A CITIZEN'S GUIDE TO FOREST HEALTH MONITORING

How It Works:

A Step-by-Step Manual for Forest Health Monitoring

OBJECTIVE:
To observe trends in local forest health through consistent monitoring of a wide range of ecological attributes overtime.

Step 1:
Laying your 300' transect

Step 2:
Photograph and geo-reference the start point

Step 3a:
Point center quarter

Step 3b:
Ground cover

Step 3c:
Surface fuel visual estimation

Step 3d:
Shrub density

Step 4:
Understory vegetation density estimation with wildlife board

Step 5:
Photograph and geo-reference the end point

Step 6:
Nature hike

What To Do:

Pass #1 Quantiative Data

OBJECTIVE:
To monitor how forest structure and composition is responding to a variety of mechanical treatments established by the San Juan Headwaters Forest Health Partnership.

PROCESS:
Each monitoring brigade will have four people, divided into two groups. Each group will be assigned to certain data collection responsibilities outlined below:

PROCEDURE:

GROUP #1 TASKS
Point Center Quarter in 4 Quadrants, collecting:
- Tree Diameter
- Species ID
- Height
- Height to Live Crown

GROUP #2 TASKS
Point and Area-Based Sampling, collecting:
- Ground Cover
- Surface Fuel Estimation
- Shrub Density and ID
- Wildlife Board

What To Do:

Pass #2 Observational Data

OBJECTIVE:
We like to call this the "**Nature Hike**"! Pass #2 seeks to draw on the observational strengths of the volunteer monitors to collect information on trends of other indicators of forest health and resilience.

PROCESS:
Each monitoring brigade will return along the 300' transect as one group. All members will participate in observing and noting the presence/absence of forest health indicators while walking towards the transect start point.

FOREST HEALTH INDICATORS:

- **Signs of Wildlife (i.e. scat, tracks, fur, bones, calls, visual sightings, etc…)**
- **Wildlife Habitat Features (i.e. middens, burrows, nests, cavities, dens, etc…)**
- **Beetles and Signs of Insects (i.e. pitch tubes, galleries, flagging, defoliation, live beetle sightings, etc…)**
- **Invasive Plant Species**
- **Additional notes (i.e. erosion observations, mushrooms and edible plant species, rare plant species, etc…)**

STEP 1:

