



## Green-Up and Green-Down Site Selection



1. Your plant phenology site should be in an area where green-up of native plants is due to climatic factors such as increased temperature or precipitation. Watering and fertilization alter plants' green-up and green-down cycles, and the data would not be representative of natural vegetation and local climate connections. Buildings absorb solar radiation and shelter sites from wind. Therefore, avoid sites near buildings or where watering or fertilization is done. For the phenology protocols, near means that the plant is closer to a building than the height of the building. To determine if the building is too close, stand at the plant and sight the top of the building through your clinometer. If the angle is greater than  $45^\circ$ , the building is too close.
2. Non-native species, called exotics, have green-up and green-down cycles that may not be tied to the local climate. Often this is because exotics have not evolved to survive in the local climate. If you are unsure which plants are natives or have evolved to grow in a climate regime similar to yours, ask a local greenhouse or agricultural extension agent, or the appropriate staff at a local college or university.
3. Your green-up and green-down site must be accessible so that students can visit the site at least twice a week. It may be the same as a Quantitative Land Cover Sample Site or your Atmosphere Study Site. Be sure to determine the location of your site by identifying the latitude, longitude and elevation following the *GPS Protocol*.
4. Because the results of your green-up and green-down measurements may be related to temperature and precipitation data from the *Atmosphere Investigation* and soil moisture and temperature data from the *Soil Investigation*, it is better to choose a site close to the Atmosphere and Soil Moisture Study Sites. The local topography can

cause weather to vary even within short distances. This is particularly true in mountainous and coastal regions. The horizontal distance between the Phenology and Atmosphere and Soil Moisture Sites should be less than 2 kilometers and the elevation differences less than 100 meters, so that you can see whether your atmosphere data correlates with your green-up and green-down data.

5. Green-up and green-down detected by satellites are influenced mostly by a few dominant overstory plant species. These will be the species with the largest share of canopy coverage. If you are using a Quantitative Land Cover Site, you already know the dominant species. If you are using a different site, use the one to three over-story species that are dominant for your region. These over-story plants may be coniferous trees, broadleaf trees, broadleaf shrubs, or grasses. For phenology measurements you should choose a deciduous plant so, if the dominant plant species are all evergreen conifers, use the under-story broadleaf shrubs as your green-up plants. For example, if your study site is 90 percent white pine (a coniferous tree) and 10 percent sugar maple (a broad leaf tree), use the sugar maple trees as the study plants.
6. Scientifically, it is most useful if the tree or shrub branch used for the *Green-Up Protocol* is the same as the one used for the *Green-Down Protocol*. However, you may do only the Green-Up or Green-Down measurements or you may use different branches or even different sites if this is necessary to match your educational requirements. If you use different sites for green-up and green-down, create a site definition for each.
7. Since a change in plant growing season may be due to a change in climate, students at your school should try to use the same site and the same plant species consistently, year after year.

# Tree and Shrub Green-Up and Green-Down Site Selection

## Field Guide

### **Task**

Define the site for green-up and green-down measurement of trees and shrubs.

### **What You Need**

- Green-Up and Green-Down Site Definition Sheet*
- Pencil or pen
- Compass
- Flagging tape or other durable identification
- Dichotomous keys and/or other local species guides
- GPS receiver
- GPS Data Sheet*
- GPS Protocol Field Guide*

### **In the Field**

1. Complete the top of the *Green-Up and Green-Down Site Definition Sheet*.
2. Select one tree or shrub. The tree or shrub should be among the dominant native species in your area, deciduous, and easily accessible.
3. Select a healthy and relatively large branch on the south side of the plant in the Northern Hemisphere or the north side of the plant in the Southern Hemisphere. Use a compass or GPS receiver to determine direction. If a lower branch is chosen, it should be on the edge of the stand of trees or shrubs since branches inside a stand may experience a different microclimate due to shading.
4. Identify genus and species using field guides or the help of plant specialists. Record the genus and species on the *Green-Up and Green-Down Site Definition Sheet*.
5. Mark the branch with flagging tape or some other durable identification. Label the flagging tape with a unique number and your name/group name, school name and class.
6. Take a GPS measurement following the *GPS Protocol*.

# Grass Green-Up and Green-Down Site Selection Field Guide

## **Task**

Define the site for green-up and green-down measurement of grasses.

## **What You Need**

- Green-Up and Green-Down Site Definition Sheet*
- Pencil or pen
- GPS receiver
- GPS Data Sheet*
- GPS Protocol Field Guide*
- Nails or stakes or other durable identifiers
- Meter stick or tape measure
- Dichotomous keys and/or other local species guides

## **In the Field**

1. Complete the top of the *Green-Up and Green-Down Site Definition Sheet*.
2. Identify genus using field guides or help of plant specialists. Record the genus on the *Green-Up and Green-Down Site Definition Sheet*.
3. Select a one-meter square area dominated by grass plants. Mark your one-meter square plot with nails or stakes or other durable identifiers.
4. Take a GPS measurement following the *GPS Protocol*.