AN UPDATED CHRONOLOGY FROM HUNTER CREEK

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Introduction

Dendrochronology is one of the most important environmental recording techniques for a variety of natural processes and a monitor for human-caused changes to the environment.
Trees record any environmental factor that directly or indirectly limits a process that affects the growth of ring structures from one season to the next, making them a useful monitor for a variety of events.
In the library at UNR there are several tree core samples collected in 1934 and 1935 for the first ever study using tree rings to reconstruct streamflow. This summer I revisited some of the sites of these collections focusing on the species *Pinus jeffreyi* Murray. This allowed me to update the chronologies of these samples and update the streamflow reconstruction.

Site and Cores

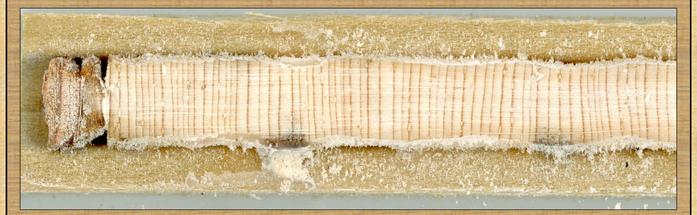
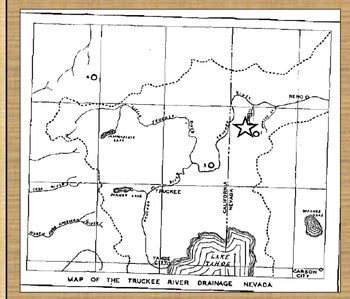


Figure 1. Example tree core



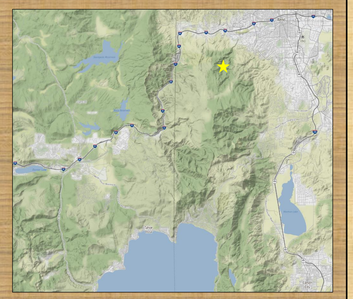


Figure 2. Original (1934) and new (2019) location maps of **Hunter Creek**

Figure 3. Hunter Creek, west-facing slope

Methodology

After collecting the samples, the individual rings are visually crossdated using skeleton plots and then measured using a Velmex measuring bench under a binocular microscope with a resolution of 0.001mm. The crossdating accuracy is then checked using statistical methods in the R package dplR (Bunn et al. 2008). Once dating issues were resoloved samples were detrended to remove undesirable trends due to biological or ecological causes and averaged to produce a site chronology. Figures 6 & 7 are a before and after image of the crossdating procedure. These plots correlate 50-year segments of each core with the series average. In Fig. 6 there are several issues to resolve (i.e. there is a lot of red) and in Fig 7 the situation has improved by accounting for missing rings and measurement errors.

Figure 4. Some narrow rings in the 20th

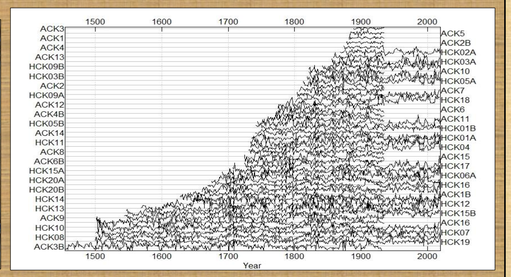


Figure 5. Spaghetti plot

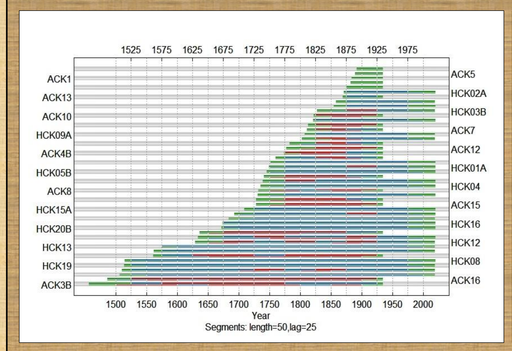


Figure 6. Uncorrected blue bar segment **correlation plot**

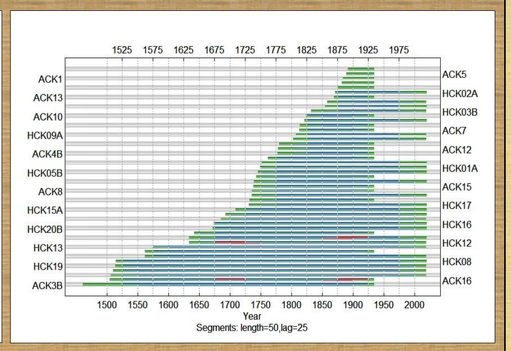


Figure 7. Corrected blue bar segment **correlation plot**

Observations

- There is a clear ring synchronization between the 47 samples I examined (Fig.5 & Fig.7).
- Correlating the ring width data with instrumental precipitation for the period 1895-2018, reveals that trees from hunter creek are much more sensitive to variations in precipitation rather than temperature; possibly the two factors act independently on the ring width (Fig.11).
- There is a close statistical correlation between Hunter Creek and Truckee river streamflow data and a synchronization with different climatic events recorded in 20th, for example the lake Tahoe level (Fig. 10 & Fig. 4).
- In conclusion, thanks to the significant data, it is possible to go backwards in time and see which were the driest and wettest years (Fig. 8).

Passion is in all great searches and is necessary to all creative endeavors!
William E. Smith

Results

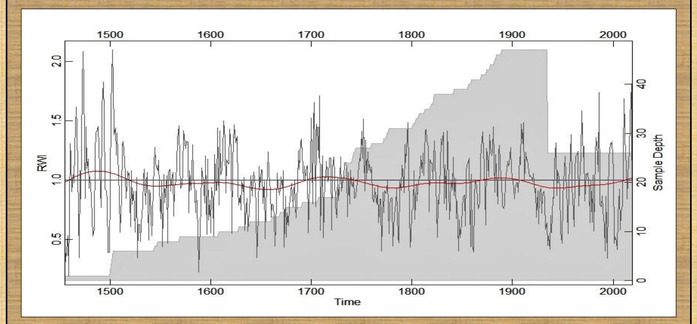


Figure 8. Master chronology

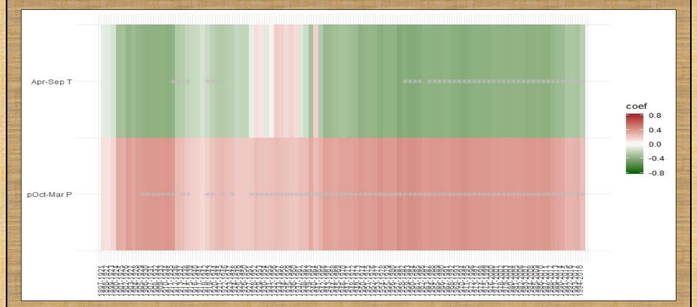


Figure 9. Moving correlation plot

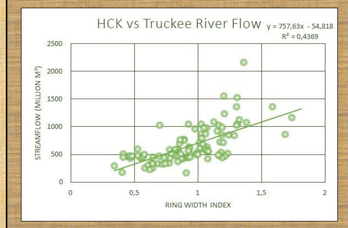


Figure 10. Scatter plot

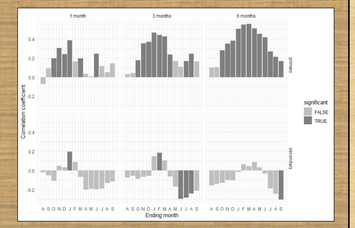


Figure 11. Seasonal correlation plot of precipitation & **temperature**

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