The Rings of Time: Dendrochronology at Jack Creek's Cow Camp

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GREYBULL RIVER SUSTAINABLE LANDSCAPE ECOLOGY

Ryan McElhoe cuts a cross section of an axe-gouged stump.

Dendrochronology reveals more than just when something happens. It can also reveal processes of human interaction with the landscape. During the 2005-2006 field seasons, investigation was conducted at a ranching cabin used during the summer when cattle from a nearby ranch in Wyoming's Big Horn Basin were moved to summer grazing on leases in the Shoshone National Forest. Research based on 13 historic cores, 10 cross sections and 7 cores from nearby trees are used in beginning development of an understanding of cabin construction and usage of the surrounding forest. Events such as drought and fire are also recorded in tree rings. By matching dates from our samples to a skeleton plot – developed as part of a broader investigation of historic dendroecology in the Absorkas – temporal patterns in usage of forest areas are revealed. The samples are derived primarily from trees and stumps with indications of human modification, such as axe marks. This gives further insight into the way life progressed during late 1800s cabin building. Was it more important for humans or livestock to be housed first? And did climatological factors inhibit the building of the cabin? Understanding the way environmental factors helped or hindered past construction of cabins is useful in understanding how people adapted to and utilized their environment.

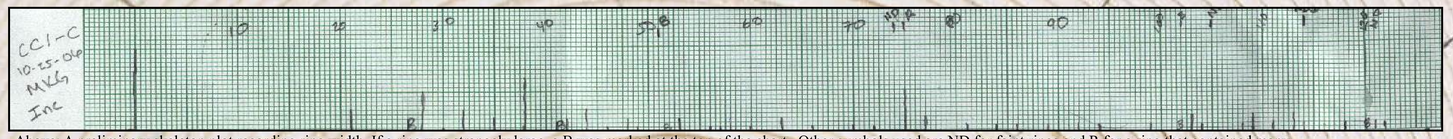
Introduction

The ability to hold a record of human activity and the date of such events make trees ideal site features. Dendrochronology decodes these dates from trees by analyzing tree rings created by tree growth throughout each year. Each ring is composed of a light-colored early wood and the darker late wood, where the tree shuts down and toughens up for winter. Every year gets a ring, making trees exceptional date-keepers. Environmental factors can affect the distance between two rings of late wood. If, for example, the tree is not getting enough water or the weather becomes too cold, growth slows, resulting in a narrow ring (Stokes and Smiley 1996:8-9). This makes dendrochronology useful for understanding past environmental conditions (Dean 1996:461). Ring width sequences form recognizable patterns that are dated and compared to other samples.

Dendrochronology can be applied to stumps, standing trees and logs – that may even be part of a structure. It is important to note that this extremely useful resource is easily destroyed by such things as fire and human action. This means that collection, study and data sharing from as many sources as possible is vital. Otherwise, we will lose valuable insight into the past (Dean 1996:467).

For this purpose the 2006 CSU summer field school participants collected thirteen historic cores, ten cross section and seven cores from living trees from the Jack Creek Cow Camp and many more samples from other areas in the Greybull region. At the cow camp, cores were collected cabin, latrine and a corral built into an existing tree.

We were hoping to answer such questions as when the cabin was built and if there was evidence of an older structure. Was the latrine built at the same time and could the axe scored and saw cut stumps nearby the remains of cabin building material? A date could also be found for when the corral was built – or at least when it incorporated the living tree. Parts of the cabin exhibit signs of re-use, such as notching that does not fit with the current uses.



Above: A preliminary skeleton plot recording ring width. If a ring was strangely large, a B was marked at the top of the chart. Other symbols used are ND for faint rings and R for a ring that contained many resin ducts – a possible indication of tree healing. Counting began as near to the pith, or center, of the tree as possible. However, not all cores pass through the pith. INC indicates that the core did not pass through the pith.

A living tree is used as a corral post. The scar is datable. Photo by Marcy Reiser.

Historic Cores and Cross Sections

Historic cores need a larger drill bit that the one used for taking living cores and are taken from dead wood. This can be a structure, a log or a dead tree. When choosing historic cores, it is important to find a solid place to drill so that the core will emerge intact and the drill will not stick. To find the age at which the tree was felled, samples should be taken from areas with bark or beetle galleries, which indicates that rings close to the outer edge are present. Make sure the area is not hollow. Patterns in historic cores can be matched to others, allowing for further extension into the past. However, at least one historic core in a sequence must be matched to a living sample's pattern to get an actual yearly date.

