**Sample collection**

**Materials**: make sure you have the following with you each day

* Increment borer (2 sizes)
* Masking tape
* Permanent markers
* Multiple straws with holes (to allow the cores to dry)
* Dbh tape
* Tree core kit (with tools to help unjam and sharpen boeres

**Procedures**

* Select the proper borer (smaller size for 10cm dbh to about 20cm dbh and larger for all others)
* The coring should be approximately perpendicular to the tree trunk at breast height (137 cm)
* The boring should be started slowly and carefully to avoid sideways slippage of the bit against the tree trunk.
  + Hold the borer shaft near the threaded bit with one hand while applying pressure toward the tree and turning the borer with the other hand.
  + Once bit has begun drilling into the tree, both hands can be used to advance the borer.
* After the increment borer has been advanced into the tree to the desired depth, the extractor is fully inserted into the borer.
  + The extractor should be inserted with the concave side of the extractor facing down.
  + Now rotate the borer one half turn counter clockwise to break the core and remove the core from the borer by pulling extractor.
  + Often, this procedure will remove the entire core from the borer. In some cases, however, part of the core will remain in the borer because extractors sometimes lose their ability to adequately grip the core or because part of the core becomes wedged in the bit. Probable causes of a jammed core in the core barrel include a dull core-barrel bit and a dirty core barrel.
  + To remove a jam insert the extractor fully into the borer once the depth of penetration has been reached, rapidly remove the borer from the tree, insert an unpainted golf tee into the end of the bit, and press it against the tree while removing the extractor and tree core. In most cases, this gently removes the entire core without damaging the cutting edge of the bit (the most expensive part of the borer)
* Once the core is extracted and present on the extractor use a straw of appropriate length and slowly push the core inside making sure to include all pieces of the core
  + Although including the bark is not necessary, it can help when mounting the core
  + Make sure the core is entirely inside the straw and tape it close or fit another smaller straw over the open end to ensure the core is inside
  + Use a piece of tape to create a label around the straw
    - Label the straw with the species code of the tree, date cored, and specific tree ID number
* Pack the core back into the bag carefully and make sure not to bend or break it

**Drying**:

* Once back in the lab put the straws (with cores inside them) in an open container and let them sit to dry, be sure to bring them out into the sun when possible, and make sure they do not get wet again
* This may take several weeks, cores must be dry before further processing

**Mounting**:

* **Materials**:
  + Regular Elmer’s glue
  + Core mounts of various sizes
  + Pencil
  + Masking tape
* **Procedures**:
  + Select a core (still in the straw) and choose a core mount of appropriate size. The core should fit inside the mount with a few cm to spare
  + Copy the information from the straw (species code, date cored, tree ID number) onto the core mount facing you
  + Slowly and carefully remove a core from a straw using an extractor if necessary
  + Place the core within the core mount with the inside of the tree on your left side. Make sure the rings radiate out from the left side of the core mount
    - Remove any excess of the tree ring past the pith (center of the core) and make sure it fits within your select core mount
  + Remove the core and place a good deal of glue down on the mount
  + Place the core firmly on the core mount. There should be enough glue that it slightly overflows, make sure you use enough to stick the core down
  + Place the masking tape over the core in several spots to hold it down firmly
  + Let it sit for about a week to make sure it is fully dry

**Sanding**:

* **Materials**:
  + Belt sander
  + Sand paper 80P, 120P, 220P, 320P, 400P
  + Safety glasses, face mask, hearing protection
* **Procedures**:
  + After cores have sufficiently dried use the belt sander at 80P to sand them down to about 1/3 their original width. There should be a flat surface on each core, but the rings will not yet be readily visible
  + Sand the cores with progressively less course sandpaper from 120P to 220P to 320P to 400P. After 400P the rings on all the cores should be visible, though some of the most recent rings may still be somewhat difficult to see (especially if the tree had stunted growth in the last few years of its life)
  + Clean up and vacuum the area
  + Store the cores for further processing

**Memorization and List Method**

**Procedures**

* Once the cores have been sanded they should be preliminarily marked before any further processing.
* Look at the most recent rings under the microscope, if they are still difficult to see you need to hand sand them down using even finer sandpaper going from 800P to 1,000P, to 1,200P
* If the most recent ring (the one closest to the bark) is a full ring assume it is from the previous year (meaning the tree died before the survey), if the most recent ring is a partial ring assume it is from the current year (meaning it died in the spring/summer)
  + It is possible the trees have not put on rings for a few years before they died, but at this stage you’re just trying to get an approximate age
* Count backwards marking every 10 years (very lightly) with a pencil.
  + Every decade should be a single dot, every half century (1950, 1850) should be a double dot and every one hundred years should be a triple dot (2000, 1900)
* Reference years
  + 1977 is usually more narrow than 1976 and 1978
  + 1966 and 1965 were major drought years, they are both more narrow than 1964 and 1967
  + 1947 is usually more narrow than 1946 and 1948
  + Make sure the reference years match, if they do not you should double check. At this point however, you are still doing preliminary matching. The dots made are for reference, they are not definitive
* Mark the older year in pencil on the side of the core
* Store the cores for further processing using WinDENDRO or Velmex and MeasureJ2X

**Resources used**:

Phipps, R. L. (1985). Collecting, Preparing, Crossdating, and Measuring Tree Increment Cores. *US Geological Survey Water Resources Investigations Report 85-4148*, 48. Retrieved from http://library.wur.nl/WebQuery/clc/275330

Speer, J. H. (2010). *Fundamentals of Tree-Ring Research*. Tucson, Arizona: The University of Arizona Press.