

2017 MANITOBA ENVIROTHON

FORESTRY EQUIPMENT USAGE

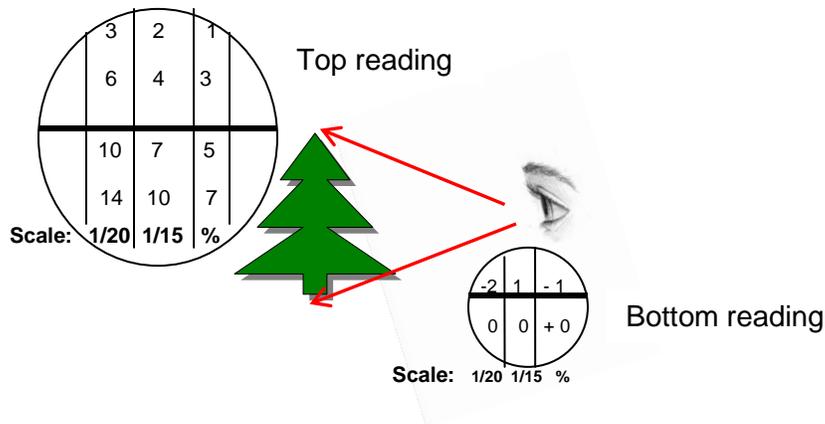
Why Measure?

- Forest growth, stand development and health monitoring
- Site productivity measurements
- Permanent sample plots (PSP) using repeated measurements on same trees over time allow growth calculations,
- Calculated volume for harvest (TSP, PHS)
- Calculation of forest regeneration status and survival (Regen and FTG)
- Dendrochronology – Tree-Ring databases, long-term climate studies, biotic and abiotic factors
- Standardized measurements using easy to use and carry equipment often with mathematical basis incorporated – ie Pythagoras, or using easy to calculate constants, ie milhectares

Height Measurements (Clinometers):

- Suunto is most common
- Also Haga, manual methods, laser rangefinders
- Most use theory of right angle triangles to calculate height based on hypotenuse and trigonometry
- Require distance from object

View through eye-piece of SUUNTO clinometer:

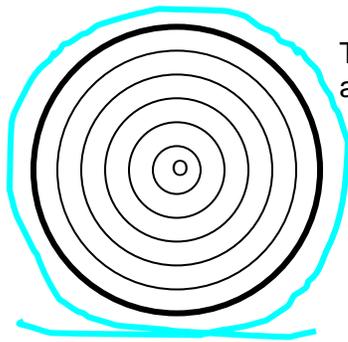


Technique for SUUNTO:

- Measure distance to tree (this example will use the 20 (left-most) scale)
- Suunto is unit-dependent. That means the height measurement will be in feet if you use feet to measure from target tree or meters if you use meters from tree.
- Look through eye piece, ensure you are holding so you can read numbers (neck cord hanging down). To choose appropriate scale (look straight up (make sure your are oriented to not look directly into the sun, the scale will be visible at the bottom of the list of numbers)
- Align horizontal black bar with top of tree, record reading = about 9
- Align horizontal bar with bottom of tree, (remember to use the same scale as before), record reading = about - 2
- If your eye level is above the base of the tree as shown, add the two numbers together.
From picture, example:
Top = 9, bottom reading = -2
Total Height = 9 + 2 = 11 feet or meters depending on distance
- Repeat and average results
- If you are on a steep slope, further instruction on the device is required.

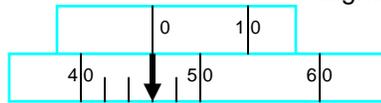
Diameter Measurements (Tapes, Calipers, Rulers):

