

Bonanza Creek LTER New Site Network Research Site Installation Methods

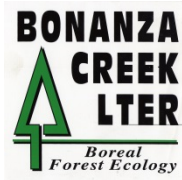


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1. INTRODUCTION

The Bonanza Creek LTER research program is part of a national network of sites investigating long-term population, community and ecosystem dynamics across major terrestrial, fresh water and marine biomes. One responsibility of each site is to monitor long-term ecosystem parameters and make those data freely available to the science community.

The BNZ LTER established a set of sites in the mid 1980s representing various stages of forest successional development, and has been regularly monitoring vegetation composition and tree growth over the past 20 years.

In order to test new theories concerning how the boreal forest is responding to changing climate and disturbance regimes, we have proposed a new network of permanent sites where we will be monitoring long-term changes in forest composition and ecosystem function over multiple decades. The sites will represent 3 different ages of forest development following fire, in stands that were black spruce prior to the fire. Young stands = < 10 years old; intermediate aged stands = 40-60 years old; mature stands = > 80 years old. The young stands and intermediate-aged stands will be located across multiple fire scars, and compositionally will include hardwood, mixed, and black spruce stands.

General objectives for the crew:

The primary objective of the New Site Network Crew is to properly install approximately 40 new LTER permanent research sites. At each site the crew will be responsible for completing the following: establishing the boundaries of the site and internal plots, performing a tree inventory, recording

site attributes, installing site signage, photo documentation, and recording GPS coordinates. Each crew will be expected to make daily check-ins with a designated LTER point-of-contact via sat phone, ensure back-up of data on a daily basis, and keep detailed notes of any discrepancies. Upon return from the field each crew will be responsible for emailing data to the in-town technicians, and communicating any needs regarding equipment, ect. for the next field trip.

Because these sites will be the core for the new BNZ LTER monitoring program, the care given to their initial setup cannot be overestimated. It is *essential* that all aspects of site and plot layout be done with extreme care and consistency. It is very important that crews minimize the amount of disturbance they introduce during site establishment. Avoid trampling to the greatest extent possible, do not break branches in order to measure DBH more comfortably, and be very mindful of the location of vegetation survey plots. In general, Leave No Trace principles should be observed for all activity in the field.

2. PREPARATIONS AND EQUIPMENT NEEDS

See appendix 8 for checklist

Field Equipment

Field vest, Compass, Hammer, Lumber Crayon, Diameter tape, Hand lens, plant ID book, Food and water, Rain Gear, Boots, iPad, GPS, Shrub tool, Tree Paint, Wire, Pliers

Site Materials

Each site needs 22 yellow topped stakes, 20 orange topped stakes with holes, 36 pink topped PVC point frame guides, 36 orange topped PVC point frame guides, set of numbered tags (1-20) for plot marking, tree tags (21-1000), 3 site marking signs, screwdriver and screws for signs.

Camping Equipment

Tents, water (X gallons per person per day), Table, Cooking Gear, Cups, Plates, Bowls, Silverware, Soap, Sponge, Paper Towels, Oil, Screen tent, Lighters, Headlamp,

Truck Equipment

Spare tire, Shovel, Axe, First Aid kit, Jumper cables, towrope,

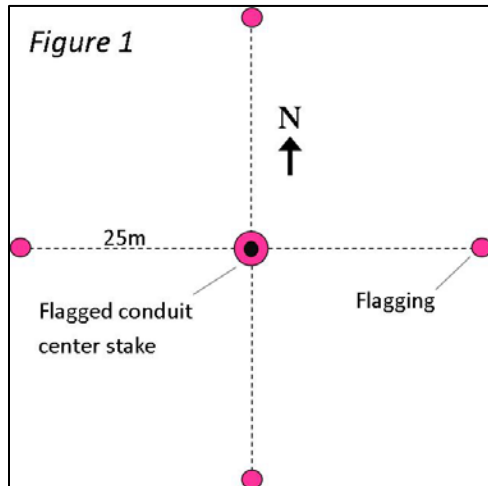
3. LOCATING THE SITE

Site Location

Site locations have been determined by researchers over the past two summers. The center of each site is marked with a piece of metal conduit and several pieces of pink flagging. Use the PDF Maps app on your iPad to navigate to the best jump off point from the roads system. Take a waypoint at your truck parking spot, both with a GPS and as a pin on your pdf map. It is helpful to note this set of coordinates, the highway mile post, and any relevant landmarks of your parking spot in a field notebook, as you will later record these data via iPad on the site description form.

Site Navigation

Navigate to your target coordinates using GPS and/or ipad. Search for the metal conduit locator stake,



representing the approximate center of the site. This stake, as well as an adjacent tree, will be flagged. There will also be flagging 25m north, east, south and west of the center stake (Figure 1).

If you cannot find the center stake: Do not install the site unless all of the following are true:

- Crew has searched for at least 30 minutes
- Crew has located a tree with heavy flagging in agreement with your target coordinates
- Crew has found at least 1 of the 25m flagging locations, and it is at an appropriate azimuth to the tree.
- If your GPS error is greater than 20m, crew must find 3 out of 4 25m flagging locations.

4. ESTABLISHING THE SITE

a. Equipment needed

4 people, 4 Compasses, 2 60m tapes, 1 100 m tape, GPS, 22 yellow fiberglass marking pins, 20 red fiberglass marking pins, 22 yellow-topped conduit stakes, 20 orange-topped conduit stakes with holes drilled through them. Sequentially numbered metal tags 1-20, wire and wire cutter, 5' PVC stake, 72 1' PVC guides.

b. Locating the prime corner

Once the center stake has been located, you must establish the “primary corner”. The primary corner is defined as the northwest corner of the site. To locate the primary corner, measure 39.05m at 310° (NW) from the center stake. Once a prospective location has been established, measure back 39.05m at 130°. This should bring you directly back to the center stake. In order to establish your prospective location as your prime corner, you must be within 10cm of the center stake on your return “check” measurement. If this is not the case, redo the measurement until you have 10cm or less of error. Once established, insert a temporary PVC stake at the prime corner. A yellow-topped boundary stake will later be inserted as well at this location once the site lay-out is complete, but PVC is used initially because it does not interfere with the compass reading.

c. Laying out the site boundaries (See Appendix 1 for a site design map)

1. Make sure all compasses are set to the proper declination, 19 degrees East in Fairbanks for 2013
Note: this will not be the case for all areas you travel to. Check before you go!
<http://www.ngdc.noaa.gov/geomag-web/#declination>
2. *Establish the western site boundary:* The goal is to walk a perfectly straight, 50m line from the NW corner to the SW corner. One person (P1) stands at the PVC prime corner and sets their compass to 180° . Use the compass to sight a path directly south for a second person (P2) to follow. P1 holds the "0" end of a 60 meter tape, making sure the metal on the end of the tape does not disturb the compass reading. It is helpful to slip the tent stake on the end of the tape into your belt. P2 then pulls the tape 50m south(180°). To accomplish this, P1 at the prime corner, must guide P2 as to the best path through any obstacle encountered. It is likely that at some distance you will not be able to see each other. A third person (P3) must now act as a sighting point between P2 and P1. If the vegetation is particularly thick, have P1 anchor the tape. P1, P3 and P2 now all move south down the tape, forward-sighting and back-sighting(0°) to the crew member visible. It can be helpful to have a P4 stand at the prime corner. When 50m has been reached, leave this tape in place, and insert a temporary marker pin.
3. *Check the diagonal:* From the SW corner, pull 39.05m at 50° . If the error off the center stake is

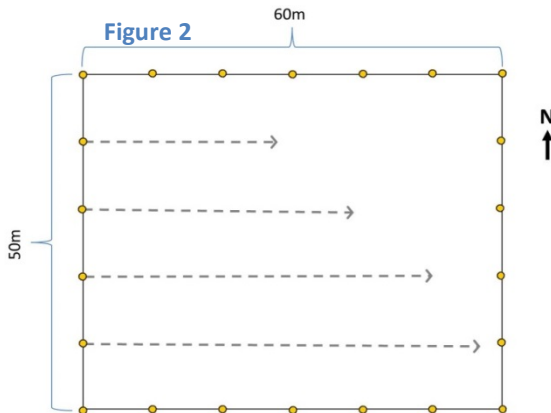
greater than 1m, redo the western boundary. Once an acceptable tolerance has been reached, record your error value.

4. *Establish the northern boundary:* Return to the prime corner. Set the compass to 90° (270° for back-sighting) and make a **60m** line to the northeast corner of the site. Place a temporary marker at 60m.
5. *Check the diagonal:* From the NE corner, pull 39.05m at 230° . If the error off the center stake is greater than 1m, redo the northern boundary. Once an acceptable tolerance has been reached, record your error value.
6. *Establish the eastern site boundary:* From the NE corner, establish a 50m boundary (180° from NE corner SW).
7. *Check the diagonal:* From the SE corner, pull 39.05m at 310° . If the error off the center stake is greater than 1m, redo the eastern boundary. Once an acceptable tolerance has been reached, record your error value.
8. *Establish the southern site boundary:* Use a compass to best guide you through any obstacle. Go 60m at 270° . This should bring you to the SW corner. Record your closure value. Leave this tape in place.

