# Dating Barked Stripped Trees at Hidden Lake, Willamette National Forest, Oregon August, 1991

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## Introduction

Since the arrival of the white man to North America the plight of native Americans has been a continual battle in preserving their heritage and culture. Today native land claims and access to natural resources is one of many topical domestic issues facing both local and federal governments. Archaeological evidence of past and present native use is strong evidence in support of land claims. On many federal and private holdings, early Americans have been accustomed to gathering and harvesting natural resources for both their spiritual and domestic livelihood.

Today, the native North American cultures is severely eroding under the pressure to assimilate Anglo norms and mores. Preserving lands and customs deeply associated with a culture is the first step in thwarting it's demise. In this study, an area known for providing natural materials for primitive tool construction was examined to determine how recently native North American Indians had visited the site.

"Culturally-modified trees" (CMT's) are trees or dead-wood material that were altered by early inhabitants. For example, the inner bark of western red cedar was commonly used to make baskets while the tannin from western hemlock reportedly was used to preserve natural fiber products. Near Hidden Lake on the Blue River Ranger District of the Willamette National Forest, Oregon there is a large concentration trees stripped of their bark for such purposes.

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## Objectives

Forty-two culturally modified trees have been identified by US. Forest Service archaeologist Eric Bergland. A number of these CMT's had been previously dated using tree ring counts by Mr.Bergland and documented along with photographs and historical accounts from surviving natives regarding their activities in the area (Bergland, 1990). Members of the 1991 Dendroecological Fieldweek archeology group wanted to substantiate the dating of these bark stripping activities near Hidden Lake area and determine whether a new tool could be used to aid in dating CMT scars.

The goals of this study were, to build and test a device to assist in the non-destructive dating of bark-stripped trees and to obtain tree-ring dates from some of the many bark-stripped trees at Hidden Lake for Forest planners developing interpretive programs and trails for the area.

## Methods

The first step was to develop and design a tool that could be brought into the field and used to reconstruct interior ring patterns of scared trees without destructive sampling. To relate exterior stem features with interior ring patterns would be to one's advantage when deciding exactly where to drill into the tree with an increment borer. To accomplish this chore a portable frame, similar to a shaper used by carpenters to copy intricate shapes, was built (fig.1). The Parker Measuring Frame (PMF), provided an accurately detailed trace of the trees circumference that was transcribed onto a full scale map. Increment cores, taken at strategic locations around the stem at the same height as the measuring frame, were used to transcribe growth patterns from ring curvature and size directly onto the stem map.

The second technique used to age CMT scars was to core directly through the callus growth near a wound in an attempt to intercept, inter-annual, trauma cells formed at the time of injury. Cross dating cores and identifying precisely the year in which the trauma cells were formed would provide the most accurate scar dates.

Of the seven trees examined in this study five distinctive scar types, relative to scar shape and species and species on which they are found, were defined.

Western red cedar:

*Single bark strip, Type: 1;*

Characterized by a clean axe cut along the base of the stem and torn bark up the stem 3-5 meters high.

*Single bark strip, Type: 2;*

Similar to Type 1 only the top and sometimes parallel sides of the scar were also cut with an axe resulting in a distinctly rectangular scar 1-1.5 meters high and 0.5-0.35 meters wide.

*Tree-Girdle;*

Characterized by a continuous series of axe scars that completely encircled a stem.

Western hemlock:

*"D" Cut, Type:1*

A backwards "D" shaped scar about 1 meter high and 0.5 meters wide.

*"D" Cut, Type: 2*

Same as Type: 1 only the bark within the axe cuts has been peeled away.

To age the scars made on cedars both the PMF and discriminate coring were used. The scars on the two hemlocks provided an interesting opportunity to compare growth rate changes both within and above the wound area. From tree #15, 'D' cut Type 1, one core through the center of the inscribed scar, and one outside the scar at the same height was taken. From tree #17 , 'D' Cut Type 2, another two cores were taken one directly above the top of the open scar face and another 10.0 cm. to the left of the scar in the living portion of the stem.

## Results

Table (1), presents the results of the scar datings. The tree numbers used to identify individuals are those defined in Burgland, 1990. Dates given in column three are those determined also by Bergland, 1990. For only two trees, scar dates derived during this examination are questionable and deserve notation (tree 12, and A[2]) . Column five describes that technique used to date the scars.

Table 1.

| tree # | Species | scar date [3] | Feildweek dates | Method used |
|---|---|---|---|---|
| 2 | Western red cedar | 1911-16 | not-dated | - |
| 7 | Western red cedar | not-dated | 1946 | core |
| 12 | Western red cedar | not-dated | 1940-41 | core |
| 15 | Western hemlock | not-dated | 1946 | PMF |
| 16 | Western red cedar | 1935-40 | 1946 | core/PMF |
| 17 | Western hemlock | not-dated | 1943 | core |
| A[2] | Western red cedar | not-dated | 1957-67 | core |

[2] actual tree # unknown
[3] from Bergland, 1990

Once it was possible to relate exterior surface features to hidden, interior ring patterns, a diagrammatic picture of internal wound response to injury was developed (fig.2). This physiological response schematic was used as an aid in coring other trees for which cross-section reconstructions were not performed. Two distinctive features should be noted in this diagram. The first is the accelerated growth release in the callus wood as the tree attempts to quickly close its wound. Second is the resulting reduction in growth beginning about 90 degrees from either side of the wound edge and continuing 180 degrees in both directions. This distinct physical change in growth and the degree to which it is noticeable, is very likely related to the combination of wound size and tree vigor at the time of scarring. It appears to represent a change in carbohydrate allocation in response to injury.