Top view of tree trunk cross-section



Tape wrapped
around tree

Front view of tape properly
aligned around tree trunk



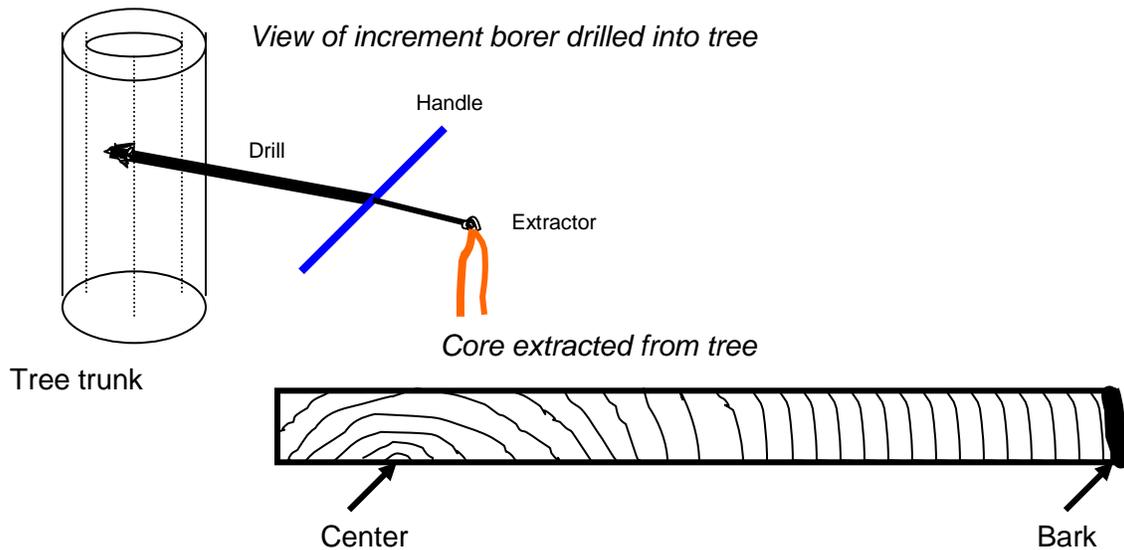
43 mm or 4.3 cm

Technique for Diameter Tape:

- Use side of tape which reads: **CIRC. TO DIA. π mm**
- Wrap tape around tree, at standard height above ground (1.3 meters = Breast Height)
- ensure it is horizontal and no obstructions on stem like branches, etc are affecting it
- Pull tight, read number below 0, this is the diameter, from above example = 4.3 cm

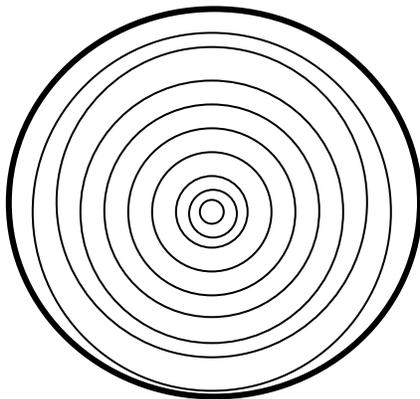
(Note: Tape is graduated into tenths of centimeters)

Age Determination (Increment Borer):

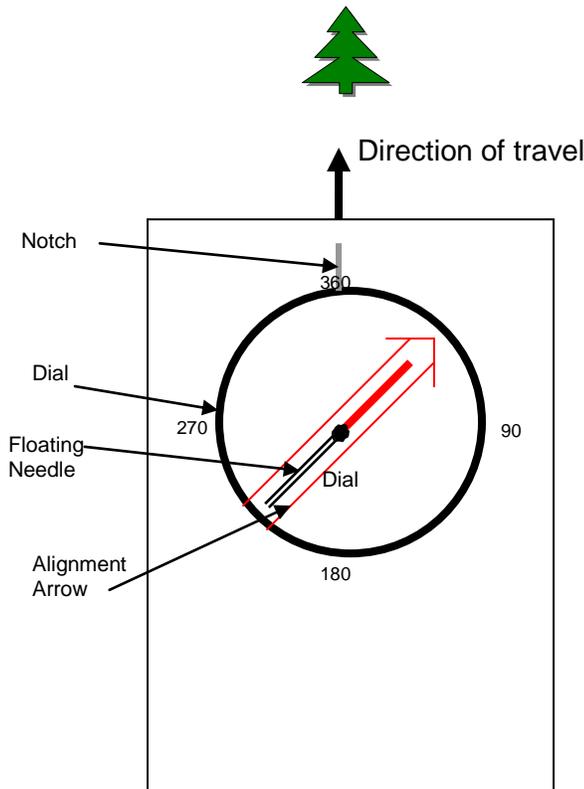


Counting Tree Rings:

- Can be done from cut logs, stumps, cookies, etc
- Use increment borer to extract cylinder of wood from living tree
- Bore into tree ensuring borer is **horizontal** and will pass through center and slightly beyond at standard height above ground (0.3 meters or length of borer handle)
- Insert extractor and remove core
- Count rings from center to bark (if center not visible re-bore)
- Use water to wet rings for better visibility and hand lens if rings very close or hard to see
- Example tree is 26 years old



Location Determination (Compass, GPS):



Compass Technique:

- Ensure declination is properly set (It is provided on most NTS maps)
- To head North (360°) as in diagram
- Turn large dial until desired azimuth 360 is under notch
- Hold compass flat and level so that floating needle float freely (beware wearing too much jewelry or being near large metal objects)
- Turn body and compass until floating needle lines up with large arrow on compass dial
- Pick an object in the distance in line with the notch and walk towards it
- Re-sight as necessary until object is reached
- Can be used in to calculate what azimuth a certain object is from user by reversing technique. (Stand with notch pointing at object, turn compass dial until red needle and arrow are aligned, read off azimuth at notch.)

GPS or Global Positioning System is very useful tool to find the coordinates of an exact spot on the earth or to navigate to a set location. It is also used to track the path or route of vehicles or animals. When information from a GPS source is used with GIS or Geographic Information Systems map or tabular data, many useful analysis or studies can be performed.

- **More detailed training on these subjects will be provided during this workshop.**