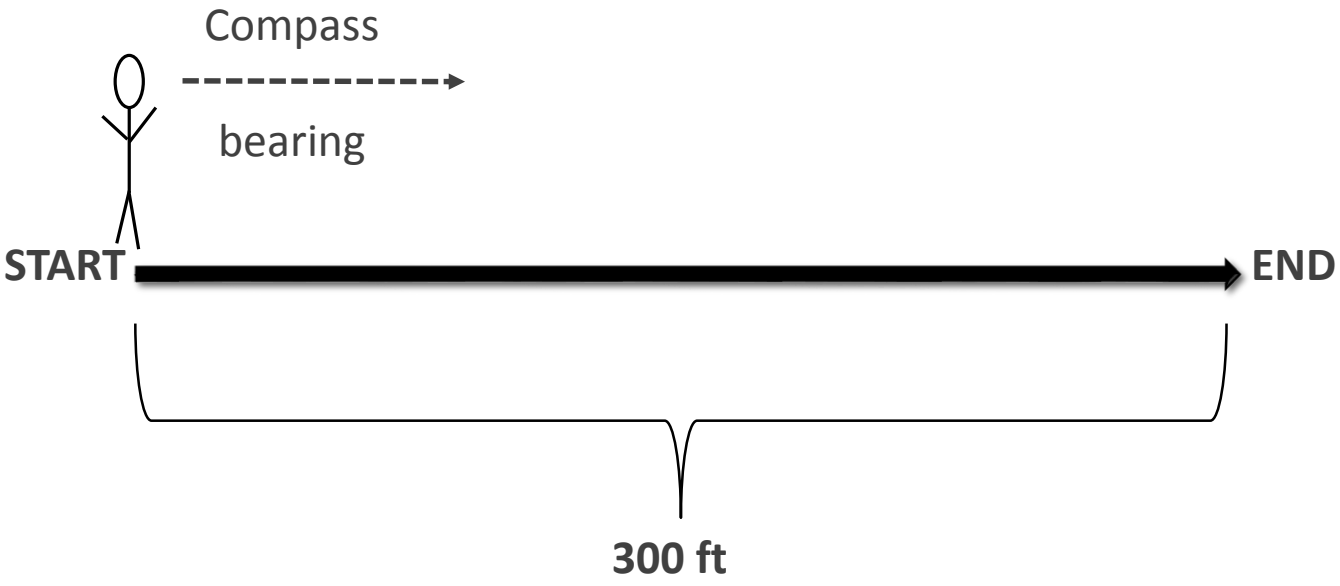
Laying your 300 Foot Line Transect

MATERIALS:

- GPS Unit
- 300’ Tape
- Compass
- Compass bearing
- Transect coordinates

INSTRUCTIONS:

1. Using the GPS coordinates provided by the volunteer leader, navigate to the start point of your transect.
2. Take the compass bearing provided by the volunteer leader.
3. Have partner walk the bearing with the 300’ tape, laying it on the ground in a straight line.

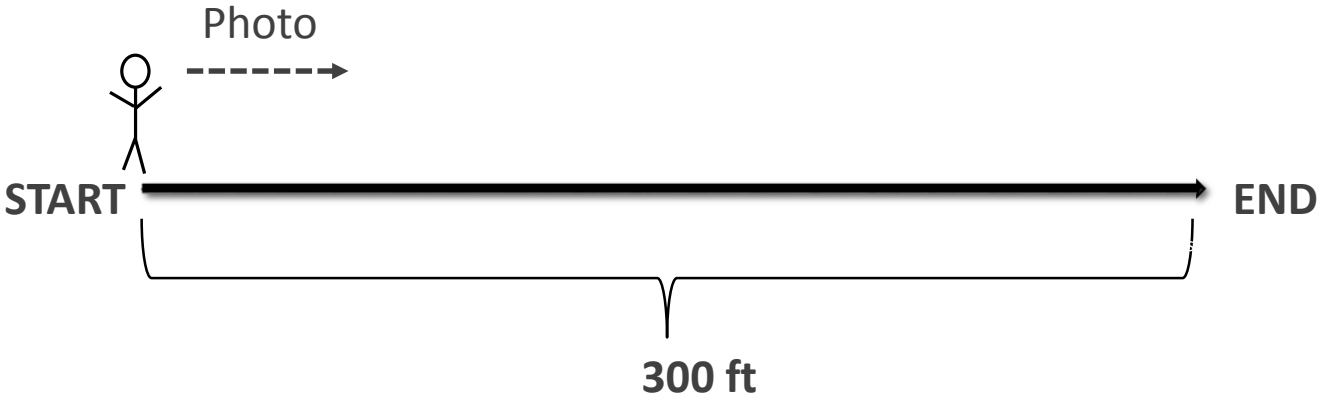


STEP 2:

Photograph and Geo-Reference the Start Point

MATERIALS:
- GPS Unit
- Digital Camera

INSTRUCTIONS:
1. Take a digital picture of the line transect from starting point, facing the direction of the transect.
2. Record the number of the picture on the data sheet and camera used.
3. Save the transect start point as a waypoint on your GPS unit. Record UTM coordinates on data sheet.



STEP 3:

Point Quarter Center

MATERIALS:

- Diameter Tape
- 100’ Tape
- Compass
- 66’ Chain Rope

INSTRUCTIONS:

1. Locate Quadrant 1 (see Appendix 1).
2. Using 100’ tape, locate the closest tree or stump to plot center.
3. If the closest object to the plot center is a tree, record its distance from plot center and species. If the closest object is a stump, do the same as if it were a tree. Measure as close as possible to the base of the stump. You must then ALSO locate the nearest living tree and record the distance and species.
4. Measure and record the Diameter at Breast Height (DBH). If it is a stump, record the average of the cross-section diameter lengths.
5. Measure and record the total height, if it is a tree(See Appendix 2).
6. Measure and record the Height-To-Live-Crown, if it is a tree(See Appendix 2).
7. Repeat for Quadrants 2, 3, and 4.