Cores taken from cedars that did not intercept trauma cells were cross-dated and examined for synchronized reduction and release periods resulting from differential allocation priorities. Starting with a known date behind the scar face and counting outward to the beginning of both severe reduction and release periods (path'b' and path'c', fig1.) revealed the year of wounding in nearly all cases. In only one instance, tree #16, a core taken three centimeters from the scar edge intercepted trauma cells within the ring formed during the year of injury (fig.1, path 'a'). In this instance it was not only possible to determine exactly the year the wound was made, but also that time relative to the growing season growing.

## Discussion

From discussion with those familiar with the growth of cedar in this area, latewood formation begins in early August. The trauma cells were found two to three cells after the commencement of latewood formation. This position corresponds, seasonally, to the time when those berries sought by Indians are ripe for harvest. This finding provided an unanticipated additional insight into the pragmatic nature of these native people. Since there are no know permanent settlements nearby, those who visited Hidden Lake for berry picking must have travelled some distance. Making their baskets on site reduced the amount of material carried during the journey in.

The cores taken from trees 15 and 17 showed dramatic contrasts in growth rates prior to and following injury. Recall that the scar made on tree #15, 'D' Type 1, did not remove bark from the stem, leaving some living tissue within the incised scar. One core from the center of this scar show a very dramatic reduction of growth beginning the year after wounding. Similarly, from tree #17, 'D' Type 2, one core extracted from immediately above the open scar face also showed a dramatic reduction in growth beginning the year after injury. In both cases the effect of wounding was that akin to a localized girdling of the stem. Growth within and above the scar continued, but at a drastically reduced rate.

Finally, It is interesting to note the close temporal grouping of scar dates. Ignoring the dates from trees #12 and "A", all scars were made within the 1940's.. Possibly a period of hard times for these people, representing a temporary return to subsistence survival practices.

## Conclusion

Preserving our nations natural cultural heritage is a part of true stewardship for the land. Areas such as Hidden Lake on the Willamette National Forest hold in their natural splendor a cultural historic record. Tree-ring dating techniques can be used to unfold that history in a non-destructive manner. Leaving intact areas such as Hidden Lake for generations who follow is an investment in civilization both old and new.

## References

Bergland E.O., Evidence For Native American Bark Containers From the Western Cascades of Oregon. Presented at the 43rd Annual Northwest Anthropological Conference, Eugene, Oregon. March 23, 1990.

Figure 1.

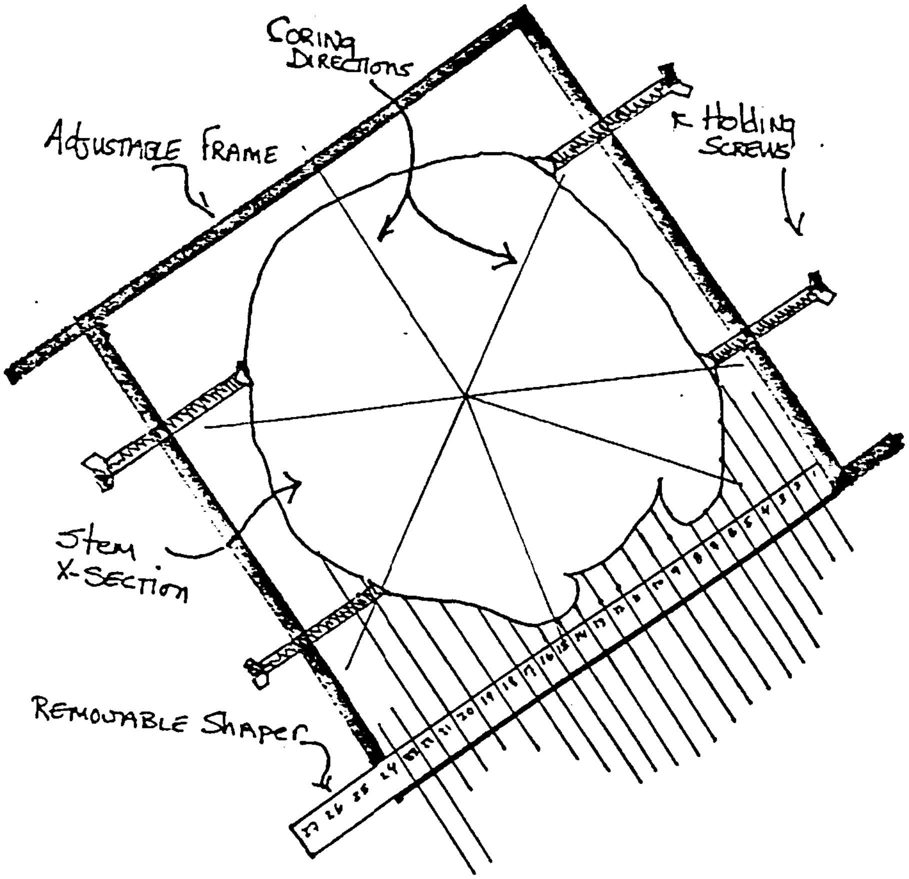


Figure 2.