9. Place yellow temporary marker pins at each corner of the site, and every 10m along the boundary.

d. Laying out the internal plot markers

1. Pull a 60m line at 90° from each 10m increment on the western site boundary: (See figure 2).
On the western boundary, locate the yellow marker pin 10m south of the prime corner. Using two or more people, pull the tape 60m at 90° from this pin to its companion pin on the eastern site boundary. One person directs with a compass, one person walks with the tape and back-sights. When a straight line has been achieved, anchor the tape at a height that will preserve the most vertical accuracy, and place red marker pins every 10m (n=5) along the line you have just created. **TAKE CARE NOT TO**



TRAMPLE VEGETATION NEAR THESE PINS AS THEY MARK THE VEGETATION SURVEY PLOTS.

Repeat this process from the next yellow marker pin on the northern boundary. **ALWAYS START FROM THE WESTERN BOUNDARY OF THE SITE.**

2. *Repeat this process* for the remaining three yellow boundary pins until you have laid out the 12 internal plots (this will mean you have inserted 20 red marker pins).
3. *Replace marker pins with permanent metal stakes. If you will be installing PVC guides, complete the PVC installations before introducing metal stakes to the site.* Yellow topped for the boundary and orange topped for the internal plots. Stakes should be driven in as deep as possible with a sledgehammer, to a maximum depth of 50cm. At the prime corner, remove the PVC, insert yellow-topped stake, and slide the PVC back over the stake. Push the PVC into the ground if possible. The PVC will now remain here permanently to mark the prime corner.
4. *Label these stakes* using wire and numbered metal tags in accordance with figure 11 in Appendix 2: *Plot Layout*. Notice that only orange-topped stakes will receive number tags. Tags used will be numbers 1-20.

Note: because tags are purchased in sequences of 1-1000, you may sometimes need to use tag 101 to mark

stake 1, 102 for stake 2 ect. Be sure to note this in your site description.

e. Installing point bar guides

At each site, [12] 1m^2 vegetation sampling plots need to be established. In subsequent years, researchers will use a sampling tool called a point bar to measure vegetation along two transects within this 1m^2 area. To ensure uniform placement of the point bar from year to year, the new establishment crews must install 6 PVC guides where the feet of the point bar are to be placed. No vegetation sampling will be done by the establishment crews. Vegetation sampling plots are to be established on the SE side of each orange topped stake that has a number within the following range: 1-4, 6-9, 11-14. Note, this is the same range as the tree plots, but because of the labeling scheme of the orange topped stakes, veg plots 6-9 will not coincide with tree plots 6-9. (See Figure 12 in Appendix 2: *Plot Layout*).

1. *Locate the NW corner of plot 1.* This is the location of the orange stake with tag 1. Using a compass, familiarize yourself with the boundaries of this 10m^2 plot (see figure 11 in Appendix 2: *Plot Layout*).

2. *Install the first PVC guide:* Place one pink PVC guide on the northern boundary of the site, on the east side the red pin. The PVC guide should be touching the pin, do not drive it into the ground yet. Next, insert the dowel on the end of the point bar jig into the top of the PVC. You may need to move the

PVC slightly east to accommodate the width of the jig. Keep the PVC on the northern plot boundary and as you adjust. The tail of the jig needs to be able to clear the orange stake while the “T” end of the jig is pointing SE. Install the first PVC guide here using a 2lbs sledgehammer.

3. *Install the remaining 2 guides to form point bar “position A”:* Reinsert the dowel into the installed guide. Using a compass, rotate the head of the jig until it points SE (135°). Install two more pink PVC guides, one on each end of the “T”. (See Figure 3)

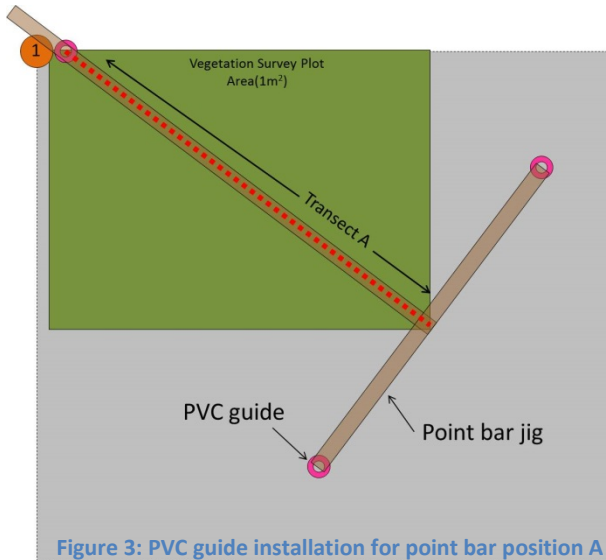
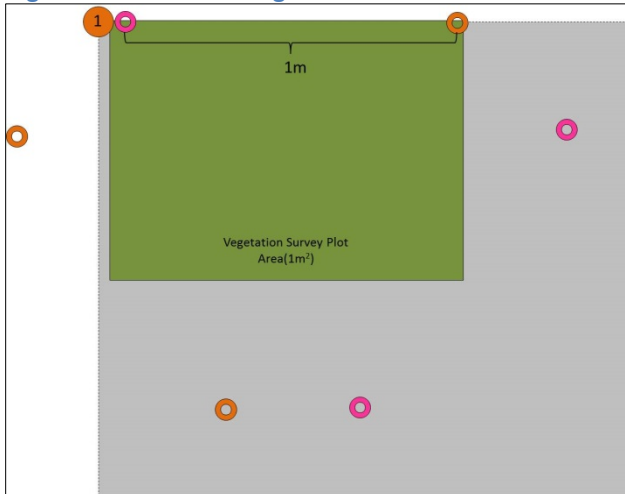


Figure 3: PVC guide installation for point bar position A

4. *Install guides to form point bar “position B”:* Install an orange topped PVC guide 1m East of your first pink guide (the one next to the orange stake).

Use a compass and tape to define point of installation. Next use the jig to install the remaining two orange guides: Insert the dowel on the tail of the jig into the guide on the northern plot boundary. Rotate the jig so that the head is pointing SW (225°). Install the remaining two orange guides, one at each end of the “T”.

Figure 4: Plot 8 -All PVC guides installed



Follow this process for all plots where a vegetation survey is conducted (see figure 12 in Appendix 2: *Plot Layout*). A plot with all PVC guides correctly installed is shown in figure 4.

Note: If you encounter a tree at either the installation location of the PVC guides, or along the transect (red dotted line in figure 3). Move the set of guides for that particular

point bar location. Attempt to preserve the azimuth, but ultimately, do what is necessary to move the entire transect as little as possible from the correct location. If the second set of guides is able to be installed at the correct location, do so. Do **not** position second point bar location in accordance with the first if one is not in the perscribed location.

Trees, even large ones, encountered on the 1m² veg plot area are not a problem unless they interfere with the pvc guide placement or the placement of the point bar. (You are simulating this with the jig).

5. SITE ATTRIBUTES

New Site Network Description Form - Data Entry Guidelines

The figure displays two pages of a tablet-based form titled "NSN Description Form". The form is divided into two main sections. The left page (Page 1) includes fields for "Date", "Site Name", "File Name" (with a dropdown and "Other:"), "Observers", "Weather", "Parking", "GPS Lat:" and "GPS Long:" (two pairs), "Site", "GPS Lat:" and "GPS Long:" (two pairs), "Location Notes" (a large text area), "Scale (m)", "Aspect", "Elev.", and "Comments". The right page (Page 2) features dropdown menus for "Topographic Position", "Site Contour", "Distance of Transportation", "Water Flow", "Site Age of Onset", "Site Module", "Vertical Storage", and "Cultural Geomorphology", followed by an "Other Notes" text area. Logos for UAF (University of Alaska Fairbanks) and SOGASZA (Sustainable Observations and Geospatial Analysis) are visible on the right side of both pages.

Figure 5: Pages 1 and 2 of the NSN Description form

The purpose of the New Site Network (NSN) Description form (figure 5) is to record the conditions of the site at the date of set-up, directions for reaching the site, and other important information for the future of the study. Below are instructions for filling in each field in the form, as well as definitions of terms and methods for choosing appropriate site descriptions.

NOTE: Many aspects of the site description have been previously recorded by the researchers who did the original site selection. Consult "Site_Characteristics.xlsx" for the data that have and haven't been recorded at your current site. This file is located in the Documents app Site Description -> Site_Characteristics.xlsx. You do not need to fill in a field in

the site description form if there are already data contained in the spreadsheet for that attribute. Exceptions to this- Always fill out the following fields: Date, Site, Observers, Fire Name, Weather, Parking Coords, Site Coords, elevation and Closure Values. Also always take photos.

NSN Description Form Field Descriptions - PAGE 1

Date The date text box is auto-populated with the current day's date.

Site Name The name assigned to the site.

Fire Name Choose the fire name where the site is located from the drop-down list.

Observers Should be the initials of the Crew Leader.

Weather Is it a sunny day? Rainy? Cold and cloudy? Give a (very brief) description.