STEP 3b:
Ground Cover

MATERIALS:
- Point Stick

INSTRUCTIONS:
1. Directly at plot center, orient the point stick vertically and place it just beneath the tape.
2. Record type of ground cover according to table below.

GROUND COVER
Bare Ground
Litter
Dead Wood
Rock
Moss
Lichen

STEP 3c:

Surface Fuel Visual Estimation

MATERIALS:

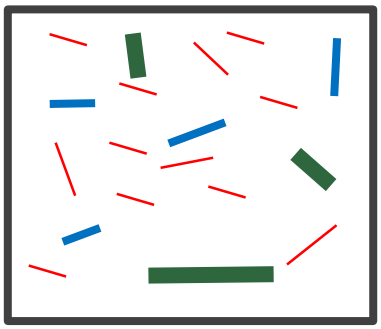
- Square meter frame
- Surface fuel photoseries notebook

INSTRUCTIONS:

1. Lift the 300' tape and place the m^2 frame so the center of the square coincides with plot center and corners of frame are at 90° from tape.
2. Within the frame, identify the fuel components that **ARE NOT PRESENT** first. Record a "0" in their respective locations on the datasheet.
3. Progress through fuel components that are less present to those that are most dominant.
4. Record as "tons/acre".

Example:

1 hr
10 hr
100 hr



Size Classes:

- 0" - ¼": 1 hour fuels
- ¼" - 1": 10 hour fuels
- 1" – 3": 100 hour fuels

Calculate:

1st 100 hr : 0.45 tons/acre

2nd 10 hr : 0.13 tons/acre

3rd 1 hr: 0.32 tons/acre

STEP 3d:

Shrub Identification and Density

MATERIALS:

- PVC point stick
- Field ID book

INSTRUCTIONS:

1. Using the PVC point stick, rotate it horizontal to the ground and hold it at the indicated center. This will give you 1/2 meter on either side.
2. Hold the point stick so that it is also 1 meter above the ground.
3. Between each PCQ plot center, walk along the transect and call to your partner every shrub that falls within the range of the point stick.
4. Record each shrub that is either a) **below** the point stick or b) **above** the point stick within the 75 foot section.
5. Repeat between each PCQ plot center along the entire length of the 300' transect.

STEP 4:

Understory Vegetation Estimation with the Wildlife Board

MATERIALS:

- Wildlife Board
- Data Sheet
- 2 Observers

INSTRUCTIONS:

1. This requires two people. It is divided into two passes. The first pass goes from 0 → 150, and the second from 150 → 300.
2. One observer stands at the beginning of the transect (0 feet), while the other carries the wildlife board and sets it at 30 feet.
3. The observer estimates the percentage of wildlife board that is **covered** by vegetation in each section, starting at the ground level. Estimate to the nearest 5%.
4. Once recorded, the wildlife board advances 30' while the observer remains stationary. Repeat the same procedure until the wildlife board reaches either 150' or is completely covered.

   ****If the wildlife board is completely covered, observations cease and the observer moves to the mid-point of the transect (150') and the process starts over.**
5. Repeat the same procedure for pass 2.

