

## DENDROCHRONOLOGICAL INVESTIGATIONS IN THE VICINITY OF COLLIER GLACIER

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### Introduction

Volcanic and glacial history of the Cascade region for the last millenium is not well documented. Recent photographic evidence indicates that Collier Glacier has retreated from a position abutting Collier Cone in 1940 to a higher position 1.5 to 2.0 km south of Collier Cone by 1965. Although the extent of the Collier glacier during the so-called "Little Ice Age" is not well known, a glacially sculpted valley west of Collier Cone offers a potential pathway. Spatial distribution of old trees within this valley should provide insight into the presence and movement of the glacier prior to 1900. Additionally, growth characteristics of the trees closest to the glacier may reveal the influence of glacial microclimate. Furthermore, the high frequency of eruptions in this part of the central high Cascades, the dates of which are only poorly known or unknown may affect tree growth and allow recognition of absolute dates of these early historic and prehistoric eruptions. With these questions in mind, a group of six members from the Dendrochronological Fieldweek Workshop (August 16 to 24, 1991 at the H.J. Andrews Experimental Forest, Blue River, Oregon), sampled trees in the valley west of Collier cone.

### Methods

was conducted in the Three Sisters Wilderness Area on August 19 and 20, . Four sites were chosen at increasing elevations progressively closer to Collier Cone. Mountain hemlock (*Tsuga mertensiana*) was sampled at sites A, B, and C while whitebark pine (*Pinus albicaulus*) was cored at site D. At each mountain hemlock site, six trees were cored at approximately breast height (1 - 1.5 meters above ground). If the tree provided an unsuitable core, a second core was taken or another tree was chosen. Cores of krummholtz whitebark pine were taken 25 cm above the ground. We selected for trees of maximum age based on tree diameter and avoided sampling trees growing in clumps. We unexpectedly discovered a fresh-appearing "boulder train" composed of a long, narrow ridge of unsorted sands, gravels, and boulders. This interesting feature prompted us to expand sampling to include flood-scarred trees at the terminal end of the "train" as well as a wedge of wood from a snag in the "train" center. In addition, we took cross sections from two 1.5 meter tall mountain hemlock saplings to estimate the tree ages at breast height. Photographs were taken of each site and of the over-all geography of the study area.

In the lab, each core was dried in an oven for two hours at 70 degrees F and air dried over night. We mounted, dried, and surfaced the cores. All samples were skeleton plotted to establish ring-width patterns for crossdating. We found no strong similarities to established chronologies from Oregon and California, therefore, we had to develop our own chronology. Important "marker" rings included narrow rings at 1972, 1962, 1953, 1943, 1916, 1899, 1880, 1866, 1862, 1840, 1820, 1810, 1801, 1775, 1742, 1715, 1710, 1668, 1640 and wide rings at 1905 and 1839. Each core was examined by at least two individuals during the dating process. We determined inside dates for each mountain hemlock core, dated damage to the trees associated with the "boulder train", and dated and measured whitebark pine ring widths.

## CONCLUSIONS

1. The valley which doglegs west from Collier Cone was not occupied by the glacier, except perhaps in its extreme upper reaches, in the past 500-550 years.
2. Evidence for nearby tephra eruptions (Yapoah Cone and Three Sisters being the most probable sources) is lacking in our tree rings with the exception of the 1801, 1810-12, and 1916 years. Frost rings here and in high elevation Sierra Nevada trees suggest the 1810 event was at least regional in scale, however.
3. Krummholz whitebark pine on Collier Cone crossdate with hemlock, are potentially quite old, and may be useful for monitoring microclimate associated with glacial movement.
4. Scarring of trees associated with the boulder train suggests flooding events in the early 1940's and mid-1950's.