GPS Coordinates – Parking Provide GPS coordinates for the parking spot used to access the site. Provide the coordinates using degrees/decimals/minutes.

GPS Coordinates – Site Provide GPS coordinates for the center stake of the site, in decimal degrees.

Example: (Lat) 64.58679 (Long) -148.56789

Location Notes

How did you get to the site? What is the easiest access point and are there are hazards to be aware of? (Draw a quick sketch on page 3).

Example: "off pipeline access road approx 2-3miles down slope" or "150m N of MD-U1, with bear den between sites."

Slope Take from the center stake with a clinometer.

Aspect Take compass direction from the center stake downhill.

Elevation Provide the elevation of the site in meters.

Comments Provide any pertinent information about the site not related to location.

Example: “nearly pure spruce stand, thick organic, some rock & permafrost, small birch present also, many spruce <1m and equal amount about 3m”

NSN Description - PAGE 2

Topographic Position: Classification of the site location on the topo-sequence (i.e. is the site located on the summit of a hill, the valley bottom, a drainage channel, etc.)

Choose the best fit for your topographic position from the drop-down menu (see Figure 6 for examples of topographic features).

Site Contour: The curve of the ground at the site location (i.e. is the site on straight (flat) ground, convex, concave, undulating, etc.)

Select the appropriate site contour from the drop-down menu.

Evidence of Thermokarst: “Thermokarst” refers to the irregular landscape of soil depressions and bands of broken tundra caused by melting permafrost. Select the appropriate description from the drop-down menu.

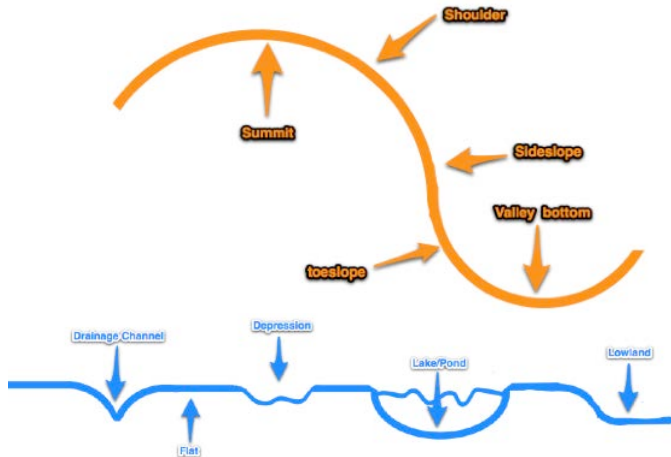


Figure 6: Diagram of topographic positions

Water Flux: Water flux refers to the source of the water supply for soils and vegetation, especially in the context of wetlands. Select “no water,” “mineraltrophic,” or “omnitrophic” from the drop-down menu. “No water” indicates a dry site with no obvious water flow. Mineraltrophic refers to surface water supplied from streams or springs (versus “ombotrophic” water flux, or rainfall supplied vegetation). Omnitrophic refers to water from all sources, including rainfall, groundwater, and surface water.

Estimated Age of Oldest Trees: Estimate the age of the oldest trees at the site.

Site Moisture¹

Site moisture is defined as the “potential moisture available for plant growth.” Classification is first based on the topographic drainage at a given site. Site moisture is then modified based on factors that control drainage: permafrost and soil texture. Site moisture is one of the site characteristics measured in the NSN Description form (Figure 5). Follow the bellow steps to determine site moisture.

SUBHYDRIC	Very considerable surface moisture; saturated with less than 5% standing water	
MESIC TO SUBHYDRIC	Considerable surface moisture; depressions or concave toe-slopes	
MESIC	Moderate surface moisture; flat or shallow depressions including toe-slopes	
SUBXERIC TO MESIC	Very noticeable surface moisture; flat to gently sloping	
SUBXERIC	Some noticeable surface moisture; well-drained slopes or ridges	
XERIC	Little surface moisture; stabilized sand dunes and dry ridgetops	

Figure 7: Pictographic classification key for potential site moisture of black spruce stands in interior Alaska (source: Johnstone, Hollingsworth, and Chapin III, 2008).

¹ Johnstone, Jill, Teresa N. Hollingsworth, and F. Stuart Chapin III (2008). A Key for Predicting Postfire Successional Trajectories in Black Spruce Stands of Interior Alaska. United States Department of Agriculture.

Procedure

STEP 1: Determine the site moisture based on topography

Dry sites:

Xeric—little surface moisture: soil surface is perpetually dry except immediately after precipitation. Typical sites are stabilized sand dunes and convex ridge tops.

Subxeric—some noticeable surface moisture: the soil surface is generally dry but can remain moist for a few days after a precipitation event. Typical sites are well-drained slopes or flat ridges.

Subxeric to mesic—very noticeable surface moisture: the soil surface remains moist for many days after precipitation before drying out and has some recharge of moisture from lateral water flow. Typical sites are level to gently sloping, flat terrain.

Moist sites:

Mesic—moderate surface moisture: the soil surface is often moist (not dry and crumbly), with reliable moisture recharge from lateral waterflow. Typical sites are flat or shallow depressions, including toeslopes.

Mesic to subhygric—considerable surface moisture: the soil surface is almost always moist, with persistent moisture recharge from surrounding areas. Typical sites are depressions or concave toeslopes.

Subhygric—very considerable surface moisture: surface soil is typically saturated with free water, often with small (< 5 percent of area) patches of standing water. Lateral drainage is generally impeded. Typical sites are lowland depressions with the water table near the surface, often adjacent to hygric wetlands.

Step 2: Does the site have extensive shallow permafrost?

If there is shallow permafrost (max thaw depth < 75cm below surface), the site becomes one classification wetter. Shallow permafrost creates a water-impermeable layer near the soil surface.

Example: A site classified as subxeric to mesic based on topography would be reclassified as mesic if underlain by shallow permafrost (see Figure 7).

Step 3: What is the soil texture of the site?

If there the soil is coarse in texture, the site becomes one classification drier. Coarse-textured soils are those dominated by sand or gravel in at least the upper 50 cm of the soil profile. Coarse soil increases soil drainage, decreasing site moisture by allowing moisture to drain away into deeper soil layers.

Example: A site classified as subxeric to mesic based on topography would be reclassified as subxeric if the predominant soil texture is coarse (see Figure 7).

Surficial Geology Surficial geology refers to landforms and the unconsolidated sediments that lie under them. Select one of the following from the drop-down menu:

Loess – Silt-sized sediment formed by the accumulation of wind-blown dust from rivers.

Glaciofluvial Deposits – Coarse sediment deposited by glacial rivers with glacial headwaters. Sediment is dominated by sand or gravel.

Active Alluvial Silt – Fine loose sediment deposited by a water source (rivers, lakes, or glacial). Active alluvial silts are in the process of being formed.

Active Alluvial Gravel/Sand – Coarse loose sediment deposited by a water source. Active alluvial gravel/sands are still in the process of being formed.

Stabilized Alluvium – Unconsolidated silt or gravel/sand deposited by a water source in the past.

Undifferentiated Hill Slope Colluvium – Loose unconsolidated sediments deposited at the base of hill slopes by rain, sheetwash, or downslope creep.

Drained Lake/Lacustrine Organic Deposits – Organic material deposited by a lake.

Lake/Pond Organic, Sand, Silt – Organic and mineral material deposited by a lake or pond.

Surficial Geomorphology Select the best option from the drop-down menu.

Frost Scars – An irregular trench-like feature on a land surface caused by permafrost.

Hummocks – A rounded knoll or mound of ground caused by permafrost. Typically occurs in groups, creating an irregular surface landscape.

Thermokarst Pits – Holes in the ground caused by melting permafrost.

Hillslope Water Tracks/Small Streams – Small streams of surface water.

Poorly Developed Hillslope Water Tracks – No distinct streams but evidence of water movement.

Gentle Rolling/Irregular Microrelief – Undulating surface not related to hummocks or thermokarst pits.

Stony Surface – Ground with lots of exposed mineral material.

Lakes, Ponds, Rivers – Are there lakes, ponds, or rivers on or near the site?

Disturbed – Animal disturbance.

Other – Other observed geomorphology.

Unknown – Unknown geomorphology not listed above.

Comments Record any other information about the geology of the site (rocky, sandy, etc).

