Group Activity: Bristlecone Pine Project

Names: _____ _____

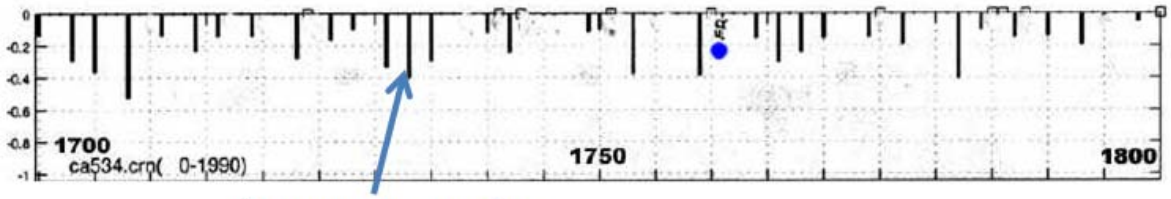
_____ _____

Objectives: Develop and test three hypotheses about tree-ring growth and global change at five Bristlecone pine sites. The site data table, skeleton masters, ring-width indices and additional data is available to you

A hypothesis is an educated guess about how the world works. In this case, you make a statement about the data you collected (site table) and additional information for the five bristlecone sites

Hypotheses #1 & # 2 are stated for you

Skeleton Plot masters represent environmental conditions or events recorded in certain year at a site. They also a great way to compare how similar or different the sites are to each other, and whether narrow rings at different sites are related to the same environmental variable:



Lines represent narrow rings

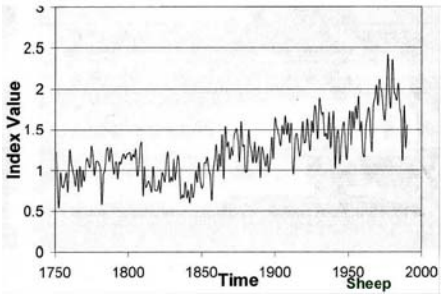
❑ **Hypothesis #1:** Bristlecone pine sites that are closer together will **pattern-match and crossdate** better than sites that are far apart.

1) Determine which sites are near each other and which are far apart (the CA sites vs. CO sites)
2) Line-up the skeleton plot masters from these sites to make several comparisons.
3) Discuss the results of the comparisons (testing Hypothesis #1) and RECORD YOUR FINDINGS HERE:

Do the California sites pattern-match/crossdate with each other?	Do the Colorado sites pattern-match/crossdate with each other?	Do the CA sites pattern-match and crossdate with the CO sites?
Is Hypothesis #1 supported? *(State YES or NO and explain why or why not)*		

SPECULATE on what factors: similar environmental response (moisture-sensitive vs. temp-sensitive) , similar elevation, similar rock type, etc. – might influence whether sites pattern-match & crossdate or not.

Ring-width indices are plots of tree growth over time. They show whether the trees at a site have an increasing trend (i.e. are growing wider rings) in the 20th century compared with earlier centuries ➔



❑ **Hypothesis #2:** The increasing growth trend at the temperature-sensitive sites in the 20th century is evidence of a growth response to the Northern Hemisphere global warming trend of the 20th century

1) Compare the ring width index plot from each site with the Global Surface Temperature Anomaly graph (which represents the northern Hemisphere) and record your answers:

Are the trends in ring-width at Campito and Sheep Mountain similar to the temperature data?	Is the trend in ring-width Methuselah Walk similar to the temperature data?	Are the trends in ring-width at Hermit Lake and Almagre Mtn similar to the temperature data?
Is Hypothesis #2 supported? *(State YES or NO and explain why or why not)*		

Why does the Methuselah Walk site not have an increasing trend in ring width during the 20th century?

CONSTRUCT A TESTABLE HYPOTHESIS about Frost Rings at the study sites.

(Hints: Has the number of frost ring in the 20th century changed under warmer conditions? Is the total number of frost rings related to site elevation? Are frost rings related to years with explosive volcano eruptions? Do frost rings always occur when the tree has narrow ring (i.e. a short growing season?)

❑ Your **Hypothesis #3:**

Now examine the available data to test your hypothesis (you may use data from the site table, the skeleton plot masters or the list of volcanic eruptions)
DESCRIBE YOUR FINDINGS & EXPLAIN whether your hypothesis is supported

	Site Data Table				
Site Name	**Sheep Mountain (SHP)**	**Campito Mt (CAM)**	**Methuselah Walk (MWK)**	**Almagre Mt. (ALM)**	**Hermit Lake (HER)**
Geographic Location	White Mountains, California	White Mountains, California	White Mountains, California	Rocky Mountains, Colorado	Rocky Mountains, Colorado
Elevation (meters and feet)	3,475 m; 11,500 ft	3,400 m; 11,000 ft	2,805 m; 9,200 ft	3,5356m; 11,600 ft	3,657 m; 12,000 ft
Upper Forest Border Lower forest border	Upper	Upper	Lower	Upper	Upper
Moisture-sensitive vs. Temperature sensitive	Temperature	Temperature	Moisture	Temperature	Temperature
Rock Type	Dolomite	Sandstone	Dolomite	Granite	Sandstone
Describe something interesting from the site photos website					
What is the number of frost rings for the site?	4	2	0	4	4
Which century has the most frost rings?	1800 – 1900	1800 – 1900		1800 – 1900	1800 - 1900
Describe the trend in the ring widths over time	No trend before 1850; Increasing trend post-1850	Almost a step-change, Increasing trend Post-1850	Flat line, no trend	Increasing trend Post-1850, almost a step change	Almost decreasing trend before 1850; Increasing trend post-1850
Is there a difference before and after 1850?	Yes, because increasing post 1850	Yes, because increasing post 1850	No change over time	Yes, because increasing post 1850	Yes, because increasing post 1850
Is the variance high or low for the plot? (look at all plots first)	Low	High	High	Moderate	Moderate
Is there anything interesting you see in the plot?			Very high variance	Big dip around 1850	Big dip around 1850