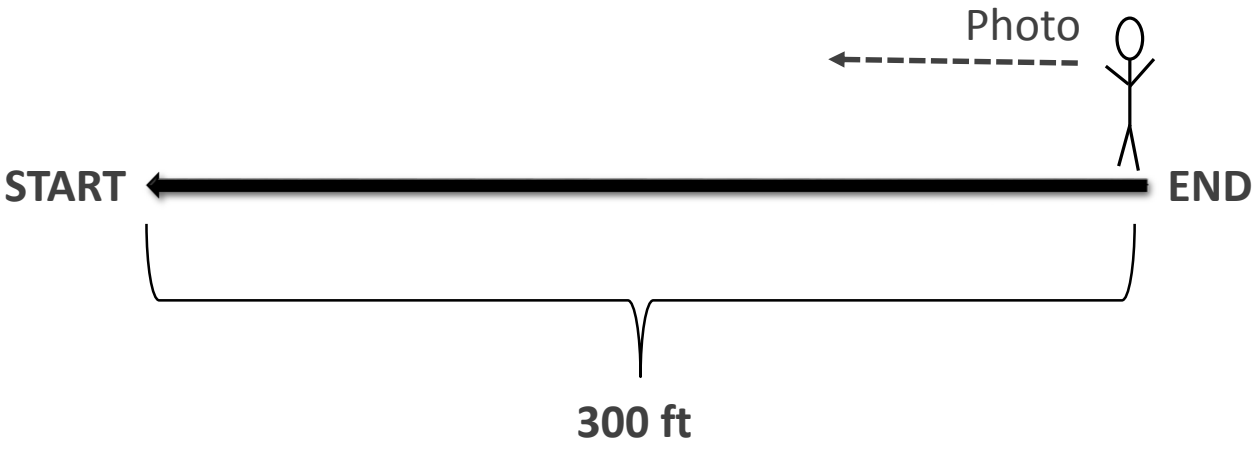
REPEAT ALONG ENTIRE TRANSECT

STEP 5:

Photograph and Geo-Reference the End Point

MATERIALS:
- GPS Unit
- Digital Camera

INSTRUCTIONS:
1. Take a digital picture of the line transect from end point, facing back along the transect.
2. Record the number of the picture on the data sheet.
3. Save the transect start point as a waypoint on your GPS unit.



STEP 6:

Nature Hike

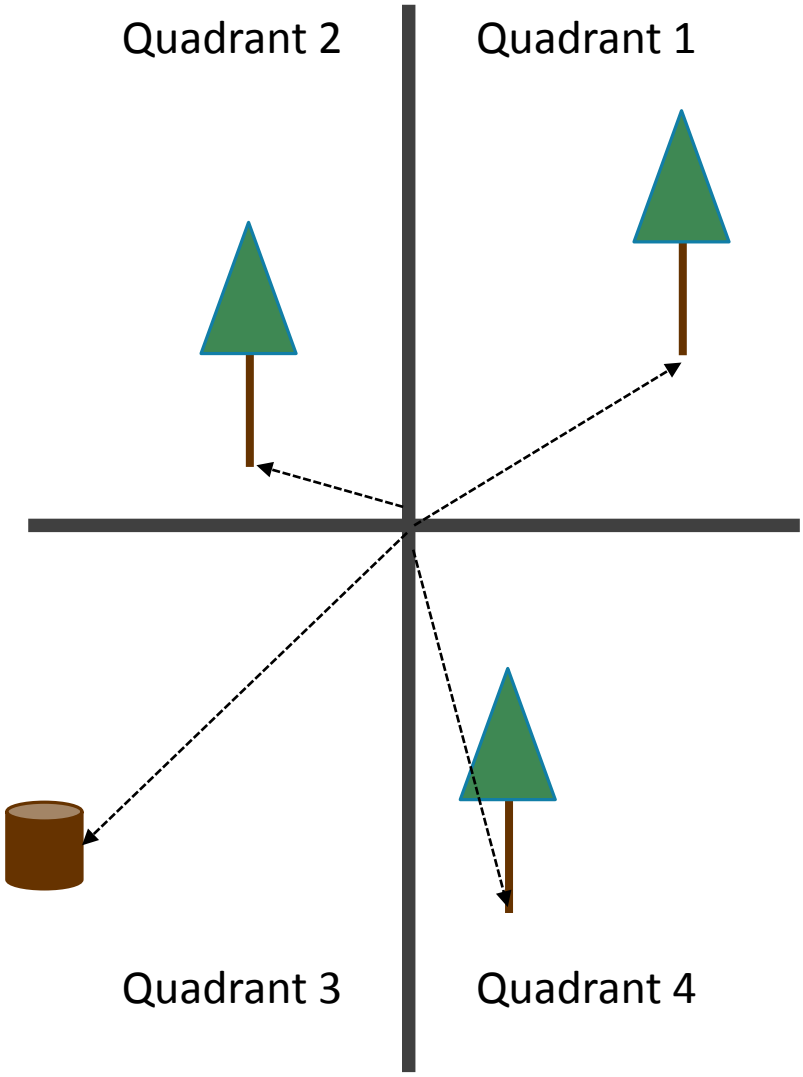
MATERIALS:

- Digital Camera
- Field ID Book

INSTRUCTIONS:

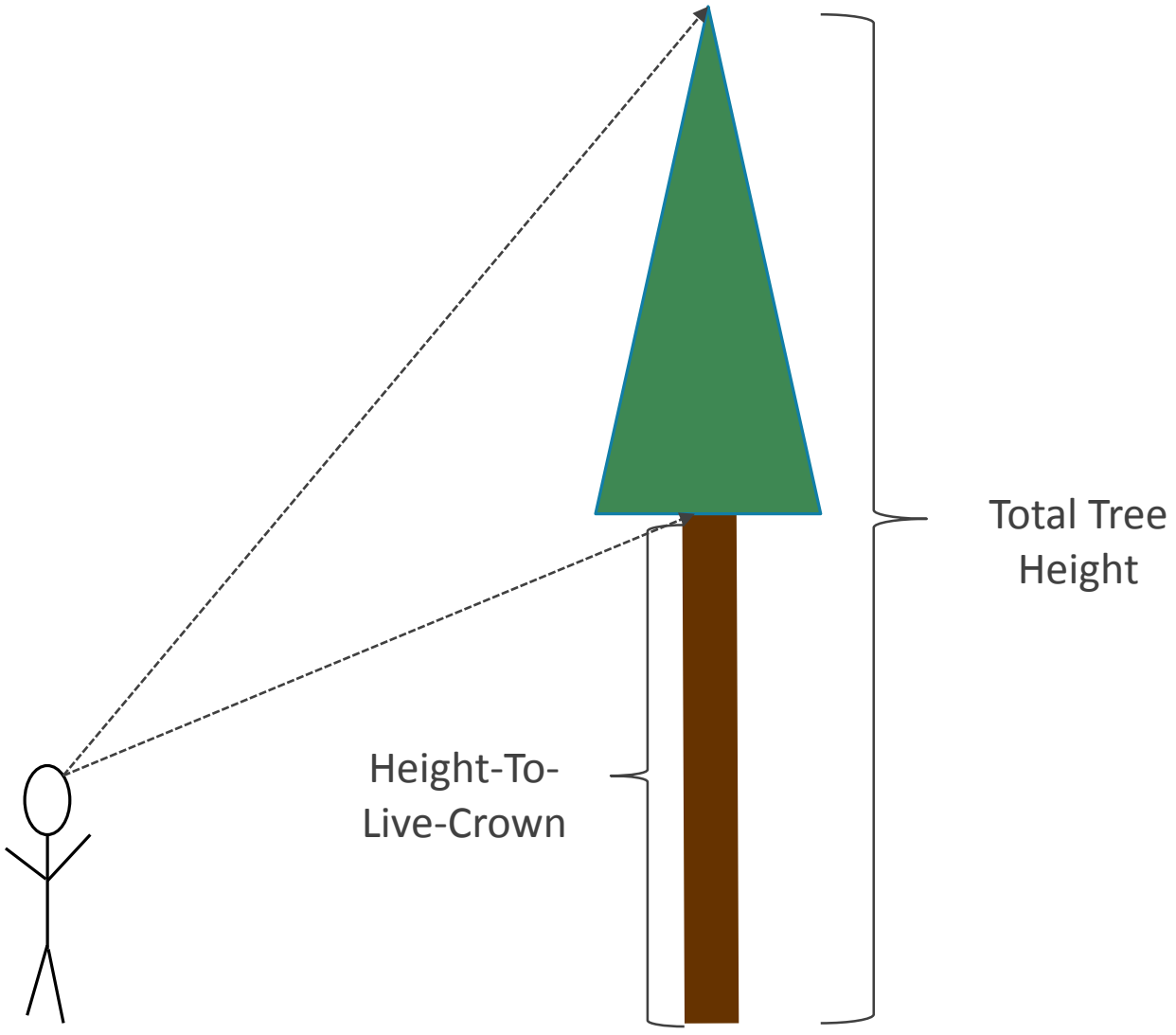
1. You have made it through the hard part of the transect! Now it is your turn to enjoy a nice walk back, observing the forest around you.
2. As the group walks back together, be alert for other signs of forest health, including: wildlife, wildlife habitat, invasive species, disease, insects, erosion.
3. Note down the presence/absence of everything you see or do not see.
4. Take pictures of anything special, unusual or alarming.
5. Enjoy the forest!