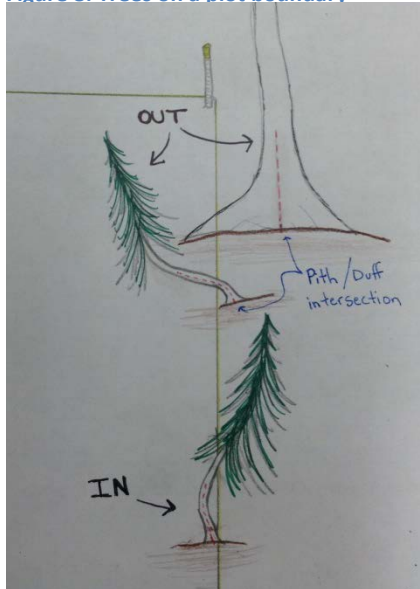
6. TREE INVENTORY -

Only trees within the 30m x 40m inner plots (1-4, 6-9, 11-14 n=12) will be measured. An individual is considered a tree if it is at least 2.5cm in diameter at breast height (1.37m). For instructions on dealing with difficult DBH measurement situations, see Appendix 3. Each tree will be marked with a numbered tag, a temporary crayon dash at DBH, and then with tree paint at DBH. All tree inventory data will be recorded using an iPad. For data entry protocol, see Appendix 4.

a. Delineate Plot Boundaries

With a 60m tape: anchor the end at the lowest numbered plot stake (this signifies the number of the plot you are currently on) and proceed to wrap the plot's boundaries using the four stakes as corners. As you are not taking an actual distance measurement here, you may run the tape along the ground's surface as long as it maintains a horizontally straight path. Have a second person with a compass guide you. By completing

Figure 8: Trees on a plot boundary



the action of wrapping plot boundaries, you are defining which trees are within your current plot. An individual tree is considered within a plot when its pith falls within the plot boundary at the point where the base of the boll meets the forest floor. Trees originating outside the plot boundary, but leaning into it, do not count as being within the plot. (See figure 8).

b. Tree tagging

Begin tagging trees on plot 1 (See figure 11 in Appendix 2: *Plot Layout*), this plot is bounded by stakes 1, 2, 9, and 10). All trees on plot 1 should be finished before moving on to the next tree plot. A number tag is attached to each individual tree with an aluminum nail driven approximately 1.25” into the boll.

The tag should be nailed at a height of 1.2m on the side of the tree facing the lowest numbered stake (which is also the number of that tree plot). If DBH must be measured at an alternate location, nail the tag where it will not interfere.

For trees less than 5cm in diameter at DBH, the nail can do significant damage and the tag should be attached using wire, placed loosely around a solid branch so as not to affect growth. This should be noted in the data using the check box provided. Since you’ve already used tag 20 when installing plot stakes, tree numbers should begin at 21 and follow upwards in sequence. For ease of remeasurement, number trees in an orderly fashion (tree 134 is beside 135, ect.). If you encounter a situation plot with more than 1000 trees and need to start a new package of tags: do so from tag 21 and **scratch** (do not

write in sharpie) the letter “A” following the number. Tag 21 becomes 21A, ect. This will prevent future confusion if remeasurement crews attempt to locate their current plot by tree number. Only incorporate letters into the tree tags if you will have two trees with the same number on a **site**. Finish an entire package of tags before opening another, unless you do not have an appropriate sequence (1-20, 101-120, 201-220, 301-320, 401-420, 501-520, 601-620, 701-720, 801-820, 901-920) with which to label your orange topped stakes.

c. Distance and Azimuth

It was determined that distance and azimuth are useful data in certain situations. It is, however, too time consuming to take these measurements for every tree. Distance and azimuth is to be taken from the position of the lowest numbered plot stake. Be sure to take the compass readings before you install the permanent metal plot stakes. Measure distance and azimuth in the following situations only, otherwise leave these fields blank.

Standing Dead: so future crews can find these trees when they fall.

Trees tagged out of order: If you are forced to get out of sequence with your tagging (for example, you realize you’ve missed a tree and now #333 is going to be put in a clump of trees in the 100’s).

Starting a new package of tags mid-plot: take distance and azimuth to tree 21 after installing tree 999.

Special situations: it never hurts to take distance and azimuth. If you have an odd situation that you are

making a note about, include distance and azimuth so that future crews can find the oddity quickly.

d. Diameter measurements

*NOTE: There are a lot of variations that can complicate DBH measurements. Refer to Appendix 3 for details about measuring DBH under unusual circumstances. **DBH is to be measured in all circumstances for the initial measurement, regardless of whether the tree is alive or dead.***

To find the point where DBH will be taken:
Measure 1.37m vertically up the bole, starting from the forest floor on the uphill side of the tree. On trees with the root collar above ground level, DBH should be taken at 1.37m above the highest point of the root collar. For leaning or curved trees, measure 1.37m along the bole. Using a lumber crayon, make a mark at the location DBH is to be measured.

Take the measurement with a metric diameter tape. Be sure the tape is level and not twisted. Read the diameter to the 0.1cm, always rounding down. If the diameter is measured somewhere other than DBH (as suggested in Appendix 3) note the actual height of the DBH measurement location in the notes for that tree.

e. Additional characteristics

In addition to DBH, several other characteristics are to be recorded for each individual. (See figure 9). This represents one record.

Date: Will auto-populate when taped

Site: Site name

Plot: Plot number tree is being tallied on. Note, trees are to be tallied on internal plots only, consequently, these are the only plots available for choice on the dropdown.

Figure 9: Tree inventory form

LTER Tree Inventory Data Sheet

Date: Site:

Plot: Tree ID:

Species: Distance:

DBH: Azimuth:

Alive

- Standing
- Leaning (>45 deg)
- Topped Top HT (m):

Wired instead of nailed?

Dead

- Standing
- Leaning (<45 deg)

Down (to be used in subsequent inventories only)

Notes:

ID#:

LTER
UAF
UNIVERSITY OF ALASKA
FAIRBANKS
BONANZA CREEK LTER
Center for Forest Ecology

Species: Select the individual's species from the dropdown. If unsure after seeking help, use best guess and note.

PICMAR = *Picea mariana* (black spruce)

PICGLA = *Picea glauca* (white spruce)

BETNEO = *Betula neoalaskana* (Alaska Paper Birch)

POPTRE = *Populus tremuloides* (Quaking Aspen)

LARLAR = *Larix laricina* (Tamarak/American Larch)

POPBAL = *Populus Balsamifera* (Balsam Poplar)

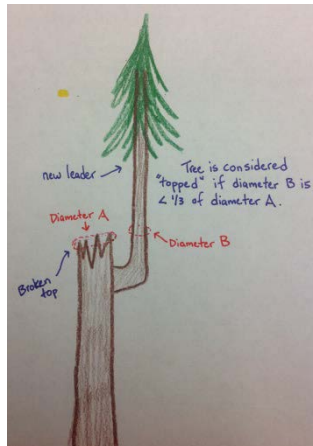
Tree ID: Tag number affixed to that individual

DBH: Diameter measurement (cm)

Alive/Dead: Must check on box. If you are unsure, use your best guess and make a note.

If Alive-

Standing: select if tree is standing at an angle less than 45° off vertical. If you are unsure, draw a mental line from the base of the tree to the top of the live material and gauge its angle.



Leaning: select if tree is leaning more than 45° to either side of vertical. Use this category for live trees (PICMAR in particular) that sometimes adopt a horizontal growth form.

Topped: Select if the tree is missing its top, has a dead top, and/or has a new leader that is less than $1/3$ the diameter

of the broken top at the point where the top was broken (not where the new leader originates from the trunk). Note: you must still indicate standing/leaning for a topped tree.

Top HT (m): record height with laser to the top of the live material. Note: live, topped trees are the only circumstance where height is measured. (See Appendix 5 for Laser operation)

Wired instead of Nailed?: Select if tree was too small to be nailed, and wire was used. (no need to note in notes section)

If Dead-

Standing: select if snag is standing at an angle less than 45° off vertical.

Leaning: select if snag is leaning more than 45° to either side of vertical.

Down: Downed trees will not be measured in this year's inventory. This category will however, be used in subsequent inventories for trees previously recorded as standing or leaning.

Notes: Only use this field if you if you deviated from protocol (ex: took DBH at a location other than 1.37m, or were unsure of one or more data items you recorded in the above fields.) If a photo was taken of the situation, record this here.

ID#: This field will auto-populate, with each new record.

f. Tree Painting

Paint each tree at the crayon mark where DBH was taken. To avoid getting paint on measurement equipment, this is to be done **after** sections a.-d. have been completed. Preferably by a separate person.

7. SITE SIGNAGE-


All sites will need to have appropriate signage for making landowners and others aware of the research site and ownership.

Install 3 signs per site. Place one sign at the prime corner, and place two at locations along the site boundary, each facing the typical angle of approach.

8. PHOTO DOCUMENTATION –

Three photos are taken per site: 1 from the prime corner facing SE, and 2 of the site signage. When taking pictures of signage: photograph the approach, with signage visible. Do not photograph only the sign.

Photo documentation protocol using the iPad:

- a. Take the above three photos using the Camera app, in the “Photography” folder.
- b. Open the Snap app from the photography folder and tap the  button
 - Navigate to your first site photo in camera roll
 - Tap New note
 - Label using the following convention:
“bnzlter_SITE_YYYYMMDD_PhotoLocation_UNIQUE ID”
Ex) bnzlter_EI22_20130625_Approach_1
 - Tap the button
 - Drag your label to the least obstructive spot on the photo.
- c. Open the Photos app, in the “Photography” folder
 - If a photo is currently displayed, double tap and navigate back to album view
 - Tap the + button in the left corner and title album with the site name.
 - Add captioned photos to the new album.

This process will create duplicate photos (one captioned, in the new album, and one original non-captioned in the camera roll. This is fine.

