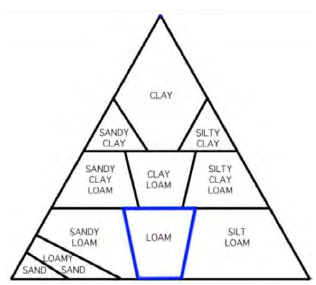
Call it a clay loam and go to Step 4.



Otherwise, if the soil is:

- Smooth
- Easy to squeeze,
- At most slightly sticky,
- Forms a short ribbon (less than 2cm)

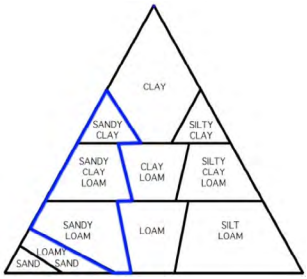
Call it a loam and go to Step 4.



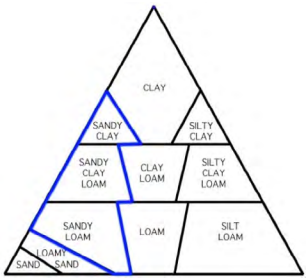
Step 4

- Wet a small pinch of the soil in your palm and rub it with a forefinger. If the soil:
  - Feels very gritty every time you squeeze the soil, go to **A**.
  - Feels very smooth, with no gritty feeling, go to **B**.
  - Feels only a little gritty, go to **C**.

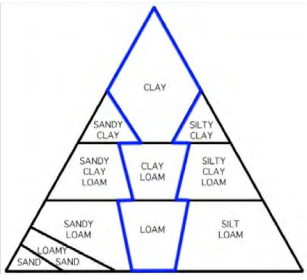
A. Add the word **sandy** to the initial classification.
- Soil texture is either:
  - sandy clay,
  - sandy clay loam, or
  - sandy loam
- Soil texture is complete. Record the texture in your Student Journal.



B. Add the word **silt or silty** to the initial classification.
- Soil texture is either:
  - silty clay,
  - silty clay loam, or
  - silt loam
- Soil texture is complete. Record the texture in your Student Journal.



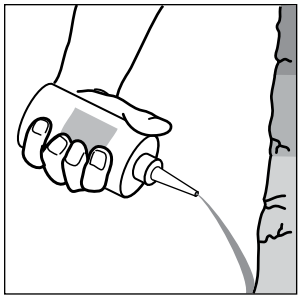
C. Leave the original classification.
- Soil texture is either:
  - clay, clay loam, or loam
- Soil texture is complete. Record the texture in your Student Journal.



E. *Measuring Roots*
1. Observe if there are **none**, **few**, or **many** roots in each horizon.
2. Record your observation in your Student Journal.

F. *Measuring Rocks*
1. Observe and record if there are **none**, **few**, or **many** rocks or rock fragments in the horizon. A rock or rock fragment is defined as being larger than 2 mm in size.
2. Record your observation in your Student Journal.

G. *Measuring Free Carbonates*

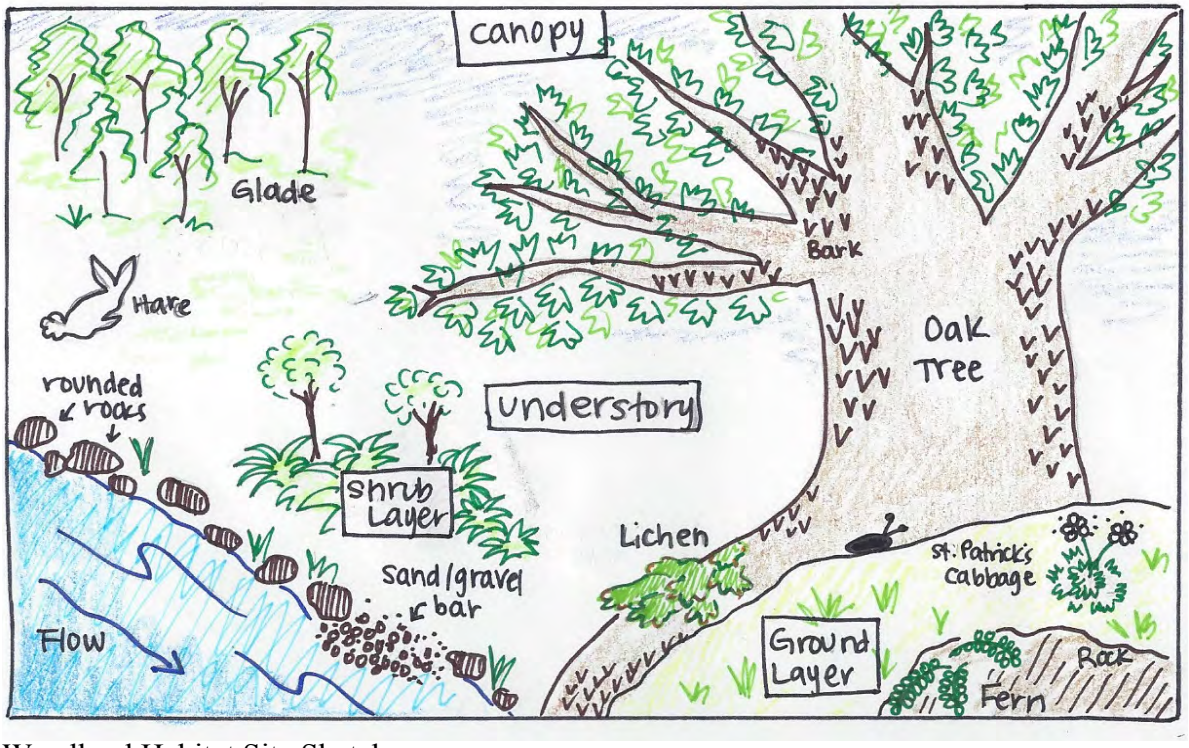


1. Set aside a portion of the exposed soil to use for the free carbonates test. Make sure not to touch it with your bare hands.
2. Open the acid bottle and squirt vinegar on the soil particles. Be sure to use caution and point the bottle directly at the soil, not toward other students, especially toward eyes. If vinegar gets into your eyes, rinse with water for 15 minutes.
3. Look carefully for the presence of effervescence. The more carbonates that are present, the more bubbles (effervescence) you will observe.
4. Record in your Student Journal one of the following as the result of the Free Carbonate Test:
   - **None:** if you observe no reaction, the soil has no free carbonates present.
   - **Slight:** if you observe a very slight bubbling action; this indicates the presence of some carbonates.
   - **Strong:** if there is a strong reaction (many, and/or large bubbles) this indicates that many carbonates are present.

Make sure all members of the group have all the data recorded in their journals.

Conclusions and Reflections

Spend some time journaling or discussing your results. Consider these questions as you reflect on your experience (you can write some notes in the “Additional Notes” pages of your journal): How does this habitat compare to the one you live in at home? What suprised you about your findings? What did you learn about woodland habitats? What did you expect to discover?



Woodland Habitat Site Sketch