Cross sections are acquired from dead trees and stumps that showed signs of human usage, such as cut marks or notching.

Kristi Gensmer takes an historic core from the Cow Camp Cabin latrine. Photo by Marcy Reiser.

Preparation and Data Collection

Samples broken before or during transport need to be carefully glued together. If the pieces are not attached correctly, ring analysis will be skewed. The thinner, longer – and therefore, more fragile – living cores are mounted in wooden frames for protection. All samples are sanded with increasingly finer grained sandpaper – 150, 300 and 400.

Our method to find patterns consisted of comparing the width of individual tree rings to those on either side. If the ring was much narrower, a line was drawn on our skeleton plot. The taller the line was made, the narrower the ring was in comparison to its neighbors. Rings are compared against their neighbors because relative widths should change comparably from tree to tree, but other factors affect ring width. For instance, older trees with larger girths will have thinner rings than a young, thin tree. Thus, comparing the old and young trees' rings directly to each other would be difficult.

Patterns discovered with skeleton plots can be matched to other plots to determine dates of events (Dean 1996:461). Other features such as frost and fire scars can also be used as date markers (Dean 1996:463).

Preliminary Results

Data analyzation is still underway, however the patterns are beginning to emerge and using dead wood density may make patterns more apparent. The use of alternate techniques have made species thought to be useless for dating yield results (Dean 1996:461).
The separate use of axes and saws for logging different areas suggest these events too place in different time periods. If trees were harvested in a specific area, it is expected that adjacent trees would exhibit growth spurts in their rings. Samples show some indication of this.
It is interesting to note that historic cross sections are from thinner trees, yet have just as many rings as the living cores. This means that the trees used as building material were slower growing. For some reason, the builders seem to have specifically selected for this trait.

References

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1996 Dendrochronology and the study of human behavior. In *Tree rings, environment and humanity*, edited by Jeffrey S. Dean, David M. Meko and Thomas W. Swetnam, pp 461-169. Radiocarbon, University of Arkansas.
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1996 *An introduction to tree-ring dating*. The University of Arizona Press, Tucson.

Amanda Herron saws mightily to obtain a cross section of this stump near Jack Creek's cow camp cabin.

Jillian Bechberger obtains a living tree core. Photo by Marcy Reiser

Living cores

Living cores are those taken from trees still experiencing growth. The most recent annual ring gives a point of reference that allows for exact dating of past events. This means that if dead wood ring patterns overlap that of the living core, events in the dead wood can be dated. For instance, if a living core shows that the tree is 250 years old and there is a dead wood sample that matches the earliest 50 years of the living core, we know that the last ring of the dead wood sample is 200 years old.

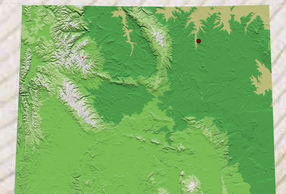
The best living core samples are taken from trees that are susceptible to the changing environment. If the tree is too near a water source, for instance, it will not show thinned rings during years with low precipitation. However, sampling a tree that is in unusually harsh conditions, like at the edge of a forest, will not yield a useful pattern of tree rings, either. The ring patterns from moderately struggling trees will be most comparable to other samples.

Mounted living cores from the cabin.

A cross section awaits analysis under a microscope.

Soon after returning to Fort Collin it was discovered that beetles infected a specimen and the infestation was spreading to other samples. Unfortunately, trees weakened by drought are prime beetle targets. While beetle galleries are useful to confirming the outer rings of trees, they wreak havoc on the samples. Freezing them seemed to halt beetle advance.

The next issue arrived with the sample types. The only trees available were Engleman Spruce (*Picea engelmannii*) and Whitebark Pine (*Pinus albicaulis*). These trees are complacent, meaning that they do not react strongly to harsh environmental conditions. Their rings often do not form distinctive width patterns. The subtle patterning means that larger samples of these woods are necessary. To find this pattern 100 to 200 rings may be necessary, which may mean that the historic cores are not datable.



The location of the Jack Creek Cow Camp cabin

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