Each site should have its own album. Each album should have at least 3 photos. If a photo is taken to accompany an individual tree record (documenting an unusual situation,

ect.), use the above process to add a caption containing the tree number. Also note in the tree's formconnect record that a photo exists.

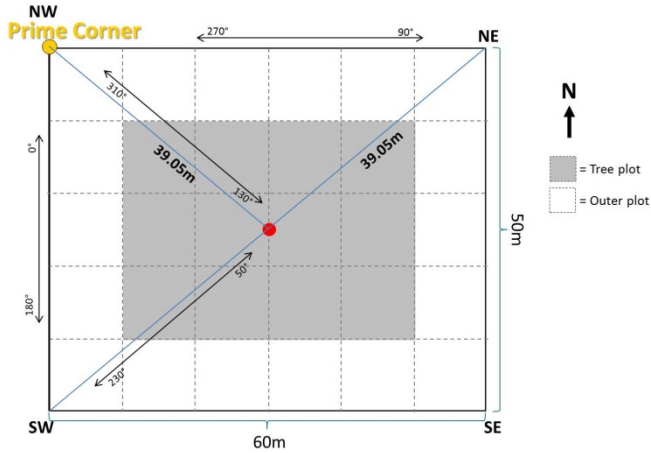
Add any relevant site photos to the site's album. The office crew will decide which should be added to the permanent record.

9. GPS

Record and save the coordinates of the parking area and the center stake. Allow the GPS to average, collecting at least 100 readings. Record coordinates in a field notebook, as picking up the GPS will cause the averaging to restart. This set of coordinates will need to be recorded on your Site description form. Also note the error if it is above 20m.

APPENDIX 1 – Site Layout

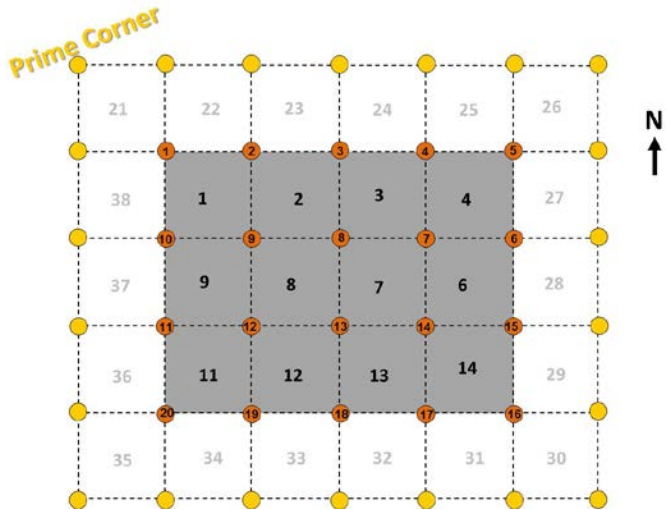
Figure 10: Site layout



Notice: because the site is not square, the azimuth needed to reach each corner differs slightly from what would be read on the compass as directly NW, NE, SE and SW.

APPENDIX 2 – Plot Layout

Figure 11: Plot Numbering and Stake tags



Notice the yellow boundary stakes do not receive number tags. These number tags are the same as used on the trees. Consequently, you will need to alter your tree numbers to give priority to correct tags on the orange stakes. Sequential tree numbering is preferred, but not required.

Figure 12: Location of the 12 Vegetation Survey Plots



- = 1m² veg plot area
- = Orange topped stakes

Notice: The PVC guides are the only thing marking a veg plot. Veg plots derive their numbers from the orange topped stake at their NW corner, and do not have their own labels. The 1m² area of a veg plot is simply the area from within the

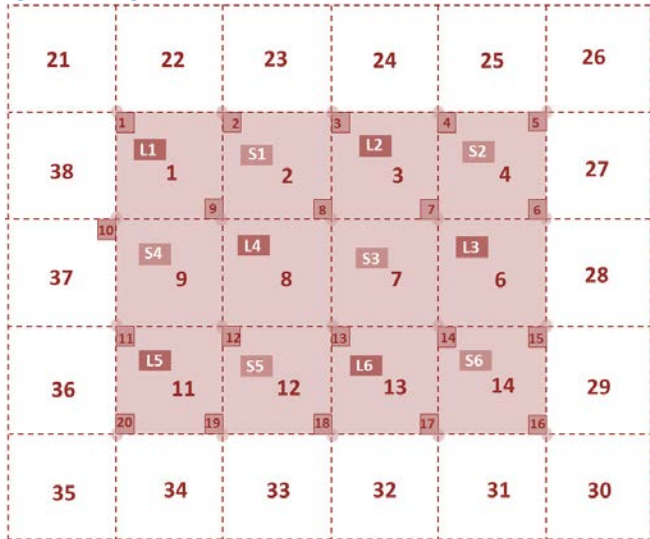
vegetation is sampled. Because of the nature of the sampling device, the PVC guides will cover an area larger than 1m².

Become familiar with the location of veg plots to avoid trampling during installation.

REFERENCE ONLY!

This figure show the veg plot placement scheme used on previously established core LTER sites. It is being changed for the new site network installation because it is confusing. Use this figure to aid in site navigation when visiting any previously established LTER sites.

Figure 13: Veg Plot Placement Scheme on Core LTER sites



■ = 1m² veg plot area

● = Orange topped stakes

L# = Litter Tray

S# = Seed Tray



APPENDIX 3 – Tree diameters

For all conditions where DBH is not measured at the standard height, the height at which the diameter was measured must be recorded in the notes field.

The following has been adapted from:

USDA Forest Service, PNW Research Station. 2011. *FIELD INSTRUCTIONS FOR THE ANNUAL INVENTORY OF COASTAL ALASKA 2011*. Forest Inventory and Analysis, Resource Monitoring and assessment Program.

*Note that all measurement units contained in the text have been changed to metric, but those in the figures have not.

DIAMETER ON STUMPS

Diameter on stump 1.37m tall: Use a logger's tape, cloth tape or ruler to measure the longest and shortest axes across the top of the stump. Record diameter as the average of the two measurements.

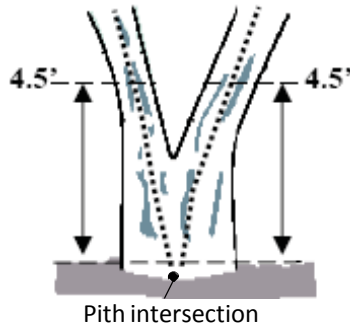
DIAMETER AT BREAST HEIGHT

Special DBH situations:

1. **Forked tree:** In order to qualify as a fork, the stem in question must be at least 1/3 the diameter of the main stem and must branch out from the main stem at an angle of 45 degrees or less. Forks originate at the point on the bole where the piths intersect. Forked trees are handled differently depending on whether the fork originates below 0.3m, between 0.3m and 1.37m or above 1.37m.

Trees forked below 0.3m: Trees forked below 0.3m (see Figure 8.9) are treated as distinctly separate trees. DBH is measured for each stem at 1.37m above the ground. If stems originating from forks that occur below 0.3m fork again between 1.0 and 1.37m, the rules in the next paragraph apply.

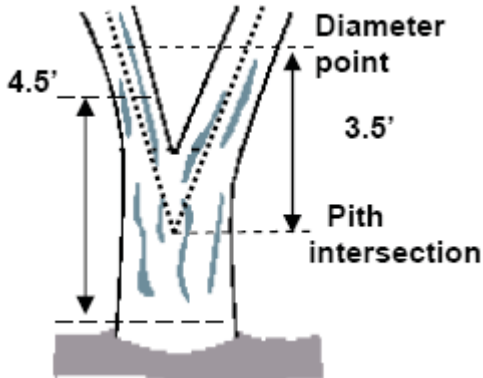
Figure 8.9: Trees forked below 1.37m



a. Trees forked between 0.3m and 1.37m:

Trees forked between 0.3 and 1.37m (see Figure 8.10) are also tallied as separate trees. The DBH of each fork is measured at a point 1.07m above the pith intersection. When forks originate from pith intersections between 0.3 and 1.37m, the limiting distance is the same for all forks they are either all on, or all off the plot. Multiple forks are possible if they all originate from approximately the same point on the main stem. In such cases, measure DBH on all stems at 1.07m above the common pith intersection.

Figure 8.10: Forked
between 0.3 and 1.37m



Once a stem is tallied as a fork that originated from a pith intersection between 0.3 and 1.37m, do not recognize any additional forks that may occur on that stem. Measure the diameter of such stems below the base of stem separation (i.e., do not move the point of diameter the entire 1.07m above the first fork).

