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**BIO 181 Lab**

Supplemental Learning Aids

# Unit 4.2: Urban Ecology and Field Methods

## Ecological Methods – Part 2: Field Sampling Techniques

You get to go explore! Enjoy your time outdoors, but be safe!

Due at the start of lab this week (Unit 4.2)

### Instructions:

In preparation for data collection, be sure to read the background information in the lab unit pages 55-61, and read all of the steps below. Although you will not be completing this lab exactly as written in the lab manual, we will follow it as much as possible. The methods you will be using are below. Note that we will not be able to complete Methods, #4: Gloomy Scale Sampling—Estimating Surface Area of Scale Insects, but during the In-Lab meeting you will be analyzing data collected from previous semesters to see what conclusions can be determined.

Reading: *Dying Trees in Cities? Blame It on the Concrete* (<https://news.ncsu.edu/2019/03/urban-effects-on-trees/>).

### Materials you need on the field:

- > [Data Collection Handout – Urban Ecology](https://wordpress-projects.wolfware.ncsu.edu/bio-181l-zchxzbn/wp-content/uploads/sites/75/2020/06/Scale-InsectsLab-) (<https://wordpress-projects.wolfware.ncsu.edu/bio-181l-zchxzbn/wp-content/uploads/sites/75/2020/06/Scale-InsectsLab->

[unit\\_onlineversion\\_handout.docx](#)),

- > measuring tape or long string,
- > a magnifier app for your phone (you should have it from Unit 4.1): *Magnifying Glass* for iPhones (<https://apps.apple.com/us/app/magnifying-glass-flashlight/id908717824>) or Android ([https://play.google.com/store/apps/details?id=com.rvappstudios.magnifyingglass&hl=en\\_US](https://play.google.com/store/apps/details?id=com.rvappstudios.magnifyingglass&hl=en_US)).
- > pen or pencil,
- > phone camera/regular camera.

**Safety:** Please be mindful of traffic, wildlife, standing water, any sort of brush or vines that may be hazardous. Wear closed-toed shoes and socks to cover your ankles. You may want other protective items like a hat, sunscreen, long-sleeved shirt and long pants.

## Complete Methods, # 1-3 (pp. 57-58)–Follow additional information below for Methods

Search for two locations near to you, one that is urban with impervious surfaces (Area "A"), i.e., asphalt, concrete, and one that is a more natural area (Area "B").

### **Methods #1 – Making observations:**

Find a tree (ideally of the same species) in the two locations (Area "A" and Area "B"), make observations (follow page 57 items #1 a-e) and record on the data collection sheets for each location, pp. 62 & 65. Note: not all trees may have leaves at this time, but you may be able to observe other features of the tree. Identify your tree. Try to make as many observations as possible and take pictures (add GPS location/geotag, if possible).

You may want to get ideas from the background material in Unit 4.1. and refer to the page for [identifying herbivory, fungal incidence, and other associations](https://wordpress-projects.wolfware.ncsu.edu/bio-1811-zchxzbn/laboratory-units/unit-4a-leaf-herbivory-procedures/) (<https://wordpress-projects.wolfware.ncsu.edu/bio-1811-zchxzbn/laboratory-units/unit-4a-leaf-herbivory-procedures/>).

Do an online search for important characteristics of trees and how to tell if a tree is healthy. See the list of **Resources** at the end of this page that includes tree identification guides/apps, information on organisms that live on or around a tree, and characteristics of tree health.

### **Methods #2 – Plant-to-Pace:**

Complete Method #2 a-d for the two trees you selected, one at each location (Area "A" and Area "B").

Record your data in Table 4.2-1 (Area "A") and Table 4.3-1 (Area "B"). See the following for additional

clarification:

[Pace to plant technique \(https://content.ces.ncsu.edu/measuring-impervious-surface-cover-with-the-pace-to-plant-technique/\)](https://content.ces.ncsu.edu/measuring-impervious-surface-cover-with-the-pace-to-plant-technique/).

### **Methods #3 – Diameter at Breast Height (DBH):**

Record this measurement for each tree, and enter in Table 4.2-2 (Area “A”) and Table 4.3-2 (Area “B”).