Appendix 1:
Quadrant Layout



Appendix 2:

Defining Total Tree Height and Height-to-Live Crown



Appendix 2:

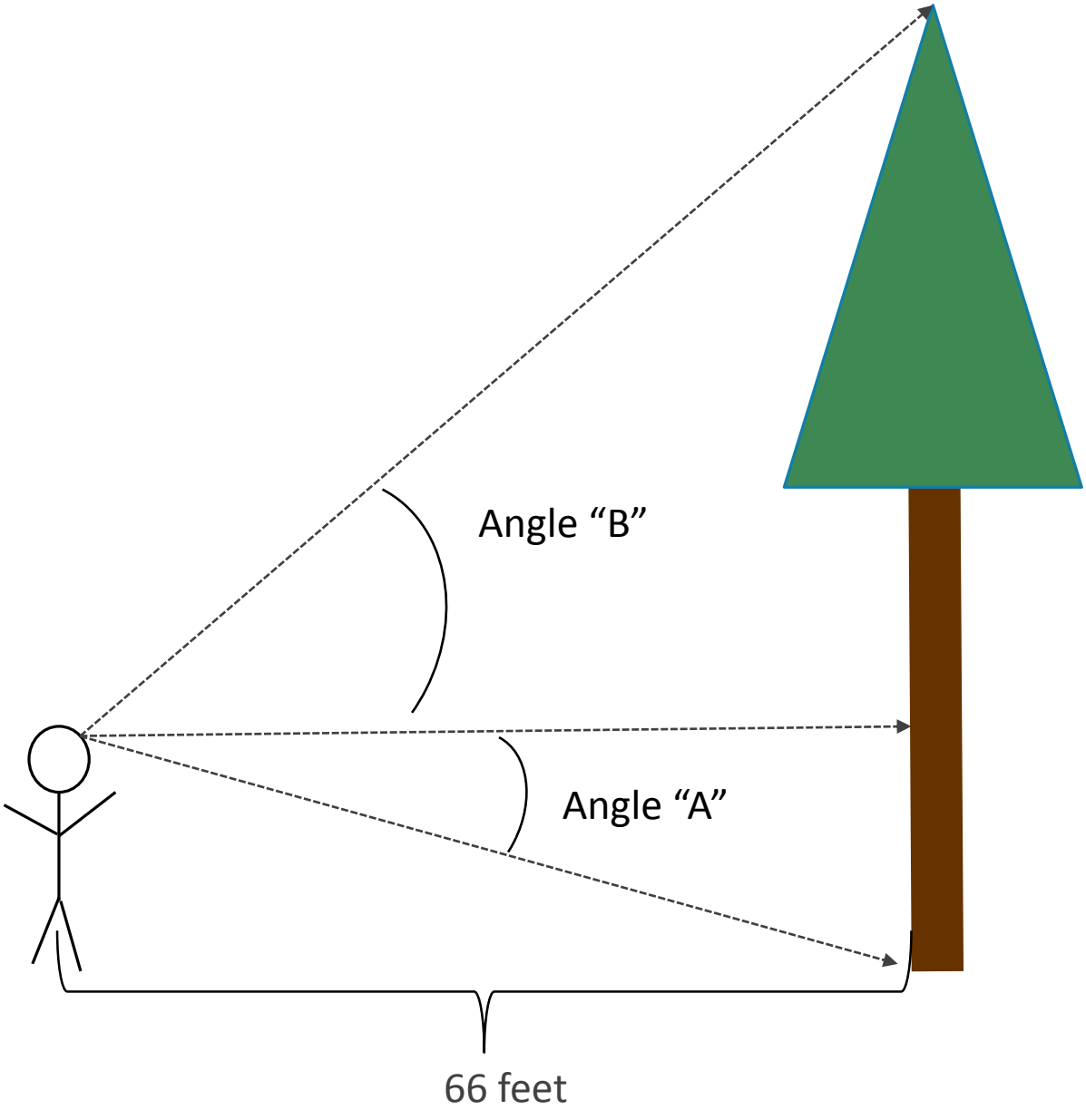
Measuring Total Tree Height and Height-to-Live Crown