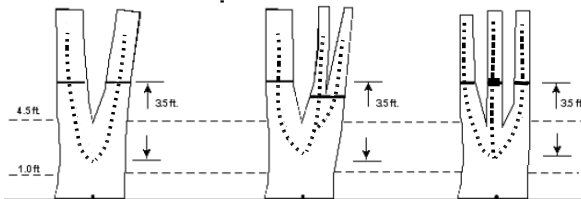


Figure 8.11: Where to measure DBH on trees forked above 0.3m

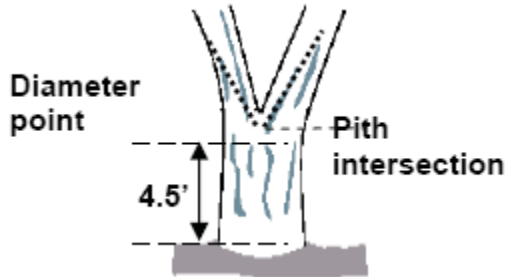


Figure 8.12: One tree

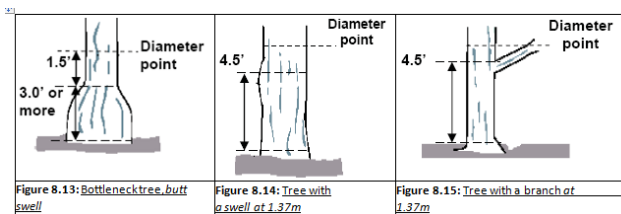
Trees forked at or above 1.37m: Trees forked at or above 1.37m count as one single tree (Figure 8.12: One tree). If a fork occurs at or immediately above 1.37m, measure diameter below the fork just beneath any swelling that would inflate DBH.

2. Stump sprouts: Stump sprouts originate between ground level and 1.37m on the boles of trees that have died or have been cut. Stump sprouts are handled the same as forked trees, with the exception that stump sprouts are not required to be $\frac{1}{3}$ the diameter of the dead bole. Stump sprouts originating below 0.3m are measured at 1.37m from ground line. Stump sprouts

originating between 0.3m and 1.37m are measured at 1.07m above their point of occurrence. As with forks, rules for measuring distance and azimuth depend on whether the sprouts originate above or below 0.3m.

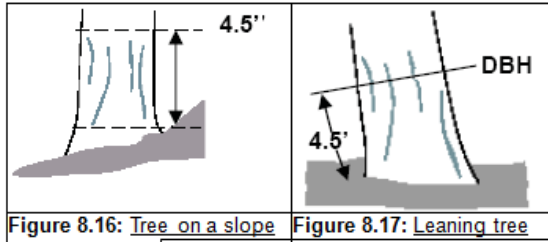
3. Tree with butt-swell or bottleneck: Measure these trees 0.46m above the end of the swell or bottleneck if the swell or bottleneck extends 0.91m or more above the ground (Figure 8.13).

4. Tree with irregularities at DBH: On trees with swells, bumps, depressions, and branches at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form (Figure 8.13 through Figure 8.15).



5. Tree on slope: Measure diameter at 1.37m from the ground along the bole on the uphill side of the tree (Figure 8.16: Tree on a slope).

6. **Leaning tree:** Measure diameter at 1.37m from the ground along the bole. The 1.37m distance is measured along the underside face of the bole (Figure 8.17)

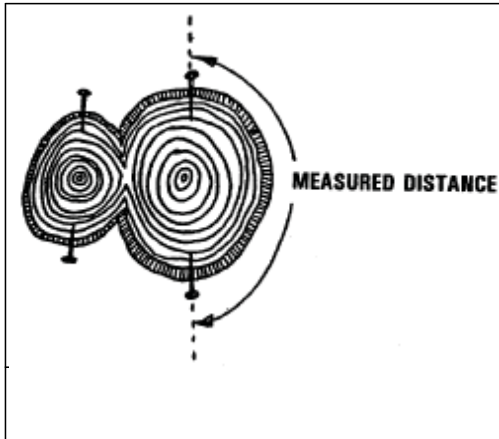


8. **Independent trees that grow together:**

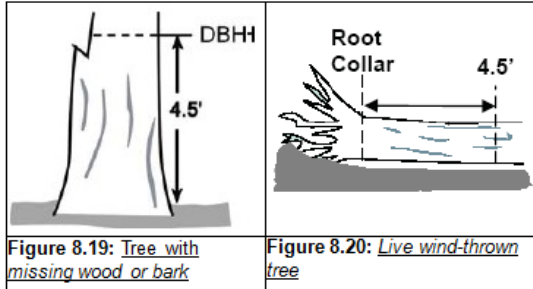
If two or more independent stems have grown together at or above the point of DBH (Figure 8.18), continue to treat them as separate trees. Set two diameter nails at DBH halfway around the tree's circumference from each other (after placing 1st nail, stand back from bole; take azimuth to nail; on opposite side of bole, place nail where the back azimuth of the first nail lines up). Measure the distance between the nails with a diameter tape making sure zero is aligned and not the hook at the end of the diameter tape with one diameter nail. Multiply the measurement by 2 and record the result as the current diameter. Example: Distance measured = 12.8 inches (12.8×2) = 25.6 inches.

Note that “Double Nail Method” was used.

Figure 8.18: Independent trees growing together



9. Missing wood or bark: Do not reconstruct the DBH of a tree that is missing wood or bark at the point of measurement (Figure 8.19). If a tree has a localized abnormality (gouge, depression, etc.) at the point of DBH, apply the procedure described for trees with irregularities at DBH.



10. Live windthrown tree: Measure from the top of the root collar along the length to 1.37m (Figure 8.20).

11. Down live tree with tree-form branches growing vertical from main bole: When a down live tree, touching the ground, has vertical (less than 45 degrees from vertical) tree-like branches coming off the main bole, determine whether or not the pith of the main bole (averaged along the first log of the tree) is above or below the duff layer.

A. If the pith of the main bole is above the duff layer, use the same forking rules specified for a forked tree, and take all measurements accordingly unless:

-If the pith intersection of the main down bole and vertical tree-like branch occurs below 1.37m from the stump along the main bole, treat that branch as a separate tree, and measure DBH 1.07m above the pith

intersection for both the main bole and the tree-like branch (figure 8.21)

- If the intersection

between the main down bole and the tree-like branch occurs beyond the 1.37m point from the stump along the main bole, treat that branch as part of the main down bole (Figure 8.22).

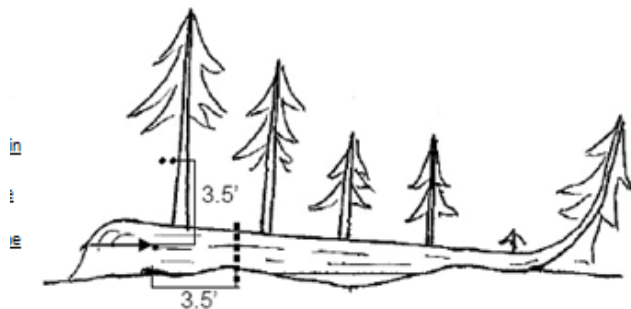


Figure 8.21: Down tree above duff

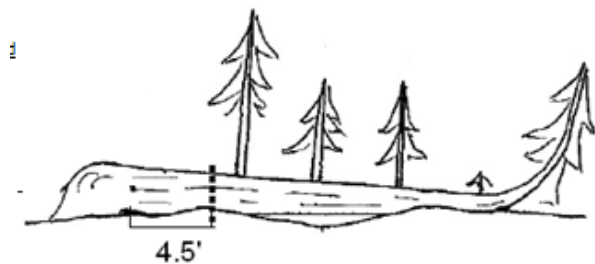


Figure 8.22: Branch beyond 1.37m from stump

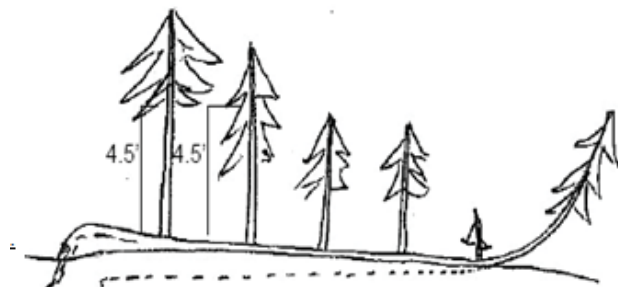


Figure 8.23: Down tree below duff

B. If the pith of main tree bole is below the duff layer, ignore the main bole, and treat each tree-like branch as a separate tree; take DBH and length measurements from the ground, not necessarily from the top of the down bole (Figure 8.23). However, if the top of the main tree bole curves out of the ground towards a vertical angle, treat that portion of that top as an individual tree originating where the pith leaves the duff layer.

12. Tree with curved bole (pistol butt tree): Measure along the bole on the uphill side (upper surface) of the tree (Figure 8.24).

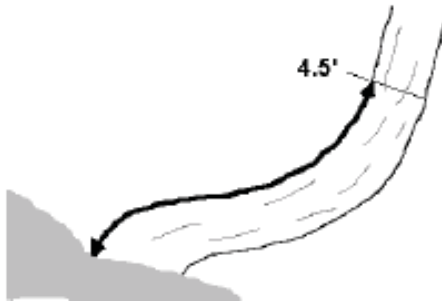



Figure 8.24: Tree with curved bole (pistol butt tree)


APPENDIX 4- iPad Data Entry Protocol

When starting on a new site:

1) Create new form from master

- Open FormConnect App from  the Data folder.
- Tap and hold "Tree Inventory Master" form → Clone
- Tap and hold cloned form → Rename → type site's name
- Tap new form to open

2) Begin Data Entry

- enter data for first record
- use the clone button  to create a new record.

