# Where Does Wood Come From? Using Tree Rings and Isotopes to Identify the Origin of Wood in Streams and the Surrounding Landscape

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## Introduction

- Floods can result in wood transport and deposits in streams and on floodplains (Figure 1)
- Methods described here can add to present methods trying to identify the source of wood
- **Study Goal**
  - **Determine the source of wood deposited in valleys in the Colorado Front Range, USA following a flood that occurred in 2013**
- **Research Question:**
  - **Was large wood deposited in valley bottoms during the flood sourced from the hillslopes or sourced closer to the stream?**

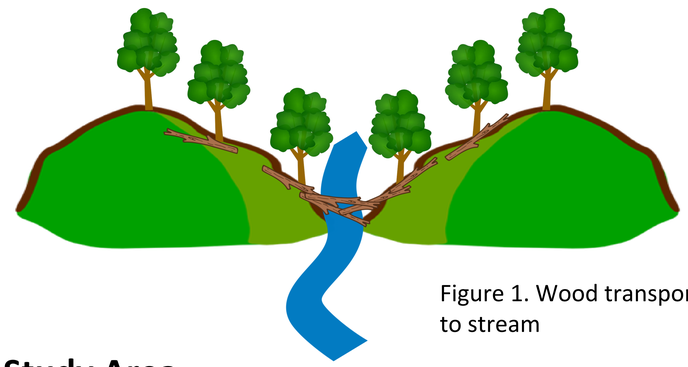

Figure 1. Wood transport to stream

## Study Area

- West Creek Catchment near Rocky Mtn. National Park (Figure 2)
- Sampled from two sections of the stream (reach 28 and reach 34)

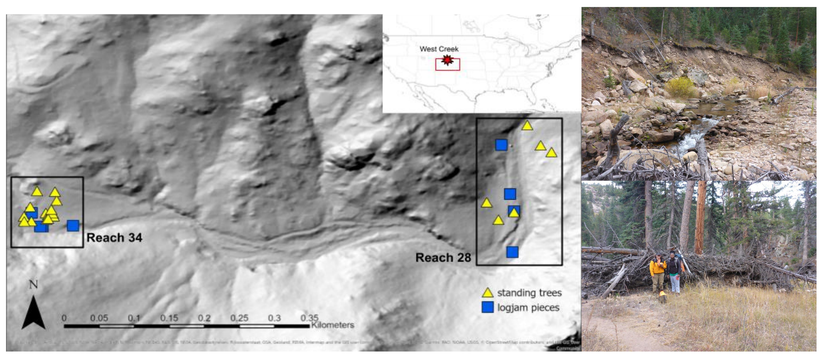


Figure 2. Study Site

## Sample Collection

- Tree cores and wood samples collected from **logjams** (piles of packed wood) and at different hillslope positions (valley bottom, mid-slope, and upslope) in the study site (Figure 3)
- Tree samples made up of Ponderosa pine, Douglas-fir, and Engelmann spruce

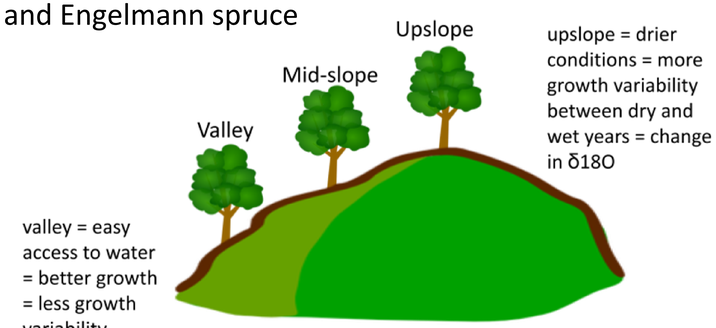


Figure 3. Relationship to tree growth and isotope values by position

## Tree Rings Measurements

- Calculated ring width index (**RWI**) and basal area increment (**BAI**) from raw tree ring widths (Figure 4)

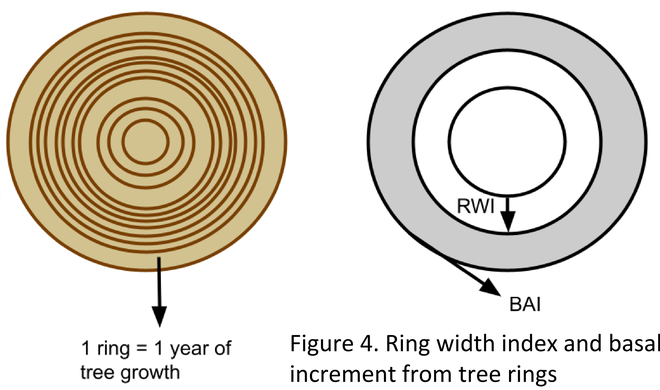


Figure 4. Ring width index and basal area increment from tree rings

## Isotope Measurements

- Measured **δ18O** (amount of oxygen-18 to oxygen-16) of sampled trees to determine whether the climate signal captured in **isotopes** (variation of an element) can be used for determining source location of wood samples (Figure 5)

The δ18O in water can be recorded in tree rings when they take in water through their roots

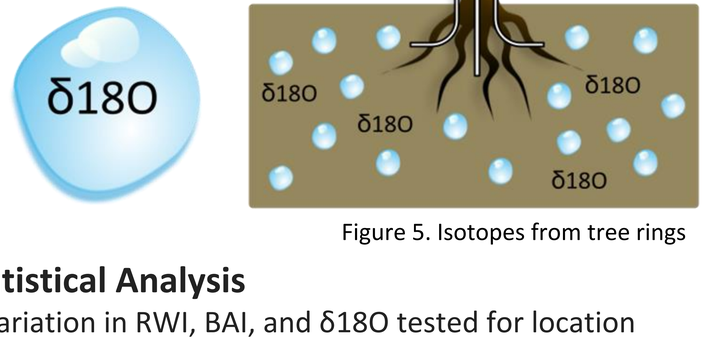


Figure 5. Isotopes from tree rings

## Statistical Analysis

- Variation in RWI, BAI, and δ18O tested for location differences
- Wood growth and δ18O patterns correlated with hillslope position and position estimated from strongest correlations

## Broader Impacts

- Identifying how wood is being transported and deposited is helpful for river managers, who intentionally place wood in rivers
- Wood in streams and floodplains:
  - affects river form and habitat diversity
  - stores carbon
  - can damage buildings and houses if transported to residential areas and towns

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