Ignore the note at the bottom of these data tables, as they refer to the scale insect protocol you will not

be completing. You will need a measuring tape to measure the circumference of your tree (or use a string, ribbon, or anything you can wrap around the tree and later use to measure with a measuring stick or ruler). DBH measurements are taken at 4.5 feet/1.37 meters above the ground. Refer to the following NC State Forestry page to view videos on how to take DBH measurements:

[Video – How to take DBH measurements \(https://forestry.ces.ncsu.edu/forestry-videos/\)](https://forestry.ces.ncsu.edu/forestry-videos/).

*Alternate Option 1* (same Methods as above, but different sampling location option):

If you cannot find (or go) to a natural area as a comparison to an urban area, you may choose two trees in an urban setting. They do not need to be the same species in this case, but they can be. You can then make observations and comparisons within the context of their microclimates. Follow the same protocol listed above for everything else.

*Alternate Option 2* (same Methods as above, but different sampling location option):

If you live in a rural area and cannot find (or go) to an urban area, choose two different trees in your area. They do not need to be the same species in this case, but they can be. Try to choose two different locations. For example, if you have trees close to your house or other structures like driveways, stonework, patios, walkways, etc., you can use that as our “urban” tree location. You may then choose a location farther away from these types of structures around your property. Follow the same protocol listed above for everything else.

### **Resources:**

**Tree Health and Urban Ecology:**

13 Steps for evaluating tree health:

<https://www.deeproot.com/blog/blog-entries/13-simple-steps-to-evaluate-trees>  
(<https://www.deeproot.com/blog/blog-entries/13-simple-steps-to-evaluate-trees>)

Damage to landscape trees from NC State's Extension program:

<https://gardening.ces.ncsu.edu/weather-2/storm-damaged-landscape-trees/>  
(<https://gardening.ces.ncsu.edu/weather-2/storm-damaged-landscape-trees/>)

What Tree Should be Planted from NC State's Extension program:

<https://lenoir.ces.ncsu.edu/2019/02/what-tree-should-be-planted/>  
(<https://lenoir.ces.ncsu.edu/2019/02/what-tree-should-be-planted/>)

**Resources for Tree and Organism Identification:** Here are some resources in the form of links and applications (some of these apps are not free, but you can search for your own online too):

NC Tree Identification from NC State's Extension program:

<https://gardening.ces.ncsu.edu/2015/08/nc-tree-identification/>  
(<https://gardening.ces.ncsu.edu/2015/08/nc-tree-identification/>)

Trees – NC State Resources Extension Program:

<https://gardening.ces.ncsu.edu/gardening-plants/trees-3/> (<https://gardening.ces.ncsu.edu/gardening-plants/trees-3/>)

ChopDoc – list of apps for tree identification by leaves and bark:

<https://chopdoc.com/how-to-identify-tree-by-leaves/> (<https://chopdoc.com/how-to-identify-tree-by-leaves/>)

Seek by iNaturalist – app that helps you identify organisms:

[https://www.inaturalist.org/pages/seek\\_app](https://www.inaturalist.org/pages/seek_app) ([https://www.inaturalist.org/pages/seek\\_app](https://www.inaturalist.org/pages/seek_app))

MyNature Tree Guide:

Android: <https://www.amazon.com/MyNature-Inc-Tree-Guide/dp/B00CJ1OYV4>  
(<https://www.amazon.com/MyNature-Inc-Tree-Guide/dp/B00CJ1OYV4>)

iPhone <http://www.mynatureapps.com/mynature-tree-guide/>  
(<http://www.mynatureapps.com/mynature-tree-guide/>)

iBird: <http://ibird.com/#> (<http://ibird.com/>).

Peterson's Bird Guide: <http://petersonguides.com/apps/apps.php>  
(<http://petersonguides.com/apps/apps.php>).

Merlin Bird ID: <https://merlin.allaboutbirds.org/> (<https://merlin.allaboutbirds.org/>).

Audubon Bird Guide App: <https://www.audubon.org/app> (<https://www.audubon.org/app>).

Butterfly Collection – app for identifying butterflies and other insects:

<http://hunter.pairsite.com/butterfly/> (<http://hunter.pairsite.com/butterfly/>).

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