3) Pre-completion back up

At least once during the day (prior to site completion), back up the data you have collected for this site so far.

- Tap the export button 
- Tap "All Records"
- Tap "Export" → highlight CSV → Open In... → Documents

4) Check Data in Documents App

While it is possible to edit your .csv in Documents, refrain from doing so. We want the data contained in FormConnect to be the master version. The purpose of exporting your data to the Documents app, is to have an easy-to-view table, and a local copy should the FormConnect app crash.

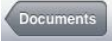
- Check over the .csv spreadsheet for errors

-If you find errors, return to FormConnect, correct the errors, and repeat step 3 to re-export your data to a new .csv in documents

5) Organize files in Documents

Move error-free .csv to “Pre-completion Backups” folder

-Tap

-Tap  the blue arrow button to the right of your new .csv

-Move → /Pre-Completion Backups → Save

-Hit home button to exit Documents

-Open FormConnect and resume Data entry

6) Export and check complete site dataset

To be done before leaving the field, upon completion of a site.

-Repeat steps 3 and 4.

-Rename your completed .csv according to this naming scheme:

“YYYYMMDD_Site_Crew#”

Ex) A site completed on June 16, 2013 by Crew 2 would be named “20130616_FP1B_Crew2.csv”

-Move .csv to Completed site data folder

7) Email your data

To be done as soon as you come back into wifi.

-Open Documents → Completed Site Data

-Tap “Edit” button on top right

-Tick radio button to the of the left file

-Tap tiny mail icon at the bottom of the screen

-Include any relevant metadata (unresolved errors, ect.) in the email body

-Mail To: celiaj87@gmail.com and
leah.pyne3@gmail.com
CC: scarlson3@alaska.edu

Tips and Extras

Crew Email Accounts installed on ipads 1 and 2:
bnzcrew1@gmail.com and bnzcrew2@gmail.com
PW: P.mariana (no spaces)

(You shouldn't need to enter a password to access the crew account on the ipads)

To conserve battery life while entering data:

- Double click home button
- Press and hold an app in the bottom panel
- Hit the close button on the top left of every app you aren't using

To take a screenshot:

- Press the home button and the sleep button at the same time

APPENDIX 5- LASER 200 INSTRUCTIONS

SECTION L.1 OVERVIEW

Accurate heights are necessary in order to determine tree volume and for other uses. The laser can be used to get fast and accurate tree heights. It can also be used to measure distances and percent slope. This instrument is more fragile than the GPS units. Some precautions must be taken with the lasers to keep them working properly. These are:

Never look at the sun through the scope. Looking directly at the sun can permanently damage your eyes.

Never point the laser directly at the sun. Exposing the lens system to direct sunlight, even for a brief period, may permanently damage the laser transmitter.

Do not expose the laser to extreme temperatures. It is rated for a temperature range of -22 to +140 degrees Fahrenheit.

Don't leave the instrument in the vehicle during the heat of the day.

Do not use batteries with "voltage check" features built on the batteries. The battery case of the laser is too narrow for these batteries, and they could get stuck in the instrument.

Do not drop the laser. Immediately return it to its case when you get back to the vehicle. There is usually more danger of

damaging the instrument in the vehicle than out in the woods.

SECTION L.2 BASIC OPERATION

All directions for using the laser buttons are given assuming you are holding the instrument with the LCD display screen facing you and the 2 round lenses are facing the object you want to measure. The buttons will be referred to as:

L1 - the left button closest to you

L2 - the left button in the middle

L3 - the left button furthest away from you

R1 - the right button closest to you R2 - the right button in the middle

R3 - the right button furthest away from you

Turn the laser on by pushing L1 or R1

Turn it off by pushing L2 and L3 at the same time. The laser may turn itself off after a period of inactivity. Once the instrument is on, push the R1 button to make the red dot appear in the sighting scope. If there is no red sighting dot, repeatedly push the L2 button until the red dot appears and is the correct brightness.

To light up the display screen, press L3. Press L3 again to turn off the light.

SECTION L.3 SETTINGS

Make sure the settings are correct before using the laser. To set the correct measurement units, go into the main menu and:

Step 1. Press R2 or R3 to scroll through the menu until SYS is displayed in the upper right hand corner of the screen.

Step 2. Press R1. ON or OFF will show in the center of the screen. FILTER will flash at the bottom.

Step 3. Press R2 until OFFSET is flashing. The number displayed should be 0000.00. This means that the starting measuring point is the center of the instrument.

Step 4. Press R2 until PIVOT is flashing. The number displayed should be 0000.59. When this number is set at 0.00, the laser is set to calculate heights using a tripod attached to the center of the instrument. The pivot point is the center of the laser. We use the pivot value at 0.59 because this sets the pivot point at the rear of the instrument, and this allows you to shoot a height while using your head as the pivot point. To change this number, press L1 until the number you want to change is flashing. Press L2 or L3 until the correct number is showing. When the number is set at 0000.59, press R1.

Step 5. Press R2 until UNITS is flashing. Select F (feet) using the R1 button.

Step 6. Press R2 again and D (degrees) should be flashing. If not, press R1 to toggle on D.

Step 7. Press R2 again and “%” should be flashing. It should say ON. If not, press R1.

Step 8. Press R3 twice to accept the new settings and back out to the main display.

SECTION L.4 FILTER AND REFLECTORS

When you are working in areas of dense brush, you need to make sure the laser is giving you the distance to the correct target. The best way to do this is to use a reflector as a target and use the filter option on the laser. The laser will only lock onto the highly reflective targets and ignore the less reflective brush. To use the filter option:

Step 1. Place a reflector (or have someone hold it) on the tree where it can be seen from the required distance. The laser will not work in the filter mode without a reflector as a target.

Step 2. Go to the main menu on the laser and push R2 or R3 until SYS is displayed on the screen.

Step 3. Press R1 to select the SYS option. The FILTER option will blink, and it will say the FILTER is OFF or ON.

Step 4. Push R1 to toggle FILTER between ON and OFF.

Step 5. Press R3 to save the desired setting and to back out into the main display. When the FILTER is on, FILTER will appear at the bottom of the screen when the laser is measuring distances.

SECTION L.5 DISTANCE AND PERCENT SLOPE

Note: this is for reference only. For the new site network, we are not making in-field slope distance corrections.

Horizontal distance (HD): Turn the laser on. The top-middle of the LCD screen will say HD. Point the red sighting dot at the target. Press R1 and hold it down until the laser locks on the target, then release. You can tell when the instrument locks onto its target by sound. It buzzes while it is searching for the target, then beeps when it locks on to a target or there is an error. If you get an error message, simply aim again and press R1.

Slope distance (SD) and Vertical distance (VD): Push R2 or R3 until the correct display is shown. Then aim and press R1 until the laser locks on target. Or, measure a horizontal distance, then push R2 until the correct display is shown.

Percent slope: Press R2 or R3 until INC is displayed. Then aim and press R1.

SECTION L.6 TREE HEIGHTS

The best way to measure a tree height is to make sure you have a clear shot at the leader or a clear shot of the tree trunk. Make sure you are getting a distance to the tree trunk,

and not some branches in front of it. If you can't get a clear shot at the leader or the tree trunk, use a reflector (Section L.4). Once you are in position with your target in sight, go to the main menu:

Step 1. Push R2 or R3 until HT is displayed in the upper left of the screen.

Step 2. Push R1 once, aim at the target, then push R1 until the laser locks on target. This will measure the horizontal distance.

Step 3. The down arrow will flash. Aim at the base of the tree and push R1 to get the percent slope.

Step 4. The up arrow will flash. Aim at the top of the tree and push R1 again to get another percent slope.

Step 5. Press R1 once more and the laser will display the height. Make sure this height is reasonable before recording it in the PDR.

SECTION L.7 GATES

The gate option can extend the laser's minimum range or restrict its maximum range. It is most often used to help you make sure you are hitting the right target when objects near you or just beyond your target might give you false readings. You don't have to set both gates. You will probably only need to set the short gate because of brush or fog between you and your target. You can set a gate by shooting a target or by entering distances into the instrument. To set a short gate by

laser, go to the main menu and:

Step 1. Press R2 or R3 until GATE is shown on the display.

Step 2. Push R1 to select the gate option.

Step 3. Press R1 to toggle the gate between ON and OFF.

Step 4. Push R2. The S indicator will flash.

Step 5. Aim at a target that is at the distance you want to set as the short gate and press R1.

Step 6. Now you can either set a long gate, or press R3 to go back to save the short gate and return to the main menu. The S will be displayed when you are measuring distances to show the short gate is on. To set a long gate:

Step 7. Push R2. The L indicator will flash.

Step 8. Aim at an appropriate target and press R1.

Step 9. Press R3 to save the gate and go back to the main display. The L will be displayed when measuring distances.

The gates are reset to OFF when the laser is turned off, but gate values are saved in memory. This means that if you have saved a gate and turn off the instrument, when you turn it back on the gate will be set to OFF. If you go back into the gate option and turn the gate ON, it will remember the last distances you shot for the long and short gates.

To clear out a gate value: Display the gate values by following

the instructions in this section. When the desired gate value is displayed, press and hold down R3 until the number is deleted.