INSTRUCTIONS FOR MEASURING HEIGHT ON FLAT GROUND:

1. From base of tree, walk 66’ (1 chain) using the pre-measured chain rope, preferably along the contour of the hillside.
2. Open the compass with the mirror plate on your left, compass plate rotated to 270 degrees and the compass hinge aligned vertically with the tree.
3. Using the edge of the base plate, tilt the compass until the hinge is pointing at the bottom of what you are measuring.
4. Using the mirror, record the angle from reading the red numbers off of the base plate (angle “A”).
5. Repeat the same procedure for the top of the tree (angle “B”).
6. Add Angle “A” and “B” (A + B) and calculate using the following equation found on page 23.

Appendix 2:

Measuring Total Tree Height and Height-to-Live Crown



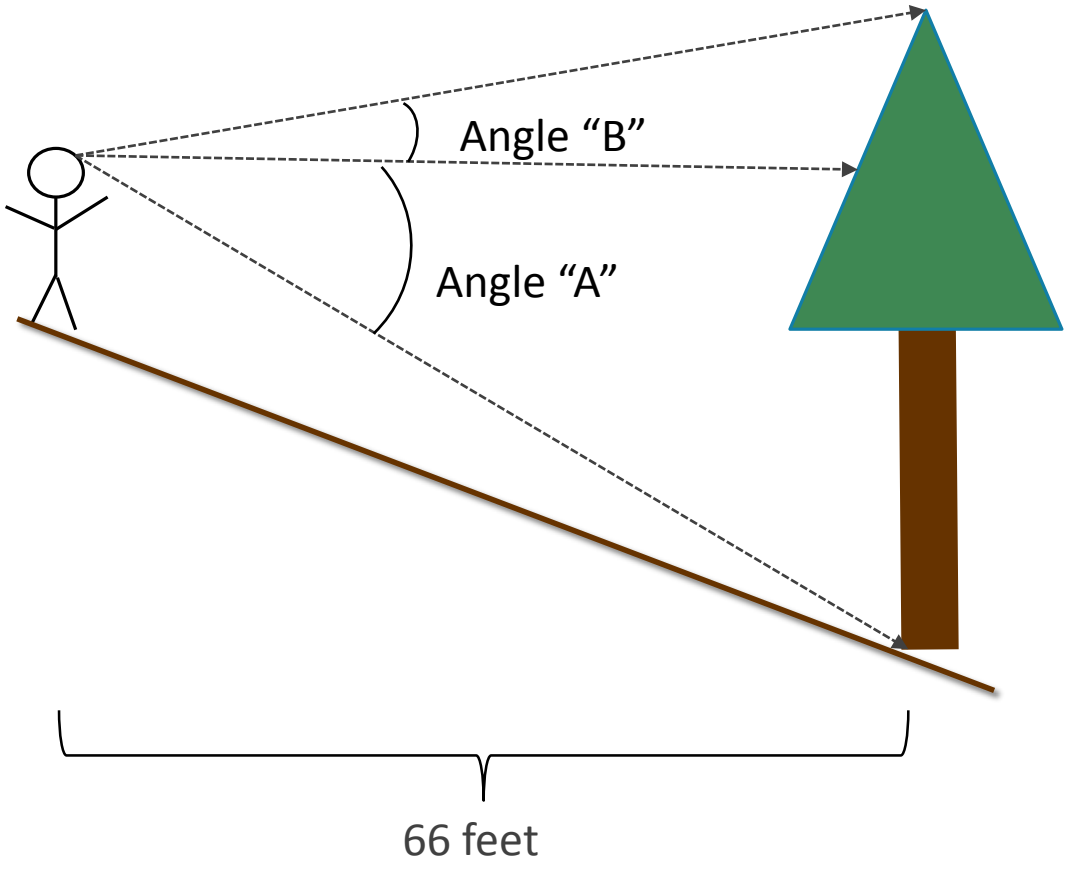
Appendix 2:

Measuring Total Tree Height and Height-to-Live Crown

INSTRUCTIONS FOR MEASURING HEIGHT ON A SLOPE:

If the tree is **downslope from you, follow the same instructions as described for measuring height on flat ground.

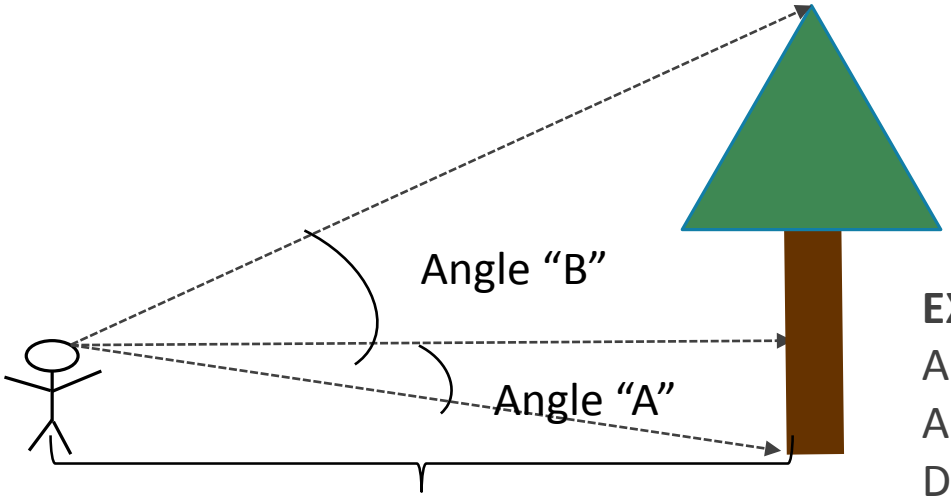
1. From base of tree, walk 66' (1 chain) using the pre-measured chain rope. **This must be a horizontal distance from the base of the tree! For slope distance, see the correction tables in Appendix 3.**



Appendix 2:

Calculating Total Tree Height and Height-to-Live Crown

TREE HEIGHT = Distance x tan(angle)



Angle	Tan(angle)	Angle	Tan(angle)
5°	.087	50°	1.191
10°	.176	55°	1.428
15°	.268	60°	1.732
20°	.364	65°	2.145
25°	.466	70°	2.747
30°	.577	75°	3.732
35°	.700	80°	5.672
40°	.839	85°	11.430
45°	1.00	90°	NA

EXAMPLE:
Angle "A" = **15°**
Angle "B" = **40°**
Distance from Tree= **66 feet** (1 Chain)

Calculation:
Angle "A" + "B" =
15° + 40° = **55°**
tan(angle) = tan(55°)
= **1.428**
Tree height =
Distance x tan(angle)
Tree height =
66 x 1.428
Tree height = 94 feet

Appendix 3:
Slope Correction Tables

Angle	300' Tape
0°	0
5°	301.1
10°	304.6
15°	310.6
20°	319.3
25°	331
30°	346.4
35°	366.2
40°	391.6
45°	424.3
50°	466.7
55°	523

Angle	100' Tape
0°	0
5°	100.4
10°	101.5
15°	103.5
20°	106.4
25°	110.3
30°	115.5
35°	122.1
40°	130.5
45°	141.4
50°	155.6
55°	174.3

Angle	66' Tape
0°	0
5°	66.3
10°	67
15°	68.3
20°	70.2
25°	72.8
30°	76.2
35°	80.6
40°	86.2
45°	93.3
50°	102.7
55°	115.1