

Real Trees Have Curves: Dendrochronology at Fairfield Osborn Preserve

Laruen James, Mark Castro, Justin Reacer, David Price, Quinten Rodriguez, Pasha Aboamery, Chris Cunningham, Emma Anthony, Kyle Towers, Gracie Lock, Devin Connor

Geography 317

Sonoma State University

Instructor: Michelle Goman

Overview

Geography 317 visited the Fairfield Osborn Preserve (FOP) to perform dendrochronological data collection. Tree cores and tree cross sections were taken from two locations: a PG&E tree cut performed in 2013 and a side slope along the Moving Mountain Trail (MMT). The purpose of collecting the samples was to determine average tree age, fire frequency, and the dates and frequency of mass wasting events. We employed various methods and techniques to determine the occurrence of mass movements and the fire history within the preserve including the use of increment borers to take cores of J-Trees along the upper MMT. In addition, we took cross-sections from Oak (*Quercus* sp.) and Bay (*Umbellularia californica*) tree species within a PG&E transmission cut along the lower MMT. Lab work included sanding down all of the samples using sand paper from a grit size ranging from 60 to 400 in order to see the growth rings and possible fire scars. Microscopes were used to count tree rings and determine tree age. Preliminary findings suggest the absence of fire within this part of the preserve within the past 100 years. Furthermore, mass movements on MMT were noted within the last 20 and 40 years.

Research Questions

- Determine the approximate age of tree stands
- Establish dates of past mass movements
- Determine history of fire

Location of Study



The study area encompasses an oak woodland forest facing south west. The cross-sections were taken at the PG&E cut site while the cores were taken at a higher elevation further up the MMT.

Methods

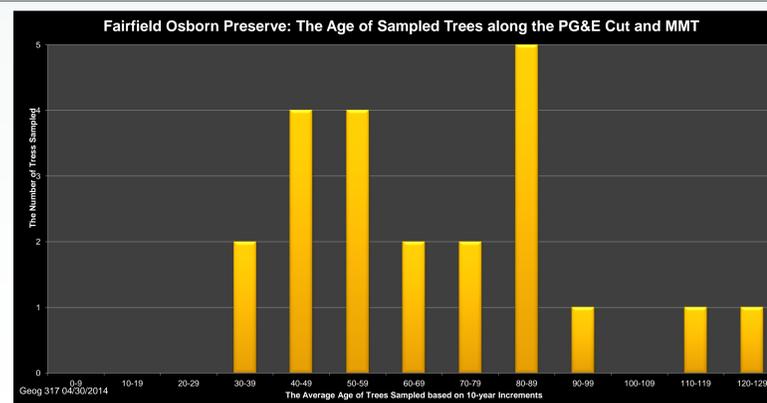
- An increment borer was used to obtain upslope and downslope cores from "J" trees. These trees were chosen because they are likely to provide data with regards to mass wasting events on MMT. A chainsaw was used to gather cross sections from existing downed trees at the PG&E site.
- Tree core samples were mounted and then prepared for analysis by sanding cross sections and cores to a final abrasive medium of 400 grit. Samples were then examined under a microscope to determine approximate age and identify date of eccentricities that were indicative of mass wasting and fire histories.



Ring Structure of a Bay Tree



Results



Findings

| Calendar Year | Number of Eccentricities in Decade | Percentage of Earth Movement |
|---------------|------------------------------------|------------------------------|
| 1950-1959 | 3 | 12.5% |
| 1960-1969 | 3 | 12.5% |
| 1970-1979 | 4 | 16.6% |
| 1980-1989 | 1 | 4.2% |
| 1990-1999 | 1 | 4.2% |
| 2000-2009 | 0 | 0% |
| 2010-Present | 0 | 0% |
| Inconclusive | 12 | 50% |

Conclusion

- Tree ages from the two study areas ranged from 37 to 125 years (1888-1976)
 - Trees from the PG&E area ranged from 38 to 87 years in age
 - Trees from the MMT ranged from 37 to 125 years in age
- In this time frame, no fire events were detected
 - One tree showed evidence of internal scarring, suggesting possible fire or mechanical damage from unknown source.
- Observed ring eccentricity suggests the most active period of mass movements in the two areas occurred from 1953-1976

Acknowledgements

The Waters Collaborative Fund and the Steve Norwick Memorial Fund
 Our Community Partners: Dr. Claudia Luke and Suzanne DeCoursey
 John-Scott Forester from the Department of Art and Art History
 Fairfield Osborn Preserve Volunteer Mike Weihman