SECTION L.8 CUMULATIVE DISTANCES

A cumulative distance measurement allows you to move from one target point to the next, stopping at each one to measure the distance to the next target point. The laser accumulates the measured distances in both slope and horizontal distances (SD and HD) to give you a running total. To take a cumulative distance, go to the main menu and:

Step 1. Press R2 or R3 until MULTI is displayed on the screen.

Step 2. Press R1 to enter the MULTI option. DIFF will be displayed.

Step 3. Press R2 once. CUM will be displayed.

Step 4. Press R1. Either SEL or a number will be displayed. If SEL is displayed, HD will flash on and off. Press R1 to toggle between HD and SD. Press R2 when the correct indicator is flashing. If a number is displayed, that means there is already a cumulative distance saved on this instrument. You can either clear out this distance by holding down R3 until 0.00 appears, or continue to add to the distance by going to step 5.

Step 5. Aim at the target and press R1 to fire the laser.

Step 6. If you are not satisfied with the measurement, repeat step 5 to retake the measurement. If you are satisfied with the measurement, and wish to add it to your total, press R2. The new total will be displayed.

Step 7. Repeat steps 5 and 6 to add more measurements to the total. You can choose whether you want horizontal or slope distances at any time. If a distance has been measured,

you can change from slope or horizontal distance by pressing R3 twice. SEL will be displayed. Push R1 to toggle between SD and HD. Press R2 twice to get back to the total distance. Go to step 5 to add more distances.

The cumulative measurement total is saved in memory even if the instrument is turned off. Turn the instrument on and scroll back to the MULTI-CUM option and resume the procedure with step 5. To clear out the current total and begin another series of measurements, hold down R3 while the cumulative distance is showing until the number is deleted.

APPENDIX 6- LTER Satellite Phone Instructions: Basic version

For Iridium models, see instructions included in case.

- 1.) Rotate antenna up, making sure it is inserted fully into the back. Extend the antenna by pulling upwards on the tip.
- 2.) Open lower phone and push red power button.
- 3.) Enter PIN (1111) and press OK
- 4.) If necessary, register the phone by pressing the up arrow and then the '8' key.
- 5.) Once registered, press and hold the '0' key until the '+' symbol appears.
- 6.) You may now make a call, just like a long distance call from any phone.
- 7.) (1 + area code + number) Alaska's area code is 907.
- 8.) Be patient, it may take a while for it to start ringing.
- 9.) Try again if you don't connect.

Appendix 7 - CONTACT INFORMATION

Primary Contacts:

Shalane Frost:

Office: 907-474-5435
Cell: 434-249-1487
Home: 907-479-2723
Email:
scarlson3@alaska.edu

Jamie Hollingsworth:

Office: 907-474-7470
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u

In-Town technicians:

Celia Jackson:

Cell: 206-819-1595
Email:
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Leah Pyne:

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Alternative LTER contacts:

Karl Olson

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Office2: 907-474-5540
Email:
jdolson@alaska.edu

Teresa Hollingsworth

Office: 907-474-2424
Email:
tnhollingsworth@alaska.edu
du

Jason Downing:

Office: 907-474-6364
Cell: 907-479-2837
Email:
jpdowning@alaska.edu

LTER trailer: 907-474-
1534

Emergency and other contacts:

Emergency: 911

Poison Control: 1-800-222-1222

Poison Control Center:

1650 Cowles St Fairbanks AK 99701

(907) 456-7182

Alaska State Troopers:

Fairbanks: 907-451-5100

Coldfoot: 907-678-5211

Delta Junction: 907-895-4800

Nenana: 907-832-5554

Tok: 907-883-5111

UAF Dispatch (24hours): 907-474-7721

Forest Service:

Alaska Regional Office

PO Box 21628

Juneau, AK 99802-1628

(907) 586-8806

Clinics and Hospitals:

Anchorage Hospital/Emergency Room:

Phone: 907.562.2211

3200 Providence Drive

Anchorage, AK 99508

Fairbanks Memorial Hospital & Denali Center:

1650 Cowles St.

Fairbanks, AK 99701
Phone: (907) 452-8181

Fairbanks Urgent Care:

1867 Airport Way Fairbanks, AK 99701
Phone: (907) 452-2178

Tok Clinic:

(907)-883-5855
124 5 Tok Cutoff Road
Tok, AK 99780

Delta Junction Family Medical Center:

Phone: 907-895-5100
Family Medical Center is located at Mile 267.2 Richardson
Highway
Near Delta Junction

APPENDIX 8-CHECKLISTS

CAMP checklist

- Canopy
- Screen for canopy
- Stakes for canopy
- 4 chairs
- Table
- Propane lantern
- 100 ft. rope
- Small nylon cord
- Duct tape
- 8x10' tarp
- Hatchet
- Lighters/matches
- 2 tents
- 4 extra stakes
- Hand saw

TRUCK checklist

- Atlas
- Ax/hatchet
- Shovel
- Gas can
- Tool kit
- First Aid Kit
- Ratchet straps
- iPad charger
- Satellite phone charger
- External batt charger
- Drill charger
- Power inverter
- Jumper cables
- Tow rope
- Bungee cords
- Flares
- Spare tire
- Tire jack

KITCHEN checklist

- Coleman stove
- Propane for stove
- 4-5 water jugs
- 1 action packer
- 1-2 cooler(s)
- 1 large plastic tub
- 2 dishwashing tubs
- Coffee pot
- 6 plates
- 6 bowls
- 4-6 cups
- Cutting board
- Silverware
- Chopping knife
- Paring knife
- Serrated knife
- Tupperware
- Cast iron pan
- Stir-fry pan
- Large stock pot with lid
- Medium pot
- Small pot
- 3 mixing bowls
- Cheese grater
- Tongs
- Big spoon
- Ladle
- Egg container
- Measuring cups
- Measuring spoons
- Strainer
- Can opener

- Veggie peeler
- Multi-spice
- Whisk
- 4 dish rags
- Bleach
- Green scrubbies
- Soap
- Garbage bags
- Ziplock bags
- Hand sanitizer

FIELD checklist

- iPad
- iPad case
- Extra data sheets
- Clipboards
- GPS
- Methods manual
- Field vests
- Pencils
- Compass
- Laser(s)
- Clinometers
- Metric DBH tape
- 100 meter tape
- 60 meter tape
- PVC pipe
- Yellow-tipped conduit
- Orange-tipped conduit

- Tree tags
- Aluminum nails
- Hammers
- Hand drill
- Screws

- Wire
- Wire cutters
- Site signs
- Bug spray
- Satellite phone
- Bear spray
- First Aid Kit
- Whistles
- Pliers
- Lumber crayons
- Tree paint

APPENDIX 9 – GLOSSARY

Glossary of terms for New Site Network

Actual Length: The *actual length* of the tree is *measured* from ground level (*measured from the uphill side of a tree on a slope*) to the highest remaining portion of the tree still present and attached to the bole. For trees with missing tops (top on live trees is completely detached; top of dead trees is greater than 50% detached from the tree), measure the *actual length* of the tree from ground level to the break. Forked trees should be treated the same as unforked trees.

Aspect: Compass direction that a slope faces.

Average: (GPS): Letting the GPS collect multiple readings from which to calculate the average (more accurate) location.

Azimuth: A horizontal angle measured clockwise in degrees from a reference direction, usually the north or south point of the horizon, to the point on the horizon intersected by the object's line of altitude (a line from the observer's zenith through the object to the horizon). If north is the reference point (0°), then east has an azimuth of 90°, south is 180°, and so forth through 360°.

Bole: The main stem of a tree, extending from one foot above the ground to the point on the tree where *diameter outside bark* (DOB) reaches 4 inches.

Browsing: Chewed or gnawed off branches due to animal feeding.

DBH (Diameter at breast height): Tree DBH is outside bark diameter at breast height. Breast height is defined as 1.37m above the forest floor on the uphill side of the tree. For the purposes of determining breast height, the forest floor includes the duff layer that may be present, but does not

include unincorporated woody debris that may rise above the ground line.

Declination: The measurement describing the angular difference between true north and magnetic north on a compass.

Duff: Decaying vegetation covering a forest floor.

Forest floor: The freshly cast, partly decomposed, and fully decomposed vegetative material on the soil surface.

GPS: Global Positioning System. Information from this system is collected and used to determine the latitude and longitude of each site.

Pith: The small soft center of the tree trunk or branch.

Plot: Each 10mx10m square (n=30) within the site

Prime Corner: The northwest corner of the research site.

Root Collar: The transition zone between stem (bole) and root at the ground line of a tree or seedling.

Site: The entire 50 x 60m research area.

Slope: Measure of change in surface value over distance.

Snag: A standing dead tree.

Succession: The progressive replacement of one dominant type of species or community by another in an ecosystem until a stable climax community is established.

-*Primary succession:* An ecological succession that occurs following an opening of uninhabited, barren habitat or that occurs on an environment that is devoid of vegetation and usually lacking topsoil.

-*Secondary succession:* The ecological succession that occurs on a preexisting soil after the primary succession has been disrupted or destroyed due to a disturbance that reduced the population of the initial inhabitants.

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